The final decades of the eighteenth century were a time like no other in the history of the Pacific Islands. Although the Manila galleons had been crossing the Pacific with their cargoes of gold, silver, and the diverse riches of the East for some two centuries, and while a few other voyagers (among them Tasman and Schouten and Le Maire) had ventured beyond the narrowly defined Spanish routes, the vast majority of islands in the Pacific had yet to experience “first contact” between indigene and European. The “discovery” of Otaheite (Tahiti) by Captain Wallis of the *Dolphin* in June of 1767 — and the reports soon to follow from Louis de Bougainville — set the intellectual salons of Europe buzzing with accounts of Polynesian isles. Exploration of the Great South Sea suddenly became a centerpiece of the Enlightenment project, forever linked with the Herculean voyages of James Cook, who literally created the modern cartographic representation of the Pacific (Thomas 2003; Salmond 2003).

The voyages of Cook, Vancouver, Bougainville, Bligh, La Pérouse, D’Entrecasteaux, Wilson, and others in the final decades of the eighteenth century brought island after island into their first contacts with Europeans. With their long isolation from the West broken, the pace of change in island societies quickened dramatically. Perhaps the most immediate — and often devastating — consequence of such first contact was the introduction of a host of diseases previously unknown to the islanders for which they had no prior exposure and lacked resistance. Cook himself was famously aware of this problem, although his issuing of orders to prohibit sexual contacts between his ships’ crews and the Hawaiians failed to halt the spread of sexually transmitted disease during the initial encounters between the British and Hawaiians at Kaua’i and Ni’ihau in 1778 (Bushnell 1993). The impact of “virgin soil epidemics” is now understood as a critical part of the larger process of “ecological imperialism” (Crosby 1986) by which the West was able to
so rapidly and aggressively expand from the Old to the New Worlds, including the Pacific.

Yet the question remains: How severe were the effects of depopulation in the first few decades following European contact with individual island societies? Any answer depends upon having accurate estimates of indigenous population sizes and densities at the moment of first contact. Two possible sources of information may inform us of these populations: the firsthand accounts of the European voyagers and direct archaeological evidence for population and settlement density in the late pre-Contact period. In the debates that have swirled around the question of Pacific populations over the past few decades, it is almost exclusively the first source that has been drawn upon, critiqued, and typically rejected as unreliable. Our aim in this book is to explore the second avenue: the possibilities of a paleodemography of the Pacific as opened by recent advances in archaeological research. Moreover, the questions we seek to address are not limited to the sizes of Pacific populations at the moment of fatal encounter at “first contact” but extend to the longer, deep-time evolution of island populations.

Otaheite: Johann Forster versus Norma McArthur

We will not attempt to canvas the entire field of Pacific historical demography here, but we will spotlight the core issues through a brief consideration of how historians, demographers, and anthropologists have viewed the population of that quintessential Pacific locale: Tahiti. Robertson, master of the *Dolphin* — among those who first laid European eyes upon the island — was greatly impressed by the density of its population:

> from the shore side one two and three miles Back there is a fine Leavel coun-
try that appears to be all laid out in plantations, and the regular built Houses
seems to be without number, all along the Coast. . . . This appears to be the
most populoss country I ever saw, the whole shore side was lined with men
women and children all the way that we saild along. . . . (Robertson 1948, 139)

On the eve of his departure, after time for exploration and reflection, Robertson
would pen in his journal: “I dare venter to say there is upward of a hundred thous-
ant Men Women and Children on it” (1948, 234).

Cook, in May 1774, was even more impressed by the multitude of the Tahitian
populace, stating that “the whole Island cannot contain less than two hundred
and four thousand inhabitants” (Beaglehole 1961, 409). But it was Johann Rein-
hold Forster, naturalist on the same second voyage, who wrote the most detailed
exposition, “On the Numbers of Inhabitants in the South-Sea-Isles, and their
Population,” as part of his famous *Observations* (1996 [1778], 145–152). His estimate
Long-Term Demographic Evolution

for all of Tahiti was 121,500 persons. Forster drew upon two empirical sources of data to derive his population estimate: (1) a review of a "great naval expedition" assembled at Pare, which allowed an estimate of the number of fighting men; and (2) a detailed estimation of the numbers of breadfruit trees and the population these could, in principle, support. The latter, interestingly, prefigures modern efforts at estimating populations through the "carrying capacity" approach (see chapter 8). Forster used these two methods to cross-check each other, finding that the potential for breadfruit production surpassed the actual numbers estimated by the first method: "Having thus fairly stated the possibility of so great a population, we shall certainly not be thought unreasonable in our estimate" (150).

