Mme

Ola i ke kai a Kanaloa: To Live in the Sea of Kanaloa

An Archaeological/Historical Perspective on the Marine Management of Kaho'olawe

INTERNAL DRAFT

by
Hallett H. Hammatt Ph.D.
&
David W. Shideler M.A.

Illustrations
by
Rodney Chiogioji

Prepared for

Dames and Moore

Cultural Surveys Hawaii
February 1996

ABSTRACT

The purpose of this study is to provide an archaeological/historical perspective on the use of marine resources in the nearshore waters of Kaho'olawe and to present recommendations for consideration in the management of the marine resources of Kaho'olawe. This study presents a summary of the known history of the marine use of Kaho'olawe (Chapter II), a discussion of the available sources of textual information on traditional Hawaiian fishing practices (Chapter III), a detailed discussion of technologies and methods used and their applicability to Kaho'olawe (Chapter IV), a discussion of the process of change over time in Hawaiian fishing methods (Chapter V), a discussion of the religious concepts and values associated with Hawaiian fishing, (Chapter VI), a discussion of the *ko'a* fishing shrines of Kaho'olawe (Chapter VII), and a detailed glossary of Hawaiian fishing vocabulary (Chapter IX).

In the recommendations section (Chapter VIII) are a discussion and recommendations of how traditional Hawaiian fishing practices may be revitalized at Kaho'olawe and how to implement a program "to educate future generations in traditional Hawaiian fishing practices," a stated goal of the Kaho'olawe Use Plan.

ACKNOWLEDGMENTS

The authors would like to thank Mr. George Krasnick of Dames and Moore for providing information and coordination efforts in connection with this project. We would like to thank Mr. Keoni Fairbanks of the Kaho'olawe Island Reserve Committee for sharing his "*mana'o*" about this research. We would like to thank Mr. William Folk for sharing his knowledge of Hawaiian net making and fishing. We would particularly like to thank Mr. Rodney Chiogioji for his illustration, editing, and insights.

This study is largely a synthesis and relation of previously recorded data. A special *mahalo* is thus due to the major sources utilized, including in particular Donald Aweau, Emma Beckley, Peter Buck, Scott Cobb, the Fornander Source (S. N. Haleole?), Akira Goto, A. D. Kahaulelio, Samuel Kamakau, David Malo, Stell T. Newman, Mary Kawena Pukui, Rowland Reeve, Keali'i Reichel, John G. Stokes and Keali'i Tau'a. All errors are, of course, the responsibility of the authors of this study.

TABLE OF CONTENTS

ABSTRACT i

ACKNOWLEDGMENTS ii

LIST OF FIGURES vii

LIST OF TABLES vii

I. Introduction 1

II. History of Marine Use at Kaho'olawe 3
- A. Pre-1778 Jurisdiction and Use 3
- B. Affinities of the Kamōhio *Ki'i Akua* (Deity Image) 4
- C. Historic Period Jurisdiction and Use 5
- D. Historic Accounts of Fishing at Kaho'olawe 9

III. Bibliographic Essay on Sources on Hawaiian Fishing 12

IV. Hawaiian Fishing Technology and Methods 19
- A. *Hāhā* (*Hāhāmau*): Hand Collecting 19
  - *Hāhā I ke One*: Hand Collecting on Sand Beaches 20
  - *Huli ka Honu*: Catching Turtles on the Beach 20
  - *Hāhā I ke Hāpapa*: Hand Collecting in the Shallows 20
  - *Ka lawai'a puhi'ini'iniki* : Eel Snatching 21
  - *Ku'i nā 'Opihi*: Limpet Picking 24
  - Regarding the development of these techniques at Kaho'olawe 25
- B. *Peku i ka i'a* Fish kicking 26
- C. *Hola* (also *hohola, hola hola* and *'auhuhu*): Fish Poisoning 27
  - Regarding the development of these techniques at Kaho'olawe 28
- D. *Hili me ka hoe*: Smiting with Paddles 29
  - Regarding the development of this technique at Kaho'olawe 29
- E. *Kīkomo*: Gaff Fishing 30
  - Regarding the development of this technique at Kaho'olawe 31
- F. *'Oi'a* (also *I'a 'ō, Ke 'ō, 'ō he'e*): Spearing 32
  - Regarding the development of these techniques at Kaho'olawe 34
- G. Production of Fishing Line 35
  - Regarding the development of these techniques at Kaho'olawe 36
- H. (No name known; perhaps *"Aho palu"*): Baited Line Fishing 37
  - (No name known; perhaps *"aho palu"*): Passive Baited Line Fishing 37
  - *Lawai'a paeaea 'ōhiki*: Active Baited Line Fishing 37
  - Regarding the development of these techniques at Kaho'olawe 38
- I. *Pāhelehele*: Snaring 38
  - Regarding the development of these techniques at Kaho'olawe 41
- J. *Haoa*: Gorge Fishing 42
  - Regarding the development of these techniques at Kaho'olawe 42

K. *Makau*: Fishhooks 43
Regarding the development of these techniques at Kaho'olawe 44
L. *Kaulī*: Lashing of Fishhooks and Fishing Lures 49
Pā uhi: "Bonito Hook" Lures 51
Makau manō (also kīholo): Shark Hooks and Their Lashing 58
Regarding the development of these techniques at Kaho'olawe 60
M. *Ke kā mākoi o ka malo'o* Angling from shore (Dry fishing) 61
Paeaea: Pole Fishing 61
Ku'iku'i: Fighting *Ulua* with a Pole 64
Regarding the development of these techniques at Kaho'olawe 64
N. *No ka lawai'a wa'a me ka aho* Angling from Canoe 65
Lawai'a hī aku: *Aku* Fishing 65
Malau: Bait Carrier Fishing for *Aku* 66
Pāhoe Fishing 70
Mahimahi hooking and Mahimahi Trolling 71
Kāpae Fishing 72
A'ua'u Fishing 72
Kākā Fishing 73
Kūkaula fishing 74
'Ahi Fishing 76
Ke'a awai leia Fishing 76
Regarding the development of these techniques at Kaho'olawe 77
O. *'Ōkilohe'e*: Octopus Gazing Fishing 77
Regarding the development of these techniques at Kaho'olawe 78
P. *Lawai'a lū he'e* Fishing for Octopus 78
Regarding the development of these techniques at Kaho'olawe 83
Q. *Hīna'i*: Basket Fishing 84
Hīna'i 'ōpae: Shrimp Basket 84
Hīna'i ho'olu'ulu'u: Wrasse Basket 85
'Uī'uī: Vertical-Pull Baskets 87
Regarding the development of these techniques at Kaho'olawe 88
R. *Hīna'i*: Trapping 88
Hīna'i hīnālea: Wrasse Traps 89
Hīna'i puhi: Eel traps 89
Hīna'i palani, hīna'i kala: Surgeon Fish Traps 90
Regarding the development of these techniques at Kaho'olawe 91
S. *Pā i'a a me Hā*: Weirs 91
Pā i'a Weir 92
Hā: *'O'opu* Weir 95
Regarding the development of these techniques at Kaho'olawe 96
T. *'Upena:* Production of Fish Nets 96
Regarding the development of these techniques at Kaho'olawe 103
U. *'Upena*: Types of Fishnet Fishing 104
'Upena kā'e'e (Also *'Upena kāhe'e*,*'Upena pao'o*, *'Upena 'Iāo*:
Hand Held Scoop Nets 104
'Upena uluulu (also reported as *'upena ulūlu*, *ulu'ulu*, and *ahu'ulu*): Two
Handled Scoop Nets 106

'Upena papa'i, 'Upena 'aki'iki'i, 'Upena uhu: Vertical-Pull Dip Nets 109
'Upena uhu 109
Luelue, Pōuouo 'Upena 'ōpelu ('Upena 'a'ai 'ōpelu): Vertical-Pull Bag Nets 112
Luelue 112
Pōuouo 112
'Upena 'ōpelu ('Upena 'a'ai 'ōpelu) 113
'Upena opule 114
Ma'oma'o fishing. 115
'Upena 'apo'apo: Gill Nets 115
Ma'oma'o Fishing 116
Hō'au'au Fishing 117
Ho'omoemoe Fishing 117
'Upena Honu: Turtle Nets 117
'Upena Manō: Shark Nets 118
'Upena hahau Thrashing nets 119
'Upena ula Lobster nets 119
'Upena ho'opuni: Surround Nets and Seine Nets 119
Pihā Fishing 120
Nehu Fishing 120
Kala kū Fishing 121
Ka lawai'a moi me ka 'upena 122
Ka lawai'a kā lā'au 122
Hano (hano mālolo) 122
'Upena kolo Fishing 123
'Upena 'ō'io Fishing for *'Ō'io* 124
'Upena Fishing for *Weke 'Ula* 125
'Upena papa Fishing for *akule* 125
Lau fishing: Fishing Using Long Lines with Dependant Leaves 126
Lau nui Fishing 126
Lau nui Fishing for *uhu* 128
Laukapalili Fishing 129
Lau 'apo'apo fishing 130
Lau ahi Fishing 130
Lau 'ōhua Fishing 130
Lau 'ōhualiko Fishing 131
Lau ko pahu 'anae Fishing 131
Regarding the development of these techniques at Kaho'olawe 132
V. Rearing 132
Regarding the development of these techniques at Kaho'olawe 133
W. Auxiliary Fishing Techniques 134
Hānai Feeding 134
Melomelo Bait sticks 134
Ka lawai'a palu Bait 135
Ka Lama: Torches 136

V. *Ho'omanamana* Traditional Fishing Religious Practices 137
A. *Nā loina lawai'a* Fishing Customs 137
B. *Ka 'alemanaka* The Calendar 139
C. *Nā waiwai* Values Associated with Hawaiian Fishing 142

VI. Historic Change in Fishing Technology in Hawai'i 145
A. Pre-contact Change 145
B. Late Eighteenth Century Changes 145
Pearl Fishery 146
C. Nineteenth Century Changes 146
Double Cowry Lures 149
Throw nets 151
Hawaiian Whale Fishery 153
Hawaiian Seal Fishery 156
Sea Otter Fishery 157
Leeward Islands Shark Fishery 158
Loli (Beche-de-mer or Trepang) Fishery 158
Dynamite 158
D. Early Twentieth Century Changes (to WW II) 159
E. Implications of Change in Fishing Technology for Marine Management at Kaho'olawe 161

VII. *Nā Ko'a of Kaho'olawe*: The *Ko'a* of Kaho'olawe 163

VIII. Recommendations for Marine Management of Kaho'olawe 169
Introduction 169
Problems with encouraging the retention and dissemination of Hawaiian fishing practices in the marine management of Kaho'olawe 170
General Recommendations 172
Recommendations for Infrastructure 174

IX. Glossary of Hawaiian Fishing Terms (for fish names see Titcomb 1972) 177

X. References Cited 208

APPENDIX A: *KO'A* OF KAHO'OLAWE 213

LIST OF FIGURES

Figure 1	A comparison showing similarities among the Kamōhio image (T 18) and two images from south O'ahu (T 20 from 'Ewa and K 5 from "near Honolulu").	6
Figure 2	Head Types (HT) of Hawaiian One-piece Hooks	45
Figure 3	Shank and Point Shape Types of Hawaiian One-piece Fishhooks	46
Figure 4	Bend Shape Types of Hawaiian One-piece Hooks	46
Figure 5	Outer Base Types of Hawaiian Two-piece Hooks	47
Figure 6	Inner Base Types of Hawaiian Two-piece Hooks	47
Figure 7	Steps in Traditional Fishhook Manufacture	48
Figure 8	Illustrations of Fishhooks Recovered from Kaho'olawe Sites (Adapted from McAllister, 1933:23-24)	50
Figure 9	*Pā Uhi* or Trolling Lure	52
Figure 10	*Malau* or Bait Carrier. A Hypothetical Reconstruction of a Pre-contact *Malau* (Following Kamakau, 1976 and Kahaulelio, 1902).	67
Figure 11	*Lū He'e* or Octopus Lure	80
Figure 12	*Hīna'i*: Showing a Basket of the *Hīna'i 'ōpae* Type and Trap of the *Hīna'i hīnālea* Type.	86
Figure 13	*Pā I'a* or Weir	93
Figure 14	General View of Commencement of Net-Manufacturing Technique	100
Figure 15	Commencement of a Net (from Stokes, 1906:153)	100
Figure 16	*'Upena uluulu* (or Two-handled Scoop Net) Typically Used by Divers	107
Figure 17	*'Upena uhu* or Dip Net	110
Figure 18	*Lau nui* or *Lau lima* Fishing	127
Figure 19	*Lū he'e* Showing: A. A Typical Pre-contact Form and B. & C. Probable Historic Innovations	150
Figure 20	Map of Kaho'olawe Showing Location of Shrines, Burials, and *Heiau* (from Kaho'olawe Conveyance Commission, 1993:61)	167

LIST OF TABLES

Table 1:	Commercially Caught Species at Kaho'olawe, 1903	10
Table 2:	Net Mesh Sizes	98
Table 3:	Table of Hawaiian fleet and catch 1839-1894 from Cobb (1902:512)	154

I. Introduction

This study presents an archaeological/historical perspective on the use of marine resources in the near shore waters of Kaho'olawe and formulates recommendations for consideration in the future management of these marine resources. Our research began with a study of the history of marine use at Kaho'olawe which is presented in Section II. There is simply very little available information on the history of marine use at Kaho'olawe which can facilitate decision making regarding marine management; much of what has been recorded has been reported in previous studies (particularly Dept. of the Navy, 1983; Reeve, no date; and Reichel, 1993).

In order to produce a useful document, it was decided to broaden the approach to see what could be presented about traditional Hawaiian marine use in general which might be applied to the specific circumstance of Kaho'olawe. While traditional Hawaiian marine use undoubtedly included voyaging, swimming, surfing and canoeing, it was decided to focus on traditional Hawaiian fishing practice, as this is by far the most important aspect for marine management considerations and an area in which we have some expertise.

The Guiding Principles of the Kaho'olawe Island Reserve Commission assert: "In modern Hawai'i, Kaho'olawe serves as the foundation for the revitalization of Hawaiian cultural, religious, and subsistence practices" (*Kaho'olawe Use Plan* 1995:12). This includes the stated goal "to educate future generations in traditional Hawaiian fishing practices" (*op.cit.*:40). We decided to focus on how this might be best accomplished in the marine management of Kaho'olawe. Traditional Hawaiian fishing practices can not be learned from a book which is precisely why the "learn-by-doing apprenticeship educational methodology" has the potential to work so well in the land and seas of Kaho'olawe.

However, the education of "future generations in traditional Hawaiian fishing practices" requires some knowledge of the available sources of information, the technologies and methods used, the process of change over time, and the vocabulary with which the Hawaiians of old thought about fishing. We must look to our sources about information on the past. The purpose of the body of this paper is to review these sources, technologies, and methods, make them more publicly available, and draw recommendations for a consideration of the past that may inform the future. Hence Section III of this work presents a bibliographic essay on literary sources on Hawaiian fishing, Section IV presents an extensive overview of Hawaiian fishing methods and practices with a discussion of how they may be revitalized at Kaho'olawe, Section V reviews the history of change in fishing technology in Hawai'i, Section VI and Appendix A present a review of the sacred places of Kaho'olawe associated with fishing, Section VII presents an extensive glossary of fishing terms, and Section VIII presents a summary of specific recommendations for the marine resources management of the waters of Kaho'olawe to facilitate the stated goal.

II. History of Marine Use at Kaho'olawe

A. Pre-1778 Jurisdiction and Use

A survey of historic literature turned up little regarding the history of political jurisdiction of marine resources specific to Kaho'olawe in pre-contact times. In Hommon's (1976:148, 134-135) study of Hawai'i's pre-contact political history, he notes the apparent chronological congruity of Kaua'i's annexation of Ni'ihau and Maui's annexation of Lāna'i circa 1600. Hommon posits a dramatic increase in efforts at territorial expansion in this time frame. Hommon (1976:151) writes:

> In sum, though the Early traditions include accounts of military raids, chiefly rivalry and usurpation, the relatively plentiful evidence of expansion through the application of force and the superiority of the principal of monopoly of power over the principles of rank and kinship that is found in the later periods is lacking. The inference that is drawn from this comparison is that governments in the present sense had not developed in the Hawaiian islands until the early 17th century.

If, as Hommon (1976:280) concludes, "it is probable that the early 17th century also saw the annexation of Lanā'i and East Maui by West Maui and of Ni'ihau by Kaua'i", then Kaho'olawe may have come under the direct political control of Maui chiefs at about that time Hommon (1976:81) makes the following comments regarding the role of political boundaries in ancient Hawai'i.

> When asked the purpose of boundaries, the Hawaiian informants would reply that it was necessary to memorize the boundaries well to avoid straying into the neighboring *ahupua'a* while collecting wild plants or hunting. Apparently such transgressions were considered to be poaching and the residents of the violated *ahupua'a* would retaliate the poacher by destroying his house.

The *kapu* on fisheries was strictly enforced. As Malo (1951:209) relates the seasonal prohibitions on the consumption of *'ōpelu* and *aku* were "under pain of death."

Kū'ali'i aided the chiefs of Kona district, Molokai in a dispute over fishing

grounds claimed by Kona but encroached upon by chiefs of Ko'olau district of the same island. With the aid of Kū'ali'i's army, the Kona chiefs defeated those of Ko'olau on Kalaupapa peninsula and Kū'ali'i returned to O'ahu. (Hommon 1976:327 citing Fornander 1969:282, 293-294).

B. Affinities of the Kamōhio *Ki'i Akua* (Deity Image).

In 1913, the Bishop Museum archaeologist J. F. G. Stokes described a unique fishing shrine at Kamōhio Kaho'olawe and recovered a number of sacred objects including a certain 43' high *ki'i akua* or deity image. While the antiquity of the image is not known, it almost certainly pre-dates the *'ai noa* event of 1819 which curtailed image worship.

The deity represented is not known. Stokes (Book I : 16 &17; Book II:12 & 13) entries for March 10 and March 26, 1913 relate the presence of "many fish offerings and coral...[a] *kā* [canoe bailer]...a little sugar cane...a lot of bananas around the idol and several coconuts" as well as at least soma *'awa* and "a great number of Cypraea *mauritiana*") The bananas and the cowry shells, seemingly for octopus lures, suggest Kanaloa associations (Valeri 1985:15). Bananas and fish were a documented offering to Kanaloa, but they were also documented as offerings to Kāne and Lono and coconuts were most commonly associated with the Kū pantheon and sugarcane with Kāne. Furthermore, Stokes suggests the possibility "that the wooden idol was an afterthought and that the offerings before mentioned were an overflow from the stone offertorium" located just upslope.

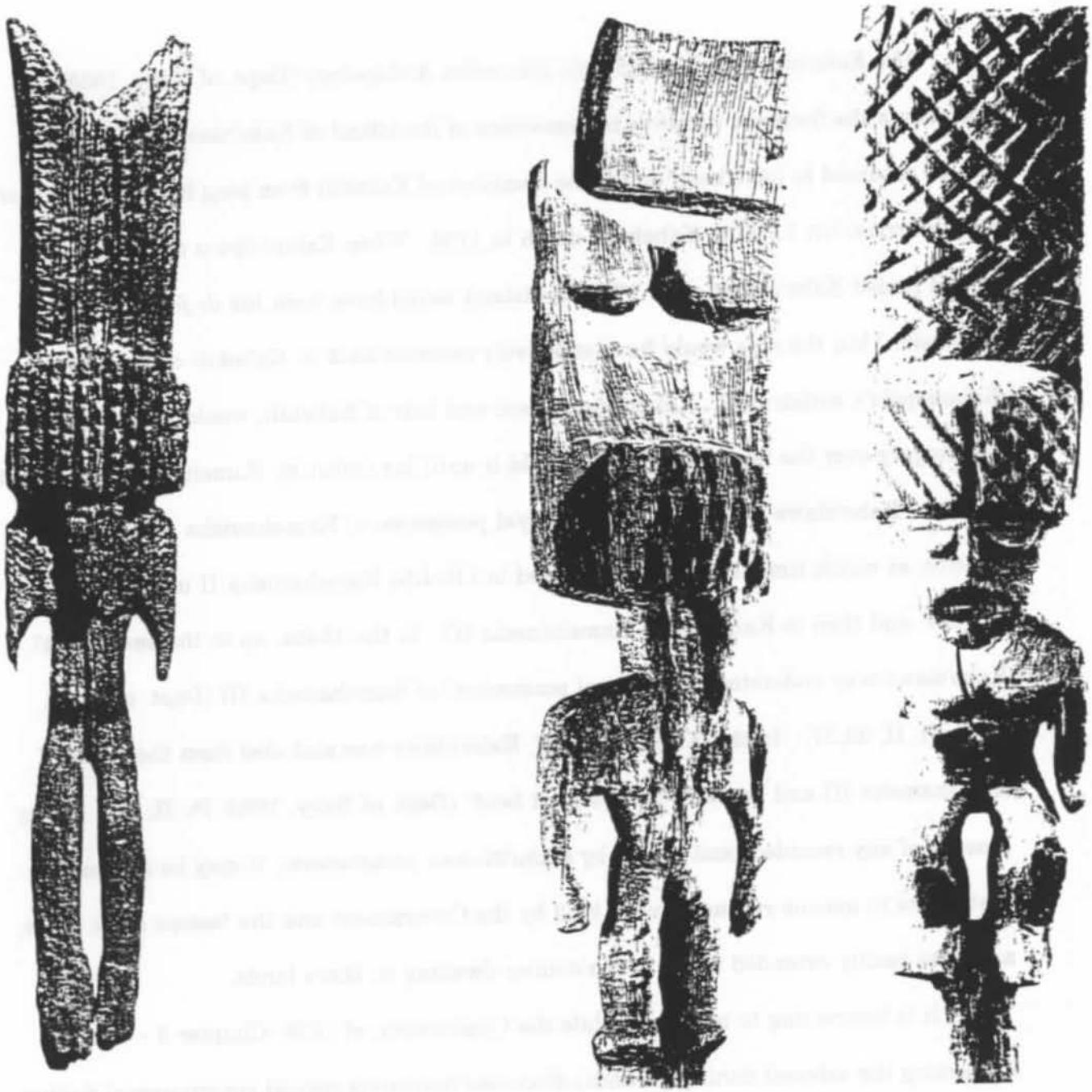
The wood of the image was reported by Adrienne Kaeppler, Curator of Oceanic Ethnology at the Smithsonian Institution, to have been identified to the *Rubiaceae* or

coffee family (Reeve no date, Appendix X). Many species of *Rubiaceae* grow in the Hawaiian islands but the image size is compatable with only a few, such as the *'Ahakea* (*Bobea sp.*) whose yellow wood was used for paddles and the gunnels of canoes. Such a large piece of wood could conceivably have washed up on Kaho'olawe as drift wood but it seems probable that the wood, or more likely the carved image, came from another island.

The Kamōhio *ki'i akua* (numbered T 18) bears a particularly close resemblance to two images (numbered T20 and K5) with proveniences from south O'ahu (Figure 1). The depictions of the headdresses, triangular face, and body form are quite similar and are rather unique among known Hawaiian religious images. This suggests that the Kamōhio image may have been fashioned in a tradition of south O'ahu iconography. Religious images are known to have been carried over long distances, however, and even if it was an O'ahu image, it can not be assumed that O'ahu people carried it to Kamōhio or that O'ahu people were the primary people worshiping there. The image could, for example, have been taken as booty froma *heiau* of South O'ahu by Kaho'olawe men involved in the conquest of O'ahu by the Maui ruler, Kahekili (c. 1783).

C. Historic Period Jurisdiction and Use

In the case of the island of Lāna'i, historic accounts offer information about usufruct rights of Maui natives to that island. Ellis (1969:10), in the mid-1820s, related that "many of the inhabitants of Maui repair [to Lāna'i] for the purpose of cutting posts and rafters." King (1942:19) notes "we sometimes find Lāna'i called a *kalana* (division of land, district) of Maui." Legends and historic political boundaries closely tie Lāna'i with the Lahaina District of Maui (Emory, 1969:13, 26). The case is not so clear with Kaho'olawe.



The Kamōhio *ki'i akua* (numbered T 18) T20 K5

Figure 1 A comparison showing similarities among the Kamōhio image (T 18) and two images from south O'ahu (T 20 from 'Ewa and K 5 from "near Honolulu").

The *Kaho'olawe Cultural Study, Hawaiian Archipelago* (Dept. of Navy, 1983) documents the frequent turnover in possession of the island of Kaho'olawe. The island can be assumed to have been under the dominion of Kahekili from long before the time of Cook's arrival (in 1778) to Kahekili's death in 1794. When Kalani'ōpu'u of Hawai'i Island raided Kaho'olawe, *circa* 1777, the island would have been his *de facto* "royal possession" but the rule would have effectively reverted back to Kahekili of Maui upon Kalaniōpu'u's withdrawal. Kalanikūpule, son and heir of Kahekili, would have inherited sovereignty over the island in 1794 and held it until his defeat by Kamehameha the Great in 1795. Kaho'olawe would have been a royal possession of Kamehameha until his death in 1819, at which time it would have passed to Liholiho Kamehameha II until his death in 1824, and then to Kauikeaouli Kamehameha III. In the 1840s, up to the end of 1847, Kaho'olawe was understood as a "royal possession" of Kamehameha III (Dept. of Navy, 1983: Pt. II, 32,37). In the "Great Māhele", Kaho'olawe was excluded from the lands of Kamehameha III and became "Government land" (Dept. of Navy, 1983: Pt. II, 38). In the absence of any recorded land claims by *maka'āinana* (commoners), it may be assumed that rights to marine resources were held by the Government and the lessees of its lands, and were tacitly extended to the *maka'āinana* dwelling on those lands.

It is interesting to note that while the Constitution of 1839 (Chapter 3 - 8, 2. Respecting the tabooed fishing grounds) discusses numerous special governmental fishing rights on seven islands, no such special exclusions are listed for Kaho'olawe (Jordan and Evermann, 1902:362). Changes to the laws made in April of 1841 discussed the "royal fish" of five islands but none are reserved at Kaho'olawe (Jordan and Evermann, 1902:364) or seemingly in any subsequent legislation.

In historic times, Kaho'olawe, Molokai and Lāna'i have been closely attached to

Maui for governmental purposes. Jurisdiction over Kaho'olawe, however, was often changed. In Section 498 of the Civil Code of 1859, we read that "for taxation, educational, and judicial purposes", the first district (1) of the Maui group of islands was "From Kahakuloa to Ukumehame, including Kaho'olawe to be called the Lahaina District" (King, 1942:21), but in "Chapter XXIII of the Laws of 1890, the island of Kaho'olawe in the Maui group was transferred from Lahaina district to Wailuku district" (King, 1942:23), and in Act 84 of the Session Laws of 1909 Maui islands district 2 including "the island of Kaho'olawe, [was] to be styled the Makawao district." (King 1942:25). To further complicate the picture, King (1942:19) relates "Kaho'olawe [was] in one instance placed in Ko'olau District of Maui." Thus virtually every portion of Maui (Lahaina, Wailuku, Makawao, and Ko'olau District) has claimed political rights to Kaho'olawe in historic times.

The Great *Māhele* of 1848 gave jurisdiction of Kaho'olawe to the government of the Kingdom. For a decade, attempts to lease the island were unsuccessful and then starting in 1858 the island was leased to a new party about every decade. R. C. Wyllie leased the island in 1858 (Dept. of Navy, 1983: Pt. II, 52-58), and control of the lease passed to E. H. Allen in 1864 (Dept. of Navy, 1983: Pt. II, 58-63), to Albert D. Courtney & William H. Cummins in 1880 (Dept. of Navy, 1983: Pt. II, 63), to Kynnersley Brothers & R. von Tempsky in 1887 (Dept. of Navy, 1983: Pt. II, 64), to Ben F. Dillingham in 1901 (Dept. of Navy, 1983: Pt. II, 71-73), to Christian C. Conradt in 1903(Dept. of Navy, 1983: Pt. II, 74-77), to E. P. Low in 1906 (Dept. of Navy, 1983: Pt. II, 77-79), and to Angus McPhee in 1918 (Dept. of Navy, 1983: Pt. II, 109). Evidently these lessees did little with their marine resources rights other than to zealously defend them. Cobb (1905:488) relates that in the late 19th century: "The refusal of the former lessees to permit outside

fishermen on the island, or even to fish in the adjacent waters previous to the abrogation of the fishery rights in the islands, had prevented its development into an excellent fishing station."

D. Historic Accounts of Fishing at Kaho'olawe

Kahaulelio discusses his personal experiences fishing at Kaho'olawe in the mid-nineteenth century and mentions three fishing grounds at the island (April 4, 1902). His most detailed account concerns the grounds called Laepaki (KealaiKahiki) which is said to be the shallowest of the grounds lying in only 90-120' despite its being five miles distant from KealaiKahiki and three miles off shore.

Cobb (1902:497-498) notes that ten persons were employed at the turn of the century on Kaho'olawe in the raising of sheep and:

> these people have a seine which they use in catching a supply of fish for their own consumption. Formerly they sent the surplus to Lahaina whenever an extra large catch was made, but during the past two years they have evidently done but little, as nothing has been received there from them. There are said to be plenty of fish around the island, but the owner of it claims the fishery right and refuses to allow the fishermen from the other islands to fish there unless they pay him for the privilege.

Cobb (1905:459,488) notes that :

> Kaho'olawe had no commercial fisheries in 1900. "In 1900 the sheep herders employed on the island possessed a seine, which they used in catching a supply of fish for their own consumption, but as they had no surplus none were sold. During the year 1903 five Hawaiians and four Japanese operated two seines [on Kaho'olawe] and caught 27,100 pounds of fish, which they sold at Maui towns for $1,456.

The two seine nets used in 1903 are reported to have collectively been 670 yards long with an estimated value of $250. "Shore and Accessory property" was valued at a further $150. Thus the total value of fishing gear at Kaho'olawe was estimated at $625. There were three boats in use with a total estimated value of $225. The breakdown of fish

commercially caught at Kaho'olawe and their dollar value are given as follows:

Table 1: Commercially Caught Species at Kaho'olawe, 1903

Species	Pounds	Value
Akule (Big-eyed Scad, *Selar crumenophthalmus*)	18,000	$1,080
Kumu (A goatfish, *Parupeneus porphyreus*)	500	50
Laenihi (A wrasse, *Hemipteronotus melanopus*)	2,000	100
Moano (A goatfish, *Parupeneus multifasciatus*)	200	10
Moi (Threadfish, *Polydactylus sexfilis*)	6,100	183
Mu (Bigeye, *Monotaxis grandoculis*)	200	28
Pualu (A surgeon fish, *Acanthurus xanthopterus*)	100	5
Total	27,100	$1,456

Cobb further relates:

> The present lessee will operate several seines on the beach and will have a net pen anchored in the little bay near the settlement, in which the fish will be retained until it is convenient to send them to Mā'alaea Bay, on Maui, on a gasoline launch. Owing to the number of sharks in the waters surrounding the island, it has been found necessary to have a net constantly stretched across the mouth of the bay [Kūheeia Bay?] to keep them away from the pen.

While the total commercial catch of Kaho'olawe was quite modest in 1903, accounting for only 0.4% of the total tonnage and 0.2% of the total value of fish caught in the Hawaiian archipelago, the catch of *akule* and *moi* are notable (accounting for 1.3% and 5.5% of the commercial tonnage for those species in the archipelago).

Another early account of fishing on Kaho'olawe is related by Alexander Boniface Akina in an interview with Keli'i Tau'a (HFN, August 1984:23). Born on Kaho'olawe circa 1904, Mr. Akina relates some of his own fishing experiences as well as some of those of his father, Auhana Akina, who was probably fishing on Kaho'olawe in the nineteenth century. On the off-chance a reader might like to catch *ulua* it is perhaps worth exerpting Auhana Akina's winning Kaho'olawe strategy:

> He took used handlines that were as big as ropes. The old fishermen used large ropes so they wouldn't cut their hands especially when they hooked the large *ulua*. Uncle Alex's dad always went to areas where the current was very strong. He would first catch a black *puhi* (eel) that he immediately roasted over a fire.

> He would then cut a few sections off the *puhi* and pound them into small pieces for *palu* (chum). He baited his hooks with long strips of the left over *puhi*. The elder Akina knew the flow of the tide, so he waited until the setting of the sun. As he observed the outward flow of the current, he proceeded to throw the *palu* into the *moana* (ocean). A few minutes later, he placed his baited hooks into the ocean. Uncle Alex said his dad never failed to return home with three to four ulua that weighed one hundred plus pounds.

Alexander Akina had some of his own stories about fishing on Kaho'olawe in the early twentieth century. "Even though some of the areas were rocky and poor for *kolo* (drag net fishing). 'At that time there was so much fish that we were able to catch two to three thousand pounds of the prized *moi*.'" Perhaps Alexander Akina used the same nets Cobb described.

Alexander Akina also went throw net fishing for *moi*. "When the tide went down they headed for the ponds. There they would find schools of *moi* locked in the ponds, so it was easy to throw the nets over the schools."

III. Bibliographic Essay on Sources on Hawaiian Fishing

This study reviews Hawaiian fishing technology and discusses its potential applicability to Kaho'olawe marine management. Major textual sources for Hawaiian fishing techniques reviewed in this study include Campbell (1967:140-142); Malo (1951); Kamakau (1976); S. N. Haleole? (Fornander Collection Vol. VI Part 1, pgs. 172-191); Beckley (1883); Kahaulelio (1902); Cobb (1902, 1905); Hosaka (1944); Scobie (1949); Titcomb (1952, 1978); MacKellar (1956), Buck (1964), Newman (1970), and Goto (1986), Tau'a, (1982-1990) and Aweau (1994-1996). In his dissertation, Newman (1970:48-49) reviews the problems of analyzing bibliographic sources on Hawaiian fishing technology. As Newman points out sources typically ignore cultural change during the historic period and often merely quote earlier sources, often without acknowledgment. At the same time however, much detailed information is often found buried in anthropological and archaeological studies. A brief review of major data sources, with a thumbnail biographic sketch of the most important authors is presented here.

Archibald Campbell, who lost both feet from frostbite off Alaska, arrived in Hawai'i in January of 1809. He departed O'ahu in March of 1810. The twenty-two year old Campbell was then employed as a sail maker by Kamehameha the Great at O'ahu. He gives accounts of native customs of the time in his *Voyage Round the World from 1806 to 1812*. Campbell (1822:194-197) discusses fishing by net, hook and line, and poisoning.

David Malo was born at Keauhou, North Kona Hawai'i, *circa* 1795, and described Hawaiian fishing techniques in a manuscript *circa* 1840. Nathaniel B. Emerson edited and translated the work in 1898, and it was further edited by W. D. Alexander before being published by the Bishop Museum Press in 1951 as *Hawaiian Antiquities*. Chapter

40, "Concerning fishing," runs to four pages (208-211) with a subsequent two pages of notes; "...[H]is information on fishing usually consisted of merely naming various net and hook types with no explanation or description" (Newman 1970:79). As several authors have pointed out it is "impossible to tell when the additional detail [in the notes] was that of Malo, Emerson, or Alexander" (*Ibid.*).

Samuel M. Kamakau, commonly regarded as the greatest Hawaiian historian, published a series of articles between October 14 and November 3, 1870 in the Hawaiian language newspaper *Ke Au 'Oko'a* in a series he called "*Ka Mo'olelo Hawaii.*" A portion of these articles were published by Bishop Museum Press in 1976 as *The Works of the People of Old: Na Hana a ka Po'e Kahiko*. Part Three of this publication (33 pages) is devoted to fishing methods. Kamakau's best known work, *Ruling Chiefs of Hawai'i*, includes a few passing references regarding fishing (particularly in the time of Kamehameha the Great).

S. N. Haleole is credited (by Thomas Thrum in the Preface) with most of the text written in Hawaiian in Vol. VI, Part 1 of the *Fornander Collection of Hawaiian Antiquities and Folklore* compiled by Abraham Fornander. Haleole was a member of the Lahainaluna group of Hawaiian scholars from 1834. This text may date from the mid-nineteenth century but is an attempt to document traditional practices. Some of the practices documented in the Fornander account are almost certainly historic (he discusses spears tipped with "*hao*" or iron) and it is often not possible to tell what is truly a pre-contact practice. The chapter in Fornander (Vol. VI, Part 1, pgs. 172-191) "An Account of Fishing" (*He Moolelo no ka Lawaia*) runs 10 pages in the Hawaiian and the same in the English translation.

Emma Metcalf Beckley (Mrs. Moses Nakuina) was the daughter of the chiefess

Kaili Kapuolona and an intimate friend of the Hawaiian monarchy. She was in charge of the government library and curator of the Hawaiian National Museum (later incorporated into the Bishop Museum) in the 1880s when she was asked by the Minister of Foreign Affairs of the Kingdom to produce a study of *Hawaiian Fisheries and Methods of Fishing with an Account of the Fishing Implements used by the Natives of the Hawaiian Islands* (1886). Published in English, this survey runs 21 pages.

A. D. Kahaulelio published a sequence of articles in weekly installments (typically) in the Hawaiian language newspaper *Ka Nūpepa Kū'oko'a* ("The Independent Newspaper" which ran from 1861-1927) between February 28 and July 4, 1902 on the subject of "Fishing Lore" (the actual column heading changed repeatedly). Newman (1970:65-66) offers this summary of Kahaulelio's life:

> Kahaulelio was born in 1837 and began fishing intensively with his father and grandfather in 1848, continued to fish with them until their deaths some 16 years later, and then fished for another 25 years by himself. Kahaulelio seems to have quit extensive fishing sometime around 1880 although he makes several references to fishing in the 1890's. This account of Kahaulelio is quite full and detailed, providing an excellent source on Hawaiian sea exploitation for the middle nineteenth century.

Kahaulelio refers to himself as a lawyer (*"he loio au"*; *Mei* 2, 1902, pg. 4). He received his lawyer's license in 1870 (*Mei* 23, 1902:4) and was based in Lahaina, Maui, but traveled frequently. Kahaulelio is of particular importance for the present study because he relates specific fishing practices he himself was involved in at Kaho'olawe. He is our only source of information from a skilled Hawaiian fisherman of the nineteenth-century. The newspaper articles, by a Hawaiian in Hawaiian for Hawaiians, was translated by Kawena Pukui and manuscripts of her 106-page typed translation are available at the Bishop Museum Library and University of Hawai'i Hamilton library.

John N. Cobb was a professional statistician employed by the U.S. Fish

Commission to gather data on commercial fisheries operations in Hawai'i. He produced two major studies germane to this report. "Commercial Fisheries of the Hawaiian Islands" (published in *The Fishes and Fisheries of the Hawaiian Islands: A Preliminary Report* by David S. Starr and Barton W. Evermann in 1902) presents his study of the conditions of the commercial fisheries of 1901 and "also of their past history and the changes in the methods, extent, and character of the fisheries in historic times" (Cobb 1902:383). He presents a wealth of detailed information on fishing methods and the state of fishing in Hawai'i at that time based on three months of research which included observations of fishing, interviews of fishermen, and analysis of written documents. As Newman (1970:50) points out, "although Cobb's work was done in 1901 and his statistical base was 1900, it is reasonable to accept his data as illustrating sea-exploitation practices at the very end of the nineteenth century." His later work "The Commercial Fisheries of the Hawaiian Islands in 1903" (published in 1905; 77 pages) is a detailed survey of the fisheries of the archipelago by island and includes a study of the "Fisheries of Kaho'olawe" (1905:488).

Edward Y. Hosaka published *Sport Fishing in Hawai'i* (198 pgs., 58 pgs. devoted to fishing techniques) as a handbook written for sports fishermen, in 1944. Written by a skilled fisherman and well illustrated, this work provides what is perhaps our best account of fishing practices in the early twentieth century and documents many of the innovations that had occurred since the time of Cobb. It is often unclear whether techniques Hosaka records are previously undocumented pre-contact Hawaiian practices, traditional Japanese practices or new fishing methods evolved in Hawai'i in previous decades. All three seem probable.

R. A. Scobie produced an M. A. thesis at the London School of Economics on "The

Technology and Economics of Fishing in Relation to Hawaiian Culture" (M.A. thesis, 1949). His Chapter III on fishing techniques runs 41 pages. While providing no original primary source material, this study is of note for its attempt at a theoretical analysis of fishing technology, dichotomizing all fishing apparatus into seizing instruments and intercepting instruments. Scobie provides references to primary material that might be otherwise missed.

Margaret Titcomb compiled *Native Use of Fish in Hawai'i* (170 pages) in 1952 with the collaboration of Mary Kawena Puku'i. While containing relatively little data on Hawaiian fishing technology *per se*, this work is a wealth of data on virtually every other aspect of fish and Hawaiian culture, and includes an extensive bibliography.

In contrast to Hosaka, who exhibits several decades of intimate first hand experience with fishing in Hawai'i, is Jean Scott MacKellar who arrived in Hawai'i during W.W.II and wrote *Hawai'i Goes Fishing* (160 pages) in 1955. The value of MacKellar's work lies largely in the documentation of the radical changes in the decade since Hosaka's handbook was published. Hosaka knew nothing of diving fins and snorkels in 1944 and MacKellar not only knows about these but relates in text and photographs SCUBA diving which was already "especially popular with Hawai'i's service men" (MacKellar 1956:80).

Sir Peter H. Buck (Te Rangi Hiroa), born in New Zealand of an Irish father and Maori mother in 1880, was appointed ethnologist and director of the Bernice Pauahi Bishop Museum in 1936. His *Arts and Crafts of Hawaii*, the product of three decades of work, was published in 1957 (six years after his death). His Chapter VII on Fishing (78 pages) focuses on material culture as manifest in artifact collections at the Bishop Museum. A great strength of this study, unequaled elsewhere, is the attention to details

of construction and lashing, and the copious photographs and illustrations of indigenous artifacts.

T. Stell Newman produced his doctoral dissertation in Anthropology, "*Makai-Mauka: Fishing and Farming on the Island of Hawaii in A. D. 1778*," as "a multi-discipline synthesis of native Hawaiian fishing and farming practices on Hawaii Island" (Newman 1970: Preface). The production of this study was associated with archaeological field work conducted in the Lapakahi Project (at what is now Lapakahi State Park, Kohala, Hawai'i Island) supported by various agencies. Newman's chapter "Hawaiian Exploitation of the Sea" (60 pages) provides what is probably the best single survey of the subject. His historical approach, differentiating between native and introduced patterns of fishing, is particularly valuable.

Akira Goto produced his doctoral dissertation in Anthropology on "*Prehistoric Ecology and Economy of Fishing in Hawaii: An Ethnoarchaeological Approach*" (1986). This study largely focuses on fishing technology (particularly fish hooks) and its correlation with marine fauna (midden) in Hawaiian archaeological sites. His chapter, "Indigenous Use of the Sea: an Ecological Model," includes a section on "Indigenous Fishing Technology and Methods" (pages 130-159). While this section is largely an overview of major previous studies, its value lies in Goto's attention to fishing "strategies" and in his pan-Polynesian comparisons. Goto provides the most thorough study oun Hawaiian fish hooks.

Roland Reeve, in his wonderful study "*Nā Wahi Pana o Kaho'olawe: The Storied Places of Kaho'olawe*" (Consultant Report # 17, no date) presents material on legends related to fishing at Kaho'olawe, a number of mentions of fishing related to place, and several valuable appendices including:: L. "Traditional Fishing Methods Practiced on the

Island of Kaho'olawe (largely extracted from the Kahaulelio articles)", M. "Kaho'olawe Shipwrecks, N. a discussion of "The Kaho'olawe Shark Image and 'Awa Cup", and Appendices W, X, and Y concerning the Stokes expeditions of 1913.

Keali'i Reichel, in his 1993 "*Traditional Fishing Practices and Uses of Waters Surrounding Kaho'olawe*" presents a review of Hawaiian religion, traditons, tools, and equipment; discusses the fishing methods used by Kahaulelio; and devotes the majority of his text to transcriptions of interviews of people who knew Kaho'olawe's waters in the early twentieth century. The present study seeks to amplify a number of areas spearheaded well by Reeves and Reichel.

Keli'i Tau'a, a Hawaiian scholar, musician, chanter, and fisherman began writing a monthly column "Hawaiians and the Sea" in *Hawai'i Fishing News* ("Proclaimed by many to be the best area fishing publication in the world today!") in February 1982 and continued until August 1990. He draws upon a number of sources, particularly the experiences of Maui Island *Kūpuna* (elders).

Donald S. Aweau, a law student, fisherman, and Hawaiian studies graduate from U. H. Mānoa, has been continuing this column since July 1994. His column relates matters of custom and traditions of place drawn from twenty sources, as well as contemporary lore. The vividness and openness of his style is reminiscent of Kahaulelio's. Several of his articles deal with contemporary Kaho'olawe for which he clearly has much aloha.

IV. Hawaiian Fishing Technology and Methods

This chapter presents sources on different methods and techniques of traditional Hawaiian fishing, an overview of these methods and techniques, and a discussion of the applicability and development of these techniques in the marine management of Kaho'olawe.

A. *Hāhā* (*Hāhāmau*): Hand Collecting

Sources. Hand collecting is discussed in Kamakau (1976:59, 86-87); Fornander (1919:176-177); Kahaulelio (Feb. 28, Mar. 7, May 23, May 30, June 20, 1902); Cobb, (1902:421); Buck (1964:287-288); Newman (1970:51); and Goto (1986:131-132).

Overview. Hand collecting or groping was a common method of collecting seafood. Hand collecting was carried out by young and old and by men and women but is often associated particularly with women (Fornander, 1919:177). Hand collecting could be carried out at any time but there was often preference for low tide and moonlit nights. This mode of collecting was typically performed in tide pools and shallow water but was also a major mode of diving collecting. Hand collecting includes the collecting of *'opihi* and other shell fish from the littoral zone of high energy coast lines, the collecting of *honu* (turtles) and *'ōhiki* (*Ocypode sp*. or "Ghost crabs") from sand beaches, and the collecting of fresh water algae and andronymous fishes and shellfish in streams. Most turtle, lobsters, sea urchins, sea cucumbers, shellfish, shrimp, and seaweed were probably taken by hand. Various crabs, octopi, eels and a variety of other fish were taken by hand.

***Hāhā I ke One*: Hand Collecting on Sand Beaches**

'Ōhiki sand crabs were caught on sand beaches by running them down and grabbing them or by excavating their corkscrew burrows. Kahaulelio (May 16, 1902 ; pg. 4) suggests that excavation was too much work (*"he luhi ke loa'a kau ohiki ma ke 'eli ana"*) compared to catching them with a blossom baited line.

***Huli ka Honu*: Catching Turtles on the Beach**

Kahaulelio (May 23, 1902) offers details on the way turtles were caught on sand beaches. He recommends hunting in the early dawn to catch female turtles returning to the sea, running as fast as you can, stepping on the left flipper of the turtle with your left foot, and heaving the turtle on its back.

> *...I ka wā kakahiaka nui molehulehu, ho'okokoke 'oe ma ka hai mau'u kalamālā e pili ana me ke one, e 'ike nō auane'i 'oe I nā honu wahine nunui e ho'i ana I kai. ia manawa e holo 'āwiwi 'oe me ka māmā a loa'a ka honu. alaila , o ka wāwae hema ke'ehi a pa'a I ka hui hema o ka honu, a o ka lima me kou ikaika a pau ke huli ka honu I kau ho'ohuli ana, e ai honu ana 'oe, a I 'ole e huli, o ke kai ka palena a o ka ho'oku'u ka pono o pulupē kou wahi lole I ke kai.* (Kahaulelio; *Mei* 23, 1902; pg. 4)

***Hāhā I ke Hāpapa*: Hand Collecting in the Shallows**

A generic Hawaiian term *"pakauele"* was the "general name for small fish that are easily caught by hand, as *manini* [Convict tang or *Acanthurus triostegus*], *lauhau* [various small butterfly fish, particularly *Chaetodon quadrimaculatus.*], *pāo'o* [particularly *Chlamydes cotticeps* but probably including a variety of *Eleotridae* and *Gobiidae* species]" (Pukui and Elbert, 1986). Kamakau (1976:87-88) relates that other fish taken by hand included *hou* and *'olali (*wrasses, *Thalassoma sp.), lelo* (trepang or sea cucumbers according to Buck 1957:287), and even sharks, *nu'ao* and *nai'a* (mammal dolphins),

hāhālua (manta rays, *Manta birostris*), *hailepo* (uncertain, probably a ray), *'ahi* (yellow fin tuna, *Thynnus thynnus*) and *kahala* (amberjack, *Seriola dumerili*). The catching by hand of these larger free-swimming species is presented in the context of a discussion of a famous fish trap (Ka-pā-akule at Pu'uloa or Pearl Harbor, O'ahu) and must surely have been most exceptional in other situations. Fornander's account (1919:177) adds other types of fish taken by hand including other wrasses (*awela*, *mananalo*), and four fishes for which no data is available (*niholoa*, *paolakei*, *paokauwila*, *paoluahine*).

***Ka lawai'a puhi'ini'iniki* : Eel Snatching**

Kamakau (1976:86-87) relates the following curious account of the snaring of eels by hand *"lawai'a pāhelehele puhi":*

> The Hawaiians well knew that eels are "ugly-faced" *(maka kalalea)* wild creatures with sharp teeth; that they can bend sideways and tear a man's hand to shreds. Those who were expert in this kind of eel fishing used their fingers as "hooks" (*makau*) and their arms as "lines" (*aho*). The palm of the hand was the "chum bait" (*ka palu o ka maunu*), and the outstretched fingers the *makau* that hooked the eels. The eel fisherman got his bait in the daytime - *he'e pali*, *'a'ama*, or *'opihi* - and on a dark night when the sky was thickly studded with stars the eel fisherman - or one who caught fish by hand *(lawai'a hāhāmau)* or one who gathered shellfish *(lawai'a hīhīwai)* - would say, "there are fish tonight - the stars are twinkling." He would grab a long bag *('eke)* and tie it on in back, take a water gourd for the beach (*ipuwai kahakai*) in his hand, and go down to the smooth rocks and pebbles at the shore. The eel fisherman looked for a jumbled mass of rocks with pebbles among them and arranged a place for himself near a large rock with many pebbles. He chewed the back of an *'a'ama* crab and spewed it out. The smell attracted the eels. The sea dashed over the fisherman as he lay face down close to a crevice in the rock that stretched below in the foam. If he could use both hands equally well, he could fill two bags and the water gourd with eels. In snaring the eels the fingers were stretched wide apart while the thumb pressed down and held crab meat in the palm of the hand. The back of the hand rested on pebbles, with the fingertips up against the face of the rock or of the crevice. The head of an eel would appear between the fingers as it came to eat from the palm of his hand. The fisherman would clamp his fingers together, and the head of the eel would be caught fast. If all the spaces between the fingers were filled, then six eels might be caught at one time. As their tails thrashed about, the fisherman would bite the eels in the middle of the back, and their wide open mouths would bite him on the cheek, on the neck or on the earlobes. The eel snarer went on with this odd way of fishing until his bag was full.

