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– ARTICLE –

The Kealakekua Region: Salubrious core, political centre

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ABSTRACT

Archaeological, ethnohistoric, and oral traditional resources pertaining to the region around Kealakekua Bay on the Kona coast of Hawai'i Island offer unsurpassed perspectives on ancient Hawaiian society and the nature and emergence of the Hawaiian primary states. Supported by abundant marine resources and highly productive agricultural lands of the vast rain-fed Kona Field System, the region's communities, probably among those that founded the 2,000 km² Kona District, became a centre of the island's peripatetic royal court and of the annual four-month Makahiki festival. Much that we know of this court, this festival, the residents of Kealakekua Region, and the larger Hawaiian world at the moment of contact with the non-Polynesian world comes from dozens of graphic depictions and written eyewitness accounts of the only sustained Hawaiian sojourn of Captain Cook's last expedition (1779). These resources are augmented by decades of subsequent accounts of Hawaiian scholars, residents, and visitors. Analyses of archaeological evidence of the eighteenth century intensification of the Kona Field System and traditional histories evincing the coeval emergence of the Hawai'i Island primary state offer an opportunity to test hypotheses linking the two processes.

Keywords: Hawai'i, Polynesia, primary state

INTRODUCTION

It is a pleasure to be able to contribute to this special issue of the journal honoring Pat Kirch's extraordinary career, evident in his prodigious output of often pioneering, thought-provoking monographs and articles, and the programmes he has led, particularly the multidisciplinary Hawai'i Biocomplexity Project, whose participants have revolutionised our understanding of ancient Hawai'i's rain-fed agriculture. Among the contributions of this programme has been the emphasis on the importance of the regional perspective, focused mainly on the Leeward Kohala Field System (LKFS) in Kohala District, Hawai'i Island and Kahikinui District, Maui. The invitation to contribute stirred me to return to a subject in which Pat and I have long shared an interest, the nature and rise of the Hawaiian polities, and to a place where we both have worked, the region surrounding Hawai'i Island's Kealakekua Bay (Hommon 1976, 1986a, 1986b, 2013; Kirch 1984, 2001, 2010, 2012). Among Pat's many projects was research he conducted between 1978 and 1982 that initiated the long-term archaeological programme in the portion of the Kona Field System in the Amy B. H. Greenwell Ethnobotanical Garden (AGEG) (Kirch 2001). My discussion below of the Hard Times Hypothesis is also appropriate here, as it is based on events on the island of Tikopia, a Polynesian outlier studied in depth by Pat and ethnobotonist Doug Yen in 1977–1978 (Kirch and Yen 1982).

I would also like to take this opportunity to draw particular attention to yet another aspect of Pat's career; evident in two deliberate efforts to retest his former conclusions with new data. One of these was his revision with Mark McCoy of the early end of Hālawa, Moloka'i chronology from approximately the fifth or sixth century range (Kirch 1984:77) to no earlier than AD 1300, based on new radiocarbon dates from the Hālawa dune site (Kirch and McCoy 2007).

The other example concerns a conclusion drawn by Pat and Marshall Sahlins in their monumental 1992 study of Anahulu Valley, O'ahu that the lower valley was only sparsely inhabited before the nineteenth century (Kirch 1992; Sahlins 1992). For a decade this view of Anahulu's history seemed a major anomaly when compared with widespread evidence elsewhere in Hawai'i of extensive settlement of areas with cultivable land well before 1800. Then in 2002, in light of new evidence of pre-nineteenth century settlement of the upper part of the valley, Dega and Kirch (2002) revisited the previously collected data from the lower valley and concluded that in the latter 'the Historic period reshaping of the landscape [had] evidently obliterated most surface traces of the late prehistoric settlement…'. Concurring with Ernst Mayr (1997:79–106), the authors note that:

> over the long term, science is both self-correcting and cumulative in its knowledge base. [The Anahulu restudy] has allowed us to correct and refine some aspects of the original model. This, in our view, is illustrative

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> of the way good science both should, and usually does, work. (Dega and Kirch 2002:124).

The willingness to actively reconsider and re-study conclusions based on previous research exemplified by these two examples must be widely adopted if there is to be a chance of addressing what in my view is the biggest challenge to the Hawaiian archaeological community: the task of reconstructing ancient Hawai'i's chronological framework. The necessity for this difficult, perhaps decades-long task is evident in the fact that, as recent ongoing studies have found, fully 90 percent of the 2,334 Hawaiian archaeological radiocarbon determinations from Hawai'i Island, Maui, and parts of O'ahu are from wood charcoal of unidentified taxon and plant structure (Rieth and Athens 2013:3). In a history as recent and as brief as Hawai'i's, no event or process – from a single use of a hearth to archipelagic agricultural expansion – can be reliably dated with age determinations from unidentified samples in which the risk and magnitude of in-built age are unknown.

THE EMERGENCE OF THE ANCIENT HAWAIIAN STATE

In what follows I explore the contribution of the Kealakekua Region's documentary and archeological record to understanding the nature and emergence of the late eighteenth century Hawai'i Island polity. Each of the three Hawaiian polities (the other two of which were based on Maui and O'ahu) was evidently organized as a state, defined as an autonomous society with a centralised government consisting of a leader or co-leaders who delegate power to a stratified bureaucracy that accomplishes society-wide tasks including tax collection, public works development, maintenance of internal order, diplomacy, and the waging of war. These Hawaiian polities were *primary* states in that they emerged endogenously, uninfluenced by preexisting states (Hommon 2013).