Yet "thought unreasonable" he would be by twentieth-century demographers and anthropologists. The dean of Society Islands' ethnohistory, Douglas Oliver, would write that Forster's efforts were "pure fantasy" (1974, 34). Oliver was heavily influenced by the work of Norma McArthur (1967), a historical demographer whose key book Island Populations of the Pacific epitomizes a mid-twentieth-century perspective that the early voyagers had routinely and consistently overestimated the populations they encountered at first contact. McArthur reduced the population of Tahiti, at the advent of Europeans, to a mere 30,000, barely a quarter of Forster's estimate. Oliver (1974, 33) elevates this estimate slightly to 35,000.

Why this rejection of the much higher estimates of those who actually witnessed first contact? Although the arguments presented by historical demographers including McArthur (1967) are complex and nuanced, the answer fundamentally comes down to two points: (1) a decision to privilege the historical "head counts" and later censuses undertaken some decades after first contact, usually by missionaries; and (2) a judgment that the effects of "virgin soil" epidemics in the critical first few decades of contact were not nearly so severe as would be implied by acceptance of the early voyagers' estimates. The first London Missionary Society (LMS) contingent arrived in 1797, three decades after Wilson and the Dolphin, and upon reconnoitering Tahiti found that "the accounts of former navigators as to the populousness of the country are greatly exaggerated" (Wilson 1799, 166). Wilson ventured a district-by-district count, arriving at an islandwide total of 16,050 (215). By 1829, an LMS head count reduced this number to a mere 8,658 (Rallu 1990, 227).

Beyond her claim that epidemics reported by natives — whom she asserted were unable to count numbers greater than ten or twenty — were meaningless, McArthur did not explicitly discuss why she thought it impossible that Tahiti or other Pacific islands could have undergone massive population declines in the first three or four decades following contact with Europeans as a result of virgin soil epidemics. But this viewpoint is implicit throughout her work, as she
consistently rejected early voyagers’ estimates of high populations, preferring to take missionary counts as far closer to the mark and only slightly elevating those later numbers to arrive at values for Contact-era populations. Most historical demographers of the Pacific have followed her lead.

David Stannard’s Challenge

The staid field of Pacific historical demography, with McArthur’s work setting the tone, was precipitously challenged twenty-two years after the publication of her major tome by David Stannard (1989), a historian and professor of American studies, who addressed the question of how many inhabitants had first met Captain Cook — not at Tahiti, but at another of his famous landfalls, the Hawaiian Islands.1 In chapter 4, Kirch reviews in some detail Stannard’s argument and the reactions it provoked. For the moment, suffice it to say that Stannard took serious issue with the accepted orthodoxy of Hawaiian historical demography, that — in a case very parallel to that of Tahiti — the estimate by Lt. King of Cook’s company of some 400,000 Hawaiians was a considerable overestimate. Applying the same kinds of assumptions as McArthur, scholars of Hawai’i (most notably Schmitt 1971, 1973, 1977) had reduced their estimates of the population at first contact to 200,000 or so for the entire archipelago.

Referring to the revolution in historical demography that had shaken up notions of the pre-Columbian population of the New World (e.g., Dobyns 1966), Stannard argued with great passion that “Pacific island historical demography remains largely in an arrested state similar to that of such scholarship in the Americas several decades ago” (1989, xvii). For Hawai’i specifically, Stannard adduced a variety of evidence to argue that rather than revise Lt. King’s 1778 estimate downward, the truth lay in the other direction. “In 1778 . . . the population of Hawai’i was probably almost as large as it is today,” on the order of 800,000 to perhaps 1 million people (see chapter 4). Notably, some of this evidence was archaeological in nature, such as archaeological surveys of vast agricultural field systems and terrace complexes (19–21) and of extensive areas of inland settlement that would have escaped the notice of early voyagers (123–124). Indeed, in an exchange with demographer Eleanor Nordyke, the critical importance of archaeological data to help resolve the debate over the size of the Contact-period Hawaiian population came to the fore, with both Nordyke and Stannard seeming to agree about nothing except the fact that “archaeological assessments” could perhaps offer key evidence (112–113, 122–123).

