Advances in Archaeological Practice is a peer-reviewed journal that seeks to share solutions in the broad practice of archaeology. Launching in 2013, the full-color digital journal is published four times per year. The journal publishes original articles that present creative solutions to the challenges archaeologists face in the ways that they approach the archaeological record to learn about the past and manage archaeological resources. “Practice” is defined broadly and topics can include, but are not limited to, innovations in approach, technique, method, technology, business models, collaboration, compliance, process, ethics, theory, public engagement, and training. The journal is a benefit of membership in the Society for American Archaeology (SAA).

For author guidelines, editorial board, sample articles, and much more, please visit the journal’s page on SAAweb (www.saa.org).

Look for the link to the courtesy issues available in 2013!

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FORUM: NATIVE HAWAIIAN PERSPECTIVES ON ARCHAEOLOGY PART 1 OF 2 GUEST EDITOR: KATHLEEN KAWELU

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On the cover: Excavators at work in area DD at Marj Rabba (see page 27).
This issue of the magazine is a perfect example of why I have loved serving as the Editor of The SAA Archaeological Record. The diversity of archaeology today is fascinating—the many perspectives and values that inform views of the past, the innovations in technology and its applications that colleagues invent to solve archaeological problems, and the continual renewal of archaeological materials to yield new and interesting information about those who lived before us. When Kathleen Kawelu contacted me last year about publishing a forum on Native Hawaiian perspectives on archaeology, I couldn’t think of a better way to lead up to the SAA meetings in Honolulu. The content of the forum does not disappoint, and in January and March readers will have the opportunity to learn about archaeology on these islands from a perspective not previously represented in the magazine. I believe it will enrich many people’s experiences in Hawai’i as they engage ideas at the meetings and indulge in sightseeing excursions that bring them face to face with the local landscape. I cannot thank Kathy enough for her hard work on this forum, and for her work in helping to make the upcoming meeting in Honolulu a success.

The individual articles in this issue are a perfect example of the diversity of what SAA members submit to share with you through the magazine: salvage archaeometry, futures in publishing, new uses for Google Earth, and really cool quadcopters and the like! These articles were either brought to me as an idea for a piece in the magazine or sent to me as unsolicited manuscripts. While I often draw on my own resources and networks for content, it is always ideal when authors offer to share their experiences and ideas through the magazine. The community of archaeologists in our organization consistently impresses me, and it is a privilege to facilitate exchanges among the SAA membership.

I have mentioned before that I am working on an index for The SAA Archaeological Record from its inception in 2000 through 2012. This project is on track for completion by the time I step down as editor at the annual meetings in April, and I hope will help you all engage the diversity of materials the magazine covers with greater ease.

Finally, it is with great sadness that I say goodbye to John Neikirk as the SAA Manager of Publications. I have enjoyed working with John and appreciated his professionalism, his commitment to collaborative work and excellent production, and his strong sense of work-life balance. All of these things have made our partnership an incredibly pleasant and productive one from my perspective, and I can assure you I could not have done my job without his help, patience, and support. So good luck John in your future endeavors and thanks for everything. You will be missed!
A Taste of Honolulu

The 78th Annual Meeting will be a hallmark meeting for the Society, with the second-largest number of submissions ever, and a plethora of unparalleled activities. The venue will be the Hawaii Convention Center, along with the headquarters hotel, the Hilton Hawaiian Village. Please feel free to explore the content and fabric of the meeting through the Preliminary Program which is posted on www.saa.org. Preliminary programs were also dropped in the mail at the end of December. Even if you are already registered because of a participant role, you will want to peruse the program and take advantage of the workshops, field-trips, lu‘au, and other events now open for registration.

In addition to the President’s Forum/Opening Session, The Future of Archaeology: Engagement with Descendant Communities, scheduled for 6 pm–8 pm on Wednesday, April 3 at the Hilton Hawaiian Village, the Ethics Bowl, exhibits, symposia, forums, and posters you can choose from activities including:

 ►An Authentic Hawaiian Lu‘au Saturday, April 6 from 6–9pm! Experience the true local flavor and Hawaiian culture on the beautiful grounds of the Bishop Museum. The lu‘au will feature traditional Hawaiian cuisine, music, and dancing. Tickets are available for 300 attendees. Details are provided in the Preliminary Program. This is absolutely a not-to-miss event!

 ►Extraordinary field trips—Including Joint POW/MIA Command (JPAC), Central Identification Laboratory (CIL), Lyon Arboretum and Botanical Garden, a behind the scenes tour at the Bishop Museum, Makua Training Range, and Kaniakapupu, Summer Residence of King Kamehameha III. Check them out!

 ►FameLab: Exploring Earth and Beyond—Sponsored by SAA, NASA, and National Geographic

FameLab EEB is fun-filled day of competition, coaching, and camaraderie that’s all about communicating! It’s something like American Idol for archaeologists...you give a 3-minute powerpoint-free talk to a panel of judges...but unlike American Idol, the feedback is strictly constructive! There’s a communication training workshop, too, so everyone wins.

We invite you to compete to convey your own research or related science concepts. Each contestant has the spotlight for only three minutes....no slides, no charts—just the power of words and any prop you can hold in your hands. A panel of experts in both science and science communication will do the judging.

The heart of FameLab EEB’s lies beyond the excitement of the competition element—at each event, there is a science communication workshop led by professionals in the field. These workshops provide insight into how best to talk to stakeholders along your career paths such as department heads and political representatives, but also voting neighbors and relatives, youth in your communities, and perhaps even to broad public audiences through the lens of a camera or the voice of a blog. The skills you gain in these workshops can even carry over into effective proposal writing!

From teaching evolution to planetary exploration to climate change, public interest in science is high. In this landscape, strong science communication skills are critical to sustaining credibility and funding. And in today’s media-intensive environment, your ability to convey your science can reshape the face of science exploration and discovery.

Join us during the SAA Annual Meeting on Thursday April 4 ... give a 3-minute talk, get a career’s worth of science communication networking and tips from the pros!

Registration, eligibility requirements, and more info can be found at: http://famelab-eeb.arc.nasa.gov/

Questions can be directed to Daniella Scalice at the NASA Astrobiology Program daniella.m.scalice@nasa.gov or April Chabries at National Geographic Society (achabrie@ngs.org)

►Have a look at the range of workshops from Faunal Data entry and Integration in tDAR, Best Practices in teaching Archaeology Online, Comparative and Complementary 3D Documenta-
I just had the privilege of reviewing the galley proofs of the Preliminary Program for our 2013 Annual Meeting in Honolulu this coming April. Of course, by the time you are reading this, the program will have been mailed out to you and posted on SAAweb. The program will begin on the evening of Wednesday, April 3 and continue till Sunday, April 7 at noon. Our first event will be the President’s Forum on Wednesday evening, “The Future of Archaeology: Engagement with Descendant Communities.” Given that the future of Archaeology is dependent upon positive working relationships between archaeologists and descendant communities, I think you will agree that this is an excellent way for us to kick off our 78th annual meeting.

After Wednesday night, we have scheduled over 1,000 individual papers and posters, 170 organized sessions, and 13 forums for you to attend. Over twenty of the organized sessions are sponsored by interest groups, SAA committees, private firms, journals, and other scholarly organizations, and governmental agencies. For example, this year sees the inauguration of the Frison Institute Symposium with a session entitled “Dates and Data: New Applications of Radiocarbon Dating to Archaeological Problems.” Friday afternoon the 2013 Fryxell symposium will honor the work of Anthony F. Aveni. Other sessions honor other notables including Leigh Kuwanwisiwma, Patrick Kirch, Henry Wright, Bill Isbell, Ken Ames, Richard Gould, and Bernard Waines. The Rock Art Interest Group is sponsoring two sessions, “Rock Art in Broad Perspective: Method and Interpretation in Contemporary Practice” and “Our Land is Girt by Sea: Rock Art, Seascapes and Inscribed Meanings.” The Zooarchaeology and Bone Technology Interest group is sponsoring a double session on beads, beadwork, and personal adornments that will be held Saturday. These are just a sampling of the variety of sponsored sessions you will have to choose from.

Appropriate for the venue are the numerous sessions and forums that focus on Oceania and the Pacific Rim in general and the Hawaiian Islands specifically. For example, on Thursday there will be a two-part session organized around theoretical and methodological issues of colonization in Oceania. On Friday afternoon, a number of sessions will interest Pacific Ocean scholars including “Pacific Ethnographies in World Archaeologies” and “Collaborative Research in the Pacific Basin and Beyond: Re-Shaping Archaeological Practice to Provide Space for Communities.” These are followed by the “Binding the Cord for a Stronger Hawaii: Hawaiian Transformations in Archaeology and Cultural Resource Management” forum on Saturday morning and on Sunday the “Archaeologies, Legacies, and Heritages of Colonial Encounters in the Pacific and the Caribbean” session.

When you need a break from the papers and posters, there are events aplenty to attend. The Ethics Bowl preliminary rounds will be held on Thursday morning with the main event Thursday afternoon. Many of our interest groups will be meeting Thursday afternoon. Of course the exhibit hall (open Thursday, Friday, and Saturday between 9 am and 5 pm) will hold nearly 40 different vendors, CRM firms, publishers, and affiliated associations. While you are perusing the books and wares, don’t forget to review the State Archaeology posters (cast your vote before noon on Friday) and place a bid at the Native American Scholarship silent auction.

A number of events for new and current members alike are scheduled. On Wednesday evening there will be a reception for all SAA student members, new members, first-time attendees, and committee and task force volunteers. This is a great opportunity to start building your professional networks. Also the Student Affairs Committee will host a Student Day on Saturday, April 6. Please don’t forget the Annual Business meeting and awards ceremony on Friday night from 5:00–6:30 pm. Wednesday through Saturday there will be a variety of workshops on topics such as the Digital Archaeological Record, teaching archaeology online, 3D documentation, and airborne laserscanning. The CRM Expo will be held Saturday starting at 1:30 pm.

As usual, there are a number of local attractions and tours available. Destinations include the Joint POW/MIA Command Central Identification Laboratory, the Lyon Arboretum and Botanical Garden, a Behind-the-Scenes tour of the Bishop Museum’s
Perishables Fibers, the U.S. Army’s Makua Training Range, and the Summer Residence of King Kamehameha III. And don’t forget to purchase your ticket for the Hawaiian Lu’au held at the Bernice Pauahi Bishop Museum on Saturday night from 6:00-9:00pm. Your ticket will include roundtrip transportation, authentic Hawaiian foods, contemporary Hawaiian music, Hula performance, and access to the Bishop Museum’s Hawaiian Hall and Abiga’1 Kinoiki Kekaulike Kahili Room.

Of course, I want to thank the members of the Program Committee who in just a few short weeks reviewed the submitted abstracts and helped to assemble the program: Keith Ashley, Jane Eva Baxter, Caryn M. Berg, Virginia L. Butler, Ethan E. Cochrane, Liam Frink, Brett Hill, Terry L. Hunt, Joseph W. Lehner, Ernest S. Lohse, Desiree R. Martinez, Jerry D. Moore, Juliet E. Morrow, Marit K. Munson, David L. Peterson, Sean Rafferty, Kathryn Reese-Taylor, John D. Rissetto, Kari L. Schleher, Rebecca H. Schwendler, Miriam T. Stark, Christina Torres-Rouff, Mary Beth D. Trubitt, Christian Wells, and David R. Yesner. I would also like to thank the SAA staff, particularly both Cheng Zhang and John Neikirk for all their support and assistance throughout the effort of assembling the program. Finally, I offer my sincere gratitude to my Program Assistant, Shaza Wester Davis, whose skills, knowledge, hard work, and virtuosity with Excel made assembling the program possible.

Come to FameLab!
Thursday, April 5
Exploring Earth & Beyond with NASA and National Geographic
Luʻau in contemporary Hawaiian culture bring together family and friends to celebrate key moments in life, such as a baby’s first year of life, a wedding, or a graduation. The annual gathering of friends and colleagues for the SAA meeting in Honolulu is an excellent reason to celebrate.

The festivities begin with a brief welcome by keiki (children) from Pūnana Leo o Mānoa, a Hawaiian language immersion school. Children enrolled in ‘Aha Pūnana Leo schools receive their instruction and education in Hawaiian so the native tongue will be perpetuated for generations to come. Throughout the evening we’ll be entertained by local performers as well, sharing traditional and contemporary Hawaiian music, and accompanied by hula dancers.

Food is central to the luʻau, and we’ve chosen Ha ili’s Hawaiian Foods, a family owned and operated restaurant as our caterer. Since 1950, three generations of this Hawaiian-Chinese family have served up ‘ono (tasty) Hawaiian food to the people of Hawaiʻi. Locals attending the event will not be disappointed, as the usual fare of luʻau food will be served. For the newcomer, this will be an opportunity to try Hawaiian delicacies such as kalua pig (baked pig), squid luʻau (squid in a taro leaf/coconut milk stew), lomi lomi salmon (salted salmon with tomatoes and onion), ‘uala (sweet potato), poke (raw fish), poi (baked and pounded taro), and haupia (coconut pudding). Beverages will be provided, but beer and wine will also be available for purchase, providing guests an opportunity to sample Hawaiʻi’s local beers.

The Bernice Pauahi Bishop Museum in Kalihi Valley, the site of the luʻau, is the oldest anthropological institution in Hawaiʻi. The exhibits in the newly renovated Hawaiian Hall will be available during the luʻau so guests can learn about Hawaiian culture, from the realm of the gods through key moments of Hawaiʻi’s ancient and contemporary history. Visitors will also be able to view an interpretive display of kāhili, the feather standards that were so vital to Hawaiʻi’s traditional royalty, as well as many other exhibits. The Museum gift shop will also be open for guests who wish to purchase books and locally-made crafts.

Space is limited to 300 guests, so be sure to sign up for the luʻau when you register for the conference. For registered program participants, you can still sign up for the Saturday luʻau: simply use the advance registration form near the end of the preliminary program, and also online at www.saa.org/annualmeeting.

Looking forward to seeing you at the luʻau!
Apparently, I joined the SAA at the beginning of my third year in graduate school, in the middle of 1973, because I have a continuous run of *American Antiquity* starting with the July 1973 issue. But SAA became more important to me when I took my first (and, as it turned out, long-lasting) permanent job at the University of North Carolina at Charlotte, in 1980. At that time, and for several years following, I was the only professional archaeologist for 60 miles in any direction. I was teaching in a program of 12 sociologists and only five anthropologists. So, I became very much a generalist, teaching Old and New World archaeology, field school, Introduction to Anthropology, and so on. In order to maintain my identity as an archaeologist, my networks through professional organizations were essential. For several years, SAA and other professional organizations meant mostly socializing and presenting papers at annual meetings. But, I had an exemplary mentor in Prof. Patty Jo Watson, of Washington University, who had been my Ph.D. advisor, and served the SAA, as well as NSF, NEH, the AAA, and her university, in many roles. So, beginning in the early 1990s, I began participating in SAA committees.