I propose that the organisational revolution that was the emergence of the Hawaiian primary states consisted of the introduction of innovative variations on traditional Polynesian social, political, and economic themes including the following:

- The paramount symbolic chief, a traditional elder who embodied the maximal social group but held little political power, either was joined by a politically-defined active ruler to form a diarchy or was superseded by a broad-spectrum leader who claimed both political and symbolic roles.
- The traditional double property title of chiefs (*ali'i*) and common people (*maka'āinana*), was shifted to privilege chiefly claims over those of the people.
- Formerly autonomous district chiefs ceded certain powers to a central active or broad-spectrum ruler.
- The central active or broad-spectrum ruler delegated power to a stratified bureaucracy consisting largely of district chiefs and their subordinates.
- Grafted onto Makahiki, originally an annual first-fruits ceremony with deep historical roots, was the collection of taxes including wealth items for the leaders and bureaucrats.
- The active ruler's collection of taxes for the support of the government encroached on the traditional role of the paramount chief as the generous distributor of collected gifts to the people.
- The traditional *'aina*, hundreds of local homelands of small, local, semi-autonomous communities into which each island was divided, came to be treated by the ruler and his bureaucracy as tax districts (*ahupua'a*).
- The active ruler adapted the traditional arts of war to the capture and annexation of lands by conquest (Hommon 2013).

THE KEALAKEKUA REGION

The Kealakekua Region, situated near the middle of Hawai'i Island's western coast in the ancient district of Kona, consists of Kealakekua Bay and the 15 traditional land units that border it (Figure 1). The region encompasses some 117 km², roughly the size of Kaho'olawe, the smallest of the eight main Hawaiian Islands. The two northern land divisions of the region, Ka'awaloa and Kealakekua, were *ahupua'a*, (also known as *'āina*), local community homelands. The names and limited size of most of the other units suggest that they were originally *'ili'aina*, subdivisions of *ahupua'a*. Many of these small land units may have been awarded in the early nineteenth century by King Kamehameha (also known as Kamehameha I) to warriors who had supported him in his career of conquest that led to the unification of the Hawaiian Islands (Hommon 2013:13–14).

Kealakekua Bay measures about 2.4 km by 1.6 km. Most of its marine life is found in a band of inshore waters out to a depth of about 10 fathoms (18m), beyond which the bottom drops off steeply. The abundance of the more than 100 species of fish, measured in weight per unit area, is one of the highest recorded in Hawai'i (Doty 1968:18–19). The sheer 150-m cliff known as Pali Kapu o Keōua dominates the northeast side of the bay.

In 1779, David Samwell (Beaglehole 1967:1176), a ship's surgeon on Captain James Cook's final expedition, identified five 'Towns' along the shore of the bay, actually coastal settlements referred to by the names of the long, narrow *ahupua'a* and *'ili'aina* land units in which they were located. These settlements were Ka'awaloa (Figure 2) at the northwest end of the cliff, and Kealakekua (or Kekua, also spelled 'Kakooa', Figure 3), Waipuna'ula, Kalama, Kahauloa, and Ke'ei along the southeast shore of the bay. Today the Kealakekua Bay State Historical Park occupies a coastal strip encompassing the cliff and the shoreline settlements of Ka'awaloa, Kealakekua, and Waipuna'ula. Lieutenant

