

FROM SHELLMOUND TO BATTLEGROUND: CHANGING PATTERNS OF SETTLEMENT AND LAND USE ALONG THE URASOE COAST, CAMP KINSER, OKINAWA

Judith R. McNeill and David J. Welch

International Archaeological Research Institute, 2081 Young Street, Honolulu, Hawai'i 96826

ABSTRACT

In November 2000, archaeological survey was conducted along a 3 km coastal section in US Marine Corps Camp Kinser (Makiminato Service Area) in Urasoe City, southern Okinawa. This survey, coupled with documentary research, revealed the presence of 21 cultural properties. These include 2 late prehistoric buried shell midden deposits directly behind the beach, 7 historic period tomb complexes, 3 tomb cave complexes, and buried deposits of 3 historic villages. Also identified, in the limestone escarpment behind the coastal plain, were the caves and tunnels of a World War II Japanese defensive system that played a critical role in one of the battles of the American campaign to capture the island.

Through the use of Geographic Information System (GIS) techniques and software, site distribution within the project area was mapped by site type and time period in relation to land forms, soil types, natural resources, traditional village boundaries, and other variables. Data from pre-WWII land use studies and maps, which provide extensive detail on the distribution of houses, fields, tombs, and other elements of the Okinawan cultural system, were entered into the GIS to allow evaluation of the extent to which the currently known sites reflect the traditional pattern, the degree of past cultural resource destruction, and the potential for further subsurface deposits in particular areas. Variations in site location over time reflect a pattern of change from an emphasis on reef resources to increasing dependence on agricultural crops.

This paper discusses the methodological approaches and results of an archaeological research project conducted by

International Archaeological Research Institute for the US Marine Corps in Okinawa under contract with the US Navy Pacific Division, Naval Facilities Engineering Command at Pearl Harbor, Hawai'i (Welch and McNeill 2002). The goal of the research was to produce an inventory of cultural resources at Camp Kinser, one of the island's Marine Corps installations, through (1) a review of historical documents and maps and reports of previous archaeological work on and in the vicinity of the camp and (2) an intensive survey of the less developed portions of the camp with detailed recording of any archaeological sites encountered.

Camp Kinser is located in the south central portion of Okinawa bordering the East China Sea along the island's west coast (Figure 1). It falls within the municipality of Urasoe City (Urasoe Shi) just north of Naha, Okinawa's main city, at the edge of the most densely populated portion of the island. The camp covers much of Urasoe between the coast and Highway 58, the main thoroughfare running along the west side of the island. It extends for a distance of 3 km north-south along the coast and is approximately 1.2 km wide from the coast to the highway. A fairly broad, flat limestone plateau extends west from Highway 58, then ends at a limestone escarpment, which drops about 10 m to a narrow, flat coastal plain bordering the shoreline. Camp Kinser was formerly known as Makiminato Service Area, the name that is still the official Government of Japan designation for the installation.

The research project documented 21 cultural properties (including seven new sites) within the boundaries of the camp. These include seven complexes of constructed tombs, three complexes of tomb caves, two buried shell mound sites with deposits dating from prehistoric times, the buried cultural deposits of three historic villages, and a cave and tunnel complex dating to World War II. Although sites are found all along the coast from north to south, the majority are

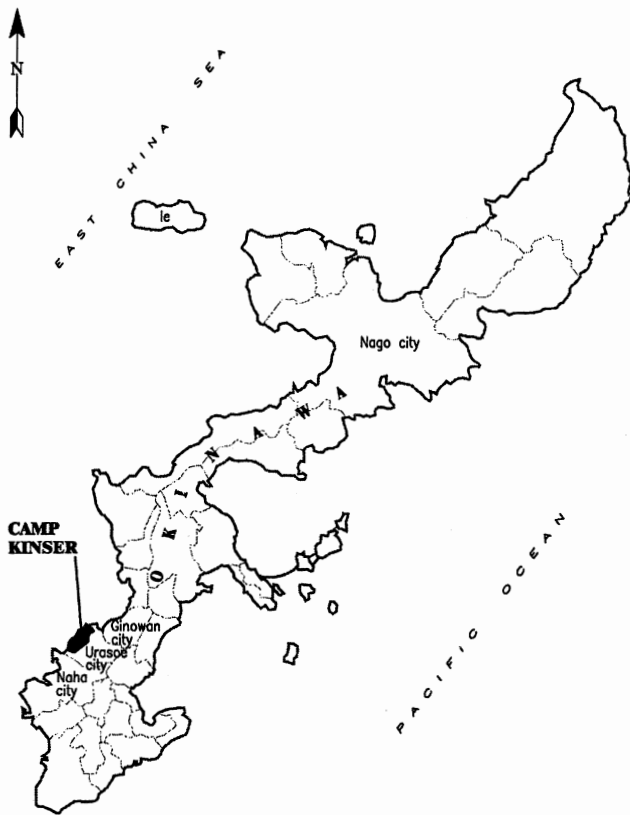


Figure 1: Map of Okinawa island showing location of municipalities and Camp Kinser.

concentrated at the north end of the project area within the boundaries of the largest of the Urasoe villages, Gusukuma. Most sites are found along the limestone escarpment which descends from the plateau to the coastal plain and the ridges that mark the edge of the plateau. This is a consequence of both the traditional use of this area for tombs and the survival of remnants of this area relatively undisturbed by modern development. On the plateau itself only buried cultural deposits are likely to have survived WWII airfield and post-WWII depot construction. On the coastal plain both prehistoric and historical period buried cultural deposits, as well as several surface sites, have survived.