Over the past 20 some years, I have worked for the SAA in the areas of awards, ethics, and on the Board of Directors (twice). My forte is not the big vision thing; rather, my strength is in managing details. I could tell you about why a professional organization cannot reach its goals without the active participation and support of its members. I could tell you about how important it is for the membership to support SAA in order to support high-quality archaeological research, appropriate preservation and cultural resource management policy, and skilled teaching at all levels. All true, but, the most important for me is: volunteering for SAA is fun. Of course, there are tedious moments (although about those moments, I could say much more from the perspective of being a department chair!), but the accomplishments are fulfilling. And, the people I have met have enriched my life and provided friendships I would not have made otherwise. The staff members who work for SAA and all the archaeologists who contribute to its governance are smart, funny, hard-working, and a great pleasure to spend time with.

Volunteering for SAA has also changed my professional trajectory. The SAA alone was not responsible for this, because during the same period, I have served in governance of the American Anthropological Association and the Southeastern Archaeological Conference as well. Together, the volunteer work I have done for these organizations led to me to publish about gender in archaeology, ethics in archaeology and anthropology, and the relationship of archaeologists and Native Americans. Serving on Student Paper Award committees for both SEAC and SAA and the Dissertation Award Committee of the SAA taught me a lot about graduate students, all of which came in handy when we were creating our own M.A. program, which was inaugurated in 2011.

Having worked in one university for over 30 years, and volunteered for multiple professional organizations for over 20 years, I can tell you that SAA is well managed. There are structures within which committees and task forces must work, so not every request is going to be successful. The globalization of both the economy and of archaeology is challenging us to expand our vision. The multiple needs and viewpoints of the membership mean that we have to make hard choices. But, SAA welcomes the insight and the energy of diverse individuals from diverse work settings. I have been standing up for Old World archaeologists (my original incarnation) in SAA for many years. SAA needs your expertise. At the same time, I think you will gain as much as you offer: expansion of your professional networks, influence over the future of the profession, interesting travel, and great friends.
The business and technological models for scholarly publishing are rapidly changing, and we need to understand what this means for books, journals, technical reports, and data. Archaeologists are grappling with the effects digital publishing will have on how we disseminate and access archaeological knowledge. These concerns affect decisions about what and how we write, where we publish, and who can access our work. At the 2012 Society for American Archaeology Annual Meeting, we held a forum titled “The Future of Archaeological Publishing” to discuss the value and advantages of print versus digital formats, the ramifications for scholarly publishing, differential access to scholarship, and who pays if we want Open Access.

Technologically, the future is here. Publishers and digital archives (such as JSTOR and Project Muse) have been providing serialized publications to academic and public libraries since 1995. Increasingly, books are becoming digital products. Books, either whole or by chapter, are made available to individuals and libraries. Scholarly publishers prepare content as PDFs and in formats compatible with various e-readers. There are a variety of digital rights management protocols that affect the user’s ability to read, download, and share files over some period of time. Digital books are distributed through publisher websites and booksellers such as Amazon. Libraries can now acquire collections of titles from the University Press Content Consortium (UPCC) at Project Muse (http://muse.jhu.edu/about/UPCC.html)—a consortium of 65 university presses—and Books at JSTOR (http://about.jstor.org/books), a collaboration of 13 publishers offering 20,000 e-books. In addition, projects like E-Gutenberg and Google Books make scholarly and popular books freely available, creating challenges for the interface of copyright law and digital technology. The digital medium is increasingly enabling the publication of supplemental materials to enhance journal articles such as data sets, videos, and graphics. These tend to be housed on publishers’ servers, regardless of the digital library or archive in which the journal itself resides. In addition, data sets, data clouds, and any product of archaeological research that can be digitized, can now be preserved in archives that are committed to preserving, maintaining, and enabling access in perpetuity. Initiatives for digital archives include the Digital Archaeological Record (tDAR) developed and maintained by the Center for Digital Antiquity, Open Context, and the Archaeology Data Service at the University of York in the United Kingdom.

The Society for American Archaeology is cautiously moving into the digital publishing arena, as well. In May 2012, current issues of American Antiquity and Latin American Antiquity were made available online to members through MetaPress; current issues for institutions are expected in 2014. The SAA Archaeological Record has been online and available to the public since 2001 and its predecessor the SAA Bulletin commenced digital publication in 1993. The SAA Publications Committee and editors are currently developing guidelines for supplemental materials.

Few, if any, technological barriers restrain archaeologists from using digital media more fully in scholarly communication. However, there are several cultural and business decisions that limit the effective digital dissemination of knowledge by archaeologists. One obstacle is associated with the university culture of tenure and promotion, which is heavily weighted toward refereed publications (e.g., see Harley et al. 2010: Executive Summary, ii; and Archaeology Case Study, p. 30). Other obstacles derive from limited access to digital information in developing countries, and from differential access to digital information within the United States based on whether an archaeologist has university library privileges or not. The differential access to digital forms of knowledge within and outside the United States adversely affects scholarship by archaeologists employed in government and the private sector. Access to scholarship is at the center of digital debates.

Open Access

Vehement arguments are being made for and against Open Access journals—journals that do not charge individual readers...
or institutions for access. Some Open Access business models call for authors to pay a fee for publishing articles, a model that is not conducive to existing forms of archaeological funding. Philosophical arguments for Open Access recognize the desirability of free flowing and quickly accessible information. In addition, government supported research (as so much of archaeology is) carries obligations of public access and utility. Open access is policy for some agencies, including the National Institutes of Health, and some universities. Universities such as Harvard, Stanford, and the University of Pennsylvania have mandated that pre-publication (or post-publication, if permission allows it) versions of an accepted article or book are archived in an open repository (http://roar.eprints.org/). The National Science Foundation now requires applicants to describe a data management plan that considers access and long-term preservation of research results.

Cost-based arguments for Open Access come from an assortment of users. Composite packages of serialized publications are sold to institutional or government libraries by publishers, and archiving and cataloging services such as JSTOR, Proquest, and EBSCO. Although often priced relative to the size of the user base, collections are expensive, and additional packages continue to be offered, even as library budgets are tightening and expenditures declining. Only those with library privileges can access these digital holdings. Research products are increasingly being made available to the nearly 90 percent of archaeologists who work in private sector, government, museum, nonprofit or other non-academic settings (Doelle and Altschul 2009). Yet, the costs of access remain prohibitive for small businesses, such as cultural resource management enterprises. Individual users can purchase publications, but costs accumulate quickly at $10 to $30 per download. Given this, users inside and outside academia make strong arguments for Open Access.

Open Access is not free, however. It is a business model in which the costs of publication are shifted to sources other than the reader. Whether the cost structure is ultimately more democratic can be debated. The Science, Technology, Engineering, and Mathematics (STEM) fields have been at the forefront of Open Access publication, although differences in disciplinary cultures and practices mean that STEM publication models are not easily adapted to use by anthropologists.

The speed to publication is not important, as historical research requires a lengthy incubation of arguments and establishing the chain of transmission of ideas. On the other end of the spectrum, those in the physical sciences, such as astrophysicists, publish primarily in referred journals, owned by scholarly societies but outsourced to commercial publishers for publication. Astrophysics is a small field and research and authorship is collaborative. Information is shared quickly, and sharing of preprint copy is desirable, if not mandated by granting agencies, universities, or departments. Archaeology is a heterogeneous field and publication practices are situated between those used by the humanities and those of the other sciences. Archaeology is characterized by a preservation ethic, slow publication, and is not particularly open to sharing data. Publication is through monographs and peer-reviewed journals with prestigious publishers, edited volumes, and conference proceedings.

Publishers of archaeology include large and small commercial presses, not-for-profit university presses, and societies. Each has its own business model. Scholars provide the content for and the peer review of manuscripts. This time is funded with office salary lines or project budgets, if it is compensated at all. Tasks covered by the publisher’s overhead include acquisition of material, coordination of peer review, editing, proofreading, manuscript formatting and design, printing, promotion, distribution, general administration, and inventory management. At the University Press of Colorado (UPC), the average production cost of one book title in print is $32,774 (Table 1). On the face of it, this sounds quite expensive until you consider that the average cost per journal article in print is $9,378 in the eight journals examined by Waltham (2009). Currently, the cost of book publication is paid by individual or institutional readers, and is offset by author subventions, support from scholarly societies or universities or, rarely, grant funding: additional support for journals is less common.

The production of digital humanities and social sciences journals costs about 25 to 33 percent less per page than their print-ed counterparts (Waltham 2009). The not-for-profit UPC (Table 1) digital book would be 23 percent less costly than its print counterpart, if the title was produced solely as a digital product (and if authors were willing to forgo royalties in support of an Open Access model). In general, digital anthropological scholarly books cost the reader from 0 to 30 percent below the lowest printed price, proportionate to the difference in cost between the two media.

If we move to Open Access models in which the consumers do not support the costs of publication, who will pay? In the STEM fields, the author pays and support for publication is typically built into project budgets and generally an allowable cost funded by granting agencies. In anthropology, the time for author-
ship can be built into project budgets but the cost of publication production is rarely allowed by major granting agencies such as the Anthropological Publishing Landscape

Professional societies with journals struggle to meet the high costs of publishing. The nearly 7,000 members of the SAA currently support the self-publication of two journals (with a third in development), a magazine, and a book press. In contrast, Wiley-Blackwell owns the journal of the American Association of Physical Anthropologists (N = 1,700 members), which is published six times per year, as well as producing an annual yearbook. The American Anthropological Association (AAA) (N = 11,000 members) publishes 22 journals and a newsletter supported by member dues and subscription. The AAA retains ownership of its publications, but has entered into a second five-year publication partnership with Wiley-Blackwell in an arrangement that helps the association use funding generated from more profitable journals to sustain the less profitable serials, thus supporting the intellectual diversity of the association’s publication portfolio.

Journals are a substantial member benefit of professional societies. For those who do not regularly participate in the scholarly community in other ways, such as attending annual meetings or serving on committees, it might be the primary member benefit. When society publications are placed in digital packages, even those with one- to five-year “moving walls” that allow only members the most current issues, non-members have access to a valuable member benefit, potentially lessening the incentive to join the organization. The ensuing and critical loss of dues affects the health of the organization and further limits the funds available for publication. Society journals in digital packages may earn usage fees. In its study of publications and sustainability (www.aaanet.org/issues/press/upload/Schmid-Compatibility-Mode.pdf) the AAA estimates that these returns to the society do not compensate for the loss of dues (Figures 1 and 2). As the membership size of many societies currently remains flat, the revenue stream for publications is important to the fiscal health of the organization. Societies such as the SAA will need to consider new business models for funding their publications generally, and identify alternative sources of funding if they wish to move to an Open Access model.

The one hundred public and private universities that support presses supports all of the scholarly publishing that does not go to commercial presses. Many universities do not support their own presses. University presses do not discriminate based upon the affiliation of the author and so take on the costs of supporting researchers inside and outside their own institutions. If all its book titles were published as Open Access, the University Press of Colorado estimates that its level of institutional or other publishing support would have to triple (Table 1).

In the AAA’s study of publications, one possible resolution of the cost and access conundrum might be to create “Premium Publishing” models, in which text is made available in more than one platform. An unformatted version might be made available for free in HTML. A formatted, citable, “premium” version would be available at a price better able to support the costs of production.
The online peer-reviewed Open Access journal, *PLoS ONE* (http://www.plosone.org), charges authors $1350. *PLoS ONE* further reduces both the time to publication and the costs of production by not providing copyediting. University-based journals may reduce costs by using volunteer assistants and department staff and by digital publishing through their libraries. Identifying places for reducing or streamlining costs while assuring authors and readers of quality will be the challenge of any Open Access journal hoping to attract top-level articles.

Authors seeking promotion and tenure prefer to publish in influential journals, as measured by statistics such as impact factors. On-line journals still struggle for the legitimacy of more traditional publishing venues, and their cost-cutting measures have ramifications. With inconsistent quality control, variable assurances of effective peer review, and shorter track records, digital journals generally have less prestige than more mainstream journals. Open Access journals in the STEM fields and medicine have increasingly higher impact factors. In time, anthropology journals will follow.

Part of adding authority to digital publications is establishing them within a chain of scholarship in line with the record created by print publishing. Digital scholarly publications that present new data and ideas in disciplinary debates cannot be malleable if they are to be addressed. Only a single version of a publication can be the legal copy of record under a single copyright. Further, publications need to have internet addresses with permanency or Digital Object Identifiers (DOIs); publications on faculty home pages, society websites, or Academia.edu are not sufficiently stable as a citation. Digital series are not systematically acquired by the Library of Congress, as print publications are. Thus, deliberate inclusion of “born digital” journals or books in digital archives provides stability and can help prevent the loss of this record.

**Other Dimensions of Access**

Digital publishing is exciting when we talk about disseminating knowledge across boundaries and changing the culture of our discipline to be more inclusive of ideas by a variety of colleagues across the world. The technology has the potential to cross the barriers that limit scholarship because of work setting, language, or country of practice. Publications that can be found by keyword-based searches using CrossRef or other search engines can dramatically change exposure for young scholars, reintroduce rare or early works now digitized, or identify relevant works in other disciplines.

**tDAR** (http://www.tdar.org/; http://core.tdar.org/document/376844; http://core.tdar.org/document/376847), with its focus on a wide variety of data, has the potential to open up the problem of “gray literature” (e.g., publications that do not have ISBN numbers). Over the years, a variety of databases, such as the National Archaeological Database (NADB) (http://www.cast.uark.edu/other/nps/nadb/), have provided citation-level information about technical and compliance reports, although NADB has not been updated since 2004. Digital archives provide cost-effective solutions to both the preservation of and access to digital documents, data sets, images, etc. from contemporary archaeological investigations. These data can be easily uploaded to a digital archive as a part of the regular project workflow. The cost of submitting project results to digital repositories is based on the amount of material. The business model is similar to that of other curation facilities, and the investigator
pays the cost, whether through their grant, institution, or client (Kintigh and Altschul 2010). The Archaeology Program of the NSF does permit budgeting for the digital archiving of data and reports. If contemporary archaeological studies include digital curation in their scope of work, the tremendous quantities of taxpayer funded data that have only rarely been disseminated beyond local and agency audiences can become open to wider use. When sensitivity of subject matter or protected classes of data, such as very specific site location information, are of concern, documents can be redacted or access otherwise limited (Watts 2011). Digital archives, like the Archaeology Data Service repository and tDAR, can also be used to provide access to and long-term preservation for digital data that supplement formally published books and journal articles.