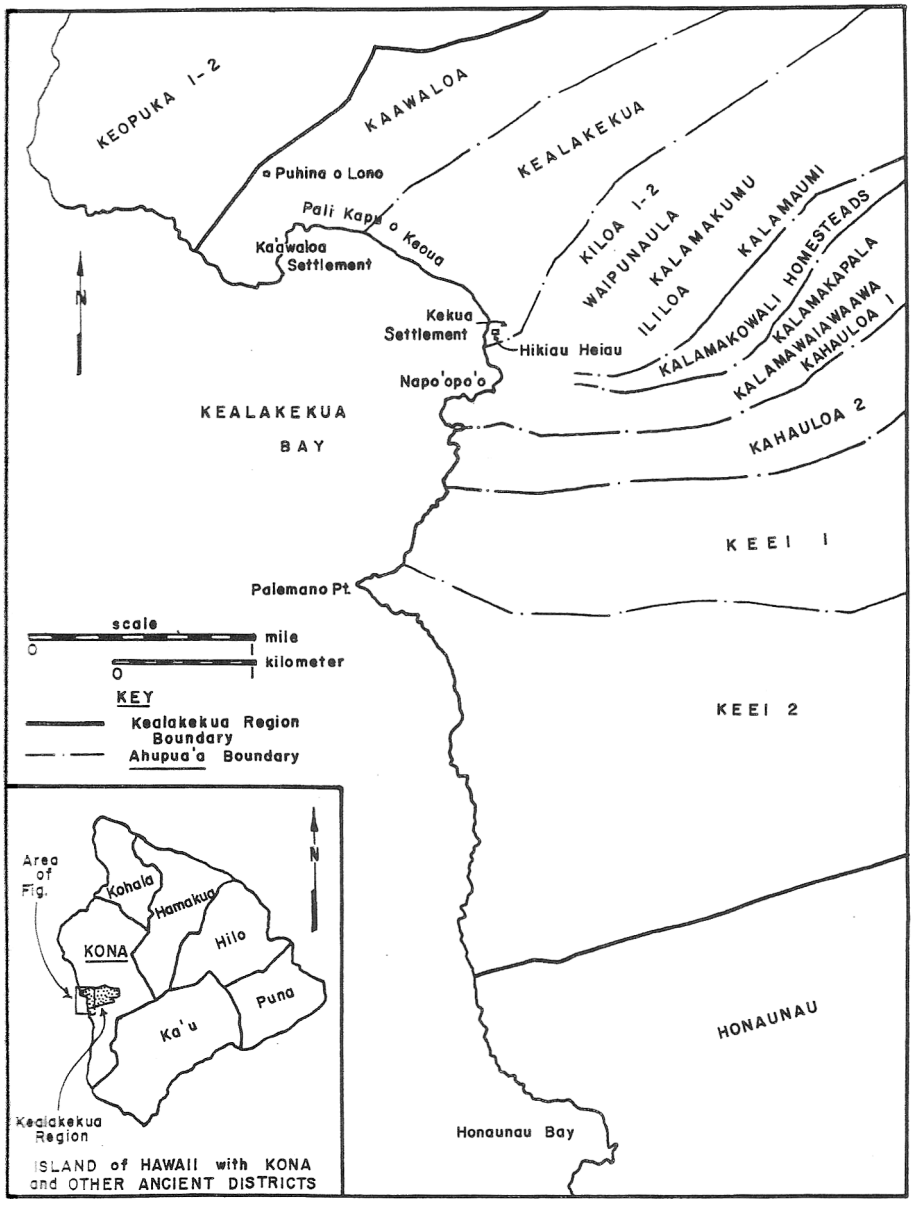

Figure 1. *Makai* Zone of the Kealakekua Region. (Hawai'i State Parks; from Hommon 1986a)

James King of the Cook expedition counted four coastal settlements ('villages') rather than five, with about 80 houses each, plus 30 'straggling' houses along the shore, and an additional 50 houses among the inland plantations. Applying his estimate of six persons per house, King estimated the population around the bay at 2,400 (Cook and King 1784:128). Inland of the coastal settlements the region encompasses a portion of the Kona Field System, a complex of rain-fed agricultural fields in central Kona District measuring roughly 29 km (N-S) by 6 km.

DOCUMENTARY RESOURCES

Analysis of the Kealakekua Region's abundant archaeological and documentary resources can tell us much about the nature of the Hawai'i Island primary state in the early contact era, about 1778 to 1819, and its emergence in the seventeenth and eighteenth centuries. Unlike the other widely recognized, pre- or proto-literate, primary states of Mesopotamia, Egypt, the Indus Valley, China, Mesoamerica, and Andean South America, those of Polynesia, including Tonga as well as the Hawaiian Islands, exhibit the unique advantage of having been documented in writing by fully literate participants and observers (Hommon 2013). The 31 days that the Cook Expedition spent in Kealakekua Bay in January and February, 1779 produced an incomparable trove of eyewitness accounts describing Hawaiian society and culture at the moment of contact with the non-Polynesian world.