In this paper we examine the entire range of the Okinawan cultural sequence, not only the prehistory but also history as it is reflected in the archaeological record. The research was intended to identify and describe the evidence that has survived the devastation of WWII and, through this evidence, to interpret the role the inhabitants of the Urasoe coastline played in the development of Okinawan culture. For Urasoe, maps and a rich written record document the pre-WWII economy, land use patterns, location of resources, and political organization. Six villages that once occupied

the land on which the camp now stands (Figure 2) lost large portions of their territory and, in three cases, the village residential areas themselves as a result of the appropriation of their land by the US military. Our work attempts to relate the remaining cultural resources from the historical period to the known history and traditions of these villages.

METHODS

The research to create an inventory of cultural properties involved a review of previous archaeological survey and excavation in the project area, for which we are grateful to our Okinawan colleagues, particularly Shijun Asato at the Prefectural Archives and the archaeologists of the Urasoe City Board of Education (Urasoe BOE), for their help in interpreting the Japanese language reports of this research. We visited all recorded sites with the Okinawan archaeologists to confirm locations and further discuss their work.

Because many of the sites date to the historical period, we reviewed documentary sources, such as the 1935 land use maps for Urasoe and the text explaining these maps (Urasoe BOE 1986, translated by Jennifer Creamer), accounts discussing Okinawan tombs and prayer sites (with Japanese language sources translated by Lorraine Minatoshi Palumbo; e.g. Kowan Village Literary Group Editorial Committee n.d.), summaries of World War II military construction and battles in the project area (Appelman *et al.* 1960; Belote and Belote 1970), and engineering maps of Camp Kinser since World War II.

Of the 275 hectares that make up the camp, our team surveyed 63 hectares of the minimally developed, and apparently least modified, areas. Although much of this area was found to have been extensively altered, several new sites and new features of existing sites were found and recorded, especially along Shukuguchi Ridge, a small ridge rising above the coastal plain, which has been little modified since World War II. Maps were prepared and Global Positioning System (GPS) locations recorded for all cultural resources; both those identified during the documentary research and those found during the survey.

Analysis involved integration of the data into a geographic information system (GIS). A GIS is essentially a geographic database that supports spatial operations on the data that it holds. These spatial operations allow the database to answer questions concerning what is located at a particular place, where is it located, and what spatial patterns exist, with the answers to these questions usually generated as a map. For the present project site locations were determined using a survey grade GPS receiver, descriptions and data were entered into a site database, information from historical maps digitally traced, and a series of GIS maps generated. The GIS has proved to be a useful tool for analyzing and interpreting the cultural resources