As strange as Kamakau's account seems, it is largely substantiated by other sources. In an editorial comment, Dorothy Barrere notes (Kamakau 1976:90):

> Kamakau's account of snaring eels by hand is substantiated by Kahaulelio (1902, June 20) and by Kawena Pukui. Kahaulelio calls it *'ini'iniki* fishing, and says that the eels caught were the small *puhi laumilo* (*Gymnothorax undulata*). Pukui has watched this method of eel snaring for *puhi 'ini'iniki*, or *puhi 'ōilo*, infant eels. *He'e pali* was the bait used, and "sometimes two or three eels were caught at once." (Pukui)

Fornander (1919:176-177) offers a variant in which both hands are used, "the bait being held in the right hand, the left hand snatching" performed "at high tide when the sea is boisterous".

Kahaulelio (*Iune* 20, 1902; pg. 6) also discusses this "'*ini'iniki* eel fishing" suggesting that it was particularly well-liked. He relates that Hawaiian women would deliberately allow eels to bite their necks so their husbands would not become angry (seemingly to supply an alibi for marks acquired during amorous liaisons). Kahaulelio (*Iune* 20, 1902; pg. 4) answers the question as to why Hawaiians went to such lengths to acquire eels by remarking that eels were esteemed more than wives ("*a minamina loa ia ka puhi, mamua o ka wahine mare...*")

Tau'a (April 1983:8) offers yet another variant of this *puhi'ini'iniki* fishing from his own experience at Manawai Beach, Maui. While this is a late twentieth century account, it has the hallmarks of antiquity.

> We first gathered up a bunch of ha'uke'uke (an edible variety of sea urchin) and pounded it to make palu (chum). We then opened a hole in the sea wall by removing a rock so that the ocean rushed in, bringing with it the young eels. We then put the cracked sea urchins in the middle of our hands with our fingers wide open so the eels could swim in between our fingers to get to the sea urchins. When the young eels swam between our fingers to get at the sea urchins, we would grab two or three eels and, at once, place them in our fish bags. Other, more cautious, fishermen used gloves or socks to keep from getting bitten.

Hand collecting was often accomplished with no equipment at all but often made use of sticks to snag or prod prey, a stone or simple pry to strike and loosen shellfish from rock or cliff, and fiber creels or gourd containers to store the catch. Occasionally hand collecting would involve the moving of rocks and coral either to facilitate the capture of prey or to actually construct features of stone and coral which would attract desired species and at which they could be caught time after time.

Most hand collecting was done by individuals but occasionally several people would work together. Kahaulelio (May 30, 1902; pg. 6) relates a method of *Uouōa* (false mullet, *Neomyxus chaptalii*) fishing in which between two and ten children and/or adults would form a line and clap their hands and make smacking noises with hands and lips (*"pa'ipa'i na lima e 'ūpoho ai, alaila, mukāmukā no ho'i na waha"*) in order to herd the fish into shallows where they could be caught by hand under the rocks.

In another account of people working together, Kahaulelio (*Feberuari* 28, 1902; pg. 6) writes about *"lau kō pua"* or *"lau kō pua li'ili'i"* ("fishing for young fish") in which children drag yellowed banana leaves (*"lau mai'a pala"*) in the shallows during rainy months to frighten small fish so that they run up on shore where they may be easily picked up by hand.

A third account Kahaulelio offers (*Maraki* 7, 1902; pg. 6) of group fish driving by a wading group of people is *"ho'ōmo"* ("to draw in, as a wave") fishing. The purpose of this group effort was to catch *'iāo* (silversides, *Hepsetia insularum*) fish to be used as bait in *aku* (skipjack tuna, *Katsuwonus pelamys*) fishing. Kahaulelio relates that more than a hundred men, women, and children would gather in the pre-dawn to kick (*peku*) or drive *'iāo*.

Much hand collecting was undertaken at night by torch light. While frequently a

scoop net was used in torch fishing, it seems that often sea life was just picked up by hand. Kahaulelio (*June* 20, 1902; pg. 4) relates an account of torch fishing and pinning an eel to the bottom with a piece of an iron hoop (*"hao apo pahu"*) to secure it and facilitate picking it up by hand. Doubtlessly sticks were used in pre-contact times in a similar manner.

***Ku'i nā 'Opihi*: Limpet Picking**

The only specific form of fishing on Kaho'olawe that has a *mo'o'ōlelo* (tradition) associated with it is *'opihi* picking. Kahaulelio (*June* 27, 1902; pg. 3) claims that the size of the *'opihi* clinging to the sea cliffs at Kanapou, Kaho'olawe was unequaled and relates his having boiled goat meat in the shells of the Kanapou *'opihi*. The size of the *'opihi* is explained in a *mo'o'ōlelo* about a man of Kohala, Hawai'i Island named Pu'uiaiki (Pu'u-i'a-iki = small heap of fish?) whose canoe was swamped in the 'Alenuihāhā Channel. He was swimming for Kaho'olawe when a giant *'opihi makaiauli* (*Cellana exarata*) appeared before him. The Kaho'olawe prophet, Moa'ula, had sent the giant *'opihi* to rescue Pu'uiaiki. The story then takes a turn as a giant shark appears and swallows Pu'uiaiki whole. Pu'uaiki uses his *'opihi* shell to scrape the wall of the shark's stomach for three days and the shark landed at Kanapou Bay and died. Pu'uiaiki comes out of the shark with a bald head (presumably having lost his hair from the shark's digestive juices). This story is almost certainly a regional adaptation of the popular story of Punia, the rascal wonder child of Kohala and the huge shark Kai'ale'ale (many versions, ex. Fornander Vol. 5, Part II pg. 296 ff.). In Kahaulelio's account, the protagonist, Pu'uiaiki, is led up to a spring "above" the bay by fearful Kaho'olawe fishermen who then stone him to death while he is drinking. They then cover his body and fill the spring with stones. This unique localized part of the story may have arisen

out of a spirit of Kaho'olawe defiance of Hawai'i Island interlopers (as in the raid of Kalani'ōpu'u). The story ends with an account of the prophet Moa'ula rescuing Pu'uiaiki in the night and the Kaho'olawe fishermen finding the stones piled on the upland side of the spring the next morning. This *mo'o'ōlelo* presumably explained the configuration of stones at the spring when Kahaulelio first visited Kanapou in 1848 (as well as the large size of the *'opihi* to be found in the vicinity).

Various species of *honu* (turtles), *ula* (lobsters), *wana* and *'ina* (sea urchins) , *loli* (sea cucumbers), *pupu* (mollusks), and *limu* (seaweed) were taken by hand while diving. Kahaulelio (Mei 23, 1902) explains the technique of catching turtles by diving, in which the trick is to turn the turtle upside down as quickly as possible (*"ho'ohuli 'āwīwī me ka hikiwawe a huli ke alo iluna, he māmā wale nō a kau ana I luna o ka wa'a"*) to make it tractable and easy to maneuver.

Regarding the development of these techniques at Kaho'olawe.

Groping for seafood has risks of sea urchin spine puncture, coral cut, and eel bite which may be of particular concern at locations remote from health care facilities. *'Opihi* (Limpet, *Cellana sp.*) gathering is proverbially dangerous. Every year an average of two people die in Hawai'i in the rough waters favored by *"he i'a make ka 'opihi"* ("The *'opihi* is a fish [creature] of death"; Pukui 1983:70).

All turtles are protected by federal law. State fish and game laws govern the taking of various crustaceans and small fishes which were commonly taken by hand.

Certainly the gathering of *'opihi* and other sea food by hand should be encouraged in certain situations. The use of modern gloves and foot wear might be allowed out of safety considerations. No special gear would seem to be required but the manufacture of

storage bags and containers could be technologies explored in association with hand collecting. The collecting of *'opihi* is one of the only fishing techniques with a specific associated myth at Kaho'olawe and this story and its variants deserves to be retold.

The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of hand collecting to a minor extent.

Allowing the use of mask, fins, and snorkels might well encourage the practice of hand collecting.

The creation of *pā i'a* weirs and/or "fish houses" (*ahu*, *imu*, and *umu*) would be corporate constructive activities which could encourage hand collecting.

B. *Peku i ka i'a* Fish kicking

Sources: Pukui (1983:147).

Overview There were certain places where shallow sandy flats allowed for the taking of fish by kicking. Sometimes one can relatively easily run up and kick a fish where it is quite difficult to catch them by hand. Hīlia Moloka'i was so named because the mullet there could be "smitten (*hīlia*)" by the sides of one's feet (Pukui et al. 1976:46.) Pukui (1983:147) explained the Hawaiian riddle "*Ka i'a kā wāwae o Hīlia* (the fish of Hīlia kicked by the feet)" as refering to mullet. "Hīlia is a place on Molokai where mullet often come in schools near the shore. The people wading into the water, would kick the fish ashore where others would pick them up."

Regarding the development of this technique at Kaho'olawe.

This fishing method would seem to have limited applicability.

C. *Hola* (also *hohola, hola hola* and *'auhuhu*): Fish Poisoning

Sources. Fish poisoning is discussed by ʻĪʻī (1959:69); Campbell (1822:196-197); Cobb (1902:509); Fornander (1919:VI, Part 1:188); Stokes (1921:219-233); Newman (1970:51); and Goto (1986:132).

Overview. A variety of plant species including *'auhuhu* (*Tephrosia purpurea*), *'ākia* (*Wilkstromis sp.*, particularly *W. sandwicensis*), *ipu 'awawa* (*Curcurbita maxima*), *'ānapanapa* (*Columbrina asiatica*) and *'awa* (*Piper mythisticum*) are mentioned in connection with *hola* fishing but it appears that *'auhuhu* and *'ākia* were by far the most used, with the former greatly preferred as most efficacious. The most widely used Polynesian fish poison, "*futu*" (*Baringtonia speciosa*) was not present in Hawai'i in pre-contact times.

Stokes (1921:227) relates that the *'auhuhu* "was gathered for *hola* during the growing period, as the natives assert that it was without bitterness in its dormant state. This bitterness they associate with the poison." This seasonal pattern of growth and procurement of *hola* lead Stokes to conclude that *hola* fishing was only conducted seasonally.

Stokes (1921:220-225) provides a detailed account of *hola* fishing with *'auhuhu*. This method was commonly employed in fresh water streams and pools, tide pools, and along reefs and rocky shores and was sometimes used by divers. The plants were pulled

up, roots and all, and carried close to the desired place for *hola* fishing at low tide. Large numbers of the plants were pounded with locally available boulders for ten minutes, then the peeled stems and roots were discarded and the plant was pounded for another ten minutes to the fineness of chaff. The *hola* was then applied to pools or ledges with simply twisted grass bunches which served as temporary "spoons" or applicators to get the *hola* poison into crevices and holes without risk of eel bite. The *hola* dyed the water green. Within ten to fifteen minutes the fish (with the exception of eels which are less susceptible) are swimming aimlessly or floating. After the fish were stunned by the poison, they were collected by hand or more commonly with dip nets or seines. Stokes (1921:224) lists eighteen types of fish caught by poisoning at Hōnaunau, Hawai'i Island with *aholehole (Kuhlia sandwicensis)*, *'ala'ihi* (*Holocentrus* sp,) and *'ohua* (juvenile *manini* or convict tangs, *Acanthurus triostegus*) being the most numerous. Stokes points out that small (juvenile) fish appeared more resistant to the poison but they also succumbed and seemingly once under the influence a fish did not revive, even if placed in clean water. Campbell (1822:197) declares that "when taken they [fish] are instantly gutted, in order that the poison in their stomach may not affect the quality of the fish." Stokes (1921:225) relates that his Hawaiian informants "said that they did not treat such fish differently in any way from those caught by other means and that they were personally in no degree affected by the hola ... [but that] some O'ahu natives say that hola gives a bitter taste to fish entrails, which on this account are removed before the meal. Stokes does relate an account of a woman dying from direct consumption of *hola*.

Regarding the development of these techniques at Kaho'olawe

As early as 1850, the Kingdom of Hawai'i sought to control fish poisoning by

legislation (Jordan and Evermann, 1902:365). Stokes noted in 1921 (:229), "the practice of *hola* has been almost, if not entirely abandoned in the Hawaiian islands, owing in part to a lessening of the available poison plants." State fish and game laws prohibit fishing with poison without a permit. Poisoning is an indiscriminate method of fishing which kills or adversely affects all species coming in contact with the poison. Evidently the direct ingestion of *hola* can be fatal (Stokes, 1921:225). It would seem inadvisable to revive this fishing method to any extent.

D. *Hili me ka hoe*: Smiting with Paddles

Sources: Kahaulelio (Mei 23, 1902:3) and Cobb (1902:420) discuss this fishing method.

Overview. Kahaulelio relates an unusual method of catching *a'ua'u* fish (small bill fish?) in which men killed or stunned them with paddles (*"e hili like ana kēia mau kānaka I na hoe ma ka nihinihi a e pau loa kēia papa a'ua'u I ka make, a pēlā iho lā ke 'ano o ka lawai'a ana o ke a'ua'u."*).

Cobb indicates that a "popular method" of catching fish such as *'ama'ama* mullet was done at night. The fish were lured close to a boat by a light and, when they "are fascinated or dazzled by the light, a stick is suddenly brought down on them, stunning or killing them. They are then picked up and put into the boat."

Regarding the development of this technique at Kaho'olawe

This fishing method would seem to have very limited applicability.

E. *Kīkomo*: Gaff Fishing

Sources: Fornander (1919: Vol. VI, Part 1:176) and Tau'a (HFN October 1986:11) discuss this method of fishing.

Overview. While Pukui translates this term "*kīkomo*" rather vaguely as "pole fishing in shallow sea", the account in Fornander appears to be about gaff fishing: "It is a hook placed at the head of a short rod one fathom in length. The place for fishing is a cleft in the rocks. Eels also are the fish to be caught" (Ibid.).

Cobb (1902:427) depicts a most inscrutable Hawaiian artifact consisting of an approximately 11 inches. diameter discoidal basalt sinker stone with two very substantial, large, barbed hooks lashed together on one side. The hooks, which each have a shank length of perhaps 10 inches, are lashed end to end (head to head) in a linear fashion across a diameter of the sinker stone. They are lashed in such a way that the bend of the hooks stand vertically and the points of the two hooks face each other with the points perhaps 12 inches apart. The lashing is depicted as massive and a notably thick cord is depicted as being heavily lashed to where the hook heads meet at the center of the discoidal sinker stone and running off of the illustration. The caption reads "Hooks used in catching turtles and squid." The use of this traditional artifact appears to be explained in a story from Nahiku Maui related by Keli'i Tau'a.

The story concerns a Mr. Ephraim Bergau Sr. who used an unusual fishing rig consisting of "a 22 foot long *pāke* [Chinese] bamboo pole with a 1/4 - inch head...a 28 foot length of line 3/8 inch thick,...[and] on the line was a two pronged hook with the prongs facing opposite one another. A piece of lead was positioned just above the hook." While Mr. Bergau's rig was clearly historic in composition, the principle seems the same as in

the probably traditional artifact Cobb illustrated. This is how Tau'a relates its use:

> Watching from the banks, a fisherman would spot a turtle. Cautiosly he would let down line and allow the waves to pull the hook and lead out to the turtle. The turtle would swim over the line and toward the two prng hook. As it moved over the hook, it would often snag the lower part of its body; this would guarantee a *hana pa'a* (hook up) Caution had to be taken not to pull on the line since that would cause the turtle to slip off the hook. Turtle fishermen also had to be sure not to hook onto the wings. Hooking a wing would almost always cause the turtle to slip off the hook.
> After the turtle was securely attached to the hook, the bamboo pole had to be fastened to the rocks so that the fisherman could manipuate the turtle line with his hands. Ephraim Jr. reported that some of the catches were so large that a few other villagers had to come to a fisherman's rescue and help pull the turtle in.

The story is clarified somewhat in that the Hawaiian word "*'ēheu*" means "wing, as of bird" and "flipper, as of turtle." Noting that *'ēheu* also means "pectoral fin," by logical extension, the term *'ēheu* ("wing') would be more apt for the powerful fore flippers. Perhaps the Hawaiian word "*hui*" defined as "flippers of a turtle" was more commonly used for the rear flippers (which, unlike the fore flippers, do rather "meet" and "cluster" or "*hui*"). Thus it would appear that Mr. Ephraim's strategy and Cobb's artifact were used for snagging the hind flippers of turtles. With their powerful fore flippers unencumbered, it is easy to understand Mr. Ephraim Jr.'s account of the great fight to be had and why Mr. Cobb's artifact is so well lashed!

Regarding the development of this technique at Kaho'olawe

This fishing method would seem to have limited applicability but might be well worth some attempt at minor revival as the gaffs could be easily replicated along pre-contact lines and could be used in other kinds of fishing as well. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage such a revival. Associated activities would be gaff manufacture and discussions of technique.

F. *'Oi'a* (also *I'a 'ō, Ke 'ō, 'ō he'e*): Spearing

Sources. Spearing is discussed by Kamakau (1976:70,85-86); Fornander (1919:178-179); Beckley (1883:1-3); Kahaulelio (*Aperila* 18, *Mei* 23); Cobb (1902:507-508); Buck (1964:288); Newman (1970:52); and Goto (1986:133-134).

Overview. The Hawaiian fishing spear was a straight wood shaft, evidently sometimes as long as two *anana* (fathoms; hence 12 ft.) but more commonly 6 or 7 feet in length. The fishing spear was sharpened to a barbless point with the butt end tapering to a lesser thickness than the shaft. It could be made of various hard woods such as *kauila* (*Alphitonia ponderosa*), *o'a* (*Colubrina oppositifolia*), *alahe'e* (*Canthium odoratum*), *'ulei* (*Osteomeles anthyllidifolia*), *'a'ali'i* (*Dodonaea sp.*) or *uhiuhi* (*Mezoneuron kauaiense*). Kamakau (1976:86) asserts that some spears had "bone points made from dog or human bone, lashed on with coconut fiber" but this seems to have been quite the exception with most pre-contact spears just tapering to a fire-hardened wooden point. Beckley (1883:1) indicates spears "were perfectly smooth, without hook or barb."

Spears were used in different ways: to kill (pith) fish caught by deep water angling or other means, were commonly used in the taking of *he'e* (octopus) on the reef and were used in spear fishing while walking or standing in the shallows and in diving. Both men and women used spears, but men may have commonly used larger spears ("*wēlau*" or "pole") and women smaller spears ("*kui*" or "stringer") (Kahaulelio: *Aperila* 18, 1902; pg. 3). It has been suggested (by Goto) that spearing technology was relatively undeveloped in Hawai'i (presence of only a simple spear head) due to environmental factors (general absence of lagoonal environs). Beckley and Buck assert that spearing while diving was more important than spearing from above the water. In fact, Beckley (1883:2) asserts

that "except in cases of *'o'opuhue* [Porcupine fishes such as *Diodon hispidus*] spearing, above-water spearing is very rarely used, and then generally in connection with deep sea line and hook fishing." Even in the case of spearing *'o'opuhue* from above water, Beckley maintains this was fairly specific to spearing in enclosed salt water ponds (where the *'o'opuhue* were thought to be less poisonous). Cobb, almost certainly following Beckley, describes above water fishing for *'o'opuhue* in similar terms but also discusses the spearing of *he'e* (octopus), the spearing of *honu* (turtle) from rocks along the shore,and *puhi* (eels) by first luring them out of their holes with bait. Beckley (1883:1,2) gives the fullest account of traditional diving spear fishing:

> Diving to a well-known station by a large coral rock or against the steep face of the reefs, the diver places himself in a half crouching position on his left foot, with his right foot free and extended behind, his left hand holding on to the rock to steady himself, watches and waits for the fish. Fish in only two positions are noticed by him, those passing before and parallel to him, and those coming straight towards his face. He always aims a little in advance, as, by the time the fish is struck, its motion has carried it so far forward that it will be hit on the gills or middle of the body and thus secured. ...when the fish is hit the force of the blow generally carries the spear right through to the hand...where it remains, whilst the fisherman strikes rapidly at other fish in succession should they come in a *huakai* (train) as they usually do.

Kahaulelio (*Mei* 23, 1902; pg. 4) relates that spearing was the easiest way (*ka lawai'a ma'alahi loa e loa'a ai ka honu*) to take *honu* (turtles). He relates that fish species speared included *nenue* (rudder fish *Kyphosus fuscus*), *kala* (surgeon fish, *Naso sp.*), *palani* (surgeon fish, *Acanthurus dussumieri*), and *panuhunuhu* (parrot fish, *Scarus sp.*).

The duration a Hawaiian diver could hold his breath underwater and the depth he could reach were matters of much speculation in early explorer accounts. Undoubtedly Hawaiians have always been very good divers. Kamakau (1976:86) claimed Hawaiian divers "could reach depths of two hundred feet and more." Such accounts are however

prone to exaggeration. The Fornander account (1919:178-179) relates Hawaiian spear fishermen holding their breath from "about half an hour" to "fully one hour"; "How wonderful (*kupanaha maoli*)!"

Kamakau (1976:70) notes that octopus spearing (*'ō he'e*) could be carried out from canoes, while diving, and while wading. The best time for octopus spearing was in the mornings of the rainy winter months (*ho'oilo*). Beckley (1883:3) relates that spearing octopus in the shallows was usually done by women.

Spearing was often performed on reefs and shallows at night by torch light when marine species were commonly either sleeping or mesmerized by the light and easier to spear.

Regarding the development of these techniques at Kaho'olawe

Kahaulelio reflects on how spear fishing brings encounters with sharks and calls spearfishing "fearful" and "terrifying" "*o ka pilikia nui ma kēla 'ano lawai'a, he kū I ka weli ame ka ho'omāka'uka'u maoli nō, he mea akaka loa, e hānai maoli ana no 'oe I kou kino na ka niho o ka manō*". Kahaulelio gives warning that spearfishing is the "fishing of death": "*Nolaila ma kēia 'ano lawai'a, ke kau leo aku nei au I nā po'e puni lawai'a a pau. he lawai'a make kēla a mai ho'ā'o e lawelawe I kēia 'ano hana o hālāwai auane'i me kēia ho'okalakupua o ka moana, a loa'a ka pō'ino.*" Kamakau (1976:86) agrees that "sharks were the 'fighting companions' (*hoa hakakā*) of the spearfisherman." Despite the risks, traditional Hawaiian spearfishing, using wooden spears without any method of propulsion other than a thrust of the arm, would seem to merit revival and encouragement. Allowing the use of "safety gear" and a modern mask, and perhaps fins and snorkels as well, might substantially encourage such a revival as

few would seem likely to be enthusiastic for long about venturing off-shore with only a handspear without these modern aids. Mask, fins, and snorkels would seem to add a measure of safety as well. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would do much to encourage such a revival. The creation of one or more *pā i'a* weirs could provide a learning ground. Associated activites would be fishing spear manufacture and discussions of technique.

G. Production of Fishing Line

Sources: The production of fishing line is perhaps best discussed in Kamakau (1976:44,45,52-55,76) and Stokes (1906:106).

Overview. Baited line fishing, snares, nets, and hook and line fishing required the production of fishing line for which *olonā* (*Touchardia latifolia*) was the most desired fiber. Occasionally other natural fibers such as coconut husk fiber or coir (*'a'a pulu niu*), *hau* (*Hibiscus tiliaceus*) fiber, *wauke* (*Broussonetia papyrifera*) fiber, and *'ahu'awa* (a sedge, *Cyperus javanicus*) fiber would be used. Stokes (1906:106) relates that "the spinning of cord, *hilo*, was always done on the bare thigh by women, the native terms for the process being *hō'aha* for coir and *hō'aho* for other cords. Men generally attended to braiding." It is unclear whether this was the pattern of line production in pre-contact times. Kamakau (1976:76) states that fishing lines were usually bartered:

> ...a fisherman did not twist, *hilo*, his own lines, but got them from those whose work it was to make them. Those people would twist the cords into two or three strands according to the desire of the fisherman. The work of twisting was laborious. The palm of the hand was used to rub (*hamo*) fibers over the thigh, and to make a firm, tight cord of two or three strands, even throughout.

The *'ahu'awa* "common on the banks of the taro ponds, was prepared by drawing

the freshly plucked stem between two rounded sticks tightly compressed for the purpose of removing the juices, and heckling, and then spinning the fresh fibre [*sic.*] into cord" (Stokes 1906:106). The *hau*, *wauke*, and *olonā* "were prepared similarly, being partly macerated in running water and scraped with a piece of pearl shell or turtle rib. This would be a process of a few days" (*Ibid.*). Stokes (1906:105-106) relates that "the production of [coconut] coir was simple, merely requiring the separation of the fibres [*sic.*] of the husk, and, when spun or braided into cord, was highly esteemed for the lashing of canoe outriggers on account of its presumed durability in saltwater" but was seldom used for fish line "not being as strong nor as pliable as the more favored *olonā*."

Regarding the development of these techniques at Kaho'olawe

The manufacture of lines must have been a common occupation in ancient Hawai'i and is surely one well worth reviving at Kaho'olawe. It would seem that all plant fibers to be used in line manufacture would be best imported from off-island, at least in the short term. While the preferred plant for fishing lines, *olonā*, is not a rare plant today, it is probably not common enough, or easily obtainable enough to meet the line needs of a program to encourage the retention and dissemination of Hawaiian fishing techniques. Perhaps the use of *olonā* should be focused on the "snood lashing" of hooks and lures with other plant fibers used for purposes (such as most nets) where vastly greater quantities of line might be required. The identification and aquisition of *olonā* (with an emphasis on conservation and sustainable harvesting) might be incorporated in "orientation sessions" of groups bound for Kaho'olawe. Coconut and perhaps *hau* would be much more readily available traditional fibers with which to practice and learn line manufacture, and to create fishing devices.

H. (No name known; perhaps *"Aho palu"*): Baited Line Fishing

Sources: Fishing with a baited line but no hook is discussed by Kahaulelio (*Mei* 16, 1902; pg. 4) and Scobie (1949:58).

Overview: Baited line fishing used a fishing line and a bait or lure, but no hook. Fishing with a baited line appears to be of two major sorts: passive and active. Both forms are associated with fishing for crabs.

(No name known; perhaps *"aho palu"*): Passive Baited Line Fishing.

Scobie (1949:58) relates a form of simple passive fishing in which "dead baits of fish-heads or flesh were tied to short lines to which a wooden float was attached. They were set in shallow water and usually were watched by children who lifted the bait as soon as the float bobbed and so secured the crab."

***Lawai'a paeaea 'ōhiki*: Active Baited Line Fishing**

Kahaulelio (*Mei* 16, 1902; pg. 4) discusses active *paeaea* fishing for *'ōhiki* sand crabs. In this fishing a *nohu* (*Tribulus cistoides*) blossom is tied to the end of a line and cast over a sand beach. The angler lies flat on the sand and moves the line to and fro (*"moe iho oe ilalo o ke one a ho'omaka e paeaea aku, he hala 'ole ho'i kau o ka 'ōhiki"*). After the crab seizes the blossom, the line is quickly flicked toward the angler and the crab is secured. Kahaulelio comments that he could capture four times as many crabs by this method in the time it would take to dig them out of their burrows. Scobie (1949:58) relates that women used a similar technique with *'opihi* as bait for black crabs (*'a'ama*).

Regarding the development of these techniques at Kaho'olawe

This fishing method would seem to have limited applicability but might be well worth some attempt at minor revival. The passive form of baited line fishing would seem to have limited applicability in that there are probably few succulent crabs in the shallows of Kaho'olawe. *Paeaea* fishing for *'ōhiki* sand crabs and for *'a'ama* black crabs on the other hand would be practicable and has the advantages of relative safety and accessibility to a broad cross section of population, for many of whom many Hawaiian fishing methods are too rigorous and/or dangerous. The crabs can be eaten or make excellent bait.

I. *Pāhelehele*: Snaring

Sources Snaring is discussed by Kamakau (1976:87); Beckley (1883:10-12); Kahaulelio (May 16, 1902); Cobb (1902:420); Buck (1964:289); Newman (1970:51-52); and Goto (1986:132-133).

Overview. Snaring involved the noosing of prey. There were three basic kinds of snaring associated with: 1) fishing for eels and lobsters, 2) fishing for sharks, and 3) fishing for *'a'ama* (*Grapsus grapsus*) crabs.

Most commonly snaring was used in lobster and eel fishing with the snare mounted on a pole and often used in conjunction with bait (which might be attached to a second pole). Cobb noted that he only saw such snares being used on Hawai'i island and not on any of the other major islands. A noose on a pole (*pāhelehele puhi*) was placed in front of an eel hole, the eel was attracted with bait, and, when the eel stuck the fore part of his body through the noose, the cord was drawn tight and the eel pulled to the surface.

and the

Beckley and Ka

role of chumming ("*Kūpalupalu manō*

used a dead man as chum and that ordinary fisherm

their bait. This is how it was done:

The fishermen sailed far out on the ocean, until the land looked level with the
sea; that was the place for shark fishing. When all was ready, the prow of the
canoe was turned into the current so that the upswell of the current would be
behind the canoe. The net (*kōkō*) containing the decomposed pig mixed with
pebbles and broken *kukui* nut shells, was tied to the starboard side of the canoe
at the forward boom (*kua 'iako mua*). Then the net was splashed in the sea and
poked with a stick until the grease (*hinu*) ran through the pebbles and *kukui*
shells. A shark would scent the grease; its dorsal fin (*kuala*) would break
through the surface of the sea, and it would snap its teeth close to the canoe.. . .
The fisherman would pat the shark on the head until it became used to being
touched; then he rested his chin upon the head of the shark and slipped a noose
over its head with his hands, turning his palms away from the shark lest it see
their whiteness and turn and bite them. When the snare reached the gills, th
fisherman eased it downward to the center of the body, then he pressed a foo
the shark's head, bending it forward as he tightened the noose. If it were a
shark - two, three, or four *anana* (fathoms) long [hence 12', 18', 24'], there w
be a furious tugging and battling. If it were a small one, it would not be l
before it was bent over the *kua 'iako*. (Kamakau 1976:87)

Kamakau relates that sometimes a snare utilizing crossed sticks of *wauke* fa
noosing of the shark. Beckley offers an account of shark noosing which dif
Kamakau's, primarily in the utilization of *'awa* to stupefy the shark, the
feeding as the shark is led to shore, and the dispatching of the shark in

Beckley (1883:11) writes:

The fleet would sail many miles out to sea in the direction in wh
known frequently to appear. Arrived at a comparatively shallo
containing the head fisherman and the priest and sorcerer, wh
be indispensable, would cast anchor; meat and baked liver we
overboard, a few bundles at a time to attract sharks. After

> and scent of cooked meats would spread through the water many miles in radius. The *niuhi* would almost always make its appearance after the third or fourth day, when bundles of the baked meats were thrown as fast as it could swallow them. After a while it would get completely tame and would come up to one or other of the canoes to be fed. Bundles of the liver with the pounded *'awa* would then be given to it when it would become not only satiated, but also stupefied with 'awa, and a noose was then slipped over its head, and the fleet raised anchor and set sail for home, the shark following a willing prisoner, the people of the nearest canoes taking care to feed it on the same mixture from time to time. It was lead right into shallow water till it was stranded and then killed. Every part of its bones and skin was supposed to confer unflinching bravery on the possessor. The actual captor, that is the one who slipped the noose over the *niuhi's* head, would also, ever after, be always victorious.

Reverend Hiram Bingham relates an eye-witness account of Hawaiian shark snaring from 1820 in which it appears the noose was passed over the shark's tail rather than its head:

> The shark played or raved round the vessel [*Thaddeus*], with the boldness and fierceness of a hungry tiger, and put up his nose to the side of the brig to smell the track where the swimmers had ascended from the water. G. P. Kaumualii and one of the officers, dexterously put a snare upon him, as he passed under the main-chains. The vigorous floundering of this Leviathan made the sea boil. He seized hold of the end of a pole with his teeth, by which, in connection with the rope on his flukes, the shipmen and passengers drew him up the side of the vessel upon deck (Bingham 1847:67).

A fourth variant on shark snaring is provided by Kahaulelio (*Mei* 2, 1902; pg. 4) in his discussion of "*uluulu*" ("sea cavern") fishing. In this fishing, a diver would slide silently into the sea holding one end of a five fathom (30 ft.) rope, swim down to a sea cavern commonly inhabited by *manō lālākea* (white-tipped sharks, *Triaenodon obesus*) resting on the bottom ("asleep"; "*he hiamoe no ka manō*"), and slip a noose over the shark's tail. If necessary the diver would fan away the sand under the shark's tail to facilitate the noosing and then the noose would be pulled tight and the shark pulled to the surface.

Kahaulelio (*Mei* 16, 1902; pg. 4) discusses "*paeaea 'a'ama*", the snaring of

'a'ama (*Grapsus sp.*). crabs. This technique utilizes a small thin pole which is forked at the end, often utilizing thin coconut midribs, between which is a fine thread ("*aho lopi*"). The fine thread is slowly placed close to the eye stalk ("*na maka o ka 'a'ama*") of the crab. When it touches the eye stalk, the crab will retract the eye securing the cord between eye and carapace, as the pole is jerked up pulling the captured crab toward the angler.

Regarding the development of these techniques at Kaho'olawe

These fishing methods would seem to have limited applicability but might be well worth some attempt at minor revival. *Paeaea 'a'ama* seems a particularly distinctive Hawaiian fishing method and like baited line fishing has the advantages of relative safety and accessibility to a broad cross section of population, for many of whom many Hawaiian fishing methods are too rigorous and/or dangerous. The crabs can be eaten or make excellent bait. Noosing of eels and lobsters may be quite successful, particularly at night in the shallows. While few today relish eels as much as *ka po'e kahiko*, lobsters seem to always find a popular reception. State fish and game laws govern the taking of undersized and gravid lobsters and slipper lobsters and prohibit the taking of all lobsters and slipper lobsters during the summer months (May-August). The noosing of sharks should probably be generally discouraged for safety considerations. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of snaring techniques. Associated activites would be the manufacture of *Paeaea 'a'ama* rigs and crab and lobster nooses and discussions of technique.

J. *Haoa*: Gorge Fishing

Sources. Kahaulelio (*June* 20, 1902; pg. 6) discusses "*ha'awa*" (probably a variant of "*haoa puhi*") fishing for eels and Kamakau (1976:77) discusses the use of gorges in deep water bottom fishing.

Overview. As described by Kahaulelio, a one-inch length of coconut leaf midrib (*nī'au*) was sharpened at both ends to create the gorge. A thin line was then attached to the middle of the gorge which was then placed carefully in a *okuhekuhe* (*Eleotridae* or *Gobiidae*) fish bait. When an eel would swallow the bait, the line would be pulled lodging the gorge sideways in the craw of the eel.

Kamakau discusses the use of gorges in deep water bottom fishing at *ko'a pōhākioloa* (Pukui and Elbert define this as "fishing grounds about 260 m. deep"): "when a fish swallowed a gorge it stuck fast, and the fish died down there in the *ko'a*." He calls these more serious fishing gorges made out of bone "*ho'omō*" ("to cut") but says they were like the gorges used in eel fishing which he calls "*ho'olaoa*" (Pukui and Elbert note varying pronunciations are *la'oa*, *haoa*, *ha'oa*).

Regarding the development of these techniques at Kaho'olawe

These fishing methods would seem to have limited applicability but might be well worth some attempt at minor revival. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of gorge manufacture and use. Associated activities would be the production of lines and gorges and the discussion of technique.

K. *Makau*: Fishhooks

Sources The major sources on Hawaiian fishhooks include Goto (1986); Sinoto (1962, 1976); and Buck (1964:324-342).

Overview Hawaiian fishhooks may be categorized in a number of ways. Major types include one-piece fishhooks, two-piece fishhooks which are lashed together at the base, and composite hooks in which a typically crescent-shape bone point is lashed to a large wooden hook (trolling lures and octopus hooks are dealt with separately below). Goto (1986:142) introduces Hawaiian fishhook terminology:

> A general Hawaiian term for fishhooks is *makau*. In historic times fishhooks were named according to their component materials; for example shell hooks (*makau pāweo*), human bone hooks (*makau iwi kanaka*), turtle-shell hooks (*makau 'ea*), and so on.

Goto (1986:166) "examined approximately 4,700 fishhooks...more than 80% of total fishhooks ever scientifically recovered in Hawaii." He notes that Hawaiian fishhooks were made primarily of mammal bone and pearl shell but were also made of bird bone, fish bone, mammal tooth, turtle shell, cowry shell, and wood. Goto (1986:197-199,248) noted strong regional variations with Hawaiian hooks. For example, the eastern islands (Hawai'i, Maui, Molokai. Lāna'i and Kaho'olawe) show a strong preference for mammal bone hooks while "pearl shell is equally as important as mammal bone on the islands of O'ahu and Kaua'i." Mammal bone hooks were made of pig and dog bone but "of the total assemblages, at least 35% are made of human bone" (it is often difficult to identify the type of mammal bone used in small hooks).

The work of Emory, Bonk, and Sinoto (1959) established that the form of Hawaiian fishhooks changed over time. This change is particular manifest in the "head types," (lashing points) of one-piece hooks. Subsequent analysis (Goto 1986) has confirmed a

trend from the early head type 1 forms to head type 4 forms in use in the 18th century (Figure 2).

In addition to temporal and spatial variation, Goto has noted a high degree of individuality in Hawaiian fishhook forms. The variation in the shank and point shapes and bend shapes of one-piece hooks are depicted in Figures 3 and 4. Variations in the form of the base (lashing point) of two-piece hooks is depicted in Figures 5 and 6.

The technique of manufacturing seems to be much the same regardless of selection of material. Sinoto (1967, 1976) has outlined the following process:

1. to produce "roughout tabs" by cutting mammal bone or pearl shell, usually these tabs are rectangular in shape;
2. to produce "prepared tabs" by grinding or polishing the outer surface of the tabs - the outer surfaces of the fishhooks are roughly shaped at this stage;
3. to groove by filing or notching to separate shank parts from points - some jabbing hooks are roughly finished by this procedure;
4. to drill one or two holes in the center of the prepared tabs - one drill often results in rotating hooks, and two drills may result in either jabbing or rotating hooks with barbs at the inner side of shank and point.

The general process of manufacture is illustrated in Figure 7.

Regarding the development of these techniques at Kaho'olawe

Fishhook and lure manufacture might be a focus of efforts in education in traditional Hawaiian fishing practices ideally leading to the point where a person learns to make a hook with which he or she can catch a fish and then cherish the hook as a memento of the Kaho'olawe experience. While the focus would be on the crafting of a finished fishhook this would seem to inherently involve experience in the making of a variety of other tools (coral files, scoria abraders, pump drills, etc.). While visitors might be urged to bring their own raw materials and traditional tools, some effort should probably be made to stockpile suitable bone and shell. Interaction with various private and/or governmental agencies might easily supply an abundance of animal bone. While the traditional pig and

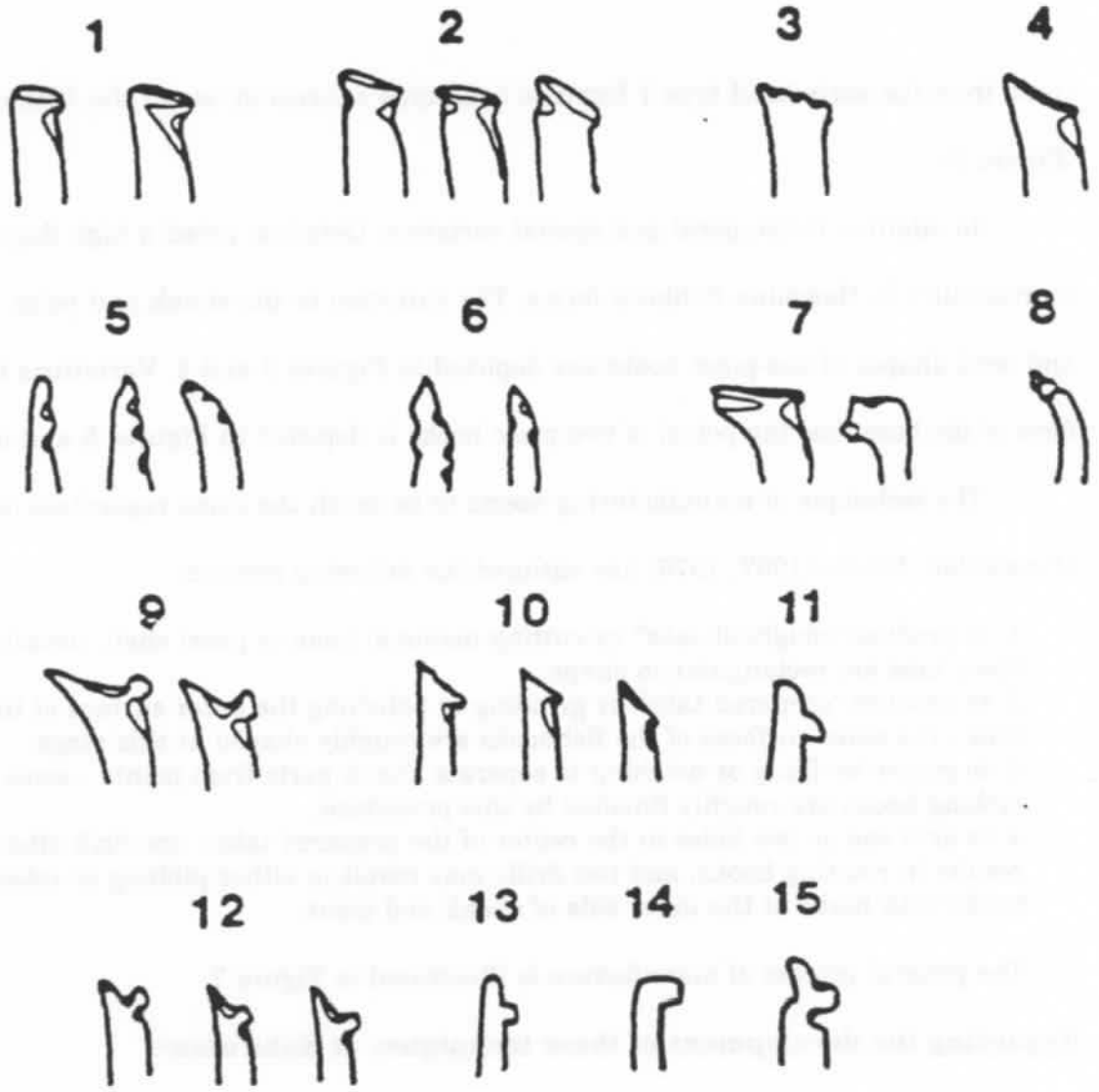


Figure 2 Head Types (HT) of Hawaiian One-piece Hooks: 1. HT1a, 2. HT1b, 3. HT1c, 4. HT1d, 5. HT2a, 6. HT2b, 7. HT3a, 8. HT3b, 9. HT3c, 10. HT4a, 11. HT4b, 12. HT4c, 13. HT4d 14. HT4e and 15. HT4f (Adapted from Goto, 1986 Appendix C)

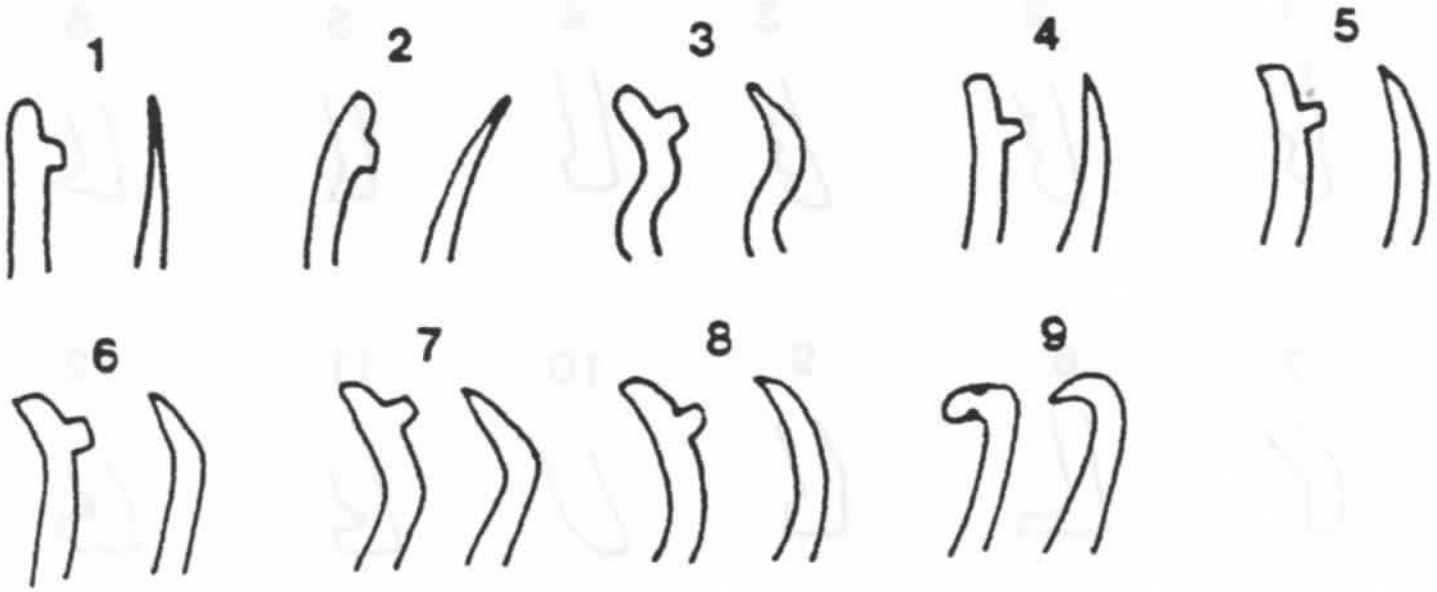


Figure 3 Shank and Point Shape Types of Hawaiian One-piece Fishhooks: 1. Straight, 2. Outcurved, 3. Wiggly, 4. Slightly Incurved, 5. Incurved, 6. Tip Incurved, 7. Angular, 8. Circular and 9. Tipped In (Adapted from Goto, 1986 Appendix C)

Figure 4 Bend Shape Types of Hawaiian One-piece Hooks: 1. U-Shape, 2. V-Shape, 3. Circular, 4. J-Shape, and 5. L-Shape (Adapted from Goto, 1986 Appendix C)

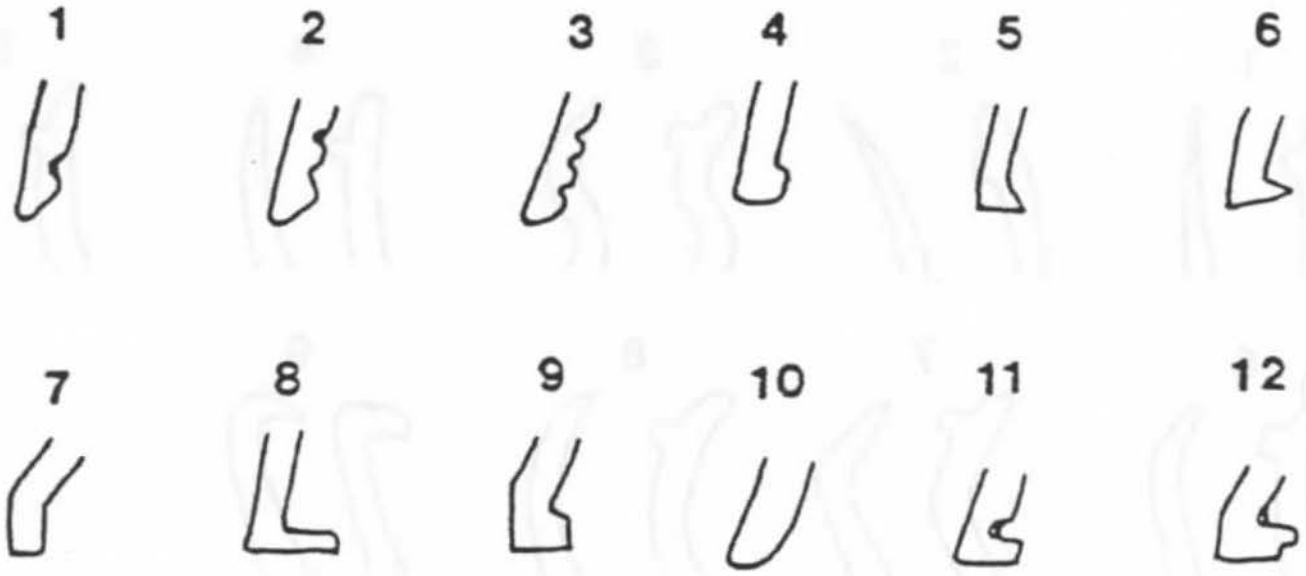


Figure 5 Outer Base Types of Hawaiian Two-piece Hooks: 1. One Notch, 2. Two Notches, 3. Three or More Notches, 4. Rectangular Knob, 5. Triangular Knob with Flat Base, 6. Knob with Triangular Base, 7. Curved Plain Base, 8. High Knob, 9. Pronounced Knob, 10. Straight Base, 11. Notch and Knob, 12. Knob on Knob (Adapted from Goto, 1986 Appendix C)

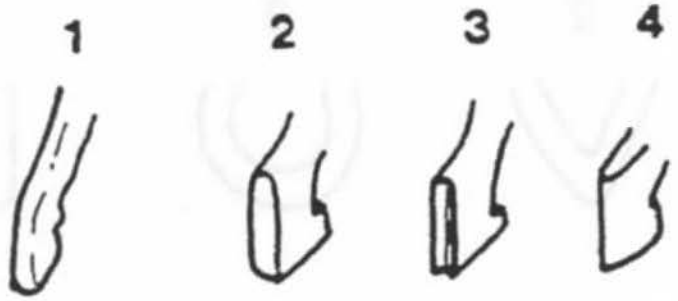
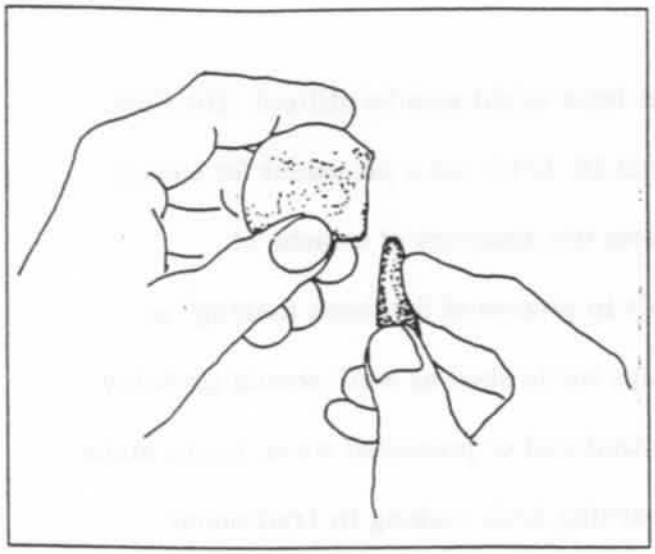
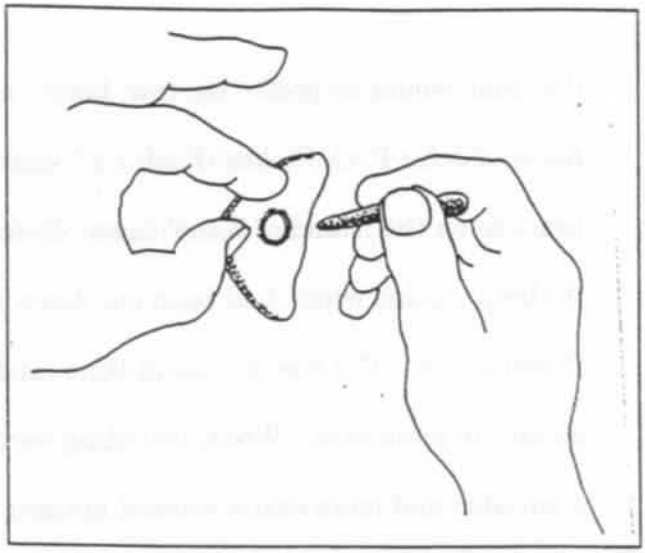


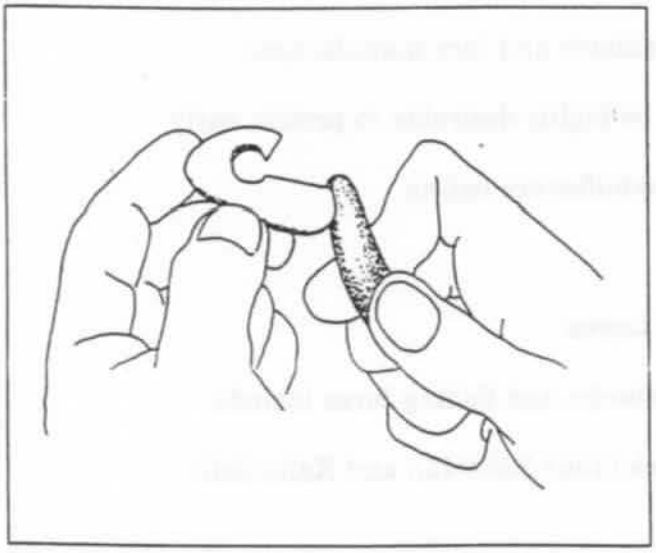
Figure 6 Inner Base Types of Hawaiian Two-piece Hooks: 1. Unfaced, 2. Faced, 3. Grooved, 4. Ridged (Adapted from Goto, 1986 Appendix C)



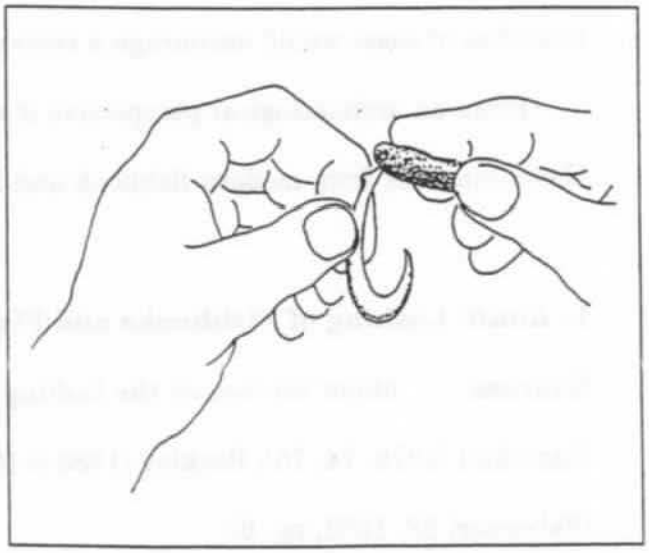
Having selected a shell, the craftsman searches for the strongest portion to create the hook and begins removing the unwanted parts with a coral file.



