

Jeffrey H. Overton, AICP, LEED AP

PRINCIPAL, CHIEF ENVIRONMENTAL PLANNER



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As Group 70's Chief Environmental Planner, Mr. Overton leads the preparation of Master Plans, sustainable development plans, environmental impact documents, land use permitting and community involvement for private developments, military installations, and government projects. He has prepared over 100 environmental impact documents for residential communities, infrastructure and utilities expansion, waterways and coastal structures, agricultural developments, scientific installations, schools, resorts, retail/commercial centers, and recreational facilities. Mr. Overton directs community and area-wide Master Plans, site selection studies and urban design plans, and provides expert testimony before State and County land use authorities. He has extensive experience in watershed analysis and coastal environmental planning.

SELECTED PROJECTS

KAMAKANA VILLAGES - ENVIRONMENTAL REPORT, 201H, LUC, ZONING	<i>Kona, Hawai'i</i>
MAKA'IWA HILLS RESIDENTIAL COMMUNITY - MASTER PLAN, EIS, ZONING	<i>'Ewa, O'ahu</i>
KAPOLEI WEST GOLF RES. COMM. - MASTER PLAN, ZONING	<i>Kapolei, O'ahu</i>
HANAUMA BAY MARINE EDUCATION CENTER - EIS, SMA, CDUA	<i>Honolulu, O'ahu</i>
KAPOLEI HARBORSIDE CENTER - EIS, MASTER PLAN, STATE LAND USE, ZONING	<i>Kalaeloa, O'ahu</i>
KAMEHAMEHA SCHOOLS NORTH SHORE LANDS - MASTER PLAN	<i>North Shore, O'ahu</i>
MAUNA KEA SCIENCE RESERVE COMPLEX - MASTER PLAN, EIS, MGMT. PLAN	<i>Mauna Kea, Hawai'i</i>
LĀ'IE DEVELOPMENT PLAN AMENDMENTS - EIS, DP AMENDMENT	<i>Lā'ie, O'ahu</i>
HILO JUDICIARY COMPLEX - SITE SELECTION STUDY/EIS	<i>Hilo, Hawai'i</i>
HAWAII STATE JUDICIARY - STATEWIDE MASTER PLAN	<i>State of Hawai'i</i>
PAN-STARRS OBSERVATORY - NEPA EIS	<i>Mauna Kea, Hawai'i</i>
UPCOUNTRY TOWN CENTER - MASTER PLAN, EIS, PERMITS	<i>Pukalani, Maui</i>
PHYCAL ALGAE PILOT PROJECT - EA (NEPA), PERMITS	<i>State of Hawai'i</i>
'AIEA TOWN CENTER - MASTER PLAN, EA	<i>'Aiea, O'ahu</i>
ALOHA TOWER COMPLEX - REDEVELOPMENT GUIDELINES	<i>Honolulu, O'ahu</i>
COCONUT PLANTATION VILLAGE - SMA, PDU, ZONING	<i>Kapa'a, Kaua'i</i>
DILLINGHAM MOKULĒ'IA RANCH - MASTER PLAN, PERMIT STUDY	<i>Mokulē'ia, O'ahu</i>
HĀWEA POINT/USCG LIGHT RELOCATION - EA, SMA, CDUA	<i>Kapalua, Maui</i>
KAMAKE'E STREET / WARD CENTER REALIGNMENT - EA	<i>Kaka'ako, O'ahu</i>
KANU O KA 'ĀINA SCHOOL - EA	<i>Waimea, Hawai'i</i>
KAUAI TECHNOLOGY CENTER - EA FOR PHASES I & II	<i>Waimea, Kaua'i</i>
KAWAIIHAE DEEP DRAFT HARBOR - NEPA EIS & EA	<i>Kohala, Hawai'i</i>
KAWAILOA BEACH PARK (CHUN'S REEF) - EA & SMA	<i>Hale'iwa, O'ahu</i>
KOKO HEAD DISTRICT PARK - EIS, SMA, CDUA	<i>Hawai'i Kai, O'ahu</i>
KO'OLAU LOA SUSTAINABLE COMMUNITIES PLAN	<i>Windward, O'ahu</i>
KO'OLAU LOA WATERSHED - BWS WATERSHED MANAGEMENT PLAN	<i>Windward, O'ahu</i>

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KUALOA RANCH - MASTER PLAN, EA, PERMITS	<i>Kualoa, O'ahu</i>
KUALOA REGIONAL PARK - WASTEWATER SYSTEMS EA, SMA	<i>Kualoa, O'ahu</i>
KUNIA VILLAGE TRANSITION - MASTER PLAN, VARIANCE	<i>Kunia, O'ahu</i>
LĀ'IE WASTEWATER RECLAMATION FACILITY - FACILITY PLAN, EIS	<i>Lā'ie, O'ahu</i>
LANIHAU SHOPPING CENTER/ HENRY STREET - EA	<i>Kona, Hawai'i</i>
LE JARDIN ACADEMY NEW CAMPUS - EA, DP, ZONING & SMA	<i>Kailua, O'ahu</i>
LIHI LANI AGRICULTURAL COMMUNITY - MASTER PLAN, EIS, PERMITS	<i>Pūpūkea, O'ahu</i>
MANINI'ŌWALI RESIDENTIAL COMMUNITY - EIS & PERMITS	<i>Kona, Hawai'i</i>
OCEAN BAY PLANTATION AT HANAMĀ'ULU - MASTER PLAN, EIS, CDUA	<i>Līhu'e, Kaua'i</i>
PELEKANE BAY & WATERSHED - ECOSYSTEM RESTORATION PLAN (NEPA)	<i>Kohala, Hawai'i</i>
POAMOHO CAMP TRANSITION PLAN - VARIANCE	<i>Wahiawa, O'ahu</i>
POINTE AT PO'IPŪ RESORT CONDOMINIUMS - SMA PERMIT, BURIAL PRESERVE	<i>Kaua'i, Hawai'i</i>
ROYAL KUNIA PHASE II - MASTER PLAN, PDH	<i>Kunia, O'ahu</i>
SOUTH KONA FLOOD HAZARD STUDY - FEMA FLOOD MAPPING	<i>South Kona, Hawai'i</i>
SUNSET BEACH RECREATION CENTER - EA, SUP, SMA	<i>Pūpūkea, O'ahu</i>
UH MĀNOA, STAN SHERIFF CENTER - SITING STUDY & EA	<i>O'ahu, Hawai'i</i>
USARHAW NORTH - END STATE DEVELOPMENT PLAN	<i>Schofield Bks, O'ahu</i>
WAIALUA TOWN MASTER PLAN - REVITALIZATION PLAN	<i>Waialua, O'ahu</i>
WAILUKU REDEVELOPMENT - AREA PLAN, DESIGN GUIDELINES	<i>Wailuku, Maui</i>

PROJECT HONORS & AWARDS

KAMEHAMEHA SCHOOLS NORTH SHORE PLAN - APA HAWAII'Ī CHAPTER OUTSTANDING PLANNING AWARD	2008
WAIALUA TOWN MASTER PLAN - APA HAWAII'Ī CHAPTER COMMUNITY-BASED PLANNING AWARD	2005
MAUNA KEA SCIENCE RESERVE MASTER PLAN - APA HAWAII'Ī CHAPTER OUTSTANDING PLANNING AWARD	2000

PROFESSIONAL REGISTRATIONS

ENTERPRISE HONOLULU - BOARD OF DIRECTORS, 2009	2009-PRESENT
US GREEN BUILDING COUNCIL - LEED AP	2007
URBAN LAND INSTITUTE - HAWAII'Ī CHAPTER	2004
AMERICAN INSTITUTE OF CERTIFIED PLANNERS (AICP) - MEMBER	1989-PRESENT
AMERICAN PLANNING ASSOCIATION (APA), HAWAII'Ī CHAPTER - MEMBER	1986-PRESENT


EDUCATION

M.S. MARINE ENVIRONMENTAL SCIENCES - STATE UNIVERSITY OF NEW YORK, STONY BROOK, NY	1983
B.S. ZOOLOGY/BIOLOGICAL OCEANOGRAPHY - DUKE UNIVERSITY, DURHAM, NC	1979



LEE W. SICHTER
 PRINCIPAL PLANNER

Mr. Sichter helps to direct the firm's efforts in the preparation of comprehensive planning and environmental studies. With over 30 years of local experience, he has extensive knowledge of the land use permitting system and land use policy in Hawai'i. He is well-versed in managing the preparation of environmental review documents and permits for industrial, commercial, resort, and government projects. Mr. Sichter also assists clients in strategizing the best approach for obtaining necessary approvals for their development projects to move forward. As an expert in the state's EIS process, Mr. Sichter served on a working group assigned by the Legislature to recommend improvements to Chapter 343 Hawai'i Revised Statutes.

EDUCATION	 <p>Master of Urban and Regional Planning, University of Hawai'i at Mānoa B.A., Political Science, with distinction, University of Hawai'i at Mānoa</p>
AFFILIATIONS	<p>American Planning Association Hawai'i Science & Technology Council</p>

SELECTED PROJECTS

LAND USE PERMITTING AND ANALYSIS

- Makalawena Resource Management Plan, Island of Hawai'i
- Waikele Gulch Permitting Analysis, Waikele, O'ahu
- Makakilo Quarry Expansion, 'Ewa, O'ahu
- Kapolei Regional Mixed Use Center Permitting Analysis, 'Ewa, O'ahu
- Kapolei Shopping Center Permitting Analysis, 'Ewa, O'ahu
- Kroc Center Planning Analysis, 'Ewa, O'ahu
- Chevron Pipeline Replacement, O'ahu
- Chevron Refinery Special Management Area Use Permit, O'ahu
- Imperium Renewables Hawai'i LLC Biodiesel Plant at Kalaeloa Harbor, Final EA and SMA Use Permit, Hawai'i
- Kalaeloa Master Plan, 'Ewa, O'ahu
- Shinwa Property Due Diligences, Kaua'i and Maui
- Barbers Point Military Housing Privatization, 'Ewa, O'ahu
- Waikikian Development Plan, Final Environmental Impact Statement, and Permitting, O'ahu
- Kālia Tower, Hilton Hawaiian Village, Land Use Analysis, O'ahu
- Lagoon Tower, Hilton Hawaiian Village, Entitlements Analysis, O'ahu
- Hualālai at Historic Ka'ūpūlehu Development Permits, North Kona, Island of Hawai'i
- Ka'ūpūlehu Resort Expansion Development Permits, North Kona, Island of Hawai'i
- Ka'ūpūlehu Integrated Resources Management Plan, North Kona, Island of Hawai'i
- Mauna Lani Resort, Island of Hawai'i
- Lahaina Front Street Urban Plan, Maui
- Pāpa'a Ranch Land Use Analysis, Anahola, Kaua'i
- Keālia Ranch Land Use Analysis, Anahola, Kaua'i
- Lana'i Company Land Use Analysis, Lana'i
- Convention Center Impact Study, O'ahu
- Cutter Auto Park Due Diligence, Kapolei, O'ahu