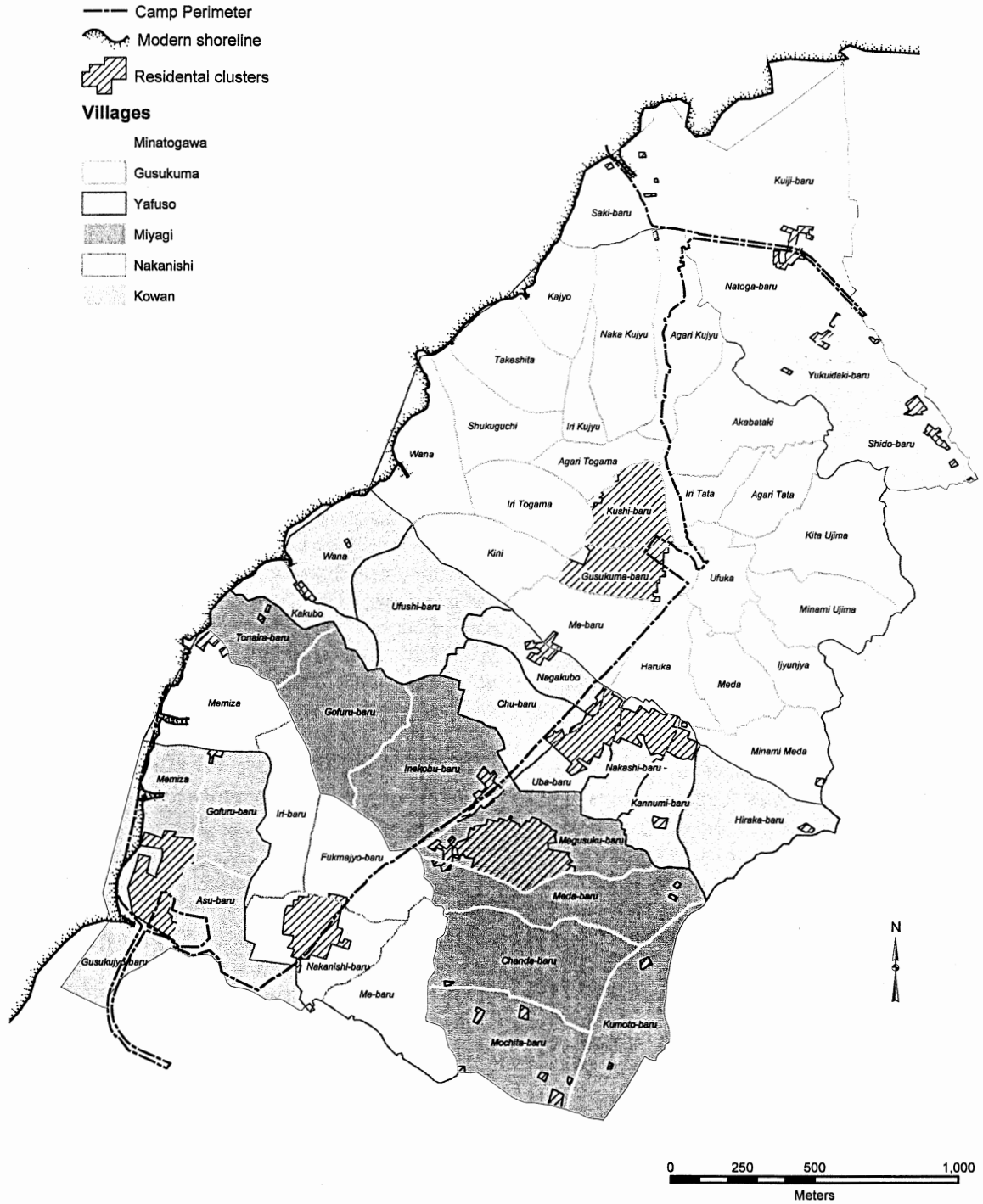


Figure 2: Map of the traditional villages and their component precincts in the immediate vicinity of Camp Kinser.

data and it is with the use of this database and the maps generated from it that this paper embarks upon a study of changing landscapes and settlement patterns along the Urasoe coast.

DISTRIBUTION OF RESOURCES AND POTENTIAL USES

Interpreting past settlement along the Urasoe coast depends on a recognition of the distribution of available resources of potential value to the prehistoric, protohistoric, and historic period inhabitants. In the GIS, environmental data from numerous sources are integrated in a way to define easily the distribution of critical resources (Figure 3).

From the standpoint of agricultural potential, the soils of Camp Kinser are not of particularly high value (Stensland 1957). The Shioya loam soils of most of the coastal plain are sandy, well-drained, and of limited fertility. The Okinawa clay loam soils, which developed on the limestone escarpment and plateau are more finely textured, have better water retention capabilities, and are more fertile. However, the ground was probably quite rocky with numerous, scattered, small limestone outcrops, which would have made farming difficult. Perhaps the main limiting factor, however, is the absence of perennial streams or other permanent water sources in this highly permeable landscape. The only important rivers, the Ohira-gawa to the south and the Shirigagawa to the north, run along the boundaries of the project area. These have deposited rich clayey alluvial soils along their banks and provide sufficient water to permit the cultivation of rice and taro in wet fields along their valleys. Other land suitable for growing rice or taro is all but absent.

Instead, farmers would have had to rely on crops that could do well on dryland soils, with a dependence on rain water. Inhabitants of the area during the late prehistoric and protohistoric periods would have relied on crops such as millet, wheat, and barley (Takamiya 1997). Historical period farmers successfully grew primarily sweet potatoes and sugar cane on the plateau soils, and some areas in northern Urasoe were known for the special flavor of their sweet potatoes (Urasoe BOE 1986).

Of more value to the prehistoric inhabitants (and of continuing value for the Gusuku and historical period villagers) and setting this coastal section of Urasoe off from other areas was the access it granted to rich sea resources on the adjoining reef. Their importance is indicated by the large number of traditional names (Urasoe BOE 1988) that are associated with places on the reef and the channels running through the reef (see Figure 3). At Ufuguchi sea urchin, seaweed, and octopus were caught; at Agariufuguchi and Atunshi, nets were set out to trap fish, while at Amagachi fish fences were erected; at Kowanino seaweed was culti-

vated and shrimp collected; and at Katagachyagumuchi fish and squid were caught. Sometimes the names themselves indicate the resources that were being gathered; for example, Kubushimigumu (*kubushimi* = hard-back squid) was a place where hard-back squid were caught and Takuyanusachi (*taku* = octopus) was a hole in the reef where octopuses were found.

In addition the ocean was a potential source of salt, and in the past sea water was evaporated at locations along the coast to produce salt. This sea salt in turn was used in other food processing activities along the coast, the most important of which was probably preservation of fish. However, the historical accounts of village activities also indicate that *tofu* (bean curd), which required the addition of salt, was made at the coast where clean, clear water ran through a channel in the reef (Urasoe BOE 1986, 1988).

The sea also provided an inexpensive means for the transport of goods to major markets. Channels were deep enough that boats could land, pick up produce, and transport it elsewhere. In recent times boat traffic is known to have included the transport of vegetables, watermelons and sweet potatoes from the coastal Urasoe villages to the main market in Naha, and apparently there was further trade of some special produce from Naha to the major Japanese cities of Osaka and Tokyo (Urasoe BOE 1986). In earlier times worked shells from shellfish gathered on the reef were transported to Kyushu, and in the protohistoric period trade was conducted with Southeast Asia and China (Urasoe BOE, Cultural Properties Section 1991, 1993a).

CHANGING PATTERNS OF SETTLEMENT

The Prehistoric Shellmound Period

The earliest evidence of human occupation along the Urasoe Coast comes from Site 8, the Kajyo Shellmound site (Figure 4), a buried midden deposit with cultural deposits that date back to late in Okinawa's Early Shellmound (Japanese Late Jomon) Period between 3500 and 3000 years ago. Extensive data recovery excavations conducted at the south end of the site by archaeologists from the Urasoe BOE (Urasoe BOE, Cultural Properties Section 1991, 1993a) document deposits containing Ichiki type pottery, which dates to this time period. This is the period when human settlements become common and widespread on Okinawa and indicates that the Urasoe coast was one of the locations favored by these early settlers. Occupation at the site continued for the next 2000 years. Posthole patterns indicate the presence of a semi-subterranean house that dates to the Final Jomon Period c. 3000-2300 years ago. Earthenware sherds and stone tools are common, and shell and bone artefacts are also found. The abundance of shellfish remains suggests that they were an important protein source, along with fish and