With a shell drill, the craftsman has cut a hole through the shell, beginning to define the inner curve of the hook.



The rough shape of the hook is apparent after the craftsman cuts through to the drilled hole and continues filing toward the final shape he has intuited



The hook is near completion and the craftsman refines the shapes of the point and the knob that will secure the hook to a line.

Figure 7 Steps in Traditional Fishhook Manufacture

dog bone would be preferred, cow, horse, and goat bone might also be utilized. The field notes of John F. G. Stokes (Book I 17; dated March 10, 1913) set a precedent for such a practice on the island of Kaho'olawe. Stokes relates the discovery of a cache of "bullock's shins which had been cut down probably in process of fish hook making" at Kamōhio Bay. The use of human bone (and perhaps turtle shell as well) should probably be totally prohibited. Wood, including perhaps introduced or processed wood, might make a suitable and more easily worked material for learning hook making by traditional techniques. While traditional styles of pre-contact Hawaiian fishhooks might be emphasized, particularly in the replication of fishhook forms known from Kaho'olawe (Figure 8), there could still be room for individual expression.

The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of fishhook and lure manufacture.

From an archaeological perspective it would be highly desirable to protect early Hawaiian sites from modern fishhook and lure manufacture debris.

L. *Kaulī*: Lashing of Fishhooks and Fishing Lures

Sources Major sources on the lashing of fishhooks and fishing lures include Kamakau (1976: 74, 75); Beckley (1883:9-10); Buck (1964:325-342); and Kahaulelio (Feberuari 28, 1902, pg. 6).

Overview Fishhook lashing was a fine art necessary to attach fishhooks to short segments of line (called in English a "snood" or a "snell") which could then be more readily bound to fishing lines, to lash snoods to lines, to lash two-piece hooks together at their base, to lash bone points onto large wooden hooks, to lash points onto trolling lures (*pā*

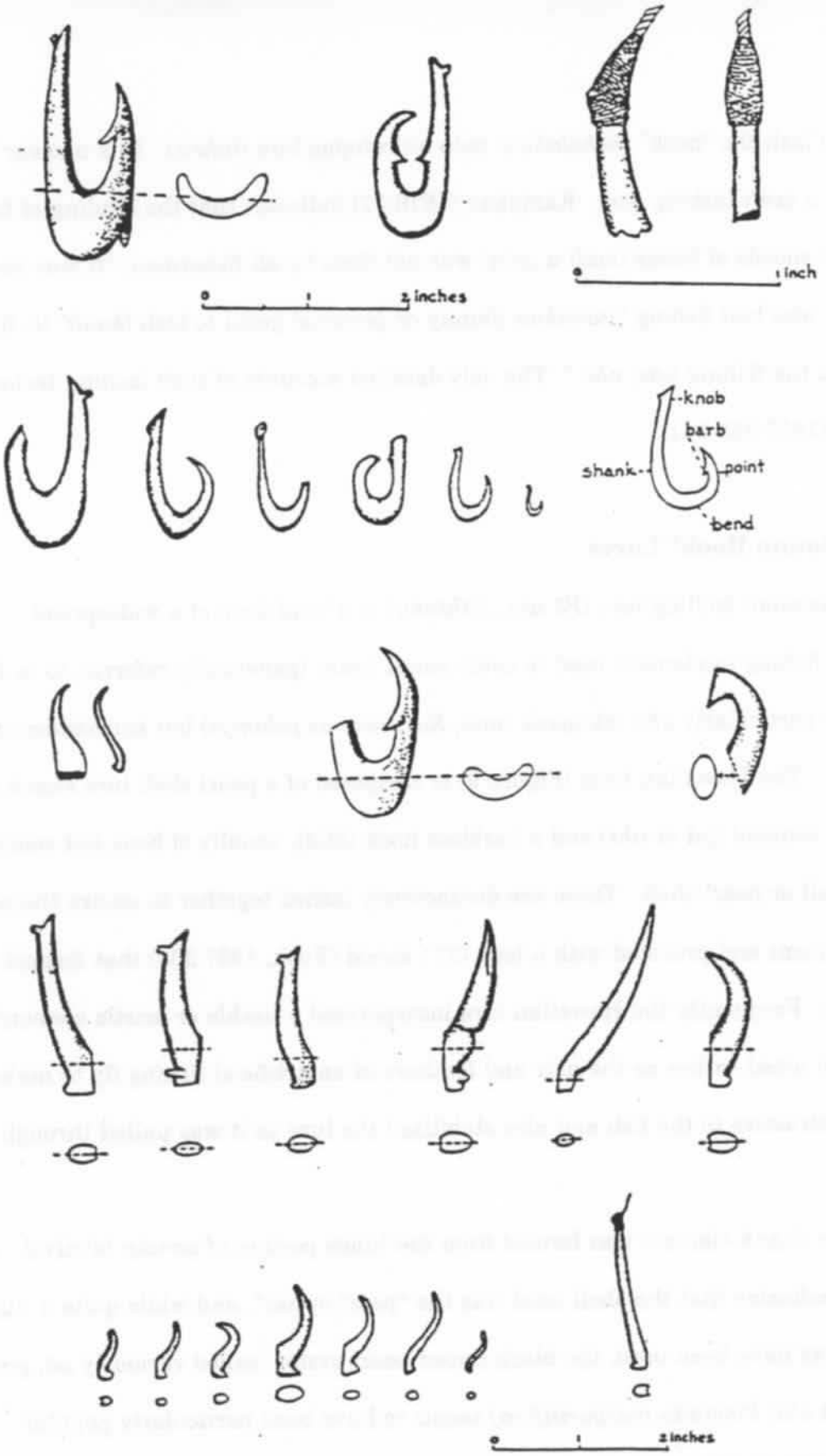


Figure 8 Illustrations of Fishhooks Recovered from Kaho'olawe Sites (Adapted from McAllister, 1933:23-24)

uhi) and to lash the "hook" (*kākalahe'e)* onto an octopus lure (*lūhe'e*). It is unclear how specialized a craft lashing was. Kamakau (1976:77) indicates that the binding of fishing lines to the snoods of hooks (*mali a pa'a*) was not done by all fishermen: "It was the work of the man who had fishing *'aumakua* [family or personal gods] to lash (*kaulī*; *lī*) the snoods onto the fishing line, *aho*." The only detailed accounts of such lashing techniques is in Buck (1957:335-341).

Pā uhi: "Bonito Hook" Lures

The Hawaiian trolling lure (*Pā uhi, Pāhīaku*) is a local form of a widespread Polynesian fishing implement used to catch small tunas (generically referred to in English as "bonito") particularly *aku* (skipjack tuna, *Katsuwonus pelamys*) but *kawakawa* and *'ahi* as well. The Hawaiian form (Figure 9) is composed of a pearl shell lure shank or oblong lure element (*pā* or *uhi*) and a barbless hook (*lālā*), usually of bone but sometimes of turtle shell or pearl shell. These are distinctively lashed together to secure the point to the lure element and provided with a long (27') snood (Buck, 1957:335) that formed the trolling line. Frequently the Hawaiian lure incorporated a hackle or bristle element (*hulu*) which acted rather as the hair and feathers of an artificial fishing fly to make the lure more attractive to the fish and also stabilized the lure as it was pulled through the water.

The lure shank element was formed from the hinge portion of certain bivalvia. Buck (1957:333) indicates that the shell used was the "pearl oyster", and while quite a number of species may have been used, the black-lipped pearl oyster (called variously *pā*, *paua*, *pāpaua,* and *uhi*; *Pinctada margaritifera*) seems to have been particularly popular. Kamakau (1976:74-75) writes about these trolling lures:

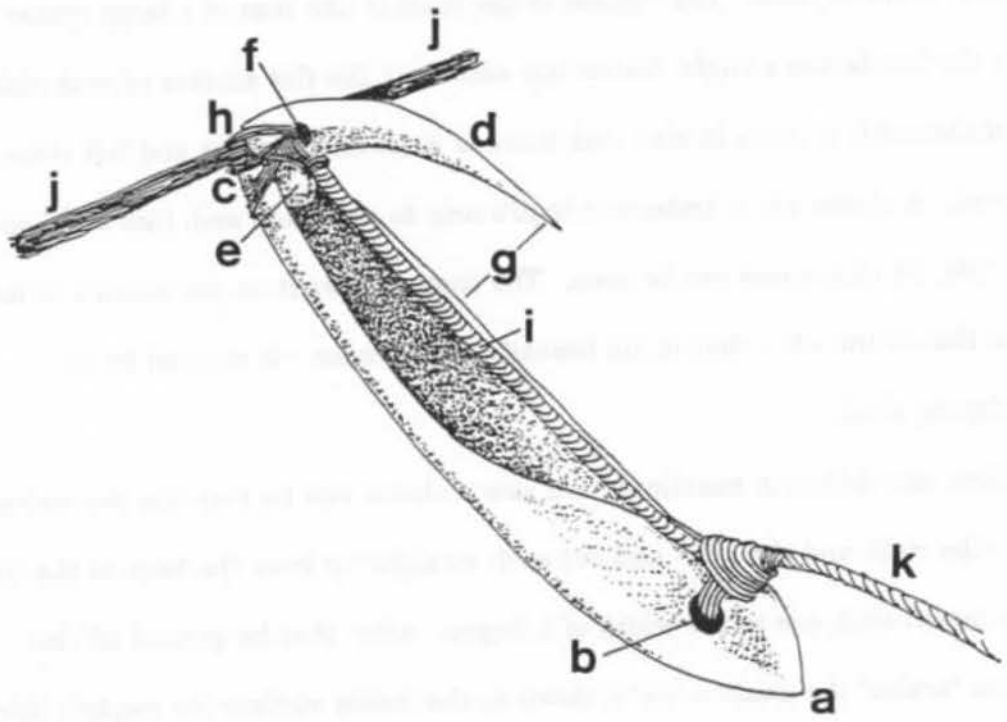


Figure 9 *Pā Uhi* or Trolling Lure: a. *Ihu* or *poʻo* (nose of the shank), b. *Puka Ihu* (hole in nose of shank), c. *Muli* (stern of shank), d. *Lālā* (bone point of lure), e. *Kapuahi* (base of the *lālā*), f. *Humu* (hole(s) drilled in the *lālā*), g. *Hāmama* (gape), h. *ʻAuwae* (chin overhanging shank), i. *Pou* (lashing), j. *Hulu* (bristles), k. *Kaʻā* (snood)

Fishermen searched for a hard bait, that is an uhi, or thick mother of pearl bivalve (*pāpaua mānoanoa*) found in the ocean. One name for this shell is *uhi*, another name is *paua*. The outside of the shell is like that of a large oyster (*pipi nui*); the inside has a slight hollow (*ua naua 'ia*); the flat surface of each side is a hand's breadth or more in size, and there is meat on the right and left sides [valves]. A choice *uhi* is iridescent (*e pi'o ana ke ānuenue*) and, like a red cowry, *leho 'ula*, its choiceness can be seen. The cowry shows it on the outside of its shell; that of the *uhi* - that is, its beautiful iridescence - is covered by its enveloping shell.

When one skilled in examining *uhi* saw a choice one he took the two valves (*pā*) - the right and the left - and cut each straight up from the base to the tip. Then he cut each one to the width of a finger. After that he ground off the outside "scales" (*ka unahi o waho*) down to the inside surface (*ka maika'i iloko*). The *pā* like the *leho 'ula* - was a choice chiefess (*ali'i wahine maika'i*), and the lure, the *pā hī aku*, was desired by the *aku* fish as a beautiful chiefess is desired by men. At the base of the *pā* there is a ridge, and through this a hole was drilled as a foundation for the cord of the snood, *ka'ā*. The cord ran from the hole to the edge of the hook that was fastened to the tip of the shank lure, *pā*. The hook was made of human or dog bone, filed smooth and curved nicely. Pig bristles crossed at the base of the hook where it joined on top the tip of the shank so that the hook would not fall over. The bristles ruffled the water behind the lure as those on the canoe paddled in unison, and the *aku* mistook the lure for an *'iāo* [silversides; *Hepsetia insularum*] or other small fish and crowded around to seize the *pā hī aku*.

Kahaulelio (Feberuari 28, 1902, pg. 6) speaks of the "customs" of the manufacture of trolling lures (*he loina ka hana ana o ka pā lawai'a aku*). The length was to be five inches and the width (maximum) one inch between where the line was fastened at the head of the lure (*po'o e pa'a ai ke aho*) and the hook, with the width narrowing down (*miomio*) to 1/8 -1/4 inch wide fore and aft. A hole was made in the front or head (*po'o*) of the lure. The line was lashed to a hole in the base of the human bone (*iwikāne*) hook and through the hole in the head of the lure shank and then continued on to a snood that could be lashed to the line of a bamboo fishing pole. Then a finer line was used to lash the hole in the base of the hook to the lure shank. Trolling for *aku* was evidently very much a male enterprise and it may be noted in passing that Kahaulelio specifically indicates the hook was made of the bone of a male, possibly because of the perception of greater strength in the bones of men. Later (Maraki 7, 1902; 6) he uses the non-gendered "Human bones" (*iwi kānaka* and *iwi o ka po'e make*).

Both Beckley and Kahaulelio divide *pā* on the basis of color. Beckley (1883:9-10) relates:

> the ... mother-of-pearl hooks are called *pā* and are of two kinds, the *pā-hau* (snowy *pā*) and the *pā ānuenue* (rainbow *pā*). The *pa-hau* is used in the morning till the sun is high, as the sun's rays striking it obliquely make it glisten with a white pearly light which looks like the shimmer from the scales of the smaller kinds of fish on which the bonito lives, but at midday when the sun's rays fall perpendicularly on it, it appears transparent and is not taken by the fish. The *pā ānuenue* is then used. This has the rainbow refractions, and the perpendicular rays of the sun make it shimmer and glisten like a living thing. Sometimes shells are found uniting the two characters, and such are always highly prized, as they can be used all day. The shell is barbed on the inner side with bone and two tufts of hogs bristles are attached at the barbed end at right angles to it. The bristles are to keep the inner side up so the shell will lie flat on the surface of the sea.

Kahaulelio (*Maraki* 7, 1902; 11) also maintains there were two divisions of *pā* lures which he calls the *lehua* and the *uhi*, which roughly correspond in use to Beckley's *pā-hau*

and *pā ānuenue*. The *lehua* lures were used from sunrise to eight a.m., then the *pā uhi* was used when the sun was higher overhead. He writes of two types of variegated (*ānuenue*) lures: the *onohilelehua* and *uhipaa* that the aku would bite at any time of day. If the fisherman had a *pā* with colors like a rainbow (*ānuenue*) it was as a beloved sweetheart (*he ipo aloha ia*). He would sleep with it by his pillow to save it from theft. Another favorite *pā* lure shank was the *pā ku'ala* which was completely white and was quite difficult to obtain.

A third account of *pā* coloration was told to Buck (1957:334) by Kalokuokamalie, a resident of Kona, Hawai'i: "Kalokuokamalie referred the various shank colors under the general term of *mūhe'e*" (Pukui and Elbert suggest that perhaps the lures were "so named because the colors of the shell suggested those of the cuttlefish"; *"mūhe'e"* most commonly meaning cuttlefish). Kalokuokamalie "paid particular attention to streaks (*no'a;* 'colored as colored streaks in pearl shell') in the color." Buck (*Ibid.*) notes that "he gave me the names of 14 different *mūhe'e* which, with the exception of two general colors [seemingly supplied by Pukui and Elbert as *mūhe'e kā'ope*, yellowish pearl shell lure and *mūhe'e mākoko*, pearl shell lure with reddish tinge suggesting the red of the *he'e mākoko*, a red octopus], were named after fancied resemblances to some color feature of fish (five), plants (four) and a bird, a crab, and a coral."

Buck lists six names from Kalokuokamalie, including::

> *mūhe'e kīkākapu*, spotted like the *kīkākapu* fish; *mūhe'e pua hau*, reddish like the fading flower of the *hau*; *mūhe'e 'ōhiki*, whitish streaks (*no'a*) like the legs of the *'ōhiki* sand crab; *mūhe'e koa'e*, white with three streaks like the tail of the tropic bird (*Phaethon sp.*); *mūhe'e 'ākoʻakoʻa* worm eaten below red like the *ko'a* branching coral [?]; and *mūhe'e laenihi*, white (*ke'oke'o*) shank with two curves like the head of a *laenihi* fish (according to Kalokuokamalie, the best form of shank).

Buck (1957:333-334) provides a more quantified account of lure shanks based on the

Bishop Museum collection and an introduction to terminology:

> Some local shell was small so the lengths of the shanks varied considerably. In the 83 shanks examined, the lengths range from 50 to 120 mm. The average length of the shanks of larger hooks is about 80 mm.; of smaller ones between 50 and 60 mm. The segment of shell is shaped to a point at the thick hinge end, and the sides slope upward to meet in a median edge, below which is a transverse hole, drilled from side to side. From the pointed hinge end, the shank widens out to a greatest width of 11 to 19 mm., with the average 14 mm. The edges of the shank then narrow gradually to reach a minimum width at the end of 4 to 8 mm., with the greatest number of shanks 6 mm. wide. The narrow end of the shank is characteristic of Hawaiian hooks.
>
> The projection of the hinge part is on the inner surface of the shell; and as this surface is uppermost during trolling, it is convenient to term it the upper surface or front of the shank. The under surface, which is the outer surface of the shell, may be termed the back. The back of the shank in the natural state of the shell is covered with a thick, dull layer which is ground off to expose the iridescent color of the shell beneath.
>
> The thick end of the shank was termed *ihu* (nose) by Kaloku, the hole, *puka ihu*, (nose hole), and the other end the *muli*. This follows the canoe terminology in which the bow is the *ihu* and the stern, the *muli*. For descriptive purposes, I will term the thick end the head; and the hole the head hole in preference to the "eye" recommended by some ethnologists. For consistency, the other end will be termed the tail, particularly as it carries the hackle which is usually meant for the tail of the small fish which the lure represents.

Buck (1957:334-335) gives the following description of bonito lure points and their lashing (See Figure 9):

> The point (*lālā*) curves upward and forward from a fairly long base (*kapuahi*) above which one hole (*humu*) is drilled. The length and curve of the points vary a good deal...a few points are incurved and a fair number are obtuse angled. However when shown assorted specimens of the Museum hooks, Maunupau, an experienced fisherman of Kona, Hawai'i, declared that the incurved point and the obtuse-angled point were both *hewa* (wrong). When the point was lashed to the shank, the inner end of the snood stretched tautly between the point hole and the head hole a little above the front surface of the shank. The gape (*hāmama*) of the point was thus the vertical distance between the sharp end of the point and the taut inner snood and, according to Maunupau, this should be the height of the thumbnail. Thus before the point was finally fixed, the gape had to be measured so that it could be altered if necessary. The point was placed in position on the shank and a fiber or thread loop stretched taut between the two holes. Holding the point in position with one hand, the workman measured the gape with the vertical thumb nail of the other hand. If the point was too high, the front part of

the point base was ground down to lower the point; if too low, the back part of the base was ground down to elevate the point...the point was placed in position with the back part of the base projecting partly beyond the end of the shank. The projecting part was termed the *'auwae* (chin). A thread three of four feet long was tied at one end to the head hole with an overhand knot. With the point to the right, the thread was stretched back and passed through the point hole from the near side. It was passed forward to go through the head hole from the far side. Two or more long loops were made between the two holes, and the thread was then carried in a number of turns around the shank and through the point hole. The turns were made obliquely on the back of the shank, with alternate turns crossing the others so that a neat chevron pattern was formed on the back of the shank. Maunupau stated that there was no set number of turns but that they were continued until the fisherman was satisfied that the point was firm. In the lashings examined there were usually four turns each way. The remaining length of the binding thread was left free for future use.

Buck (1957:336) then goes on to explain how the snood lashing was made:

One end of the line forming the true snood was passed through the head hole and an open overhand knot was made at a point where the short end would be long enough to reach the point and return. The short end was then stretched to the point, passed through the point hole under the previous long loops of the binding thread, and passed back through the open overhand knot at the head hole for an inch or so. The knot was adjusted so that the two lengths to the point hole were drawn taut and the knot tightened. The short end and the main line were pulled upward from the knot to form what was termed the *pou*. The short end was frayed out.

The long end of the binding thread, which had been left free, was wound around the snood and passed back through the point hole and a number of diagonal turns made between the point hole and under the projecting chin (*'auwae*) of the point base. The thread was brought forward from the last turn through the point hole to the snood, where it was fixed with a half-hitch. The binding thread then made close seizing turns (*'uo*) around the snood line and its previous long loops as far as the shank head, where some figure-of-eight turns were made around the *pou* to make it stand up. A figure-of-eight turn was made through the head hole and around the *pou* and the thread fixed with some turns and half-hitches around the snood beyond the head hole. Any extra length of frayed fibers of the short end were cut off, completing the snood lashing to the head hole. The pou which consisted of the long and short parts of the snood line combined, is a characteristic feature of the Hawaiian snood lashing. It was made to prevent the hook from wobbling when trolled.

Buck (1957:337) states that unlike most snoods, the trolling lure snood was quite long (27') and would be tied directly to a bamboo pole without any separate line being used. When not actively in use, the long snood attached to the lure was doubled up in a hank,

five inches long, kept together by a couple of half-hitches. Thus these prepared lure lines were relatively quickly interchangeable by simply tying a new line onto the bamboo trolling pole. Buck (1957:336-337) then continues to give us our best discussion of hackles and hackle lashing:

> The Hawaiian hackle (*hulu*) was made of white or black pigs bristles. It was peculiar in that it was lashed crosswise to the long axis of the shank, instead of trailing directly behind, as in the bonito hooks of other Polynesian islands. The small bunch of stiff pig's bristles, about 2 inches long, was held with its midpoint under the projecting chin of the point base and against the end of the shank. A thread was tied with an overhand knot around the snood in front of the point, passed through the point hole from the near side, carried obliquely down from the far side to cross over the hackle, then under it to return to the point hole on the near side. The next turn from the far side passed under, then over, the hackle to cross the first turn diagonally over the middle of the hackle. Two more similar turns were made, followed by two single turns around the hackle to the outer side of the diagonal turns on the far side. The thread was crossed directly to make two similar turns around the hackle on the near side, and the thread was either passed directly to the snood or indirectly through the point hole, if there was room for it. Some half-hitches were made around the snood in front of the point to complete the lashing. In some hooks a couple of turns were made around the oblique turns between the hackle and the base chin before the thread was brought up to the snood. Maunupau said that the transverse position of the hackle made the lure ride on its back with the point uppermost when trolled, and he held that more than two turns around the hackle on each side of the middle turns would bend the sides of the hackle back in a V-form, which was wrong.

***Makau manō (also kīholo)*: Shark Hooks and Their Lashing**

Distinctive hooks were used for catching certain large fish. While these hooks were often particularly associated with catching large sharks (*manō, niuhi, luhia*), Kamakau (1976:77) maintains they were also used for catching *a'ulepe* (Sailfish, *Istiophorus*). Some shark hooks were made like a larger version of the two-piece hooks but more commonly they were of one piece of wood with a bone point. The preferred woods were *uhiuhi* (*Mezoneuron kauaiense*), *alahe'e* (*Canthium odoratum*), *koai'e* (*Acacia koaia*) and *'Āheahea* (*Chenopodium oahuensis*) (Kamakau 1976:77). Shark hooks often had peculiar lashing in both the attaching of bone point to the point limb and of the snood. The end of

the point limb of the shark hook was prepared in two ways: a wide, shallow transverse groove or "bed" (for the lashing to rest in) was carved around the point limb, just back from the end of the point limb, and a groove (to accommodate the tang of the bone point) was carved on the exterior concave side of the point limb (the outside) back from its terminus. The tang of the bone point was placed in the groove and the winding lashing lay neatly in the bed. In some cases, the distal end of the tang of the bone point was carved to be slightly raised which served to keep the tang from slipping up under the lashing.

The snood lashing of shark hooks was particularly intricate and evidently unique to this type of hook. The ends of the shank limbs of these hooks were typically not knobbed but rather notched with a series of relatively wide and deep transverse grooves (typically three grooves). Attachment can be understood as falling in three phases.

The first phase of lashing involved the tying of several (typically six) thin strips of *olonā* bast, side by side, to the tip of the shank and covering the shank tip. Lashing began with the laying of *olonā* bast down along the shank limb extending well below the lowest groove. As each strip of bast was applied, a narrow strip of *olonā* binding thread fastened it down tightly into the groove below. The next thin strip of *olonā* bast was laid next to the first and the binding thread was passed over it to lash it down into the groove. Successive strips of the olonā bast were thus laid down and lashed until the tip of the shank limb was covered. Then binding threads were used to bind the bast over the other two grooves. It appears that typically six winding turns would lie in each groove. The bast was then bound together tightly in two more discrete places: on the tip of the shank terminus, and just above the shank, again with perhaps six winding turns.

In the second phase of lashing, the portion of three of the strips of the *olonā* bast

extending down past the lowest transverse groove were doubled over to lie along the tip of the shank limb (while the other three strips were left lying along the lower shank) and lashed to each of the three grooves. The process was then repeated with the other three strips being bound to each of the three grooves. When all the strips had been doubled back, the first layer was completely covered. This second layer was then further bound tightly in two more discrete areas: first at the tip of the shank limb and then just above the tip (following the binding pattern with the first layer).

In the third phase, a textile cover was added. Buck (1957:340) suggests this was done "for purely aesthetic reasons" but surely it added further strength and protection of the snood lashing from abrasion. As Buck (1957:340-341) describes it:

> The textile cover was formed of longitudinal wraps and a weft of a two-ply coarse thread. All the warps required for the cover were first attached near one end of the weft. They were lengths of single ply twisted *olonā* fiber which were doubled in the middle, the loop passed over the weft, and the two ends drawn through to form pairs. The loop was drawn taut and the pair twisted into a loose two-ply to form single warps, and the warps were attached closely, there being 26 warps to the inch. A length of 3.2 inches was required to encircle the shank below the lower ends of the fixed *olonā* strips. By drawing the ends of the weft taut, the two ends of the warp attachments met with the warps extending upward to cover the fixed olonā strips. The short weft end was interwoven with the warps on the right to dispose of it, and the long end was worked from right to left in close spiral turns of a check weave. When the weft grew short, another length was laid over it; and the two continued as a double weft until the old one petered out. As the weaving proceeded upward and grew narrower, some warps were dropped out of the weaving and were covered by the others. At the top end the weft was carried around in close turns over the warps and tied to end the weaving. The free ends of the warps were included with the *olonā* strips, which were divided into plies and braided into three-ply or eight-ply to form the snood in the completed covers.

Regarding the development of these techniques at Kaho'olawe

The use of bonito lures and shark hooks are rather specialized fishing techniques that may have limited applicability to Kaho'olawe today. The creation of these lures and their lashing might be encouraged apart from utilitarian purposes as cultural artifacts.

Certainly trolling for tunas with traditional lures from canoes might be encouraged even if the chances of success are modest. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such lashing techniques and use. While it seems clear that at least some pre-contact Hawaiians caught sharks for both food and sport, the existing cultural values associated with sharks, particularly in Maui county, would seem to preclude deliberate fishing for sharks. This may be for the best as shark hooking seems to inherently involve attracting sharks.

M. *Ke kā mākoi o ka malo'o* Angling from shore (Dry fishing)

Sources The major sources on angling from shore are Kahaulelio (*Mei* 6, 1902: 4; *Mei* 16, 1902: 3); Beckley (1886:8); and the Fornander source (1919:, Vol. VI, part 1:176-177).

Overview Angling from shore seems to have included two major types of fishing: the "lighter" *paeaea* pole fishing, and the more robust *ku'iku'i* fishing which consisted of fighting *ulua* with a pole from shore.

***Paeaea*: Pole Fishing**

Paeaea is defined (Pukui and Elbert) as "to fish with a light pole offshore; pole fishing." It seems that the use of the English "offshore" is somewhat misleading as *paeaea* fishing is an "inshore" technique, typically used while standing on a beach or rocky shoreline (i.e. fishing off of the shore). It seems that *aku* fishing, while it often involved a pole, was not typically considered *paeaea* fishing as the *aku* pole is notably "heavier" than the typical *paeaea* pole and the techniques involved are quite different than in the light shore fishing typical of the *paeaea* method. *Paeaea* fishing is nearly synonymous with what is popularly known as "bamboo pole fishing." It was a type of fishing particularly

associated with childhood and youth. Kahaulelio (Mei 6, 1902: 4) understands *paeaea* fishing as falling in seven divisions (*māhele*): six in the sea (*kai*) and one on the land (*'āina*). Beckley (1886:8) also associates the number seven with *paeaea* fishing saying "there are only seven kinds of fish sought for in the *paeaea* fishing" and hence this conception may be proverbial. The poles (*mākoi*) used according to Kahaulelio were typically: *kilika* (the black mulberry, *Morus nigra*), *ha'uoi* (or *ha'uōwī* or *ōwī*; a weedy verbena, possibly *Verbena litoralis*) and small bamboo (*'ohe li'ili'i*) and were between 3 ft. and 9 ft. long. The Fornander source indicates that much longer poles of up to eighteen feet (*'ekolu anana*) were used. Kahaulelio's seven divisions of *paeaea* include fishing for: 1) a variety of common small shallow-reef fish (*kupīpī* or *Abudefduf sp.*, *hināle*a or wrasses, etc.); 2) *moi* (threadfin or *Polydactylus sexfilis*) fish; 3) *uhu* (parrot fish, *Scaridae*); 4) *ula* or lobsters; 5) *'a'ama* crabs; 6) *'ōhiki* sand crabs; and 7) *'o'opu* (*Eleotridae* and *Gobidae*). The *paeaea* method of fishing for *'a'ama* crabs and *'ōhiki* sand crabs involves the use of a pole but no use of a hook and these methods have been discussed in the sections on snaring and baited line fishing respectively. With these exceptions, Kahaulelio's divisions of *paeaea* fishing seem to be based on target species and minor differences in technique rather than differences in technology. In his first type, fishing for common small reef fish, the art is reputed to lie in the right choice of bait (*'a'ama* crabs, *'ōhiki* sand crabs, and *'ōpae* shrimps) and hiding oneself behind a boulder so as not to be seen by the fish. Regarding the second type of pole fishing for *moi* fish there are no details except that the bamboo poles were long, the bait was *'a'ama* crabs and *'ōpae* shrimps, and that Kahaulelio and his friends were very quick ("*'eleu*") to this kind of fishing. The third division, fishing for *uhu*, is of particular interest for Kahaulelio relates that he did this on the beaches (*nā kahakai*) of Lāna'i and

Kaho'olawe. This fishing started with the collecting of sea urchins (*hā'uke'uke*, particularly *Colobocentrotus atratus; wana*, long spined forms, particularly *Diadema paucispinum*; or *'ina*, *Echinometra sp.*). The sea urchins were crushed and tossed in as chum (*palu*) at the fishing site with the *niho* (the "Archimedes' lantern" or "teeth") being reserved to bait the hook. Kahaulelio comments on how much fun (*le'ale'a*) this kind of fishing was because the *uhu* bent the pole like the *aku* did. Kahaulelio tells us he never did go *paeaea* fishing for lobsters but that a friend did and broke all his *aku* fishing poles (*'ohe hī aku*). Such fishing was at night, typically from cliffs. Kahaulelio writes of pole fishing for *'o'opu nōkea* (or *'o'opu nākea*; seemingly a whitish goby) in a stream near Lahainaluna in 1853. Worms (*ko'e*) were the bait.

Beckley gives more details on how chumming with *palu* was accomplished in *paeaea* fishing without specifying target species. She relates (1883:8-9) that "the fisherman takes a handful of shrimps, baits his hooks, and then, bruising the remainder and wrapping it up in coconut fibre, ties it with a pebble on the line and close to the hooks; the bruised matter...serves to attract fishes."

The Fornander source (1919:, Vol. VI, part 1:176-177) calls this kind of fishing *Ke Kāmākoi* or simply "to fish with a pole." He relates the pole is of bamboo and hau and both pole and line are 18 ft. long. For bait he recommends in addition to *'a'ama* crabs and *'ina* sea urchins, *pe'a* (starfish) and *he'epali* (young octopus that clings to rocks). He recommends fishing at headlands and says that fish to be caught include the *uhu*, *halahala* (young *kahala* or amberjack), *'o'opukai* (or *po'opa'a*; hard head, *Cirrhitus pinnulatus*) *'aniholoa* (a small fish, no data), *hou*, *a'awa*, *hināle*a, and *awela* (these four fish are wrasses).

Ku'iku'i: Fighting *Ulua* with a Pole

It is interesting to note that in these early accounts of pole fishing from shore there has been no reference to catching the species which are most sought after by shore casters today, specifically the *papio* and *ulua* (*carangidae* fishes or jacks). Kahaulelio (*Mei* 16, 1902: 3) describes two methods of fishing for *ulua* which he calls *ku'iku'i* and *pahoe* fishing. He describes *ku'iku'i* (probably from the meaning "to fight") fishing as using a stout wooden pole (*kahi lā'au kaukau no ho'i*) a thick three-ply *olonā* line (*he aho olonā ka'ākolu nuinui*), and a *puhi paka* eel (Pukui and Elbert identify as *Lycodontis flavimarginatus*; proverbially fierce and dangerous) for bait. Kahaulelio associates this fishing with the coastal cliffs (*kahakai pali*) of Kaho'olawe and says that dark nights (*ahiahi pō'ele'ele*) and particularly dark, calm nights (*pō pouli mālie*) are the time to do this kind of fishing. He remembered the sharp report (*'u'ina*) of the pole as his father fought the *ulua*.

Regarding the development of these techniques at Kaho'olawe

For many, angling from shore is fishing and hence these techniques have a great deal of appeal. These techniques have an appeal to a wide cross section of society. *Paeaea* fishing includes what might commonly be called "bamboo pole fishing" which is one of the most widely accessible forms of fishing. Catching an *ulua* by the *ku'iku'i* method would be attractive to the most experienced fisherman. *Ku'iku'i* fishing is traditionally associated with the coastal cliffs (*kahakai pali*) of Kaho'olawe and thus might be particularly worth encouraging. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such angling from shore fishing techniques.

N. *No ka lawai'a wa'a me ka aho* Angling from Canoe

Sources Angling from canoe fishing methods are discussed by Kahaulelio (*Maraki* 7, 1902; 11; *Mei* 23, 1902:3); The Fornander source (1919: Vol. VI, Pt. 1:184-189); Newman (1970: 61-64, 73-76); Kamakau (1976:72-73); and Cobb (1902:421.)

Overview Major methods of angling from canoe included *lawai'a hī aku* fishing, using a *Malau* (bait carrier) in fishing for *aku,* Mahimahi hooking and Mahimahi Trolling, *A'ua'u* fishing, *Kākā* fishing, and *Kūkaula* fishing.

Lawai'a hī aku: *Aku* Fishing

Aku fishing could be performed by trolling *pā hī aku* lures behind a sailed or paddled canoe or by casting these same lures into a school attracted to bait tossed from the bait carrier (*malau*) of a more or less stationary canoe. Kahaulelio (*Maraki* 7, 1902; 11) points our how easy (*ma'alahi*) trolling was in windy places for the sail did the work but that in places where it was calm, the paddlers would lose their tempers with the work (*huhū maoli ka po'e hoe*). In trolling, "each canoe was paddled strongly in a different direction," but if a *malau* was used, "all stayed in one place" (Kamakau 1976:75). Kamakau (1976:71-72) notes how chiefs enjoyed the sport of *aku* fishing and that this fishing was often accompanied with displays of adornments such as *lei* and fine *malo*. Kamakau (*Ibid.*) maintains that in the old days, the fish were so numerous "they filled double canoes and boats in such numbers that most of them rotted" but that during the reign of Kamehameha III (1825-1854), "the *aku* and *'ahi* fishes disappeared" from many prime fishing grounds.

Malau: Bait Carrier Fishing for *Aku*

In addition to trolling for *aku*, the trolling lures were also used with the *malau* technique. The *malau* is described (Pukui and Elbert) as a "canoe bait carrier, some two or three fathoms long, with holes pierced in the sides and bottom to admit water, as used for bonito fishing." Pukui and Elbert appear to be describing a *malau* of the historic period constructed of boards. The precise configuration of a pre-contact *malau* is unknown (See Figure 10 for a hypothetical reconstruction). Kamakau (1976:72 -73) gives the best account of this technique:

> In this kind of fishing, a *malau*, made like a canoe, two or three *anana* long, more or less, with a closure in front and in back was used [to hold live bait]. It was a flat canoe (*he papa wa'a*) drilled with many holes on the sides, with a backbone (*kuamo'o ka'ele*) underneath. The bases of the front and back closures were lashed securely underneath the hull (*ka'ele*). There were sticks running on each side of the top edges of the closures to hold them rigid. Then matting (*'ahu*) was stitched to that and this side of the hull and wound over those sticks and stitched securely. This became a *malau*.
>
> The value of this "canoe" was that the *'iomo* [or *'iamo;* "to jump into water without causing a splash, same as *'iāo*], that is, *'iāo* fish [silversides, *Hepsetia insularum*], and mullet spawn could be liberated in there and they would live - because of the fresh sea water in it (*maloko o ka 'ahu*). The *'iomo* could be caught on one day and kept alive in the *malau* until the day of fishing even if they had been taken at a distant place. In the single canoes called *panipani* [a small outrigger canoe], the *'iāo* were kept in the canoes. A *panipani* canoe was manned by three or four - or perhaps five - men, and carried only one or two fishing poles, as did the *kāpili* [evidently a canoe with parts or superstructure lashed onto the hull piece] canoe.
>
> The *malau* was the bait tank for the six or seven poles of the double canoe, the *kaulua*.
>
> When the double canoe went out to fish for *aku*, the *malau* was put between the two canoes under the *pola* platform and tied securely to the *kua 'iako* [portion of boom]. The place where the *aku* would be was where the *noio* birds [Hawaiian noddy tern; *Anous tenuirostris melanogenys*] gathered above the *pīhā* [round herring; *Spratelloides delicatulus*], the *nehu pala* [yellowish anchovy, *Stolephorus purpureus*], and the other small fishes that leaped above the surface to escape the snapping of the *aku*. Then the noio would swoop down screeching over the fish. These birds were companions (*hoa aloha*) of the *aku* and the *kawakawa* - where these fishes went, the birds sought them out.

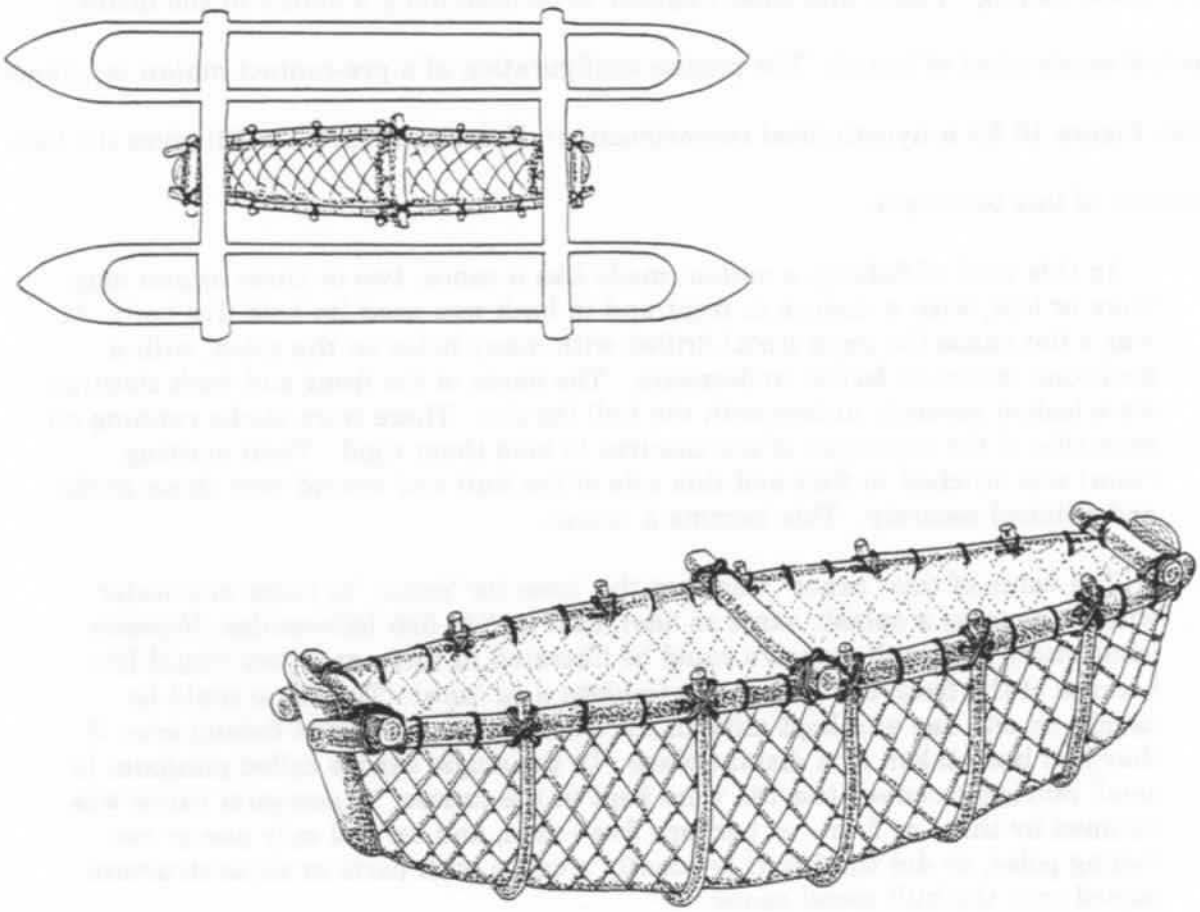


Figure 10 *Malau* or Bait Carrier. A Hypothetical Reconstruction of a Pre-contact *Malau* (Following Kamakau, 1976 and Kahaulelio, 1902).

When the head fisherman saw where the birds were gathered he called out to the paddlers in front "Stop the canoe, *kākona*!" The front paddlers stopped the canoe, then steered to turn the stern of the double canoe to the fish. Even if there were forty canoes, all stopped at the same time, and the fleet formed into a square or a circle or a rectangle - or lay scattered - according to the way the fish were grouped. Then the fisherman called, "Throw out the *'iāo*!" Two men jumped down [onto the *malau*], one to throw out *'iāo* and one to give *'iamo* to the fishermen. They stood on the *lā'au holo* of the *pa'imalau* [*malau canoes*] (*kū iho lāua ma na lā'au holo o ke pa'imalau*), and the one in charge of throwing out the *'iāo* tossed them about one by one. There would be a splash, and as the number of *'iao* increased there would be more and more splashing. The rushing of the aku was like billows being agitated, or surging waves breaking and the currents of water were set in motion as the paddlers wielded their paddles to hold the canoes in position. The *'iāo* jumped about behind the canoes; the *aku* and the *kawakawa* followed to snap at them, and got in back of the canoes. Then the lines of the bamboo fishing poles were cast.

The two fishermen at the very back of the canoe held out short poles; those standing behind them held out longer ones, and those at the *kua 'iako* laid their poles across the *pola*. When he saw them lined up the head fisherman called out, "throw out the *'iāo*!" The chummer scooped up a container full and poured out the contents. Then the head fisherman called, "The *'iamo*!" and the man in charge of the bait got it ready; he bit the noses of the fish and crammed them into his mouth or into a container. The fisherman reached out for one, thrust the point of his hook into the opening of the *'iāo* [*'iamo*] and out through the back of its head, leaving the tail to "skip along" (*kokololio*) the surface of the sea. The fisherman placed the pole between his thighs, held it with his left hand, and with his right hand shook (*kōpī*) the *'iamo* in the sea. When the fish took the bait and broke water, the fisherman stood up straight and grasped the pole with both hands. The fish came completely out of the water and slapped against the right side of the fisherman's chest, sounding like the dashing of one wave against another as its head smacked against the fisherman's armpit. He ran his right hand along its head and with a quick push with his open palm he freed the hook and shoved the *aku* forward into the canoe. From the *'iāo* in his mouth he rebaited his hook and cast again. If he used forty *'iāo* he would catch forty *aku*. Some fishermen caught fewer than others and some caught more - especially those at the very rear of the canoe. It took only a few minutes for the churning and the crowding around of the *aku* - then all was quiet again as the fish disappeared. Again the fishermen watched for a spot where the birds flew and dipped their wings into the water, , for that was where the fish were, and they followed them. This went on until the *'iāo* were gone; then the baitholder, *pa'imalau*, was lifted up onto the *pola* and turned over. This gave rise to the often-quoted saying, "*Huli ka malau*" - The *malau* is turned over [the operation is over].