Despite how many of us have received emails from Internet cafes in Yap or Yerevan, international access to digital products remains uneven. Wide dissemination can be complicated by the contradictory needs of American and other scholarly cultures. North America and Western Europe remain the primary markets for digital scholarly publications. In fact, in those areas, paper publications without a digital counterpart are rapidly becoming invisible to the modern researcher. In other parts of the world, however, paper remains the preferred medium for publication as Internet connections and computer literacy are still tools of a privileged class of scholars. The digital medium makes it increasingly possible to consider publication in multiple languages. Currently, it is more common and cost-effective for journal and book publishers to publish abstracts in multiple languages. For example, the international publisher Springer may publish an abstract in English, French, German, Spanish, Chinese, Japanese, and Arabic. Yet, English remains the international language for scholarly publication, and scholars in countries such as Latin America and China get more academic credit for publishing in English.

The technological advances established by STEM and their publishers, allow archaeologists to move from print to digital publication in ways that have the potential to disseminate information, as data or prose, widely and quickly. Differences in archaeological funding and publishing practices limit the effectiveness of the technology. Ultimately, the business models that we build for supporting our publications need to reflect our values regarding access to publishing, the quality of scholarship, the dissemination of information to a variety of stakeholders, the importance of our scholarly societies, and our willingness to invest in the health of our discipline. Developing effective and accessible digital publications is an issue every archaeologist should be concerned with.

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Recent discussions in archaeology regarding the need for data-management and data-sharing infrastructures (e.g., Kansa 2010; Kintigh et al. 2011; Snow 2010; Snow et al. 2006) apply to all aspects of archaeological inquiry and to all branches of the discipline. This includes archaeological science, or what I refer to here as archaeometry: a branch of archaeology involving the application of analytical methods from chemistry, physics, and geology to the study of archaeological material culture. Archaeometry shares with archaeology a “dirty little secret” (Fagan 2006): Results of analyses too frequently go unreported and are not made available to the scientific community. How we manage, store, and distribute our data are central to this dirty secret, but there is little public discussion of how these matters relate to archaeometry. I want to open this discussion and provide a clear example of why archaeometrists must begin looking to develop standards for data storage and data distribution.

Because of my own biases as an archaeologist, I believe the best way to direct current and future efforts is to learn from the past. Here, I describe ongoing work at the University of Missouri Research Reactor (MURR) highlighting the centrality of data-management practices to our responsibilities as scientists. My goal is to provide a real-world example to help guide the future of archaeometric data management, and to demonstrate how current data-management practices directly influence future research use of data. These issues are not new. Bishop and colleagues (1984) advocated similar ideas over two decades ago, themselves expanding on earlier discussions by some of the founders of modern archaeological science. The details of this particular discussion draw from my own experience at the MURR Archaeometry Laboratory working with data from one of the first nuclear laboratories in the world to conduct large-scale provenance analyses using NAA. Archaeological research at LBL emerged in the 1960s with the use of X-ray fluorescence (Shackley 2011), and by 1968 the program included the use of NAA (Asaro and Adan-Bayewitz 2007). Though archaeometric research at LBL continues today, irradiation of specimens at the lab ended in the late 1980s with the decommissioning of the Berkeley reactor and Asaro’s retirement in 1991. Throughout its lifetime the Berkeley program generated compositional data for over 10,000 archaeological specimens. And, although primarily known for their studies of pottery from the Near East and Mediterranean, the program analyzed specimens from across the world (Table 1, Figure 2).

In 2006, Frank Asaro transferred a collection of LBL archival material to the Archaeometry Laboratory at MURR (Asaro and Adan-Bayewitz 2007). This material included surplus powders, over 5,000 pages of handwritten records, 20 volumes of dot-matrix elemental-abundance printouts, and a COM microfilm archive (Figure 3). Although considerable effort was made to digitize the LBL database in the 1980s, the floppy disk supposedly containing these data was unreadable in 2006.

The amount of data and the presence of detailed descriptive data for most specimens give the LBL archive significant potential for future research, and the documents (correspondence, records of transfer, solicitation letters, manuscript drafts, etc.) make the archive a unique primary-source for studying the history of archaeometry and archaeology. However, none of these data are stored digitally, and all of the paper records show signs of physical degradation.

The entire body of archival material, including the COM microfilm, is in varying states of preservation. Therefore, our conservation efforts included generating an archival-quality digital copy of all documents. Paper records and photographs were
scanned as archival-quality *.TIFF images, and copies were down sampled in *.PDF (documents) and *.JPEG (photographs) formats for on-line viewing. In order to slow deterioration of the original paper documents, the archive was eventually transferred to MU’s Museum Support Center.

Major focus has centered on the 20 volumes of elemental abundance printouts contained in the archive because of their potential utility in future compositional research projects (Figure 3). Digitization of these data involved line-by-line transcription of 38 abundance values. Individual values were later verified by a second individual to minimize data-transcription errors. Descriptive and contextual data—when present—were transcribed directly from handwritten records. These data include archaeological provenience (e.g., site, unit, level) and specimen descriptions (e.g., pottery type, ware, decoration). After transcription of all elemental data and their corresponding descriptive/contextual data, we transcribed all remaining descriptive/contextual data in the archive—thus providing a list of specimens known to have been analyzed, but for which compositional data have not been located.

Since 2006, work on the archive had been a part-time effort funded through MURR’s normal operating budget. However, in 2011 I, along with Michael Glascock, received a grant from Digital Antiquity to aid in finalizing work on the LBL archives and to prepare them for distribution through the Digital Archaeological Record (tDAR). This grant allowed us to make publicly available much of the LBL archive, and to now shift focus to locating and digitizing LBL data not present in the archive.

### Completeness of the LBL Archives

The archive contains compositional data for roughly 4,500 specimens. Data for an additional 600 specimens had been digitized by the University of Manchester archaeometry program in the 1990s (Newton et al. 2007). The combined database accounts for roughly half of the estimated 10,000 archaeological specimens reportedly analyzed by the LBL (Asaro and Adan-Bayewitz 2007). Data for an additional 1,000 specimens have so far been located in various journals and monographs. But, by far the largest portion of “missing” data (ca. 2,000 specimens) came from former LBL employees and collaborators. Digitization of these data is ongoing. As of this writing, MURR has digitized descriptive, contextual, and compositional data for nearly 6,600 individual archaeological specimens analyzed at LBL. We anticipate that greater than 80 percent of the total sample analyzed at LBL will have been located, digitized, and made publicly available.

### Are These Data Useful?

Throughout the course of working on the LBL archive project,
several colleagues have asked why MURR would go to such lengths to preserve decades-old data from a completely different laboratory (Figure 4). I have three answers to his question.

1. Ethical obligations. From an ethical standpoint, it is important to note that archaeometric studies at LBL (and virtually all other nuclear-archaeometry programs in the U.S.) were supported by federal funds through the Department of Energy, the National Science Foundation, the United States–Israel Binational Science Foundation, and other publicly funded granting agencies. As such, there remains an obligation to make these data available. Although small portions of the LBL database have been published, the vast majority of data have never been reported.

2. Potential for future research. Provenance research typically involves evaluating the provenience postulate: the idea that groups of chemically similar materials may represent geographically restricted deposits because of similarities in formation, secondary, and post-depositional processes. In the absence of well-defined geological deposits, provenance arguments may be made using a criterion of abundance, which holds that the most-abundant compositional profile present at a site may be tentatively assumed to represent “local” production. Regardless of whether analyses use the provenience postulate, the criterion of abundance, or any other explanatory mechanism, access to as large a database of potential source materials as possible provides greater confidence in conclusions regarding provenance. The LBL data provide a massive database of comparative specimens and recreating these data would require significant labor and expense. To put this point into context, consider that in 1988 the fee for a single analysis by NAA at LBL was $125. Using a conservative estimate of 10,000 activation analyses of archaeological artifacts conducted by the laboratory over a 20-year span, and not accounting for cost increases or inflation, the costs of re-creating these data would exceed $1,250,000. Under MURR’s current NSF cost-deferment program per-specimen rate, costs for generating these data would exceed $500,000, and require a minimum of 4 years’ time operating at peak capacity and refusing all other research projects.

3. To help avoid similar problems in the future, we can use the experiences of preserving these data to help in learning about how we do science and how we can minimize the potential for data loss moving into the future. I believe this final point is probably the most compelling reason to work on the LBL archive, and I would like to now turn to some specific lessons relating to laboratory practice and data management that can be drawn from my experience with the LBL project.

**Toward Developing Good-Practice Standards in Archaeometry**

There is, as yet, no consensus in the archaeometry community on how we ensure that our data remain usable moving into the future. Considering the current trend in anthropology in general, and archaeology in particular, toward developing infrastructures for data preservation, now is an excellent time for archaeological scientists to consider how our treatment of data—is connected with these concerns. I offer the following suggestions as a first draft of sorts covering what I believe to be essential components of any laboratory’s data-management policy. These include the use of digital and paper records, maintaining rich descriptive and contextual information, recording analytical protocols associated with each analysis, development and use of metadata structures to facilitate...
recording all of these data, development of an on-line data-access portal, and retaining a surplus specimens to ensure the possibility of repeated analysis.

**Digital and Paper Records**

Transcription and verification of roughly 250,800 individual elemental abundances (6,600 specimens x 38 elements per specimen) as well as descriptions, contexts, and other associated data is a monstrous task, and one for which most archaeometry laboratories are ill suited. Digital data storage could have potentially eliminated the need for such a labor-intensive undertaking; however, digital files do not guarantee permanent availability of data. File formats change over time. Media and hardware needed to read digital records change even more rapidly. I remember 5.25" floppy disks, but only one student in my 2011 Introduction to Archaeology class knew what one of these was. More to the point, I would be hard-pressed to locate the hardware and software to read such a disk today. Lest we think that saving files on DVD-ROM may ensure longevity, burned-disc media have an average lifespan of 2–5 years depending on quality and storage conditions. Recall that the 3.5" floppy disk supposedly containing digital copies of the LBL database was unreadable, despite the passage of less than 20 years. A shift towards WWW-based data storage and distribution may eventually make obsolete storage media and hardware commonly used today. Given the rapid pace at which computer hardware and software change, an important role remains for paper-based records. From a curation standpoint, laser-printed text on acid-free paper remains the single most reliable and durable method of archiving information. But, while paper might be ideal for preservation, it doesn't lend itself to complex multivariate statistics typically performed on compositional data.

**Context and Descriptions**

From the perspective of a nuclear-research laboratory, we may not always consider the preservation of contextual and descriptive data. (“That’s the archaeologist’s job!”) Yet, these data are vital to providing archaeological significance to the data we generate (Bishop et al. 1984; Neff and Glascock 1995:279). In the absence of archaeological context (e.g., site, unit, level, feature) and descriptors (e.g., type, variety, decoration, temper, portion of vessel), our elemental abundances are simply tabulations of numbers. Description and context are usually—but not always—provided by collaborators to the laboratory, but they are not always transcribed or preserved in a way making them easily married to compositional data.

I have heard it said by some archaeometrists that because archaeological classifications (e.g., pottery types) change, it is pointless to retain such information. Yes, classifications change, but this ignores the larger issue of what occurs if these data are never recorded in the first place. Knowing even a limited amount of information about a specimen provides information necessary to bring compositional data to bear on anthropological questions. Admittedly we cannot compile every tidbit of information on what we analyze, and the information may not be adequate for all research questions. However, laboratories **must** record a minimum set of archaeological data with their analytical results if those results are to have any anthropological significance.

**Record Analytical Protocol**

Most researchers who have worked in an analytical laboratory know that information on analytical protocols is rarely stored alongside compositional data. Laboratories have published
descriptions of their procedures, although these are often modified slightly. Put simply: Not all data are the same, and users of these data must know how data were generated, the limitations of these data, and the limitations of analytical techniques. For example, the LBL group modified and refined the elemental abundances used for their standard comparator (Perlman/Asaro Standard Pottery) over the course of 20 years of analyses. Which abundances they used in an analysis changed the elemental abundance calculations for the archaeological specimens. Maintaining protocol records specific to each assay is fundamental to evaluating data quality at a later date.

**Metadata**

These observations illustrate the need for laboratories to develop, implement, and maintain database structures for data storage. The complex and individualistic nature of geochemical data for archaeological research requires a structured but flexible organizational system. Development of metadata structures can address some of these issues. The use of metadata has become standard practice in fields requiring storage and distribution of massive amounts of data (e.g., geographic information science) generated by disparate laboratories and by differing techniques, and it should be adopted by the archaeometry community as well. Implementation of metadata structures could be standardized at the individual laboratory, or through a consortium of active laboratories. However, metadata structures are implemented, we must find a standardized way to record and communicate what these data represent and how they represent it.

**On-Line Data Sharing**

Snow and colleagues (2006) have suggested that Web-based data-sharing portals are the future for archaeological data (see also Kansa 2010). I firmly believe such a data-sharing portal is the future for archaeometric data as well. Regardless of whether it is explicitly for archaeometric data or it is included as a component of archaeological portals, availability of large bodies of raw data will increase the efficiency and quality of new research. Geochemical and associated archaeological data are simply not suited for distribution in traditional print media. On-line supplementary material is certainly a step in the right direction. But, on-line components to new articles do not address the thousands of specimens for which no publication exists.

Some researchers may have concerns over posting data online: How do you ensure that your work is used with proper recognition? Open-access licensing agreements (e.g., the Science Commons initiative) may address such concerns. Licensing is not intended to prevent inappropriate use of data, but they are one way for laboratories to explicitly state how they expect their data to be used, including modification and redistribution. In this way, laboratories are able to exercise some control over their data while still making them available. The MURR laboratory has made portions of its database public for more than 15 years. And, after 1000+ individual downloads, I am unaware of any instance in which these data have been used without proper citation. Indeed, the number of downloads suggests that there is real need for open-access compositional data for use in comparative research and training of students.

Inspiration for an on-line repository may come from sites such as the World Data Center for Paleoclimatology or the United States Geological Survey’s National Geochemical Database. The *ceraDAT* prototype developed by Hein and Kilikoglou (2012) is a promising first step towards such a web-based portal. Yet, as I mentioned earlier, all data are not equal. Users must be informed about data and how it may and may not be used. How comparable are data, generated 20 years apart at two different NAA laboratories? Is it possible to directly compare lab-based XRF, portable XRF, NAA, and ICP-MS data? What of the statistical background necessary to analyze these data? Experience with and understanding of these techniques and the data they produce is necessary. But, as several recent papers demonstrate, this seems a novel discovery for some archaeologists using portable XRF units. These are topics best left for another venue, but there is a very real question about educating data consumers. MURR and some other laboratories have educational programs that address this concern. Web-based curricula could complement such programs and introduce field archaeologists to the complexities of compositional data analysis, but even this should not—and cannot—replace real-world hands-on experience with experts. This is an area where archaeological scientists have a major role to play moving into the future, especially those considered with releasing data publicly.