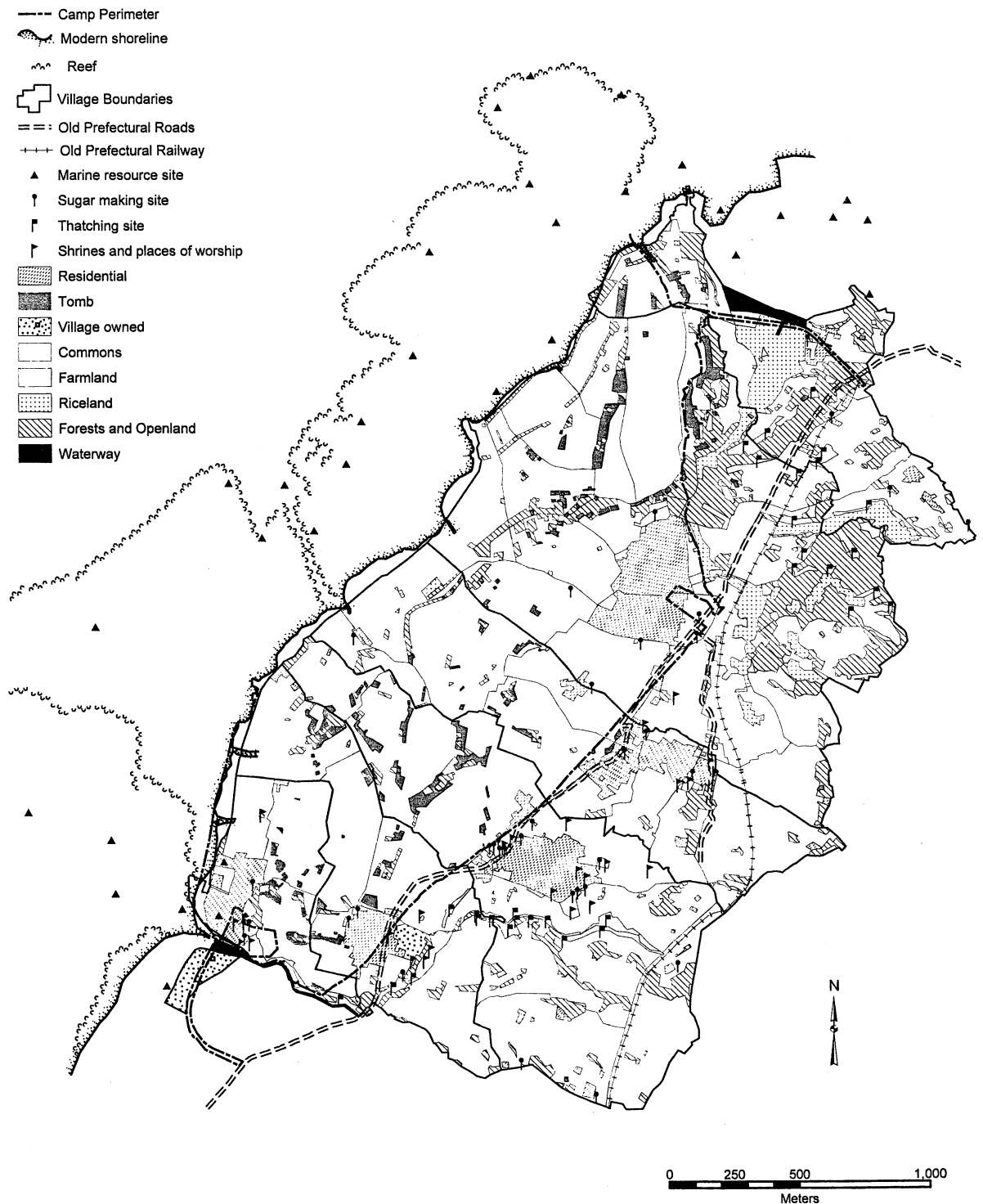


Figure 3: Traditional land use patterns of Urasoe villages. The locations of primary cultural features and uses prior to World War II are based on 1935 maps.

wild boar (Takamiya 1997:96). Beyond this, it is not certain what were the other main components of the diet.

During the Middle Shellmound (Early Yayoi) Period a small settlement was established seaward of the area where the earlier remains were found. This movement may reflect lowering of sea levels and progradation of the coast following the mid-Holocene high sea stand. An array of postholes indicates the presence of four and possibly five house areas and the settlement probably extended farther to the southwest.

Additional patterns of postholes indicate the presence of houses dating to the Late Shellmound Period 2300-1200 years ago. The artefact assemblage includes both utilitarian items, such as earthenware pots, grinding stones, adzes, hammerstones, polishing stones, net weights, and spoons, and ornamental items, such as bracelets and pendants. The presence of the grinding stones suggests processing of plant foods, either wild nuts or perhaps the earliest domesticated grain crops.

Long distance exchange of goods was an important element of the early economy. Shell of two species of mollusc (*Conus* sp. and *gohora*, a type of *Strombus*) were found stockpiled at the site and would have been processed into bracelets; such bracelets are commonly found in chiefly sites on Kyushu and clearly became major trade items between chiefs on Kyushu and the Okinawans. The collection and export of shells seems to have been especially active during the Middle Shellmound Period and to have declined afterwards (see adjoining papers in this volume by Kinoshita and Shinzato).

Settlement during the prehistoric Shellmound Period was concentrated along the coastal strip below the limestone escarpment (Figure 5). In addition to the Kajyo Shellmound site, testing to the south revealed the presence of another prehistoric midden, the Kowan Shellmound site (Site 12) (Urasoe BOE, Cultural Properties Section 1993b). This pattern might in part be a reflection of the fairly extensive subsurface testing that has been conducted on the coastal strip and the limited testing on the plateau above. However the testing and excavation in the vicinity of Site 15 (see Figure 4) along the slope above the coastal plain failed to reveal any evidence of prehistoric use of that area (Urasoe BOE, Cultural Properties Section 1992).