Caves at Waikele Permitting Analysis, Waikele, O'ahu
 Turtle Bay Land Use Analysis, O'ahu
 Marine Corps Base Hawai'i, Hiking Trail, Kāne'ohe, O'ahu
 The Contemporary Museum Entitlements Analysis, O'ahu
 Keahuolū Final Environmental Impact Statement, North Kona, Island of Hawai'i
 Keāhole Generating Station EIS, North Kona, Island of Hawai'i

MASTER PLANS

Hōkūli'a Phase 3 Master Plan, Island of Hawai'i
 Keahuolū Master Plan and Environmental Impact Statement, Kailua-Kona, Island of Hawai'i
 Kalaeloa Master Plan and Economic Study, O'ahu
 Upolu Airport Master Plan and Environmental Study, North Kohala, Island of Hawai'i
 General Lyman Field Master Plan, Hilo, Island of Hawai'i
 Bishop Estate Kaka'ako Phase II Master Plan, O'ahu
 Kailua Beach Park Revised Master Plan, Kailua, O'ahu
 Koko Head Regional Park Master Plan, O'ahu
 Kealakehe Planned Community Master Plan, North Kona, Island of Hawai'i
 Taman Dayu Master Plan Report, Indonesia
 Ie Jima Resort Master Plan, Okinawa, Japan

ENVIRONMENTAL IMPACT STATEMENTS / ENVIRONMENTAL ASSESSMENTS

Keahuolū Master Plan and Environmental Impact Statement, Kailua-Kona, Island of Hawai'i
 Imperium Renewables Hawai'i LLC Biodiesel Plant at Kalaeloa Harbor, Final EA and SMA Use Permit, Hawai'i
 Large-Capacity Inter-Island Ferry (Super Ferry) Act 2 Draft EIS, State of Hawai'i
 Kula Nei Draft and Final EIS, North Kona, Island of Hawai'i
 Lili'uokalani Trust Keahuolū Lands Draft and Final EIS, Kona, Island of Hawai'i
 Kealakehe Planned Community Draft and Final EIS, North Kona, Island of Hawai'i
 Ali'i Highway Final EIS, Kona, Island of Hawai'i
 Keāhole Generating Station Draft and Final EIS, North Kona, Island of Hawai'i
 Waikikian Development Plan Draft and Final EIS, Waikīkī, O'ahu
 South Kohala Resort Draft and Final EIS, South Kohala, Island of Hawai'i
 Ka'ūpūlehu Resort Expansion Draft and Final EIS, Kona, Island of Hawai'i
 East Māmalā Bay Wastewater Facilities Plan and Draft and Final EIS, O'ahu
 Hawaiian Riviera Resort and Marina Draft and Final EIS, Ka'u, Island of Hawai'i
 Bank of Hawai'i Annex Tower EA, O'ahu

RESOURCE MANAGEMENT

Makalawena Resource Management Planning, North Kona, Island of Hawai'i
 Ka'ūpūlehu Integrated Resources Management Plan, North Kona, Island of Hawai'i
 Hualālai at Historic Ka'ūpūlehu Comprehensive Public Access Plan, North Kona, Island of Hawai'i
 Hualālai at Historic Ka'ūpūlehu Anchialine Pond Management Plan Update, North Kona, Island of Hawai'i
 White Sands Beach Anchialine Pond Management Plan, South Kohala, Island of Hawai'i

A person wearing a red helmet with a headlamp, a blue long-sleeved shirt, and white pants with green knee pads is crouching in a dark, rocky cave. They are holding a flashlight in their right hand, illuminating the cave floor. The cave walls are dark and textured, with some white mineral deposits or stalactites visible. The overall scene is dimly lit, with the primary light source being the person's flashlight.

**BIOLOGICAL SURVEY OF LAVA TUBE CAVES
KEAHUOLU, KONA, HAWAII**

**Prepared for
Belt Collins Hawaii
2153 North King Street, Suite 200
Honolulu, Hawaii 96819**

**Prepared by
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Executive Summary

In early June 2008, Belt Collins Hawaii, Ltd. tasked SWCA Environmental Consultants (SWCA) to investigate lava tube caves within two parcels at Keahuolu, Kona, Hawai'i Island. The purpose of the study was to provide information to support preparation of an environmental impact assessment for the HHFDC Keahuolu Affordable Housing Project on Hawai'i Island. Specific study objectives included: 1) biological surveys of caves within the project area; 2) identification of biologically significant caves; 3) a list of species found in the caves; and 4) providing management recommendations for the more biologically significant caves. Due to limited project funding, SWCA focused his investigations on caves already located and identified by PHRI, Inc. The SWCA Team limited its reconnaissance surveys to caves most likely to harbor appropriate habitat for troglobites and large enough to permit access.

The project area is approximately 272.063-acres overall and consists of two principal tracts (TMK 7-4-21:20; TMK 7-4-21:por. 21) at Keahuolu, Kona District, Hawai'i Island. PHRI (1990) documented approximately 50 lava tube caves within the larger parcel of land owned by Liliuokalani Estate that includes the 272-acre parcel addressed by PHRI (2007). Surface expressions of these features were concentrated in the northeastern and south central portions of TMK 7-4-21:20. SWCA found several additional entrances and tube segments that were too narrow to enter; however, our GPS coordinates did not correspond clearly with some locations mapped by PHRI (1990 and 2007), and are therefore considered as new findings.

The SWCA study team found eight cave openings at Keahuolu, only three of which appeared to have suitable habitat for troglobitic arthropods and were accessible. The team found 14 distinct species of invertebrates within these four caves. Only two of these species are likely to be endemic to Hawai'i Island (Howarth, personal communication). Current State and Federal regulations provide no special protection for any of these species. The remaining species are either facultative cave residents, regular visitors to caves, or accidental cave residents. Many non-cave-adapted native plants and birds are known to use damp cave entrances on Hawai'i Island for shelter or nesting; however, SWCA biologists did not observe any evidence of cave use by such species during their surveys. Although several species of native flora occur within the project area, vegetation is generally dominated by introduced species. The presence of suitable cave habitat and supporting native plant roots, and presence of native obligate cave-dwelling invertebrates, indicate that additional cave ecosystems not open to human access probably exist within the Keahuolu project area.

Based upon our investigation of the property, including our review of the Hawaii Cave Protection Law, SWCA finds no indication that cave resources on the Keahuolu site represent a statutory obstacle to development other than where regulated archaeological resources are coincident with cave entrances or underlying passages (PHRI 1990 and 2007).

1.0 Background to the Resource

Most of our knowledge of cave species comes from work in continental regions with very different geological and evolutionary histories than Hawai'i. In well studied cave systems in the mainland US and elsewhere (principally southern Europe, Japan and New Zealand), cave faunas are characteristically associated with karstic landscapes or limestone regions with subterranean voids created by dissolution of the rock (Barr 1968). In the continental United States, it is thought that the cave animals are typically relicts of faunas left behind after the last ice age as geohydrologic regimes changed in the northern hemisphere (Barr 1968, Poulson and White 1969, Christiansen 1982, Culver 1982).

Because the Hawaiian Islands are younger and geologically very different, with most caves occurring in basalts rather than limestones, there was no expectation that a cave-adapted fauna would have developed here. This preconception was dramatically changed when in the 1970's Dr. Frank Howarth (B. P. Bishop Museum) began discovering and describing a diverse array of troglobites in Hawaii (Howarth 1972, 1983, 1991).

Animals that can be found in caves (cavernicoles) are generally termed:

- Troglobites – obligate and exclusive cave dwellers for their entire life.
- Trogllyphes – can live in caves or other cave-like (moist cool dark) habitats.
- Troglloxenes – can be found in caves but do not live their entire life there. They may have adaptations to the cave environment such that they complete part of their life cycle in caves, but must return to the surface to feed and thus retain adaptations for surface life.

Troglobites are characterized by a number of anatomical and physiological adaptations to cave life collectively referred to as troglomorphy (Barr 1968, Christiansen 1982, Holsinger 1994, Culver et al 1995, Christman et al 2005). Troglomorphic characteristics include loss of pigment and loss of sclerotization (hardening of exoskeletons), reduction or loss of eyes, elongation of appendages and sensory structures with long hairs, lengthened life span, modified life history patterns, and metabolic adaptations to nutrient-poor conditions. As a result of adaptation to low energy environments, the life cycle of many troglobites is characterized by delayed reproduction, increased longevity, lower total egg production, and production of larger eggs (Culver 1982).

Associated with these adaptations are very narrow and specific ecological requirements which include high (100% +) relative humidity, temperatures that do not fluctuate rapidly, and for some troglobites, a tolerance of, or perhaps a preference for high CO₂ levels (Howarth and Stone 1990). Conversely, troglobites are thought to be poor competitors with surface animals, except in their very restricted cave habitats. Also, they probably are not able to acclimate quickly to rapid changes in their physical, biological or chemical environment (Barr 1968, Culver 1982).

The origin and geographic distribution of troglobites have important general implications for evolutionary biology (Barr 1968, Holsinger 1988). Many continental troglobitic species are considered to be relicts persisting in subsurface refugia long after their surface ancestors abandoned their geographic range due to climate fluctuations. Troglobite species present stunning examples of evolutionary processes. They come from an array of taxa, both vertebrate and invertebrate, and while their diversity is impressive, they tend to share a suite of morphological and physiological characteristics that represent adaptations to a common and very specific environment. Functionally, the evolution and diversity of troglobites in Hawai'i parallels that of continental cave faunas, however, in terms of systematics and evolution, the species are derived from completely different ancestors and the evolution has taken place in a very different geological and ecological framework.