For a glimpse of the wealth of information generated

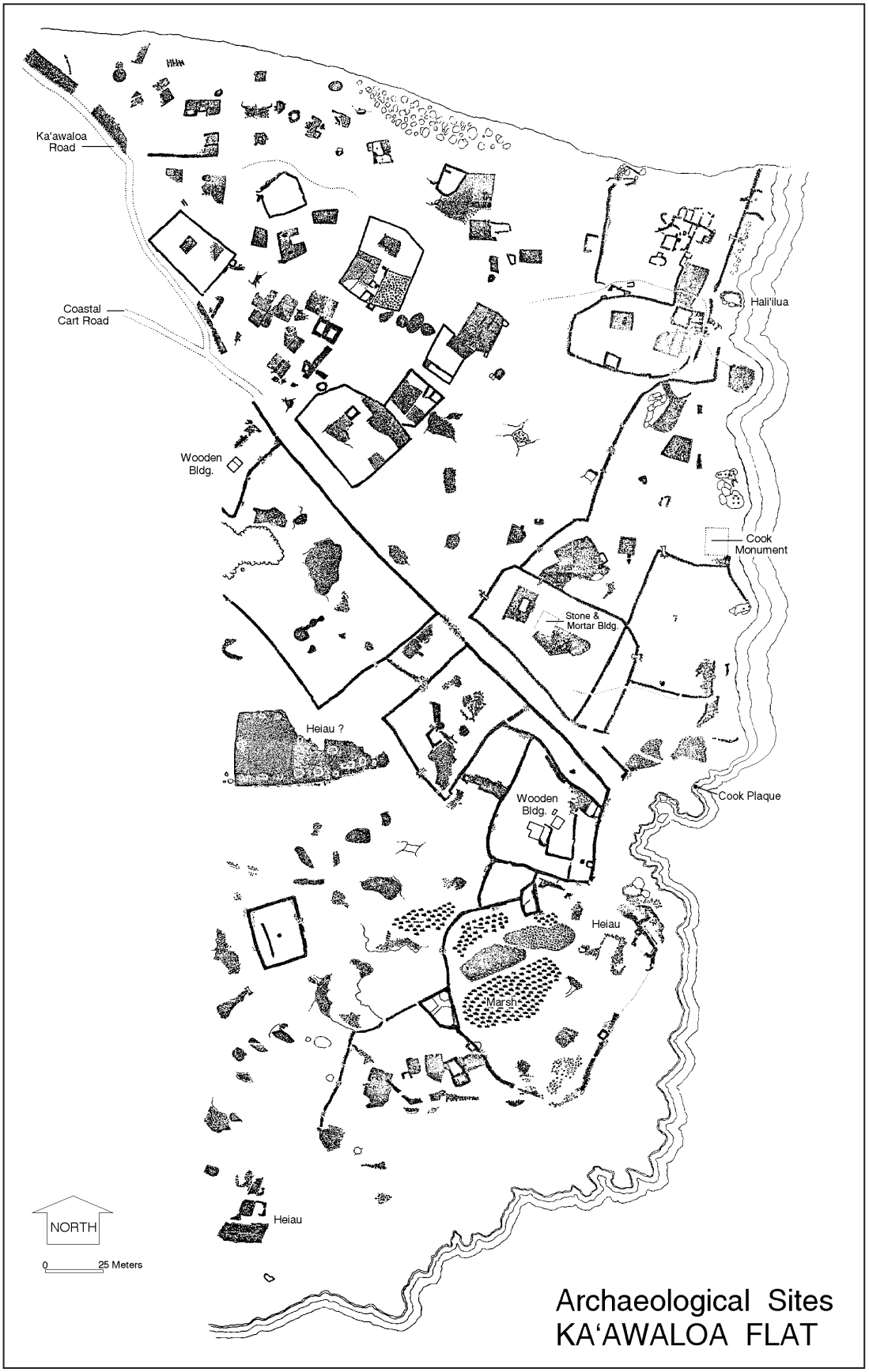

Figure 2. Ka'awaloa Coastal Settlement. (Hawai'i State Parks)

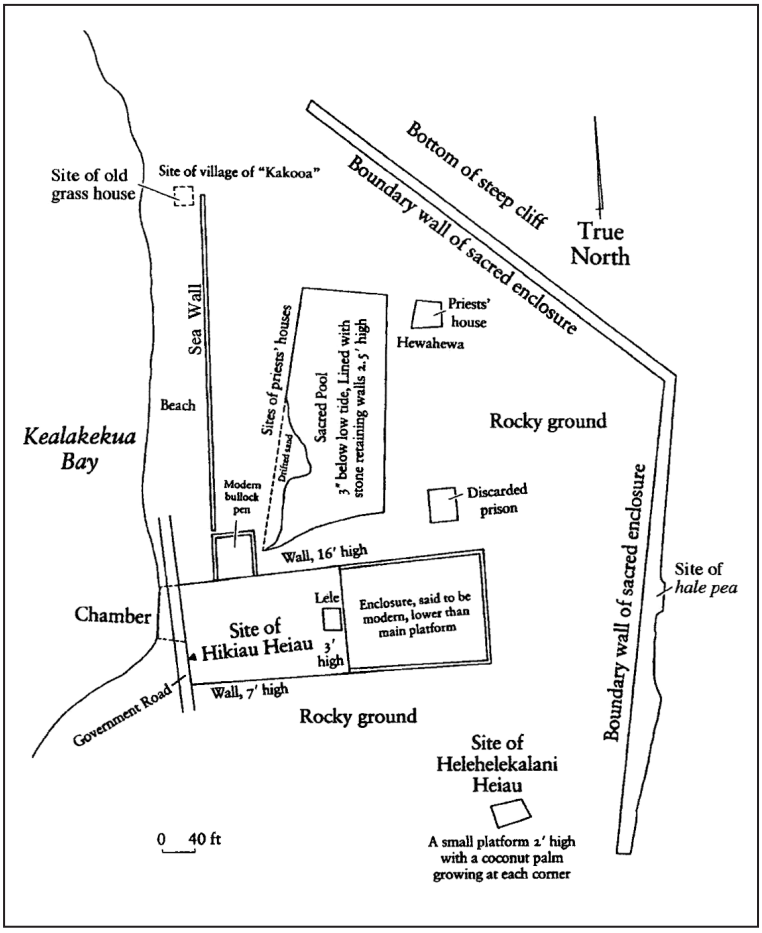

Figure 3. J.F.G. Stokes's map of the Hikiau Complex, Kealakekua *Ahupua'a* as it existed in the early twentieth century. (Bishop Museum; reprinted by permission from Stokes 1991)

by the members of the Cook expedition, consider this: the *Historical Resources Study: Kealakekua State Historical Park* (Hommon 1986a) lists 492 written resources indexed by subject, with nearly 15,000 page references mostly pertaining to the early contact era, as well as 131 graphic resources, including 25 original drawings and paintings by John Webber and others (and 11 more illustrations available as engravings) depicting people, places, and events at Kealakekua. Among the written resources are 31 primary documents by 21 members of the Cook expedition and 15 documents by five members of the Vancouver expedition, as well as nine other eyewitness accounts written between the years 1784 and 1794. These resources deal with a broad array of Hawaiian life from ceremonies, warfare, and affairs of state, to crafts, houses, canoes, and sports. The index entries of Lieutenant King's journal alone runs to 650 page citations pertaining to 335 subject listings, from anklets and *'awa* to women's status and wrestling. Subject listings for *heiau* (temples) total 177, and for houses, 319. Among the later resources included in the study are summaries of the region's records of the Māhele, the land reform of 1846–1855 that resulted in the award of allodial titles to real property to the Hawaiian Crown, the government, and individuals.

THE COASTAL (*MAKAI*) ZONE

The archaeological and documentary resources of the ancient Kealakekua Region tend to refer to two broadly defined zones, the coastal (*makai*) zone where most of the residences were concentrated, and the inland (*mauka*) zone with its agricultural fields and upland forest.