Caves (Site 3) cut into the escarpment behind the Kajyo Shellmound site contained a diverse assemblage of utilitarian tools and food remains that suggest Late Shellmound Period use for temporary shelter rather than burial. The remains include earthenware pottery, stone tools (e.g., adzes and scrapers), shell artefacts (e.g., perforated bivalve shell ornaments, *Conus* shell bracelets), bone artefacts, and midden remains of fish bone, mammal bone, and marine shell (Urasoe BOE, Cultural Properties Section 1990).

Gusuku Period

There is only very limited evidence of the use of the Urasoe Coast during the protohistoric Gusuku Period (c. AD 1100-1600). No *gusuku* (castles) are recorded near the coast, although at least five are documented on ridge tops farther inland in Urasoe, including Urasoe Castle, the largest of the Okinawan castles in the fourteenth century (Okinawa Prefectural Board of Education 1994:46; Pearson 1997). Urasoe was the political and ritual center of Chuzan, one of three kingdoms that emerged from two centuries of competition to dominate the island in the fourteenth century. By the beginning of the fifteenth century Chuzan controlled the entire island, and the first king of the Sho dynasty moved the capital 6 km southward to Shuri. From the small and indirect trade it engaged in during the twelfth century, Okinawa during the following centuries developed an increasingly important role in both official tributary and private commercial trade with China and came to serve as an intermediary in the exchange of goods between China and Southeast Asia (Pearson 1997, 2001; Kerr 1958:124).

This transformation of Okinawan society during the Gusuku Period is only weakly reflected in the archaeological record of the project area. The settlement pattern does shift, from one focused on the coast and reef resources to one which indicates the growing importance of the domesticated crops and animals that were introduced late in the Shellmound Period (Figure 5). In addition the growing immersion of Okinawa in the east Asian international sea trade and the distribution of trade items beyond the castles is demonstrated in the appearance of sherds of Chinese celadons and porcelains and a Chinese coin in archaeological deposits at Gusuku Period sites.

Gusuku Period features found at Site 8, the Kajyo Shellmound, and at Site 15, the Gusukuma Agricultural Field site, suggest that these areas were being used for cultivation and for small scale workshop activities rather than for permanent habitation. Locally-made stoneware and earthenware pottery sherds are predominant in the artefact assemblages from these sites, but there are also some fragments of Chinese blue and white porcelain and green celadon and a Chinese coin dating to AD 1237 (Urasoe BOE, Cultural Properties Section 1991).

It is probable that there was extensive occupation by the later portion of the Gusuku Period. Historical accounts from the first half of the 17th century, immediately following the Gusuku Period, refer to Gusukuma and Nakanishi as established villages by 1623 and Kowan, Miyagi, and Yafuso as established villages by 1649, suggesting that initial settlement very likely began during the Gusuku Period (Urasoe BOE 1986). Since there has been only minimal testing of subsurface deposits in the residential areas of any of