**More Than Data: Paperwork and Surplus Specimens**

Finally, it is important to point out that laboratories do more than generate data. They, like the LBL archive, are libraries of correspondence, manuscripts, and other documents. In the case of the LBL records, these documents give insight into how the pioneers of archaeological science perceived their work. Retaining these materials allows future researchers to understand the decision-making processes of the analyst and the evolution of their discipline. Moreover, such documents are an essential reference for resolving potential errors and omissions in second- or third-generation copies of data. The LBL archive, for example, contains a manifest of Greek pottery and several letters detailing their analyses. One letter includes corrections to the museum accession numbers and the archaeological context of several sherds. Had this letter not been retained, these specimens would have been erroneously attributed as shown in the sample manifest, thus resulting in fallacious archaeological conclusions.
Laboratory archives, like that of LBL, usually contain surplus specimens. Changes in geopolitics since the late 1960s have resulted in closure of some countries and regions to Western archaeological research, or they have made research dangerous and difficult. Museum curation policies have also changed significantly over the past 30 years. Many institutions are more reluctant toward destructive sampling. Archives of surplus specimens are therefore potentially irreplaceable resources that may be drawn upon in the future for conducting new analyses (e.g., Boulanger et al. 2012) and for evaluating inter-laboratory compatibility.

Conclusions

Preservation of data from past, present, and future archaeometry laboratories should be a major concern. Compositional data and associated archaeological significance provide a major body of information useful for current and future research. Work with the LBL archive demonstrates the difficulties associated with, and the importance of, preserving and disseminating these data. In presenting these issues to the broader archaeological community, I hope to draw parallels with current discussions in the archaeological community about data preservation and sharing, and to encourage archaeological scientists to consider how best to ensure permanence of our data. In my view, discussions on this topic must include adopting consistent and transparent data-storage policies, continued use of paper-based archives, and a commitment to open-access policies.

Importantly, I do not wish to fault past researchers for poor data-management policies. They, like current researchers, did the best that they could with the resources at hand. Because science is a human endeavor, it is subject to very human concerns. Funding is lost, and laboratories close. Researchers retire. Although these events may, in the moment, seem unanticipated, with foresight we can take steps now to ensure long-term stability of our data. We work hard to generate these data: fighting for funding to support our laboratories and to analyze specimens, struggling to convince archaeologists and museums of the benefits of destructive analyses, and slaving over explaining compositional data in a manner that has anthropological significance. Should we not similarly work hard to ensure that these data are preserved? Archaeologists are currently struggling with how best to preserve and disseminate their data. Archaeological scientists are uniquely positioned to guide how a particular subset of these data is best managed. As such, we must join this conversation and begin discussing how we may ensure that our methods, techniques, data, and results are compatible with and accessible for future researchers.

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The use of satellite imagery for archaeological research has dramatically improved the study of ancient sites and landscapes. Providing an aerial view, satellite images are an outgrowth of the discipline's early use of aerial photography. Archaeologists in the early twentieth century eagerly adopted the bird's eye perspective to identify and document patterns of human activity that were otherwise invisible on the ground, such as the crop marks that indicated the remains of Roman villas in England in the pioneering aerial photographs taken by O.G.S. Crawford in the 1920s. Given the costs of generating original aerial photographs, archaeologists in the past two decades have turned to satellite imagery to acquire a vertical perspective on archaeological landscapes (for comprehensive reviews, see Fowler 2004; Parcak 2009: ch. 2).

Archaeologists utilize satellite images for a variety of research and monitoring purposes. Images can be used to examine areas of the world in which field research is impractical or inadvisable due to factors such as warfare and insurgency, landmines, and problems of logistical or political access (e.g., for Afghanistan see Thomas et al. 2008; for Cambodia see Evans and Travaglia 2012; for Egypt see Parcak 2009; for Iraq see Stone and Ziman-sky 2005; for Saudi Arabia see Kennedy 2011). Historical data from the earliest satellite programs, such as CORONA images starting in the late 1950s, can be utilized to evaluate landscapes that have subsequently changed, providing archaeologists with a more comprehensive palimpsest of ancient activities prior to modernization (e.g., Ur 2003). Satellite images of more recent date can be used to monitor destruction and changes due to warfare, looting, flooding, deforestation, construction encroachments, and other adverse impacts.

Until recently, however, the price of satellite images limited their use. Commercial satellite images could cost hundreds of dollars per frame, and archaeological projects often required several images to cover survey regions (particularly when the area of interest was in the corner of an image, necessitating the purchase of adjacent frames). CORONA images are relatively inexpensive, but many of the photographs are marred by cloud cover and in any case the digitized images require sophisticated processing to georectify prior to use. By contrast, the advent of Google Earth has dramatically democratized access to archaeological landscape information worldwide (Ur 2006; Zukerman 2011). In developing countries such as India, satellite images available through Google Earth have provided the scope for archaeologists at both the student and the professional level to make use of aerial imagery.

As in the case of crop marks revealed through aerial photography to be the plans of Roman villas, satellite-based reconnaissance can detect patterns of human activity that are very difficult to discern solely from ground-based survey, particularly in areas of dense vegetation and modern human activities such as agriculture. Large-scale landscape modifications in the form of mounds, embankments, and ditches often blend in with their surroundings, revealed only when they are viewed at a much larger scale and from a vertical perspective.

Finding Walled Settlements in Eastern India

We present here a case of the use of publicly available Google Earth satellite imagery to locate and identify archaeological sites in eastern India. The current site-location project was an outgrowth of ongoing research at the ancient site of Sisupalgarh, located in the eastern Indian state of Odisha (formerly Orissa). Sisupalgarh is an Early Historic settlement, with the earliest
occupation in the mid-first millennium BC and continuing until the middle of the first millennium AD.

Sisupalgarh was initially excavated in 1948, constituting one of independent India’s first major archaeological research projects (Lal 1949). Incidentally, the 1948 project also made use of that era’s most sophisticated aerial-survey technology to illustrate the perfectly aligned ramparts and gateways, an outline that is still preserved in Google Earth images today (Figure 1a). The rampart, measuring 1.1 kilometers square, has two formal gateways on each side, further identifying the construction as one that was planned and executed on a massive scale.

Sisupalgarh has again been investigated in recent years in which geophysical surveys and excavations focused on the social and economic aspects of urban life in the Early Historic period (e.g., Mohanty and Smith 2008; Mohanty, Smith and Matney 2007; Smith 2008). Throughout these investigations, Sisupalgarh was considered to be unique among the many walled urban centers of the Early Historic period because of the regularity of the rampart. The site also has significant historical importance, being associated with the third-century BC Kalinga War whose catastrophic effects are credited with inspiring the invading Gangetic ruler Asoka to renounce violence and lend political support to the nascent Buddhist tradition.

The historical record, along with the size and configuration of Sisupalgarh, clearly indicates the presence of a strong and effective administration. But there are no documents or other historical records that indicate the scope and extent of the political territory of which Sisupalgarh was a part, nor of the relationships sustained between Sisupalgarh and neighboring population centers that comprised the Kalinga domain. Archaeological survey in the region has been limited, with the majority of survey projects initiated by students and faculty working with very limited budgets and the majority of Indian government-sponsored projects concentrating on the region’s extensive Buddhist sites.

The potential for evaluating the region’s sociopolitical integration in the Early Historic period has been made possible, however, through the use of Google Earth satellite imagery. In conjunction with a survey at the Neolithic site of Golbai Sasan located 40 kilometers southwest of Sisupalgarh, R. K. Mohanty’s team encountered the site of Talapada on the opposite side of the river whose surface artifacts were of the Early Historic period. In order to examine the newly discovered site’s potential relationship to Golbai Sasan, team members utilized a laptop computer equipped with a portable Internet connection to make a startling discovery: the site of Talapada has a rampart and gateway configuration identical to that of Sisupalgarh, but at a one-quarter scale (Figure 1b). Measuring 500 meters on a side, the site of Talapada has one formal gateway on each side of the rampart, providing a duplicate of Sisupalgarh in both planning and execution.

The presence of identical material culture types and a replica design of the rampart leave no doubt that Sisupalgarh and Talapada...
pada shared strong social and political connections. Given the existence of one subsidiary site, the team then began to use Google Earth to systematically examine satellite images elsewhere in the region. Through this process, the team did identify another location at the village of Lathi on the outskirts of the city of Berhampur, located 150 kilometers southwest of Sisupalgarh. Lathi's outline indicates that the site was built on the same pattern as Talapada, and constitutes another example of a small-scale replica of Sisupalgarh's urban plan (Figure 1c). Preliminary investigations of this site confirm the presence of a rampart and gateways, with artifacts of the Early Historic period that indicate the site's contemporaneity with both Talapada and Sisupalgarh.

Satellite reconnaissance in conjunction with ground-truthing will continue in hopes of identifying other such sites. With the two emplacements of walled settlements in the style of Sisupalgarh now having been identified at Talapada and Lathi, however, the potential for interpreting Sisupalgarh's ancient territorial expanse is already well-established. The discovery of these sites provides an exciting new scope for research on urbanism, political economy, and territorial interactions in the Early Historic period.

Discussion

Google Earth has the potential to revolutionize survey data collection and analysis, with a few hours' work on Google Earth enabling archaeologists to find sites at a scale that would take years using traditional ground survey alone (for comparable transformative effects using LiDAR see Chase et al. J. Arch. Sci. 2011). Google Earth provides imagery that can be easily accessed through desktop computers, laptops, and even cellular phones in a manner that enables both pre-field and in-the-field examination of geographic anomalies. When used in its mobile form, Google Earth can be used as a background against which to mark and label ground-truthed commentary on the location and size of archaeological sites. Google Earth images, like other satellite images, also can be utilized to identify geographic features associated with archaeological sites such as lake and ocean coastlines and riverine paleochannels.

Although Google Earth is not as sophisticated for data analysis as other forms of GIS and data collection, its low cost of acquisition (essentially free to anyone with access to a computer and the Internet) and its coverage makes it particularly useful to archaeologists working abroad. As Michael Goodchild has noted (2008:20–22), Google Earth's precision surpasses many developing countries' official mapmaking services whose budgetary constraints as well as national-security concerns often limit researchers' access to data. More recent additions to the Google Earth repertoire, such as the "history" feature that allows users to look at a decade's worth of images from a single location, provides data that can be used to understand ongoing site-formation processes as well as documenting recent natural and human-caused changes to archaeological sites.

Google Earth's capacity to illustrate road overlays also should not be underestimated as a logistical aid to fieldwork (Figure 2). In rural India, road networks and signage are limited, and the most practical method of finding one's way around the landscape is to stop and ask residents for the best pathway to a point of interest. Google Earth images facilitate those conversations by providing a landscape perspective that is highly intuitive, along with suggested road links. The team was continually impressed by the ease with which local villagers, even those with little or no formal education, could immediately identify topographic features on satellite images.

Using Google Earth, the costs of field survey including vehicle rental and surveyor time can correspondingly be reduced. For many archaeologists in developing countries, transportation to the field is the single greatest expense of research; any increased efficiencies in site location can make a significant difference in the size, scale, and duration of regional survey projects. In addition to identifying the location of potential sites that can be visited, Google Earth also can provide some indication of where sites might be hypothesized to exist but where ground-truthing is impractical or prohibited (for example, on military bases or other government installations). The location of these “missing” sites are critical for understanding ancient trade routes and other networks, in which even the identification of potential site locations adds robusticity to an overall regional model.
Google Earth and other forms of satellite imagery do have some limitations that are worth noting here. As in all aerial prospection, ground-truthing is necessary to ascertain the presence of ancient cultural remains. Modern effects, such as recent construction and dismantling of sites, also may post-date the most recent satellite activity. Although Google Earth does have some three-dimensional capacity, slight elevations characteristic of many ancient sites may not be visible except at ground level. Vegetation such as trees planted on embankments may exaggerate linear features, making them appear more prominent in satellite imagery than they are on the ground (Figure 3).

Anomalies in satellite imagery also can be difficult to interpret: linear anomalies may either represent lower topography (such as ditches) or elevated topography (embankments), while dark and light areas can be the result of water accumulation, stone outcrops, areas of burned vegetation, or anthropogenic soils. Some types of sites will be more easily recognized than others and our project’s focus on the distinctive perimeter ramparts of Early Historic settlements constitutes an optimal research question for Google Earth site discovery (for similar discoveries of fortified settlements using satellite imagery, see Parcak 2009:50; Vega et al. J. Arch. Science 2011).

When topographic, historical, or colonial maps are available they can be used in conjunction with satellite imagery to add information about the likely source and chronology of modern landscape modifications. Historical maps can sometimes contain anomalies that are not immediately visible on Google Earth and vice-versa; when the goal is to locate previously-unknown sites, a combination of all available data types is helpful. At Lathi, for example, topographic maps illustrated just one L-shaped embankment, while the Google Earth image clearly depicted an entire rectilinear outline with a moat and rampart at the location.

Although Google Earth is free to use, the acquisition of high-quality images for publications does entail costs that are at present prohibitively expensive for many researchers in developing countries (currently $399 per user per year, with a slight bulk discount available for multiple users within a single project). Google Earth does however offer some grants for educators to be able to access the advanced features of the program including GIS data import and high-resolution printing.

**Conclusion**

As seen in our team’s discovery of previously-unknown fortified settlements in eastern India, satellite imagery provides a quick, inexpensive, and effective method for identifying anomalies for further investigation. In the case of Talapada, Google Earth imagery enabled the research team to make sense of a pattern of construction that was otherwise difficult to read from the ground. In the case of Lathi, the identification of a potential site was initiated through a search of Google Earth images to match patterns of known type in the landscape.

The widespread availability of Google Earth in developing nations is providing a powerful source of landscape data for archaeological research. In many cases, topographic maps can be difficult to acquire for both logistical and political reasons, with government mapping agencies citing the sensitivity of international boundaries and coastlines as a rationale for limiting the distribution of printed exemplars. By contrast, Google Earth is widely available, regularly updated, and can be accessed in a variety of ways including at any local Internet kiosk for a very modest hourly rate. This availability has the potential to provide a new generation of students and scholars with powerful tools for site discovery and interpretation.

**Acknowledgments.** We would like to thank the Archaeological Survey of India for the opportunity to conduct this research. Support for the investigations described in this paper has been provided by the Deccan College Post-Graduate and Research Institute, Pune, and the Cotsen Institute of Archaeology, UCLA.
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IN BRIEF

2013—A Phenomenal Year!