Due to the lack of light for photosynthesis, most cave communities lack in situ primary producers. Instead, they rely on energy and nutrient input from the surface, and thus, cave systems can be strongly influenced by characteristics of the surface ecosystem. Nutrients are introduced into caves in the form of plant detritus washed in by surface waters, micro- and macro-organisms that enter caves under their own power, guano from bats, rats, and mice, from plant roots that penetrate the cave, and the eggs and wastes of troglloxene species and the bodies of occasional epigeal animals that wander into the cave and die. As such, cave communities are typically thought to be made up of decomposers (Culver 1982); they break down organic debris brought into the cave to obtain nutrients and energy. Cave communities often have fairly low species diversity due both to the restrictive environment and the reduced pool of species available to any cave system (Culver 1970).

Howarth and Stone (1990) described several cave zone habitats for troglobites. The **entrance zone** receives sunlight and may have surface plants. The **twilight zone** has some light present but at lower levels of illumination. The **transition zone** has no light but is affected by surface temperature and humidity changes. The first three zones are all to a greater or lesser extent influenced by surface conditions. Deeper into the cave are the **dark zone** which has little or no daily air exchange with the surface and high relative humidity and generally constant conditions; and the **stagnant zone** which has less air exchange than the dark zone often with high CO₂ levels. Typically true troglobite populations are restricted to the dark and stagnant zones though individuals do occur in the transition zone.

Another important concept, particularly with reference to the habitat of small cave animals, is that of mesocaverns. These are small voids, cracks and passages inaccessible to humans, but accessible, or perhaps even preferred by troglobites (Howarth 1983). Because these small features are often undetectable as well as inaccessible, quantifying them or even verifying their presence can be highly uncertain, yet they may actually be the primary habitat of species of interest. Here the term 'cave' will refer to voids large enough for humans to investigate directly. The term 'mesocavern' will refer exclusively to those very small spaces inhabitable by cave fauna, but inaccessible to humans and 'cave system' will refer to subterranean features with both accessible caves and mesocaverns with known or potential connectivity among them. Troglobites are vulnerable to impacts from human activities due to their absolute dependence on specific environmental conditions present only in caves systems. The cave environment is relatively monotonous compared to surface habitats and is characterized by stable temperatures, constant near-saturation humidity, low evaporation rates, and the absence of in situ photosynthetic nutrient production (Barr 1968, Culver 1982, Howarth and Stone 1990).

1.1 Lava Tubes on Hawai'i Island

The Keahuolu project site is located on the western flank of the 8,271 ft Hualalai volcano. Hualalai is the third oldest of the five volcanoes on Hawaii with flows dating to at least 130,000 years before present (Moore and Clague 1992). Three major rift zones radiate from the top of Hualalai to the north, northwest and southeast. Lavas in the project area are between 3,000 and 5,000 years old and probably originated from a vent in the northwest rift zone between the Ka'upulehu Cone and Pu'u A'lauawa (Wolfe and Morris 1996). The last eruption of Hualalai occurred in 1801 creating the Huehue lava flow, which passed to the north of the project area, reaching the coast near Keahole Point. While Hualalai is still considered a significant volcanic hazard, seismic activity within Hualalai is currently low and there is no evidence of magma movement (Clague and Dalrymple 1987). Moore, Clague, Rubin and Bohrsen (1987) suggested that another eruption is probable in the next 200 years, but could occur in the next few decades. The last major earthquake originating from Hualalai occurred in 1929 and shook the area with aftershocks for more than a month. A few intermittent streams in the area are subject to flash flooding (Peterson and Moore 1987), but no significant surface drainage channels occur on the Keahuolu property.

Surface lavas of Hualalai are primarily alkalic olivine basalts. Basaltic lavas are generally classified into two types, 'a'a and pahoehoe. 'A'a lavas have a rough, clinker like surface overlying a denser core. Pahoehoe usually has a smooth ropey surface. The two forms differ primarily in heat and gas content but can erupt from the same volcanic vent. 'A'a and pahoehoe lavas vary greatly in their ability to produce soils and support vegetation. The rough texture of 'a'a forms soils better than the smoother pahoehoe. As a result, 'a'a flows often support a greater plant diversity than similar aged pahoehoe.

Lavas within the project area consist of both 'a'a and pahoehoe. Voids can occur in a'a, but pahoehoe is strongly associated with the presence of lava tube caves. Lava tube caves form readily when the surface crust of a pahoehoe flow cools and insulates the underlying flow allowing it to travel for many miles without losing its heat energy (Kauahikaua et al 2004). As the eruption ceases, the molten lava drains from the tube leaving an empty passage. Sections of lava tube often collapse creating skylights, sinkholes, cracks and trenches. These openings can be very deep and often have vertical or undercut walls. Blockages within the tube can result in over-pressuring and subsequent surface breakout. Surface breakouts can be persistent leading to new tube branches, which may or may not parallel the master tube.

Clearing of the blockage may result in abandonment of breakout passages and resumption of flow through the master tube. Lava tubes in Hawaii are valued as biological resources (Giffin 2003). Cave entrances and passages provide important habitat for many kinds of plants and animals. Volcanic sinkholes and skylights in some Hawaiian caves form natural refugia where vascular plants can persist without being damaged by herbivores. Arthropods, snails, birds, and mammals also inhabit lava tubes. Howarth (1983, 1990, 1991 and 1993) described the fascinating ecology

of native cave arthropods and their habitats in Hawaii. In some areas, native forest birds, especially 'apapane (*Himatione sanguinea*) and 'oma'o (*Myadestes obscurus*), occur in lava tube openings. Lava tube skylights and sinkholes formed natural pitfalls where palaeontological (fossil) resources can be found today (Olson and James 1982, 1991; Olson and Ziegler 1995; Ziegler 2002). Extinct endemic waterfowl including a flightless goose have recently been documented from the Big Island and may have been extirpated by the native Hawaiians (Giffin 2003). Bones of goats and pigs were observed in the Keahuolu caves by SWCA.

Hawaiian caves have been described as ecologically sensitive environments. None of the obligate cave fauna now known from Hawaii Island are currently listed as Candidate, Threatened, or Endangered species by the U.S. Fish and Wildlife Service (Service). Kaua'i Cave Amphipod *Spelaeorchestia koloana* and the Kaua'i Cave Wolf Spider *Adelocosa anops* are both listed as endangered species by the Service, but neither of these species occurs on the island of Hawai'i. The Service recognizes one species of cave invertebrate on Hawai'i Island, the troglobitic cixid leafhopper *Oliarus polyphemus*, as a species of concern. This species was not found by SWCA within the Keahuolu project area.

2.0 Study Methods

SWCA speleologist Dr. Kemble White assisted by botanist Shahin Ansari and cartographer Ryan Taira of SWCA conducted cave surveys on June 18-20, 2008. Because of limited funding, surface reconnaissance surveys were first conducted to locate known cave entrances or other indicators of subsurface voids, and to locate any previously unidentified features. The focus of the surveys was to develop a general understanding of the troglobitic cave fauna within the Keahuolu area, rather than to take an exhaustive inventory of each cave. No surveys were conducted in caves known to harbor human skeletal remains as identified in (PHRI 1990 and 2007). Where caves and entrances identified in this study correspond with known archaeological sites identified by PHRI (1995 and 2004), this report refers to the sites by their SIHP site number. Otherwise, cave numbers correspond to SWCA's GPS waypoint numbers.

The SWCA team then spent approximately six hours searching for troglobitic fauna in three of eight caves within the project area. Invertebrate specimens collected within the caves were preserved in 95% ethanol and delivered to Dr. Frank Howarth of the Bishop Museum for taxonomic analysis.

3.0 Results

3.1 Caves Sampled at Keahuolu

Eight significant cave entrances were investigated by SWCA biologists in locations highlighted in the PHRI 1990 and 2007 archaeological reports as containing caves (Sites 13450, 13452, 13441, 13471, and 13474) (Figure 1). Each cave was briefly assessed for troglobite habitat potential by exploring the first few meters of passage. Once each had been inspected, SWCA then surveyed the three caves with highest potential to containing troglobitic species. Cave numerical designations represent SWCA's GPS waypoint numbers. **Bold numbers** indicated caves surveyed by SWCA scientists for this study:

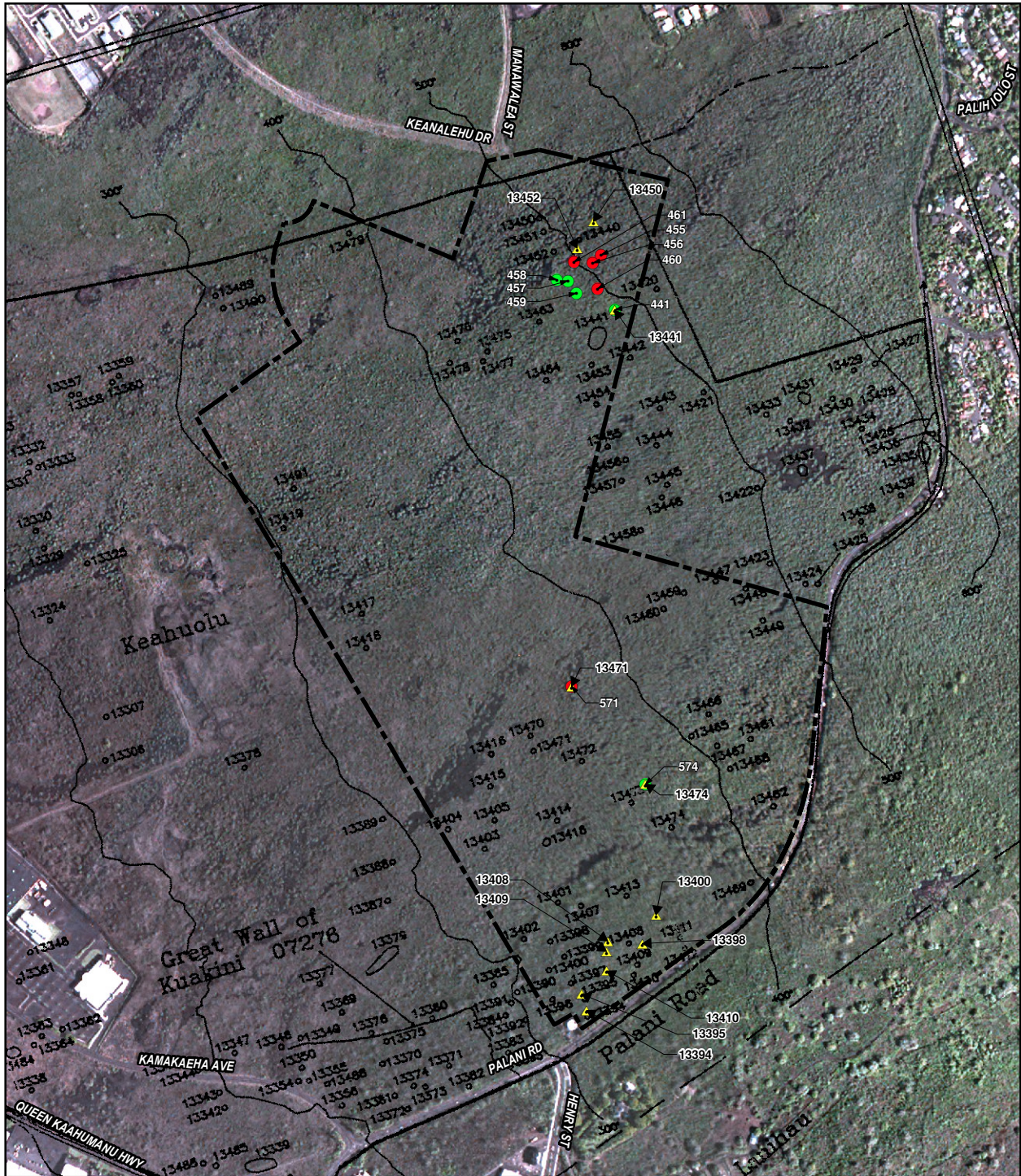
- **Cave 441** (SIHP 13441) is marked by a chain of three skylights extending mauka to makai with approximately 10 m of obvious passage extending mauka from the mauka-most skylight. The roughly 10 m-long passage measures about 3 m in diameter. From the terminus of that passage three smaller tubes continue mauka but only one, which blows air, is accessible. It measures roughly 1m wide by 0.5 m high and was explored for approximately 8 meters where a biological survey was conducted in a moist section of passage. SWCA biologists documented *Schrankia* sp., a cave-adapted moth common to caves across Hawai'i Island, and an assortment of very small spiders and other unidentified inverts from this cave.