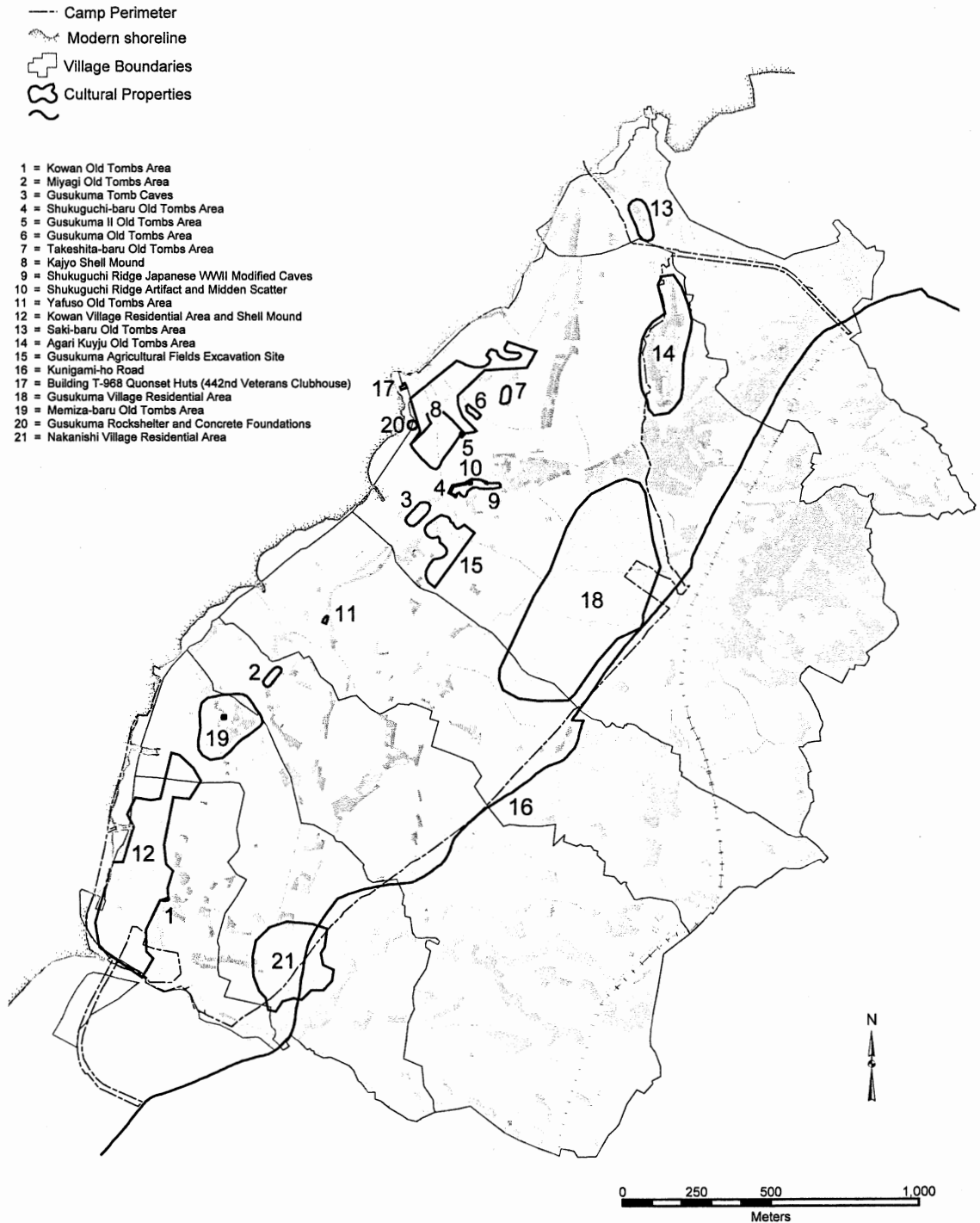


Figure 4: Location of Camp Kinser cultural properties relative to Urasoe traditional villages and land use patterns.

these villages, there is no archaeological evidence on which to base an estimate of their initial period of occupation.

The inland plateau location of the residential area of each of the villages, except for Kowan (see Figure 2), suggests that agricultural resources were now of more importance than resources from the sea. It is clear that during the Late Shellmound Period agriculture replaced gathering as the main source of food for the Okinawans. The major crops cultivated during the Gusuku Period, based on a few historical accounts (descriptions recorded by Korean drift voyagers) and limited botanical evidence from archaeological excavations appear to have been rice, foxtail millet, wheat, barley, and possibly (though not yet identified archaeologically) broomcorn millet (Takamiya 1997:184). While the project area possesses little land suitable for cultivation of wet rice, the three dryland grain crops could have been grown on the Okinawa clay loam limestone soils of the plateau. Analysis of macrobotanical remains from two nearby Gusuku Period sites, Gusuku and Morikawabaru, indicate that the dryland crops appear to have been a far more important component of the Gusuku Period diet than rice (Takamiya 1997:203). Takamiya (1997:201) argues that rice, because its ideal maturation season corresponds with the period of highest probability for typhoons, may not have been well-suited to thrive on Okinawa and certainly would not have been reliable as the main subsistence crop.

If the Gusuku Period Okinawans were relying primarily on dryland crops, then a settlement pattern not greatly different from that of the traditional historical period would be expected. Thus buried deposits dating from this period should lie below those belonging to the historical village residential clusters.

It is also possible that many of the tomb caves at Sites 3 and 4 (some of which do possess Gusuku Period remains) and some of the constructed tombs may date to this period. At this point, without further excavation, dating of the tombs is difficult and, because they are used through the generations, may in any event prove problematical. The urns used to contain the bones at the tomb caves consist of large stoneware jars of a style that has been in use since the 14th century and thus could date to any time since then. The *kamekobaka* (turtleback) style of tomb was not introduced until the Late Gusuku Period and did not begin to become widespread until the end; thus, the tombs of that style probably date later. However, the *horinukibaka* (enlarged natural cave) style tombs at Sites 1 and 11, the *hirafuchiba* (single slope roof) tombs at Sites 2, 6, and 19, and the *hafubaka* (gable roof house) tombs at Site 6 are built in styles known to have been common in the Gusuku Period.

Traditional Historical Period

The historical period, or period of the traditional villages (c. AD 1600-1944), was one in which heavy use was made of the Urasoe coast and its resources. The five villages noted in the early 17th century accounts continued to grow in population and by the last decade before the beginning of World War II had quite substantial populations. Kowan contained 72 households, and Gusukuma with 278 households and 208 hectares of land was the largest in Urasoe in both population and physical extent despite the removal of some of its precincts in the north to form the new village of Minatogawa early in the 20th century (Kowan Village Literary Group Editorial Committee n.d.; Urasoe BOE 1986).

It seems likely that the distribution of villages as recorded in the 1930s land use maps (see Figure 2) extends far back into the historical period. The archaeological evidence (Figure 5) is limited in that the residential areas and many of the agricultural fields of the villages now lie buried beneath modern fill for the construction of military facilities and the urban expansion of Urasoe. However testing in the former residential areas of both Kowan and Gusukuma villages reveals the presence of remains from several centuries of habitation (Urasoe BOE, Cultural Properties Section 1993b; Shimoji 2000). Excavations in former agricultural areas uncovered features that in type and density would be expected in non-residential, rural areas. At the Kajyo Site (Site 8), inland of the Shellmound Period deposits, trenches connected with agricultural activities, alignments of stones such as those used to divide farm fields or to line the sides of trails and paths, and an earth oven, indicate that cultivation and either food processing or preparation took place along the coastal plain (Urasoe BOE, Cultural Properties Section 1991, 1993a). Features uncovered farther inland at the Gusukuma Field Site (Site 15) include stone lines, paths or roadways, and a stone-lined pit that may have been used in processing cane into sugar or rice into *awamori* (Okinawan distilled liquor). The faunal remains include those of common domesticated animals: dog, cat, goat, cattle, and horse. The presence of mollusc shells indicates the continued use of the reef resources (Urasoe BOE, Cultural Properties Section 1992).