Kahaulelio (*Maraki* 7, 1902; 6) also discusses *malau* and *malau* fishing at length.

He relates that the *malau* was 12 feet long (*'elua anana*), and then appears to state that the height and depth of the *malau* were both about 1 1/2 feet (*he ha'ilima ke ki'eki'e 1/2 o ka iwilei*). Some question remains about Kahaulelio's dimensions but he certainly didn't mean a heigth of six inches as Newman (1970:74) understood. Kahaulelio relates the *malau* had a floor of boards (*papa malalo*), and fine mats (*moena makali'i*) on the sides, and head boards (*po'o papa*) before and behind firmly tied together. He relates that in the afternoon of the day before fishing, the malau would be filled with *'iāo* fish. At three the next morning, the double canoe (*kaulua*) was prepared for fishing with the stocked *malau* fixed between the two hulls and sailed out to the *aku* grounds. Kahaulelio indicates that this fishing was very proprietary and that single canoes were not allowed to come close to the double canoes involved in *malau* fishing under risk of the single canoe having its fishing gear plundered (*hao*) for that was the custom of former times (*he kānāwai mau ia no na malau I ke au kahiko*). Kahaulelio points out that this custom was disregarded in the late nineteenth-century.

When the fish were dipped out, the fishermen on each side of the double canoe might catch *aku* in the hundreds. Kahaulelio mentions the custom of scooping out of the sea for subsequent reuse any remaining *'iāo* bait fish that had not been devoured and were clinging close to the canoe. Beckley (1883:9) makes it clear that the broadcast bait fish "immediately make for the shadow cast by the canoe as affording comparative shelter."

Both Kahaulelio (Maraki 7, 1902:6) and Beckley write about the use of live bait fish for *aku* fishing without the cumbersome *malau*. Kahaulelio emphasizes the keeping of the bait alive in a few inches of water in the hull of the single fishing canoe itself while Beckley (1883:9) relates, "these fish could be taken out in large gourds or tubs." While

Kamakau clearly indicates that *aku* were caught with baited hooks in *malau* fishing, Kahaulelio seems unclear about the pre-contact pattern (he is clear that in historic times they were caught with unbaited metal hooks). Beckley clearly understands that unbaited trolling lures were used in this stationary fishing with the broadcasting of bait fishes: "the mother of pearl hooks [she later makes it clear she is referring to trolling lures] are then thrown in the water without being baited and are mistaken for fish by the bonito, being on account of their shimmer and glisten like the *'iāo*."

Cobb (1902:421) indicates that the use of *pā* shell trolling hooks was "now quite rare" in 1901. Cobbs account of *aku* fishing parallels closely those of Kamakau and Kahaulelio, even to the detail of the fishermen pulling the *aku* into their armpits to facilitate hook removal and dropping them neatly into the hull of the canoe.

Pāhoe Fishing

Kahaulelio describes the *pāhoe* ("to paddle") method of *ulua* catching which is basically trolling behind a paddled canoe, but involves two innovations to attract these fish. This *pāhoe* method was practiced both inside and outside the reef (*maloko a mawaho ia o kuanalu*). He emphasizes the importance of paddling rhythmically (*e hoihoi ai me ke kāpapa*). This "*kāpapa ulua*" technique is defined (Pukui and Elbert) as "rhythmic tapping of canoe side with a paddle to drive *ulua*." The concept is probably to attract the curious *ulua* fish to the repetitious beat echoing through the canoe hull. The Fornander source (Vol. VI, Pt. 1:188-189) also discusses this *kāpapa ulua* technique and makes it clear that the *ulua* hears the noise and chases the canoe (*Lohe ka ulua, hahai I ka wa'a*). The other innovation, in Kahaulelio's account, is that the canoe trails behind a bolus of stinking vegetable food (*kōelo [kōwelo] 'ai me ka pula I mea e honi mai ai ka ulua I ka hauna*) which the *ulua* sniffs and is thereby attracted.

Mahimahi hooking and Mahimahi Trolling

Yet another distinctive trolling method was used to catch mahimahi (this appears to be the only Hawaiian fish name to enter the English language; *Coryphaena hippurus*). Kahaulelio (*Mei* 23, 1902:3) first describes how "mahimahi *lapa*" (male mahimahi) and "mahimahi *oma*" (mahimahi *wāhine*) were often caught in the course of *aku* fishing as they would come in on the broadcast *'iāo* bait. Mahimahi were frequently taken on *aku* fishing rigs of bamboo poles with *'iāo* baited hooks. Kahaulelio, however, indicates that mahimahi were usually taken at such times on long handlines ("*ke ka'au o ke aho*"; 240 ft. long?). *'Ōpelu* (mackerel scad; *Decapterus sanctae-helenae*) or pieces of *'ōpelu* fish (*'āpana o ka 'ōpelu*) are recommended for bait. When the mahimahi takes the bait, the fisherman is warned not to pull the fish in yet (*'a'ole e pono 'oe e wikiwiki mai I ka huki*) for the mahimahi is simply swishing the bait around in its mouth (*mūmū*). Furthermore, when the mahimahi starts to rush about like mad (*holo pupule*), the angler is told to allow the line to be pulled out for sixty feet (*'umi anana*) before the line is drawn in. Kahaulelio relates an interesting technique used when the mahimahi is brought to the side of the canoe but before the fish is boated. Holding the line close to the fish, the head of the mahimahi is spun around swiftly (*e ho'opōniuniu ae 'oe I ke po'o*) two or three times and then the tail is grabbed and the fish boated. This action will diminish the strength of the fish by making it dizzy and hence the fish is more easily boated.

In trolling for mahimahi, Kahaulelio recommends using the stomach (*ka 'ōpū*) of an *aku* for bait and compares the method to the *pāhoe* method of *ulua* trolling. In the trolling for mahimahi it is recommended that a small *wiliwili* wood floater, streamlined fore and aft, be tied to the line 30 ft. in front of the bait.

The Fornander account (Vol. VI, Part 1:184-185) calls the floater of *wiliwili* wood a

kōheoheo and asserts that the 30 ft. long line was baited with a live *mālolo* (flying fish) to catch mahimahi.

Kāpae Fishing

The Fornander source (Vol. VI, Pt. 1:184-185) gives *kāpae* as a method of fishing for *mālolo* (flying fish) with a line of approximately 162 ft. (*iwakālua-kūmāmahiku anana ka loa*) baited with lobster or flying fish meat. The tide and wind bear the floating line on the surface, whence perhaps the name arises (*kāpae* "Name of a trade wind at Hana Maui and Puna Hawai'i.") It is unclear whether the canoe is typically at rest or in motion during this fishing.

A'ua'u Fishing

Another distinctive form of trolling was carried out in *A'ua'u* fishing. Though Kahaulelio (*Mei* 23, 1902:3) writes: "We all understand the nature of this little fish, long and slim" ("*Ke maopopo ala no kākou I ke'ano o kēia wahi i'a, he lōihi pīlalahi wale no kahi kino*"), the identification of this *a'ua'u* fish remains somewhat cryptic. Titcomb (1952:67-69) explores the problems with the *a'u* fish nomenclature which seems to typically refer to "bill fish" (*Istiophoridae*), but occasionally seems to have been used by native speakers for the *'aha* (needle fish), *iheihe* (half-beaks) and even *kakū* (barracuda). Titcomb never refers to *a'ua'u* fish. Pukui and Elbert are of little help, identifying *a'ua'u* only as "small *a'u* fish." Kahaulelio relates that these fish could be caught in *hano* nets used for *mālolo* or flying fish, they could be hooked when they came in on the *'iāo* bait used in *aku* fishing, they could be smacked with paddles and captured, or they could be trolled for with a 12 ft. bamboo pole and an *olonā* lure. The lure was made of scraps of *olonā*, folded or bent in a tuft (*o ka hunahuna olonā. e pelupelu mai 'oe a pa'a*

I na huehuelo o ke olonā, a pupupu maika'i). With such a lure, a whole school of these fish could be taken. Kahaulelio notes that the Kiribati (Gilbert) Islanders ("*Tiripati*") at Lāhaina fished for *a'ua'u* with similar "flies" made of bits of rope like the *olonā* lures (*hunahuna ma'awe kaula e like nō me ke olonā*) and were very successful. It is unclear if the Kiribati fishermen learned the technique from the Hawaiians or the Hawaiians from the Kiribati people or whether it was independent invention.

Kākā Fishing

Kahaulelio (*Maraki* 7, 1902; pg. 6) maintains that there were two basic kinds of deep sea fishing (*'elua māhele 'ano nui*); *kākā* fishing (this can refer to several different types of fishing) and *kūkaula* fishing (Pukui and Elbert define this as "deep water fishing with hook and line; fishing grounds at about 80 fathoms depth"). Both the *kākā* and *kūkaula* methods used a weighted handline without a pole. The basis of Kahaulelio's conceptual dichotomy is unclear. Newman (1970:75) reasonably concludes:

> The primary distinction between the *kākā* and *kūkaula* techniques would seem to be the greater depth and the larger number of hooks attached to each line with the *kākā* technique. There is no mention by Kahaulelio of the use of coconut midrib spreaders [sic. "coconut sheaths (*kiu lolo niu*)"] for the *kūkaula* fishing, so this may be another difference, although it may have been merely an omission.

Kākā fishing, as Kahaulelio describes it, is a particularly deep water bottom fishing technique done from a drifting canoe. The line was 1200 ft. long (200 *anana*) and had from 40 to 50 hooks. The hooks were attached to short side lines about 3 ft. long (*iwilei paha*) and a section of coconut sheath was used to keep them in place (*kiu lolo niu*) at intervals so the hooks wouldn't tangle. The bait would be obtained at night and made fast to the hooks in advance. Before dawn the fishermen would sail to the *ko'a lawai'a* (fishing ground). They would send the baited rig to the bottom with a *pākā pōhaku* (sinker on a fish line for deep sea fishing). Kahaulelio indicates that the three fishermen

would stagger the dropping of their rigs, probably to increase success of attracting and hooking fish. Sometimes all the hooks were taken (*ua pau pono na makau a pau I ka 'ai ia e ka i'a*). He comments that sometimes fish would get off the hooks but float to the surface of the sea (as their swim bladders expanded from pressure drop) where they could be picked up. This *kākā* fishing allowed a fisherman to return with a full canoe while there was still daylight, in contrast to *kūkaula* fishing in which one returned after dark.

Another account of *kākā* fishing is recounted by H Waterhouse (1899: 104-106). The fishing was specifically for *'ula'ula* at a grounds located about two miles off the kona coast of Hawai'i. The rig is described as including:

> a lava stone about as large as a man's head, used as a sinker, The line itself was a 3/8" cord, not unlike a variety used in hammock netting; a little above the sinker and for a distance of about six feet, there ran out from the line little bamboo canes in a horizontal position, about a foot and a half in length, and from the ends of these canes dangled another piece of line to which was attached the baited hook.

The line was lowered to the bottom in nine hundred feet of water, the line was jerked releasing the drop stone, and the line was drawn six feet off the bottom. The *'ula'ula* bit quickly on the unspecified "special kind of fishmeat" bait. Waterhouse also relates fish getting off the line but floating to the surface with their "stomachs floated out of their mouth like an inflated toy balloon" so that they could be retrieved.

Kūkaula fishing

Kūkaula fishing involved a long line with a drop weight marked at intervals by the tying on of fibers from the heavy end or base of a coconut frond (*pulupulu, hāniu*). This was a handline, and when large fish were taken the line would cut (*moku*) the fingers. Kahaulelio (*Maraki* 7, 1902; pg. 6) indicates the line was from 480 ft. to 720 ft. (*'elua a 'akolu ka'au ka loihi*) long, but the fishing was done in waters 300 ft. to 480 ft. deep (*50*

a ke 60 a 70 anana ka hohonu...ina e 80 anana) and typically in the range of 300 ft. to 360 ft.. Part of the apparent discrepancy between the length of the line and the depth of the water fished may be explained by the strategy of slackening (*ua kapa 'ia I hō'alu ana he kō ī*) the line, called "*kō ī*", by releasing 42 ft. to 60 ft. more line to compensate for the current. Commenting on the Kahaulelio account, Newman (1970:75) notes "The hooks used were 'crescent shaped," called *mahina*, and were so designed that the fish hooked themselves without the fisherman having to set the hook, thus making them incurved (rotating hooks)." The Fornander source (Vol. VI, Pt. 1:188-189) notes that this kūkaula fishing was done at night. This deep water hook and line fishing was used to catch *'ula'ula* (several species of red snapper), *opakapaka* (several species of snapper), *ōholehole* (Titcomb, and Pukui and Elbert say this is the same as the common shore fish *āholehole*; *Kuhlia sandvicensis*), *hahanui* (no data), and *ukikiki* (refers to both *opakapaka* under 12 inches and young *'ula'ula*), but *kahala* (amberjack; *Seriola aurea-vittata*), *ulua* (large jacks various *Carangidae*) and *lehe* (resembles *ulua*; *Caranx chelio*?) were caught as well.

The innovation in this fishing was in the marking of the fishing line with coconut fibers to measure the amount of line let down (and hence the depth). The first mark was tied on at the 240 ft. mark (called the "*kānuku*" or "funnel") and then marks are tied on every 30 ft. with the marks named "*alo*" ('face" at 270 ft.), "*kua*" ("back" at 300 ft.), *kāmanamana* (meaning uncertain, at 330 ft.), *kai'aiki* ("the little fish"? at 360 ft.), *kua-o-kai'aiki* ("the back of the little fish"? at 390 ft.), and the last the *kāmoe* (meaning uncertain at 420 ft.). When the stone weight (*pōhaku pākā*) reached the desired depth, the line was jerked (*e 'ā'ili a'e*) and the stone was released (*hemo*). Presumably one function of the marked line was as a kind of bottom depth recorder but fishermen could also easily share information about the depth at which the fish were biting with such a

system.

'Ahi Fishing

The Fornander source (Vol. VI, Pt. 1:186-187) asserts that approximately 2400 feet of hand line (*ho'okahi lau anana*) was used in *'ahi* fishing. A nice, flat drop stone (*pōhaku maika'i pālahalaha*) was used to carry down the large hooks baited with *aku* or *'ōpelu*. When approximately 480 feet of line (*'elua ka'au anana*) had payed out, the line was jerked to release the stone. The additional line was held in reserve to fight the fish which was proverbial for the speed at which it would pull line. Kamakau (1976:76) graphically depicts this. "When taken by an *'ahi*...the line would rise and fall (*'ōle'ole'o*) in the gourd curving like the *ama* or the *'iako* of a canoe or the arch of the rainbow." Aweau (March 1995:4) suggests that the fish name *'ahi* may be cognate to the word for fire (*ahi*) in reference to the heat of friction on the sides of the gourd and canoe from the line generated by the pull of the fish. Pukui and Elbert relate that *'ahi* lines were marked with coconut husks to keep track of the line paid out with the first husk called "*nuku*" (beak) the second "*poli*" (bosom) and the third "*manamana*" (fingers).

Ke'a awai leia Fishing

Pukui and Elbert offer a definition of *Ke'a awai leia* as "Small stick with hooks at each end and line in the middle, as used for small fish." This appears to be what Kahaulelio is describing in his discussion of "*Ka Lawai'a palu*" or "bait fishing" (Aperila 18, 1902:6.). Kahaulelio is discussing hook and line fishing for the small *kole* surgeon fish (*Ctenochaetus strigosus*) when he says that the kind of hook used for *kole* (*ke 'ano makau no ho'i o ke kole*) was a thin bar or "stick" of lead between the hooks (*he wahi ke'a kēpau mawaena, a ma na po'o nā makau*). While the reference to lead makes it clear that the

form of this rig had been historically altered, it seems likely this rig was based on a precontact practice. It appears that the rig used the stick (*ke'a*) simply as a kind of spacer bar, at each end of which was a hook dependant on a short line. Kahaulelio asserts that when the tips of these hooks were smeared with a good *palu* or bait that in no time at all the bags were filled with *kole*.

Regarding the development of these techniques at Kaho'olawe

Reading the accounts of canoe angling techniques, one quickly feels the enthusiasm of the Hawaiian authors for these kinds of fishing techniques. These techniques have an advantage in that they typically involve minimal contact with the ocean floor which may recommend them in the ordinance strewn waters of Kaho'olawe. On the down side, these techniques may commonly involve a relatively high level of investment and skill. As they are done from canoe, it may be more difficult to conveniently and safely involve numbers of people in these fishing strategies. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such canoe angling techniques.

O. *'Ōkilohe'e*: Octopus Gazing Fishing

Sources *'Ōkilohe'e* (Octopus gazing) fishing is discussed by Kahaulelio (*Aperila* 18, 1902: pg. 3) Newman (1970:77); Fornander source (1919: Vol. VI, Pt. 1:180-181); and Kamakau (1976:69-70.)

Overview According to Kahaulelio this form of octopus fishing is much easier than fishing with a cowry shell lure (*"he nui ka hana 'oia, a he ma'alahi ka hana 'ana o kēia"*). A small stone is tied to a thin stick (*'āmana*), five inches long, which is tied to a

hook *(kākala makau)*. Several *nohu* (*Tribulus cistoides*) blossoms are tied to the stone (*he mau puanohu, nāki'i iho maluna o kahi pōhaku)* and act as a lure. This form of octopus fishing differs from *lūhe'e* fishing, it is usually conducted in shallow water (around six feet deep), the octopus are usually spotted *('ōkilo)* from the surface before they are angled for, and the octopus caught are said to be smaller. Kamakau relates a similar understanding, but states this method was used in water as deep as ten fathoms, notes that the sinker used was often "a small crude stone perhaps from an *imu*" (in contrast to the select and worked sinker stones used in *lūhe'e* fishing), and says that the blossoms were tied to the *'amana* stem rather than to the sinker as Kahaulelio indicates.

Regarding the development of these techniques at Kaho'olawe

This fishing method would seem to have limited applicability but might be well worth some attempt at minor revival as the lures could be easily replicated along pre-contact lines. Perhaps some ready substitute could be found for the *nohu* (*Tribulus cistoides*) blossoms or consideration could be given to planting *nohu* plants around *kahua kauhale*. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such *'ōkilohe'e* techniques.

P. *Lawai'a lū he'e* Fishing for Octopus

Sources Lawai'a lū he'e fishing for octopus is much described, including accounts by Kamakau (1976:67-69); Beckley (1883:3,4); Kahaulelio (*Aperila* 4, 1902; *Aperila* 18, 1902); Scobie (1949:64); Buck (1964:357-363); Newman (1970:64, 76-77); Fornander source (1919:Vol. VI, Pt. 1:180-181); and Goto 1986:156-157).

Overview Fishing for octopus by "shaking" (*lū*) a lure up and down. Typically this fishing involved a lure (Figure 11) constructed by the lashing of a stone sinker (*pōhaku*) to

a cowry shell (*leho*) with a thin stick (*'amana*) between them lashed to a hook (*kākalahe'e*). There were several variants including lures with one, two, or no cowry shells.

Kamakau (1976:67) is the poet of the *lūhe'e*. He waxes eloquent over the beauty of a fine cowry shell lure. He relates that particularly prized color patterns, such as the *leho ahi*, "red like the red of a fire brand", and the *leho kupa*, a deep dark red like that of "a shade-ripened mountain apple", "were desired and searched for as a beautiful woman is sought." Kamakau relates the allure of such a valued cowry shell for an octopus: "Just as a woman with lustful eyes (*maka leho*) entices many men, so a beautiful *leho* arouses the desire of the *he'e*." The imagery is explicitly sexual.

> The handsome stone was the "husband" to the cowry, and the cowry was "married" to the stone. When the two matched in beauty and they swayed in dance in the ocean, the *he'e* came to watch the joyful dance. Those of them who wished to kiss ("*honi*") the cowry, leaped to embrace and kiss her because they were aroused by the dance. (*Ibid.*)

While a number of sources (Beckley, 1883:3; Titcomb, 1978:342) say that the preferred species for cowry shell lures were the Hump-backed or Mauritius Cowry (*Cypraea mauritius*) and Tiger Cowry (*C. tigris*), of the perhaps thousand or so cowry shells modified for octopus lures the authors have seen in Hawaiian archaeological sites, the vast majority have been the Reticulated Cowry (*C. maculifera*) with *C. mauritiana* a distant second, and we have yet to see a single *C. tigris*. The complete cowry shell was used in the Hawaiian *lūhe'e* lure, and they were almost invariably perforated in the same way. Two holes were drilled, or more commonly punched, into the dorsal surface of the cowry shell along the medial line, one on each end, each about 3/4 of an inch from the natural indentations of the lip. Buck (1964:360) gives particulars of lashing:

> The fixation at the back hole is made in one of two ways. In the simplest and most general method, the end of the cord is pushed through from the inside of the shell and knotted on the outside with an overhand knot. The

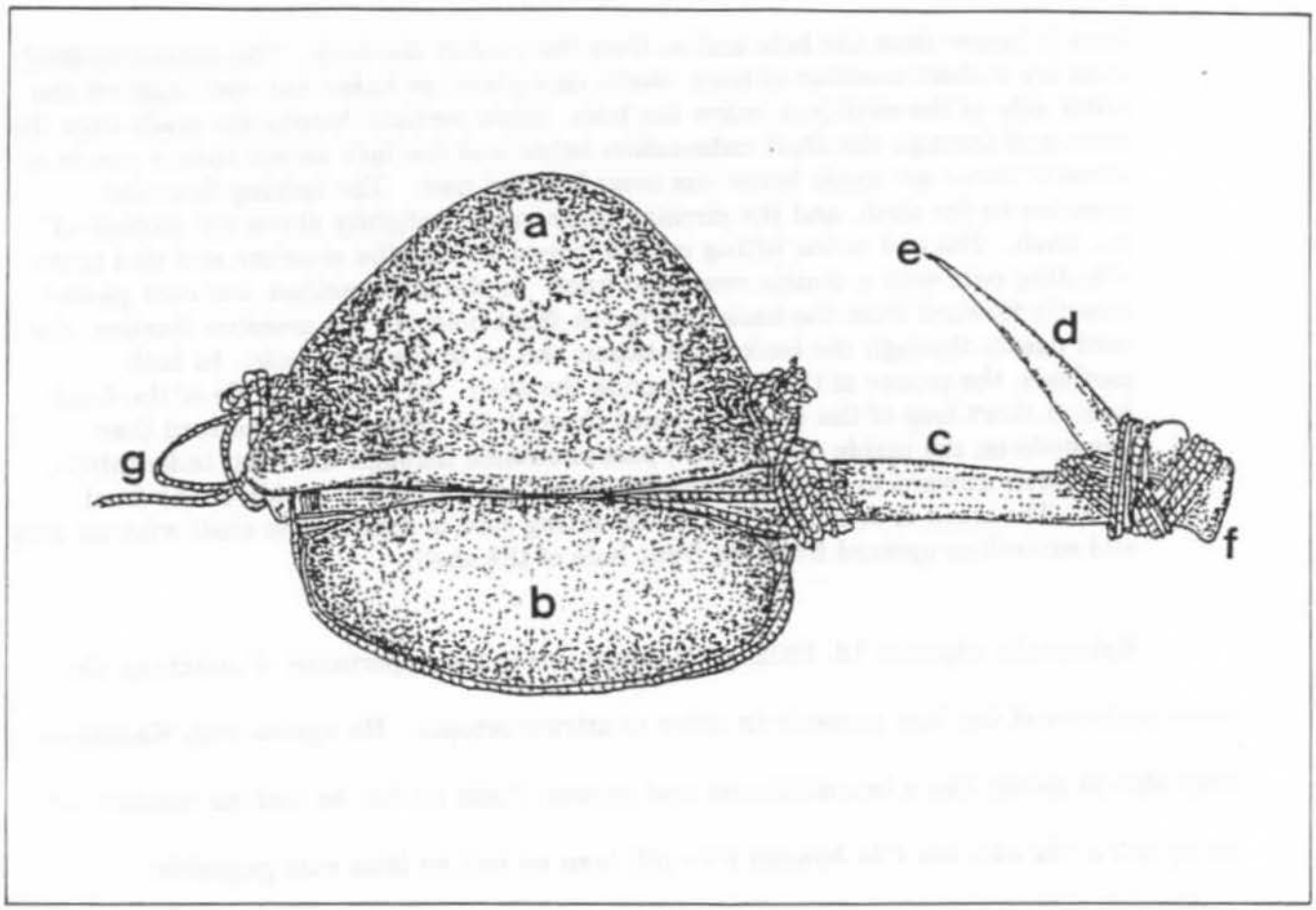


Figure 11 *Lū He'e* or Octopus Lure: a. *Leho* (Cowry), b. *Pōhaku* (Sinker Stone), c. *'Amana* (Wooden Stem or Shank), d. *Kākala* (Hook), e. *Maka* (Point), and f. *Puapua* (Tail End of Lure)

knot is larger than the hole and so fixes the cord at the back. The second method is to lay a short crossbar of bone *'ekaha* (sea plant) or *kukui*-nut shell against the outer side of the shell just below the hole. Some vertical rounds are made over the stick and through the shell indentation below and the hole above; then a couple of circular turns are made below the cross bar and tied. The lashing fixes the crossbar to the shell, and the circular turns raise it slightly above the surface of the shell. The end of the lifting cord is looped around the crossbar and tied to its standing part with a double overhand knot. In the knot method, the cord passes directly forward from the back hole to the front hole. In the crossbar fixation, the cord passes through the back indentation and on to the front hole. In both methods, the course of the cord is inside the shell. At the inner side of the front hole, a short loop of the cord is pushed through the front hole. The cord then descends on the inside of the shell, passes outside through the front indentation, and turns upward to pass through the short loop on the outer side of the front hole. The slack is drawn taut, and the lifting cord is fixed to the shell with its long end extending upward from the front hole of the shell.

Kahaulelio (*Aperila* 18, 1902; pg. 3) emphasizes the importance of matching the stone sinker and the lure properly in order to attract octopus. He agrees with Kamakau: they should match like a beautiful man and woman (*"pēlā nō ho'i ka wahine maika'i, a ia nō ho'i a 'ike aku 'oia I ke kanaka u'i e pili 'ana nō ho'i ka lāua mau pupuleho pēlā nō ho'i kēia"*). Great attention was given to preparing the cowry shell by toasting or baking it over a fire and licking it (*"he puhipuhi I ke ahi ka leho, alaila palu iho me ka wai o ke alelo"*). Baking the cowry shell for an hour over a smoky charcoal fire is recommended, caressing the cowry in the fire (*"I ka milika'a 'ana I ka leho I ke ahi"*). Kahaulelio recommends that the cowry toasting be accomplished by several fishermen sitting together and thinking together (*"a lōkahi ka mana'o"*) about the process of *lūhe'e* fishing. Beckley (1883:3) notes: "Cowries with suitable spots, but objectionable otherwise, are slightly steamed over a fire of sugar cane husks...giving them the desired hue."

The importance of the stones is attested to in the number of names for types that have been preserved. Malo (1951:19)) gives twenty-four distinctive names for stones (*pōhaku*) used for *lūhe'e* lures including: *hiena, ma-heu, hau, pa-pa, lae-koloa, lei-ole, ha-pou, kawau-pu'u, ma-ili, au, nani-nui, maki-ki, pa-pohaku, kaua-ula, wai-anuu-kole,*

hono-ke-a-a, *kupa-oa*, *polipoli*, *ho-one*, *no-hu*, *lu-au*, *wai-mano*, *hule-ia*, and *maka-wela*. Kamakau (1976:68) gives nine distinctive names for stones used for *luhe'e* lures including: *komana*, *pu'uku'ua*, *maili*, *polipoli*, *pupukea*, *kalapaiki*, *'iole*, *kaua'ula*, and the *'o'io*. Kahaulelio (*Aperila* 18, 1902; pg. 3) gives six names for types of stones used for *lūhe'e* lures including: *O-ahi, Ina, Hawae, Palaa, Ala, Pulewa*. The fact that only two names are shared in these three lists suggests a high degree of independent evolution in Hawaiian traditions of *lūhe'e* sinker stone typology and/or the penchant of fisherman to make up pet names for their beloved sinker stones.

Kahaulelio (*Aperila* 18, 1902; pg. 3) relates that the same name typology for the sinkers was applied to different cowry shells with the ideal being to match a cowry and a sinker stone of the same "type" (an *o-ahi* stone with an *o-ahi* shell and so forth). The account in Fornander (1919 : VI, pt. 1 pg. 180) emphasizes that "the octopus will not seize it [the lure] if the stone is not identical with the shell (*'a'ole e 'ai ka he'e ke like 'ole ka pōhaku me ka leho*)." The size, shape and pattern must be the same. While this may have been true in theory, it is notable that the cowry shells are longitudinally "grooved" on the flat, ventral side (the buccal cavity) with a smooth and convex dorsum while the stones are typically flat on the ventral side and longitudinally grooved on the convex dorsum.

Between the shell and the sinker, and projecting down two inches below them, is a six-inch long stick to which a hook called a "*kākalahe'e*" (*kākala* = "spur" or "spine") is made fast. Kamakau (1976:68) provides a detailed account:

> The *'amana* of the hook was a small wooden stem or shank about six inches in length. The back portion of the 'amana was shaped flat for three inches and at the very top it was notched to take a small cord. From the middle the 'amana was Y-shaped like the space between the fingers, and the tip end stretched out like a finger for three inches or a little more. The tip [distal end] was flattened on the upper surface and was notched underneath, and that is where the *kākala* "spur" was fastened. The spur was the hook, and was made of dog and human

> bone filed sharp. Its point, *maka*, faced inward toward the 'amana, and it was lashed on with fine cord. The stalk of a ti leaf - or perhaps the scale of a large uhu - was attached under the tip end of the 'amana, and the whole bound up tightly.

Amazingly, Kahaulelio writes of using a line 480 ft. ("*kanawalu anana*") long. The lure is let down to the bottom, and jerked as the canoe drifts to keep the lure moving ("*oni'oni*" = "move", "stir", "wiggle", "wag") along. Kamakau (1976:68) relates that the fisherman enticed the octopus "with a sort of hula." When the octopus seizes the lure and one feels the weight, the line is to be pulled taut and then jerked toward the side of the canoe, and then the octopus can be hauled up and dispatched. Kahaulelio does not emphasize biting the octopus to kill them but this is probably because the grand father from whom he learned this type of fishing was toothless ("*'a'ole...niho*").

Kamakau (1976:68-69) relates that skilled *lū he'e* fishermen would operate two lures simultaneously, one with their right hand and one with a foot as they sculled along with their left hand: "So it went with the fisherman pulling up one octopus after another ... as they did not cease to yearn for the cowries." Kamakau (1976:69) asserts that some lures were so efficacious that "when they were merely shown alongside a canoe, the *he'e* would just rise up and fill the canoe."

Regarding the development of these techniques at Kaho'olawe

This seems to be a particularly destinctive Hawaiian fishing method. This fishing method has limited applicability but might be well worth some attempt at minor revival as the *lūhe'e* lures could be replicated relatively easily along pre-contact lines. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such *lūhe'e* techniques.

Q. *Hīna'i*: Basket Fishing

Sources The major source on true basket fishing is Beckley (1883:4-6) and Cobb (1902:412-415). There are also brief discussions in the Fornander source (Vol. VI, Pt. 1:178-179) Newman (1970:52-53).

Overview One of the simplest forms of fishing was to drive the prey into a desirable location and harvest with an open basket. One such form of open basket fishing was the *hīna'i 'ōpae*. A logical extension of this form of fishing was to set a baited basket and then simply pick it up when fish had entered. It is unclear whether the *hīna'i ho'olu'ulu'u* designated an open basket or included some funnel feature (hence a true trap). Large open baskets on ropes like the *'uī'uī* could be used in deep water and functioned much like the vertical pull nets.

Referring to both basket fishing and trap fishing, Newman (1970:52) asserts that "relatively few basket traps were made." Cobb (1902:412) seems to agree, asserting that "the natives [Hawaiians] do not do much in this line [*hīna'i* fishing], the south sea islanders being the principal users of this form of apparatus [in Hawai'i circa 1900]."

***Hīna'i 'ōpae*: Shrimp Basket**

Beckley describes *hīna'i 'ōpae* ("shrimp basket" also called *'āpua 'ōpae* "shrimp trap") fishing in which an open basket made of *'ie'ie* aerial roots was used for mountain shrimping (Figure 12). Women would wade through the water in a crouching position, "moving small stones and thrusting sticks under the large ones to drive the shrimps [*'ōpae*] to a suitable place" where the basket would be placed under the shrimps and sifted out of the water. From such basket fishing a more sophisticated form was developed that was an intermediate step in the development of true fish traps.

Cobb provides more details discussing two ways *hīna'i 'ōpae* were used, in addition to Beckley's method.

Another freshwater method was:

> to take a fairly deep basket with a large mouth, and putting this in a favorable spot in the water, build a mud wall on both sides of it and extending out a short distance. The fisherwoman then goes a little ways upstream and by beating the water drives the *'ōpae* into the basket, which she removes and empties, going on to another place and repeating the operation.

The *hīna'i 'ōpae* was also used in salt water. As Cobb relates it:

> a basket is used with a wide flaring mouth, gradually sloping toward the center, a few inches from which it suddenly branches off into what looks like a long circular spout inclosed at the extreme end. These baskets vary in size and are usually operated by women. Holding the basket in the left hand they wade out in an almost nude condition to a suitable spot, when they sink down until only the head is visible, and pushing the right hand under the rocks, drive the *'ōpae* into the basket which is so manipulated as to partly envelop one side of the stone. The mouth of the basket is closed by drawing the sides together and holding them in this position. The *'ōpae* are then transferred to a gourd floating alongside...the women are expert and rarely fail to make good catches.

Hīna'i ho'olu'ulu'u Kahaulelio (Mei 16, 19023) discusses the *hīna'i ho'olu'ulu'u* as having a small "pointed beak" (*"nuku 'oi'oi iki"*) and hence as a true trap, but Beckley makes no mention of such a cone. The difference between a *hīna'i* basket with perhaps a small opening, and a *hīna'i* trap with a funnel feature may be largely a semantic difference, which did not exist in the Hawaiian language. Because of the difference in description of construction and use, Beckley's *hīna'i ho'olu'ulu'u* is treated as a "basket" and Kahaulelio's is treated as a trap.

***Hīna'i ho'olu'ulu'u*: Wrasse Basket**

Beckley (*Ibid.*) describes a form of *hīna'i ho'olu'ulu'u* ("to set a fish basket") fishing where baskets were used for *hīnālea* fishing: "A light framework of twigs is first tied together, and then the vines, leaves and all, are wound in and out, round and round

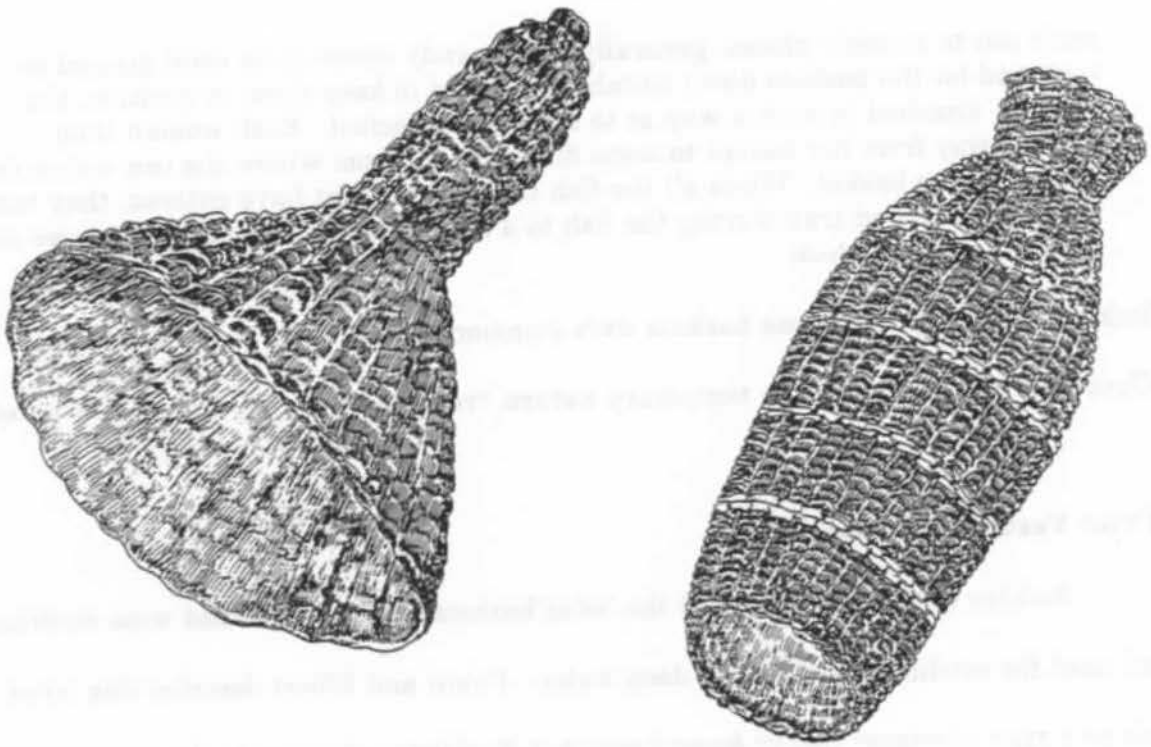


Figure 12 *Hīnaʻi*: Showing a Basket of the *Hīnaʻi ʻōpae* Type and Trap of the *Hīnaʻi hīnālea* Type.

till of the requisite size, three or four feet in circumference and about one and a half in depth." Beckley relates that bait (pounded shrimp) was sometimes encased in coconut fiber in the bottom of the basket but that the scent of the bruised and withering leaves was often sufficiently attractive to fish so that no further "bait" was required. The women (only women fished in this manner) then:

> wade out to suitable places, generally small sandy openings in coral ground or reef, and let the baskets down suitably weighted to keep them in position, the weights attached in such a way as to be easily detached. Each woman then moves away from her basket to some distance, but from where she can watch the fish enter the basket. When all the fish that are in sight have entered, they take the basket up and transferring the fish to a large small-mouthed gourd, move the basket to a fresh place.

Beckley points out that these baskets were commonly made from *'āwikiwiki* vines (*Canavalia sp.*) and were of a temporary nature, "renewed from day to day as wanted."

'Uī'uī: Vertical-Pull Baskets

Beckley (1883:6) relates that the *'uī'uī* baskets were shallow and wide mouthed and used for catching *'uī'uī* fish in deep water. Pukui and Elbert describe this *'uī'uī* fish as a type of trigger fish or *humuhumu* but Beckley's reference to the appearance of *'uī'uī* "at intervals" of many years much more closely describes the small file fish *Pervagor spilosoma,* called *'o'ili lepa* or *'o'ili 'uwi'uwi.* The manner of operation was much like that used with vertical-pull nets: "Two sticks bent over the mouth or opening from side to side, and at right angles to each other for a handle to which to tie the draw string [string to lower and pull up the basket]." These baskets were baited with half-roasted sweet potatoes and, in historic times, with cooked pumpkins and raw ripe papayas. An interesting feature of these baskets was the twisting of several wraps of *pōhuehue* vine (*Ipomoea pes-caprae*) with the leaves intact around the bent sticks above the basket which "throw a little shade in the basket to keep the fish from being drawn up

to the surface of the water"; *i.e.*, the vines decreased the propensity of the *ʻuīʻuī* fish to swim up over the edge of the open basket and thus escape as the basket was being drawn up. The vines probably had an attractant function as well.

Regarding the development of these techniques at Kahoʻolawe

This fishing method would seem to have limited applicability but might be well worth some attempt at minor revival. Construction materials would have to be brought from other islands. Success in basketry work has recently been achieved with "banana poka" and other exotic vines which might be more easily obtained than the traditional native species. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such *hīnaʻi* techniques.

R. *Hīnaʻi*: Trapping

Sources *Hīnaʻi* (meaning "basket" or "basket fish trap") is discussed by Kamakau (1976:79-85); Beckley (1883:6-7); Newman (1970:52-53); and Goto (1986:134-135).

Overview A variety of forms of basket traps (*hīnaʻi*) were used in both fresh and salt water. Small traps were commonly made out of braided *ʻieʻie* (*Freycinetia arborea*) aerial rootlets, *ʻinalua* vines (also called *pōniu*, *Cardiospermum halicabum*), *ʻiwikiwiki* vines (no data), or *hala* (pandanus). Larger traps were made with *lama* (*Diospyros sp.*) saplings tied with *ʻieʻie*. These basket traps were placed in suitable locations or "haunts" (*au*) described as "where there is a crevice so that the sea runs in and out" and were weighted down with pebbles. They were typically named after the target species for which they were intended (*hīnaʻi hīnālea* for *hīnālea* wrasses, etc.).

***Hīna'i hīnālea*: Wrasse Traps**

Kahaulelio and Kamakau both state that the *hīna'i hīnālea* were made of *'inalua* vines (also called *pōniu* and *hale-a-ka-i'a; Cardiospermum halicacabum)* in possible contrast to Beckley's *hīna'i hīnālea* "baskets" made of *'āwikiwiki* vines. Kahaulelio compares them to Japanese lanterns (*ka ipu kukui Kepanī li'ili'i*) in size with a small funnel on top (*nuku 'oi'oi iki maluna*). Kahaulelio recommends baiting the traps with *'elekuma* (*Xanthidae* sp.) crabs which he regards as much better bait than *'ohiki* crabs. In contrast to Beckley's "baskets", which were set in the shallows by wading, these traps were set in deeper water. These traps could be set by diving or could be lowered down on a line from a canoe, in which case a float of buoyant *wiliwili* wood would be tied to the end of the line at the surface. After a relatively short period the traps would be brought to the surface and the *hīnālea* secured.

Kamakau (1976:79-82) presents a *mo'o'ōlelo* (tradition) of the origin of the *hīna'i hīnālea* as having been created by the *mo'o* (reptile goddess) Kalamainu'u of Ka'ena, O'ahu, who thus became an *'aumakua* (guardian spirit) for trap fishing.

***Hīna'i puhi*: Eel traps**

Kamakau (1976:79) states that eel traps (*hīna'i puhi*) "were tightly woven and squat shaped and about as big around as two men could reach." Woven of *'ie*, these traps had two compartments, one or more tight funnels (*nuku*) and a hole on the side through which the eels could be poured (Kamakau, 1976:83). A flat rock was attached underneath and a lifting rope was attached to the trap and to a float. The traps were set at night in the *au*, or haunt, of the eels and left until morning.

***Hīna'i palani, hīna'i kala*: Surgeon Fish Traps**

Kamakau (1976:79) states that the *hīna'i palani* and the *hīna'i kala* "were big enough for two or three men to crouch inside." Kamakau (1976:83-84) emphasizes that the way to be successful trapping surgeon fishes was to feed them for several days in a row prior to the trapping. If the quarry were *palani* (*Acanthurus dussumieri* and probably several other species) surgeon fishes, the bait used would be broiled, half-cooked sweet potatoes strung on a cord and suspended on a weighted line beneath a buoy. After feeding the *palani* for four or five days in such manner, tooth marks on the sweet potatoes would show that *palani* were feeding, the fisherman then let down an *'api* or feeding basket as large as a bathtub and wide open at the top, weighted with some large stones and baited with a number of strings of sweet potatoes. Beckley (1883:7) states these feeding baskets (which she calls *'ie lawe* or "taking baskets") were "a large basket of the same kind [as the traps] without the inverted cylinder, and wider in the mouth, to allow the fish free ingress and egress." Evidently the *'api* was left suspended from a buoy at the feeding spot and each day the fisherman would rebait it with more sweet potatoes. He would then skip a day, presumably so the accustomed fish would become hungry, and then substituted a well-baited *hīna'i palani* trap for the *'api*. Many *palani* could thus be caught, and the *hīna'i* would be baited and lowered until no more *palani* entered it. There is little description of the *hīna'i palani* trap but it seems to have been shaped rather like a wash tub with a shallow cone in the top. Kamakau (1976:84) states that well made *hīna'i puhi* and *hīna'i palani* could last for years.

The *hīna'i kala* would appear to have been the largest of the *hīna'i* traps; Kamakau (1976:84) asserts that it could hold as many as sixty *kala* (*Naso* species surgeon fish which grow up to 2 ft. long). Beckley (1883:6-7) describes these (which she calls *'ie kala*) as "round, rather flat, baskets four to five feet in diameter by two and a half to

three in depth and about one and a half across the mouth." She notes "a small cylinder or cone of wicker is attached by the large end to the mouth and turned inwards towards the bottom of the basket." The *kala* were fed for several days with bundles of *Sargassum* sea weed (*limu kala*), ripe breadfruit, half-roasted sweet potatoes and historically with cooked pumpkin and papayas much as the *palani* were fed with sweet potatoes. As the *kala* became accustomed, the *'api* basket was baited with the seaweed. The making of the *hīna'i kala* was a major affair, taking two or three days and attended by strict *kapu* (the working men could not rejoin their wives and households and no shadow could fall on the trap or trap materials). The *hīna'i kala* was made of *lama* (native ebony, *Diospyros sp.*), warps and *'aukā* and *ninika* wefts (the meaning of these terms is uncertain) bound together with aerial roots of the *'ie'ie* for the twine.

Regarding the development of these techniques at Kaho'olawe

This fishing method could be spectacularly successful and would be well worth some attempt at revival. Construction materials would have to be brought from other islands. Success in basketry work has recently been achieved with "banana poka" and other exotic vines which might be more easily obtained than the traditional native species. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such *hīna'i* fish trap manufacturing techniques.

S. *Pā i'a a me Hā*: Weirs

Sources *Pā'ia* weirs of various constructions are discussed by Kahaulelio (*Iulai* 4, 1902; pg. 3); Cobb (1902:417); Stokes (1909:199-212); Kamakau (1976:88); Emory (1969:48); Sterling and Summers (1978:42-43); and Summers (1971:152). *Hā* weirs are discussed by Beckley (1883:8); Cobb (1902:419) and Titcomb (1972:124).

Overview The term weir is used here to designate a large permanent or semi-permanent structure used to trap or facilitate the capture of fish which would be constructed in some suitable shallow water location with stones and sometimes posts. Weirs were relatively rare in the Hawaiian islands according to the literature but many may have been modest structures and hence overlooked or have been confused with fish ponds.

***Pā i'a* Weir**

The simplest weirs were, as the Hawaiian name *"pā i'a"* suggests, simply "fish walls". Kahaulelio (*Iulai* 4, 1902; pg. 3) calls the associated form of fishing *"holoholo"* fishing (because the fish "run" after being frightened). Stones are arranged to form a triangular wall near shore. It appears that the shore commonly formed one side of the triangle. At the apex of the triangle a gap of about two feet in width was left open. As Kahaulelio describes it: *e 'au kolo mālie mai ai 'oe a hiki I ka waha o ua pā holoholo nei, alaila, me ka 'eleu kou hoa e ho'olei mai ai I kahi pōhaku. ke pahū nō, ua komo aku la ka 'anae iloko, ina 'elua, 'ekolu I ka wā ho'okahi.* One fisherman stealthily swims and crawls to the gap and places a rounded net across the opening. His partner then throws a stone or causes a commotion, sending the fish, typically two or three *'anae* (large mullet, *Mugil cephalus*), fleeing through the gap into the waiting net.

The most famous weirs were at Pu'uloa (Pearl Harbor) O'ahu (Stokes 1909:199-212;. Sterling and Summers 1978:42-43). Ka-pā-akule (or kapākule; located at "Hammer Point" on the west side of the entrance) was the most storied weir but there were at least three other weirs at Puleou (also called Po'okala, on the tip of the Waipi'o peninsula), Keanapua'a (just east, across the channel from Po'okala) and at Bishop's Point (on the east side of the harbor entrance). The generic form of these weirs is depicted in Figure 13. Three of these weirs were described by Stokes as follows:

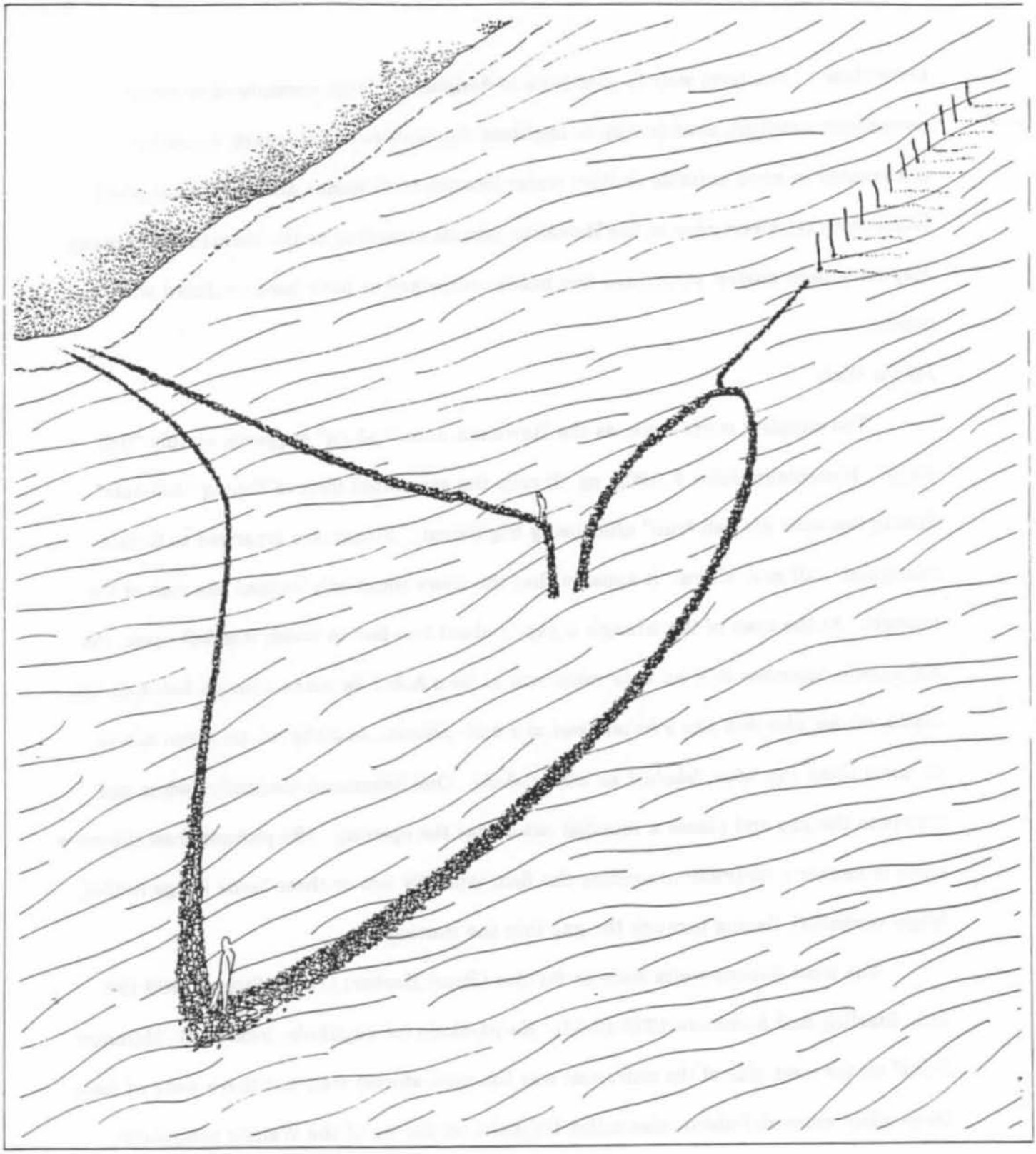


Figure 13 *Pā I'a* or Weir

> The general shape of the three fish traps is alike. A heavy curved wall following generally the direction of [parallel to] the shore was built in the deeper water, and, turning back for about one third of the distance, formed a pocket and acted as one side of the entrance. From the turn [of the pocket] another wall ran out to deep water as a leader. From the shore side of the entrance a wall was constructed, first parallel with and then directly to the shore, diminishing in size as the water shoaled. The rear end of the outer wall and the beach were joined by another wall. The walls varied in width from a single line of stones near the shore to from three to six feet in the deepest part, and were built of blocks of coral reef rock.