- Cave 455 as observed from the surface has mauka and makai passage extending from a single collapsed skylight. The larger mauka passage extends for at least 20 m. Line of sight makai is only a few meters. This cave was given low priority for biological survey in favor of larger tubes. No biological survey conducted. Exploration not conducted beyond entry area.
- Cave 456 occurs directly makai of 455 by approximately 10 meters. Through a 4m by 3 m skylight only a few meters of passage are visible in either the mauka or makai directions. The short mauka segment (6-8m) contains two inaccessibly small skylights which light the passage. This cave was given low priority for biological survey in favor of larger tubes. No biological survey conducted. Exploration not conducted beyond entry area.
- **Cave 457** was larger than the previous caves encountered and given a high priority for biological survey because of its accessibility and relatively small entrance which restricts air exchange maintaining more humid conditions. The 1m by 2m entrance occurs at the northern edge of a knoll covered predominantly with fountain grass, which was inconsistent with surrounding vegetation cover (mostly koa haole). Biological survey documented *Schrankia* sp., a cave-adapted moth common to caves across the big island and an assortment of very small spiders and other unidentified invertebrates from the cave. Cave 458 is another entrance to cave 457 connected by a short segment of passage.
- Cave 459 has a 5m diameter skylight entrance and occurs in the middle of a knoll covered predominantly with fountain grass, which was inconsistent with surrounding vegetation cover (mostly koa haole). The cave has more extensive passage than others. The lava tube consists of at least 50 m of braided passage intersecting an upper level passage at the makai end. Roots of a nearby autograph tree (waypoint 458) can be seen in the upper passage. Roots are generally more absent than in the other caves and lack of moisture contributed to poor habitat conditions for cave fauna.
- Cave 461 consists of a single skylight with approximately 15 m of passage in the mauka direction ending at a collapse. Collapse blocks all makai passage. This cave was given low priority for biological survey in favor of larger tubes. No biological survey conducted. Exploration not conducted beyond entry area.
- **Cave 574** (SIHP 13474) contains approximately 60 m of passage in the makai direction following a reasonably discernable ridge-like surface form consisting of some walking passage, but primarily stooping to crawling passage. Additional passage extends mauka, but ceiling did not seem stable and exploration was not attempted. Biological survey documented *Schrankia* sp., and an assortment of very small spiders and other unidentified inverts.

3.2 Vegetation

Twenty six (26) plant species were observed by SWCA within the Keahuolu project site in June 2008 (Table 1). The majority (19) of these species is introduced. No rare, threatened or endangered plant species were found. Thickets of koa haole (*Leucaena leucocephala*) and alahe'e (*Canthium odoratum*) shrubs dominated the 'a'a landscape at the site. Other common tree species included noni (*Morinda citrifolia*), autograph tree (*Clusia rosea*), Christmas berry (*Schinus terebinthifolius*) and kiawe (*Prosopis pallida*).

Fountain grass (*Pennisetum setaceum*) was the dominant ground cover especially in the northern part of the project site where koa haole and alahe'e thickets were interrupted by small areas of fountain grass grasslands. Flame flower (*Talinum fruticosum*), uhaloa (*Waltheria indica*) and guinea grass (*Panicum maximum*) were also abundant in the understory. Vegetation common in shaded areas at cave entrances included 'Ala'ala wai nui (*Peperomia blanda*) and laua'e fern (*Phymatosorus grossus*). Moa fern (*Psilotum nudum*) and the endemic vine, uhi (*Smilax melastomifolia*) were only found around the opening of cave #457 in the northern site.



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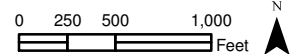
Legend

- PHRI 2007 Arch Sites - digitized
- Project Boundary - digitized

Note: PHRI 1990 Arch site locations are approximate

Caves Observed by SWCA

- Surveyed by SWCA
- Not Surveyed by SWCA



Aerial Source: PDC
Data Source: PHRI Dec 2007; August 1990:

Table 1. List of Plant Species Associated with Lava Tube Caves at Keahuolu, Kona, Hawai'i.

Family	Scientific name	Common name	Status
Dicots			
Acanthaceae	<i>Barleria cristata</i> L.	Philippine violet	Naturalized
Anacardiaceae	<i>Schinus terebinthifolius</i> Raddi	Christmas berry, wilelaiki, nani o Hilo (Moloka'i)	Naturalized
Apocynaceae	<i>Catharanthus roseus</i> (L.) G.Don	Madagascar periwinkle, kihāpai	Naturalized
Asclepiadaceae	<i>Stapelia gigantea</i> N.E.Br.	Zulu giant, giant toad plant, carrion flower	Naturalized
Clusiaceae	<i>Clusia rosea</i> Jacq.	autograph tree, copey, Scotch attorney	Naturalized
Convolvulaceae	<i>Ipomoea indica</i> (Burm.) Merr.	koali 'awa, koali 'awahia, koali lä'au (Ni'ihau), koali pehu	Indigenous
Crassulaceae	<i>Bryophyllum pinnatum</i> (Lam.) Oken	air plant, life plant, 'oliwa kü kahakai	Naturalized
Fabaceae	<i>Abrus precatorius</i> L.	black-eyed Susan, bead vine, rosary pea, pūkiawe, pūkiawe lei, pūkiawe lenalena (Ni'ihau), pūpūkiawe	Naturalized
Fabaceae	<i>Leucaena leucocephala</i> (Lam.) de Wit	koa haole	Naturalized
Fabaceae	<i>Prosopis pallida</i> (Humb. & Bonpl. ex Willd.) Kunth	algaroba, mesquite, kiawe	Naturalized
Fabaceae	<i>Pithecellobium dulce</i> (Roxb.) Benth.	Manila tamarind, 'opiuma	Naturalized
Malvaceae	<i>Abutilon grandifolium</i> (Willd.) Sweet	hairy abutilon, ma'o	Naturalized
Passifloraceae	<i>Passiflora suberosa</i> L.	hue hue haole	Naturalized
Piperaceae	<i>Peperomia blanda</i> var. <i>floribunda</i> (Miq.) H.Huber	'ala'ala wai nui	Indigenous
Portulacaceae	<i>Talinum fruticosum</i> (L.) Juss.	flameflower	Naturalized
Rubiaceae	<i>Morinda citrifolia</i> L.	noni, Indian mulberry	Polynesian introduction
Rubiaceae	<i>Canthium odoratum</i> (G.Forst.) A.C.Sm. & S.P.Darwin	alahe'e, 'öhe'e, walahe'e	Indigenous
Sapindaceae	<i>Dodonaea viscosa</i> Jacq.	'a'ali'i, 'a'ali'i kü makani, 'a'ali'i kü ma kua, kūmakani	Indigenous
Sterculiaceae	<i>Waltheria indica</i> L.	'uhaloa, 'ala'ala pū loa, hala 'uhaloa, hi'aloa, kanakaloa	Indigenous
Verbenaceae	<i>Lantana camara</i> L.	lākana, lä'au kalakala, lanakana (Ni'ihau), mikinolia hihui, mikinolia hohono, mikinolia kukū	Naturalized
Monocots			
Poaceae	<i>Pennisetum setaceum</i> (Forssk.) Chiov.	fountain grass	Naturalized
Agavaceae	<i>Agave sisalana</i> Perrine	sisal, sisal hemp, century plant, malina	Naturalized
Poaceae	<i>Panicum maximum</i> Jacq.	guinea gass	Naturalized
Smilacaceae	<i>Smilax melastomifolia</i> Sm.	hoi kuahiwi, aka'awa, pi'oi (Kaua'i), uhi, ulehihi	Endemic
Ferns			
Psilotaceae	<i>Psilotum nudum</i> (L.) P.Beauv.	moa, moa nahele, pipi, 'o'omoa, upright whiskfern	Indigenous
Polypodiaceae	<i>Phymatosorus grossus</i> (Langsd. & Fisch.) Brownlie	laua'e, maile-scented fern	Naturalized

3.3 Cave Life at Keahuolu

SWCA found 14 species of cave arthropods at Keahuolu and collected 13 species. A list of species collected in the caves at Keahuolu appears in Table 2. Only two possible native cave species are represented in the collected material. The rhagidiid mite belongs to a group with two known blind cave species and an eyed species known from fumaroles near Kilauea. There are also eight adventive species recorded in Hawai'i; thus a specific identification would be necessary to confirm the status of this species. The other native is the cave moth (*Schrankia* species), which is one of the more interesting cave-adapted species in Hawai'i. It is unique in displaying a range of characters from highly cave-adapted forms to typical epigeal forms. The adult specimens collected during at Keahuolu appear to be the flighted twilight zone form. Their presence indicates that plant roots, which are the larval food, enter the cave. It is therefore surprising that other root-associated native species were not found. No native species that are characteristic of the deep cave zone were found at Keahuolu.