Even though the year has hardly begun, it is shaping up as an extraordinary one for SAA. Three major initiatives will be launching this year:

- The SAA Online Seminar Series will be launching. Watch for topics and times.
- *Current Research Online* will be debuting on the web.
- *Advances in Archaeological Practice*, the new journal, will premiere in August 2013.

Keep an eye on your email and SAA for details on these exciting new initiatives!

Staff Notes

A 10-hour per week position has been added to the staff team as of January 2013. Elisabeth Herschbach will be joining the staff as Editorial Specialist. Her primary responsibilities will revolve around the new journal, but she will have assignments touching all of the SAA’s publications.

After a dozen years, John Neikirk, manager, Publications left the Society on January 18 for an opportunity at another organization. I know that the membership will join the staff in wishing John the best and thanking him for the legacy he has left to the publications program.

Eleanor Umali joined the staff as the new manager, Publications on January 21. Eleanor is a seasoned publications professional with well-honed production skills. We expect that the publications program will continue to thrive under her management.

The coordinator, Membership and Marketing position has been reinvented into the coordinator, Membership and Meetings position. Alyssa Barnett, the staffer, will be taking on more responsibilities specifically tied to the annual meeting in addition to the volunteer program.
Archaeologists have long seen the value of aerial photography for the study of ancient sites. The recent electronic symposia at the SAA meeting in Memphis (Kite Aerial Photography 1912–2012: 90 years of stagnation and 10 years of innovation in aerial archaeology) highlighted the fact that archaeologists have been using low elevation photography to document excavations for 100 years. Aerial imagery is useful in a wide variety of contexts, including excavation documentation, regional mapping, and site identification (Giordano and Haley 2006). Radio control aircraft, however, have until recently only sporadically been used as platforms for aerial photography. A variety of recent advances in technology have made UAVs (Unmanned Aerial Vehicles) an excellent platform for low cost aerial archaeology, and a viable and cost-effective alternative for acquiring spatial data (Verhoeven 2009). While UAVs are increasingly being deployed for mapping landscapes, there is also a growing movement to utilize these machines as part of the documentation of excavations (Rinaud et al 2012).

During the summer of 2012, at the Chalcolithic (4500–3600 BCE) site of Marj Rabba, in the Lower Galilee of Israel, I utilized several aerial photography platforms, including two different UAV systems, to test the feasibility of extremely low cost tools for documenting excavations and generating spatial data. Use of these systems proved successful, improving the quality of excavation recording, while simultaneously allowing us to explore new tools for spatial data collection. I outline some considerations about the use of UAVs in archaeology and some of the results below.

Why UAVs?

UAVs have a number of benefits compared to other tools for aerial archaeology. Foremost is cost. It is possible to build a machine capable of flying a camera aloft for as little as $200 USD. This is cheaper than an aerial photography balloon (which has a higher initial cost plus ongoing costs for flying), comparable to kites, and lower than airplane rental for traditional aerial photography. Kite photography, which has had more frequent use in archaeological applications, should be seen as complimentary to the use of UAVs. Radio controlled (r/c) models fly best when there is little to no wind, while kite aerial photography relies on constant and stronger winds. Thus, differing conditions may dictate the better choice. However, in my recent experiments with gyro and accelerometer stabilized aerial platforms, it was possible to fly in some very gusty conditions, making UAVs more suitable to a wider variety of conditions than kites.

UAVs can also be launched from a variety of field sites that may not be convenient or even possible using alternative systems. UAVs can be flown in very tight spaces, requiring little open ground to take off and land. They can be operated where it might be impossible to fly a kite due to encroaching tree cover or power lines, and in places too remote to reach using traditional aerial photography. They are small, can easily be stored and transported in field vehicles and they can be set up and deployed rapidly.

There are, however, some major obstacles for archaeologists using UAVs. The biggest drawback is training. Flying any r/c aircraft takes a degree of skill that can only be acquired through practice. This practice often involves repeatedly testing and often crashing equipment, which can cause costs to balloon. However, training costs can be mitigated in several ways. First, a variety of flight simulators exist that are designed to help would-be pilots get a start in flying r/c models before ever risking real-world smashups. These simulators help novices get the hang of one of the most perplexing problems with r/c flight: as the model moves around the sky it becomes increasingly difficult to keep track of the orientation of the model relative to the pilot. In the U.S., radio control modeling is an active and dynamic hobby with thousands of clubs operating around the...
country, most of which are setup to provide formal and informal training. Anyone interested should check out the Academy of Model Aeronautics (www.modelaircraft.org) for a list of nearby clubs. As a rule, r/c hobbyists are a friendly group, often willing to provide extensive help to beginners. They are also generally excited about nontraditional uses of r/c technology in fields like archaeology, which I recently discovered giving a lecture to a roomful of r/c enthusiasts, with the Vintage Radio Control Society, about the use of UAVs at Marj Rabba.

Finally, the need for specialized flight training as a basis for utilizing UAVs is rapidly diminishing. A variety of vendors currently offer civilian-use fully autonomous systems that do not require a pilot in order to perform photography and mapping missions. These companies provide turnkey systems that have the capability of taking off, flying, photographing, and landing without any active input from a person. These systems, such as the ones offered by Pteryx (www.trigger.pl) and Mavinci (http://www.mavinci.com), cost significantly more to purchase and operate than the low cost DIY options discussed here. However, even the price of autonomous solutions is rapidly decreasing, with the availability of options like the open source ArdupilotMega system, which provides low cost autonomous control of UAVs and is supported by an active development community (see diydrones.com).

It is important to note that there is huge variation, globally, in the legality of operating radio controlled systems, operating these devices for commercial purposes, and operating these systems autonomously. In the U.S., for instance, there are a variety of restrictions on the use of r/c aircraft and these restrictions are undergoing changes right now as the Federal Aviation Authority decides on new policies in regards to the commercial use of r/c technology. Those interested in aerial photography are strongly encouraged to find out about local laws before becoming involved and invested.

Successful Tests at Marj Rabba

In 2012, as part of the ongoing excavations at Marj Rabba, Israel (part of the Galilee Prehistory Project), I began to test several platforms for aerial imagery. In previous seasons there were severe problems getting useable overhead shots of the site. Local commercial aerial photographers were outside of our budget, and attempts to utilize a short ladder on top of nearby spoil heaps was always comical, sometimes dangerous, and of limited utility. Since field conditions were hazardous for flying and I was interested in trying a variety of new ways of obtaining low cost aerial imagery, I ultimately settled on 3 systems that would provide 3 different scales of images: Pole Aerial Photography (PAP), Quadcopter Photography, and r/c Plane photography.

Camera selection is important for UAV photography, especially when considering low-budget options. Size and weight are of paramount importance, too, since UAVs generally have low payload-carrying capacities. However, the availability of a free alternative firmware for Canon point and shoot cameras, called the Canon Hackers Development Kit (CHDK), opens up a simple avenue for UAV photography. The CHDK firmware is free, easy to run on a wide variety of cheap Canon cameras, supported by a large online community, and provides the ability to run “intervelometer” scripts. An intervelometer automatically fires the camera shutter at a constant interval. With a large memory card, a camera running CHDK can be turned on before launch, and then shoot constantly for the entire duration of a flight (approximately 5–15 minutes). The huge number of aerial photographs thus created provides extensive coverage of archaeological sites, and does not require the pilot to worry about depressing a shutter button while flying. During the excavations at Marj Rabba, I utilized a small Canon point and shoot running CHDK, as well as a GoPro Hero camera, on all three of the aerial setups.

Pole aerial photography (Figure 1), while not the main topic of this article, should not be undervalued as an aerial photography method. It is flexible and versatile, and can be adapted to a variety of situations. In this case, the author utilized a small Canon point and shoot running CHDK to capture aerial images of the site.

Figure 1: The author doing Pole Aerial Photography in Area AA/BB at Marj Rabba. Note the tall grass, piles of stones, and presence of trees and olive groves that made launching and landing an r/c plane challenging.

Figure 2: Small quadcopter used for low-level photography at Marj Rabba. Colored propellers provide visual references to help orient the pilot.
platform. As with all aerial photography systems, PAP setups can vary significantly in price, but initial entry costs are low. This summer I utilized a 7m, carbon fiber, deep-sea fishing pole purchased in downtown Jerusalem, Israel. The Canon camera, running CHDK, was mounted to the end of the pole using a small, flexible, “GorillaPod” tripod attached via duct tape. Total cost, including the camera, was less than $170 USD. This setup worked great for getting quick overhead shots of small archaeological features.

For photographs of entire archaeological units, I built a small “quadcopter” (Figure 2). This is a radio-controlled vehicle that consists of 4 small electric motors, powered by a small battery. The vehicle contains a sophisticated micro-processor that gets control inputs from the pilot as well as input from a suite of onboard sensors consisting of accelerometers, gyroscopes, a magnetometer, and a barometer. This processor is then able to vary the speeds of the 4 motors dynamically, allowing it to stabilize itself, counteract the effect of wind, and respond appropriately to inputs from the pilot. Including the purchase of spare parts, the completed and functional quadcopter cost less than $300 USD. This small machine was able to carry aloft either of the aerial cameras (Canon or the GoPro Hero).

The quadcopter proved to be an ideal platform for photographs from altitudes that were just out of range of the PAP setup to altitudes of approximately 40 m. Any time an area supervisor or director wanted to record the current state of excavation, I could send the “quad” aloft to record some photos, with an absolute minimum of interruption to the dig. The only limitation on the utility of the quad was that it is hard to keep track of the orientation of the machine if it gets too high. Rather than risk losing control, it was only utilized at low altitudes. Additionally, 4 small motors, spinning at high and constantly variable speeds, create a lot of vibration, creating some blurry digital images. This is a common problem for these types of machines. While the onboard cameras were generally set to record 1 picture per second, the majority of photos often had to be discarded because of the vibration, leaving only a few good results per flight.

Finally, for higher altitude photos, I utilized a small foam r/c plane (Figure 3). I modified a trainer type aircraft purchased from a local Israeli hobby shop. This model has a 1500 mm wingspan, and sufficient power to carry a GoPro camera to higher altitudes than could be achieved with the quadcopter. While still not flying very high (<100m), this setup was able to take photographs that provided more complete coverage of the total site area than was possible with the quad or the pole. Unfortunately, the large number of olive groves, densely cobbled and uneven fields, nearby forest, and tall power lines meant that it was not possible to cover the area as comprehensively as would have been preferred, and it proved a consistent challenge to land the plane without damage. This limited the number of times I attempted to fly this platform, but it was still used successfully for basic overviews of the site and the plane did survive the season intact.
Results

Over the course of the season at Marj Rabba I used all 3 aerial photography setups to document ongoing changes in the exposed architecture at the site (Figures 4, 5, and 6). The quad and pole systems were utilized on a regular basis as new features emerged, and the plane was flown occasionally to provide wider overviews. These systems were able to generate thousands of photographs of the site at all phases of excavation. As documentation, these pictures will be critical for final publication of the excavation. They provide the necessary perspective to illuminate the relationships between different areas and architectural units within the site. Additionally, in at least one instance, the photographs obtained with the quadcopter helped excavators evaluate the presence of features that were hard to discern at ground level.

Several recent technological innovations now allow the photography recorded with low altitude, low cost systems to be used as the basis for generating GIS-based spatial data as well as for generating beautiful 3d models (Figures 7 and 8) (Brutto et al. 2012; Chiabrando et. al 2011). Even more amazingly, this can also often be done for very low or no cost using open source software. One of the goals for utilizing UAVs at Marj Rabba was the possibility of producing 3D spatial data over the course of the excavation. With the help of ground control points (GCPs) recorded with a total station, I created 3D models of all of the excavation areas which are intended to be used in conjunction with public outreach about the site. I was also able to generate digital elevation models of the surrounding area to be used as part of the ongoing process of mapping and surveying the landscape. For an excellent introductory tutorial on creating Digital Elevation Models from 2D aerial imagery, see Mark Willis's Blog: http://palentier.blogspot.de/2010/12/how-to-create-digital-elevation-model.html.

My experience with UAVs at Marj Rabba has demonstrated that these systems have the capacity to help archaeologists in a variety of contexts, and at costs that are well within the budget of even modest excavations like the Galilee Prehistory Project.

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Finally, thanks to Omer Tamuz for help in planning, researching and building the quadcopter in its earliest stages.

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Send us your posters!

Don’t forget to submit your Archaeology Week/Month poster to SAA for the 2013 contest. This year’s contest will include posters dated April 2012 – March 2013.

• Submit a cover sheet with contact name, title, mailing address, email, and phone number. Please include written permission to display images of winning posters on SAAWeb and in the newsletter of the SAA Council of Affiliated Societies (CoAS).

• Mail two copies—unfolded and unmounted—of your state poster to: Maureen Malloy, Society for American Archaeology, 1111 14th St. NW, Suite 800, Washington, DC 20005-5622 by March 1, 2013.

• Email a digital copy of the poster to Maureen_Malloy@saa.org

All submissions received by the deadline will be displayed in the exhibit hall in Honolulu, April 4-6, 2013. Meeting participants will vote for their favorite poster and the top three winners will be announced at the SAA business meeting on Friday, April 5, 2013.

Check out the archive of winning posters on SAAWeb at http://www.saa.org/publicftp/PUBLIC/resources/ArchMonthforpublic.html

The poster archive contains winning images dating back to the first competition, held in 1996.

SAAWeb also has tips on how to create an Archaeology Month poster, examples of successful Archaeology Week/Month activities, and tips for successful Archaeology week events!

FROM THE SAA PRESS

All the King’s Horses: Essays on the Impact of Looting and the Illicit Antiquities Trade on Our Knowledge of the Past

Edited by Paula K. Lazrus and Alex Barker


Regular Price: $26.95, Member Discount Price: $21.95

Kindle® Edition Available!
The gathering of the SAA in Hawai‘i, for the annual meeting, has prompted the participants of this forum to write about the current status and future directions of Hawaiian archaeology. The seeds for this forum came about through efforts of the Committee on Native American Relations, who sought to help organize a conference session on cultural resource issues in Hawai‘i for the 2012 Memphis meeting. Instead, our group directed our efforts to this forum, and the opportunity to address a larger body of our peers.