In the case of the Ka-pā-akule trap, a "fence" of *'ohia* wood posts, some up to 30 ft. high extended out from the deep water end of the leader to extend the "v" or funnel leading into the trap. As the water is relatively shallow and its seems unlikely the poles could have been driven far into the substrate, the indicated height of these posts initially seems extraordinary. The reason for the length of the poles was almost certainly so that they would cast longer shadows (which would appear to "move" more) so the shadows would be more successful in scaring fish into the weir. Writing about these weirs, Kamakau (1976:88) notes that after fish had been observed to enter these weirs, "a man ran out and placed a 'cut-off' seine net (*'ōmuku lau*) in the opening" which caught some fish while "those not caught in the net were attacked with sharp sticks and tossed out, or were seized by those who were strong."

Propitiation of the Hawaiian gods Kū and Hina appears to have been carried out in association with these weirs into the twentieth century. The principal fish caught in these weirs were *akule* (Big-eyed scad, *Selar crumenophthalmus*), *'ō'io* (bonefish, *Albula vulpes*), *weke* (goatfish, certain *Mullidae*) *pualu* (surgeon fish, *Acanthurus xanthopterus*), and *makiawa* (round herring, *Etrumeus micropus*).

Molokai had at least three weirs. Summers (1971:152) quotes Kawena Pukui that the half-acre off-shore construction at Honouliwai (East end, Molokai) "was used as a trap

rather than for storing fish." There was no *mākāhā* in the opening of the wall. When fish came around the eastern point of the bay they would go into the pond. A net was then let down over the opening, and the fish caught. The fish most often caught were the *weke*. Summers (1971:62-63) quotes John F. G. Stokes (field notebook, 1909) that there were weirs at Kaumanamana and Hikauhi gulches on the south shore of Molokai which he calls "*Pā hīnālea*". Summers suggests these *Pā hīnālea* are referred to obliquely in the legends of Paka'a and Kuapaka'a as the places where *hīnālea* fish could be readily acquired. The neighboring structure at Nanainaniku'eku'e with its eight outward lanes (Summers 1971:63-64) may also have been primarily a weir.

Emory (1969:48) asserts that the off-shore constructions at Waia'ōpae and Haua on Lāna'i were fish traps. Emory describes these weirs as follows:

> The one at Waia'ōpae is a low stone wall extending from the south side of a sandy point and running out onto the shallow mud flat. It follows the shore northward, two to three hundred feet out, and returns to the shore at a point 1,472 feet from where it left...The wall of the fish trap at Haua curves out from shore about 500 feet. The two ends are 1,480 feet apart on the shore. About 300 feet from each end of the wall is a break 12 feet wide on either side of which a wall extends at right angles out to sea for 20 feet, forming a lane in which the water is deeper

***Hā*: *'O'opu* Weir**

Passing reference may be made to another form of weir, the *hā*, which were "an ingenious method of catching *'o'opus*" (Beckley 1883:8). Beckley descibes them as "a platform of large logs placed side by side across our larger streams on the mountain slopes" used in conjunction with "a ditch leading out to a plain." A *hā* is thus a type of watercourse or trough-like fish trap or weir for catching *'o'opu* at times of freshets (Titcomb 1972:124).

Regarding the development of these techniques at Kaho'olawe

The *pā i'a* fishing method could be quite successful and might be worth some attempt at revival. *Pā i'a* would have the advantage of focusing fishing activities in a discrete, relatively safe area which might be cleared of ordinance. Such a modest construction might also improve adjacent canoe landings. Construction would be by volunteers with locally available stones. Culture specialists, archaeologists, and marine engineers should be consulted during site selection so as to avoid degradation of shoreline and archaeological sites. The major problem may be in obtaining the permits required by various government agencies for marine constructions. With widespread support the permitting process might be streamlined, but clearly this has been most complicated in the case of the reactivation of Molokai ponds and is not a trivial matter. The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of such *pā i'a* fish weirs. There would seem to be no direct application of the *hā* to fishing at Kaho'olawe.

T. *'Upena:* Production of Fish Nets

Sources: Netting manufacture is discussed by several authors but particularly by Beckley (1883:12-20); Stokes (1906:105-111, 152-162); and Buck (1957:289-312).

Overview As was the case with fishing lines, *olonā* (*Touchardia latifolia*) was the most desired fiber for the manufacture of fish nets. Stokes (1906:155) reports that *hau* (*Hibiscus tiliaceus*) fiber and *'ahu'awa* fiber (a sedge, *Cyperus javanicus*) were used for the rough turtle net (*'upena honu*) and that "*hau* bark was stripped from the tree and while fresh was roughly twisted into thick rope" for the shark net (*'upena manō*).

> netting is said to have been used to lie in the water, as a protection against sharks, a few feet outside an *olonā* net in which captured fish were awaiting landing. Fisherman declare that sharks dislike the roughness of an article manufactured of coir. Another fisherman stated that the Hawaiian nets were not of coir, and that the use of such material was due to the Gilbert Islanders...(*Ibid.*).

In the Bishop Museum collection is a *'upena ahuulu* (also called "*'upena uluulu*" by Pukui and Elbert; described as "a small hand net" according to Stokes) made of *wauke* (*Broussonetia papyrifera*) fiber. Stokes (*Ibid.*) suggests that in this case "it is probable that some cord prepared for *kōkō* (a carrying net) was substituted during a scarcity of *olonā*." Clearly the use of fibers other than *olonā* for fish nets was exceptional.

The production of fish line has been briefly described above. Kamakau (1976:117-118) provides the following data on net making culture and how the line was procured:

> The making of fish nets was an important craft of *ka po'e kahiko*. Mai'ai was the originator (*kanaka kahiko*) of net making, and from him came the *kapu* lineage of the net-maker; it was a *kapu* lineage inherited from the ancestors. The *kapu* protected the net maker from being pierced by his own shuttle. His eyes were upon the meshes he was netting, and no one might come near to his side [lest he be distracted].
>
> The first thing for a net maker to do was to barter for *olonā* fiber until he had a great deal of it. He would take pigs of an *anana* in length to an *olonā* scraping shed and receive "four thousand strands" of fiber (*mano olonā*). With dogs, loads of fish and food from his taro patches and fields, he would get enough *olonā*. If it were *olonā haku*, that is *olonā* that was prepared for the chiefs, then the people of the land sections - *ahupua'a*, *kalana*, *moku* - would prepare the *olonā* and braid it. But sufficient *olonā* cordage was obtained by a mere man only by patience. When finally he had enough to make the kind of net he wanted, his wife was the one who braided the cord for the net. She was repaid for her work with pigs, fish, *poi*, *pā'ū*, or whatever else she wanted (it is unclear whether commoner women might have received pigs prior to the overthrow of taboos in the *'ainoa* of 1819 and thus this may be a historic pattern).

In addition to the line, three tools were commonly used in the production of fish netting: the gauge or net spacer (*haha*, *haha kā 'upena*); the shuttle or needle (*hi'a*); and

the net mender (*kī'o'e*). Stokes (1906:107-11) gives a detailed discussion of these tools and how they were used from both ethnography and the Bishop Museum artifact collection:

> The gauge, *haha* is a short, thin, flat instrument of varying widths. In describing a net, the native put his fingers into the *maka* or mesh, and if the first finger filled the space, the mesh was *mākahi*; if three fingers were needed, then the mesh was *mākolu*, etc. For sizes between, the words *'oene* or *'oa* [also *'owā*] were added to the name of the smaller mesh. The following is a table prepared for the writer [Stokes] by a native fisherman, with the sizes approximated:

Table 2: Net Mesh Sizes

Nae	1/4 inch
Nukunukuā'ūla (also *Nukuā'ūla*)	1/2 inch
Mākahi	1 inch
Mākahi 'oene	1 1/2 inch
Mālua	2 inch
Mālua 'oa	2 1/2 inch
Mākolu	3 inch
Mākolu 'oa	3 1/2 inch
Māhā	4 inch
Mahae	4 inches and upwards
Mālewa	7 inches and upwards

> The shuttle, *hi'a*, is found in two distinct shapes. The more highly esteemed was...composed of a shaft with an eye at each end, the outer edge of which was cut away to admit the cord. The shank of this is round in cross section and diminishes toward the middle, making a more effective tool than that with the flattened or grooved shank, for the native implement allowing of a cylindrical winding could pass more cord through a given mesh. The natives were always very careful when filling their shuttles, passing the cord straight up and down along the shank, then winding on one side crossing the cord and repeating on the other, to attain the cylindrical form. The other form is the *kī'o'e*, better known as a net mender, is a round stick of wood about one-third of an inch in diameter and six inches long. The stick for about one-third of its length has been cut down, leaving a shoulder, and tapered to a blunt point. There are two specimens...in the Museum which are exceptional, having the butt only one-third the total length. To fill this style of needle, two half hitches were passed around the tapered end and a loop made around the fingers of the hand holding the tool (*Ibid.*).

The *haha kā 'upena* gauges were evidently commonly made of a variety of materials as the Bishop Museum collection includes turtle shell (seemingly particularly

popular), whale rib, human bone, bamboo, and *naio* (*Myoporum sandvicense*) wood specimens (as well as historic iron and brass examples). Presumably the whale bone became more commonly used in the historic period. The majority of the gauges in the Bishop Bishop Museum collection reported by Stokes had a width in the range of 0.8-1.2 inches (they are notably very thin) and thus this may have been a particularly common mesh size (notably quite small). The *hi'a* shuttles in the Bishop Museum collection are made of walrus tusk, whale rib, *Kauila* (*Alphitonia ponderosa*) wood, bamboo, *Naio* wood, and pine wood. *Kauila* and *naio* seem to have been particularly popular for *hi'a* shuttles. The walrus tusk used in one specimen must have been a historically introduced, and the use of whale rib again probably became more common in the nineteenth century. Stokes (1906:111) annotates the "pine" specimens as "not originally Hawaiian." All of the *kī'o'e* in the Bishop Museum collection are reported as "wood." Stokes (1906:108) notes that these tools were not used for particularly fine mesh or for particularly large mesh. For very fine nets, a piece of coconut midrib (*nī'au*) was used for the *kī'o'e*.

> In making the large-meshed, coarse nets for sharks or turtle, neither shuttle nor mesh stick was generally resorted to. The cord was wound over the hand and elbow for several turns, the hank thus formed doubled and wound with the rest of the cord until a pear-shaped ball was made. The cord could then be drawn from the inside through the point of the ball, which retained its shape until expended. The cord in this form took the place of a shuttle, while the spacing was roughly done by the hand.

Stokes (1906:152) gives details on the construction of netting used in fish nets keyed to a useful diagram (Figures 14 and 15):

> The method of beginning a net is interesting, and has been shown to the writer [Stokes] by fishermen on O'ahu and Molokai. The native, having filled his shuttle from the ball of twine without severing the line, takes another cord,...[Fig.] *aa*, the ends of which he ties together. Sitting on the ground with feet far apart, he inserts the first toes [of each foot] into the ring and stretches it tightly. The ball is passed under and over *aa* three times toward the right, and the friction on the cords is sufficient to keep the line *e* taut while closing the knots. Then the

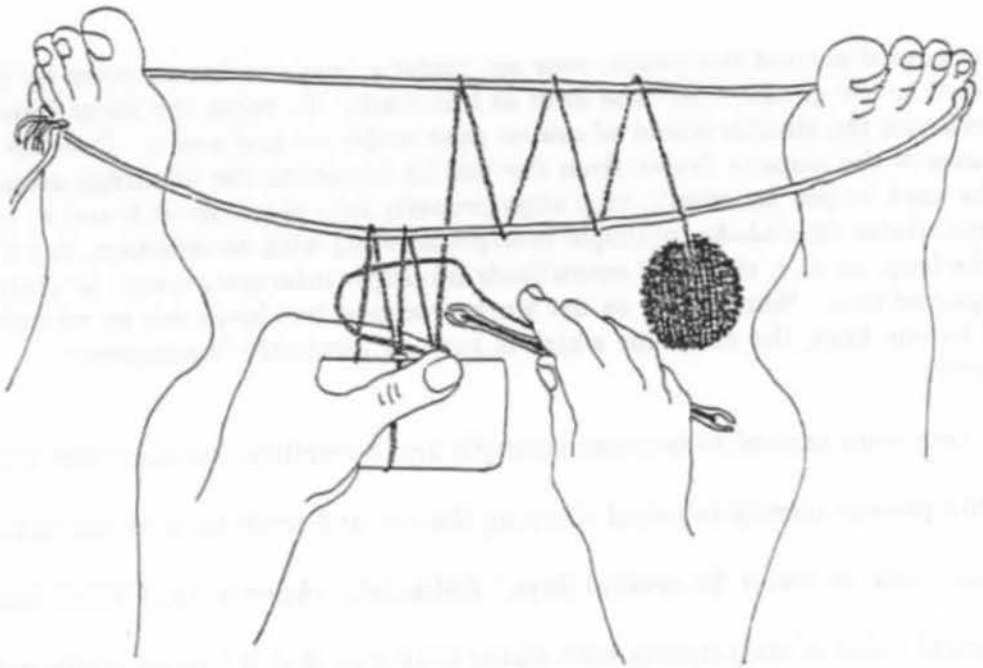


Figure 14 General View of Commencement of Net-Manufacturing Technique

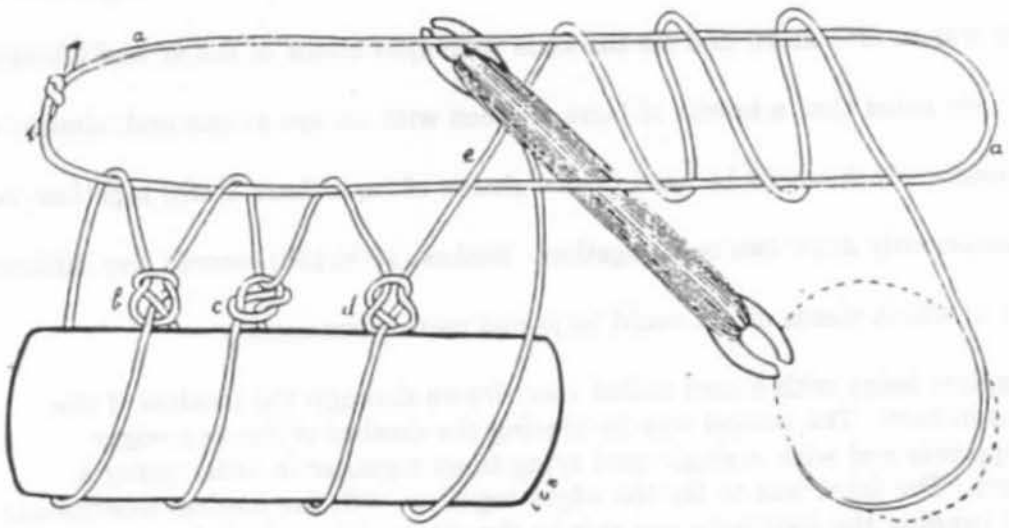


Figure 15 Commencement of a Net (from Stokes, 1906:153)

> shuttle is passed around the gauge, over *aa*, under *e*, and *e* is drawn down by the shuttle cord to the gauge where the knot at *b* is made. To begin the second and alternate knots the shuttle would of course pass under *aa* and over *e*. Cord for the continuance of the loops is drawn from the ball by loosening the windings around *aa*. When the knot (called *kā*, *'ūmi'i*, etc.) slips properly into place, as at *b* and *d*, the worker ejaculates *kāki'okohe* [multiple interpretations!] with satisfaction, but if it misses the loop, as at *c*, the word *omau'ōkole* [multiple interpretations!] is uttered with disgusted tone. Sometimes, as the work proceeds, two loops are by mistake enclosed by one knot, the name for which is *mau'a'e* [probably "transgress", "interrupt"].

Many nets were tanned to increase strength and durability. Stokes (1906:156) states that "the process merely required steeping the net and fresh bark of the *kukui* (*Aleurites moluccana*) in water for several days." Kahaulelio (Aperila 18, 1902:3) indicates that the principal value of such dyeing with *kukui* bark was that it turned white nets brown, which was less likely to frighten the fish.

Stokes (1906:156) notes that fish nets were frequently composed of two or more pieces of net which could be fastened together in a temporary manner or with greater permanence. Stokes (1906:108) cites "native fishermen" as telling him "the quickest and simplest way was to dive down and tie the ends with split stems of the *kī* leaf [*Cordyline terminalis*]." He notes that a needle of bone or wood with an eye at one end, similar to the kind of needle which would be used to sew sheets of *kapa* (bark cloth) together, could be used to temporarily draw two nets together. Stokes (1906:156) records five different specific ways in which pieces of net could be joined more permanently:

> ...the simplest being with a cord called *'aea*, drawn through the meshes of the two edges in turn. The second was by placing the meshes of the two edges exactly opposite and with a single cord tying them together in order using a single knot. The third was to lay the edges together with the meshes alternating and then running the cord from one side to the other with a single knot at every mesh; this at first glance has the appearance of continuous netting. The fourth method of joining was to net on one edge and run the shuttle in turn through the loops of the other edge. The fifth was by joining the two edges by the usual form of netting.

Stokes (*Ibid.*) notes that frequently old nets were "recycled", either by being cut down from larger nets or by being used as patches in other nets.

Larger nets typically had a top line (*'alihi pīkoi*) to which wood floats were attached and a bottom line (*'alihi pōhaku*) to which stones were attached as sinkers threaded through the marginal meshes of the upper and lower edges of the net. The preferred wood for net floats (*pīkoi*) was *hau*, and *kukui* wood seems to have been a second choice. Curiously, "*Wiliwili* (*Erythrina sandwicensis*), the lightest wood in the islands, was not considered sufficiently durable. (*Ibid.*)" but the floats of some Bishop Museum nets are recorded as being made of it (Buck, 1957:297). Buck (*Ibid.*) notes that "net floats may be classed in three forms: cylindrical, D-shaped and wedge shaped." In the cylindrical form, a branch about 2.7 inches in diameter was typically chopped into sections about 4 inches long and the soft central pith canal reamed out. A binding cord could then be passed through the float and attached to the *'alihi pīkoi*. The D-shaped version was obtained by splitting the branch lengthwise in two like a rail and cutting it into pieces 4.7 inches long, 3 inches wide and slightly over an inch thick. Two holes would be drilled or punched through the soft wood on opposite ends of a long side to facilitate tying to the *'alihi pīkoi*. The wedge shaped version was obtained by cutting larger diameter branches into segments, then splitting these segments into narrow radial wedges, and then piercing two holes at opposite ends of the narrow apex of the wedge. The wedge shaped floats could then be lashed in the manner of the D-shaped floats. It is uncertain whether all three of these float forms were in pre-contact use. Stokes (1906:156) questions whether the cylindrical form of *pīkoi* was used in ancient times, but Buck (1957:297) notes that this form is/was "common in the Polynesian Islands." Doubtlessly the availability of metal made routing out the pith canal of the cylindrical

form far easier. Anyone who has ever tried using "traditional" *pīkoi* has probably been impressed with how very little buoyancy (and how much water-logged weight!) such a float provides in comparison to commercially available types.

Traditional *'alihi pōhaku* or sinker lines receive relatively little attention in the literature. Beckley (1883:12) relates that "small pebbles frequently ringed or pierced are used for sinkers" and Buck (1957:342-343) posits that elliptical sinkers, particularly in a range of 1 to six ounces, with transverse grooves (as opposed to longitudinal) were associated with fish nets. The breadloaf-shaped type of sinker is often popularly associated with nets but as Buck points out the only Bishop Museum associations are with the highly specialized dip nets (*'upena uhu*) and he concludes (1957:345) "the grooved under surface of the bread loaf sinkers could well be fitted to the bottom rope of some nets, but I have no evidence they were so used." It seems probable that a common practice was to use locally available stones on a temporary basis to weight the *'alihi pōhaku* or bottom line of nets by heavily weighting the ends and/or placing the stones on the lower portion of the net.

Given the strong currents and surge that characterize the inshore environment in the Hawaiian islands and the relatively high water resistance of small-eyed natural fiber nets, the relative lack of buoyancy of traditional *pīkoi,* and relative lack of negative buoyancy of posited net *pōhaku* it is amazing that Hawaiian nets didn't just keel over and drift downstream. The efficacy of these nets is a tribute to the Hawaiians detailed knowledge of local conditions and fish patterns, and spirit of working in unity.

Regarding the development of these techniques at Kaho'olawe

Net manufacture and repair have the advantage of being relatively simple to learn

and are amenable to the efforts of groups of any size. Some large mesh nets might be made of *hau* or coconut coir but *olonā* might be reserved for purposes where strength was more of a factor (as in fishhook and lure snoods). It would be worth considering the use of cotton or other available natural fiber lines for the manufacture of fishing nets. The fish and game laws of the State of Hawai'i specify a minimum mesh size for nets which is probably a good guideline to follow for conservation purposes.

U. *'Upena*: Types of Fishnet Fishing

Sources: Types of nets and methods of netting are discussed by Campbell (1967:141-143); Kamakau (1976:60-67); Malo; Fornander (1919:176-191); Beckley (1883:12-20); Cobb; Stokes (1906:105-111, 152-162); Buck (1957:289-312); Newman (1970:53-60,66-73,78); and Goto (135-142).

Overview Nets were a subject of great cultural elaboration and were of almost infinite variation. Nets may be thought of as following into a few basic types, here referred to as scoop nets (including one handled and two handled variations), dip nets, gill nets seines and methods using nets in coordination with long lines with *ti* leaves attached (*lau* fishing).

***'Upena kā'e'e* (Also *'Upena kāhe'e*, *'Upena pao'o*, *'Upena 'Iāo*: Hand Held Scoop Nets**

Hand held scoop nets receive relatively little attention in the literature. They could be used for scooping up small fish and other sea life in the shallows or could be used to scoop up fish which had been surrounded by a larger net. There were two major forms

of the frames of hand held scoop nets. One relatively small form consisted of a tear-drop-shaped frame, typically made out of a single piece of pliable wood, but it could be made out of two or more pieces of wood or vines lashed together. The other major form consisted of a frame of two straight sticks lashed together at their ends at an angle.

Buck (1957:299-302) describes three specimens of the tear-drop form in the Bishop Museum collection which range from about 18 inches to 32 inches in length and from 12 inches to 17 inches at their greatest width. It was evidently a common practice to lash a short cross bar or brace near the apex of the frame for greater structural soundness and to improve on the handle. The mesh was typically 0.5 inches or less and lashed to the frame with a spiraling line. Scoop nets used for scooping up fishes held in a surround net were typically quite shallow (7 inch deep) while scoop nets used for catching fishes in the shallows were typically deeper (10 inches to 21 inches). These nets used to catch free fishes were often named after target species such as *'upena 'iāo* and *'upena pao'o*. They were often used by women and often were used at night.

In the Fornander account (Vol. VI Pt.1:176-177) is a discussion of a large hoop net made of *alahe'e* wood, twelve feet in circumference used in "*holoholo*" fishing. This account is similar to the Kahaulelio account of *holoholo* fishing except that instead of placing it in the opening of manmade weirs, the Fornander account describes its use in natural openings leading out of pools or rock basins where the sea ebbs quickly (*O kahi e mio ana ke kai o ke kāheka*). As in Kahaulelio's account of fishing at a weir, this *holoholo* fishing was a two person job, with one person holding the net and the other driving the fish by splashing with his feet (*ke kāpeku I ka i'a*).

The scoop nets with a frame of two straight sticks lashed together at an apex were much larger. The two sticks held the net open, especially when the net was being

propelled forward by a wader and the water pressure held the sticks apart. The large mouth of such a net was good for skimming just under the surface or along a sandy bottom but was not good for catching fish darting amongst the rocks.

Such nets were also used by divers. Kahaulelio (Mei 2, 1902:4) discusses the use of such nets in the fishing for *kūmū* (Purplish goat fish, *Parupeneus porphyreus*) and *'āhuluhulu* (young *kūmū*) at depths of twelve to twenty four feet. The net Kahaulelio describes had support sticks of *'ūlei* wood, one of perhaps three feet in length (*he iwilei*) and the other perhaps seven and a half feet long (*he iwilei a muku*) and a net suspended between them of about 1 1/2" mesh (*mākahi 'owā*). Kahauleilio acknowledges that it was a lopsided looking net (*he 'ano kapakahi ke 'ano o kahi 'upena*) and compares its appearance to that of the crescent moon on the "Nights of Kū" (*nā Kū 'ekolu.*) In the early morning, after spotting a likely sea cavern (*uluulu*) from the surface, a diver would descend with this net in his left hand and a *pula* fish driver in his right, enter the cavern until only his feet were visible, and chase the *kūmū* into the net.

'*Upena uluulu* (also reported as *'upena ulūlu, ulu'ulu,* and *ahu'ulu*): Two Handled Scoop Nets

Fornander (1919:178-179) describes these nets as consisting of two sticks, each a yard long, with a yard-wide net suspended between them (Figure 16). Beckley (1883:15) describes the net similarly as: "a small bag of two inch-mesh, about two and a half feet across the opening or mouth of the bag and the same in depth. Two sticks are attached on each side of the opening leaving a space of half a foot in width between them."

Buck (1957:302) describes two Bishop Museum specimens in which the poles are 44 inches long and quite thin (0.2-0.4 inches in diameter) and extend beyond the netting so

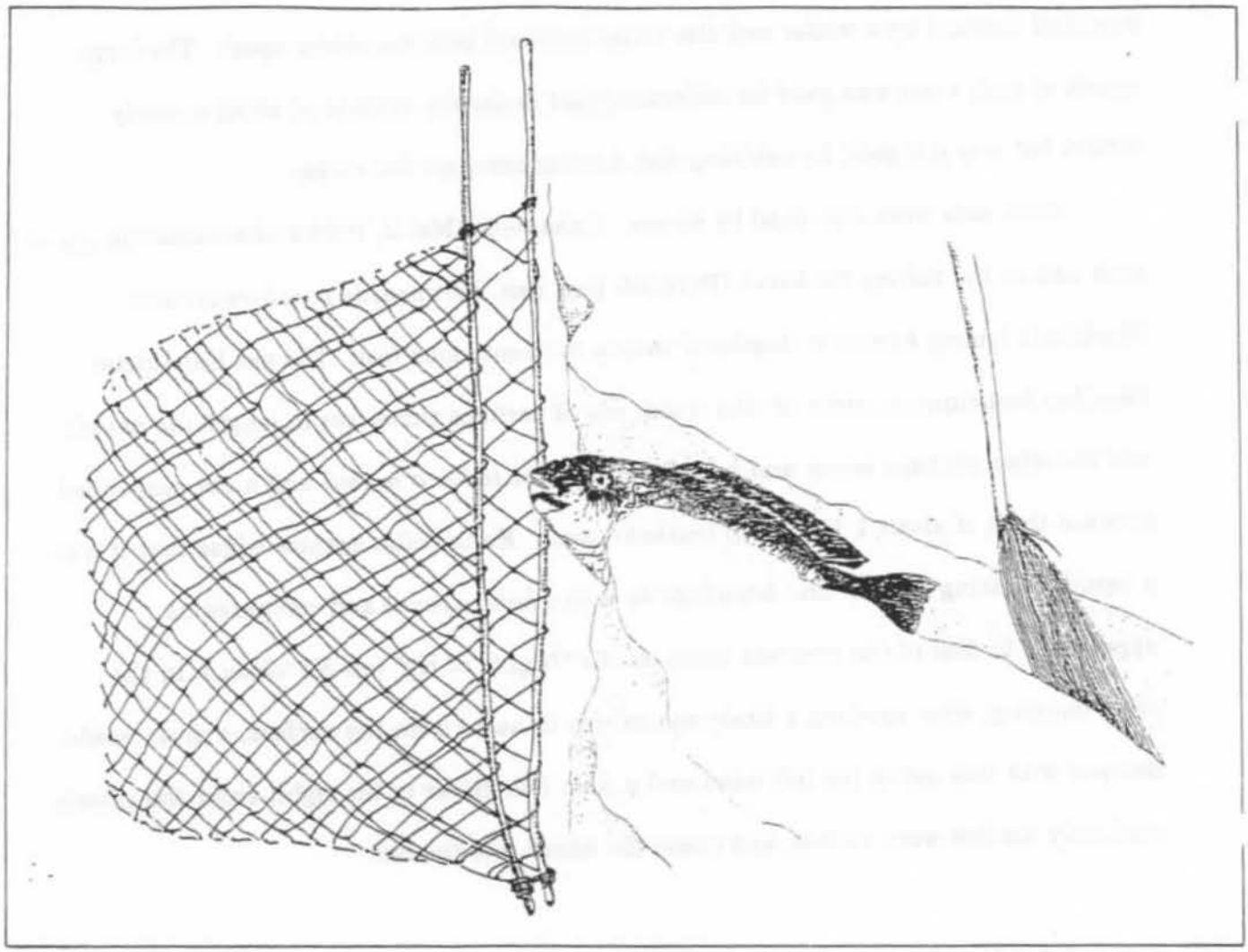


Figure 16 *'Upena uluulu* (or Two-handled Scoop Net) Typically Used by Divers

as to form handles. The netting of the two specimens had finished lengths of 34 inches and 44 inches and had 12 inches and 16 inches finished depths with meshes of 1.25 and 0.75 inches. In both cases the *'upena uluulu* was made of netting that had been doubled over. In both cases the sides are sewn up to form a long narrow bag and, rather amazingly, the maximum width of the openings of both of these nets is 2.5 inches!

According to Fornander the *'upena uluulu* was used by two men, one holding the net and the other prodding fish with a stick or "broom" (*pula*) out of their holes and into the net. The Fornander account suggests this net is used exclusively in diving and the notes to Malo (1951:213) state that with the *'upena uluulu* "the fisherman dived deep down under water." Beckley (1883:15) somewhat contradicts Fornander stating:

> This net is managed by one person only who dives to the small caves and holes in the bottom of the sea, which are always well known to the local fishermen, and placing his net across the opening of the cave or hole, mouth inwards, He then inserts a slender rod, with a tuft of grass at the end, called a pula into the hole, and gently drives the fish which may be in there into the open mouth of his net, which, by joining the two sticks together he closes. Then placing his driving stick over the closed mouth as a further preventative, he rises to the surface and emptying his bag into the canoe, goes to another cave or fish hole where he repeats the operation.

It may be noted how similar in form the *'upena uluulu* is to the small two-handled seine nets used in much of the world but how different in function it is. The small two-handled seines, which do not appear to be known in early contact times, are held with the sticks as wide apart as possible (either vertically to skim over the bottom or diagonally to skim just under the surface). The Hawaiian net, with its very narrow aperture, is very specialized. Fornander (1919:178) relates that the fish to be caught by the *'upena uluulu* are the *kumu*, the *uhu* and such fishes.

'Upena papa'i, 'Upena 'aki'iki'i, 'Upena uhu: Vertical-Pull Dip Nets

Buck (1957:304) uses the English "Dip Net" to refer to a class of nets suspended from, and tied to the ends of a framework of two crossed and arched sticks. The difference between a dip net and a bag net may be largely semantic but bag nets tend to be bigger, have a deeper "bag" - typically 6 ft. or more in depth, and may be kept open by a framework of sticks around the perimeter of the mouth rather than by the arched sticks of the dip net. The vertical-pull nets seem to have gone under a variety of names associated with specific forms and functions including: *'upena papa'i*, *'upena 'aki'iki'i*, and *'upena uhu*.

'Upena uhu

Beckley (1883:15) describes the *'upena uhu* (Figure 17) as

> ...a square of two or three inch mesh, which has been slightly gathered on the ropes and attached on the four corners to slender strong sticks tied together at the middle in such a way that they will cross each other at the middle and can be closed together when wanted. When crossed they spread the net open in the form of a shallow bag, a string is tied to the crossing of the two sticks and the net is then ready for operations.

Beckley (1883:15) relates that the *'upena uhu* was typically used in conjunction with a technique called *ho'ohaehae* (to decoy *uhu* fish by tying an *uhu* to a line). In this technique, a previously caught *uhu* fish is dropped with a string attached and is used to lure other *uhu* fish. The decoy is gently drawn into the net, followed by more *uhu*, and then the *'upena uhu* is pulled up swiftly. Beckley (1883:16) relates that "by a peculiar twitch and pull on the string the sticks can be made to swing around and lie parallel, thus effectively closing the net."

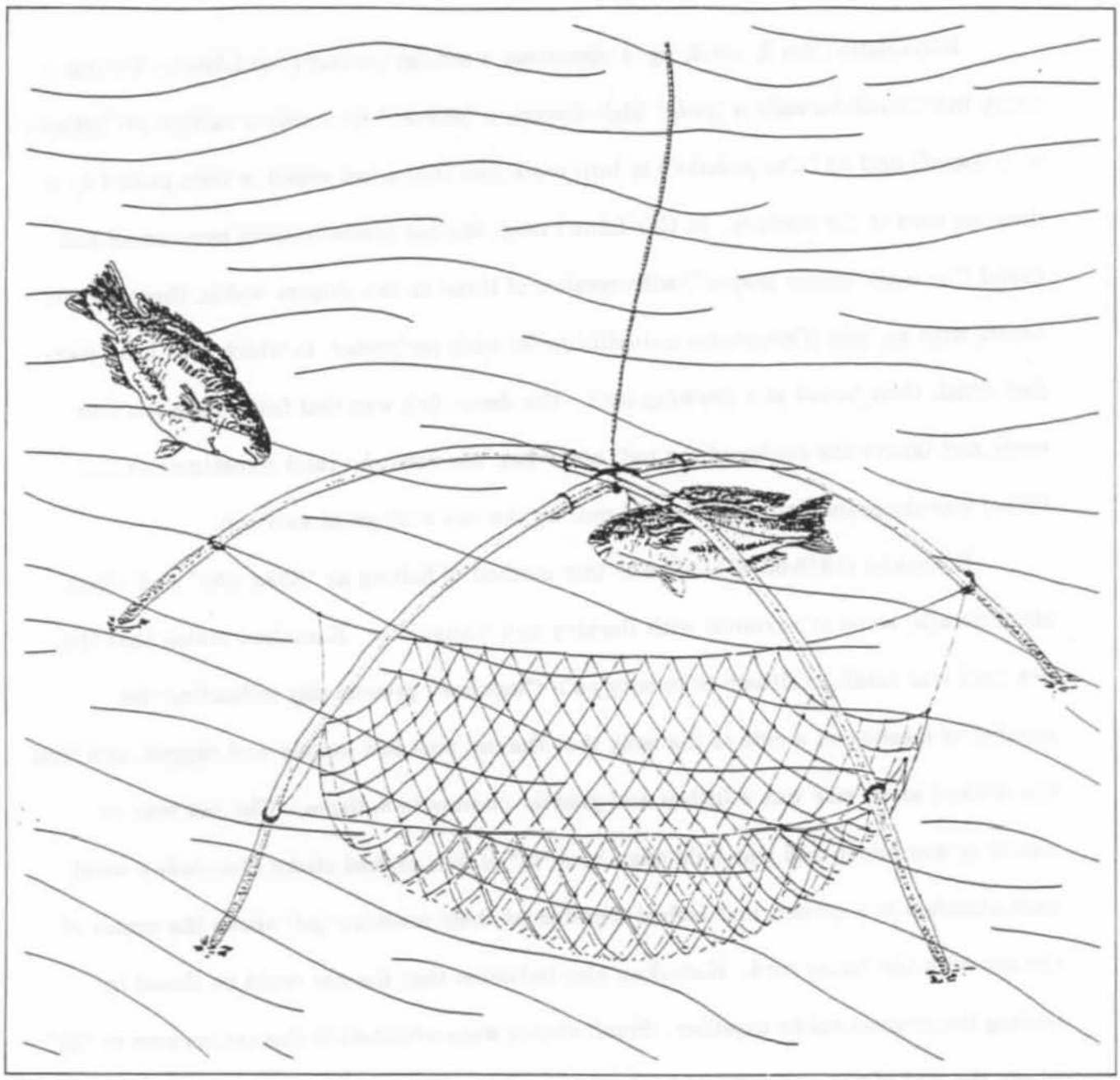


Figure 17 *'Upena uhu* or Dip Net

Kahaulelio (Mei 2, 1902; pg. 4) describes a similar strategy, on Lāna'i, of using a decoy fish (which he calls a "*pula*" [fish driver], a "*pakahi*" [probably a variant on "*pākali*" = "a decoy"] and an "*uhu pakahi*") to lure more *uhu* into a net which is then pulled by a drawing cord to the surface. In this Lāna'i case, the net seems to have been small and round ("*he wahi 'upena poepoe*"),with meshes of three or two fingers width, three feet in depth, with an *'ūlei* (*Osteomeles anthyllidifolia*) stick perimeter, to which four lines were tied which then joined at a drawing cord. The decoy fish was tied fast where the four cords met (above the center of the net) and when the new *uhu* (and sometimes two or three) was close, the fisherman would pull up the net with great exertion.

Kamakau (1976:65-67) refers to this method of fishing as "*Kākā uhu*" and offers other details, some at variance with Beckley and Kahaulelio. Kamakau states that the net used was small, of fifteen to twenty *pu'u* ("meshes"; presumably indicating the number of meshes on a side of the net), that the net was tied loosely and sagged, and that the favored mesh size was 4 inches and greater (*mahae* to *mālewa*). The net was an *anana* or more deep and was held open by a "*lā*" of four arched sticks of *walahe'e* wood, each attached to a corner, and lashed together at their juncture (*pū*) above the center of the net with the *hānai* cord. Kamakau also indicates that the net could be closed by pulling the crossed sticks together. Small stones were attached to the net corners or "*hē*" where the tips of the *walahe'e* sticks were lashed with cords.

Kamakau emphasizes the decoy *uhu* had to be in good condition (no loose scales, no mucus flowing from the eyes, no ripped gills) and notes that the decoy was tied to a line through its gill. Newman (1970:57) specifically states that the decoy *uhu* "was tied through the mouth and one gill opening to a line." Kamakau indicates a common practice was to use the decoy fish without a net at first. He relates that the fisherman waited

until he saw the "visitor *uhu*" (*uhu malihini*) "'kiss' (*honi*) the decoy *uhu* two or three times with the desire to 'marry' it (*a ho'ao lāua*)" before he pulled the decoy up and attached it securely to the net. Then the net was again lowered and when the visitor *uhu* tried to "sleep with" the decoy (*moe pū*), the net would be pulled up and the visitor *uhu* caught.

***Luelue, Pōuouo 'Upena 'ōpelu ('Upena 'a'ai 'ōpelu)*: Vertical-Pull Bag Nets**

Bag nets tend to be bigger than "dip nets", have a deeper "bag"-typically 6 ft. or more in depth, and are more commonly kept open by a framework of sticks around the perimeter of the mouth rather than by the arched sticks of the dip net. Vertical-pull bag nets went by a variety of names associated with particular configurations and functions.

Luelue

One "vertical-pull" net was called "*luelue.*" Pukui and Elbert (1986:214) define it as a "bag net with meshes the width of a finger, as held open by a hoop of *walahe'e* [*alahe'e*; *Canthium odoratum*] wood and baited and lowered into the sea by four long cords." Kahaulelio (*Mei* 23, 1902; pg. 4) describes baiting the net with pounded lobster to catch *lauhau* ("*hau* [*hibiscus*] leaf"; small butterfly fish, *Chaetodon* sp.) and *panuhunuhu* (*uhu*; parrot fish, *Scaridae*).

Pōuouo

Another "vertical-pull net was the "*pōuouo*". Pukui and Elbert (1986:343) define the *pōuouo* as a "bag net with meshes two fingers wide, similar to but larger than the *luelue*."

Kahaulelio (*Mei* 23, 1902; pg. 4) describes the net as bordered with *walahe'e* or *'ūlei* wood, similarly baited with lobster, and used to catch *panuhunuhu* and *halahala* (small *kahala* or amberjacks; *Seriola dumerili*).

'Upena 'ōpelu ('Upena 'a'ai 'ōpelu)

The *'ōpelu* (mackerel scad, *Decapterus sanctae-helenae*) was a highly desired fish. One means of catching *'ōpelu* was with a vertical-pull bag net. Kahaulelio states the nets of the late nineteenth-century were commonly about 18 ft. long, 30 ft. in circumference and divided into three sections: the *holoulei* (with *mālua'owa* meshes of approximately 2 1/2 inches), the *pō'ai* ("circle", "hoop," with *mākahi'owa* meshes of approximately 1 1/2 inches), and the *hope* ("last", "posterior";" with *mākahi* meshes of approximately one inch). Sticks of *'ūlei* (*Osteomeles anthyllidifolia*) wood of from 6 ft. perhaps 3 ft. in length (*he anana, a he iwilei*) were joined together until they were 30 ft. in length and were bent to form circles or hoops to hold the bag net open. In the late nineteenth century, *kolomona* (*Cassia sp.*) wood was also used for these hoops. The hoop seems to have commonly been a couple feet larger in diameter than the attached net, doubtlessly supplying greater tension to hold the net open. The net was fastened in place to the hoop with eight tying cords (*hānai*). The point where the tying cords were attached to the hoop was called a *pū* and the drawing cords (*kaula huki*) were attached there. Beckley (1883:16) emphasizes the importance of bait in association with net fishing for *'ōpelu* by calling the net and method *'upena 'a'ai 'ōpelu* - with "*'a'ai*" meaning "to take bait readily, as fish." Actual fishing strategies differed somewhat as some fishermen would lower the net before starting to feed (*hānai*) the *'ōpelu* and others would start feeding the fish first. Bait used to attract *'ōpelu* into the mouth of the net included *pū*

(pumpkin), *papaia* (papaya), *kalo* (taro), *'ōpae* (shrimp) and *lohelohe* (dragon fly larvae). The *lohelohe* was a first-rate bait (*helu 'ekahi o nā 'ai a ka 'ōpelu*) and Kahaulelio laments their rarity at the turn of the century. The bait was often lowered into the water in coconut sheaths (*'a'aniu*) weighted with lead. Boluses of this bait would be tossed in and the hoop net could either be moved under the bait or the bait could be so placed as to move the *'ōpelu* over the middle of the hoop. At the proper time, the "rope puller" (*kanaka huki*) would pull, perhaps gently at first, and then with all his might until the *'ūlei* sticks reached the surface. The hoop could be sprung or released to facilitate emptying of the bag net if necessary.

In the context of net fishing for *'ōpelu*, Kahaulelio discusses what he calls the *Onopupupu* which he says was a lucky omen (*ulia laki*) for *'ōpelu* fishing and which he calls the father and mother of the *'ōpelu*. Titcomb (1952:122) also relates the Hawaiian belief that the *ono (*wahoo, *Acanthocybium solandri)* fish was a "parent of the *'ōpelu.*" According to Kahaulelio, this *Onopupupu* was to be fed bits of *'ōpelu* to keep it hanging around for it was believed to draw in *'ōpelu*. Kahaulelio (Aperila 18, 1902:3) relates that for all the *'ōpelu* fishermen, the *Onopupupu* was like a mistress they wished to caress, a friend indeed (*o nā lawai'a 'ōpelu a pau, ua like loa kēia me ka wahine manuahi a kahi po'e e kūwiliwili nei, a hoa'loha maoli nō*). He also calls the *Onopupupu* an "*akua-'ai-kahu*" or "god who eats his attendants" presumably because the *ono* eats *'ōpelu* and also leads them to their deaths at the hands of fishermen.

'Upena opule

Beckley (1883:16) states that the *'Upena opule* was "a bag net a fathom in length having a small oval mouth two or three feet wide." This vertical-pull bag net was used to

catch *opule* wrasses (several species of the genus *Anampses*). "It was used with a decoy *opule*, previously caught, which is drawn back and forth at the mouth of the net" (*Ibid.*)."

Ma'oma'o fishing.

The Fornander source (Vol. 6, Pt. 1:186-187) discusses fishing for *ma'oma'o* with what appears to be a vertical-pull bag net, eighteen feet long, and seemingly with a wooden hoop holding open the mouth composed of four lashed sticks (*'ehā la'au ma ka waha a puni.*) While this net was typically baited with lobster, sometimes a unique form of lure was included. Pieces of gourd (*pōhue*, *ipu 'awa'awa*; *Lagenaria siceraria*) were worked into a discoidal shape, blackened in the fire, and tied to the opening of the net. The *ma'oma'o* would see these disks and think it was bait and would be attracted into the net.

***'Upena 'apo'apo*: Gill Nets**

Gill nets operated on a principle of "catching" or "grasping" (*'apo'apo*) fishes, lobsters, or turtles by the gills, fins or other projections. These nets would be set either from shore or canoe and typically the weight line (*'alihi pōhaku)* would rest on the bottom. The *'ūpena 'apo'apo* might be used in three different ways (as neatly summarized by Newman;1970:53):1) letting the net remain stationary and allowing the fish to entangle themselves in the mesh; 2) driving the fish into a stationary net; or 3) moving the gill net to encircle the fish and then scarring them into the entangling mesh. Cobb's (1902:399) comment that gill nets "were rarely if ever, being drifted" fits the the literature on traditional fishing as well as for the later period. Often the naming of a type of gill net fishing was after the target species but the type of netting used and the specific strategy employed were often rather specific to the quarry sought.

Gill nets are reported to have ranged in length from fifty five feet to twelve hundred feet, and in height from seven feet to twenty-five feet with a mesh size range from one-half to seven inches.

Newman (1970:66-68) curiously concluded that "Kahaulelio described only one net ['*upena ho'omoemoe*] that might have been a gill net" which led Newman to entertain the possibility that "gill nets were not particularly important in sea exploitation" and conclude that gill nets were "a relatively minor technique" for Hawaiians. It seems probable, however, that what Kahaulelio refers to as "*ma'oma'o* fishing", "*hō'au'au* fishing", and "*ho'omoemoe manō* fishing" were also fundamentally kinds of gill net fishing. This difference in Newman's perceptions and our perceptions underscores the frequent difficulty in determining the simplest facts in some early fishing accounts. Newman's overall point, de-emphasising the import of gill netting vis-a-vis other forms of fishing may well be accurate (Malo and Kamakau for example say little about gill net fishing specifically.)

Ma'oma'o Fishing

This net fishing method targeted the small *ma'oma'o* (called *mamo* on O'ahu; the Green Damsel Fish or Sergeant-Major, *Abudefduf abdominalis*). It is discussed by Kahaulelio (*Mei* 23, 1902:3) but he provides few details, perhaps because he had only observed this type of fishing as a child and, by 1902, it was long lost (*nalo loa kēia 'ano lawai'a*). Kahaulelio states this fishing was performed at depths of between ten to thirty fathoms and that it required expert divers *(po'e ihupani)* using a net with a mesh of two inches (*'upena mālua*). While it is not clear, this appears to be a kind of gill net fishing in which divers set the net on the bottom in deep water and the *ma'oma'o* either gilled

themselves, or more likely, divers drove the fish into the net before hauling net and fish to the surface. The Fornander source (Vol. 6, Pt. 1:186-187) discusses net fishing for *ma'oma'o* but this seems to be a different concept involving a bag net and no diving.

Hō'au'au Fishing

Kahaulelio (Mei 2, 1902:4) provides little data on this method of net fishing. This *hō'au'au* fishing was done at night and in the very early morning using a net with a two-inch (*mālua*) mesh. The fishermen splashed with their feet (*kāpeku*) to chase the fish into the net.

Ho'omoemoe Fishing

Kahaulelio (Mei 2, 1902:4) relates that *ho'omoemoe* fishing was particularly easy (*he wahi lawai'a luhi 'ole kēia*) and was best performed on calm nights (*onalunalu 'ole*). A gill net (*'upena pāloa*) approximately 360 ft. long with a mesh of about 2 inches (*mālua*) was set about 7 O'clock in the evening by two fishermen. The net could be checked at midnight to remove the fish caught and to reset (*ho'olei hou*) the net, and then the fisherman could go back to sleep (*hiamoe*). The net was left until the next morning when it was picked up.