The eleven other species are alien invaders in caves, and all that could be definitively identified are more characteristic of the twilight and transition zones near entrances rather than in the deep cave zone. Two species of spiders represent species new to the state. Both are tiny and may have been missed in earlier surveys. Non-native scorpions (*Isometrus maculatus*) were observed on the floor of SIHP site 13474 not far from the cave entrance, but not collected.

3.4 Threats to Cave Fauna

Threats to Hawaiian cave fauna and their habitats come from a variety of factors, including the following identified by the US Fish and Wildlife Service:

Pre-Contact Threats

- Land clearing and burning, resulting in the removal of surface plant sources of nutrition
- Manipulation of surface waters for kalo irrigation, changing natural humidity regimes
- Shelter cave fires, resulting in death of arthropods from toxic smoke

Post-Contact Threats

- Grazing and fires, resulting in the removal of surface plant sources of nutrition
- Predation by non-native species, including alien spiders, centipedes, scorpions, and rats
- Urbanization, resulting in physical cave collapse, food chain collapse, and habitat sedimentation
- Water development and redirection of rainwater, changing natural humidity regimes
- Cigarette smoke and cave fires, resulting in death by toxic smoke and nicotine gas
- Human intrusion and vandalism, resulting in habitat degradation and injury to cave species

The most important extrinsic threats may be indirect. Caves in the Kona area are known to have invertebrate predators as well, including the alien web-building brown violin spider (*Loxosceles* sp.), black widow spider (*Latrodectus* sp), and little brown scorpion (*Isometrus maculatus*). The alien terrestrial predaceous nemertine worm *Argonemertes dendyi* from Australia, has appeared on the Island of Hawai'i apparently spread via nursery materials. Threats specific to the Keahuolu project area include impacts to the habitat of the organisms rather than directly to the animals. There are two phases to be considered, the construction phase and the residential phase. Breakthroughs created by trenching operations for installation of utilities (electricity, cable, water, and sewage) have the potential to expose habitats to sunlight and air can destroy habitats by exposing them to the elements. Assuming that the trenching for utilities will be associated with road construction, some estimate of the area impacted by trenching can be made. Depending on the flexibility of the planning for trenching locations, consultation with engineers could serve to minimize impacts of trenching. Preventative and remedial actions for construction activities are discussed below.

Table 2. Annotated List of Arthropods Found in Keahuolu Caves. Collected by Dr. Kemble White, SWCA, and identified by Dr. F.G. Howarth, Department of Entomology, Bishop Museum, Honolulu.

Taxa	Status in HI†	Status* in cave	SWCA Sites	Notes
ACARI (Mites)				
Rhagidiidae: Genus species (unidentified)	End?	TP?	441 457	A pale predatory mite with conspicuous eye-spots. Native cave species known.
ARANEAE (Spiders)				
Pholcidae: <i>Smeringopus pallidus?</i> (Blackwall, 1858)	Adv	TP	441 457 574	4 specimens all immature are probably this species, which is common in the twilight-transition zones of lowland caves.
Scytodidae <i>Scytodes longipes</i> Lucas1845	Adv	TP	574	1 immature specimen. This species is common in the twilight-transition zones of lowland caves.
Sicariidae: <i>Loxoceles rufescens</i> (Dufour, 1820)	Adv	TP	574	1 immature specimen, probably this species. Common in the twilight-transition zones of lowland caves; also occasionally found deeper in caves.
Symphytognathidae: Genus species (unidentified)	Adv?	TP?	441	A tiny spider less than 1 mm long with only 4 eyes. 1 pair collected. New to state.
Theridiidae: possibly <i>Stemmops</i> species	Adv	TP	457 574	2 males of this small spider (~2 mm) with 6 large eyes. New to state.
Uloboridae? Possibly <i>Zosis geniculatus</i> (Olivier, 1789)	Adv	TX	574	A tiny spiderling, too immature to ID, but possibly this species. Common in the twilight.
COLLEMBOLA (Springtails)				
Entomobryidae: Genus species (unidentified)	Adv?	TP/AC	457 574	A large grey species with conspicuous eyes. Probably a leaf litter species not usually associated with caves. Not identified further.
INSECTA (Insects)				
Coleoptera (Beetles): Carabidae: <i>Typhlonesiotes swaluwenbergi</i> (Jeannel, 1937)	Adv	TP/AC	574	A tiny soil beetle less than 1 mm long; probably accidental in caves with soil.
Isoptera (Termites): Genus species (unidentified)	Adv	AC	574	A single worker. Termites are accidental in caves. Not identified further.
Lepidoptera (Moths): Noctuidae: <i>Schrankia</i> species	End	TP/TB	441 457 574	A native cave species. Highly variable in form, from small-eyed, flightless cave-adapted adults to large-winged epigeal forms. Recent DNA work demonstrates that they are all one hybridizing species in the process of splitting into new species.
Orthoptera (Crickets and relatives): Gryllidae: <i>Cycloptiloides americanus</i> (Saussure, 1870)	Adv	TX	574	A single male collected. This cricket is occasionally found in the twilight zone of dry lowland caves that have a soil layer.
Psocoptera (Bark Lice): Psyllipsocidae: <i>Psyllipsocus minutissimus</i> (Enderlein, 1920)	Adv	TP	441 457 574	Mostly nymphs were collected, which are probably this species, which is common in dry lowland caves.

† = Biogeographic status: Adv = adventive or alien in Hawai'i; End = endemic or found naturally only in Hawai'i. * = Ecological status in caves: TP = troglophile or facultative in caves; TX = troglaxene or visitor in caves; AC = accidental in caves; TB = troglobite or obligately associated with caves and underground habitats.

4.0 Conclusions and Recommendations

Hawaiian lava tube systems, including the caves of Keahuolu area, contain a variety of natural resources. SWCA found 14 species of arthropods in three caves examined in detail at Keahuolu, two of which are troglobitic species most likely endemic to Hawai'i Island. Shorter tube segments may provide suitable troglobitic habitat in mesocaverns extending away from accessible passages.

The presence of these species does not preclude development of the property. The biological resources within the project area do not represent a statutory obstacle to development. The following measures can be taken to minimize and avoid impacts to cave habitats and their unique fauna.

- Minimize the addition of topsoil or other impermeable material to the surface directly above known caves and preserves.
- Control invasive plant species within the preserves (e.g. fountain grass and other aggressive, fire-prone grasses). Landscaping in areas to be developed should utilize native plants to the maximum extent practicable. The use of aggressive fire-prone non-native grasses in landscaping should be discouraged.
- Exercise care to minimize the amount of surface disturbance during construction and trenching in the vicinity of known caves. Proposed trenching and excavation alignments should be carefully screened for the likelihood of breakthroughs.
- Prevent wildfires and develop a rapid response plan to fires within the preserves and subdivisions.
- Allow regular biological monitoring in accessible caves by competent cave biologists during project construction. A monitor can also provide advisory assistance in case of an accidental breakthrough during blasting, trenching, or construction activities.

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Plate 1. Christmas berry tree grows from the mouth of a lava tube cave at Keahuolu.



Plate 2. SWCA speleologist Dr. Kemble White sampling arthropods within a lava tube cave at Keahuolu.

RESUME: ALAN E. HAUN, PH.D.**Education**

Ph.D., University of Oregon, 1984 (Anthropology)
 M.S., University of Oregon, 1977 (Anthropology)
 B.A., University of South Carolina, 1974 (Anthropology)

Employment

Principal Archaeologist and Owner, Haun & Associates, 1999-present
 PHRI Chief Operating Officer and Senior Archaeologist, 1985-1999
 Bishop Museum Contract Archaeology Program Administrator, 1984-1985
 Bishop Museum Staff Archaeologist, 1978, 1984
 Staff Archaeologist, University of Oregon, Dept. of Anthropology, 1984
 Staff Archaeologist, U.S. Forest Service, Butte, Montana, 1974

Active Memberships

Society for American Archaeology, 1974
 Society for Hawaiian Archaeology, 1984

Certification

National Advisory Council on Historic Preservation NHPA Section 106 Compliance Training

Summary of Experience

Dr. Haun holds Master of Science and Doctor of Philosophy degrees in anthropology specializing in Pacific prehistory and ethnography. He was an Affiliate Professor of Anthropology at the University of Hawaii-Hilo for three years and taught undergraduate courses in anthropology at the University of Oregon. Dr. Haun's past projects range from cultural resource management and planning to inventory surveys to major mitigation excavation programs. He has conducted projects throughout the Hawaiian Islands and on Majuro in the Marshall Islands; Babeldoab in the Republic of Palau; Honshu, Kyushu, and Okinawa in Japan; Diego Garcia in the British Indian Ocean Territory; and Guam, Rota, Saipan, and Tinian in the Commonwealth of the Northern Marianas Islands. He has a broad range of experience in all phases of cultural resources management, and a thorough knowledge of local, state, territorial, and federal historic preservation laws, guidelines and procedures. Past clients include individuals, private companies, and local, state, and federal government agencies.

Summary of Publications

Dr. Haun is the author, or co-author, of over 1,000 papers, publications and reports. A selected bibliography follows.

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RESUME – ALAN E. HAUN, PH.D.