Archaeologists in the Pacific had themselves not been uninterested in questions of pre-Contact populations and long-term demographic histories. For Hawai’i, there had been considerable writing and debate about population growth in pre-
history, primarily with respect to rates of growth and the shape of the overall population growth curve (e.g., Cordy 1981; Hommon 1976; Kirch 1984, 1985; Clark 1988; Sutton and Mulloy 1989). In direct response to Stannard, Dye (1994) even attempted an estimation of the total Contact-era population based on a radiocarbon-date proxy model (see chapter 4 for further discussion). In other regions of the Pacific, archaeologists had used various methods to estimate local populations using settlement data or estimates of agricultural productivity (e.g., Bellwood 1972 and Kellum-Ottino 1971 for the Marquesas; Green 1973 for Tonga).

Moreover, the frequent discovery of often dense settlement distributions in the interior reaches of islands was leading at least some archaeologists to question the historical demographic orthodoxy epitomized by Norma McArthur. Christophe Sand, synthesizing the emerging archaeological record of New Caledonia, strongly questioned the validity of historically based estimates as low as 40,000 persons for this large high island, where abandoned terrace and field systems blanket vast stretches of the now-abandoned interior valleys (Sand 1995, 281–309; see also chapter 15, this volume). Spriggs echoes this view for Melanesia as a whole, writing of the “archaeological evidence of massive population disruption and decline attendant upon European contact” as seen in abandoned village sites, agricultural systems, and discontinuities in settlement patterns (1997, 253–254).

Stannard’s challenge to the received orthodoxy of Pacific historical demography has not gone unheeded by the archaeologists. In his synthesis of Oceanic prehistory, Kirch (2000, 313) opined that “the ball is now in the archaeologists’ court; it is up to us to seize the challenge and apply all of the lines of material evidence at our command to break out of the old debates.” However, demographic archaeology is not necessarily a straightforward endeavor; there are numerous methodological and theoretical obstacles to tackle. The contributions to this volume represent one step in that direction.

Archaeology and Paleodemography

Efforts to develop a “demographic archaeology” have a long history, with specific examples in various parts of the world (Cook 1972; Hassan 1979, 1981; Paine 1997). Throughout his influential writings, V. Gordon Childe (e.g., 1951 [1936]) stressed the role of population growth as a key thread in understanding the development of human societies. Later, the provocative theory of Ester Boserup (1965) spurred archaeologists to examine aspects of the archaeological record for evidence of population growth and decline as these might be indexed to sequences of intensification (Spooner 1972). More recently, archaeologists have struggled to develop detailed demographic histories for specific regions and time periods, as in the Maya lowlands (Culbert and Rice 1990).
Essential to an archaeological approach to demography is the development of specific methods for accurately estimating prehistoric populations. Recognizing that it is impossible to conduct a “prehistoric census,” archaeologists must rely upon some form(s) of proxy measure of past population. Although many specific variants have been put forward and elaborated for use in specific contexts, such proxy measures can be grouped into four major categories, based upon the kinds of data utilized: (1) osteological demography; (2) settlement demography; (3) dating curves as proxy models; and (4) productivity or carrying capacity approaches. We briefly review each of these approaches, with specific reference to their prior and potential application in the Pacific.

Osteological Demography

While we cannot go back in time to carry out a census of prehistoric people, skeletal remains — especially when these are concentrated in cemeteries or other specialized burial facilities — do provide direct evidence of past populations. Physical anthropologists and paleodemographers have expended much effort on developing techniques for reconstructing key demographic parameters from such skeletal series, especially through the construction and interpretation of life tables (Angel 1969; Weiss 1973; Moore et al. 1975). In theory, such life tables allow one to infer such parameters as survivorship, age-specific mortality, and life expectancy. Nonetheless, the use of life tables derived from skeletal remains is very much affected by issues of sampling and representativeness (such as the frequent underrepresentation of infants or other subgroups within a population). Moreover, the interpretation of such tables typically requires an assumption that the population in question was stable and stationary. Skeletal series are often accumulations representing long periods, often hundreds of years, during which times the population in question may have undergone significant changes in patterns of fertility and mortality. These are assumptions that cannot always be made for prehistoric groups, leading to various critiques of osteological demography (e.g., Bocquet-Appel and Masset 1982; Sattenspiel and Harpending 1983).