The voices heard here include Native Hawaiian archaeologists, land stewards, cultural practitioners, and activists; it represents our first endeavor to collectively write about the practice of archaeology in Hawai‘i. As Kānaka ‘Ōiwi (Native Hawaiians) involved in heritage management we represent a fairly new voice in Hawaiian archaeology, but we are a growing force, joined by new and established practitioners in this field. We stand upon the foundation set by early Kānaka ‘Ōiwi leaders, like Henry Kekahuna, who took on the responsibility to survey and map Hawaiian cultural sites and interview kupuna (elders) about valued cultural places in the mid-twentith century. Inspired by such stewardship, Nāʻali Ke Aho, an organization formed to protect wahi pana (sacred sites), along with the Society for Hawaiian Archaeology, annually recognizes individuals and groups dedicated to cultural stewardship in Hawai‘i. These honorees, like the Nā Pali Coast ʻOhana and Aunty Hannah Springer, represent the generation after Kekahuna, who continue the work of caring for cultural sites.

Native Hawaiians first began formal archaeological training in the 1970s, with individuals like Francis Ching and a cohort of women including June Cleghorn, Muffet Jourdane, and Toni Han Palermo entering the field through the University of Hawai‘i at Mānoa and the Bernice Pauahi Bishop Museum. In 1987 Cleghorn became the first Native Hawaiian to obtain a graduate degree in archaeology, and 13 years later Cachola-Abad, one of the forum contributors, became the first Native Hawaiian to earn a doctorate in this field. After more than a century of archaeological practice in the Hawaiian Islands, the discipline has produced just three Kānaka ‘Ōiwi Ph.D.s in archaeology. This must change.

In the articles to follow we present ideas about why Native Hawaiians were perhaps reluctant to enter the field, and the problems that persist in the discipline as a result of this absence. Ultimately we choose not to dwell in the negative, but seek to recognize and understand our past in order to move forward on a path that benefits our Native Hawaiian communities, the broader public, and the discipline as well. The first article in this forum by Nāleimaile and Brandt poses the question, is Hawaiian archaeology really Hawaiian? The unanimous response from the contributors is no—until recently Hawaiian archaeology has not reflected a strong Hawaiian perspective. This two-part forum begins by providing a background for our response, and continues with examples of approaches to archaeology viewed as advancing a more culturally grounded and community oriented Hawaiian archaeology.

The importance of ‘āina, land, to Hawaiian well being is discussed by several contributors, and the health of the ‘āina is directly linked to the health of our people. A few contributors speak of sustainability and kuleana (responsibility) in terms of land stewardship practices, particularly associated with traditional land divisions called ahupua‘a. Through thoughtful land stewardship, and caring for the wahi kūpuna (ancestral sites) on the land, we maintain connections with our ancestors. Cultural sites are the tangible link between generations of Kānaka ‘Ōiwi. Archaeology, then, is important because it can significantly contribute to either nurturing those connections or irrevocably damaging them. So one message heard throughout this forum is that maintaining strong cultural roots is in part contingent upon good archaeological practice. A true Hawaiian archaeology, one that incorporates Kānaka ‘Ōiwi worldviews, has the potential not only to preserve past life ways, but to perpetuate a living culture.
Western perspectives have long dominated the state and practice of archaeology and cultural resource management (CRM) in Hawai‘i. The current social, political, and economic landscape in Hawai‘i has called for a change in the conditions of preservation, protection, and perpetuation of natural and cultural resources as well as our treasured wahi kū‘ūpuna (ancestral places). A grassroots movement and educational efforts has begun to employ alternative forms of interacting with and relating to our cultural resources. Long before archaeological sites were seen as such, they were Native Hawaiian cultural sites. Rather than associating these resources with the past, we must connect these wahi kū‘ūpuna to the present, with a living, breathing, and dynamic society.

This cultural landscape consists of the physical surroundings, tangible and intangible elements, and technologies employed in the physical and spiritual world that allowed Native Hawaiians to perpetuate a way of life. This landscape included land utilization, food production, resource gathering, and spiritual practices. Remnants of this tangible evidence is seen today in areas known for taro cultivation, fishponds, adze production, burials, and structural and non-structural heiau (place of worship or a shrine) and other sacred and utilitarian places. This landscape embodies a holistic relationship with all that is present and is not limited to the physical world.

We revisit the model of the ahupua‘a (traditional land division) to witness this holistic model of this cultural landscape. Within the ahupua‘a we see and experience the traditional areas known to be populated by akua (deities) and ‘auumakua (ancestral guardians) that continue to manifest themselves through different elemental hō‘ailona (signs or portents), as well as other natural forms. The upland forests of the ahupua‘a provided fauna and flora that was used for sustenance, ritual, medicine, transportation, and ceremony. The streams provided water resources for taro cultivation, and for domestic uses. Ocean resources were also an integral part in this system. One of the more impressive aspects of the ahupua‘a system is that it functioned to nurture all forms of life, not only the kanaka (man). All of the elements that make up the resources of an ahupua‘a system give us insight into the many cultural practices and resources that were available to Native Hawaiians. Cachola-Abad (1999:11) writes that many Native Hawaiians continue to view these “as cultural components to be used to maintain a living heritage.”

These foundational elements of Hawaiian stewardship, as passed on to us through the generations, can be applied to current efforts in the management of our cultural resources today. We can incorporate current practices of CRM in the laws and legislations of historic preservation to effectively protect these very important sites and practices of Native Hawaiians.

A Hawaiian Space in Archaeology and CRM

Indigenous peoples from around the world are seeking more control in the decision-making processes concerning the management of traditional lands and their resources. By creating a space and involving themselves in these processes, indigenous peoples are asserting their authority over traditional lands (Natcher and Hickey 2002:350). Many indigenous peoples are positioning themselves in institutions responsible for the management of cultural resources. This demonstrates a need for a shift in contemporary resource management. More emphasis on the importance of a locally defined approach at resource management taking precedence over a macro-level approach in making decisions (Natcher and Hickey 2002:350) is needed.

As Native Hawaiians, we are realizing the importance in establishing a space for ourselves in these positions of authority. It’s important to consider that mere participation is not enough, for it “can lead to undesirable ends, if exercised through someone else’s system of management” (Porro 2001:301). By utilizing existing Native Hawaiian cultural practices and resource management systems into existing frameworks of CRM, we will reestablish successful strategies.
to maintain our resources. More importantly, these foundations work to reestablish these cultural practices in the now.

Native Hawaiians are moving out of a state of “liminality” (Turner 1974:97). We have been almost structurally invisible, and caught in a metaphoric state of “betwixt and between”—caught between our cultural responsibilities and our Western assimilation. However, this state also encourages individuals to search for greater meaning and to reflect on the cultural, spiritual, and political powers that sustain them as a people. It is a ritualistic transformation of the person from one form to another, one that can function towards a re-aggregation of Native Hawaiian empowerment and influence. Wallace (1956:265) relates this movement to a “revitalization process.” He defines the process as “a deliberate, organized, conscious effort by members of a society to construct a more satisfying culture” (Wallace 1956:265). He contends that a revitalization process is different from the process of culture change in that a revitalization movement rests on the “deliberate intent of individuals” rather than a slow and gradual change.

The notion of reestablishing these cultural foundations for a renewed perspective on cultural resource management intends not to merely re-create the field of CRM, but it means to infuse this field of CRM with the long-standing, traditional practices of a people who thrived as a sustainable community for centuries. Some people believe that Native Hawaiians have thrived on this ‘aina (land) since the beginning of time. The Kumu lu‘u (a Hawaiian cosmology chant) provides us with a foundation for understanding the genealogy of the Hawaiian worldview and can inform practices associated with CRM in Hawai‘i. Native people have always interacted with the past to gain a better perspective on the present (Marshall 2002:211). Native Hawaiian scholar Lilikala Kame‘eleihiwai (1992) has said that Hawaiians can feel confident in their past for the works of our kūpuna are in front of us: they are visible. That is, we stand looking at the past. We know what the past is. We can see and explore the past through the ways of knowing that have been passed down through generations. The future is unknown; it is the future that we face our backs while standing in the present. Therefore, in a Native Hawaiian worldview, we have a long tradition of learning from the past for the maintenance of our society. The study of the Hawaiian archaeological past is an opportunity to study the past with the application of legalese and other methodologies to add to the management of our resources.

**Looking to the Past for the Future**

One very important element in the development of a Native Hawaiian space in the practice of archaeology and CRM is the protection of iwi kūpuna (ancestral remains). Much of the discussion regarding this new approach has centered on the current issues surrounding the protection of iwi kūpuna amid the large-scale developments on Hawaiian land. The State Historic Preservation Department (SHPD) under former Governor Linda Lingle’s administration has effectively dismantled a burial program that was created to address the protection of iwi kūpuna statewide. There are continuing discussions among Native Hawaiians on how to mālama (care for) the discovery of iwi kūpuna. There hasn’t been any real effort to truly incorporate protocols and culturally appropriate methods into the field of archaeology and CRM. Many Native Hawaiians struggle with this lack of cultural sensitivity. This new space is not the end-all approach to change the field and practice immediately, but it does intend to implement a new way to inform and process information in an effort to broaden the perspective of the larger community.

Merely assimilating ourselves into these practices will not make them Hawaiian. We need to set our own guidelines and include our own perspectives in order for this practice to be more culturally defined and appropriate to the Hawaiian community. Native Hawaiians can participate, and in fact need to participate, as it is a part of our cultural kuleana (responsibility) to be involved. We must not continue to bemoan the fact that we are not a part of the discussions concerning our resources. We need to make all possible attempts to be at the table for discussions. The push towards creating a space for Native Hawaiian perspectives is a healthy one. As we promote a newly realigned perspective, one that demands a greater foundation of cultural competency, maybe then archaeology, heritage management, and CRM can evolve into something that reflects a stronger, more pervasive Native Hawaiian worldview and perspective.

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Wallace, Anthony
For Ka¯naka ‘O¯iw i (Native Hawaiians) our intimate affinity to our ‘aina (land) is founded on numerous connections. Some of the most meaningful are the countless expressions and actions of our kāpuna (ancestors or elders) that remain a part of the landscape. Far more than windows into our past, the many aspects of this archaeological record are reverberations of our kāpuna in the living world today—precious opportunities to interact with them in our modern context. In this way, successful culture resource management (CRM) efforts are crucial for Native Hawaiians to maintain our cultural roots and foundation, especially in the face of the massive development occurring in Hawai‘i, which frequently threatens wahi kūpuna (ancestral sites).

Archaeology conducted for rigorous research purposes, as well as CRM archaeology conducted for the exigencies of development have, in numerous instances, produced information that the Hawaiian community values. However, the overriding reality is that Kānaka ‘O¯iw i have for decades struggled with salient problems in Hawai‘i CRM activities and contexts. What follows is a brief summary of such dilemmas that have created tremendous negative impacts for Native Hawaiians.

Common Problems in Culture Resource Management in Hawai‘i

Site Boundaries

Archaeologists often delineate wahi kāpuna using highly arbitrary boundaries. Where Native Hawaiians might see a large area containing numerous structures (i.e., features) as a single integrated wahi kāpuna representing related aspects of daily life and various spiritual, social, political, and economic networks, CRM archaeologists often divide such large site complexes into numerous smaller sites. This segmentation allows developers who employ CRM firms to “preserve” a small number of sites while obliterating others. Even when features within large complexes are preserved, they are often saved with only minimal buffer areas around them, further alienating those features from their original cultural and environmental contexts. The end result is that the overall integrity of significant, large site complexes is rarely preserved. From a Hawaiian perspective, such patchwork preservation destroys the cultural significance and full meaning of these sites.

Site Function

A related challenge is that CRM archaeologists most often do not rigorously or systematically evaluate the functions of sites. Rather, CRM archaeologists (often fieldworkers on the front line and not senior, more experienced archaeologists) determine the functions of sites for archaeological survey reports by comparing sites to ones that they have seen in the past and applying layers of assumptions and stereotypes to their determinations. Site function assessments are seldom informed by Hawaiian cultural understandings. And indeed, in many cases it is impossible for archaeological investigations, even thorough ones, to reveal Hawaiian site functions without consulting ethnographic records. For instance, archaeology, no matter how rigorous, would not be able to uncover evidence differentiating a large house site occupied by lower-ranking ali‘i (chief) and a smaller-sized heiau (religious site), since their physical forms and the range of artifacts created by the activities at each would overlap significantly.

There are also many culturally significant sites that may not be archaeological (i.e., they may not have been created by human hands) but are nonetheless important in a cultural landscape (i.e., traditional cultural properties, as defined in National Register Bulletin 38), and hold the same significance as archaeological ones for native populations. Hawaiian examples of these might be a grove of trees associated with an akua (god) or a naturally occurring boulder serving as a kia‘i (guardian entity). To identify these, an archaeologist...
must consult with knowledgeable people in the Hawaiian community and integrate the resulting findings in the appropriate archaeological report.

Site Significance Assessments
Closely connected to site function assessments are site significance assessments. Both types of assessments are critical in determining whether a site is preserved or destroyed in a development project. Yet again, Hawaiian cultural practitioners or experts seldom inform such assessments. Though archaeologists are required to consult with relevant cultural communities regarding the cultural significance of sites identified, archaeologists rarely do so. Instead, they nearly always engage in such consultation only if a burial or heiau (religious site) is involved. If archaeologists do not deem a site to be a heiau or a burial, they often wrongly assume that the site lacks cultural significance and afford only scientific or archaeological value to the site.

Mitigation as “Preservation”
When sites are not deemed culturally significant and are identified as significant only for purposes of data collection, the information is extracted through data recovery, a process that inherently destroys sites. Dry-stacked stone masonry is taken apart, excavation units dug, artifacts removed, sediment samples collected, etc. In that process, nearly all that is significant about the site from a Hawaiian perspective is intruded upon. This type of “mitigation” archaeology is then followed by construction activities that obliterate what remains. What constitutes the “preservation” of the site is a series of computer files and artifacts in bags held at facilities far removed from the sites.

Consultation with Knowledgeable Cultural Experts Associated with a Project Area
When consultations do occur, the process by which they are conducted is frequently flawed. Interviewees are typically not shown all sites in a project area, or asked to comment on them specifically. Instead, they are typically asked about the mo‘olelo (histories, stories, or traditions) of the general project area, the uses of the area, and information about certain sites that archaeologists have determined to hold cultural significance (i.e., burials and heiau). Not surprisingly, much of the information from such interviews is not integrated into the archaeological report, but rather sits in a section of the CRM inventory survey completely separate from the archaeological section.

A second shortcoming of the interview process involves the limited nature of the interview process. For Kānaka ʻŌiwi, especially kāpuna (elders), the breadth and depth of ‘ike (knowledge, insight, feeling, and perception) they share is directly proportional to the depth, longevity, and quality of the relationship that has been developed between the kāpuna and the person speaking with that kāpuna. Hence, it is difficult for interviewers in a CRM context to gain the level of information that could otherwise be recorded by someone closer to the kāpuna.