Hawai'i's archaeologists usually recognise the group of Kealakekua Region's shoreline settlements, especially those of Ka'awaloa and Kealakekua, as one of several 'royal centres' that were occupied from time to time by the peripatetic royal court of the island. However, several lines of evidence indicate that by the late eighteenth century, this royal center had begun to resemble the administrative capitals of primary states elsewhere in the world. It seems accurate to refer to it as the 'proto-capital' of the Hawai'i Island state. One factor in this development was the fact that the ruler's presence was required on a regular basis during events of the annual, four-month-long Makahiki cycle,

particularly the annual procession that began and ended at Hikiau Heiau in Kealakekua. During Makahiki, in addition to general food levies, each *ahupua'a* was expected to supply the government with an amount of wealth goods and other in-kind taxes calculated, by what can be called the Makahiki accounting system, on the basis of ability to pay (Hommon 2013: 103–104). As discussed below, evidence of the status of the Kealakekua settlements as proto-capital of the centralised political state includes, in addition to the focus on annual tax collection, the relatively small size of Hikiau Heiau, the unusually high degree of settlement nucleation, the presence of a resident elite, a relatively high frequency of large houses (though in my opinion an absence of structures that would warrant the term 'palaces'), and the rivalry between the resident chiefs of Ka'awaloa and the priestly community at Kekua.

Elsewhere (Hommon 2013: 248–249) I have suggested that along with the ascension of active rulership in Hawaiian polities came a de-emphasis on architectural grandeur, exemplified by the fact that Hikiau and two other important *heiau* associated with Kamehameha's post-1779 rise to power possessed significantly smaller floor areas than did several *heiau* associated with pre-eighteenth century symbolic paramount chiefs whose rule tended to be based on traditional authority rather than political activity. Several of the largest *heiau* are so old that their construction was credited not to famous chiefs whose names were still preserved in the traditional histories but to *Menehune*, the storied little folk of Hawai'i's most distant past. The fact that the relatively small Hikiau Heiau served Hawai'i Island ruler Kamehameha and his predecessor Kalani'ōpu'u for the worship of both Lono, god of rain-fed agriculture, and Kū-kā'ili-moku, the major Hawai'i Island war god, seems to indicate that the central importance of this temple stemmed less from architectural splendor than from the political success (demonstrating great *mana*) of the chiefs who worshiped there.

Primary states elsewhere in the world commonly feature nucleated settlement patterns. While dispersed settlement patterns tend to be the norm in the Hawaiian archaeological record, it is interesting that in 1778–1779, Cook, King, and Samwell, evidently referring to two royal centres, Waimea, Kaua'i and the Kealakekua Region, made a point of remarking on the nucleated nature of Hawaiian settlements. Of the Kealakekua Region settlements, Samwell writes, '[t]hese Towns, tho' the Houses are close together, are not built regular so as to form any thing like streets but have paths running through them in a zigzag manner' (Beaglehole 1967: 1176). Among several similarities with New Zealand Māori, but not the Society Islands and Tonga, King (Cook and King 1784: 140) notes Hawaiians' 'method of living together in small towns or villages, containing from about one hundred to two hundred houses, built pretty close together, without any order, and having a winding path leading through them.' Cook speculated that a destructive fire at Kealakekua in February, 1779 had spread easily from one house to several others because they were built so close to one another (Beaglehole 1967: 520).

It is well attested in traditional and eyewitness resources that when rulers of Hawai'i Island, and probably other islands, moved from one customary royal centre to another they were accompanied by royal courts consisting of hundreds of advisors, line and staff officers, warriors, priests, and craft-specialists, sometimes accompanied by their families. Settlements in such favored centres, usually chosen in part for their abundant marine and agricultural resources, tended to contain large populations that would reasonably be expected to form relatively nucleated settlements in the narrow coastal zone.

An instance of the influx of courtiers to the royal centre in the Kealakekua Region was documented in 1794, when district chiefs and attendants in their thousands gathered at Kealakekua for a meeting called by King Kamehameha. According to Edward Bell (1929–30: 85–86) of the Vancouver expedition, since many of the newcomers could not be accommodated in existing housing, they built temporary shelters 'on every vacant spot on the ground' around the bay. The upper slopes of Ka'awaloa settlement at the foot of Pali Kapu o Keōua may have been one of the areas where visitors built temporary housing during meetings of Hawai'i Island's central government and on major ceremonial occasions. When, as in early 1779, King Kalaniōpu'u was in the region, he would stay in the home of a resident chief.

Frequently the most productive environments of each island were centrally located within traditional districts. These 'salubrious cores' may have been among the first regions to be colonised in Hawai'i's early history (Hommon 1986b: 226–227; 2013: 226–227). The high productivity evidenced in the Kealakekua Region's bay and inland field system probably helps explain how the settlements around Kealakekua Bay became elite residential precincts of powerful chiefs and priests, participants in the region's political and ceremonial centralization. Two of the prominent residents of the region were Keawe-a-Heulu, the hereditary chief of Ka'awaloa and descendant of both the 'Ī and Mahi families of illustrious warriors, and Kekūhaupi'o, chief of Ke'ei. In the decades following 1779 these were two of four 'uncles,' warrior chiefs who were close advisors and supporters of Kamehameha in his career of conquest. (Kamakau 1992: 102, 310).