Some use has been made in the Pacific of life table analysis of pre-Contact populations, where sufficiently large skeletal assemblages have been recovered through archaeological excavations, such as at Mōkapu, Pu‘u Ali‘i, or Keōpū in the Hawaiian Islands (Snow 1974; Underwood 1969; Collins 1986), the Hane dune site in the Marquesas (Pietrusewsky 1976), the ‘Atele burial mounds on Tongatapu (Pietrusewsky 1969), or the Taumako cemetery in the Duff Islands (Houghton 1996). Kirch (1984, 111–116) drew upon four of these cases from Hawai‘i, the Marquesas, and Tonga to suggest some demographic responses to density. However, given the problems noted above, such interpretations are open to question.

While osteological demography can tell us much about the health and mortal-
ity patterns of populations, it cannot provide data on growth rates or on absolute population numbers. For this reason we did not attempt to include the life table approach within the scope of our workshop. Moreover, recent sociopolitical trends in the Pacific, as elsewhere, have rendered the study of prehistoric skeletal remains problematic or impossible. In Hawai‘i, for example, all significant collections of human remains have now been reburied under the terms of the Native American Graves Protection and Repatriation Act (NAGPRA), and newly discovered remains are typically subject to immediate reinterment without analysis.

Settlement Demography

Certainly the most widely used, if methodologically varied, approaches to estimating past populations on the basis of archaeological data have involved some form of “settlement demography” (Paine 1997, 4–6). Under this rubric we may include any methods that attempt to count past populations through some proxy measure of human settlement, whether this be numbers of settlements, areas of settlements, rooms per settlement, “packed house volumes,” individual houses, house floor area, or other measures (Cook 1972; Ammerman et al. 1976; Hassan 1981, 63–92). Essentially, these methods are a form of archaeological census taking involving the quantification of some aspect of human settlement or residence, with an assumption that material remains in evidence — in a quantifiable unit — are related to some mean number of persons. Perhaps the best-known example is Naroll’s (1962) application of cross-cultural comparative ethnographic data to establish a mean value for floor area in relation to population. A rigorous example from the Maya lowlands is Turner’s (1990) use of house counts.

Settlement demography is not without its own problems and issues (e.g., Santley 1990), some of which derive from the particular culture-specific ways in which people house themselves, frustrating any attempt at a “one-size-fits-all” archaeodemography. Other problems concern the importance of dating control and contemporaneity of structures, reoccupation of houses, and the range of variation in average family or household size. In theory, however, many of these problems are resolvable or at least amenable to parameterization within an acceptable error range, thus permitting archaeological census taking to proceed.

Settlement demography is the most important approach used by the contributors to this volume. In the Pacific, despite wide variation in the nature of residential housing and settlement patterns (see Oliver 1989 for a review of these), there is a strong tendency toward permanent residential structures, each associated with a household group — often an extended family unit. Moreover, such household residences often (but not always!) left archaeological traces — such as stone-walled enclosures, curbstone outlines, or stone-faced platforms and terraces — that are readily identifiable through archaeological survey and excavation. In the chap-
ters to follow, specific examples of settlement demography are presented for the Hawaiian Islands, the Society Islands (Mo’orea), and the Marquesas.

**Dating Curves**

John Rick (1987) suggested that the cumulative record of radiocarbon dates available from the preceramic period of Peru might be taken as a proxy measure of population, introducing the notion of “dates as data.” The basic assumption here is that the amount of cultural burning in a specific region — given consistent cultural practices in cooking, hearth making, and so on over time — will be proportional to the overall population. Given a large enough sample of radiocarbon dates from cultural contexts — and again assuming that there is no bias in the selection of samples from any particular time period (an important assumption) — the total sample of dates should provide a proxy measure of population. However, this can only be a *relative* measure, not a basis for estimating absolute population sizes. Thus a sample of dates, when plotted over time, should in theory be able to tell us something about relative *rates* of population growth, stability, or decline over that time period.