Still another difficulty is that those conducting the interviews often treat each interviewee as having equal understanding of sites involved and the relevant cultural practices associated with those sites. In reality, some of the interviewed kāpuna are most qualified to speak to certain issues and/or geographic areas, while others are more qualified to speak to other points. Yet interviewees are often nonetheless asked to comment on the same matters, including some issues beyond their areas of expertise, which in some cases has created “conflicts” of opinions among those interviewed. These “conflicts” have been used to undermine credible Hawaiian stances regarding sites.

Conflicts of Interests
One of the reasons the above problems persist are the conflicts of interest inherent in a system wherein CRM firms are motivated to produce reports amenable to the entities that are their current, and possible future, employers. As such, archaeologists have clear motives to segment sites, minimize their significance, and clear the way for the intended projects of their employers.

CRM archaeologists are further in a doubly conflicted situation because their recommendations about site treatment afford them an added economic benefit. By assessing a site as being only archaeologically significant (and not culturally significant) and worthy of being preserved through recordation, CRM archaeologists set up further lucrative data recovery work for their firms.

Impact and Solutions
The above practices have collectively resulted in tremendous loss for Native Hawaiian communities, as cultural landscapes have been irreversibly impacted by archaeological determinations and development projects. To address such outcomes, a new generation of Kānaka ʻŌiwi scholars, allied with key supportive archaeologists and landowners, have initiated changes on multiple fronts (as described in other articles in this forum). Efforts have involved stronger advocacy in legal venues, taking on leadership roles in local professional arenas, engaging in innovative archaeological research that shapes the archaeological discipline from within, building archaeology training programs for Kānaka ʻŌiwi to enter into CRM work, and establishing groups for Kānaka ʻŌiwi to work collaboratively to better document, preserve, and bring back to cultural use treasured wahi kāpuna.
In 2011, Dana Nāone Hall received the Hawai‘i Cultural Stewardship Award cosponsored by Nāki‘ikeaho, an organization of Native Hawaiian archaeologists and anthropologists, and the Society for Hawaiian Archaeology (SHA). The award has been given annually since 2010, honoring outstanding individuals and organizations who have exemplified the spirit of stewardship. While her primary work has been on Maui, Dana has been a key figure in the protection and restoration of cultural sites across the islands, as well as in the creation and implementation of the state’s burial laws. In 1999, *The Maui News* named her among the “People Who Made a Difference,” in 2002 the *‘Ōiwi: A Native Hawaiian Journal* listed her among “Notable Hawaiians of the 20th Century,” and in 2011 the Native Hawaiian Legal Corporation honored her as the “Community Advocate of the Year.” Here, I briefly outline some of her more significant contributions, though many others could be noted.

A nationally recognized poet who began teaching poetry in the schools on Maui in 1977, Dana became active in Native Hawaiian and environmental issues in 1984 when she, her husband Isaac (an attorney), and families from Mākena formed the Hui Alanui o Mākena to prevent the closing of the Old Mākena Road (and the ancient Alaloa also known as the “King’s Highway” or “Pi‘ilani Trail”) by Seibu Hawai‘i, which was building the Maui Prince Hotel. Such a closure would not only cut off Native Hawaiians from the important resources of the ocean, but also from an essential source of their ancestral identity. A protracted three-year battle led to a settlement in which Seibu agreed to create a 20-foot-wide pedestrian access way and a park at the south end of the beach, to help to find kuleana owners of parcels in its property, and to establish a 3-acre living cultural center to be managed by a nonprofit organization. In summer 2011, Hawaiian-language faculty and students from the UH Maui and UH Mānoa carried out mālama ‘āina stewardship learning at Mo‘olaa as a part of their Hawaiian language immersion course. (Dana has also been a huge supporter of the Hawaiian language programs on Maui, and her daughter was in the first graduating class of Hawaiian immersion students.) Another legacy of the settlement was that Seibu also agreed to not support any further closures of the coastal road at Palauea, which later helped the Hui Alanui o Mākena and others secure over 20 acres of land for a cultural preserve where archaeological field schools have been held.

In 1987, Dana and others became embroiled in the struggle to protect the burial site at Honoka‘au, where nearly 1,000 iwi kupuna were disinterred prior to the construction of the Ritz-Carlton Hotel. Hawaiians from across the islands came to Maui and eventually the state capitol on O‘ahu to unify in opposition to the desecration, which finally led (with the help of the state) to the preservation of the burial site and the relocation of the hotel. More importantly, this was the birth of the Native Hawaiian burial movement, which had a cultural component in the formation of the group Hui Mālama I Nā Kūpuna o Hawai‘i Nei, and a legal component in the amendment of the state’s historic preservation laws to include new protections for Native Hawaiian burial sites, including the establishment of the Island Burial Councils (IBCs). Dana would eventually serve as chair and vice-chair of the Maui/Lāna‘i Islands Burial Council, which has arguably been one of the most effective IBCs in the state.

In the early 1990s, Dana joined other organizations and families to fight the construction of an 18-hole golf course in Waihe‘e by Sakan Hawai‘i. This would have destroyed one of the earliest habitation sites on Maui and impacted numerous burials in the sand dunes. After another drawn-out engagement, they succeeded in helping to create the 277-acre
Waihe'e Coastal Dunes & Wetland Refuge, presently under management by the Hawaiian Islands Land Trust. Stewardship activities revolve around wildlife habitat restoration and archaeological protection and interpretation.

Many other examples can be listed that attest to the work that Dana Nāone Hall has done, including past efforts to stop the extension of the Kahului Airport Runway and her current struggle at Kula Ridge. Equally important has been her impact in the fields of education and in the arts. She has contributed to numerous collections of poetry and scholarship and edited the landmark collection *Mālama, Hawaiian Land and Water* (Bamboo Ridge Press, 1985). She also helped produce a video on kalo farming entitled *Back to the Roots* (1994) and is featured in the State Historic Preservation's video *Nā Iwi Kāpuna* (2003). University of Colorado Religion professor Gregory Johnson in his letter of support for the Hawai'i Cultural Stewardship Award rightly notes that “Naone Hall is a steward of living tradition” who has found a national audience for her local work. Hōkūlani Holt-Padilla, the respected kumu hula and Cultural Programs Director of the Maui Arts & Cultural Center, notes, “Dana’s many personal and professional advocacies have always been to benefit our ‘aina and its people” (6/30/11 email). Writing on behalf of Nāki’ikeaho, I can think of no better model for Native Hawaiian cultural stewardship than Dana Nāone Hall. We all strive to follow the path that she poetically mapped out in her 1985 poem that I end with here.

Ka Mo'olelo o Ke Alanui
The story of the road
Dana Nāone Hall

More than four hundred years ago, as it comes down to us, the road was built by Kiha’api’ilani, who spread his cape over Maui. When the ‘ōhi’a blossoms were tossed by the wind he travelled to the island of Hawai’i to ask for ‘Umi’s help, and returned with a fleet of canoes and warriors to conquer Hāna. From Hāna the rest of the island fell to him like ripe fruit. In the years that followed, the farmers and fishermen, native tenants of the land, placed on the brow of the coast, as it circled the island, a road to catch the falling sound of the runner’s feet. Kūkini carried messages past petals of cliffs opening in mist.

Near the shore, the akule, silver black and still quivering, was divided among the paddlers and those who helped bring in the nets. The white tapa hung from the pole announced the arrival of Lono Makua during the Makahiki. Feathers and the food of the land were brought to the ahu along the road where the god in his pig form was waiting. Closer to our time, cattle crossed the road and were herded to the anchored boat. Poi, wrapped in ti leaves, came by way of another boat from Kihei. Horses, oxen and wagons stirred up the dust of the road, pausing at one store, where hands exchanged things over counters, then continued on into this century. Now there is car surf on the road and the waves keep breaking. *Dust mixing with salt air.*
After all these years, we are being told that the road will be closed. Those who propose it don’t know the road is alive. Give up the road they tell us and it will be replaced with a sign that says we can get to the beach this way, only don’t get off the path or cut across the grass, and hang on to your children not to mention don’t loose your cooler until you hit the sand. For all your troubles there’ll be a comfort station in the parking lot (a comfort to whom?) and even a concrete trail to mark where the old road once passed between the hotel and the beach, open so many hours a day and closed when the sun goes down. The lizard woman is talking but who is listening? At night, when the island is deep in the crater of sleep, across the channel the mo’o raises its head one eye reflecting the moon.

Kā Mō’olelo o Ke Alanui
The story of the road
Dana Nāone Hall
Na'Mo'olelo o ke Alanui” expresses an ongoing connection to the old coastal road in the Makena area, which evolved from the ancient trail that circled the island of Maui. Our work, as Hui Alanui o Makena, in preserving this important traditional access to the shoreline led us to Honokahua. Culturally and spiritually, we walked on the trail to reach Honokahua where a three-year long battle to protect the Honokahua Burial Site began.

The trail next led us to Waihe’e where another three-year struggle occurred over preservation of this waihi pana (legendary place). The magnificent sand dune at Waihe’e, nearly 300 feet above mean sea level, appears as a crescent-shaped feature embracing and defining the two shoreline ‘ili of Kapoho and Kapokea where at least three heiau were built, and one, Kealaka’ihonua, is still visible today. The Waihe’e Dune was used over a longer period of time even than the dunes at Honokahua, and houses yet more iwi kupuna (ancestral burials).

After many years of working on burial issues, it is my belief that if iwi kupuna are protected and left undisturbed in their homeland where they were laid to rest, we too have a home. Burial sites are an integral part of our sovereignty as Hawaiian people. These ancestral burial places constitute sovereign ground.

The work I have engaged in for nearly 30 years, protecting and preserving historic and cultural sites and lands, has rubbed against the political grain. In fact, anyone who knows Maui issues might be tempted to say that I have a problem with authority. But even powerful economic and political forces can be deflected on occasion to save some irreplaceable part of our collective heritage. The desecration of the Honokahua Burial Site was a foregone conclusion before our involvement. Powerless to prevent the excavations, all we could do was insist on agreements made as to the manner in which the digging would occur. In this endeavor, we were assisted by Theresa Donham, the project field supervisor, who adhered meticulously to the agreements and was always forthcoming, truthful, and informative about the excavations. She also made it clear that she thought the excavation was wrong. I learned a great deal about archaeology, practiced at a high level at Honokahua (albeit in service to an unjust end), which caused me to examine the ethical and moral dimensions of the profession.

Many Hawaiian oli (chants) and mo’olelo (stories) speak of companions on the way. In this respect, I would like to acknowledge my husband, Isaac Hall, my companion dissi dent. And, since I spoke briefly about Waihe’e, I would also like to acknowledge Burt Sakata, who was one of the Waihe’e community members instrumental in saving those precious coastal lands from golf course development. In the heat of the controversy, very few contemplated a different fate for Waihe’e.

I am astonished by the elements of our past that still exist—many of which are uncovered through archaeological activities. I deliberately refrain from referring to what is found as fragments because doing so suggests that we are fragmenting ourselves. To me, gratitude is an appropriate response to encountering and being in touch (literally) with still-existent sites.

For example, on the island of O‘ahu, intact, traditional burials were found beneath urban fill in the original matrix of a backshore dune system ma uka (inland) of Ala Moana Boulevard. I now see that area with different eyes. In another instance, if one stood on the second-floor balcony of ‘Iolani Palace a hundred years ago and looked west, beyond the ancient burials continuing their moe loa (long sleep) at Kawaiaha’o, the shoreline of Honuakaha would be visible just ma kai (seaward) of Queen Street.

The ancient pathways to ancestral sites continue to be traveled by our imaginative and spiritual selves. A spark of kinship can bridge centuries of time in the flash of a moment as occurred to me one day at Waihe’e when I unexpectedly saw the top half of a lei opu‘u (a bud-shaped neck ornament) and
realized I was the first Hawaiian to see this ornament since it had been separated from the person to whom it belonged.

Because of an abiding interest in continuity and the possibilities of re-connection, I do not relish being the last person, or among the last, to glimpse a site before it is destroyed, especially before we have an understanding of what that site may be—its age, function, significance, and part, if any, in a larger pattern. There is often an essential conflict with developer-driven archaeology, which attempts to navigate the regulatory process as quickly and inexpensively as possible. The desired outcome is that historic preservation review will have as little effect as possible on land development plans.

Unfortunately, far too many historic sites given State Inventory of Historic Places (SIHP) numbers end up being destroyed because they are considered significant for Criterion D (information content) only, and are neatly and irrevocably written off by the declaration that sufficient information has been obtained from the site. I have come to think of Criterion D as the default criterion. An ironic tragedy is that many of the sites consigned to destruction by the liberal use of this criterion are pre-contact or early historic in age and thus of particular value to Hawaiians. Yet, the purported information obtained from sites-so-designated rarely reaches beyond a handful of individuals.

Hawaii’s historic preservation laws place an affirmative duty on the state and its political subdivisions, the counties, to protect and conserve historic and cultural sites for future generations. The historic preservation review process in Hawai‘i relies on archaeological inventory surveys, and the reports generated by those surveys.

Since most surveys are conducted in a land development context, these situations are ripe for conflict. The necessity for an adequate survey is illustrated by an example from Maui of an extensive historic and cultural complex that is in danger of being destroyed before we know what is present and can make wise decisions about what should be preserved.

The area of concern is an open midland above the town of Kula with the distinctive octagonal-sided Holy Ghost Church in the lower right-hand corner (Figure 1). The 272-acre parcel, slated for subdivision development, is bisected by a sinuous line of green, which marks Keahauwi Gulch. Literally translated, Keahauwi is the bone shrine or the bone altar. Despite its evocative name, the majority of the gulch located within the project area has not undergone an archaeological inventory survey (AIS).

The curve of a graded access road can be seen on the south side (to the right) of the gulch as well as numerous terraces, walls, and rock mounds. A multitude of surface features are also present on the north side. In all, 1,349 archaeological features were identified. The great majority of those features (1,218), located on both the south and north sides of the gulch, were incorporated into one SIHP site number, Site 50-50-11-6338. Lumping together an unprecedented number of features from different temporal periods, into one vast non-contiguous site spread over several hundred acres, raises serious concerns. The following bullet points further question the accuracy and adequacy of the inventory survey report.

- The AIS report does not include a large format map that
clearly shows the locations and feature numbers of the 1,349 features recorded. The tiny 5½ x 8 inch map that is provided depicting features as miniscule squiggles, dots and lines, none of which are numbered.