Various eyewitness descriptions of houses of chiefs and commoners, *makai* and *mauka*, provide us with a guide to domestic architecture in the Kealakekua Region. For example, as described by Cook, Samwell, and King at Waimea and Kealakekua, the floorplan of the substantial domestic structures (probably *hale noa*, family sleeping houses) ranged from about 20 to 138 m^2 (Beaglehole 1967: 283, 1176; Cook and King 1784: 14). Though the house of any given chief was not necessarily larger than that of a commoner, the upper part of the range in these two lo-

cations appears to exceed the 9 m² to 40 m² range usually attributed to commoners' houses, a pattern that may reflect the prevalence of chiefs in the two royal centres (Hommon 2013: 41). However, we should be cautious in attributing larger houses to chiefs since King (Cook and King 1784: 140) was told at Waimea that the largest of the houses 'were designed for travelers or strangers, who were only making a short stay'. Unlike the typical four-walled *hale noa*, these structures were open at one end and apparently were similar to *halau*, long houses used for activities such as canoe construction or hula instruction.

Considering the past two hundred years of continued occupation of the Kealakekua Region's coastal zone, little intact archaeological evidence of the pre-nineteenth century settlement pattern is likely to remain at the surface. Most of the unusually dense complex of stone structures in Kaʻawaloa settlement, for example, appears to consist of foundations and walls of house lots claimed during the Māhele, and occupied during the nineteenth and twentieth centuries (Figure 2).

In some cases, however, an approximate location or a stone foundation can be tentatively identified as the site of a house of a named individual or group described in the eyewitness literature. For example, on 14 February 1779, the day that Captain Cook was killed (Beaglehole 1967: 532, 1195), King Kalaniōpuʻu, who was being hosted by Keawe-a-Heulu, is said to have been staying at Kaʻawaloa either at the house of a chief named Kaheana about 100 yards from shore where a probable house foundation can be found today, or at a place called ʻAwili at the shore. While elements of surface architecture may provide interesting perspectives on the history of Kaʻawaloa settlement in the late eighteenth century, its deeper history may be revealed in thus far unexamined cultural deposits, particularly those in collapsed lava bubbles and wetlands.

The 'Hikiau Complex' in Kealakekua Ahupuaʻa (Figure 3), across the bay from Kaʻawaloa, was bounded on the north by the Pali Kapu o Keōua, on the east and northeast by a massive stone wall, measured in the early twentieth century at 340 m in length, 5 m in width and 2.5 m high, and on the west by the shoreline (Stokes 1991: 98–102; Yent 1985: 49). North of Hikiau Heiau, which is near the southwest corner of the complex, are a brackish-water pond described in the 1779 eyewitness literature, the coastal settlement of Kealakekua (Kekua) between the pond and the cliff, and, east of the pond, the apparently permanent community of resident priests of the Lono Order who officiated at Hikiau. It seems likely that the rivalry evident in the eyewitness accounts between the chiefs, including the ruler Kalaniʻōpuʻu, at Kaʻawaloa, and the Lono priests of Kealakekua (Sahlins 1995: 66–72, 242–243) was a feature of the tension between the dual roles of kingship in the Hawaiʻi Island state.

Few of the surface structures in the approximately 60 archaeological sites of the Hikiau Complex listed by Yent (1985: 40–61), other than Hikiau Heiau and the boundary wall, are likely to produce undisturbed evidence earlier than the nineteenth century. However, subsurface test units indicate the presence of intact pre-nineteenth century deposits beneath as much as a meter of alluvium and colluvium (Yent 2006). The depth of the alluvial deposits suggests that the great wall may have served not only to delineate the boundary of the sacred Hikiau precinct but also to protect it from flooding and slopewash.

Drawings, paintings, and maps of the Kaʻawaloa and Kealakekua settlements, together with written eyewitness descriptions of the early contact era, Māhele records, and modern archaeological maps and photographs, can guide future archaeological investigations aimed at discovering what remains of eighteenth century settlement patterns and cultural deposits.

In some cases the locations of house foundations and other structures shown in the early graphic resources can be determined with reference to still-identifiable landmarks such as rock formations depicted in the art. In addition to excavations at locations identified as being occupied around 1779, a search of older deposits may yield data bearing on processes including the colonisation of the region, the nucleation of the settlements, and the development of the Kealakekua proto-capital, in part by dating the construction of house foundations, intact portions of Hikiau Heiau and the boundary wall.

THE INLAND (*MAUKA*) ZONE

Elsewhere I have estimated that the staple crops of the Kona Field System, at approximately 11,000 ha the largest of the ancient Hawaiian rain-fed, fixed-field agricultural complexes, may have supported a population of more than 47,000 (Hommon 2013: 72). By the early contact era, the defining structures of this system were the *kuaiwi*, hundreds of low, parallel stone mounds roughly 2–3 m wide, 0.3–1 m high, and often hundreds of meters long. Constructing the system's *kuaiwi* is estimated to have required moving more than two million mt of stones (Allen 2001b: 143; Hommon 2013: 72).