In the Pacific, this approach has been used by Dye and Komori (1992b) to derive the historical trajectory of population growth in the Hawaiian Islands. Using a further modification of this method that linked the recent end of the dating curve to historic-period census data, Dye (1994) also attempted to generate an absolute estimate of the pre-Contact Hawaiian population, but this requires making a number of questionable assumptions, as discussed in detail in chapter 4. In this volume, we not only reevaluate the Dye-Komori dating curve model for Hawai‘i, but we look at the application of the method to Mo‘orea in the Society Islands (Hamilton and Kahn, chapter 8), and to Kosrae in Micronesia (Athens, chapter 11).

**Carrying Capacity Approaches**

The fourth and final approach to archaeological demography involves some form of estimating the resource potential (or agricultural production capacity) of a specific environment or region and thus the total number of persons who might, in theory, be supported by this environment. Such approaches may be referred to as “carrying capacity” estimates, taking the term from population biology for the theoretical maximum population (K) that can be sustained in a given environment. The literature on carrying capacity and the various assumptions and problems associated with its use, especially for human populations, is vast and cannot be reviewed here (but see Hassan 1981, 164–173; Glassow 1978; Dewar 1984). A fundamental problem with this approach, however, is that human populations rarely if ever achieve such maximal levels of K, and they certainly do not sustain them over long periods. Thus estimates of K provide only a theoretical upper limit.
for population, given some specified technology and environmental conditions. Nonetheless, such estimates may be useful as a cross-check on population estimates derived from settlement demography or other methods.

In the Pacific, there have been attempts to estimate the carrying capacity of particular islands or sections of islands, such as Bellwood’s (1972) attempt for Hanatekua Valley in the Marquesas. More useful, however, has been the application not of total carrying capacity but of the estimated production or yield of specific agricultural systems, especially when these systems have been documented through archaeological survey. Spriggs (1981), applying Bayliss-Smith’s (1978) methods for estimating “standard populations,” pioneered this approach in Aneityum. Similarly, Spriggs and Kirch (1992) used such a model to estimate the potential agricultural production of the irrigation systems of Anahulu Valley, O‘ahu, in the early post-Contact era. As population numbers were known independently from census data, these estimates could be used to evaluate the potential levels of surplus production.

In this volume, several contributors apply variations of the carrying capacity approach—or more specifically, agricultural production models—in order to estimate potential population sizes (see chapters 6, 8, 11, and 12). Often such estimates are used in conjunction with some method of settlement demography to provide independent cross-checks on population estimates, and in our view this is the best application of the carrying capacity approach.

Long-Term Demographic Evolution in Pacific Societies

Resolving the uncertainties surrounding the sizes of Contact-era populations in various island societies—attempting to develop some new, independent criteria on which to evaluate the competing claims of Forster and McArthur and to address Stannard’s challenge—is certainly one goal of archaeological demography in the Pacific. But it is by no means the only objective. Equally important is understanding the long-term demographic evolution of island populations. Many questions arise when we begin to ask what were the historical trajectories of Pacific populations over the hundreds and thousands of years that people occupied various islands. Were founding populations typically small and potentially vulnerable to extinction? How fast did populations grow under “pristine” conditions, in the eastern Pacific at least, without the constraint of most Old World diseases? Had island populations typically stabilized by the time of their encounter with Europeans, or were they still increasing? What are the correlates of the recent findings that initial settlement dates for Eastern Polynesia appear to be later than originally estimated: number of settlers, subsequent immigration, and their cultural implications? Given human reproductive potential and pristine
environment, growth rates were certainly much higher among Polynesian settlers with developed agricultural techniques than in Neolithic communities or even sixteenth- and seventeenth-century Europe, and even the largest islands and archipelagoes could have been populated right up to their theoretical carrying capacity levels long before European contact (see Rallu, chapter 2). Did this happen, or were populations regulated and stabilized well below maximal density levels?

In his 1984 book on the evolution of Polynesian societies, Kirch laid out six different theoretical models for long-term population growth on remote Oceanic islands. These included (1) extinction, (2) exponential, (3) logistic, (4) overshoot or “crash,” (5) oscillating, and (6) step models for population growth on islands (Kirch 1984, 101–104, fig. 27). He suggested that it was possible that any of these different models might apply in a particular historical case, but that in general some form of a modified logistic model might be the most common. The Hawaiian case, tested on settlement data from west Hawai‘i Island, seemed to validate at least one instance of a logistic growth model (104–111). This led Kirch to suggest a more general set of propositions concerning early (colonizing) versus late (pre-Contact) populations in Polynesia (table 16), which can be summarized in Table 1.1. In part, this set of hypothesized correlates reflects the cultural equivalent of the r/K selection continuum proposed by MacArthur and Wilson (1967) as a general process in island biogeography (Kirch 1984, 86–87).