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- 2010 Archaeological Site Preservation Plan, Sites 26672 and 26673, Land of Hienaloli 1, North Kona District, Island of Hawaii (TMK: 3-7-5-11:007). Haun & Associates Report 713 prepared for Ms. Carol Christianson
- 2010 Archaeological Site Preservation Plan, Site 14447, Feature A, Land of Puapua'a 1, North Kona District, Island of Hawaii. Portion of TMK: 3-7-5-20:74 and County of Hawaii Easement Lot 114. Haun & Associates Report 697 prepared for Sunstone Realty Partners, LLC. With D. Henry
- 2010 Addendum to Cultural Impact Assessment for D W 'Aina Le'a Development, Land of Waikoloa, South Kohala District, Island of Hawaii. Haun & Associates Project 712. Prepared for D W 'Aina Le'a Development PBR Hawaii. With S. Kailihiwa and D. Henry.
- 2009 Archaeological Inventory Survey, TMK: 3-7-9-05:76, 77 and 78, Lands of Honalo, Maihi 1-2 and Kuamoo 1, North Kona District, Island of Hawaii. Haun & Associates Report 602 prepared for Holliday Fenoglio Fowler, L.P. With D. Henry.
- 2009 Archaeological Inventory Survey Update, Kamakana Villages at Keahuolu Project, Land of Keahuolu, North Kona District, Island of Hawaii (TMK: 3-7-4-21:20). Haun & Associates Report 655 prepared for Forest City Hawaii Kona, LLC. With D. Henry.
- 2009 Archaeological Assessment, Portions of TMK: 3-1-6-04 and 1-6-64, Land of Keaau, Puna District, Island of Hawaii. Haun & Associates Report 640 prepared for Wilson Okamoto Corporation, Honolulu. With D. Henry.
- 2009 Archaeological Assessment, Portion of TMK: 3-1-5-10:17, Lot A-2-A-1, Land of Makuu, Puna District, Island of Hawaii. Haun & Associates Report 682 prepared for Wilson Okamoto Corporation, Honolulu. With D. Henry.

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- 2009 Archaeological Assessment, Portions of TMK: 3-7-8-10:78, Land of Keauhou 1, North Kona District, Island of Hawaii. Haun & Associates Report 634 prepared for Keauhou Resort Development Venture, LLC. With D. Henry.
- 2009 Archaeological Data Recovery Plan, Site 25919, Land of Keahuolu, North Kona District, Island of Hawaii (TMK: 3-7-4-15: 014). Haun & Associates Project 615 prepared for Queen Liliokalani Trust, Honolulu, Hi. With D. Henry and D. Berrigan.
- 2009 Archaeological Data Recovery Plan, Site 26269, Land of Kaloko, North Kona District, Island of Hawaii (TMK: 3-7-3-09:055). Haun & Associates Project 641 prepared for Mr. Ron Terry. With D. Henry.
- 2009 Archaeological Monitor Report, Earthquake Damage Repair, Lands of Keopu 1-3, Pua'a 2 and Waiaha 1, South Kona District, Island of Hawaii (TMK: 3-7-5-12:001, 029, 031 and 3-7-5-16:35 and 3-75-02:007). Haun & Associates Report 666 prepared for CTS Earthmoving, Inc. With D. Henry, T. Miner and D. Berrigan.
- 2009 Plan for On and Off-site Archaeological Monitoring for Construction of Single Service Waterline Lateral, Land of Waiakoa, Makawao District, Island of Maui (TMK:2-2-2-15:43 and Portions of 2-2-13:32, 51 and 2-2-14:01 and 03). Haun & Associates Project 643 prepared for Hoeffken & Kundelatsch.
- 2009 Plan for Archaeological Monitoring of Double Service Waterline Lateral Installation, Land of Waiakoa, Makawao District, Island of Maui (TMK:2-3-9-15:008). Haun & Associates Project 643 prepared for Anthony Leon Nacua.
- 2008 Archaeological Inventory Survey, Portions of TMK: 3-7-5-19:01 and 7-9-11:40 and County of Hawaii Easement Lot 114, Lands of Kahului 2 and Puapuaa 1, North Kona District, Island of Hawaii. Haun & Associates Report 537a prepared for Sunstone Realty Partners, LLC, Honolulu Hawaii. With D. Henry.
- 2008 Archaeological Inventory Survey, Portion of TMK: 3-7-5-19:01, Land of Kahului 2, North Kona District, Island of Hawaii. Haun & Associates Report 537b prepared for Sunstone Realty Partners, LLC, Honolulu Hawaii. With D. Henry.
- 2008 Archaeological Assessment, Portion of TMK: 3-7-2-02:01, Land of Kaupulehu, North Kona District, Island of Hawaii. Haun & Associates Report 538 prepared for Mr. John Sakaguchi, Wilson, Okamoto Corp., Honolulu, Hawaii. With D. Henry.
- 2008 Burial Treatment Plan, Sites 21840, 24103, 24107 and 24114, Hokulia Subdivision, Lands of Haleki'i, Hokukano1 and Honuaino 3, North and South Kona District, Island of Hawaii (TMK: 3-7-9-12:4. 11. 8-1-27:10). Haun & Associates Report 545 prepared for 1250 Ocean-side Partners, Inc. Kailua-Kona, Hawaii. With D. Henry.
- 2008 Burial Treatment Plan, Site 16386-A, Hokulia Subdivision, Land of Ke'eke'e, South Kona District, Island of Hawaii (TMK: 3-8-1-04:3). Haun & Associates Report 546 prepared for 1250 Oceanside Partners, Inc. Kailua-Kona, Hawaii. With D. Henry.
- 2008 Archaeological Inventory Survey, TMK: 3-7-5-17: Por 4, Land of Wai'aha 2, North Kona District, Island of Hawaii. Haun & Associates Report 580 prepared for Mr. Stanley Gomes, Kailua-Kona, Hawaii. With D. Henry.
- 2008 Archaeological Site Preservation Plan, Sites 25516, 25518 and 25519, Land of Waawaa, Puna District, Island of Hawaii. Haun & Associates Report 589 prepared for Mr. James and Van Donald, Emu Park, Australia. With D. Henry and D. Berrigan.

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- 2008 Archaeological Site Preservation Plan, Sites 6348, 6350 and 6991, Land of Pahoehoe 2, North Kona District, Island of Hawaii (TMK: 3-7-37-08:21). Haun & Associates Report 594 prepared for Mr. Greg Fish, Danville, California. With D. Henry and D. Berrigan.
- 2008 Archaeological Monitor Report, Manele Small Boat Harbor, Lands of Kamao and Palawai, Lahaina District, Island of Lanai (TMK:[2]4-9-017:002, 006). Haun & Associates Report 485 prepared for KFC Airport, Inc. With D. Henry and D. Berrigan.
- 2007 Archaeological Inventory Survey, TMK: 3-7-9-11:40 Land of Kanaeue 1-2, North Kona District, Island of Hawaii. Haun & Associates Project 397 prepared for Mr. Gary Yamagata. With D. Henry.
- 2007 Archaeological Inventory Survey, TMK: 3-7-8-10:2, Por. 4, Kahalu'u Ahupua'a, North Kona District, Island of Hawaii, Haun & Associates Report 431-082206 prepared for Kamehameha Investment Corporation. With D. Henry and D. Berrigan.
- 2007 Archaeological Data Recovery Lands of Kaulana, Awalua, Ohiki, Pu'ukala and Kau, North Kona District, Island of Hawaii (TMK: 3-7-2-007:001). Haun & Associates Project 446 prepared Lynch Hawaii Development, LLC. With D. Henry and D. Berrigan.
- 2007 Archaeological Inventory Survey, TMK: 3-1-3-2:50, Land of Kamaili, Puna District, Island of Hawaii. Haun & Associates Project 467 prepared for David Jones and Marita Zimmerman Family Trust. With D. Henry.
- 2007 Archaeological Inventory Survey, TMK: 3-7-4-15: 014, Land of Keahuolu, North Kona District, Island of Hawaii. Haun & Associates Project 514 prepared for Queen Liliuokalani Trust. With D. Henry.
- 2007 Archaeological Inventory Survey, TMK: 2-2-3-002: 3, 122, Land of Kealahou, Makawao District, Island of Maui. Haun & Associates Project 522 prepared for Jeff Grundhauser and Debbie Von Tempsky. With D. Henry
- 2007 Archaeological Assessment, TMK: 2-2-3-003:106, 190, Land of Omaopio, Makawao District, Island of Maui. Haun & Associates Project 532 prepared for Mr. Paul Hanada. With D. Henry
- 2007 Archaeological Assessment, TMK: 3-8-1-005: por. 25, Land of Onouli 1, South Kona District, Island of Hawaii. Haun & Associates Project 534 prepared for 1250 Oceanside Partners. With D. Henry
- 2007 Burial Treatment Plan, Site 16785, Hokulia Subdivision, Land of Kalukalu, South Kona District, Island of Hawaii (TMK: 3-8-1-04:3). Haun & Associates report 551 prepared for 1250 Oceanside Partners, LLC, Kailua-Kona, Hawaii. With D. Henry.
- 2007 Archaeological Assessment, TMK: 3-4-4-12:28, Land of Kaapahu, Hamakua District, Island of Hawaii. Haun & Associates Project 553 prepared for Mr. David DeLuz, Sr., Kamuela, Hawaii. With D. Henry.
- 2007 Archaeological Inventory Survey, TMK: 3-1-3-04:08, land of Opihikao, Puna District, Island of Hawaii. Haun & Associates Project 556 prepared for Mr. Robert Silacci. With D. Henry.
- 2006 Archaeological Assessment Survey, TMK: 3-7-7-08: 121, Land of Kapala'alaea 2, North Kona District, Island of Hawaii. Haun & Associates Project 422 prepared for Mr. Smothers. With D. Henry.