The portion of the Kona Field System in the Kealakekua Region is evidenced chiefly in the *kuaiwi* and other archaeological features, in the early eyewitness accounts of the system in use, and in legal records of the mid-nineteenth century Māhele. The most detailed accounts in the literature of the early contact era are the descriptions by King (Beaglehole 1967: 507, 520–521, 608) of Cook's expedition in 1779 and botanist Archibald Menzies (1920) of Vancouver's in 1792. As summarised by T. Stell Newman (1970), the crops grown in the region tended to vary with altitude, ranging from sea level to 900 m, and resultant annual rainfall, varying from 800 to 2,500 mm. From shore to upland forest the distribution of dominant food crops and *wauke* (the paper mulberry, *Brousssonetia papyrifera*, that supplied the raw material for *kapa*, bark cloth) defined a series of cropping zones. These included

the sweet potato/*wauke* zone (0–150 m altitude), grading into a breadfruit/sweet potato/*wauke* zone (150–300 m), the sweet potato/dry land taro zone (300–750 m), and, at the lower forest boundary, the plantains and banana zone (600–900 m).

Among the documentary resources of the Kealakekua Region are 183 Māhele records of awarded and un-awarded lands, both *makai* and *mauka*, including 520 agricultural plots, usually with crops listed, and 62 house lots. Maps showing the distribution of the claimed parcels can identify the location of individual plots and lots which together can yield a sketch of mid-nineteenth century settlement and cropping patterns.

Two of the dozens of reports describing the inland archaeological resources of the region are of particular interest. Myra Tomonari-Tuggle (2006) describes her survey and testing of a 29 ha portion of Captain Cook Ranch (CCR) from 244 to 366 m in altitude between 0.5 and 1.3 km northwest of the Pali Kapu o Keōua. Chapters in a volume edited by Melinda Allen (2001) report research in the portion of the field system in Bishop Museum's 6.1 ha Amy B.H. Greenwell Ethnobotanical Garden (AGEG), situated 1.6 km from shore at an altitude of about 460 m. Pat Kirch's (2001) chapter in the Allen volume describes his initial research in AGEG between 1978 and 1982. Judging from Newman's (1970) summary, the CCR overlapped the breadfruit/sweet potato/wauke and sweet potato/taro zones. The AGEG area was in the lower part of the sweet potato/taro zone where the main crop was probably sweet potato.

While the *kuaiwi* were the most massive structural features in both the CCR and AGEG, in each area excavations evidenced a construction sequence in which *kuaiwi*-building was a late phase (apparently by far the most labour-intensive one) of a process of agricultural intensification. The AGEG sequence was determined to include the following phases:

I. Initial Land Use and Early Activity Areas
II. Construction of Cross-Slope Terraces
III. *Kuaiwi* Construction
IV. Stone Mound Gardening
V. Coffee Agriculture (Allen 2001a: 137–142)

The CCR phases include:

1. Early Farming and Resource Collection (AD 1500 to 1650)
2. Walled Gardens (AD 1650 to 1750)
3. The Kona Field System (AD 1750 to post-Contact)
4. Historic Dairy, Commercial Pineapple, and Ranching (Tomonari-Tuggle 2006: 160–166).

Estimates of the era of *kuaiwi* construction derived from these two projects vary by as much as two centuries, from 'after 1450 and quite possibly in the mid-1500s to 1600s' in AGEG (Allen 2001b: 140) to about 1750 in CCR (Tomonari-Tuggle 2006: 164). Tomonari-Tuggle (2006: 164–165) suggests that the difference between estimates may be attributable to a construction history not of a planned, expanding system-wide project but of widely distributed discrete patches that eventually coalesced into a connected system.

These pioneering studies, particularly their analysis of stratified structural evidence, indicate that the intensification process can be traced and compared with the results of similar research in the Leeward Kohala Field System (LKFS) (Dye 2011; Ladefoged and Graves 2008). Though the infrastructural forms of the two systems differ significantly, the tasks of selecting appropriate dating samples for sequence construction are somewhat similar. Major and Allen (2001: 97) found that the foundation stones of a *kuaiwi* in AGEG rested on a soil surface that had been prepared by first clearing away naturally-occurring loose stones. If this proves to be a general pattern in the Kona Field System, then estimating construction dates of many *kuaiwi* can be facilitated by selecting short-lived radiocarbon samples that appear to date events that bracket the laying of the structures' foundation stones.

THE HARD TIMES HYPOTHESIS

The proximity of a portion of the Kona Field System and the 'proto-capital' settlements in the coastal zone of the Kealakekua Region offers an opportunity to test the Hard Times Hypothesis. As discussed elsewhere (Hommon 2013) this hypothesis is modeled on events documented by ethnologist Raymond Firth (1959) following a 1952 hurricane that devastated the island of Tikopia, a Polynesian outlier some 5,700 km southwest of Hawai'i

During his previous stay on Tikopia in 1928–1929, Firth had observed that the four clan chiefs of the island served as what are here referred to as 'symbolic' leaders whose traditional authority stemmed not from the active use of political power but from their status as benevolent senior relatives and intermediaries with the gods. Firth (1936: 406) described the Tikopia land tenure system as one in which 'primary and more permanent rights of utilization' of crop parcels were held by patrilineal kinship groups known as *paito*. Individual families in the *paito* often cultivated particular plots, but anyone had the right to the produce of any plot and to plant crops in any plot that was not in use or under *tapu*. Though ideally permission was required, in practice the request often followed the use of the land or its produce and for a primary land-holder to withhold permission would have been considered improper in any case (Firth 1936: 385, 399, 401).

On his second trip, Firth arrived a month after the hurricane had destroyed many of Tikopia's coconut and breadfruit trees and ruined root crops with salt water. Following 23 years of rapid growth that had increased the island's population by 36 percent, the hurricane's devastation triggered sixteen months of famine and food shortages. To increase production, cultivation of the relatively undamaged agricultural area called Rakisu was extensively modified by the expansion of its boundaries, an 88 percent

reduction in land lying fallow, major changes in the crops being planted, and the subdivision of the original 55 plots into 187 much smaller parcels (Firth 1959:173).