Whether such a general model, from density-independent to density-dependent conditions, accurately or adequately accounts for long-term demographic change on islands is a matter that requires empirical testing. Moreover, whether such a transition would be best modeled as a logistic process or as some more abrupt and nonlinear type of transition (such as the rapid onset of stability after a phase of exponential growth) needs to be determined through the acquisition of fine-grained temporal data on population sizes and growth rates for particular islands. There was much discussion and debate surrounding this problem at the Mo‘orea workshop, and it is probably premature to attempt any synthesis at this stage in our research. Nonetheless, there was general agreement that understanding the underlying sequences of population growth and regulation is key to broader efforts at interpreting the longue durée of sociopolitical evolution in island societies.

The Collapse of Contact-Era Populations

Assessing population trends from initial settlement to reach high pre-Contact densities is only part of the problem. The collapse that followed European arrival still remains to be explained. Such tremendous decline has rarely been studied in depth and remains controversial in the pre-Columbian Americas and the Pa-
cific as well. A reduction of population to around 5 percent of its contact size is something that must be scrutinized and cannot be accepted without question. It was probably the main reason for rejecting Cook’s and other explorers’ figures. With some legitimate reasons, historians recently intended to revise the virgin soil hypothesis. However, there are well-documented cases of extremely high epidemic death rates in the nineteenth and early twentieth centuries, as well as year-to-year rapid decline over decades. But the poor health situation in the first decades of colonization, with almost no medical services to combat introduced diseases — respiratory, digestive, and sexually transmitted — and the effect of new ways of life with immoderate consumption of alcohol (often adulterated or locally brewed from coconuts) certainly played a role that may be more important than the virgin soil factor. Given the new evidence of high densities, the collapse can no longer be put in question, in some islands at least. But was it a general phenomenon, or were some islands or archipelagoes spared the devastation? These new findings in the direction of early estimates raise more questions on the process and causes of population decline that followed. Such collapse also bears strong consequences for native communities with respect to their cultures and social structures and the rapid changes they had undergone in the nineteenth century.

Whereas population modeling applies to the pre-Contact period, with a need to constrain models with data on archaeology and other sciences such as biology when more information will be available on environmental change, the post-Contact era is certainly a field for historical demographers. But as data on the first decades are critically missing, once again, densities provided by other sciences will remain the only measure of the adequacy of retrodictions. In other words, if it is accepted that only about 5 percent of the Marquesan population at contact remained in the early twentieth century, does this also apply to other islands or archipelagoes? Multidisciplinary work will be more necessary than ever to bring

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Early, colonizing populations</th>
<th>Late, precontact populations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>Small (&lt;100)</td>
<td>Large</td>
</tr>
<tr>
<td>Density</td>
<td>Low (&lt;10/km²)</td>
<td>High (range 50–250/km²)</td>
</tr>
<tr>
<td>Intrinsic growth rate ($r$)</td>
<td>Relatively high</td>
<td>Low</td>
</tr>
<tr>
<td>Mortality</td>
<td>Density independent</td>
<td>Density dependent</td>
</tr>
<tr>
<td>Cultural regulation</td>
<td>Limited; relaxation of incest taboo in Eastern Polynesia</td>
<td>Important: abortion, warfare, celibacy, infanticide, other controls</td>
</tr>
</tbody>
</table>
answers to the questions of the size and density of Polynesian populations at contact, their various phases of growth, and the magnitude of decline and its various forms. In the vast Pacific, answers from multidisciplinary research will be local and any generalization will be dangerous. However, these answers will have the strength of observation against the wide range of uncertainty offered by models.

Précis of this Volume

The fifteen chapters to follow address, through a variety of approaches and case studies, the various themes outlined above. Most but not all of the contributions are by archaeologists who are attempting to bring the data of prehistory to bear on questions of pre-Contact demography and long-term population growth. Chapters 2 and 3, however, set the stage for these archaeological case studies by raising more general issues from the standpoint of historical demography and population ecology. Rallu looks at the potential for reproduction and growth rates in island settings and compares these to what archaeologists think they see in the pre-Contact record. In addition, he turns his analytical lens around and reassesses the potential rate of post-Contact population collapse, raising new questions about the impact of “first contact.” In chapter 3, Shripad Tuljapurkar, Charlotte Lee, and Michelle Figgs look at the problem of population regulation in island environments, with special reference to limits on agricultural production and how these may have contributed to population control and stabilization.