'Upena Honu: Turtle Nets

The Fornander account (1919 : Vol. VI Pt. 1, pg. 180) describes the *'upena honu* as 240 feet long (*kanahā anana*) by 24 feet high (*'ehā anana*). It is said that ten people were needed to handle this net, that the net was set only when a turtle was seen on the surface of the sea, that this method was typically used without a canoe, and that from one

to five turtles could be caught in the net (*Ibid.*). Stokes (1906:155,162) states that the nets were made of *hau* and *'ahu'awa* and indicates the nets were much smaller: "they are reported to be about 100 ft. long and 6 ft. deep." Stokes reports the mesh of *'upena honu* as from 6 inches to 12 inches. The net size reported by Stokes seems much more reasonable. Perhaps the net in the Fornander account was specialized for a particular place.

'Upena Manō: Shark Nets

'Upena manō are described in the Fornander account (1919 : Vol. VI Pt. 1, pg. 188) as having the same dimensions as the **'upena honu**, 240 ft. by 24 ft. and the Stokes account (1906:155,162) also indicates that the nets are the same size as *'upena honu* (100 ft. long and 6 ft. deep in Stokes' understanding). The Fornander account indicates the difference between the two was in their use, with the shark net, an entangling net (*he hihi kona 'upena*), used at night. Kahaulelio (Mei 16, 1902, pg. 3) offers no net dimensions, but writes that they were made of twisted *wauke (wauke I milo)*, the mesh size was 4 inches and upwards (*mahae*), and that it took four to five people to handle them.

Kahaulelio (Mei 16, 1902, pg. 3) gives the best account of shark net fishing which he calls "*ho'omoemoe manō*" ("to set a shark net") fishing. Kahaulelio states the sharks fished for were the *lālākea* (white tip sharks) and the *manō kihikihi* (hammerhead sharks). The nets were set in an arc, left overnight, and then hauled up on the sandy beach in the early morning when the sharks could be heaped up like *kukui* branches (*ahu a lālā kukui ka manō*). The smelly (*holo ka hohono*) shark meat was then cut up into pieces, worked with salt, drained, and dried in the sun which made the meat *ono*.

'Upena hahau Thrashing nets

The Fornander account (Vol. 6, Pt. 1: 190-191) describes *'upena hahau* as a method of gillnet fishing where people splash the sea to drive fish toward an extremely long (*'ehā kanahā anana*; approximately 960') fence or gill net which is set mainly in a straight line but which curves (*pi'o*) at one end to catch fish running parallel to the net in a pocket of the net. As traditional Hawaiian gill nets were probably highly visible to fish, such tactics may have been quite common. In this particular case the Fornander source describes beating the water with paddles to drive fish but elswhere (Vol. 6, Pt. 1: 182-185) he mentions the practice throwing big stones and thrusting 24 ft. long (*'ehā anana*) poles into the sea to drive fish towards a net.

'Upena ula Lobster nets

Cobb (1902:399) succinctly explains lobster netting as it existed at the turn of the century. He asserts that a net "with a seven inch mesh, is frequently set around a rock or cluster of rocks in the early evening and allowed to remain there all night. As the ula come out to feed during the night they become entangled in the meshes of the net. The net is raised in the morning." While the absence of discussion of lobster netting in early Hawaiians is notable, this is thought to be mere omission and that this simple technique was probably traditional.

'*Upena ho'opuni*: Surround Nets and Seine Nets

'Upena ho'opuni (or simply "*Ho'opuni*") is defined by Pukui and Elbert as a "fine meshed net" but inherent in the concept is the idea that it would be used to "*ho'opuni*" ("surround, enclose") fish. In this study, "'*upena ho'opuni*" is taken as a generic term for a large and diverse category of surround and seine nets which would be moved

horizontally through the water to impound (rather than entangle) fish. While surround nets and seine nets may be different in principle or theory, in Hawaiian practice, the two grade into each other.

Pihā Fishing

Kahaulelio (*Mei* 30, 1902:6) relates that *Pihā* fishing utilized a fine-meshed (*nae*; approximately 1/4 inch mesh) net in order to catch three inch-long *pihā* (*Spratelloides delicatulus*, a herring similar to *nehu*) fish. The still, milling *pihā* fish would be spotted in the shallows, particularly during the months of May and June, and the fishermen would deploy a 30 ft. long, 6 ft. high net nearby. Men and women swam to the other side of the school and splashed (*po'o*) the water hard to drive the *pihā* toward the net. The net was left to lie flattened (*pālahalaha*) on the sea floor until the school was close to entering the net, when the top of the net was then pulled to the surface of the sea. Some people pulled the ends of the net around the school while others slapped the water to drive the fish into the net to keep the *pihā* from escaping. The school was thus surrounded and the net was drawn tighter. The whole net could then be lifted up or, if there were too many fish, the *pihā* could be scooped out in pails.

Nehu Fishing

Kahaulelio (*Mei* 30, 1902:6) relates that *nehu* (anchovy, *Stolephorus purpureus*) fish were caught by a means similar to the catching of *pihā* fish, the major difference being that *nehu* fishing commonly utilized several (four or five) pieces of fine-meshed (*nae*; approximately 1/4 inch mesh) net. The *nehu* were carefully observed until such a time as

they were seen to be still (*la'i nō ho'i*) and unharried by other fish. The nets were swum out and placed side by side. The people who splashed their feet in the water (*kā peku*) drove the fish into the nets, slowly at first, and then more vigorously as the fish approached the nets. Meanwhile the nets were moved towards the fish with the center net moving behind, so as to form a pocket. It appears that the side nets were wheeled in toward the center net and thus the nehu were surrounded and the nets were filled with fish.

Kala kū Fishing

Kahaulelio (*Mei* 23, 1902:3) relates the practice of "*kala kū*" fishing. While no specific reference in other sources to "*kala kū*" has been found, the meaning may reasonably be inferred from parallels and context. Titcomb (1972:84) discusses "*kala moe*" ("sleeping *kala*") and "*kala holo*" ("swift" *kala*) as names applied to *kala* (surgeon) fish exhibiting certain behavior patterns. Hence *Kala kū* fishing almost certainly applies to fishing for schools of surgeon fish that are "standing", "stopped", or "halted," ("*kū*") essentially milling about. Kahaulelio relates that this kind of fishing was performed in places where the sea was deep (*nā wahi kai hohonu*) and in places where the seas were shallow (*nā wahi kai kohola*) but this was most commonly done in shallow water with *papa* bag nets used where the sea was deeper. When the milling surgeon fish were seen, they were surrounded (*ho'opuni*) with a net with a mesh of two to three inches(*'upena mālua a mākolu*). The net could be set by swimming or from a canoe. While it is not stated, it seems probable that the milling surgeon fish need not have been completely surrounded but that when the school was partially enclosed by a set net, they could have been driven into the net where the fish would be caught by their gills, spines, and projections.

Ka lawai'a moi me ka 'upena

Pāloa nets, understood in this case as a kind of seine net, are reported by Kahaulelio (*Iula* 4, 1902:3) as having been used in net fishing for *moi* fish. He relates few details about the nature of the fishing *per se*, but states that *pāloa* nets of approximately two-inch mesh(*'upena mālua pāloa*) were used and that many fish were caught. Pukui translates the passage "'*elua nō kua ana a ua mau lawai'a nei* ..." as referring to two hauls of the net, which would certainly be consistent with the understanding of *pāloa* as a kind of seine net.

Ka lawai'a kā lā'au

Kahaulelio (*Iula* 4, 1902:3) also refers to *pāloa* nets as being used in *kā la'au* fishing in which men, women, and children beat the water with sticks (*lā'au*) and coconut sheaths (*lolo niu*) to drive fish into the net. The nets used had a mesh of approximately two to three inches (*'upena pāloa mākalua a mākolu*) and were set in the shallows by two men. As the people beat the water towards the center of the net, the two men on the ends of the net brought the ends together encircling the fish. Fish to be caught included large mullet, *awa* (milk fish, *Chanos chanos*), *'ō'io* (bone fish, *Albula vulpes*), and so forth. It is unclear whether the fish were caught by the gills or simply surrounded by the ever contracting net and grabbed. Probably both means were operative.

Hano (*hano mālolo*)

Net fishing for flying fish often involved the corporate effort of many people, nets, and canoes under the direction of a head fisherman (*ka lawai'a nui*). The Fornander source (1919: Volume VI, Pt. 1: 184-185) indicates that as many as thirty canoes might be

involved. Kahaulelio (*Aperila* 18, 1902:3) describes the nets used in fishing for flying fish (*mālolo* and *puhiki'i; Cypselurus simus* and several other species) and *iheihe* (half-beaks, *Euleptorhamphus longirostris*) as having an opening of 30 ft. or more and a length of 60 ft. to 78 ft. He notes that sometimes these nets had long wing nets attached to either side and sometimes they did not. The mesh size of the nets was often graduated from approximately one inch mesh to 1 1/2 inch to two inch mesh (*mākahi, mākahi 'owā, mālua*). The side nets were drawn in to chase the fish into the central bag. The Fornander source (1919:Volume VI, Pt. 1: 184-185) indicates that much larger nets were used. The nets were said to be about 108 feet long, a spectacular forty eight feet high (*'eono anana ke ki'eki'e*), and with a mouth (*waha*) seventy two feet long. In the Fornander account some details of use are provided. It seems the net is deployed with a central bag and then the majority of canoes take positions at some distance from the net. The canoes are paddled uniformly to surround the fish (*he hoe like nā wa'a I ka hoʻopuni ana*), or rather to drive them toward the net. The paddlers are called "flying-fish paddlers" (*he pāhoe mālolo*) which suggests they are deliberately making noise by beating the paddles rythmically against the canoe (*pāhoe*). When the canoes approach the net, they are backed off (*hoʻēmi ka wa'a*) to allow for the drawing in or closing of the net (*alaila huki ka waha o ka 'upena.*) The Fornander source gives a feeling for the complexity of the apportionment of the *mālolo* procedure If many *iheihe* and small *mālolo* were caught it was called a "*makahei*" (precise meaning uncertain; "deft mesh?"). The fish were traditionally divided at sea among the participants.

'Upena kolo Fishing

Kahaulelio (*Mei* 2, 1902:4) discusses *'upena kolo* fishing which he particularly

associates with the great bays at Kahului, Maui and Hilo, Hawai'i. As with other seine nets the preferred places were sandy (*wahi one wale nō*) as the nets could not be drawn across rugged bottom (*inā he wahi 'a'ā, ā pūko'ako'a 'a'ole e hiki*). He compares the *'upena kolo* as similar to the *'upena hano mālolo* and the *'upena papa lau nui* but notes that the *'upena kolo* is much bigger and longer. These kolo nets could be used to catch everything from small anchovy (*nehu)* to sharks and tuna (*kawakawa*).

'Upena 'ō'io Fishing for *'Ō'io*

Kahaulelio (*Mei* 2, 1902:4) discusses net fishing for *'ō'io*. Either the *papa* bag net or the *pāloa* fence net could be used to catch schools of *'ō'io* and sometimes five to seven nets would be used (presumably sewn together). The preferred mesh was about two inches (*mālua*). This form of fishing was unique as it involved two canoes whose actions were orchestrated by a spotter on shore (*ke kilo iuka*). Following the directions of the spotter, the fishermen surround the *'ō'io* school.

Beckley (1883:12-13) presents a somewhat different understanding of *'upena 'ō'io*. She indicates a very large net of eighty to 150 fathoms in length (480 ft. to 900 ft.) and two to three fathoms in depth (12 ft. to 18 ft.) with a three to four inch mesh was used. She agrees that two or three canoes were commonly used and that the role of a spotter (*kilo*) was crucial but states he "is always standing upright on the cross bars of the canoe." The art was to watch the fish until they were in a suitable sandy place, at which time the nets would be deployed, the fish surrounded, and the size of the circle reduced. As the circle was reduced the outer net was pulled around in a concentric fashion so as to form multiple rings of net "so if they make a rush to any given point and by their weight bear down the floaters, those escaping from the first circle will still be enclosed by the

outer ones" (Beckley 1883:13).

'Upena Fishing for *Weke 'Ula*

Kahaulelio (*Mei* 16, 1902:3) discusses catching *weke 'ula* (Red Goatfish, *Mulloidichthys auriflamma*) with nets set in about 60 ft. of water. If the sea floor was good (*maika'i ka honua olalo*), or smooth, a *papa* bag net could be used but if the place was not good (*'ino ke kūlana*) then a long *pāloa* net with two inch mesh (*mālua*) was used. Using the papa net was easier (*ma'alahi*) for the *pāloa* net required much effort in the frequent diving (*he hana nui ka lu'u pinepine*) to force the net together *(e na'i ai I ka 'upena a hui*) surrounding (*puni*) the *weke 'ula* fish.

'Upena papa Fishing for *akule*

Kahaulelio (Mei 16, 1902:3) discusses fishing for *akule* (big-eyed scad, *Selar crumenophthalmus*) using *papa* nets. The operation was orchestrated by a head fisherman (*ke kilo lawai'a nui*) on shore who signaled to the canoes by waving his hands. At the signal, the first two canoes would let down the *'upena pākū* or curtain nets. If the *akule* were surrounded by the curtain nets, then the bag net (*'upena papa*) was set. This was a time of silence on the canoes until the net was contracted (*hāiki*) around the school of *akule* fish. Kahaulelio notes a surprising thing (*ka mea kupanaha*): despite fishing pressure, the *akule* schools often would remain in the same place for a week giving the fishermen several opportunities to net them.

Lau fishing: Fishing Using Long Lines with Dependant Leaves

Lau nui Fishing

Kahaulelio (*Feberuari* 28, 1902:6) discusses *lau nui* fishing which he also calls *lau lima* or many-handed fishing (Figure 18). This method of fishing used: 1) long *lau* lines, commonly made of *wauke* bark, which could be 6,000 ft. long to which hundreds of dried, yellow ti leaves would be attached; 2) two 60 ft. long *pākū* or wing nets which would direct the fish into a bag net; and 3) a *papa* or bag net into which the fish would be funneled. The *papa* was composed of three types(*māhele*) of nets called *puhinui* (with a mesh of *mālua* or about 2 inches in width), *puhiiki* (probably with a mesh of 1 1/2 inches), and *pupu* (with a mesh of *mākahi* or about 1 inch in width). Kahaulelio states that the *puhinui* was at the *waha* or mouth or opening of the net, the *puhiiki* at the middle (*o waina*) and the *pupu*, also called the *mole* at the back or end (*o hope loa*) of the net. These three nets formed a 36 ft. to 42 ft. long funnel-like configuration with an opening or mouth about 18 ft. across. The *puhinui* net extended back from the opening, tapering down to 12 ft. in diameter where it was tied to the *puhiiki*. The *puhiiki* then tapered down to about 6 ft. in diameter where it joined the *pupu*, made of tough *olonā*, which formed a closed bag. There were sticks (*la'au*) in the *puhinui* and *puhiiki* to hold the net funnel open.

Two *lau* (which seems to refer to just the long lines with leaves attached) were each taken out to sea in one of two big canoes, while divers occupied three or four other canoes. The head fisherman (*lawai'a nui*) had his own canoe from which he directed operations. When the two canoes bearing the *lau* met, the ends of the *lau* were fastened together (which was called *'ōhao*). At the end of each *lau* were holes (*mau puka*) through which a 6 ft. long limb (*lālā*) of *hau* wood was inserted. The middle of the *lau* (where the

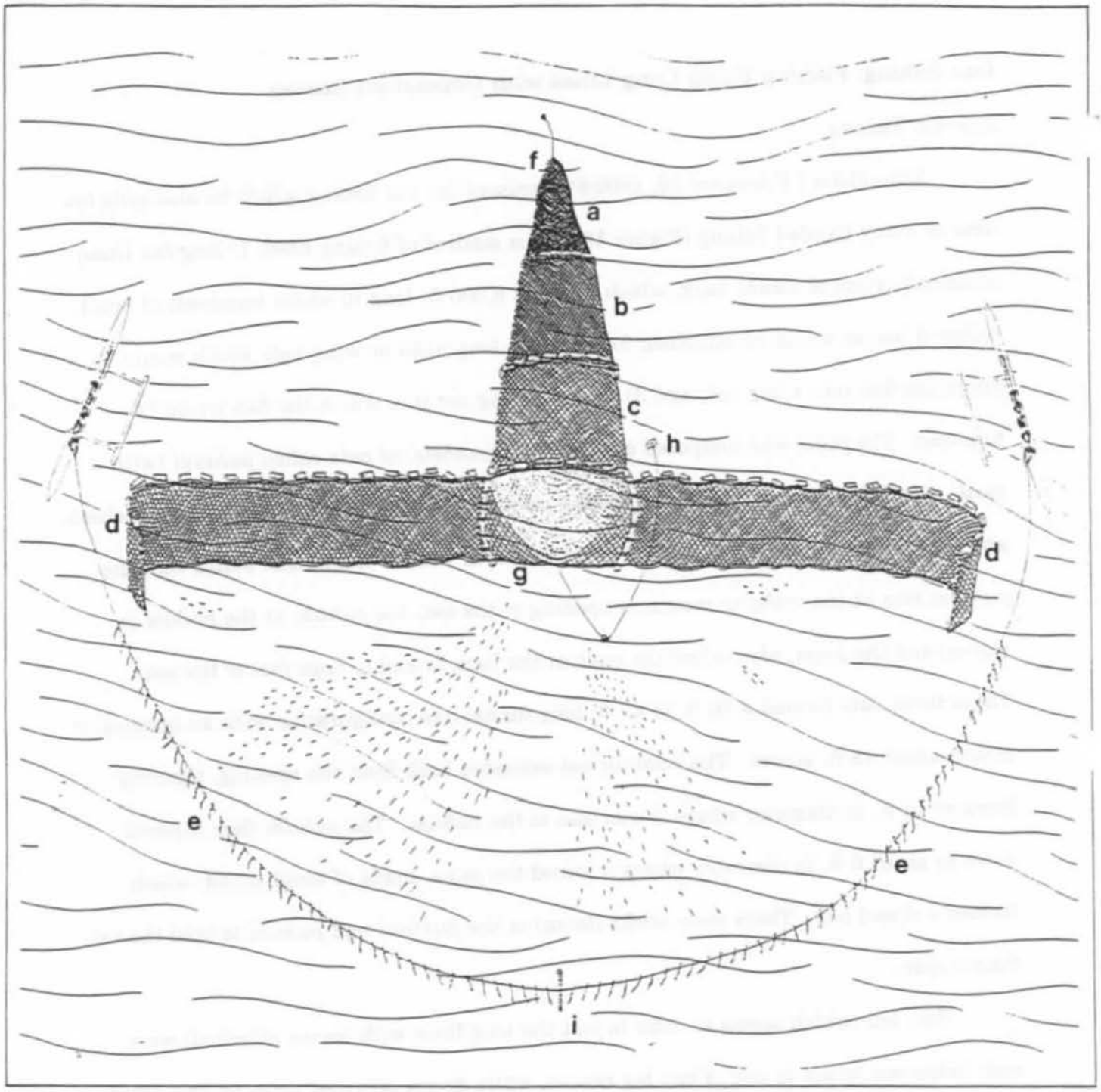


Figure 18 *Lau nui* or *Lau lima* Fishing: a. The *Pupu* (the farthest back net), b. *Puhiiki* (middle net), c. *Puhinui* (outer net), d. *Pākū* (wing nets), e. *Lau* (lines with dependent *ki* leaves), f. *Mole* (farthest portion of bag net), g. *Waha* (opening of bag net), h. *Mouo* (buoy), i. *'Ōhaō* (where *lau* are fastened)

two *lau* were joined) would be laid in 90 ft. of water and then the canoes went in opposite directions until they reached water of 6 ft. to 12 ft. deep where stone anchors (called *kuahao* or *heleuma*) were deployed. The purpose of the stone anchors would seem to be to offset the "pull" on the canoes when the men pulled on the *lau* lines. Although the middle of the *lau* was deployed in deep water, it was not allowed to touch bottom (presumably by the tension on the lines) to avoid snagging. Once the *lau* anchors (*heleuma*) were set, the six or seven men on each of the "*lau* canoes" would pull on the *lau* rope. The moving leaves and the leaf shadows would drive fish into shallow water. When the *lau* line was straight, parallel to shore, the anchors were pulled up and the two *lau* canoes converged towards a spot chosen by the head fisherman (*Po'o lawai'a*) until they were about 132 ft. apart (approximately the distance which would be spanned by the *papa* bag net opening and the two wing *pākū* nets). Divers would have already stuffed holes and crevices (*nā lua*) in the area full of various kinds of leaves and rubbish (*lau 'ōpala o kēla a me kēia 'ano*) to close them off (*panipani*) and prevent the fish from seeking shelter there. The *papa* net and the *pākū* wing nets were then deployed. The *lau* were then drawn up toward the nets, while the sides of the canoes were struck, and divers helped to drive the fish. The best divers would then *pāpo'o* or carefully swim down and raise the mouth of the *papa* net while the head fisherman helped by pulling up on a rope attached to the bottom of the opening of the net. The opening of the *papa* net was pulled to the surface thus securing the catch.

Lau nui Fishing for *uhu*

Kahaulelio (Mei 2, 1902:4) discusses the use of the *'upena papa lawai'a lau nui* net in the surrounding (*ho'opuni*) of *uhu ka'i* and *uhu kaka* but regrettably no data has

been found regarding these fish (presumably they would be types of *uhu* or parrot fish). That these fish would school and remain relatively stationary (*ho'olulu maika'i*) over large sandy spots (*one nui*) made them a good fish for *'upena papa lawai'a lau nui* fishing.

Laukapalili Fishing

Pukui and Elbert relate that *laukapalili* was the "same as *hukilau*, seine fishing but reportedly used in deeper water and with yellowed *ti* or banana leaves." Kahaulelio (Feberuari 28, 1902:6) seems to contradict this saying that this *lau* fishing was done in shallower waters (*ke kai kohola*), specifically in 2 to 3 fathoms. Kahaulelio (Mei 2 1902:4) compares *'upena kolo* fishing to *laukapalili* fishing for *'ō'io* (bonefish, *Albula vulpes*) fish. The nets used in *laukapalili* fishing for *'ōio* were like *papa* or bag nets with meshes from approximately 1/2 inches to 2 inches, 3 inches, and 4 inches and upwards (*nukunukuā'ula, mālua, mākolu, mahae*). Long *pākū* or curtain nets were fixed to the central bag net. The opening (*waha*) of this net was said to be about 60 ft. but so wide an estimate of the "mouth" seemingly would have to have included the flanking *pākū* nets. Kahaulelio indicates the *papa* net was 18 ft. to 24 ft. in length, considerably shorter than in *lau nui* fishing. Two *lau* lines with their dangling leaves were taken out by canoes to where the waves broke (*pili i ka nalu*) where they were joined in a process called *'umi* (*'umi o ka lau*). The expert men and women on shore then pulled the *lau* lines with a rhythmic give-and-take motion (*lomi*), driving the fish into the set *'upena papa*. When the fish had fled inside the bag net, it was closed and dragged ashore until the fish flopped about on the sandy beach (*ka hū o ka i'a I kahahone*).

Lau 'apo'apo fishing

Kahaulelio (*Feberuari* 28, 1902:6) mentions *lau 'apo'apo* fishing but provides few details. The net could be cast (*ho'olei*) three times and the canoe filled with a variety of small reef fish.

Lau ahi Fishing

Kahaulelio (*Feberuari* 28, 1902:6) mentions *lau ahi* fishing but provides few details. He places this method of fishing first amongst the lesser *Lau* fishing methods (*ka māhele mua kēia o nā Lauli'ili'i*). This type of fishing was done on dark nights (*pō pouli maika'i*) with little surf. The *lau* lines would be pulled in the area where the waves would break (*po'inanalu*) and many reef fish could be caught. The *lau ahi* net was made of *olonā* and had small meshes (*nae*) and two branching spreader sticks (*nā kuku 'elua, a he 'ohā no ko ia mau 'ano lau*) to support and distend the net.

Lau 'ōhua Fishing

Kahaulelio (*Feberuari* 28, 1902:6) mentions *lau 'ōhua* fishing but provides few details. Like *lau ahi* fishing, *lau 'ōhua* fishing is placed (second) amongst the lesser *lau* fishing methods (*ka māhele 'elua kēla o nā kau li'ili'i*). Two men would draw in the *lau* lines toward the net which was like that used in *lau ahi* fishing (*olonā fiber*, fine meshed, with bracing sticks to hold it open). This was hard work as the men had to stoop down (*kūlou ilalo*) in the rhythmic pulling (*lomi*) of the *lau*. The women would move in (*ho'i mai*) toward the net, presumably spaced behind the *lau* lines, splashing to help drive the fish. The fish caught were generally small fry (*'ōhua*).

Lau 'ōhualiko Fishing

Kahaulelio (*Feberuari* 28, 1902:6) discusses *lau 'ōhualiko* fishing which he joins in a class with (*ua komo pū*) *lau 'ōpae* fishing. In the morning, at low tide (*kai make*), the small (6 ft. long), fine-meshed (*'upena na'e makali'i, a makika pākū no ho'i*) net was put around an *imu* or *ahu* (a small heap of stones constructed in the shallows as a fish house). It appears that a short *lau* line was attached to one of the bracing poles (*kuku*) of the net and was used to direct the small fishes, shrimps, and small lobsters into the net as the *ahu* was dismantled. The *ahu* would then typically be reconstructed for future use.

Lau ko pahu 'anae Fishing

Kahaulelio (*Feberuari* 28, 1902:6) discusses *lau ko pahu 'anae* fishing for full-sized mullets, a kind of fishing he says is particularly easy (*ma'alahi loa*). The *papa* or bag net used was 18 ft. wide across the opening (*ākea o ka waha*) and 24 ft. to 30 ft. in length. It appears that a 24 ft. to 30 ft. long net was placed on the upper margin of the bag net (*a he 'ehā a 'elima ka lihilihi oluna*). The *lau* lines were made fast to the net. This specific reference (*e ho'opa'a mua ana nā lau I ke a'u o ka 'upena*) is unclear but may refer to fastening the *lau* to a "projection" or "handle" (*'au*) of the net. Two people pulled the *lau* while two others were needed for the net (*'upena*). The fishermen watched the mouth of the bag net to know when the *'anae* mullet had gone in. When they saw the sea was in motion (*'oni a'e ai ke kai I ka waha o ka 'upena*), the mouth of the net was to be lifted. The people at the mouth of the net would remove the mullets, bite their heads and secure them, and then they would prepare for another set.

Regarding the development of these techniques at Kaho'olawe

Net fishing in its myriad diversity might be considered as a primary focus of traditional fishing education on Kaho'olawe. Net fishing may be particularly well suited for the exploration and teaching of cultural values (and is particularly likely to meet with some success). The existence of a "traditional fishing methods only" restriction on one or more stretches of coast would encourage a revival of suchnet fishing techniques.

V. Rearing

Loko i'a or Hawaiian fish ponds were a unique feature of the Hawaiian landscape. There are at least 360 known examples of these technically advanced and innovative ponds. As Kikuchi (1976:295) explains it, there were "four basic types of fishponds developed by the prehistoric Hawaiians *loko i'a kalo*, *loko wai*, *loko pu'u one*, and *loko kuapā*." *Loko i'a kalo* were irrigated agricultural plots used in the raising of *kalo* (taro) and certain fishes (*'o'opu, aholehole*) located in inland areas and fed and drained through a series of fresh water ditches. *Loko wai* were brackish ponds and lakes often located close to the shore and subject to tidal action. *Loko wai* often had natural connections to the sea by way of streams. "*Loko pu'u one* were coastal bodies of water that had been either stranded by eustatic sea-level changes or isolated through the formation by sea action of loose irregular walls (*pu'uone*) of sand and coral detritus. The permeability of the walls allowed sea water to percolate through, while fresh water springs along the shore allowed provided internal seepage. (Ibid.)" *Loko kuapā* were located out in shallow seas and used a purposely made, permeable, wall of stone and/or coral blocks as an isolating feature.

These different types of fishponds frequently made use of ditches (*'auwai o ka*

mākāhā) and sluice grates (*mākāhā*). *Mākāhā* "were stationary structures that consisted of spaced, vertically placed wooden sticks lashed to two or more hozizontally placed sticks. (Ibid.) *Mākāhā* served to keep out debris and large fish, to facillitate circulation, to retain cultivated fish, to facilitate recruitment of fry, and to facilitate harvesting.

Kahaulelio (*Mei* 23, 1902:4) relates that the fish were typically taken from these ponds with 2-inch eye nets which were drawn across the ponds by a few fishermen in the early morning.

Regarding the development of these techniques at Kaho'olawe

The *loko i'a* (*loko kuapā* or perhaps *loko pu'u one*) techniques could be quite successful and might be worth some attempt at revival. *Loko i'a* would have the advantage of focusing fishing activities in a discrete relatively safe area which might be cleared of ordinance. They would provide an area where all could participate in fishing and would stand as testimonies to the Hawaiian values of *laulima* (cooperation) and *pa'ahana* (industry). While such structures might have to be periodically repaired, many willing hands can accomplish much in a short time. Construction would be by volunteers and could include limited excavation (in the case of a *loko pu'u one)* or construction of local stone (in the case of a *loko kuapā*), preferably in consultation with archaeologists, culture specialists and marine engineers to avoid degradation of shorelines and archaeological sites. The big problem would be in obtaining the permits required by various governmental agencies. One might think such a permitting process with widespread support could be greatly streamlined but this permitting process is clearly a major impediment.

W. Auxiliary Fishing Techniques

A number of fishing techniques could be used in coordination with a variety of actual catching techniques.

Hānai Feeding

Feeding of fish was a common practice, and was done both to facilitate the later catching of the fish and to improve their flavor. Kahaulelio (Mei 16, 1902:3) relates that *nenue* fish, for example, were fed just like hogs (*hānai maoli ia no ka nenue, e like me ka hānai ia ana o na pua'a hānai*). After a period of such feeding the fish would take the hook instantly and would be fat like the fatness of a hog.

Melomelo Bait sticks

These bait sticks (also called *mākālei*) were often endowed with magical qualities. Kamakau (1976:63) states they were made from "a piece of hard wood from the *koai'e*, *o'a*, *'a'ali'i*, or *pua [olopu'a]* tree, obtained from some noted place - a *heiau*, or a *ko'a* shrine, or some other famous spot." Typically somewhat spindle shaped, somewhat resembling a baseball bat, these were used in different ways. Sometimes they were smeared with bait and carried the bait scent. Other times it seems that the attractant was the shape and the shine of the *melomelo* stick itself. Kahaulelio (Aperila 18, 1902:3) describes his father's *melomelo* stick as about 2 1/2 feet long, smooth, shiny black, fragrant, with a small knob on one end to facilitate tying a line. He says that when it was wagged about (*hō'oni'oni*) in the sea that it resembled an eel. His father used to polish the *melomelo* with fire, coconut oil (*ka wai niu maloo*) and *māmaki* (*Pipturus sp.*) bark cloth until it glistened. In the case of Kahaulelio's father, the *melomelo* was used in

conjunction with a net sixty feet long and eighteen ft. high with an approximately 2 inch-mesh eye, and sticks which held the net open. The *melomelo* was used to lure fish into the mouth of the net which was then drawn closed. Kahaulelio and Kamakau clearly believed the stick had great efficacy in attracting fish.

Ka lawai'a palu Bait

Preparation of bait (*palu*) was a great area of elaboration in fishing lore. Kahaulelio (*Aperila* 18, 1902:6) particularly recommends the use of octopus ink sacs (*ka 'ala'ala ...o ka he'e*) for bait. Kahaulelio relates that his grandparents took well-broiled (*pulehu maika'i*) ink sacs, grated them fine with a dense stone (*'ānai no hoi me ka pōhaku 'alā),* and mixed the grated ink sacs with coconut milk (*a a'ea'e maika'i, hui pū me ka wai niu*). The mixture was wrapped in *ki* leaves and the tips of the hooks were smeared with the *palu*. Such preparations were often called "*pilipili he'e,*" which Pukui and Elbert say could be "molded about a fishhook for bait." With such bait, the pandanus bags (*ke 'eke lauhala*) could be filled with *kala* and *kole* surgeon fishes. When a person knew how to care for his bait, hunger would not tarry (*ke mālama mau ke kanaka I ka palu, pōloli kali 'ole.*)

Another method of bait fishing was to use the scales of fish already caught to lure in even larger fish. Kahaulelio (*Aperila* 18, 19026) relates that a fisherman might stop after catching three or four fish to scale them (*unahinahi I ka unahi*), and then wrap the scales, and perhaps viscera as well, in a large piece of the clothlike sheath from the base of a coconut frond (*'a'aniu nui*). This package could be lowered and then jerked loose which would bring in big fish (*komo mai ka i'a nui.*)

A common feature in Hawaiian fishing was the practice of tying the bait onto the hook with a thread.

Ka Lama: Torches

Many kinds of fishing were carried out at night in the shallows with the use of torches. Beckley (1883:4) relates that "the torches are made of split bamboos secured at regular intervals with *ki* leaves, or twigs of the *naio* bound together in the same manner...if the torches burn with a bright red flame, he [the fisherman] will be very successful." Cobb (1902:420) describes another type of torch as "a number of kukui nuts strung on rushes, or the stems of coconut leaves, which are then wrapped around with ki leaves so as to make the torch round like a candle. These latter will burn in almost any kind of weather.

V. *Ho'omanamana* Traditional Fishing Religious Practices

A. *Nā loina lawai'a* Fishing Customs

There were a great many traditional customs associated with fishing. Many of these would have been in the interpretation of omens in clouds or flights of birds which undoubtedly had practical as well as "religious" import. Many of these customs would have been specific to certain *'ohana* involving their own *'aumākua* traditions. Many of these customs would have been short term and limited. For example, "the god of one fisherman might tabu everything that was black" (Malo 1951:208). Some of the more common, widespread traditions are discussed below.

The fisherman "had to be en rapport with the gods of fishing and his own personal gods, and avoid the enmity and therefore the curses of his fellow men (Titcomb 1952:5)." The Fornander source (Vol. 6, Pt. 1: 190) lists nine of these traditions given below verbatim:

> Don't say "*E hele ana wau I ka lawai'a;*' (I am going fishing). Say instead *E hele ana wau I ka nahelehele;"* (I am going to the woods). The fish have ears and they hear; and when you say you are going fishing they hear and run away, so that you would come back empty handed.
>
> Don't hold your hands behind your back. To do so is an indication of weariness and fish, being very considerate, do not care to burden you further, so they keep out of your reach.
>
> Don't carry on a conversation on the way to, or on the fishing grounds; fish would hear and would disappear.
>
> Don't walk on the beach immediately abreast of where the net is intended to be cast. The noise of your feet on the pebbles or sand warns the fish off.
>
> Don't ask idle questions of canoe-men getting ready to go out fishing. They consider it an omen of bad luck.
>
> Don't indulge in dirty language or in smutty tales before going fishing. Even the

fish are averse to dirt.

> Don't walk on a net when it is spread out; don't step over a net when it is bundled. Take time to walk around it. It is the house for the fish when it is cast in the sea, and the fish prefer it clean.
>
> Don't "*aia*" the fish ("there it is"), when you see it entering the net; fish are timid and do not care to be noticed; and when you do, they turn right around and rush out again.
>
> Don't go fishing if your mouth is wrong (i.e. if you have made a vow which you have not fulfilled); you will only cause weariness to your companions, for you will all come back empty-handed. Fish abhor a gas bag and keep away from him.

Tau'a (August 1983:38) relates a tradition in his family to "never eat what you gather while your gathering it. If you did the ocean and environment around you would change." This is also reported by Mr. Boogie Lu'uwai (Reichel 1993:66) and is almost certainly an ancient and wide spread Hawaiian fishing tradition.

One of the best known prohibitions is against *mai'a* (bananas) in association with fishing. In popular culture, it is often considered to bode ill for the fishing if one brings along bananas or banana bread, eats bananas, talks of bananas, sees someone else with bananas or dreams of bananas. The antiquity of this tradition remains unclear. In his analysis of the traditon, Aweau (June 1995:12) associates the origin of the tradition with the idea that the *mai'a* is a *kino lau* (form taken by a supernatural body) of Kanaloa (the Hawaiian deity most associated with the deep sea.)

One of the best known fishing traditions was the offering of the "first fruits" of the fishing to the deities. "The first fish caught was always reserved for the gods and offered on the altar of the fish god on shore as soon as the canoe landed (Titcomb 1952:8)." Kamakau (1976:64) describes this succinctly:

> When the fisherman came ashore he took two fish in his right hand for the male *'aumakua* and two in the left hand for the female *'aumakua*, and went to the ko'a fishing shrine, which was enclosed by a *paehumu* wall or fence enclosing the tabu area. Inside the *ko'a* were a *kuahu* altar and a *lele* altar, where bananas

were placed. The fishermen spoke to the male *'aumākua* and cast down the fish with his right hand, then spoke to the female *'aumākua* and cast down the fish belonging to their side. After that fish could be given away.

Special rituals also preceeded the first use of a new piece of important fishing equipment. Traditionally, Hawaiians "could not use a new net, fishing rod, or canoe without prayer and sacrifice to their patron god (Cobb 190:389)."

Several species of sea life (*honu* or turtles, *ulua* or large jacks, *kūmū* goatfishes) were *kapu* to women and this *kapu* probably precluded their deliberate capture by women as well as their consumption (See Valeri 1985:115ff.) The *palani* (surgeon fish, *Acanthurus dussumieri*) is said to have been *kapu* to men, presumably because of the myth associating its strong smell with a woman urinating on a *palani* (Titcomb 1972:139).

Menstruation *kapu* seem to have been strongly associated with fishing and lasted long after the overthrow of the *kapu* system in 1819. Pukui relates one such account of Pu'uloa O'ahu in which "The gods, who despised defilement, left the pond and fish no longer came in (Sterling and Summers 1978:42)." It seems to have been a general *kapu* and belief of fishermen that women should not accompany them on their canoe fishing trips (Tau'a HFN November 1985:22).

B. *Ka 'alemanaka* The Calendar

The lunar cycle was particularly important in Hawaiian thinking, and Hawaiian thinking about fishing. It seems to be the case, as Taua (Feb. 1982:1) asserts, that "The entire population of Hawai'i adhered to a systematic and careful regimentation of planting and fishing in accordance to the influences of the moon." There is general agreement among Hawaiian sources regarding the lunar calendar (See Valeri 1985:194-199 for details.) Hawaiians named each day of the lunar month. A day (*lā*) begins at

dawn but takes its name from the following night. In each month there are four major ritual periods, collectively called *Kapu pule*. The *kapu-Kū* extends from the first night of the lunar month and ends at dawn of the fourth day (thus lasting two days and three nights, the nights of *Hilo*, *Hoaka*, and *Kū-kāhi*). The *kapu-hua* begins on the night of the twefth day and ends at dawn of the fourteenth (thus lasting one day and two nights, the nights of *Mohālu* and *Hua*.) The *kapu-kāloa* (associated with the deity Kanaloa) begins on the night of the twenty-third day and ends at dawn of the twenty-fifth (thus lasting one day and two nights, the nights of *'Ole-pau* and *Kāloa-ku-kāhi*.) The *kapu-Kāne* begins on the night of the twenty-seventh day and ends at dawn of the twenty-ninth (thus lasting one day and two nights , the nights of *Kāne* and *Lono*.) How Hawaiian fishermen used the lunar calender is largely uncertain and there may have been a great deal of variation amond different *'ohana*, districts and islands. Taua (Ibid.) emphasises the importance of the lunar calender in his own family's fishing traditions and presents an analysis of the Hawaiian calender in regard to fishing. He asserts:

> The Kū days and the Kanaloa days are periods when the sun and moon are in conjunction causing high tides. These conjunctions cause the plankton to rise. The moon at this time is relatively dark. All of these conditions encourage fish to run, making fishing with nets and line in lagoons, bays and offshore excellent

Thus Taua appears to be associating the 1st, 2nd, 3rd, 23rd and 24th nights of the lunar calendar (the *kapu-Kū* and *kapu-kāloa*) with an optimal time for fishing. Both periods are indeed relatively dark nights. The *kapu-Kū* occurs following the time of the new moon when the sun and moon are indeed in a conjunction and the spring tides are greater than average. The *kapu-kāloa* however appears to follow the third quarter of the moon and thus would be more associated with the neap tide ("a tide of minimum range occuring at the first and third quarters of the moon.") and the relatively minor tidal flux of the third lunar quarter. To further complicate matters, the question arises as to whether *ka po'e*

kahiko (Hawaiians of old) would have indeed regarded any of the *kapu pule* as particularly appropriate times for fishing. Valeri's informed understanding (1985:196) was that these were times "men must spend in the temples" which would seem to have been irreconcilable with fishing during at least the nocturnal portions of the *kapu pule*.

Discussion of annual ritual cycles are complicated because of the discrepancies in the Hawaiian yearly calender among the different Hawaiian islands (and indeed even on the same island). For example, Nathaniel B. Emerson's notes to Malo (195133-34) indicate that the closest approximation to "January" was "*Kaelo*" on Hawai'i island, "*Ikuwa*" on Molokai, "*Nana*" on O'ahu, and "*Hili-o-holo*" on Kaua'i. The annual fishing *kapu* cycle focused on two species, *aku* (skipjack tuna, *Katsuwonus pelamys*) and *'ōpelu* (Mackerel scad, *Decapterus pinnulatus*). In short, most of the early part of the year is closed to the taking of *'ōpelu* and open for the taking of *aku*, and most of the later part of the year is closed to the taking of *aku* and open to the taking of *'ōpelu*. It may be noted that this *aku-'ōpelu* fish *kapu* cycle does not conform exactly with the Hawaiian conception of two seasons (*ho'oilo, kau*) or to the beginning of the year with the *Makahiki* festival cycle of rituals (the opening of the *aku* season is associated with the end of the ritual cycle of the passage of the old to the new year.) Malo (1951:152), who follows the Hawai'i island calender, asserts that the season for taking *aku* (when the taking of *'ōpelu* was forbidden) began with the *kapu-hua* (12th and 13th nights) of the month of *Kā'elo* (corresponding to January/February) and continued for six months until the month of *Hinaia-'ele'ele* (answering to approximately July). Then the season for the taking of *'ōpelu* began (and the taking of *aku* was forbidden.) The opening of the *'ōpelu* season might have been assumed to occur exactly six months later during the *kapu-hua* (12th and 13th nights of the month) but Kelou Kamakau (1919:31,30) asserts the opening began

early in the lunar cycle during the *kapu-kū*. Historic accounts seem to agree, suggesting the rituals lifting the restriction on the *'ōpelu* occurred around the new moon (See Valeri 1985:385 n.73.)

C. *Nā waiwai* Values Associated with Hawaiian Fishing.

Fishing was a major area in which Hawaiian cultural values were expressed. Ultimately the *kahu* of Kaho'olawe will develop their conceptions of Hawaiian values for themselves according to their personal criteria and only some general introductory thoughts, which have largely been drawn from Dr. Kanahele's study *Kū Kanaka*, are offered here for consideration. Central values expressed in the course of Hawaiian fishing practices might include *ha'aha'a* (humility), *laulima* (cooperativeness), *kōkua* (helpfulness), *pa'ahana* (industry, diligence), *kū I ka nu'u* (achievement), *kūha'o* (self-reliance), *ho'omanawanui* (patience) *le'ale'a* (playfulness), *mālama* (preservation), and *mahalo* (respect).

Nature rarely misses an oportunity to teache us yet another lesson in *ha'aha'a* (humility). This humility is experienced with regard to the *kāhuna* (experts) whose skills exceed ours, the *kūpuna* (elders) who were so good at easily doing what for us is only won with hard work, and in the experience with the *moana* (ocean) and the *akua* (powers that be) that so easily squash out hubris.

So much of Hawaiian fishing required *laulima* (cooperativeness) whether in the construction of *loko i'a* or *pā i'a*, in the manufacture or assemblage of nets and lines, or in the many forms of group fishing. Success often required the *kōkua* or assistance of many hands. Fishing made clear the benefits of working together in joint action for the common good.

A survey of Hawaiian fishing shows that Hawaiians were industrious, busy, hard-working people; values which are subsumed under the Hawaiian concept of *pa'ahana*. Fishing was often hard work but diligence led to tangible achievement (*kū I ka nu'u*). Achievement imparts confidence and instills a feeling of *kūha'o* or self-reliance. This increases one's awareness of one's own ability to stand alone and be independent and take charge of one's own life.

Fishing teaches *ho'omanawanui* or patience and that through fortitude that one can persevere. Hawaiian fishing methods are striking in the utilization of patience. Fish might be fed for many days before an attempt was first made to catch them.

In discussing Hawaiian values it is easy to miss the obvious, that life was to be enjoyed and that Hawaiians were and are a life loving people. Fishing was often a serious business for survival depended upon success but it was also a source of *le'ale'a* or great joy and amusement. To read the fishing accounts of Kahaulelio or Taua is to glimpse the delight that fishing offered to life. To have a good time is a Hawaiian value.

The entire premise of the Protect Kaho'olawe 'Ohana and the Kaho'olawe Island Reserve Commission has been focused on the concept of *mālama* or preservation of both the natural world and the cultural legacy and identity of the Hawaiian people. Traditional Hawaiian fishing can be an expression of both of these forms of preservation and of acting as a caretaker of the past and the present. Traditional Hawaiian fishing teaches you to break off or cut *limu* (edible algae) rather then pull it. Traditional Hawaiian fishing teaches you to leave the small *'opihi* (limpets) so there will be more for all in the future.

While often unconsciously stated as a synonym for "thanks", *mahalo* originally held connotations of admiration, praise, and respect. These are sentiments that fishing can

elicit, *mahalo* for the *kūpuna* (ancestors), *kāhuna* (experts) and *kumu* (teachers) for their cleverness and concern, *mahalo* to the *akua* (deity) for making all things possible, *mahalo* to the *moana* (ocean) and the *honua* (earth) and *mahalo* for *ola*, for life in Hawai'i.

VI. Historic Change in Fishing Technology in Hawai'i

A. Pre-contact Change

In all probability Hawaiian fishing techniques developed over time, changing to adapt to Hawaii's unique environments. Since new technologies evolved locally and others were probably introduced from elsewhere in Polynesia. It has long been believed that two-piece fishhooks with knobbed bases, which do not appear in Hawaiian archaeological sites predating circa 1350, are a "Tahitian form" which may have been a loan technology that developed in the Society Islands. Nevertheless, western contact starting in 1778 brought a number of changes in fishing techniques.

Historic changes were brought about by the availability of new tools, techniques, and even target species.

B. Late Eighteenth Century Changes

From the arrival of Captain Cook, Hawaiian fishing technology began to adapt Western goods. Samwell (1967:1186), Cook's surgeon, would write in 1779: "Before we left Keragegooa [Kealakekua] we saw many small fishhooks which they [Hawaiians] had made with the nails they got from us..." By the end of the eighteenth century, metal fishhooks could probably be obtained for a fraction of the effort that traditional fishhooks required. While the major value of the new metal hooks was in their strength, inexpensiveness, and durability, they also had appeal as lures. Kahaulelio (March 7, 1902;6) discusses the desirability of silver and brass hooks for *aku* fishing presumably for their lure-like quality. Kahaulelio notes that the availability of metal for hooks freed Hawaiians from the tiresome searching for human bones ("*'a'ole luhi I ka imi I ka iwi o ka po'e make, kupaianaha no ka hana a na kūpuna o kākou*"). As in so much technology

transfer, Hawaiians did not simply appropriate but actively adapted. Thus when Kahaulelio discusses metal fishhooks he emphasizes manufacture, specifically the creation of *'ō'io* hooks (May 2, 1902) by heating sewing needles over a *kukui* lamp or charcoal fire, and heating the steel ribs of women's umbrellas.

Pearl Fishery

One of the first things *haoles* sought in Hawaii were pearls. In the autumn of 1791, Captain John Kendrick of the *Lady Washington* left three men ashore, in his service at wages, "for the purpose of collecting sandalwood and pearls" (Vancouver, 1793, Vol. II pg. 172). While the pearl fishery never amounted to much, it was of sufficient note that "the king [believed to be Kamehameha I] declared it [the Pearl Harbor pearl oysters] a royal monopoly, and he employed divers to bring up the oysters (Cobb 1902:524)." This probably occurred shortly after 1795. Cobb (*Ibid.*) relates that "the shell or mother-of-pearl, formed the more valuable part of the product and was usually shipped to China, where it found a ready sale but the business was so vigorously prosecuted that before 1850 it had ceased to exist, owing to the exhaustion of the bed."

C. Nineteenth Century Changes

The use of metal hooks (discussed in "Late Eighteenth Century Changes") became more widespread in the early nineteenth century. Campbell (1822:194) noted in 1810,99 that iron hooks "procured from ships are coming into more general use."

Another source of innovation in Hawaiian fishing techniques came about through interactions with other fishing cultures. Kahaulelio (May 23, 1902) writes about the

presence of some thirty natives of Borabora at Lahaina, Maui in the year 1850 and how the Hawaiians attempted to learn their skills at turtle spearing.

Iron harpoons introduced in the early days of the whaling industry greatly facilitated turtle spearing (*Ibid.*). Beckley (1883:7) reports: "The Gilbert Islanders have of late years introduced fishing with a basket in a manner different from any formerly practiced by Hawaiians."

In addition to Society Islanders and Gilbertese, Marshall Islanders also introduced innovations in fishing. Buck (1957:337) gives particulars about the introduced Marshallese method of making trolling hooks and how these techniques were hybridized with the Hawaiian technique. Some of the newly intoduced fishing practices were massive in scale. Cobb (1902:399) asserts that the Chinese at Pearl Harbor use "what is practically a purse seine, which is 50 fathoms long, 20 fathoms deep...." While many of the indigenous Hawaiian methods were on a gigantic scale, none of their nets appear to have been half as tall as this 120' deep Chinese net.

Some innovations were found to have unexpected positive results. Kahaulelio (June 20, 1902) relates how oil from beef, goat, and mutton fat, and kerosene came to replace the traditional torches used in Hawaiian torch fishing. The new technology not only provide a "cheap" source of light but the burning fat dripping into the water served to attract valued eels to the fisherman. On the other hand, some of the new technology was rejected for reasons that seem odd to us. Kahaulelio (*Ibid.*) thought that if an eel was pinned to the sea floor with a piece of an iron hoop that the hoop would cut and bruise the eel imparting an undesirable fishy odor.