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- 2006 Archaeological Data Recovery, Site 22978, Land of Honualua, North Kona District, Island of Hawaii (TMK: 3-7-5-001:44). Haun & Associates Project 432 prepared for Sunra Coffee LLC. With D. Henry and D. Berrigan.
- 2006 Archaeological Assessment Survey, TMK: 3-1-3-09: por. 005, Land of Kauaea, Puna District, Island of Hawaii. Haun & Associates Project 440 prepared for Mr. Tim Lui-Kwan. With D. Henry.
- 2006 Burial Treatment Plan, Sites 24579, 24600 and 24601, Lands of Kaulana, Awalua and Ohiki, North Kona District, Island of Hawaii (TMK: 3-7-2-007:001). Haun & Associates Project 444 prepared Lynch Hawaii Development, LLC. With D. Henry.
- 2006 Archaeological Site Preservation Plan, Sites 24573, 24593 and 24599, Lands of Awalua and Kau, North Kona District, Island of Hawaii (TMK: 3-7-2-007:001). Haun & Associates Project 445 prepared Lynch Hawaii Development, LLC. With D. Henry.
- 2005 Archaeological Inventory Survey, Ali'i Drive Improvements Project, Lands of Hienaloli 1-6, Auhaukea'e 1-2 and Pua'a 1-2, North Kona District, Island of Hawaii (TMK: 7-5-8: por 1, 3, 5, 6, 9, 11, 12, 17, 19, 22 and 7-5-9: por 3, 8-12, 14, 17-18, 20-23, 25, 27, 28, 30, 31, 34, 39, 40, 43, 47 and 65). Haun & Associates Project 141 prepared for Wilson Okamoto & Associates. With D. Henry.
- 2005 Archaeological Data Recovery, Big Island Country Club, Site 19436, Land of Pu'uuanahulu, North Kona District, Island of Hawaii (TMK: 3-7-1-05:10). Haun & Associates Project 386 prepared for Big Island Country Club. With D. Henry and D. Berrigan.
- 2005 Archaeological Inventory Survey, TMK: 3-7-2-007: 001, Lands of Kaulana, Awalua, Ohiki, Pua'ukala and Kau, North Kona District, Island of Hawaii. Haun & Associates Project 409 prepared for Lynch Hawaii Development, LLC. With D. Henry.
- 2005 Archaeological Inventory Survey, TMK: 3-7-5-16:59, Land of Puapua'a, North Kona District, Island of Hawaii. Haun & Associates Project 410 prepared for Mr. C.L. Werner. With D. Henry.
- 2005 Archaeological Inventory Survey, TMK: 3-7-5-01: 31, Land of Keopu 1, North Kona District, Island of Hawaii. Haun & Associates Project 415 prepared for Mr. Gary Chestnut. With D. Henry.
- 2004 Archaeological Data Recovery, Sites 15517, 15518, 21988, 21991, 21994, 21996, 22067, 22068 and 22069, Land of Wai'aha 1, North Kona District, Island of Hawaii. Haun & Associates Project 185. Prepared for Sunstone Realty Partners, X LLC. With D. Henry and D. Berrigan.
- 2004 Archaeological Inventory Survey, TMK: 3-8-7-008: 008, Land of Pahoehe 1, South Kona District, Island of Hawaii. Haun & Associates Project 320 prepared for Mr. Peter Dungeate. With D. Henry.
- 2004 Archaeological Assessment, Pohakea Ranch Lots Subdivision, Lands of Kapahukalua and Kaunamano, Hamakua District, Island of Hawaii. Haun & Associates Project 343 prepared for Mr. Peter Savio. With D. Henry
- 2004 Archaeological Site Preservation Plan, Site 8110 and 8111, Land of Kaumalumu, North Kona District, Island of Hawaii (TMK: 3-7-7-04:85, Lot 23). Haun & Associates Project 385 prepared for Mr. Richard Bosselmann. With D. Henry
- 2004 Archaeological Data Recovery Plan, Big Island Country Club, Site 19436, Land of Pu'uuanahulu, North Kona District, Island of Hawaii (TMK: 3-7-1-05:10). Haun & Associates Project 386 prepared for Big Island Country Club. With D. Henry

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- 2003 Archaeological Data Recovery, Sites 5748, 5749, 5750, 5753, 5755, 5756, 5761, 5762, 5764, 5771, 5773, and 5774, Pu‘uhonua Subdivision Parcel, Land of Kalaoa 5, North Kona District, Island of Hawaii (TMK: 3-7-3-10:por 27). Haun & Associates Project 102. Prepared for Mr. David Deluz. With D. Henry and D. Berrigan.
- 2003 Archaeological Data Recovery, Site 5913, Land of Kaunala, Ko‘olauloa District, Island of Oahu (TMK: 5-8-03:12 and 5-8-06:1-29). Haun & Associates Project 205. Prepared for Metropolitan Mortgage - Hawaii. With D. Henry and D. Berrigan.
- 2003 Archaeological Inventory Survey, TMK: 3-7-3-23:88, Land of Kalaoa 3rd, North Kona District, Island of Hawaii. Haun & Associates Report 243. Prepared for Inaba Engineering, Inc. With D. Henry.
- 2003 Archaeological Inventory Survey, DHHL Home Depot Site at Panaewa, Land of Waiakea, South Hilo District, Island of Hawaii. Haun & Associates Report 300. Prepared for PBR Hawaii. With D. Henry.
- 2003 Archaeological Inventory Survey, Land of Ponahawai, South Hilo District, Island of Hawaii (TMK: 2-3-49:52, 2-3-37:001). Haun & Associates Report 316. Prepared for Western United Life Assurance Company. With D. Henry.
- 2002 Archaeological Inventory Survey, TMK: 7-5-16:5 (Lots 3 and 4), Land of Puapua‘aiki, North Kona District, Island of Hawai‘i. Haun & Associates Project 186. Prepared for Mr. Dennis Moser. With D. Henry.
- 2002 Archaeological Inventory Survey, DHHL Project at Panaewa, Land of Waiakea, South Hilo District, Island of Hawai‘i. Haun & Associates Project 173. Prepared for Department of Hawaiian Home Lands. With D. Henry.
- 2002 Archaeological Inventory Survey, TMK: 3-1-3-2:71, Land of Kaueleau, Puna District, Island of Hawai‘i. Haun & Associates Project 172. Prepared for Mr. Edward Utyro. With D. Henry.
- 2002 Archaeological Inventory Survey, Waianapanapa State Park, Lands of Honokalani, Wakiu and Kawaipapa, Hana District, Island of Maui. Haun & Associates Report 168. Prepared for Wilson Okamoto & Associates, LLC. With D. Henry and Maria Orr.
- 2002 Archaeological Inventory Survey, Proposed 124-Acre Makilia Subdivision, Lands of Launiupoko, Polanui and Puehuhunui, Lahaina District, Island of Maui. Haun & Associates Project 143. Prepared for Makilia Land Company, LLC. With D. Henry.
- 2002 Archaeological Inventory Survey, TMK: 2-2-1-11:16-17, Land of Palauea, Makawao District, Island of Maui. Haun & Associates Project 136. Prepared for TMC General Contracting Inc. With D. Henry.
- 2002 Archaeological Inventory Survey, Kalaniana‘ole Highway Improvements at Makapu‘u Point, Lands of Maunalu and Waimanalo, Ko‘olaupoko and Honolulu Districts, Island of Oahu (TMK: 3-9-10: por 1 and 4-1-14: por. 2 and 13). Haun & Associates Project 122. Prepared for Wilson Okamoto & Associates. With D. Henry.
- 2002 Cultural Impact Assessment, DHHL Residential Development at Lalamilo, South Kohala, District, Island of Hawaii (TMK: 6-6-01:10, 54 & 77 and TMK: 6-6-04:12-17). Haun & Associates Project 117. Prepared for PBR Hawaii. With D. Henry and Ka‘ohulani McGuire.
- 2002 Archaeological Data Recovery, Sites 22740, 22741 – Feature E and 22749, Land of O‘oma, North Kona District, Island of Hawai‘i. Haun & Associates Project 078. Prepared for THY Development, Inc. With D. Henry.

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- 2002 Archaeological Inventory Survey, TMK: 3-7-7-004:57, 58, Land of Kaunalumalu, North Kona District, Island of Hawai'i. Haun & Associates Project 040. Prepared for Old Hawaii Realty. With D. Henry.
- 2002 Archaeological Inventory Survey, Waiaka Bridge Replacement and Realignment of Approaches, Lands of Lalamilo, Keoniki, Kauniho and Waiaka 1, South Kohala District, Island of Hawaii. Haun & Associates Report 030. Prepared for Wilson Okamoto & Associates With D. Henry and Ka'ohulani McGuire.
- 2001 Archaeological Inventory Survey, Hilo International Airport Improvements, TMK 2-1-12:portion 9, Land of Waiakea, South Hilo District, Island of Hawai'i. Haun & Associates Project 015. Prepared for Wilson Okamoto & Associates, Inc. With D. Henry.
- 2001 Archaeological Inventory Survey, Portion of TMK: 4-7-01:04, Land of Launiupoko, Lahaina District, Island of Maui. Haun & Associates Project 044a. Prepared for Makilia Land Co. LLC, Inc. With D. Henry and Maria Orr.
- 2001 Archaeological Inventory Survey, Kaunala Bay Subdivision, TMK: 5-8-03:12 and 95, and 5-8-06:1-29, Land of Kaunala, Island of Oahu. Haun & Associates Project 045. Prepared for Wilson Okamoto & Associates. With D. Henry.
- 2001 Archaeological Inventory Survey, TMK: 7-5-03:19, Land of Lanihau 1, North Kona District, Island of Hawai'i. Haun & Associates Project 068. Prepared for Mr. E.H. Patterson. With D. Henry.
- 2001 Archaeological Inventory Survey, Portion of TMK: 2-3-02:3, Land of Kamehameui Makawao District, Island of Maui. Haun & Associates Project 075. Prepared for Raymond Von Tempsky Trust. With D. Henry.
- 2001 Archaeological Inventory Survey, Emergency Replacement of Kawaikapu Bridge, Land of Kawaikapu, Island of Molokai. Haun & Associates Project 063. Prepared for State of Hawaii, Department of Transportation, Highways Division. With D. Henry.
- 2001 Archaeological Inventory Survey, TMK: 7-7-10:73, Land of Kapala`alaea, North Kona District, Island of Hawai'i. Haun & Associates Project 144. Prepared for Mr. Tom Tusso. With D. Henry.
- 2001 Archaeological Inventory Survey, TMK: 3-2-9-005:002, 3-2-8-001:002, and 3-2-7-001:001. Lands of Hakalau Nui, Makahanaloa, Kawainui, Onomea, Alakahi, Papaikou, Mokuoniki, Puu-moi, Kalaoa, Alemai and Paukaa, South Hilo District, Island of Hawai'i. Haun & Associates Project 052. Prepared for Koa Timber, Inc. With D. Henry and Ka'ohulani McGuire.
- 2001 Archaeological Recording and Assessment, Wall Bordering TMK: 2-1-06:6, Land of Kanahena, Makawao District, Island of Maui. Haun & Associates Project 051. Prepared for Mr. Dwayne Altman. With D. Henry.
- 2000 Archaeological Inventory Survey, Kaloko Industrial Park, Phases III and IV, TMK: 7-3-51:60, Land of Kaloko, North Kona District, Island of Hawai'i. Haun & Associates Project 004. Prepared for Wilson Okamoto & Associates. With D. Henry.
- 2000 Archaeological Inventory Survey, Hilo Harbor Facilities Expansion, TMK: 3-2-1-09: 2, 12, 41, and TMK: 3-2-1-07: 20-37, Land of Waiakea, South Hilo District, Island of Hawai'i. Haun & Associates Project 009. Prepared for R.M. Towill Corp. With D. Henry.
- 2000 Archaeological Inventory Survey, TMK: 2-1-07:67, Land of Ka'eo, Makawao District, Island of Maui. Haun & Associates Project 033. Prepared for The Garcia Family. With D. Henry.