The primary archaeological surface evidence remaining from the traditional historical period are the 17 *kamekobaka* style tombs cut into the limestone rock (Figure 6), mostly in Gusukuma village, but a few in other villages. Most of the tombs probably continued to be used until World War II. The historical accounts and maps (see Figure 3) show that these are but a tiny fraction of the tombs once present along the coast (Kowan Village Literary Group Editorial Committee

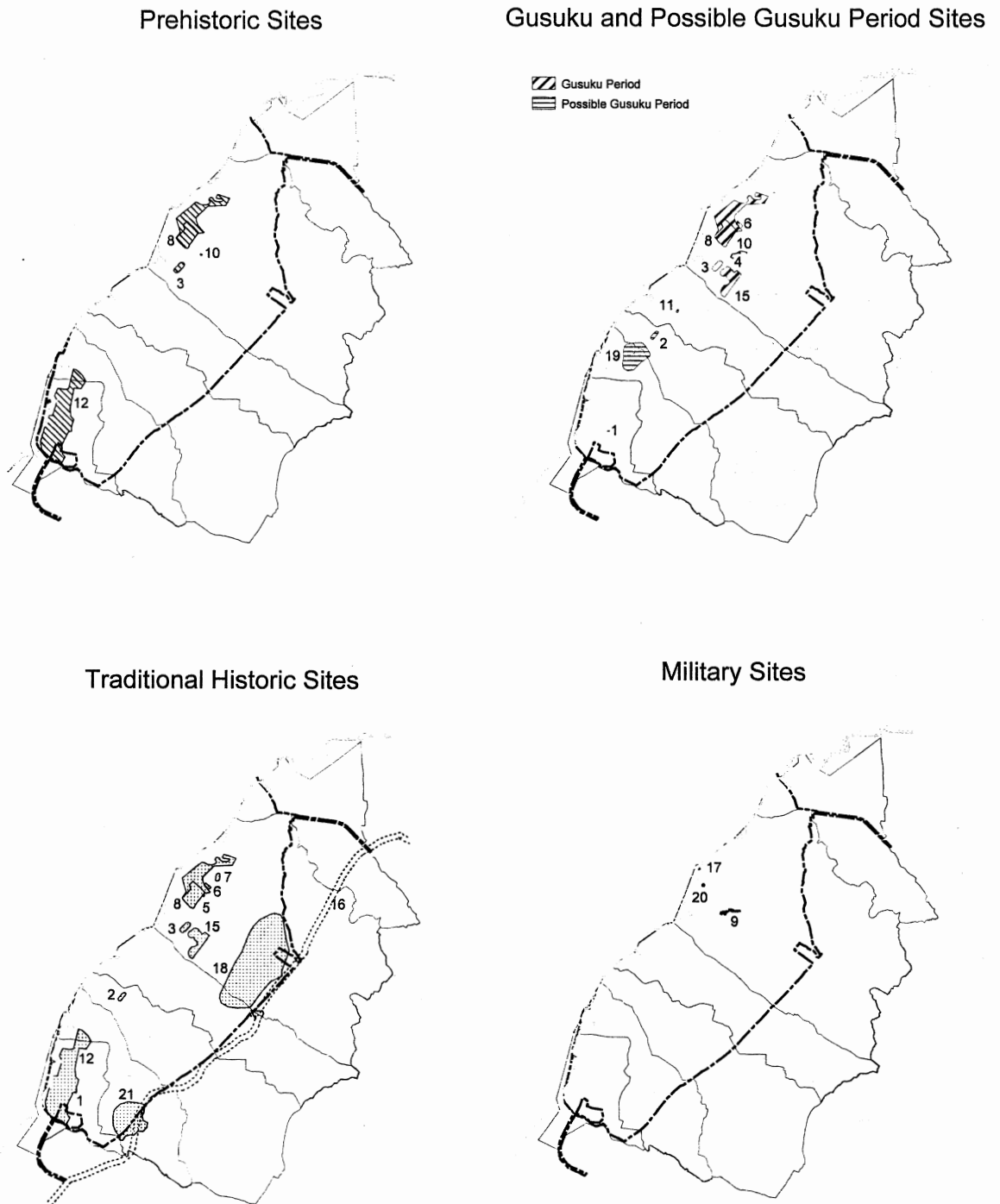


Figure 5: Distribution of Camp Kinser archaeological sites by time period.

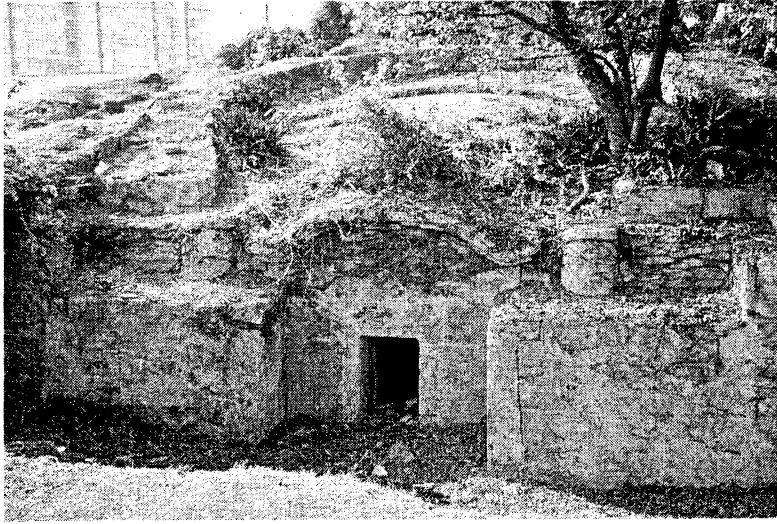


Figure 6: Rock-cut kamekobaka style tomb (Site 7, Feature 6).

n.d.; Urasoe BOE 1986). These are concentrated along the escarpment behind the coast below the plateau and in other small limestone outcrops along the coast.