New plant and animal species and various western manufactures were used as bait. Traps were baited with cooked pumpkin and raw ripe papayas (Beckley 1883:6),

beef was placed on hooks (Kahaulelio June 20,1902:6), and brandy and gin were used to attract fish (Kahaulelio, April 4, 1902). Kerosene, tobacco juice and Perry Davis Pain Killer are also discussed as bait ingredients (Newman 1970:57). Foreign bamboos were preferred over native species for their greater strength (Kahaulelio, May 23, 1902). In the nineteenth century, exotic species such as Oleander (*Nerium oleander*) and Castor Oil tree (*Ricinus communis*) came to be used as *pīkoi* or net floats (Stokes, 1906:156) and exotic species such as *kilika* (the black mulberry, *Morus nigra*) were used as poles (*mākoi*) in *paeaea* fishing (Kahaulelio *Mei* 16, 19024).

New plant species were used in place of native plants in traditional arts. Introduced *Plumeria* is reported (Stokes, 1921:226) to have been used as a poison in *hola* fishing. Stokes also suggests that the use of "quicklime" in *hola* fishing (presumably to heighten the effect of the poison) was an historic innovation. Fishing baskets were made out of weeping willow (Beckley 1883:5). Often the old arts could not compete with cheap imports: "the imported marketing baskets were generally used by those who could not obtain the old-fashioned kind" (Beckley 1883:6).

Fishing spears were probably commonly tipped with metal in the early nineteenth century. Curiously the new metal seems to have little changed the form as spear barbs were still uncommon. Cobb (1902:508) indicates spears were still commonly made of wood, though they were by then: "tipped with a thin piece of iron 1 1/2 to 2 feet in length. Most of the tips are perfectly smooth, but a few have a very slight barb."

As early as 1810, Campbell (1822:195) declares that "the lower edge [of nets] is kept under water by weights of lead or iron." Kahaulelio (April 4, 1902) discusses the use of lead weights and the use of a watch to know the time at which to fish (Kahaulelio, March 12, 1902) which probably dates to the mid-nineteenth century. The *'alihi pōhaku*

or stone sinker line on nets probably gradually gave way to the *'alihi kēpau* or lead weighted line in the early to mid eighteen hundreds.

Kahaulelio March 21, 1902) asserted that the new fashioned hooks, were far superior to the older style *mahina* or moon shaped hooks and seems to associate these new hooks with catching much larger fish.

Probably many methods of traditional fishing were going out of use by the mid-nineteenth century. Kahaulelio (*Mei* 23, 1902, pg. 4) relates, for example, that *Pōuouo* fishing (a form of "vertical pull" net fishing) was commonly seen at Lahaina in the past, but that from the passing of his parents' generation this type of fishing has passed as well. He attributes the decline to the rarity of the traditional woods but also to the rarity of the skill in making the net.

Double Cowry Lures

Cowry shell octopus lures (*Lū he'e*) appear to have been greatly elaborately in the historic period, incorporating multiple tines (*kākala*), multiple cowry shells (*leho*), and various tails (*pupua*) (Figure 19).

It remains uncertain whether double cowry lures were a traditional Hawaiian artifact or whether they first made their appearance in the nineteenth century. Buck (1957:362) points out that of eleven specimens of double cowry lures in the Bishop Museum collection, "nine have metal points and two have recently made wooden points." Buck (*Ibid.*) notes that these

> both have sinkers of the breadloaf-type which properly belong to nets. The double cowry lure evidently belongs to the later period, a period of over elaboration. The sinker, whether bread-loaf shaped or elliptical, is tied to the stem like that in the single cowry lure; but a short vertical rod is fixed to the back end of the sinker by the crossing turns of the sinker lashing. The two shells have short cross bars fixed to the back holes. The shells are fitted against each side of the stem and

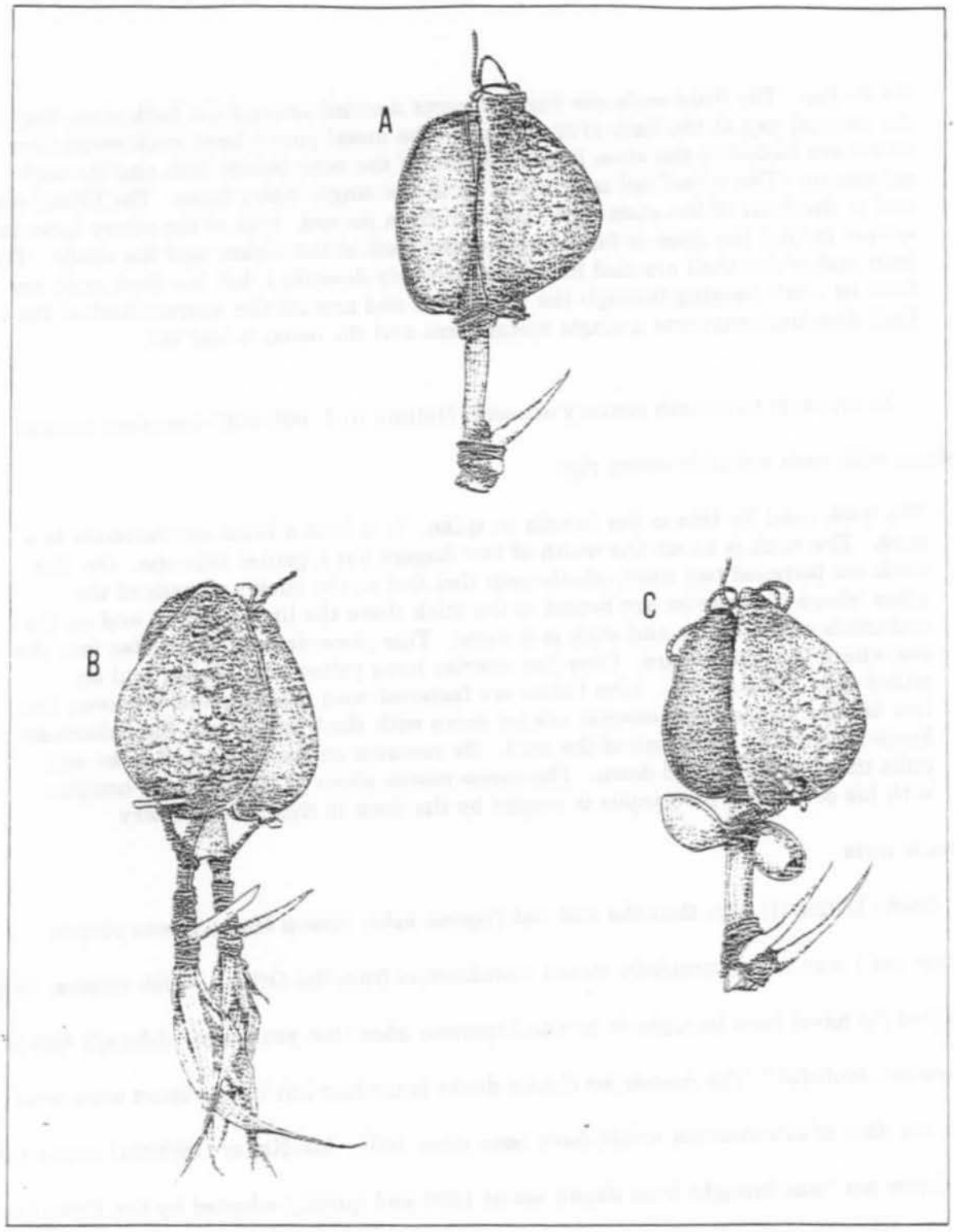


Figure 19 *Lū he'e* Showing: A. A Typical Pre-contact Form and B. & C. Probable Historic Innovations

the sinker. The front ends are fixed by cords doubled around the back cross bars and the vertical peg at the back of the sinker. The metal points have back extensions which are lashed to the stem in the manner of the bone points with similar back extensions. The ti leaf tail is attached as in the single cowry lures. The lifting cord is tied to the front of the stem about 0.5 inch from its end. One of the cowry lures is unique in that the stem is forked behind the back of the sinker and the shells. The front end of the shell are tied in the way already described, but the back ends are fixed by cords passing through the back holes and around the nearest limb of the fork. Each fork limb supports a single metal point and the usual ti-leaf tail.

In an early twentieth century account, Nalimu (n.d. 905-906) describes octopus fishing with such a double cowry rig:

> The hook used for this is the kakala or spike. It is bent a little and fastened to a stick. The stick is about the width of two fingers put together into one. On this stick are fastened two cowry shells both tied fast to the stick and back of the place where the cowries are bound to the stick there the lines are tied and on the underside of the cowry and stick is a stone. This stone draws the cowries into the sea where the octopus are. Over the cowries hang yellowed ti leaves, and on either side of the shells . Live fishes are fastened with the yellowed ti leaves, two live hinalea fishes. The cowries are let down with the live fish and the fisherman keeps hold of the other end of the cord. He remains on the canoe and jerks and pulls the cowries up and down. The canoe moves about as he fishes for octopus with his cowries. The octopus is caught by the hook in front of the cowry.

Throw nets

Cobb (1902:501) says that the cast net ['*upena kiloi*, '*upena kiola*; '*upena poepoe*, "throw net"] was a comparatively recent introduction from the Orient. Cobb relates: "it is reported [to have] been brought in by the Japanese about ten years ago, although this is somewhat doubtful." The reason for Cobb's doubt is unclear but if the report were true then the date of introduction would have been circa 1891. MacKellar (1956:24) states that the throw net "was brought from Japan about 1890 and quickly adopted by the Hawaiians because of its effectiveness." It is unclear whether MacKellar is simply following Cobb or has some other source. Cobb describes the throw net of the turn of the century as "circular, average about 25 feet in circumference and have 1 1/2 inch mesh. They have leads all around the sides and are made generally of No. 10 cotton twine." Cobb contrasts

the Japanese method of throwing the net with the method used by fishermen in the United States, in that the American style involves holding a part of the net in the mouth and the Japanese "manipulate it entirely with the hands."

Curiously the "throw net" was not discussed by either Beckley (1883) or Kahaulelio (1902) which supports the idea that they may have only come into use in Hawai'i in the last two decades of the nineteenth century and even then may have been primarily used by Japanese.

Throw nets are often assumed and portrayed as a pre-contact Hawaiian fishing technique. It may well be that pre-contact Hawaiians had a net (*'upena kūkulu aloli*) that was thrown (the verb being "*ho'olei*"; to cast, throw, heave, toss, pitch). Fornander (1919:176,177) reasonably interprets this as a "standing" (his translation for *kūkulu*) net which suggests that it was heaved out in an arc to be a standing fence or gill net and hence operated on a different principle than the introduced gill net. The fish related to have been caught by this means (wrasses, butterfly fish) would seem odd fish to target with the introduced variety of "throw net".

Despite the relatively recent introduction of true "throw nets" only about a hundred years ago, we must agree with Taua (Dec. 1982) that "The use of throw nets is an accepted method of Hawaiian fishing." As "*lomilomi* salmon" really is a Hawaiian food, so throwing net really is a Hawaiian fishing technique. For old timers Boogie Lu'uwai and David and Steven Pedro, throw nets are particularly associated with memories of their fathers' fishing at Kaho'olawe (Reichel 1993: 65,66, 85,87.)

Taua (Ibid.) makes the interesting assertion that "the methods of net throwing are widely diversified from island to island." This may possibly indicate multiple traditons of throw netting reaching Hawai'i from different sources (Japan, China, the mainland USA)

and/or may indicate the independent adaption of a new fishing technique by Hawaiians at many different locations.

Hawaiian Whale Fishery

Whaling must be considered as one of the biggest developments in Hawaiian fishing in the nineteenth century. The scale of the foreign whaling enterprise that operated in Hawai'i was so large (involving whaling ships from at least thirteen countries) that few in Hawai'i are aware of "Hawaiian" involvement in the enterprise of actually outfitting whale ships. A number of vessels flying the Hawaiian flag operated out of the Kingdom of Hawai'i and many of these were doubtlessly heavily manned by native Hawaiians. These Hawaiian flag whalers probably accounted for between 1% and 2% of all whale ships operating out of the Hawaiian Islands. In 1856, for example, four of the 356 whaleships in Hawaii were Hawaiian (Thrum, 1913:52).

As early as the early 1830s, a whaler operated by H. A. Pierce and the brig *Waverly* were whaling out of Honolulu as home port (Cobb, 1902:511). The local whaling fleet seems to have gotten off to a slow start, as by 1852, the only Honolulu vessel engaged in whaling was the brig *Juno* (*Ibid.*) and "there was no extensive development until nearly the end of the reign of Kamehameha III." Cobb (1902:512-513) supplies the following data on the "Hawaiian fleet":

Table 3: Table of Hawaiian fleet and catch 1839-1894 from Cobb (1902:512)

Year	Vessels No.	Tonnage	Sperm Oil Gals.	Value	Whale Oil Gals.	Value	Whale-bone Lbs.	Value	Ivory Lbs.	Value	Walrus teeth Lbs.	Value	Fur skins Lbs.	Value	Total
1840	1														
1842	2														
1851	1														
1852	1				1,440		400								$567
1854	2														
1856															$87,280
1857	4		6,297	$6,297	148,671	$59,468	64,915	$16,229			22,863	$2,286			$84,280
1858	17														
1859	14	4,112													
1860	6	1,595													$57,033
1861	4	880													$55,350
1862	3	734													$33,161
1863	2	622													$25,771
1864	5	1,500													$93,729
1865	5	1,356													$78,830
1866	4	1,168													$91,329
1867	6	1,636													$59,922
1868	9	2570													$40,557
1869	10	3360													$175,871
1870	12														$140,918
1871	7														$12,210
1872	4														$39,818
1873	5		1,600	1520	34,541	$12,018	17,787	$13,161	4,262	$903			90		
1874			7,304	$6,941	50,968	$17,413	21,492	$16,564	11,569	$3,015			730		$44,663
1875			30	29	102,856	$37,531	38,854	$35,883	21,553	$9970			330		
1876							13,057	$12,494	8,042	$3,217					
1878	1	189													
1880	1	188													
1881	2	103													
1894	1	294													

Note: The fact that nothing is noted for certain years does not necessarily indicate that there were no vessels during those years, but rather the lack of data.

Some might question how "Hawaiian" the Hawaiian fleet was. To be sure the design of the ships was *haole*, the ships were probably all constructed in *haole* lands, the ships were financed by *haoles*, the owners and masters may have all been *haole*, and the vast majority of the cargoes and any profits probably went to *haole* lands and *haole* hands. At the same time, as far as the government and the people of the kingdom were concerned, the Hawaiian fleet probably was considered "Hawaiian" at the time because it flew the Hawaiian flag, many ships were owned and operated by Hawaiian subjects, and the fleet operated out of Hawaii and employed so many Hawaiians. This perception was probably furthered by the "local" names of many of these Hawaiian flag whalers which included: *Honolulu*, *Oahu*, *Haalilio*, *Hawaii*, *Kauai*, *Wailua*, *Aloha*, *Kalama*, *Kamehameha Vth*, *Hae Hawaii*, *Lono*, *Paiea*, *Mauna Loa*, *Kamaile*, *Kaluna*, *Kohola*, and *Emma Rooke* (Thrum, 1913:47-68). The government of the Kingdom of Hawaii passed legislation "to encourage the visits of whaleships of all nations" and specifically to "encourage whaling by Hawaiian vessels" Cobb: 1902:515-516).

Of greater import to Kaho'olawe was Hawaiian "Bay Whaling." As Cobb (1902:513) relates:

> The small humpback whales in the winter time would resort to the region between Lahaina and Kalepolepo [Mā'alaea] Bay for breeding purposes. The sperm whales would also do the same to the leeward side and off the southern point of Hawai'i and also off the other islands at times. When a whale was sighted close to the shore parties would go out in small boats and try to capture it. If successful, the whale would be towed ashore, cut up and the blubber tried out in rude triworks.

Starting in the 1840s, the Kingdom started leasing whaling rights in local waters in accordance with Chapter 7 Section 11. "On May 26, 1847, the Privy Council considered the application of one John Freeman for whaling rights from Diamond Head to Pu'uloa" (Jones, 1938:20). On November 1, 1847 James Hough, "a Hawaiian subject", received the

whale fishery from Lahaina to Honua'ula on Maui (*Ibid.*). The *Polynesian* (May 20, 1848) relates that "Mr. James Hough...at length succeeded in capturing a sperm whale. In consequence of the difficulty experienced in 'cutting in' and getting the 'blubber' on shore, only about thirty barrels of oil were secured. This at the current rates here is worth about $800." On December 25th, 1854, C. J. Clark and H. Sherman received the whale fishery rights to Mā'alaea Bay and in 1858, Ed M. Mayor "was granted permission to establish a whaling station on the island of Kaho'olawe" (Jones, 1938:20). In May of 1858, Mayor wrote to R. C. Wyllie, who held the lease on the island at that time, for permission to establish a whaling station on Kaho'olawe (Navy, Part II, 53). Cobb (1902:513) relates: "According to several of the old inhabitants of Wailuku the natives used to kill whales in the bay quite often in the 'forties.'" Bay whaling was evidently going strong in 1862 with O. J. Harris "meeting with such success that try-works were erected at his Kalepolepo Station." (Thrum, 1913:56). As late as 1870, Captain Roys and the schooner *Anne* were engaging in bay whaling, "erecting try works, etc. at Olowalu, and bringing into use his new whaling gun manufactured by Jas. A. Hopper of this city [Honolulu] and securing two humpbacks of 40 bbls. each" (Thrum, 1913:60).

Hawaiian Seal Fishery

The Kingdom of Hawaii was actively involved in seal fisheries. Thrum (1890:67-68) relates:

> On March 2, 1824, by order of Kalaimoku, sanctioned by the King, he [William Summer] was given charge of the brig *Ainoa* for a sealing voyage, returning in October with 5,845 fur skins, a quantity of elephant [seal] oil, and fish. On this and a similar voyage in the brig *Tamoralana* (*Kamahalolani*) in 1826, in which he obtained 3,160 seal skins he reported that much better success would have resulted had they been properly provisioned.

As noted in the chart above, the Hawaiian whaling fleet, must have taken quite a few

walrus in 1857 to account for the 22,863 "walrus teeth" reported. The Hawaiian whaling fleet is also reported to have taken 7,254 gallons of seal oil in 1859, 152 walrus hides in 1870, and 450 walrus hides in 1871 (Cobb; 1902 : 513; cf. Thrum 1913:60). It seems probable these seals were all caught on the Pacific Northwest Coast or perhaps off Siberia. There was also, however, a local seal fishery.

Cobb (1902:522) reports that "on September 14, 1838, the schooner *Flibberty Gibbet*, 25 tons, Rogers commander, owned at O'ahu, returned from a twenty-one days cruise to the island of Ceres, with a cargo of sealskins." The identity of the island of "Ceres" is uncertain but the short time required for the voyage rather suggests the seals were obtained in the leeward Hawaiian Islands. Such a seal fishery seems to have been exploited: "in 1859 when the bark, *Gambia*, 249 tons, is reported as having been sealing. She left Honolulu on April 26, and cruised among the islands to the westward of this group, returning on August 7 with 240 barrels of seal oil, 1,500 skins, a quantity of sharks fins and oil, etc." (Cobb; 1902:522-523). It would thus appear that the *Gambia* crew killed 1,500 *Monachus* or Hawaiian Monk Seals. Cobb attempts clarification later, saying that the *Gambia* cruise was "among the chain of islands westward of the main group.")

Sea Otter Fishery

Large volumes of sea otter pelts were frequently sold in Honolulu in the 1820s and 1830s (Cobb, 1902:523). It is not clear however whether Hawaiian flag ships were involved in this NW Coast fishery at that time. Thrum (1913:50) indicates Hawaiian flag ships were involved in fur trading in 1854.

Leeward Islands Shark Fishery

In the time frame 1859-1886, there was a limited shark fishery operated out of Hawaii: fishing in the Leeward Islands (Cobb; 1902:523-24) for shark fins, teeth, and oil. Nets may have been used but most sharks were probably hooked.

***Loli* (Beche-de-mer or Trepang) Fishery**

While sea-slugs (*Holothuria* sp.) were a major aspect of some Pacific Island economies, there was never much of a fishery in Hawai'i. Cobb (1902:525) relates:

> Up to 1861 no attempt was made to take up the industry on the islands. In that year Messrs. Utai & Ahee, a Chinese firm in Honolulu, advertised in the local papers that they would purchase cured beche-de-mer from the natives if it could be found. This stimulated the natives and they soon found it in large numbers. Since then the custom house reports show the following exports for certain years: 1861, 6,507 lbs.; 1862, 5,809 lbs.; 1863, 5,500 lbs.; 1864, 7,135 lbs.; 1867, 4,958 lbs.; 1876, 1,125 lbs....The only island where any were sold in 1900 was Maui.

Notably in the custom house data, the volume of *loli* decreased every year but one suggesting either declining stocks or unattractively low prices. Most *loli* were probably collected by hand while wading or diving but Beckley (1883:2) reports "the larger kinds are sometimes dived for and speared."

Dynamite

Cobb (1902:508) relates that the first use of dynamite (*kianapauka*) for fishing in Hawai'i was in 1870. Dynamiting was done as follows:

> A stick of dynamite weighing about a quarter of a pound is capped and arranged with a fuse about ten inches long. The fisherman usually selects a deep hole, and paddling to within a short distance of it, he lights the fuse and when it has almost burnt to the cap he throws it from him into the hole. When it explodes every living thing within a considerable radius of where it struck is either killed or stunned by the shock. Many fish rise to the surface and are picked up by the fisherman.

Jordan and Evermann (1902:368) point out that the Kingdom of Hawai'i outlawed the use of dynamite in fishing in 1872 because "such a large number of persons had lost their lives or been maimed." They assert that "unfortunately this law is not very closely enforced and as a result great destruction is still being wrought to the fisheries by the use of this explosive, especially in the more inaccessible portions of the islands." (1902:369)

Stokes (1921:229) attributed the decline in *hola* (poison) fishing to the adoption of the method of fishing with dynamite.

Kahaulelio (February 28, 1902) repeatedly talks about the use of mosquito net (which must have been an import) for fishing.

D. Early Twentieth Century Changes (to WW II)

Noting that no mention was made by Kahaulelio, Beckley or Cobb of the propulsion of spears by slings or elastic bands, Newman (1970:52) concluded that the propulsion of spears by methods other than a thrust of the hand , "such as the 'Hawaiian sling' ...was undoubtedly of twentieth century origin."

Hosaka, writing in the early 1940s, was quite familiar with Hawaiian sling spear including both "plain" and "trigger" versions. It is believed that the Hawaiian sling was invented in Hawai'i in the early twentieth century. Traditionally it utilized a thin (1/4 inch diameter) metal shaft (perhaps clipped from fencing wire), strips of inner tube for elastic propulsion and a short segment of bamboo which served as a grip, to which the inner tube rubber was attached, and through which the shaft was guided. The "trigger version" relied on manual compression of a strip of metal (the trigger) to cause enough friction on the shaft to prevent firing. By the time Hosaka's book was pulished (1944), it appears that spring steel barbed shafts were commercially available but he seems to know

nothing of diving fins or snorkels. Clearly heavy rubber face masks were commercially available by then but Hosaka relates that goggles "usually made of the wood of hau or castor bean plant" were still in use. It seems virtually certain that such indigenously produced goggles predated face masks but they may have been a twentieth century invention as well. Hosaka (1944:41, 49) discusses other types of "gig" or jabbing spears that were in common use in the early 1940s including two-pointed, three-pointed, four-pointed and many-pointed spears, typically with a wooden handle, 5 to 6 feet long. It seems that two-pointed and four-pointed spears were most common with the tines arranged either parallel or radiating but all in a plane. The many-pointed spear was a curious innovation. Hosaka (1944:41) relates these details; it was

> ...made by adding the short points to the handle in a spiral manner. The points were formerly made of hard wood, but stiff wire usually is used now. This type of spear is used for throwing into the midst of a school of fish, such as mullet, and *uoaōa*, or aimed at a large floating fish, such as *uhu* and *nenui*.

It is uncertain when SCUBA diving was first used for fishing in Hawai'i but MacKellar (1956:80, photos) was quite familiar with it by 1955. It is interesting to note that the snorkel was still "a new breathing device" (MacKellar 1956:79) at a time when SCUBA was already popular. Diving fins were widely used by the mid 1950s but old-timers preferred the Japanese *tabis* or bare feet.

Some new innovations in fishing techniques seem to have had dramatic results. Cobb (1905:438) notes that, between 1900 and 1903, "the catch of *akule* quite materially increased...owing to the introduction by the Japanese of a method of catching them with hook and line."

By the beginning of the twentieth century, imported ropes and lines of natural fibers (cotton, hemp) had almost totally replaced native production of lines. By the time

Hosaka's book was published (1944), lines were made out of commercially available "linen" and "cord" (he specifically recommends "number 28 to 42 twisted" and number 60).

By 1944, commercially available rods and reels were much as they would be at the close of the twentieth century. Fish traps were being made out of a metal frame and one inch mesh "chicken wire." "Glass boxes" (now more commonly called "squid boxes" or "look boxes") constructed of four, trapezoidal, one-inch thick boards and a glass plait bottom, bracing, handles, and rubber padding so the upper chest and face could rest on the top. Hand-made kerosene torches were still in use but the Coleman Lamp Co.'s "knapsack torch" with three-gallon gasoline container, hand pump, pipe, valve and asbestos wick was also popular.

After 1950, nylon, monofilament, and polypropylene would come to be used almost exclusively for fishing lines, and for the majority of fishing nets.

E. Implications of Change in Fishing Technology for Marine Management at Kaho'olawe

This study of fishing technology over time has led to the conclusion that Hawaiians did not so much appropriate foreign technologies as they adapted new materials and techniques. From the fashioning of fishhooks from iron rails documented in 1779 to the early twentieth-century creation in Hawai'i of the "Hawaiian Sling" spear, there is a continuing processing of Hawaiian fishing innovation. Many of these innovations became "accepted methods of Hawaiian fishing" (as Taua says of the historically introduced throw net). Many of these Hawaiian fishing innovations, however, have passed away or are passing away. Perhaps this is because modern store-bought technologies have replaced them, or there has been a break in the teaching of fishing arts from generation to

generation, or the decrease in fish stocks and allures of the modern world have devalued such traditions. Consideration should be given to the perpetuation of some of these historic Hawaiian methods of fishing. This should be done because these historic methods are, in many cases, as Hawaiian as prehistoric methods and because some of these fishing methods (notably throw netting) are particularly association with the island of Kaho'olawe by our available sources.

This brief study on historic fishing has also brought to light that the Kingdom of Hawai'i actively encouraged an indigenous Hawaiian whale fishery and, indeed, granted permission to establish a whaling station on Kaho'olawe in 1858. It seems a virtual certainly that many Hawaiians were involved in Coastal Bay Whaling off Maui in the mid-nineteenth century. Furthermore, it seems clear that the Kingdom of Hawai'i actively encouraged sealing, including the commercial slaughter of *Monachus* Hawaiian Monk Seals.

Federal and State laws of curse protect all species of whales and Hawaiian monk seals. It is unclear whether such laws will always remain in force, given precedents for aboriginal taking of protected species, once some form of native Hawaiian political autonomy is established.

Clearly there is an overwhelming popular sentiment against the harvesting of whales and seals in Hawaiian waters. It is recommended that the K.I.R.C. follow the federal mandates against the taking of whales and seals even though there may be historic justification for such fisheries.

VII. *Nā Ko'a of Kaho'olawe*: The *Ko'a* of Kaho'olawe

The *ko'a* or fishing shrines of Kaho'olawe have been discussed previously by Reeve and Reichel (1993: 4-10). Without wishing to detract from their good work, this study wishes to expand upon it and draws upon many of their sources. The *ko'a* of Kaho'olawe are unique from an archaeological/historical perspective because of their large number, excellent state of preservation, and the association of specific traditions with some of them. There may be more intact *ko'a* features on Kaho'olawe than on any of the other Hawaiian islands.

Pukui and Elbert (1986:156) provide the following entries under "*ko'a*":

> 1. Coral, coral head; 2. Fishing grounds usually identified by lining up with marks on shore, 3. Shrine, often consisting of circular piles of coral or stone, built along the shore or by ponds or streams, used in ceremonies as to make fish multiply; also built on bird islands, and used in ceremonies to make birds multiply.

These are of course related concepts. The haunts of fish or fishing grounds were probably associated with conceptions of organic/lithic growth exemplified by coral. The ability to find such grounds was often the difference between fishing success and failure and would typically be done, as it is today, by triangulation or the lining up of two or more pairs of landmarks. *Ko'a* shrines served a purpose of increasing the catch of fish by ritual propitiation of deity, but they also facillitated the locating of off-shore fishing grounds. The term *ko'a* also refered to sites with religious functions other than fishing (discussed below).

The versions of the legend of the origin of *ko'a* shrines (legends of 'Ai'ai and his father Kū'ula kai) typically emphasis that the setting up of fishing shrines (*ko'a*) on or near the coast was deliberately to serve as markers for the triangulation of off shore

generation, or the decrease in fish stocks and allures of the modern world have devalued such traditions. Consideration should be given to the perpetuation of some of these historic Hawaiian methods of fishing. This should be done because these historic methods are, in many cases, as Hawaiian as prehistoric methods and because some of these fishing methods (notably throw netting) are particularly association with the island of Kaho'olawe by our available sources.

This brief study on historic fishing has also brought to light that the Kingdom of Hawai'i actively encouraged an indigenous Hawaiian whale fishery and, indeed, granted permission to establish a whaling station on Kaho'olawe in 1858. It seems a virtual certainly that many Hawaiians were involved in Coastal Bay Whaling off Maui in the mid-nineteenth century. Furthermore, it seems clear that the Kingdom of Hawai'i actively encouraged sealing, including the commercial slaughter of *Monachus* Hawaiian Monk Seals.

Federal and State laws of curse protect all species of whales and Hawaiian monk seals. It is unclear whether such laws will always remain in force, given precedents for aboriginal taking of protected species, once some form of native Hawaiian political autonomy is established.

Clearly there is an overwhelming popular sentiment against the harvesting of whales and seals in Hawaiian waters. It is recommended that the K.I.R.C. follow the federal mandates against the taking of whales and seals even though there may be historic justification for such fisheries.

VII. *Nā Ko'a of Kaho'olawe*: The *Ko'a* of Kaho'olawe

The *ko'a* or fishing shrines of Kaho'olawe have been discussed previously by Reeve and Reichel (1993: 4-10). Without wishing to detract from their good work, this study wishes to expand upon it and draws upon many of their sources. The *ko'a* of Kaho'olawe are unique from an archaeological/historical perspective because of their large number, excellent state of preservation, and the association of specific traditions with some of them. There may be more intact *ko'a* features on Kaho'olawe than on any of the other Hawaiian islands.

Pukui and Elbert (1986:156) provide the following entries under "*ko'a*":

> 1. Coral, coral head; 2. Fishing grounds usually identified by lining up with marks on shore, 3. Shrine, often consisting of circular piles of coral or stone, built along the shore or by ponds or streams, used in ceremonies as to make fish multiply; also built on bird islands, and used in ceremonies to make birds multiply.

These are of course related concepts. The haunts of fish or fishing grounds were probably associated with conceptions of organic/lithic growth exemplified by coral. The ability to find such grounds was often the difference between fishing success and failure and would typically be done, as it is today, by triangulation or the lining up of two or more pairs of landmarks. *Ko'a* shrines served a purpose of increasing the catch of fish by ritual propitiation of deity, but they also facillitated the locating of off-shore fishing grounds. The term *ko'a* also refered to sites with religious functions other than fishing (discussed below).

The versions of the legend of the origin of *ko'a* shrines (legends of 'Ai'ai and his father Kū'ula kai) typically emphasis that the setting up of fishing shrines (*ko'a*) on or near the coast was deliberately to serve as markers for the triangulation of off shore

fishing grounds. Not every off shore fishing ground was located through "line ups" utilizing on shore *ko'a* structures, but many were.

Kamakau (1976:133) considers *ko'a* ("shrines") to be a subset of *heiau* ("preChristian places of worship') and calls them *heiau ko'a*. He is certainly correct in that *ko'a* are fundamentally places of "*hai*" ("offering, sacrifice") which is a functional definition of *heiau* (Valeri 1985:173). Other authors treat *ko'a* as a relatively unique and discrete entity from *heiau* and this perhaps is not in error either.

Kamakau (Ibid.) writes:

> *Heiau ko'a*, fishing shrines, were sometimes large, but most of them were small. Some consisted of a house enclosed by a wooden fence, and banana offerings were made in them; but most were exposed to view and were just rounded heaps of stones with a *kuahu* altar where pigs were baked. When the offering had been made and the pig eaten, the *ko'a* was left exposed but the *imu* and its stones were covered over with dirt and packed down. *Heiau ko'a* were close to the beach or in seacoast caves, on lands with cliffs. The purpose of the *heiau ko'a* was important. The *ko'a* brought life to the land through an abundance of fish; there was no other purpose for the *ko'a* than this. There were many kinds of gods of the people who worshipped fishing gods. The people whose god was Ku'ula built *Ku'ula ko'a*; those whose god was Kanemakua built *Kanemakua ko'a*, and those of Kinilau, Kamohoali'i, and Kāneko'a did likewise, and so there were many, many *ko'a*.

Kamakau (Ibid.) then goes on to correct his earlier statement by noting that *ko'a* were also built and utilized by bird catchers for similar reason, "to give life to the land by an abundance of birds." *Ko'a* were erected by the catchers of sea birds and also by the bird catchers of the forest (Valeri 1985:175). Another use of *ko'a* was in association with voyaging. "The *heiaus* for distant voyaging (*nā ko'a heiau holomoama*) were separate *kuahu* set up when people wanted to go to other lands of this archipelago, or to lands of *Kahiki* ["abroad"] perhaps, or to unknown lands. (Kamakau 1976:144 cf. McAllister 1933:15.)" Yet another function of *ko'a* was as "houses of...*'e'epa* ["peculiar"] beings of many forms," particularly *'aumākua* of the *mo'o* ("water spirit") category (Kamakau

1964:86.) While it seems probable that the majority of ko'a of Kaho'olawe are devoted to deities of fishing and were utilized to increase the catch of fish. It seems not unlikely that some of the *ko'a* are associated with other matters (catching of birds, voyaging, *'e'epa.*)

Perhaps the best archaeological discussion of *ko'a* is presented by Bennett in his study of *Hawaiian Heiaus* (1930 :70-71) and is given below:

> The most common form is a small open platform, which is very similar to a house site, except for its prominent location on the sea bluffs and water"s edge. The platforms average around 10 x 15 feet, though some are as large as 32 x 42 feet. Enclosures like small pens are also found as *ko'as*, and in some of these the walls are high and well built. Natural boulders, in some places covered with small stones, serve as shrines on which to place fish. Doubtless a second purpose was to locate the fishing grounds by sighting two or more *ko'as*. Terraced platforms are found as ko'as in a few places, and oval and circular enclosures of small size are also found. On Maui a horse shoe wall represents a unique type. The *ko'as* are paved with rough stone and coral, or with flat stones and pebbles. Some were built of blocks of basalt or sand stone slabs. Coral is found in most of them. In general the *ko'as* are simple and devoid of any additions to the structure. In a few, however, features are found. House sites are found on some, and in others are pits. A common association is a large flat, generally natural boulder on which to lay the fish offerings. With two *koas*...petroglyphs were associated. In one natural stones in various positions within and without are given the names of gods. Ovens are located in a few *ko'a*.

Ko'a can be devoted to one or to several species of fish (McAllister 1933:68, 156, 163-164). Sometimes specific deities were associated with certain fishes or circumstances. For example, "*ko'a* to the god Kānekoa [were] set up along the banks of rivers, shore and inland ponds (*kuapā me nā loko*) for the increase of *'o'opu* fish. (Kamakau 1964:33.)" Some of the *ko'a* of Kaho'olawe are associated with the deity 'Ai'ai, son of Kū'ula. Thrum (1902:119-120) relates an account furnished by a Mr. Moses Manu:

> Thus was the good work of 'Ai'ai in establishing *ku'ulas*, stations and fish stones continued all around the island of Maui. It is also said that he visited Kaho'olawe and established a *ku'ula* at Hakioawa, though it differs from the others, being built on a high bluff overlooking the sea, somewhat like a *heiau* (temple), by placing stones in the form of a square in the middle of which was left

> a place wherein the fishermen of the island laid their first fish caughtr as a thank offering. *'Awa* and *kapa* were also placed there as an offering to fish deities.

Inez Ashdown, a long time resident of Kaho'olawe and Maui historian, relates the following in an unpublished article "The Valiant Island" (Cited in Reichel 1993:8-9):

> 'Ai'ai's 2 *ko'a* at Kanapou Bay, at Kūheeia Bay, and on Lāna'i are in memory of his father and to remind people of the Laws of the Sea or the *Kānāwai* regarding fishing etc....His 2 *ko'a* at Lae o Ku-aka-iwa and Pu'u Koa'e point to deep sea fishing, also...His two *ko'a* at Hanakanaia Bay (which should be Hono-o-ke-Honu or Hono-kana-i'a) for the "turtle or *Honu*-god which protects Kaho'olawe, were built by 'Ai'ai.

Reeves (:72) relates that in Inez Ashdown's annotations on a copy of McAllister's *Archaeology of Kaho'olawe* (page 10) can be found the following: 'Ai'ai built these ["nine fishing shrines"- she does not say where they are located] in honor of his fatherKūulakai and mother Hina-pu-ku-i'a. Some were more modern & evidently built by devotees among fishermen.

Reichel (1993:9) relates that in another article, titled "Kaho'olawe," Ashdown states:

> Twin *ko'a* to Ku'ula form a top of an imaginary triangle, the point of which indicates a deep sea fishing hole. Those *ko'a* on Kaho'olawe were built as memorial altars to his father, Kū'ula, by the obedient kindly gentle son names 'Ai'ai, the brilliant. The wife of Kū'ula is Hina-puku-i'a and her name refers to the abundance of sea creatures, the fish which we must protect. The largest and most noted *ko'a* on this *'Āina* of Kanaloa which once was rich with verdure and water and sea foods is at Haki-o-wa which is a lae or point near the north side of Kanapou Bay...

It seems probable that Ashdown is relating versions of long standing traditions of certain *ko'a* on Kaho'olawe having been constructed by 'Ai'ai, the legendary builder of the earliest *ko'a* in the Hawaiian Islands.

The exact number of ancient Hawaiian *ko'a* sites on Kaho'olawe is uncertain. A map showing the location of shrine sites has previously been produced (Figure 20), and

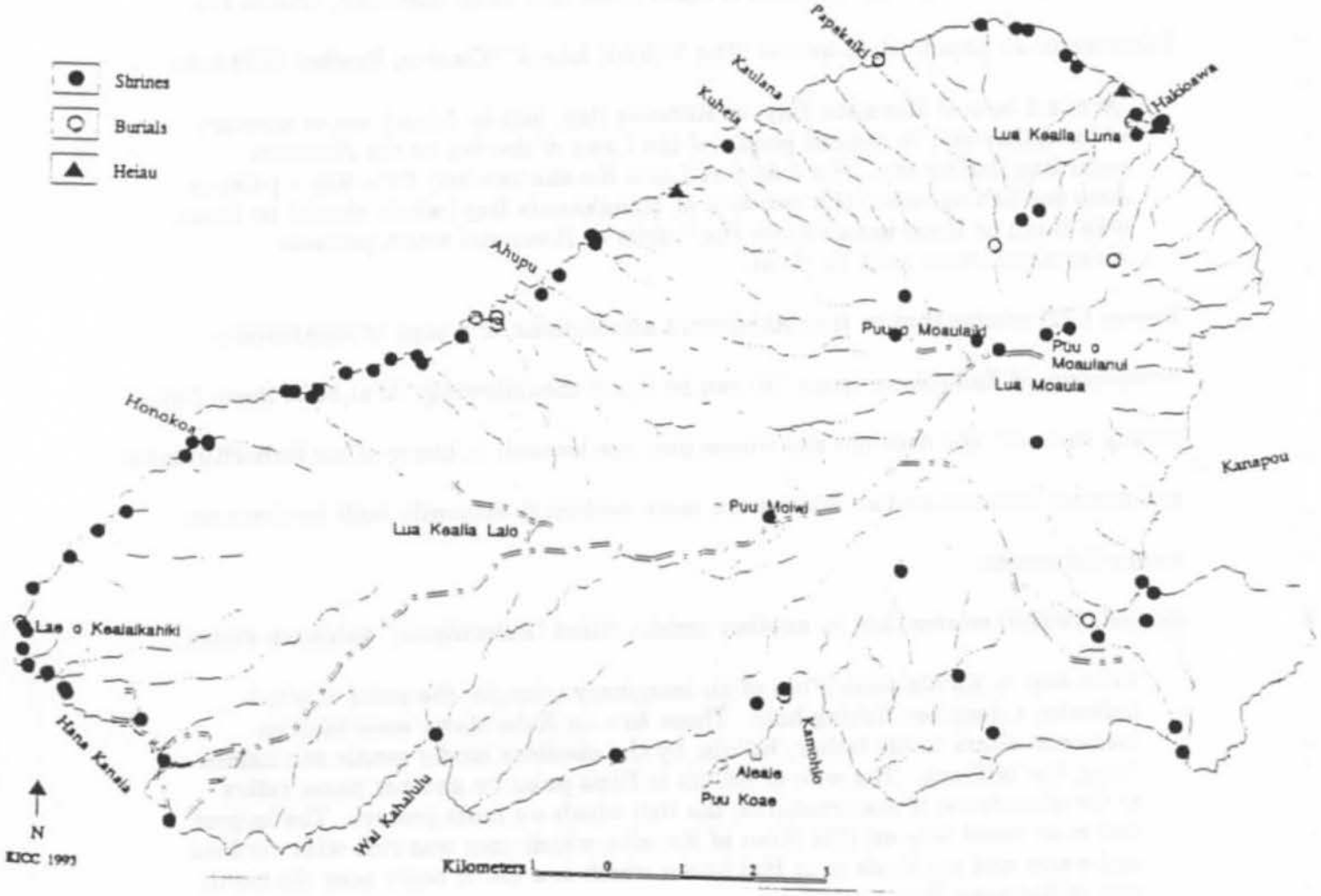


Figure 20 Map of Kaho'olawe Showing Location of Shrines, Burials, and *Heiau* (from Kaho'olawe Conveyance Commission, 1993:61)

while generally accurate, this map is thought to include at least a few mis-identifications.

The presently available archaeological data on Kaho'olawe sites containing probable *ko'a* features is presented in Appendix A by *'ili*.

VIII. Recommendations for Marine Management of Kaho'olawe

Introduction

Today one frequently hears expression of the desire to re-establish Hawaiian cultural values. Kaho'olawe has been in the forefront of such successful efforts. "In modern Hawai'i, Kaho'olawe serves as the foundation for the revitalization of Hawaiian cultural, religious, and subsistence practices" (*Kaho'olawe Use Plan* 1995:12). One way in which Kaho'olawe can serve to further foster such values is through the encouragement of Hawaiian fishing practices and values. As the revitalization of Hawaiian subsistence practices has been identified in the vision statement as a specific end, the question then becomes how best to pursue the stated goal "to educate future generations in traditional Hawaiian fishing practices" (*Kaho'olawe Use Plan* 1995:40).

Increasingly the Hawaiian people and the people of Hawai'i are becoming removed from the subsistence fishing practices of the past. This loss of ancient fishing skills was noted as early as the mid-nineteenth century by Kamakau ("There are no fishermen like that today."; 1976:62) and Beckley ("there has been no regular fishing for it [*niuhi*] for the last eighty years"; 1883:11); and Kahaulelio wrote in 1902 (*Maraki* 14, 1902:4) of methods of fishing that "had not been done for more than thirty years (*he 30 makahiki a oi I hala ae nei, pau loa kēia 'ano lawai'a*)" and other methods which were "vanishing" ("*e nalowale loa 'ana kēia 'ano lawai'a*") (*Mei* 16, 1902:3) More than one hundred years ago, these Hawaiian authors were fully aware that Hawaiian fishing methods were vanishing. This loss of fishing skills has accelerated in the twentieth century. Fishing methods which many of us once commonly observed or participated in - such as *paeaea 'a'ama* (snaring *'a'ama* crabs by their eye stalks), gathering *limu* (seaweed), *lau* net fishing (using lines with dependent *ti* leaves to drive fish), or net making - are rarely

observed today. Sadly such pre-contact fishing methods are unknown to many of Hawai'i's youth. Furthermore, even such historic fishing methods as using a "look-box" (*Kilo he'e)* to catch octopus, using a "Hawaiian sling" spear, or a throw net (*'upena poepoe*) are rapidly becoming techniques only practiced by "old timers." The reasons for the decline of such traditional practices are many, including a general decline in fish stocks, the availability of more modern and efficient techniques, the increasing distractions of the modern world, and the decline in communication between generations.

A marine management plan for Kaho'olawe should seek to encourage the retention and dissemination of Hawaiian fishing techniques. This should include particularly the encouragement of pre-contact fishing methods, but should also include the encouragement of certain historic practices which have become traditional and are now passing away. This will not be easy for a number of reasons which are summarized below.

Problems with encouraging the retention and dissemination of Hawaiian fishing practices in the marine management of Kaho'olawe.

1. The vast majority of Hawaiian fishing practices involved some degree of contact with the sea floor. Hence consideration should be given to the health risks of fishing in the ordinance-rich coastal waters of Kaho'olawe.

2. The marine resources of Kaho'olawe are not so very attractive. The *Kaho'olawe Island Nearshore Marine Resources Inventory* (18) makes it clear that "Kaho'olawe's fish population was not as impressive as one may have expected." The biomass in pounds per acre is simply not so very high, ranking fourth of six areas in the Hawaiian Islands compared in the DLNR study (16). "The fish population around

Kaho'olawe consisted mostly of small or juvenile fish (15)," in fact Kaho'olawe had the smallest average fish size of the six areas compared. The most common fish species at Kaho'olawe (the top five in terms of biomass are: 1) the surgeon fish *Umaumalei*, 2) the surgeon fish *'ōpelu kala*, 3) the surgeon fish *Māikoiko*, 4) the surgeon fish *Mai'i* and 5) the black triggerfish *Humuhumu 'Ele'ele)* are generally little appreciated as food fish today.

3. Any type of effective encouragement of traditional fishing methods would seem likely to include the restriction (*kapu*) of certain modern types of fishing methods which raises the issue of enforcement. It is unclear how such enforcement would be best handled in terms of issues of personnel, costs, powers, sanctions, etc.

4. Many fishermen have been fishing the waters of Kaho'olawe for generations using modern technologies such as rod and reel, monofilament nets, SCUBA gear, "*arbalete*"-style spear guns, etc. The use of these modern technologies in fishing have undoubtedly become traditions in some families. The rights of these fishermen to continue these practices should be taken into consideration.

5. A number of traditional Hawaiian fishing methods (small-meshed nets, fish poison, human bone fishhooks) and target species (turtles, small fish) are in conflict with present federal and state laws.

6. Many traditional Hawaiian fishing methods focus on small, herbivorous species which are little appreciated today for their food value.

7. Many traditional Hawaiian fishing methods use native plant species uncommon or rare today.

8. Many traditional Hawaiian fishing methods are very labor intensive.

9. To advocate traditional Hawaiian fishing practices may be to urge people into

harm's way. Injury and death are not so uncommon in fishing Hawai'i's waters and such risks would only be increased in trying to work with novices and with unfamiliar techniques. Pre-contact fishing methods are often riskier than methods using modern safety technology.

General Recommendations:

It is recommended that consideration be given to the establishment in perpetuity of one or more "*Kai Kapu*" discussed in the *Kaho'olawe Use Plan* (1995:23). As stated in that plan, the purpose would be "to provide a *pu'uhonua kai* for marine animals so that they may regenerate. In these areas, the shoreline would remain unimproved and fishing activities will not be allowed." The selection and designation of the locations and boundaries of these *Kai Kapu* would seem to be done best in consultation with marine biologists and local fishermen. While the three sites designated for *Kai Kapu* in the Plan (Lae o Kealaikahiki, the inlet just west of Kamōhio Bay, and at Kanapou Bay) seem appropriate, one or more of these sites might be considered in relation to the restrictive fishing recommendations made below. Such a "*Kai Kapu*" designation might not be incompatible with recreational and/or educational use. The *Kaho'olawe Island Nearshore Marine Resources Inventory* (DLNR, 1993:13) notes that commercial dive charter boats used Kanapou Bay which is cited (1993:9) as an area of "excellent underwater clarity" having "extensive" coral coverage. Under Chapter 6K of the Hawai'i Revised Statutes, commercial use of Kaho'olawe waters is strictly prohibited (*Hawai'i Fishing News,* October 1995:11). Possibly an exemption and a mutually beneficial relationship with one or more such commercial companies could be arrived at in the future that would augment or facilitate the vision of the Kaho'olawe Reserve Commission.

It is recommended that consideration be given to placing a *kapu* or reserving certain areas of coastline for traditional pre-contact fishing methods. Fish catching methods in designated areas would not be allowed to include any use of metal, or other modern man-made substances (nylon, monofilament, plastic, fiberglass) with the exception of safety equipment (*tabi* and other footwear, wet suits, life vests, etc.). Such restrictions (*kapu*) should initially be for designated time periods (rather than in perpetuity from the start) to allow for some assessment. A period of two years might allow sufficient time for some preliminary assessments. It seems unlikely that the limitation of fishing activities on a seasonal basis (Cf. Kaho'olawe Use Plan 1995:23) would allow for data sufficient for decision making. Making some exceptions, such as allowing the use of hand-made cotton lines and nets, imported wood, and of masks, fins and snorkels might serve to significantly encourage the practice of traditional methods.