Soon after the hurricane, in addition to a sharp rise in disputes over crop plot boundaries and the control of resources, the rate of reported thefts of produce soared to five times that of 1929. Within a few months, in response to the rapidly growing social unrest, certain male relatives of chiefs serving as *maru* (described by Firth as 'executive officers'), applying policies of the chiefs, began to apply coercive control in an apparently unprecedented turn toward the political. The *maru*s' measures included the organisation of night patrols to catch or frighten away thieves, the institutionalisation and increase in frequency of *fono* (public assemblies) in which the people were lectured on the evils of theft, and, in a move Firth (1959:323) called 'a formalization of Tikopia agricultural behaviour far greater than had been known hitherto,' promulgation of a set of rules including one that required that a person obtain prior permission before planting on another's land. Some 50 times in 1952–1953 in what had previously been only an occasional punishment for the rare incorrigible offender, thieves suffered the humiliation of being tied to a large stake in a public place (Firth 1959:322–324).

Based on the Tikopia example, the hard times hypothesis proposes that 'a leader of an autonomous group tends to respond to a perceived extraordinary threat to the group with extraordinary action that can transgress sociopolitical norms' (Hommon 2013:241). The hypothesis is consistent with a variety of Western examples ranging from ancient Greece and Rome to American instances of extraordinary, sometimes extra-legal, responses to the hard times following crises such as the beginning of the Civil War in 1861, the Pearl Harbor attack of 1941, and the 9/11 terrorist attack of 2001. Such examples suggest that an event that triggers extraordinary escalation in coercive action need not be frequent or of long duration to trigger significant and long-lasting change.

Comparing archaeological data from the LKFS with traditional historical accounts suggests that the hard times hypothesis might link the rise of active rulers that marked the eighteenth century emergence of the Hawai'i Island state with stressors associated with LKFS's intensification. Such 'hard times' may have featured increased labour required of both men and women to intensify sweet potato production, rapid rates of growth capable of doubling population in a single lifetime, shortened fallow leading to reduced soil fertility, increased government levies for wealth, craft goods, and staples, and expansion of cultivation to the marginal limits of cultivable lands (Hommon 2013:232–237).

TESTING THE HARD TIMES HYPOTHESIS IN THE KEALAKEKUA REGION

Until such time as the development of the Kona Field System is the subject of multi-disciplinary research programmes similar in scope to the Hawai'i Biocomplexity Project that has yielded so much information about LKFS and other rain-fed systems, there is much that can be accomplished with more tightly focused projects. For example, one element of research being conducted in the Kona Field System that archaeologists may find valuable is a project focused on the nitrogen fixing property of sugar cane used as mulch (Lincoln 2014). If beneficial effects of nitrogen fixation were observed by the planters in the LKFS, and if, as is believed, rows of sugar cane were planted along that system's stone alignment field boundaries, it may help to explain the proliferation of alignments that divided and subdivided fields into successively smaller plots: More alignments may have increased the availability of cane mulch, resulting in higher crop yields. A similar equation may have applied to the Kona Field System in 1779, for King observed that the 'walls' in Kealakekua Ahupua'a (he was apparently referring to the *kuaiwi*) were 'made of the Stones got on clearing the Ground; but they are hid by the sugar cane being planted on each side, whose leaves or stalk make a beautiful looking edge' (Beaglehole 1967:521).

Testing the hard times hypothesis in the Kona Field System would entail a search for evidence of stressful conditions that may have resulted in unrest comparable to that I have proposed may at times have been present in LKFS. Examples of such conditions include rapid population growth, reduction of fallow, loss of soil fertility, increasing chiefly demands, expansion to or beyond limits of productive land, and increased labour required for intensification projects (as in the construction of hundreds of *kuaiwi*). The intensity of cultivation in 1779 is attested in King's account of an excursion inland from Kealakekua Bay though a landscape that 'for the first 2 ½ miles ... is compos'd of burnt loose stones, & yet almost the whole surface beginning a little at the back of the town, is made to yield Sweet potatoes & the Cloth plant' (Beaglehole 1967:520). Later, King notes that a group of men returning from an inland excursion

> got clear of the Woods, & found themselves about 9 miles to the NE of the Ships; they directed their march towards the Sea, through the Plantations; Not the smallest piece of Ground was left uncultivated. By their accounts it is hardly possible that this Country can be better cultivated or made to yield a greater sustenance for the inhabitants (Beaglehole 1967:524).

CONCLUSION

The research value of the Kealakekua Region can scarcely be overestimated. Of the handful of places in the world where primary states, ancestral to all of today's nation-states, arose indigenously, only the states of Tonga and Hawai'i were described by literate eyewitnesses, and of all such written and graphic records those of the Kealakekua

Region, especially the logs, journals, drawings, and paintings of the Cook expedition in early 1779, are the most abundant and informative. More than simply a sketch of the region's archaeological and ethnohistoric resources, the brief summary presented here is offered as an invitation to colleagues to consider Kealakekua when addressing a wide variety of questions including Hawai'i's initial colonization of salubrious cores, the expansion and intensification of rain-fed agriculture, the development of settlement growth and nucleation, and the emergence of the Hawaiian primary states.

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