- Only 3 out of 743 terraces were subjected to subsurface testing. None of the terraces associated with Site 6338 were tested.
- The second-most numerous category of features was rock mounds. None of the 309 rock mounds were tested with the result that their functions and ages are listed as unknown. Rock mounds marking or sheltering burials have been found elsewhere in Kula and are present in other moku (districts) on Maui as well. It is well known that burials are an integral component of the settlement landscape. Not testing features where burials are likely to be found frustrates the purpose of an AIS.
- Twenty-five features out of 1,349 (less than 2 percent) were tested. Many of these test units were only .5 x .5 meters in size. Test units were terminated due to “time constraints” even when subsurface architecture was found. Provisional language appears throughout the AIS report. Examples include the interpretation of a terrace as “a possible pre-contact habitation feature,” the presence of “possible uprights,” and “possible” pieces of unidentified bone noted at other features.
- Out of 1,349 features, only 68 features are designated for permanent preservation.

Thirty-nine sites were newly identified, according to the AIS. The only sites slated for preservation on the south side of Keahuauiw Gulch were two small enclosures, one of which is shown in Figure 2. Both enclosures are single feature sites assessed as significant for Criterion D only and, therefore, are being preserved on an interim basis as “data banks.” No test-

On the northern side of Keahuauiw Gulch, there are excellent examples of historic ranching features. None are earmarked for preservation (Figures 3 and 4). The AIS acknowledges that the parcel contains one of the few remaining upper elevation (2,972 to 3,107 feet) agricultural field systems, including the remains of an extensive ‘auwai (water channel) system.

Given the great number of agricultural and habitation features indicating long periods of successful farming activities and settlement, it is inconceivable that heiau and other structures devoted to ceremonial purposes were not identified during the AIS. Religion was at the heart of pre-contact society in Hawaii, and places where offerings were made to the gods and ceremonies conducted to ensure fertility and productivity would have been an inextricable part of the cultural landscape.

As the name Keahuauiw indicates, this land is a quintessential kulaiw (native homeland). A supplemental AIS, which addresses the numerous, serious inadequacies of the current report is not only warranted—it is a matter of cultural justice.
Elizabeth Ann “Liz” Morris, age 80, passed away peacefully at home in Bayfield, Colorado, on June 28, 2012. She was born in Omaha, Nebraska, on April 19, 1932, and raised in Boulder, Colorado, the daughter of archaeologists Earl and Ann Axtell Morris.

Initially planning a career in chemistry, Liz’s interests changed to archaeology following a summer on the 1951 Chicago Natural History Museum’s Southwestern Archaeological Expedition at Pine Lawn, New Mexico. Her graduate coursework was conducted under Emil Haury at University of Arizona (U of A), with summers (1955–1958) spent digging at Point of Pines. Her 1959 dissertation was an analysis of her father’s Carnegie Institution excavations in Arizona, left incomplete at his death. The next year, Liz became the first woman to earn a Ph.D. in Anthropology at U of A. Basketmaker Caves in the Prayer Rock District, Northeastern Arizona was published in 1980, part of the university’s Anthropological Papers series.

Liz worked abroad for several years following graduation, first on Robert Braidwood’s Iranian Prehistoric Project and then at Hallam Movius’s French Upper Paleolithic site Abri Pataud, where she met and married archaeologist Jonathan Gell. In the early 1960s, Liz largely devoted herself to raising sons Ethan and Benjamin, but by 1966, she had begun her teaching career at Philadelphia’s Temple University.

In 1970 following a divorce, Liz accepted a position in Colorado State University’s (CSU) Sociology and Anthropology Department. Her commitment to research, teaching, and engaging students created a legacy for the Department of Anthropology at CSU as well as for Mountain and High Plains archaeology over the next two decades. Usually accompanied by her sons and dog, she founded and maintained a long-running field school and conducted original research at a number of Mountain and High Plains sites. She helped nurture a small but high quality MA program within an independent Department of Anthropology and also inspired and helped launch the careers of a succession of young anthropologists. It was Liz’s investment in students—her ability not only to teach them effectively, but also to instill a sense of commitment in them—that marked her greatest academic achievement. She sometimes expressed regret that her publication record was not larger, but it was her generosity in sharing time and research opportunities with her students that cut into time and energy that might otherwise have been spent pursuing publication. The number of CSU graduates with successful careers in anthropology, each making contributions to research, teaching, or resource management, is a legacy that far outweighs the value of a few more publications.

Liz retired in 1988. She moved to Tucson and then back to Colorado, where she continued to travel, maintain a lifelong correspondence with friends and colleagues at home and abroad, volunteer, serve as research associate at several institutions, do fieldwork, and write. Collaboration with Kelley Hays-Gilpin and Ann Deegan produced the 1998 monograph Prehistoric Sandals from Northeastern Arizona: The Earl H. Morris and Ann Axtell Morris Research. Most recently, her 2010 article in Current Research in the Pleistocene described the Paleoindian component of the Carey Lake Site (5LR230), a product of 25 years of CSU research in the Rawah Mountains.

Liz served in numerous regional and national professional societies over her career, ranging from editor of both Kiva and Plains Anthropologist; to Colorado Historical Society Board of Directors member; to the Membership Coordinator, Plains and Mountain States Region of the Society for Historical Archaeology; to the Publications Committee Chair of the Society for American Archaeology. As a result of such dedicated work, she received a number of honors including the 1991 Byron S. Cummings Award for outstanding contributions in Arizona archaeology and the 1999 C.T. Hurst Award for outstanding service to Colorado archaeology. In April of this year, Liz turned 80 and received her final honor: a symposium held in recognition of her lifelong contributions to archaeology at the annual meeting of the Colorado Council of Professional Archaeologists.

—Kelly J. Pool and Michael D. Metcalf

IN MEMORIAM

ELIZABETH ANN “LIZ” MORRIS
1932–2012
George Hamley Odell, 69, suddenly passed away at home on 14 October 2011. He received his Bachelor of Arts degree from Yale University in 1964, a Master of Arts in Teaching from Yale in 1965, and a Ph.D. in Anthropology, with specialization in archaeology, from Harvard University in 1977. He had a long career in education, teaching American History, English, and World History in the U.S. and in Europe. After returning to graduate school for his Ph.D., he served as Visiting Assistant Professor of Anthropology at the University of British Columbia (1977–78) and at Brown University (1978–79). From 1979 to 1984 he was director of the Lithic Analysis Laboratory at the Center for American Archaeology, Kankakee, Illinois. He joined the Anthropology faculty at the University of Tulsa in 1984 as an Assistant Professor, rising through the ranks to Full Professor. His untimely death came in his last year of teaching before retirement.

George was a prolific scholar who published three books, two edited volumes, 31 articles in refereed journals, 21 essays in books and proceedings publications, five published comments and letters, and 42 book reviews, and a long list of professional presentations at local, state, national, and international gatherings. He was particularly well known for his pioneering work in lithic use-wear analysis, and the frequency with which he was sought as a reviewer, consultant, and outside committee member for theses and dissertations testifies to his reputation in the profession. He resurrected the Journal Lithic Technology and served as its editor for more than a decade. He received several local and state citations of merit for his work in Oklahoma archaeology as well as the Excellence in Archaeological Analysis Award from the Society for American Archaeology.

As dedicated as he was to research, George found time for many service activities. He was a member of the Citizen’s Advisory Board for the Oklahoma Archaeological Survey from 1986 until his death. He served on the Society of Professional Archaeologist’s Committee for Certification in Teaching, as chairman of the Society for American Archaeology’s Excellence in Lithic Studies and Excellence in Archaeological Analysis Committees, as president of the Tulsa Archaeological Society, and as Treasurer for the Society for American Archaeology. He was equally active within the university community, serving on many committees, as Anthropology undergraduate advisor, graduate advisor, and as chairman of the department. Inside and outside of the university, George was known and trusted by all as the person to go to when something needed to be done and done well.

In the classroom, George was an engaging and popular teacher who communicated the excitement of learning to his students. He taught everything from freshman introductory classes to graduate seminars with the same witty and good-humored air, and he freely offered individual tutorials in his specialty of lithic use wear. Those who wanted to learn invariably found George to be an unstinting source of knowledge. He was twice nominated for the university’s Distinguished Teaching Award that is given annually among the top 1 percent of the faculty.

George H. Odell was well liked by a very large number of people, and his loss was devastating to all who knew him. He was always cheerful, optimistic, and hard-working, and he was a deeply moral man who always tried to do the right thing. He is sorely missed by his friends, students, colleagues, and associates. He is survived by his wife, Frieda Odell.

—Michael E. Whalen
NEWS & NOTES

The National Park Service’s 2013 workshop on archaeological prospection techniques entitled Current Archaeological Prospection Advances for Non-Destructive Investigations in the 21st Century will be held May 13–17, 2013, at the Cedar Point Biological Station near Ogallala, Nebraska. Lodging will be at the Cedar Point Biological Station. The field exercises will take place at the site of Alkali Station near Paxton, Nebraska. Alkali Station was a major trail facility used by travelers on the Oregon and California trails, the Pony Express, the transcontinental telegraph, and the frontier army. Co-sponsors for the workshop include the National Park Service’s Midwest Archeological Center, the Lute Family, and the University of Nebraska’s Cedar Point Biological Station. This will be the twenty-second year of the workshop dedicated to the use of geophysical, aerial photography, and other remote sensing methods as they apply to the identification, evaluation, conservation, and protection of archaeological resources across this Nation. The workshop will present lectures on the theory of operation, methodology, processing, and interpretation with on-hands use of the equipment in the field. There is a registration charge of $475.00. Application forms are available on the Midwest Archeological Center’s web page at http://www.cr.nps.gov/mwac/. For further information, please contact Steven L. DeVore, Archeologist, National Park Service, Midwest Archeological Center, Federal Building, Room 474, 100 Centennial Mall North, Lincoln, Nebraska 68508-3873: tel: (402) 437-5392; ext. 141; fax: (402) 437-5098; email: steve_devore@nps.gov.

The MA in Heritage Management (Kent-AUEB) is delighted to announce three scholarship programmes: The “Stavros Niarchos Foundation Scholarship for students from the developing world” programme, the Fulbright scholarship for an American student, and the Kent scholarships for any student. The MA in Heritage Management is a unique collaboration between the worlds of Archaeology (University of Kent, Canterbury with leading heritage management projects) and Business (Athens University of Economics and Business with one of the top 30 MBAs internationally). Courses include Education and Archaeology, Archaeological Site Management and Planning, Human Resources Management for Cultural organisations and Strategic Planning, Public Archaeology, Tourism Marketing, Project Management and others. All courses are taught in English, at or next to the archaeological site of Eleusis (home of the most famous mystic cults of antiquity) 25 km away from Athens, Greece. At the end of their studies students receive two titles: one from Kent and one from AUEB. Fees are the same for both EU and non EU students at 7,500 Euros. The scholarships are decided on the basis of academic merit and background. There is a variety of half fees, full fees, and comprehensive scholarships (covering both fees and living expenses). For more information please contact heritage@aub.gr and consult www.heritage.aueb.gr.

The California Series in Public Anthropology is continuing its International Competition in 2013. It seeks proposals for short books oriented toward undergraduates that focus on how social scientists are facilitating social change. We are looking for accessible, grounded accounts that present compelling stories, stories that inspire others. The proposals should describe a book that will be relatively short—around 100 pages—with a personal touch that captures the lives of people. The core of the book should involve stories of one or more social scientists as change agents, as making a difference in the world. The University of California Press in association with the Center for a Public Anthropology will award publishing contracts for up to three such book proposals independent of whether the manuscripts themselves have been completed. The proposals can describe work the author wishes to undertake in the near future. Interested individuals should submit a 3–4,000 word overview of their proposed manuscript—detailing (a) the problem addressed as well as (b) a summary of what each chapter covers. The proposal should be written in a manner that non-academic readers find interesting and thought-provoking. Deadline for submissions is March 1, 2013. Submissions should be emailed to: bookseries@publicanthropology.org with the relevant material enclosed as attachments.
POSITIONS OPEN

POSITION: ASSISTANT PROFESSOR
LOCATION: BERKELEY, CALIFORNIA
The Department of Anthropology at the University of California, Berkeley seeks to fill a tenure-track, junior position (Assistant Professor) in the area of the anthropology of media to begin July 1, 2013. Suitable applicants should be engaged in analytically rich and ethnographically driven research on topics concerning the production, circulation, and uptake of media artifacts, aesthetic forms, and practices. Areas of specialization we are interested in span both “old” media (print, radio, TV, film) and “new” media (Internet, smart phones). Active participation in both undergraduate and PhD programs, teaching both introductory and upper division courses, as well as graduate seminars is expected. Applicants should have the Ph.D. or equivalent at time of appointment and should send a CV, a succinct cover letter describing your research and teaching experience, and the names and full contact information of three people who would be able to provide letters of recommendation. All letters will be treated as confidential per University of California policy and California state law. Please refer potential referees, including when letters are provided via a third party (i.e. dossier service or career center), to the UC Berkeley statement of confidentiality: http://apo.chance.berkeley.edu/evalltr.html. Applications must be received by February 15, 2013 and all supplemental materials must be received no later than March 1, 2013. Review of applications

POSITION: POST-DOCTORAL SCHOLAR
LOCATION: BUFFALO, NEW YORK
Post-doctoral Scholar Position 2013-2014, SUNY Buffalo. SUNY Buffalo seeks a Post-doctoral Scholar (PS) for its interdisciplinary Institute for European and Mediterranean Archaeology (IEMA). During a 10-month tenure, the PS teaches one graduate seminar (preferably on the topic of the symposium), organizes a symposium, and edits a subsequent volume reflecting IEMA’s focus on post-Pleistocene European and Mediterranean anthropological and classical archaeology. Application letter, vita, list of references, and 3-page description of proposed symposium topic, including intended invitees, must be received by March 1, 2013 for an August 2013 start, pending final budgetary approval. Email application or inquiries to IEMA Director: pbiehl@buffalo.edu. The University at Buffalo is an affirmative action/equal opportunity employer.

CALENDAR

APRIL 3–7

MAY 15–19
Canadian Archaeological Association Annual Meeting, Whistler, British Columbia. Contact: Eldon Yellowhorn ecy@sfu.edu.

MAY 26–31
International Rock Art Congress will be held at the Marriott Pyramid North Hotel, Albuquerque, New Mexico, USA. Hosted by American Rock Art Research Association (ARARA). Registration and more information: http://www.ifrao2013.org. Contacts: Conference Co-Chair: Donna Gillette rockart@ix.netcom.com, 805-343-2575; Conference Co-Chair: Peggy Whitehead whw-pjw@att.net, 303-426-7672. ARARA website www.arara.org.

NOVEMBER 20–24
The 112th AAA Annual Meeting will be held at the Chicago Hilton in Chicago, IL. The 2013 meeting theme is Future Publics, Current Engagements (http://aaanet.org/meetings).

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