Chapters 4 through 7 all focus on the Hawaiian Islands. Although one of the last island groups to be settled by Polynesians and thus with a relatively short time depth (at least compared with islands in the western Pacific), Hawai‘i is of great interest to Pacific paleodemography for several reasons. First of all, we have the controversy over the size of the Hawaiian population at first contact, which epitomizes the larger debate about historical demographic reconstructions. Second, archaeological approaches to pre-Contact demography have a longer and more intense research history than in most other Pacific islands. If there is real potential for archaeology to contribute to the problems of long-term demographic history, then Hawai‘i will be a key proving ground. In chapter 4, Kirch reviews prior efforts along these lines, assessing what we have learned and what still needs to be done. This is followed in chapters 5 through 7 by three specific case studies, all using some variant of the settlement demography approach. Chapter 5, by Thegn Ladefoged and Michael Graves, models agricultural development and demography in Kohala, Hawai‘i Island, and in chapter 6 Kirch considers the paleodemography of Kahikinui, Maui. Ross Cordy, in chapter 7, also brings the post-Contact documentary record of the Mahele land records and censuses to bear as a cross-check on his archaeological survey data.
In chapters 8 and 9, we look at two valley case studies from French Polynesia. Hamilton and Kahn (chapter 8) apply a multidisciplinary approach to the large valley of ‘Opunohu on Mo’orea in the Society Islands. Ethnohistoric documents, house counts, and estimates of agricultural productivity are all used to try to constrain a range of possible maximal population estimates for the valley. For Hokatu Valley on the island of Ua Huka, Eric Conte and Tamara Maric (chapter 9) use a Marquesas-specific variant of the house count approach, made possible by the ethnohistoric record of culture-specific sleeping practices.

We then turn to Western Polynesia, where David Burley (chapter 10) evaluates the archaeological record for long-term population trends in the Kingdom of Tonga over nearly three millennia. In Tonga, the particulars of the archaeological record do not favor a house count approach, but some form of settlement demography is still possible, as he demonstrates. Chapter 11 is by Roger C. Green, who originally wrote it some decades ago as he was completing the first systematic archaeological work in Western Samoa; it addresses discrepancies between the historical demographic estimates of McArthur (1967) and what is implied by the density of surface archaeological remains. This is followed by a close look at the Tokelau Islands of Western Polynesia by Roger and Valerie Green (chapter 12), who draw upon a rich set of ethnohistoric records to reconstruct the demographic processes on these small atolls within the past several centuries. The Tokelau case provides an excellent model for various demographic parameters under traditional Polynesian economic and social conditions.

Moving farther west, J. Stephen Athens (chapter 13) looks at the Micronesian high island of Kosrae, noted for its intensive arboricultural system dominated by breadfruit production. Athens uses a radiocarbon dating proxy model to assess long-term demographic trends and also assess the question of maximal population of Kosrae through an agricultural productivity model. For Aneityum in southern Melanesia, Matthew Spriggs (chapter 14) applies estimates of agricultural production to estimate population levels in the late pre-Contact era and compares these to the historical demographic record of the early missionaries. And Christophe Sand, Jacques Bole, and A. Ouetcho (chapter 15) turn to the vast, near-continental island of New Caledonia, for which the historical record had suggested extremely low population densities in the later nineteenth century. Based on the extensive archaeological evidence for dense inland settlement, they question the validity of these historical estimates, hinting that the impact of first contact in La Grande Terre may have been far more severe than previously reckoned. In a concluding commentary, Kirch (chapter 16) canvases the fundamental problems of "methods, measures, and models" in Pacific paleodemography.
Notes

1. Norma McArthur had died before Stannard’s book was published, eliminating the possibility of what surely would have been a lively and contentious debate between them. Stannard, citing a personal communication from historian Gavan Daws (1989, xvi, 82), says that McArthur herself was working on the question of Hawaiian Contact-era population at the time of her death and was inclined toward reducing the estimated population to less than 100,000.