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- 2000 Archaeological Inventory Survey, TMK: 2-3-002:005, Land of Pulehu Nui, Makawao District, Island of Maui. Haun & Associates Project 034. Prepared for Mr. Sterling Kim. With D. Henry.
- 2000 Archaeological Inventory Survey, TMK: 2-3-002:171, Land of Omaopio, Makawao District, Island of Maui. Haun & Associates Project 038. Prepared for Aha Iki Associates, LLC. With D. Henry.
- 1999 Archaeological Inventory Survey Kaua'ula Development Parcel, Lands of Puehuehu Iki, Pahoia, and Pola Nui, Lahaina District, Island of Maui. Prepared for Kaua'ula LLC.
- 1998 Final Report: Phase II Archaeological Documentation and Testing U.S. Naval Activities Ordnance Annex and Waterfront Annex, Territory of Guam. Prepared for Department of the Navy, Pacific Division, Naval Facilities Engineering Command, Pearl Harbor. With J.D. Henry, M.A. Kirkendall, and D.G. DeFant.
- 1998 Archaeological Inventory Survey, Launiupoko Development Parcel, Land of Launiupoko, Lahaina District, Island of Maui (TMK: 2-4-7-01:2). Prepared for Launiupoko LLC c/o Peter Martin. With D.K. Graves and S. Goodfellow.
- 1998 Intensive Archaeological Survey, Ali'i Highway Phased Mitigation Program, North Kona District, Island of Hawai'i. Prepared for the County of Hawaii. With J.D. Henry, J. Jimenez, and M.A. Kirkendall.
- 1996 Research Design for Data Recovery for Site 50-80-11-4933 in Support of Project P268T Aircraft Apron, Marine Corps Base Hawaii, Kaneohe Bay, Oahu. Lands of He'eia and Kâne'ohe, Ko'olaupoko District, Island of Oahu. With T.R. Wolforth.
- 1996 Archaeological Inventory Survey for the Kamoku-Pukele 138-kV Transmission Line Alignments. Lands of Mânoa, Pâlolo, and Waikîkî, Honolulu District, Island of O'ahu (TMK: 2-7, 2-8, 2-9, 3-2, 3-3, 3-4). Prepared for CH2M Hill. With T.R. Wolforth.
- 1996 Final Report: Archaeological Monitoring of Trenching for Water Pipe in Support of Project KB9562RS and Fence Post Excavation for Expansion of the Canine Obstacle Course Buildings 1095 and 1096, Marine Corps Base Hawaii, Kaneohe Bay. Land of Kâne'ohe, Ko'olau Poko District, Island of O'ahu. Prepared for Department of the Navy, Pacific Division, Naval Facilities Engineering Command. With W. Wulzen.
- 1996 Archaeological Inventory Survey, Kaneohe Erosion Stabilization Project. Land of Kâne'ohe, Ko'olaupoko District, Island of Oahu. Prepared for Helber, Hastert & Fee. With J.A. Head and T.R. Wolforth.
- 1991 Archaeological Mitigation Plan, Ewa Marina Community Project - Phase I, Mitigation Plan for Data Recovery, Interim Site Preservation, and Monitoring, Land of Honouliuli, Ewa District, Island of Oahu. Prepared for HASEKO (Hawaii), Inc. With P.H. Rosendahl and S.T. Goodfellow.
- 1991 Archaeological Survey of the Naval Air Station Barber's Point Oahu, Hawai'i. Department of Anthropology, Bishop Museum. Prepared for Commander, Pacific Division Naval Facilities Engineering Command, Pearl Harbor.
- 1991 An Archaeological Survey of the Naval Magazine and Naval Communications Area Transmission Facility Lualualei, Oahu, Hawaii. Bishop Museum, Department of Anthropology. Prepared for Pacific Division, Naval Facilities Engineering Command, Honolulu.
- 1991 Intensive Archaeological Survey and Test Excavations, Ewa Marina Community Project - Phase I, Land of Honouliuli, Ewa District, Island of Oahu. Prepared for HASEKO (Hawaii), Inc. With A.E. Dunn.

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- 1990 Intensive Archaeological Survey and Test Excavations, Ewa Marina Community Project - Phase I, Land of Honouliuli, Ewa District, Island of Oahu. Prepared for HASEKO (Hawaii), Inc. With B.D. Davis and P.H. Rosendahl.
- 1990 Archaeological Data Recovery Excavations, Waikapu Mauka Partners Golf Resort Project Area, Land of Waikapu, Wailuku District, Island of Maui. Prepared for Waikapu Mauka Partners. With J. Brisban and P.M. Jensen.
- 1990 Intensive Archaeological Survey and Test Excavations, Ewa Marina Community Project - Phase II, Land of Honouliuli, Ewa District, Island of Oahu. Prepared for HASEKO (Hawaii), Inc. With A.E. Dunn.
- 1990 Archaeological Inventory Survey and Test Excavations, Kahakai Development Project Area, Lands of Puapua'a 1st and 2nd, North Kona, Island of Hawaii. (TMK: 3-7-20:1) Prepared for KG (Hawaii) Construction, and Wilson Okamoto & Associates. With J. Landrum and P.H. Rosendahl.
- 1990 Archaeological Data Recovery - Phase II, Hyatt Regency Kauai Mitigation Program, Land of Paa, Koloa District, Island of Kauai. Draft. Prepared for Ainako Resort Associates. With A.T. Walker and P.H. Rosendahl.
- 1989 Archaeological Reconnaissance Survey for Environmental Impact Statement (EIS), Azabu Keauhou Resort Project, Land of Kahaluu, North Kona District, Island of Hawaii. Prepared for Belt, Collins & Associates. With A.T. Walker and P.H. Rosendahl.
- 1989 Archaeological Reconnaissance Survey and Limited Subsurface Reconnaissance, Murray Pacific Project Area, Land of Palauea, Makawao District, Island of Maui. Prepared for VMS Realty Partners. With W.A. Shapiro.
- 1989 Archaeological Mitigation Program, Regent Kona Coast Resort, Phase I: Mitigation Plan for Data Recovery, Interim Site Preservation and Burial Treatment, Land of Kukio 1st, North Kona District, Island of Hawaii. Prepared for Huehue Ranch. With P.M. Jensen.
- 1988 Phase I - Mitigation Plan for Archaeological Data Recovery Excavations, West Loch Estates Mitigation Program, Residential Increment I and Golf Course and Shoreline Park, Land of Honouliuli, Ewa District, Island of Oahu. PHRI Report 440-070888. Prepared for City and County of Honolulu. With P.M. Jensen and P.H. Rosendahl.
- 1988 Archaeological Survey and Test Excavations, Kaupulehu Makai Resort Project Area, Land of Kaupulehu, North Kona, Island of Hawaii. Prepared for Kaupulehu Developments. With A.T. Walker and P.H. Rosendahl.
- 1988 Archaeological Reconnaissance Survey and Limited Subsurface Testing for the Waikane Golf Course Within Special Management Area (SMA), Land of Waikane, Koolaupoko District, Island of Oahu. Prepared for Group 70. With J.D. Mayberry.
- 1988 Archaeological Reconnaissance Survey and Limited Subsurface Testing, Waikane Golf Course Project Area, Land of Waikane, Koolaupoko District, Island of Oahu. Prepared for Group 70. With W.A. Shapiro and J.D. Mayberry.
- 1987 Kahoolawe Excavations, 1982-3, Island of Kahoolawe, Hawaii. Prepared for Department of the Navy, Pacific Division, Naval Facilities Engineering Command, Pearl Harbor. With P.H. Rosendahl, J.B. Halbig, M. Kaschko, and M.S. Allen.
- 1987 Archaeological Reconnaissance Survey for Environmental Impact Statement, West Loch Estates - Golf Course and Parks, Land of Honouliuli, Ewa District, Island of Oahu. Prepared for City and County of Honolulu. With A.M. Dicks and P.H. Rosendahl.

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- 1987 Archaeological Reconnaissance Survey, Hawaiian Riviera Resort Revised Airfield Site, Airfield Access Road, and Palace Resort Inland Addition, Land of Kahuku, District of Ka‘u, Island of Hawaii. Palace Development Corporation and Hawaii Ka‘u Aina Partnership.
- 1987 Archaeological Reconnaissance Survey, Hawaiian Riviera Resort Project Area, Land of Kahuku, Ka‘u District, Island of Hawaii. Prepared for Palace Development Corporation and Hawaii Ka‘u Aina Partnership. With A.T. Walker.
- 1987 Data Recovery Plan (DRP), Kuilima Resort Expansion Data Recovery Program, Kuilima Resort, Lands of Kahuku, Kawela, and Opana, Koolauloa District, Island of Oahu. Prepared for Kuilima Development Company. With A.T. Walker and P.H. Rosendahl.
- 1986 Archaeological Survey and Testing at the Bobcat Trail Habitation Cave Site (50-10-30-5004), Pohakuloa Training Area Island of Hawaii, Hawaii. Prepared for U.S. Army Engineer District, Honolulu.
- 1986 Intensive Survey and Test Excavations, Site 50-OA-2911, Kahuku Point Archaeological Area, Kuilima Resort Expansion Project, Land of Kahuku, Koolauloa District, Island of Oahu. Prepared for Kuilima Development Company. With A.T. Walker and P.H. Rosendahl.
- 1986 Intensive Survey and Test Excavations Site 50-OA-2899, Kawela Bay, Kuilima Resort Expansion Project, Lands of Opana and Kawela, Koolauloa District, Island of Oahu. Prepared for Kuilima Resort Development. With A.T. Walker.
- 1986 Phase 3 - Data Recovery Plan for Archaeological and Paleontological Excavations, West Beach Data Recovery Program, West Beach Resort, Hono‘uli‘uli, ‘Ewa, Island of O‘ahu. Prepared for West Beach Estates. With B.D. Davis and P.H. Rosendahl.
- 1985 Intensive Survey and Salvage Research Excavations, Wailea Point Condominium Site, Wailea Resort, Land of Paeahu, Makawao, Island of Maui. Prepared for Wailea Point Development Company. With A.T. Walker and P.H. Rosendahl.
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