The density of the settlement and intensive pattern of land use during this period probably reflects three factors. The first was the early 17th century introduction of two new crops: sugar cane, the most important commercial crop, and sweet potato, the most important subsistence crop in the island economy. The plateau soils were well-suited for growing the two new crops and water was less critical than for rice. In addition, particular areas were well-suited for growing specialized crops: soybeans in the red soils in the northeast part of Gusukuma, Kujyu potatoes, a particularly favoured variety of sweet potato, in the north, and watermelons and other fruits along the sandy soils of the coast (Urasoe BOE 1986).

The second factor was access to ocean resources, which would not have been available to the villages without shoreline access. As well as fish, the ocean was also a potential reservoir of salt, which in turn could be used in the preserving of fish or in the processing of *tofu*, an important food in the Okinawan diet.

The third factor was the proximity of this area to the major centers of the historical period, to the east Shuri Castle, the political center, and to the south Naha City, the economic center. Proximity to Naha especially meant that there was not a great distance to transport goods to the main market and main port for transshipment out of Okinawa. Three means of transport (rail, road, and boat) provided the Urasoe villages with quick and easy links to nearby Naha.

A noteworthy feature of the patterning of the traditional villages, and one which might have its roots in earlier times, is the delineation of village territories in a way that provided

each with access to a variety of resources (see Figure 3). Each village had access to ocean resources from the reef and landing places on the beach; to coastal lands, where salt could be processed and used in preserving fish and making *tofu* and where crops suited to sandy soils could be grown; to non-arable limestone land, especially along the escarpment between the coast and the plateau, which was kept in woodland producing firewood and provided the prime setting in which to place tombs; to limestone plateau soils where sugarcane and sweet potatoes were grown and where the main housing areas tended to be located; to riverside alluvial lands for growing taro and rice, as well as gathering *kayamo* for thatching. It is a pattern which, while not universal on Okinawa, is characteristic of island settlement in the Pacific, resembling, for example, the *ahupua'a* system in Hawai'i.

World War II

The final chapter in the archaeological story is that of World War II. The traditional world of the historical agricultural villages came to an abrupt and devastating end in 1944 and 1945 as the island was engulfed in the terrible events of the war. In March 1944 the Japanese army began to organize for the defense of the island in the event of an American invasion. Along the Urasoe coast this involved the construction of a new military airfield through the plateau farm fields and of strong defensive positions along the ridges seaward of the airfield and north of Gusukuma village to protect it (CINCPAC/POA 1945; Yahara 1995). The 64th Brigade fortified cave openings on Shukuguchi Ridge and dug tunnels into the limestone rock from the cave chambers to create a network of defensive positions (Appelman *et al.* 1960:210; Belote and Belote 1970:204).

In late April 1945 the invading American forces attacked these positions in an attempt to capture the airfield and move south down the Prefectural Road toward Naha. Capture of the ridges, in what the Americans would call the Battle of Item Pocket, took seven days. During the first few days, only two American platoons were able to cross the open spaces in the face of concentrated mortar and artillery fire from the Japanese defenses and neither was able to hold its position, but was forced to retreat in the face of counter attacks and the failure of reinforcements to arrive. Finally, on 26 April, the Americans managed to get a company to the base of Shukuguchi Ridge and to hold the position overnight, ensuring victory as reinforcements began arriving on the ridge (Appelman *et al.* 1960). The next day the Americans captured the airstrip.

While the Japanese airstrip was destroyed by or buried beneath the American airfield constructed after the battle, at Shukuguchi Ridge a portion of the cave and tunnel defensive system (Site 9) has survived (Figures 4 and 5). Seven caves remain from which tunnels had been bored into the cliff side, connecting a few of the caves together allowing troops to move protected from one position to another, and in other cases providing storage and refuge places.

The Americans immediately began construction of a new airfield and changed the coastal strip into an American military camp, as seen in a December 1945 aerial photo (Okinawa Prefectural Foundation for Cultural Promotion 2000:35). The photo also vividly illustrates the destruction of the traditional Okinawan agricultural system as a result of the war.

SUMMARY

Camp Kinser contains a set of cultural properties that reveal the settlement and use of the west Urasoe coast from prehistoric times, as much as 3500 years ago, to the recent past. The archaeological record, as it is known to date, reflects a past that began with fishermen and shellfish gatherers living along the coast, a transition to agriculture and movement inland late in the prehistoric period, and the development of a series of historical period traditional villages running along the coast relying on the cultivation of sweet potatoes, sugar cane, and other marketable crops, along with fishing on the coastal reef. This archaeological record ends with the transformation of the area during World War II by the construction of a Japanese airfield and military defense positions, a major World War II battle fought around these positions following the American invasion of the island, and the development of an American airfield and later military depot.

The use of GIS has proved helpful in looking at these changing patterns of settlement and in understanding how these changes relate to environmental constraints and opportunities for the inhabitants of the region. The distribution of historical period archaeological resources can be easily overlain and compared with the information available from historical maps. The GIS has also allowed us to develop a sensitivity map (Welch and McNeill 2002) in regard to the likelihood of subsurface cultural resources being present in different parts of the base, providing a tool that can help planners and managers plan and develop projects in ways that will minimize damage to these resources, and thus help preserve Okinawa's cultural resources that are currently under the care of the US military.

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MCNEILL AND WELCH: SHELLMOUND TO BATTLEGROUNDS, CAMP KINSER, OKINAWA

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