It is recommended that consideration be given to placing a *kapu* or reserving certain areas of coastline for traditional post-contact fishing methods. Such restrictions might be made for an initial two-year period to allow for some assessment of workability. The purpose of this designation would be to encourage the retention of native Hawaiian arts that developed with the appropriation of the technology and methods of other peoples. Methods to be allowed in such designated areas would be those that developed in Hawai'i between 1778 and circa 1914. This would allow for the use of metal hooks, lures, and spears, and such historic innovations as the throw net and Hawaiian sling spear. Fishing methods arising after circa 1914 would be prohibited.

It is recommended that consideration be given to reserving certain areas of coastline in which the use of all modern (legal) fishing methods might be allowed. As we approach the twenty-first century, it should be recognized that certain "modern" fishing

practices, fishing with rod and reel for example, are areas in which native Hawaiians and other people of Hawai'i have acquired a good deal of skill and passed on this learning for generations. It may be appropriate to encourage even such modern practices for they have become traditional for many people.

It is recommended that cultural monitors be encouraged to familiarize themselves with indigenous Hawaiian fishing methods, practices, and terminology and perhaps be given some incentive to foster the development of such methods and skills. While it seems desirable to free the cultural monitors from any "enforcement" duties they might have a certain role in monitoring compliance in areas with restricted fishing.

The guiding principles of the *Kaho'olawe Use Plan* calls (1995:8) for "learning from...the ocean." It is recommended that fishing customs and practices and associated Hawaiian values be considered as a major focus of such learning. An important component of this learning would be group activities organized at the *Kahua kauhale* (Educational and Cultural Centers/Work Camps) and *Kahua ho'omoana (*Overnight Campsites). These activities would be overseen by cultural monitors and/or visiting experts who would volunteer to share their knowledge with Hawaii's youth. Any fishermen who protest their "exclusion" from fishing Kaho'olawe might be met with a cordial invitation to come to Kaho'olawe and share their expertise in such settings. Such activities might include net manufacture and mending, fishhook and line manufacture, discussions of fishing lore, anti-erosion activities, and other learn-by-doing endeavors.

Recommendations for Infrastructure

Little in the way of infrastructure would be needed for the implementation of a program for the revival of Hawaiian fishing culture but a few points merit mention.

The development of "a shoreline and *mauka-makai* trail system" is called for in the *Kaho'olawe Use Plan* (1995:21) and would undoubtedly facilitate the revival of Hawaiian fishing culture on Kaho'olawe by facilitating access to the coastline.

While the *Kaho'olawe Use Plan* (1995:21) calls for the establishment of permanent moorings (*awa kū moku*) at four spots (the three coastal *Kahua kauhale* at Hakioawa, Kūheia, and Honokanaia and at Ahupū) "to afford safe access," the establishment of more permanent moorings should be reconsidered. The establishment of a number of permanent moorings (particularly at the *Kahua ho'omoana*) could aid substantially in facilitating the safe practice of Hawaiian fishing techniques (as well as minimizing damage to coral from anchoring). In the absence of moorings, benthic fishing activities become more problematic because of the issue of unexploded ordinance. Moorings could provide relatively safe points at which off-shore canoe fishing could be undertaken.

One of the guiding principles of Kaho'olawe management plans is that "the land and the sea are interconnected and inseparable" (*Kaho'olawe Use Plan* 1995:40). One way of emphasizing this might be through the construction of *hālau wa'a* (canoe houses) and *pā wa'a* (canoe enclosures) at the *kahua kauhale* and *kahua ho'omoana* as called for in the *Kaho'olawe Use Plan* (1995:21,22). It is recommended that the selection of sites for such structures and the selection of sites from which to acquire stones for foundation construction be made in consultation with cultural monitors and an archaeologist to avoid any disturbance of archaeological sites. Because of the legal complexities surrounding even the most modest constructions in a coastal zone and recent unfortunate misunderstandings related to similar enterprises, it is recommended that such constructions be planned in advance in coordination with the Department of Land and Natural Resources. Such constructions would be a logical focus for educational and

cultural activities associated with fishing.

Consideration might be given to the construction of one or more modest weirs (*pā i'a*) or fish holding ponds. Such constructions well illustrate values of *lau lima* and create a sense of accomplishment in addition to potentially ensuring a supply of at least some fish. If properly situated such a structure might also provide an improved location for canoe landing. The same concerns regarding adverse impact to archaeological sites and legal issues expressed above would apply.

The *ko'a* of Kaho'olawe are an area of particular concern. It is appropriate that these foci of religion associated with traditional Hawaiian fishing be incorporated in any revival of Hawaiian fishing culture. On the other hand, contemporary expressions of spirituality at some Hawaiian religious sites in the recent past have resulted in the alteration of these structures to the point where there may be conflict with existing Historic Preservation laws. Two ideas are thus suggested. Traditional *ko'a* that are to be re-used extensively should be thoroughly documented by archaeologists. Another option, which has already been implemented would be the construction of new *ko'a* structures at appropriate locations which would then serve as the proper focus for contemporary ritual activity. Such constructions should be done in coordination with cultural experts and archaeologists to conform with existing Historic Preservation laws.

IX. Glossary of Hawaiian Fishing Terms (for fish names see Titcomb 1972)

'A'ai — "To take bait readily, as fish." "Same as *'a'ei*, a net," specifically a vertical-pull bag net such as the *'upena 'a'ai 'ōpelu*.

'A'ali'i — A hard wood(*Dodonaea sp.*) favored for fishing spears and *melomelo* sticks.

'A'a niu — "Cloth-like sheath at the base of coconut frond" Pounded baits and a stone would be wrapped in such fibers and lowered to fishing grounds on a line which would then be shaken to release the bait (Kamakau 1976:79).

'A'a pulu niu — Coconut husk fiber or coir occasionally used as fishing line.

A'a pu'upu'u — "Knots in a fish net."

'Aea — "Cord, as used in joining two or more nets into a larger one."

'A'ei — "Fine net as used for *'ōpelu* and *maomao* fish; it was held open at the mouth by *kuku*, stretching poles." Same as *'upena nae kuku* (Kamakau 1976:60).

'A'ei mououo — (or *'ūpena pōuouo*) "Two-finger mesh dip nets, for young *uhu* and *kahala* fishes. (Kamakau 1976:60)"

'Āheahea — "A hardwood (*Chenopodium oahuensis*) used for shark hooks. Same as *'āweoweo*.

Aho — "Line, cord, lashing, fishing line, thong"

Aho kākele — "Trolling line"

Aho kālewa — "Trolling line"

Aho loa — "Long line, as with several hooks for deep sea fishing or for sounding" also "to hold the breath for a long time, as divers and chanters"

Aho lopi — The fine thread used in the *Paeaea 'A'ama* method of snaring crabs by their eyestalks.

Ahu — "A traplike stone enclosure made by fishermen for fish to enter." Also *umu* and *imu*.

'Ahu'awa — A sedge, *Cyperus javanicus*) fiber occasionally used in fishing line.

'Ākia — A plant, *Wilkstromis sp.*, particularly *W. sandwicensis,* mentioned in

IX. Glossary of Hawaiian Fishing Terms (for fish names see Titcomb 1972)

'A'ai — "To take bait readily, as fish." "Same as *'a'ei*, a net," specifically a vertical-pull bag net such as the *'upena 'a'ai 'ōpelu*.

'A'ali'i — A hard wood(*Dodonaea sp.*) favored for fishing spears and *melomelo* sticks.

'A'a niu — "Cloth-like sheath at the base of coconut frond" Pounded baits and a stone would be wrapped in such fibers and lowered to fishing grounds on a line which would then be shaken to release the bait (Kamakau 1976:79).

'A'a pulu niu — Coconut husk fiber or coir occasionally used as fishing line.

A'a pu'upu'u — "Knots in a fish net."

'Aea — "Cord, as used in joining two or more nets into a larger one."

'A'ei — "Fine net as used for *'ōpelu* and *maomao* fish; it was held open at the mouth by *kuku*, stretching poles." Same as *'upena nae kuku* (Kamakau 1976:60).

'A'ei mououo — (or *'ūpena pōuouo*) "Two-finger mesh dip nets, for young *uhu* and *kahala* fishes. (Kamakau 1976:60)"

'Āheahea — "A hardwood (*Chenopodium oahuensis*) used for shark hooks. Same as *'āweoweo*.

Aho — "Line, cord, lashing, fishing line, thong"

Aho kākele — "Trolling line"

Aho kālewa — "Trolling line"

Aho loa — "Long line, as with several hooks for deep sea fishing or for sounding" also "to hold the breath for a long time, as divers and chanters"

Aho lopi — The fine thread used in the *Paeaea 'A'ama* method of snaring crabs by their eyestalks.

Ahu — "A traplike stone enclosure made by fishermen for fish to enter." Also *umu* and *imu*.

'Ahu'awa — A sedge, *Cyperus javanicus*) fiber occasionally used in fishing line.

'Ākia — A plant, *Wilkstromis sp.*, particularly *W. sandwicensis,* mentioned in

	connection with poison (*hola)* fishing.
'Āki'iki'i	"Dip net as used in fishing *uhu*. Also *'upena pāki'iki'i*."
'Āku'iku'i	"A long fish net; to drive fish into the net by striking the water with sticks. Also *pāku'iku'i*."
'Ala'ala	"Ink sack in octopus or squid." Prepared in various ways which usually included the drying and broilling of the ink sacks. The *'ala'ala* was a favorite bait Pukui and Elbert relate "mixed with *'auhuhu* juice it was used as a bait, which is curious in that *'auhuhu* was a fish poison.
Alahe'e	A hard wood(*Canthium odoratum*), favored for fishing spears shark hooks, and net spreaders. Same as *Walahe'e*.
'Alihi	"Cords or fine ropes threaded through marginal meshes of upper and lower edges of nets, to which were attached floats and sinkers."
'Alihi kēpau	Lead line of a historic net.
'Alihilele	"Dragnet, mullet net." A method of fishing using a long net. (Kamakau 1976:60).
'Alihi pīkoi	Float line of a net.
'Alihi pōhaku	Sinker line of a net.
Alo	A mark on a bottom fishing line at approximately 270 ft.
Ama	"Outrigger float" on an outrigger canoe.
'Āmana	"Shaft of an octopus lure."
Anana	"Fathoms" or distance of approximately 6 ft.; "to count by this measurement or by fathoms". "The Catholic teachers from Europe...adopted this word to mean a meter (Kamakau 1976:50)" hence the term is often quite indefinite.
'Ānapanapa	A plant, *Columbrina asiatica,* mentioned in connection with poison *(hola)* fishing.
Ani	"To draw a net over te surface of water."
'Api	"A decoy stick basket [a basket made of sticks] with a wide opening; it was baited and after the fish were accustomed to coming for food, a trap was substituted."

ʻĀpua "A fish trap" same as *pai*; "Shank knob of a fishhook (also *puapua,*)" perhaps more acurately the head on the end of the shank to which the snood was attached.

ʻĀpua ʻōpae A shrimp trap.

Apuapu "File, rasp; to smooth or sharpen with a file" as in the manufacture of fish hooks. "Beard of a fish hook."

Apuapu ʻānai makau "Fish hook file."

Apuapu pele "Files made of lava (Kamakau 1976:77)."

Au "To set, as a net or fish trap." Also used to refer to haunts or crevices frequented by fish.

ʻAu "The man who sets a *kuʻu*, drop net."

ʻAuhau hola moku Mass poisoning of fish. (Kamakau 1976:60)"

ʻAuhuhu "A slender shrubby legume, *Tephrosia purpurea,* 30 to 60 cms. high, with small compound leaves, small white or purplish flowers, and narrow pods used for poisoning fish (*hola).*"; to drug fish with this plant.

ʻAukā "Wood woven through sticks in *ʻie kala* fish trap."

Āukauka "Fishing grounds, identified by lining up with landmarks ashore."

ʻAukuʻu "Kind of fishhook with a long slender shaft, perhaps named for its resemblance to a heronʻs neck." "Cords held by the fisherman (*hoʻāu*) who managed the net in *kuʻu* fishing.

Aumaiewa "Large-mouthed net placed at the wings of the *papa hului* net to receive fish; used in deep water." "A type of *lau* fishing. (Kamakau 1976:60)."

ʻAumakua (*ʻAumākua* in the plural) "Family or personal gods," often associated with sea life and fishing; "to offer grace to *ʻaumākua* before eating; to bless in the name of *ʻaumākua*.

Aupula "Fishing with a *pula* stick or *pūlale* to drive fish into a net."

ʻAuwae "Portion of the point of a pearl-shell lure which overhangs the shank."

ʻAwa A plant, *Piper mythisticum* mentioned in connection with *hola* fishing poisons.

'Āpua	"A fish trap" same as *pai*; "Shank knob of a fishhook (also *puapua,)*" perhaps more acurately the head on the end of the shank to which the snood was attached.
'Āpua 'ōpae	A shrimp trap.
Apuapu	"File, rasp; to smooth or sharpen with a file" as in the manufacture of fish hooks. "Beard of a fish hook."
Apuapu 'ānai makau	"Fish hook file."
Apuapu pele	"Files made of lava (Kamakau 1976:77)."
Au	"To set, as a net or fish trap." Also used to refer to haunts or crevices frequented by fish.
'Au	"The man who sets a *ku'u*, drop net."
'Auhau hola moku	Mass poisoning of fish. (Kamakau 1976:60)"
'Auhuhu	"A slender shrubby legume, *Tephrosia purpurea,* 30 to 60 cms. high, with small compound leaves, small white or purplish flowers, and narrow pods used for poisoning fish *(hola).*"; to drug fish with this plant.
'Aukā	"Wood woven through sticks in *'ie kala* fish trap."
Āukauka	"Fishing grounds, identified by lining up with landmarks ashore."
'Auku'u	"Kind of fishhook with a long slender shaft, perhaps named for its resemblance to a heron's neck." "Cords held by the fisherman (*ho'āu*) who managed the net in *ku'u* fishing.
Aumaiewa	"Large-mouthed net placed at the wings of the *papa hului* net to receive fish; used in deep water." "A type of *lau* fishing. (Kamakau 1976:60)."
'Àumakua	(*'Aumākua* in the plural) "Family or personal gods," often associated with sea life and fishing; "to offer grace to *'aumākua* before eating; to bless in the name of *'aumākua*.
Aupula	"Fishing with a *pula* stick or *pūlale* to drive fish into a net."
'Auwae	"Portion of the point of a pearl-shell lure which overhangs the shank."
'Awa	A plant, *Piper mythisticum* mentioned in connection with *hola* fishing poisons.

'Āweoweo	Same as *'āheahea*, a hardwood used for shark hooks.
'Āwikiwiki	Vines (*Canavalia* sp.) commonly used in constructing *Hīna'i ho'olu'ulu'u* Basket fishtraps.
'Eho	"Heap of stones underwater (at times fishermen block one end with a net and drive the fish in from the other end), also *umu*, *imu*," but perhaps most commonly natural, as opposed to manmade structures like *umu*. Also used to refer simply to round rocks where one may find *'opihi* limpets (Tau'a HFN Aug. 1983:38).
'Eke	"Sack, pocket, bag basket" typically a long bag often tied on in back used to hold the catch; bag-shaped fish net.
Hā	"Stick or furrowed stone used as a sinker, with hooks attached [also called *hā lawai'a*]." A type of watercourse or trough-like fish trap or weir for catching 'o'opu at times of freshets (Titcomb 1972:124).
Ha'awa	To Kahaulelio this was the name of gorge fishing for eels (probably a variant of *haoa puhi*).
Haha	(*Haha 'upena; haha kā 'upena*) "Net spacer or mesh stick, gauge used in making meshes in nets."
Hāhā (Hāhāmau)	"To grope, feel, as with the hands, i.e. "hand collecting;" also "trap made of twigs and small branches, for fresh water fish.
Hahau	A method of fishing with a long net (Kamakau 1976:60). This is clarified in the Fornander account (Vol. 6, Pt. 1: 190-191) as a method of gillnet fishing where people splash the sea to drive fish toward a fence or gill net which is set mainly in a straight line but which curves (*pi'o*) at one end to catch fish running parallel to the net in a pocket of the net.
Hālau wa'a	"Long house ...for canoes."
Hāli'i	Seemingly the portion of a bag net lying on the bottom as a "floor" (Kamakau 1976:61).
Hāmama	On a fishing lure, the gape or verticle distance between the tip of the point of the hook and the taut inner snood.
Hānai	To "feed" fish so as to fatten them, improve their flavor, and make them easier to catch in the future. "Fish net or trap, as for *'o'opu* fish." Tying cords which attach a net to a hoop. Tying cord that held together the cross sticks of dip nets like the *'upena kākā uhu* (Kamakau 1976:67).

Hana pa'a	"To make secure" as to set a hook and hook up with a fish.
Hano	"Fish net, as for *mālolo* fish or *'iāo*; bag net."
Haoa puhi	"Gorge used for catching eels"
Hau	(*Hibiscus tiliaceus*) Fiber occasionally used in fishing lines. Wood used for net floats and handles.
Hau ō 'iāo	"*Hau* wood handle attached to net used for *'iāo* fish."
Hau ō mālolo	"*Hau* stick handle of *mālolo* (flying fish) net."
Hawai'i loa	"Name of a line for *ulua* fishing in 17 or more fathoms of water."
Hē	"Edges of the mouth of the square *uhu* (parrot fish) net.
Hei	"Net...ensnare, entangle, catch in a net."
Heiau ho'oulu i'a	"*Heiau* where fish were offered to ensure good fishing."
Heleuma	"stone anchor" used to anchor a canoe or the ends of a net.
Hemo	To free a stone drop-weight from a fishing line with a jerk on the line.
Hī	"To cast or troll, as for bonito, *'ahi*, and *kala*".
Hi'a	"Shuttle or needle for making nets; to knot or fasten the meshes of a net."
Hiana	"Depression or hole as under water."
Hiana ulua	"Hole frequented by *ulua*."
Hihi	"To entangle....A large-meshed fish net." "Larger than hand-size... mesh. (Kamakau 1976:60)"
Hihi manō	"Net made of strong cord used for shark fishing. Also *kāhala*"
Hi'ikala	"Hook used for *kala*, a fish, and baited with *kala*, a seaweed."
Hili	"To whip, smite thrash"; a method of catching fish by smiting them with a paddle.
Hilo	"To twist, braid, spin," the spinning of cord in the production of fishing line. Stokes (1906:106) states it was always done on the bare thigh by women.

Hiohio "Lure for trolling, said to be named for its whistling sound tripping over the water."

Hinahele An *'aumakua* of fishermen..."to whom the *'ohua* fish in the sea were said to belong' (Kamakau 1976:61).

Hīna'i Basket or container made of braided 'ie vine, pandanus or other material; a kind of basket fish trap; a kind of basket fishtrap."

Hīna'i ho'olu'ulu'u used Basket fishtraps, 3-4 feet in circumference, and 1 1/2 in depth to catch *hīnālea* wrasses in the shallows.

Hīna'i *'ōpae* shrimp basket, While Beckley states this is "sometimes called *'āpua 'ōpae* (shrimp trap)," she uses this term for an open scooping basket, "looking something like the coal scuttle bonnets," as opposed to the funnel-shaped traps more properly called *'āpua 'ōpae* or *pai*.

Hīna'i uea "Wire fish trap."

Hina kea "Type of stone laid near the coral pile (*umu*) to attract fish; it was flat on one side and rounded on the other, and was believed to attract *manini* and young of other fish which resembled it in color."

Hina ke kā An *'aumakua* of fishermen. See *Ka puniu o Kapukapu*.

Hō'ā "To drive, as...fish."

Hō'aha "To make or braid *'aha* (sennit)." Stokes (1906:106) states this was the term for coir (coconut husk) braiding.

Hō'aho Stokes (1906:106) states this was the term for making or braiding cords of materials other than coir (coconut husk).

Ho'āu "To set as a net or fish trap; Fishermen who set nets in *ku'u* fishing."

Hō'au'au A method of fishing performed at night and the early morning where swimmers splashed to drive fish into a net. A method of fishing with a long net (Kamakau 1976:60).

Hoene Same as *Mākahi hoene* mesh size.

Hōkeo "Long gourd calabash as used to hold...fishing gear." Kamakau (1976:77,78) relates they "called" to the fisherman to go fishing.

Hōkeo 'ōlulo Long (about a meter) gourd containers for keeping fishing lines (Kamakau 1976:76).

Hola (Also *hohola, hola hola and 'auhuhu*) "To drug fish", "to poison fish"; fish poisoning.

Holo a'a (Also *Holo wa'a*) "A kind of fish net (no data)."

Holoholo "A net into which fish run (*holoholo*) after being frightened; to fish with this net." For Kahaulelio, *holoholo* fishing refered to a method of fishing utilizing walls (*pā i'a*) to channel the scared, running fish into a small net set in a gap of the wall.

Holoholona Same as *ipu holoholona* "Gourd containing fisherman's gear and bait."

Holokuku "Upper edge of an *'ōpelu* fish net."

Holowa'a (Also *Holo a'a*) "A kind of fish net (no data)."

Honua "Central section of a canoe fleet, as fishing *iheihe* fish." Same as *hali'i*, the "floor" of a bag net (Kamakau 1976:64).

Ho'ohaehae "To decoy *uhu* fish by tying an *uhu* to a line."

Ho'okāholoholo "Skittering in fishing." Unclear.

Ho'olaoa Kamakau's term for gorges used in eel fishing (Pukui ands Elbert note varying pronunciations are *la'oa, haoa, ha'oa)*

Ho'olei Common verb for casting or setting of a net. Does not necessarily imply flinging or throwing.

Ho'olewalewa (Same as *lewalewa and maiewa*) "Kind of fish net suspended from a canoe in the deep sea." A bag net and a diving net (Kamakau 1976:62).

Ho'olu'ulu'u "To set a *hīna'i* fish trap."

Ho'ōmo ("To draw in, as a wave") fishing. To Kahaulelio, a kind of group fish driving carried out by a wading group of people.

Ho'omō ("To cut") Kamakau uses this term to refer to bone fish gorges used in deep water fishing.

Ho'omo [Diacritics uncertain], According to Tau'a (HFN August 1990:7), this refered to 'double and single canoes employed for *aku* fishing.'

Ho'omoe "To set, as a ...fishnet."

Ho'omoemoe "To set a line or net" A method of fishing with a long net. (Kamakau

1976:60).

Ho'onoho "Bone hooks lashed together," "two points on one shank."

Ho'opuni "To surround, enclose" ex. "*Ho'opuni akule,* to drive *akule* fish into nets by surrounding them."; "a fine-meshed net."

Hope'a'ei "Part of an *'ōpelu* net." (No data).

Hope hului "The end pocket" of a large bag net (Kamakau 1976:64). Same as *mole* or *mole hului.*

Huakai "Procession, parade", a train or single file movement of a school of fish.

Huikala Fishhook "with inside and outside barbs."

Hukihe'e "Fine-meshed net used for fish fry" or small fish.

Huki lau "A seine; to fish with the seine"

Huli "Same as *hului*, bag net."; "Neck of the end pocket" of a large *papa* bag net (Kamakau 1976:61).

Huli ka Honu Turn the turtle, catching turtles on the beach by turning them over and rendering them helpless.

Hulu "Hackle" or bristle element on a trolling lure; "fishhook with the barb on the outside".

Hului (Also *Papa hului, huli*) "A kind of bag net; to draw such a net."

Hululua "Hook with two barbs."

Humu "Hole by which parts of a hook were bound together"

Hupu "Catch, as of fish."

I'a kahe (*Kahe*) "A run or school of fish."

'Iako "Outrigger boom" on an outrigger canoe.

I'a kū "Run or school of fish."

'a malihini "Stranger fish" such as *uku*, which might be infrequently caught in a given method of fishing (Kamakau 1976:65).

'Ie "Aerial roots of the 'ie'ie vine" (*Freycinetia arborea*) used in *hina'i* fishtrap construction. "Name for fish traps, combined with the name of the fish, as *'Ie Kala, 'Ie palani, etc.*"

'Ie lawe A 'taking basket' much like the larger hīna'i traps but without the cone used to feed fishes for a period of time and accustom them before the similar trap was deployed. Same as an *'api.*

Ihu "Thick end of pearl shell shank," front, or bow of the lure, same as *po'o.*

Ihu o'o Skilled or experienced ('matured nose') fishing or fishermen; same as *ihupani* (Kamakau 1976:62).

Ihupani "Expert, wise person, wisdom *Lit.* closed nose, perhaps refering to deep diving and hence profound knowledge." Expert diver fishermen.

Ihu pōhue "Gourd nose, said of one with superficial knowledge or lack of skill, perhaps so called because one floats like a gourd rather than descends to the depths of knowledge." "Fishing in shallow seas...it requires no more than just floating about on the surface of the sea. (Kamakau 1976:60)."

Imu "Rock and coral fish trap; the fisherman might insert a branch into an opening at one side to frighten the fish into a surrounding net. Also *ahu, umu.*"

'Ini'iniki "To pinch or nip repeatedly" "a way of catching small eels by holding bait on the palm of the hand and clenching the fist when the eel comes." Eel Snatching.

Ipu 'awawa A plant, (*Curcurbita maxima*), mentioned in connection with poison (*hola)* fishing.

Ipu holoholona "Gourd containing fisherman's gear and bait." Kamakau (1976:77,78) relates they "called" to the fisherman to go fishing.

Ipulē'ī "Fishhook container."

Ipuwai kahakai A water gourd for the beach used to hold the catch (particularly eels).

Kā "To make net meshes; to tie; to fish with a pole," "Canoe bailer."

Ka'ā "Snell of a fishline, snood" Lifting cord attached to cowrie shells used in *lū he'e* fishing (Kamakau 1976:89).

Ka'a 'ai Taua (HFN November 1985:22) gives this as a name for a "*palu* feeder" or person whose task is to throw out the *palu* to attract

'Ie	"Aerial roots of the 'ie'ie vine" (*Freycinetia arborea*) used in *hina'i* fishtrap construction. "Name for fish traps, combined with the name of the fish, as *'Ie Kala, 'Ie palani, etc.*"
'Ie lawe	A 'taking basket' much like the larger hīna'i traps but without the cone used to feed fishes for a period of time and accustom them before the similar trap was deployed. Same as an *'api.*
Ihu	"Thick end of pearl shell shank," front, or bow of the lure, same as *po'o.*
Ihu o'o	Skilled or experienced ('matured nose') fishing or fishermen; same as *ihupani* (Kamakau 1976:62).
Ihupani	"Expert, wise person, wisdom *Lit.* closed nose, perhaps refering to deep diving and hence profound knowledge." Expert diver fishermen.
Ihu pōhue	"Gourd nose, said of one with superficial knowledge or lack of skill, perhaps so called because one floats like a gourd rather than descends to the depths of knowledge." "Fishing in shallow seas...it requires no more than just floating about on the surface of the sea. (Kamakau 1976:60)."
Imu	"Rock and coral fish trap; the fisherman might insert a branch into an opening at one side to frighten the fish into a surrounding net. Also *ahu, umu.*"
'Ini'iniki	"To pinch or nip repeatedly" "a way of catching small eels by holding bait on the palm of the hand and clenching the fist when the eel comes." Eel Snatching.
Ipu 'awawa	A plant, (*Curcurbita maxima*), mentioned in connection with poison (*hola)* fishing.
Ipu holoholona	"Gourd containing fisherman's gear and bait." Kamakau (1976:77,78) relates they "called" to the fisherman to go fishing.
Ipulē'ī	"Fishhook container."
Ipuwai kahakai	A water gourd for the beach used to hold the catch (particularly eels).
Kā	"To make net meshes; to tie; to fish with a pole," "Canoe bailer."
Ka'ā	"Snell of a fishline, snood" Lifting cord attached to cowrie shells used in *lū he'e* fishing (Kamakau 1976:89).
Ka'a 'ai	Taua (HFN November 1985:22) gives this as a name for a "*palu* feeder" or person whose task is to throw out the *palu* to attract

'ōpelu.

Ka'aka'a "Variant of *ko'a*, coral head, fishing grounds." Fishing "grounds of the *kahala* and *'ahi* fishes (Kamakau 1976:75)" A "lesser method of fishing (Kamakau 1976:64)." No data.

Kā 'anae "Driving fish, such as mullet, *'anae*, into nets by slapping the water (Kamakau 1976:60)."

Kā'e'e "Handnet hanging on an elipsoidal wooden frame with one end pointed, used for *'ōhua* and other inshore fish; to use this net or a skirt of a dress in this type of fishing."An *'Upena kā'e'e*.

Kāhala "Net made of strong cord used for sharks."

Kahe "A run or school of fish."

Kāhe'e "To catch fish with a scoop or hand net."

Kahekahe (Ho'okahekahe) "Method of fishing with a large net placed in deep water where fish fed or bait had been strewn; to fish thus."

Kahuna lawai'a Skilled fisherman.

Ka'i "Fish net or seine; snood of a fishhook."

Kai'aiki A mark on a bottom fishing line at approximately 360 ft.

Kaiānoa "Bonito lure made of shell; bone fishhook; barbless deep-sea hook composed of two small hooks."

Kā'ihi "A fine-meshed fish net similar to *Kā'ili*."

Kai lawai'a "Fishing grounds."

Kāili "String of fish; string or fiber of any kind on which fish are strung."

Kā'ili "Fine net as used for *'ōpelu* fishing." To cast for fish." Kamakau (1976:65) seems to use the term in a disparaging way, contrasting it to the methods of "those who were trained." Kahaulelio (*Aperila* 18, 1902:6) particularly associates the term with drop-stone fishing for small reef fish (*moano*, *'a'awa*, *hīnālea*), probably because the verb "*kā'ili*" ("to tug and pull...but not with great force") describes the action by which the sinker stone was released.

Kai make (kai malo'o) "Low tide," a preferred time for many types of fishing.

Kai pakī "Driving fish such as mullet, *'anae*, into nets by slapping the water.

(Kamakau 1976:60)"

Kākā — To fish, as for *uhu*, parrot fish, with a square net, or *ulua* with hook and line but no pole; net or nets dropped in a semicircle in shallow water, as for mullets or *'ō'io*." For Kahaulelio, *kākā* fishing is a deep water bottom fishing technique using a 1200 ft. long mainline with many hooks attached to short sidelines.

Kakaka — "Deep-sea fishing with weighted line."

Kākala (Kākalahe'e) — "Octopus hook, used with a stone sinker and a cowry shell."

Kākele (Kākelekele) — "To cast with hook and line as for ulua; To slide, skid, guide" as in moving 'the line bait from side to side (Taua April 1983:8).

Kā lā'au — Refers to a method of fishing in which men, women, and children use sticks (*lā'au*) and coconut sheaths to beat the water to drive fish into a *pāloa* net.

Kala kū — A method of fishing in which a standing or milling ("*kū*") school of *kala* or surgeon fish would be surrounded with a gill net.

Kālī i'a — "String of fish."

Kā makau — "To make a fish hook of bone or other material." 'fish hook maker' (Tau'a January 1984:31).

Kā mākoi (Kā mōkoi) — "To fish with a pole."

Kāmanamana — A mark on a bottom fishing line at approximately 330 ft.

Kāmoe — A mark on a bottom fishing line at approximately 420 ft.

Kāneko'a — An *'aumakua* of fishermen (Kamakau 1976:61).

Kānemakua — An *'aumakua* of fishing; "one of the forms of Kāne in the sphere of fishing who 'possessed' *(noho maluna)* a man by the name of Kānemakua in ancient times (Kamakau 1976:61)."

Kano — "Shank of fishhook."

Kānuku — A mark on a bottom fishing line at approximately the 240 ft. length.

Ka nuku o ka pua'a — "Poetic name for deep sea *ulua* fishing" presumably associated with "*nuku momi*" a variety of jackfish.

Kāpae — The Fornander source (1919:Vol. VI, Pt. 1:184-185) gives *kāpae* as a method of fishing for flying fish with a floating line of approximately

162 ft. baited with lobster or flying fish meat. The tide and wind bear the line, whence perhaps the name (*kāpae* "Name of a trade wind at Hana Maui and Puna Hawai'i.")

Kāpapa "Rhythmic tapping of canoe side with a paddle to drive fish in a net; to do so." *Kāpapa ulua*, "To drive *ulua* thus." Actually, it appears that the purpose is more acurately to attract the curious *ulua* to the sound, the bait, and the hook.

Kāpeku "To splash the feet in the water, as in scaring fish; the person who splashes thus."

Kāpili According to Tau'a (HFN August 1990:7), this refered to a canoe 'manned by three to five men that carried one to two fishing poles.'

Kapuahi "Base of a fishhook point."

Kapu kū'ula Fishing rites (Kamakau 1976:64).

Kapuni A method of fishing using a long net (Kamakau 1976:60).

Ka puniu o Kapukapu A fishing '*aumakua*. "'The coconut shell of kapukapu' is a poetic epithet for the goddess Hina, who as Hina-ke-kā, took the form of a canoe bailer made of coconut shell, *puniu* (Kamakau 1976:89)."

Kauhulu "Gathering of fish in schools near the surface of the sea."

Kauila A hard wood, (*Alphitonia ponderosa*), favored for fishing spears

Kaukau "A lesser method of fishing (Kamakau 1976:64). No data.

Kaulī (lī) "To lash", as a fishhook or two nets together (Kamakau 1976:61).

Kāwa'a "To cast overboard from a canoe, as fish nets...; a method of deep sea fishing with nets." A method of fishing with a long net (Kamakau 1976:60).

Kāwelewele "Lines attached to a fish net."

Ke'aawaileia "Fishhook with more than one barb; small sticks with hooks at each end and line in the middle, as used for small fish."

Kēlou "Hook, to hook."

Kepa "To catch bonito, so named because the fisherman's body turns [*kepa*] as he snaps the fish from the sea into his cradt; this kind of fishing."

Kia "Fish trap." No data.

Kialoa "Long, light, and swift canoe" such as a head fisherman would use. "Fishing grounds."

Kianapauka "Dynamite", dynamite fishing.

Kīhele "Hook, to hook."

Kīholo "Large wood fishhook as used for sharks. Large fishnet about 20 fathoms long, held by a canoe at each end."

Kīkākala "To draw up with a hook, as in fishing octopus."

Kīkalakē "Kind of fishhook." No data.

Kīki'i "Spiral fishhook with the end curled back fairly close to the shaft."

Kīkomo "Pole fishing in shallow sea", this appears to refer primarily to "gaff fishing" using a hook on a pole to "gig" or pierce the body of a fish and draw it to the surface.

Kilo he'e "One who fishes for octopus by looking through a glass-bottomed box; formerly the *kilo he'e*spit chewed *kukui* nut on the sea to calm the water, then examined (*kilo*) the sea bottom for octopus; to fish thus.

Kiloi "To throw" as to throw a throw net.

Kilo i'a (or kilo I uka) "A man who observes fish movements from a high place and directs fishermen; so to act."

Kīlou "Hook, to catch with a hook."

Kini lau An *'aumakua* of fishermen (Kamakau 1976:61).

Kio "Cords made of *hibiscus*bark used as drawstrings of a large net." Kamakau (1976:61) seems to have a different understanding, "thick ropes of *hau* bark, called *kio* were laid on either side of the floor from the mouth to the end pocket, *mole*, and then nets were joined onto the sides."

Kī'o'e "Net mending instrument; to join nets together."

Kiola "To throw" as to throw a throw net.

Kioloa "Same as *kialoa*, a long, narrow canoe; Long fishing line for deep-sea fishing."

Kiu "A fishhook." Associated with deep water *kākā* fishing by Kahaulelio.

Kiulolo niu A coconut sheath used to keep *kiu* hooks in place in *kākā* fishing according to Kahaulelio.

Koali According to Tau'a (HFN August 1990:7), 'sculling [often done] with one hand while fishing with the other. He had to scull to minimize movement so that he would not disturb the water and frighten the fish.'

Ko'a "Coral, coral head; fishing grounds, usually identified by lining up with marks on shore; shrine, often consisting of circular piles of coral or stone, built along the shore or by ponds or streams, used in ceremonies as to make fish multiply; also built on bird islands, and used in ceremonies to make birds multiply."

Ko'a 'aina "Fishing grounds to provide food (Kamakau 1976:62)." Kamakau particularly associates the term with fishing grounds with a good bottom for the laying of net.

Ko'a hohonu "Deep-sea fishing grounds (Kamakau 197675)."

Ko'a kuapu'e 'Thrust-up back' *ko'a* located by landmarks (Kamakau 1976:78).

Koai'e "A native tree (*Acacia koaia*) much like the *koa* but smaller" the wood of which was used for *melomelo* sticks and shark hooks.

Ko'a pōhākioloa (Pōhākialoa) Stone used as a land mark, as of a land boundary, or for locating a fishing ground; stone with a knob at the top used as a weight for deep-sea fishing; fishing grounds about 260 m. deep"

Koe "To pull a stick with hooks through the water to impale fish."

Koehonua "Two-pronged fishhook."

Kohe "Inside barb of a fishhook."

Kohelua "Double-barbed, of a fishhook."

Koheluapa'a "Same as *Kohelua*."

Kōheoheo "Stick or buoy that floats a fishhook." The Fornander account (Vol. VI, Part 1:184-185) relates the use of a *kōheoheo* of *wiliwili* wood with a 30' long line baited with flying fish to catch mahimahi.

Koi "Fishing pole, pole fishing (same as the more common *mākoi*."

Ko'i According to Kahaulelio, the practice of slackening the bottom fishing

line in *Kūkaula* fishing to compensate for the current.

Koki A "lesser method of fishing (Kamakau 1976:64)." No data.

Kōkō "A carrying net" could be used to hold *maunu* bait

Kolo "To pull, tow, drag, to pull a seine" "Sweeping an immense bag net across a sandy bottom (Kamakau 1976:60)"

Konohiki "Fishing rights under control of the *konohiki*" or headman of an *ahupua'a*.

Ko'olauloa "*Ulua* fishline fifteen or so fathoms long."

Kū "To run in schools, as fish."

Kua A mark on a bottom fishing line at approximately 300 ft.

Kuahao Anchor weights used for the ends of a net (possibly a historic term for metal weights).

Kuahu "Altar," typically constructed of stacked stones; a ritual focus as at a Ku'ula fishing shrine.

Kua-o-kai'aiki A mark on a bottom fishing line at approximately 390 ft.

Kuapu'e "Deep-sea fishing grounds." 'Thrust-up back' *ko'a* located by landmarks (Kamakau 1976:78).

Kū'au "Shank limb of a fishhook."

Kue "Fishhook with point of hook curved inward almost to the shaft, used for large fish."

Kui "Pointed instrument of wood or metal" a fish stringer and smaller form of fishing spear.

Ku'iku'i "To fight;" a fishing method using a stout wooden pole to catch *ulua* fish.

Ku'i 'opihi "To pry *'opihi* limpets loose from a rock with a knife, formerly to hit a glancing blow with a sharp stone."

Ku'i palu "To make palu relish or bait;...to beat to a pulp."

Kūkaula "Deep water fishing with hook and line; fishing grounds at about 80 fathoms depth." Kahaulelio emphasises the marking of the hand line in this type of fishing so as to determine the depth.

Kuku "Beam...as used to support and distend a net." Stick net spreaders. According to the Fornander source (Vol. VI, Pt. 1:182), a *kuku* is "a slender stick some six feet long about an inch in thickness" that marks the middle of the lau line and facilitates its deployment.

Kukui Formerly, fishermen commonly spit chewed kukui nut on the sea to calm the water to make it easier to see beneath the surface. The broken endocarps or shells of the *kukui* or candle nut tree (*Aleurites moluccana*) were mixed with *maunu* bait to cary the chum to the bottom.

Kukui 'oa "Cracked kukui nut" same as an *ihu pōhue* - a derogatory term for fishermen of the shallows (Kamakau 1976:60).

Kula "Basket-like fish trap."

Kuleana "Privilege, responsibility" as to gather the fishing gear or carry a bag.

Kūlihi "Hooked but escaped, as a fish."

Kumu lau "providers of *ti* leaves for *hukilau* seining." According to the Fornander source (Vol. VI, Pt. 1:182), a *kumulau* is a sixty foot length of rope to which dependant *ki* leaves have been inserted.

Kumuoka "Perhaps a net used in bag-net fishing (also *oka*). Kamakau's (1976:63) use of the term is unclear.

Kuoho "Kind of fishhook said to resemble the top of a cowry shell."

Kūpali "To pole fish from a rock or cliff."

Kūpalu "To stuff with food, fatten, hence to make a favorite; to attract fish by chumming, as with decayed pork"

Kūpalu manō "To chum sharks; shark bait (said also of human taboo breakers thrown into the sea)"

Kūpō "Long net stretched across the track of fish, one end anchored in deep water, the other in shallow. To set a net at night. Scoop net."

Ku'u ('ūpena ku'u) "Type of net let down from a canoe; gill net;to set or lower a net or catch in a net; net young mullets from the fish pond."

Kū'ula "The main *'aumakua* of fishermen...a great fisherman of ancient times (Kamakau 1976:61). "Any stone god used to attract fish, whether tiny or enormous, carved or natural, named for the god of fishermen; heiau near the sea for worship of fish gods; hut where fish gear was kept with *kū'ula* images so that gear might be

impregnated with *kū'ula* mana, usually inland and very taboo."

Ku'una "Place where a net is set in the sea; to let down a fishnet."

Lā "Each of two cross sticks holding corners of the dip net called *'upena 'āki'iki'i*."

Lā'au hohoa Club for beating fish, such as eels, to death (Kamakau 1976:83).

Lā'au i'a Tau'a (June 1984:37) uses this term to refer to rafts made of several pieces of *hau* wood tied together which served much as a contemporary innertube float to ferry a net off shore and facilitate net setting. This seems likely to have been an ancient custom.

Lālā "Barb or hook, as of bone or coconut shell, on a mother-of-pearl lure" (typically barbless); "bone point of a composite hook."

Lamalama "Torch fishing; torch; to go torch fishing."

Lau "Dragnet, seine, so called because formerly made of *ti* leaves (*lau*) tied to a rope." *Lau* seems to refer to the nets used as well as the leaf lines. Lines with leaves (typically *ti* leaves) attached which were pulled through the water to scare and drive fish into the net.

Lauahi "Bagnet used for fish, as *'ōhua*."

Lau 'apo Same as *lau 'apo'apo* (Kamakau 1976:60)?

Lau'apo'apo "Type of *lau* fishing outside the reef, seine."

Laukapalili "same as *hukilau*, seine fishing but reportedly used in deeper water and with yellowed *ti* or banana leaves." Kahaulelio indicates it was used in shallow water and indicates that the major difference from *hukilau* seine fishing is that in *lau kapalili*, the people on shore pulled the *lau* lines so as to chase the fish into a stationary *papa* net.

Lau kō "Dragnet."

Lau kō pua (*lau kō pua li'ili'i*) "Fishing for young fish (*pua*) with fine nets" Also refers to fishing in which children drag yellowed banana leaves in the shallows during rainy months to frighten small fish so that they run up on shore where they may be easily picked up by hand.

Lau lele "Net fishing with small nets as in shallow water."

Lau lima Given by Kahaulelio (*Feberuari* 28, 1902:6) as another name for "*Lau nui*" fishing.

Lau nui A large seine net. Kahaulelio (*Feberuari* 28, 1902:6) describes this technique as one in which long lau lines are used to chase fish into a stationary big bag net flanked by two wing nets.

Lau 'ōhua A seine net used for juvenile fish of several types.

Lau 'ōhua liko A seine net used for tiny *manini* fish.

Lau 'ōpae "Shrimp net, about a fathom long, placed around a heap of rocks called ahu or imu (fish and shrimp were prodded from the rock pile into the net; this type of fishing."

Lawa "A large shark fishhook."

Lawai'a "Fisherman; fishing technique; to fish, to catch fish.

Lawai'a hahamau One who caught fish by hand.

Lawai'a haku "A master fisherman for a chief (Kamakau 1976:64)."

Lawai'a hihiwai One who gathered shellfish (seemingly not restricted to gathering *hihiwai per se*)

Lawai'a kōkō "Fishing within the reef, as by women and children, with long bags of fine mesh into which fish were driven."

Lawai'a kō lau "The old name for *hukilau* fishing"

Lawai'a nui (Ka lawai'a nui) Head fisherman, the fisherman who directed group efforts in collective fishing endeavors such as flying fish fishing.

Lehua An "expert, as in fishing"

Lele "Sacrificial altar or stand," typically a small raised platform of wood on which offerings might be placed, as might be found at a *ko'a* fishing shrine.

Lewalewa (Same as *ho'olewalewa and maiewa*) "Kind of fish net suspended from a canoe in the deep sea."

Lihi "Point of fish hook" and/or "portion just below point"; "pearl shell lure, as for 'ōpelu fish."

Lihi lou "Tip of a barbless fish hook."

Lo'e "Curve of a fishhook."

Loko i'a "Fishpond." A generic term for Hawaiian fishponds.

Loko i'a kalo	"Combination fishpond and taro patch."
Loko kuapā	"Fishpond." A fishpond located out in shallow seas or embayments and created by the construction of a wall of stone and/or coral as an isolating feature.
Loko pu'uone	A fishpond located just back from the coast and separated from the sea by a strand of sand and coral detritus.
Loko 'ume iki	"Shore fishpond with lanes leading in and/or out of the pond, used for trapping fish and probably only on Molokai."
Loko Wai	"Fresh-water pond or lake;" name for a brackish fishpond which typically had a natural connection to the sea by way of a stream.
Lomi	A verb commonly associated with the pulling of *lau* lines, probably because the concept "to work in and out" fit the rhythmic pulling on the lines which kept the dependent leaves in motion so as to best scare and herd fish.
Lomi lau	According to the Fornander source (Vol. VI, Pt. 1:182) the lomi lau are "those [divers?] who press the leaves down, then work forward."
Lu'aloa	"Large fishhook, as used for large fish or sometimes for bonito."
Luelue	"Bag net with meshes the width of a finger, as held open by a hoop of *walahe'e* wood and baited and lowered into the sea by four long cords."
Lūhe'e	"Fishing for octopus with line and cowry lure; the octopus lure."
Māhā	Net mesh size of approximately 4 inch
Mahae	Net mesh size of approximately 4 inches and upwards
Mahina	"Cresent-shaped fishhook."
Maiewa	(Same as *lewalewa* and *ho'olewalewa*) "Deep-sea fishing net"
Mākāhā	"Sluice gate, as of a fishpond."
Mākahi	Net mesh size of approximately 1 inch
Mākahi 'oene	Net mesh size of approximately 1 1/2 inch
Maka ki'i	"Lure (Aweau, May 1995:28)."

Mākālei "Fish trap. Name of a supernatural tree found on Molokai; portions of its root were placed by the gates of fishponds, as they were thought to attract fish. Same as *melomelo*, a stick lure."

Maka lua "Fishing net with mesh wide enough to admit wo fingers." Same as *Mālua*.

Maka puhi "Fishhook with two opposite barbs, as used for eels."

Makau "Fishhook"

Makau 'ea Turtle shell hooks

Makau iwi kanaka Human bone hooks

Makau manō Shark hooks which had a distinctive lashing.

Makau pāwea Shell hooks

Makau pāweo "Small shell hook, as used for *'ōpelu* fishing."

Makika (makika pākū) Mosquito net. Commercially available mosquito net was often used to catch small fry in the late nineteenth-century.

Mākoi (Also *Mōkoi*) "Fishing pole, to fish with a pole"

Mākolu Net mesh size of approximately 3 inch

Mākolu 'oa Net mesh size of approximately 3 1/2 inch

Malau "Canoe bait carrier, some two or three fathoms long, with holes pierced in the sides and bottom to admit water, as used for bonito fishing."

Mālewa Net mesh size of approximately 7 inches and upwards

Mali "To tie, as bait to a hook, hook to a line."

Mālua Net mesh size of approximately 2 inch

Mālua 'oa Net mesh size of approximately 2 1/2 inch

Mana "Hook used in catching eels."

Manamana "Third of three coconut husks tied to *'ahi* fishing line."

Maunu "Bait"

Maunu pahe'e "Slide bait (Aweau, May 1995:28)."

Melo melo "Club used as lure; it was smeared with bait, such as roasted *'ala'ala he'e*, roasted coconut flesh, or various aromatic leaves; let down in the water, it was believed to attract fish to a net." Kamakau (1976:63) states it "was a piece of hard wood from the *koai'e*, *o'a*, *'a'ali'i* or *pua* tree, obtained from some noted place- a *heiau* or a *ko'a* shrine, or some other famous spot." Name of a bag net and was a diving net (Kamakau 1976:62).

Moena "Place for setting (*ho'omoe*) a fish net."

Mōkilo i'a Tau'a (June 1984:37) uses this term to refer to a lookout place where fishermen went to spot fish.

Mōkū "Method of fishing *pāpa'i* crabs with bait and a net; to fish thus."

Mole "Bag in the *pāku'iku'i*net." Terminal portion of a bag net.

Mole hului Same as *mole* (Kamakau 1976:64).

Mouo "Buoy; float, as on a fishing net." Such as would be attached to a line connected to the bottom of the entrance of a bag net to facilitate the pulling up of the mouth of the bag net to the surface (Kamakau 1976:63).

Mūhe'e "Mother-of-pearl lure...perhaps so named because the colors of the shell suggested those of the cuttle fish" (*mūhe'e*)

Muli "Thin end of a pearl-shell shank; aft portion of a lure where the hook and bristles were attached.

Nae Net mesh size of approximately 1/4 inch.

Naepuni Same as *Nae*.

Naomakalua "Fish-basket trap made of *'inalua* vines, used for small fish."

Nī'au "Midrib of coconut leaf or frond" used as a gorge in fishing for small eels and as a *Kī'o'e* for very fine mesh nets.

Nīnika Same as *'īnika*, a plant? Kamakau (1976:84) states that *Nīnika* was used for the encircling wefts of *hina'i kala* traps.

Nohu "A prostrate hairy perennial (*Tribulus cistoides*)" with yellow five petaled flowers. The blossoms were used as bait in *Paeaea 'ōhiki* catching of *'ōhiki (Ocypode)* ghost crabs and also in *'Ōkilohe'e* fishing for octopus.

Nuku "Series of hooks attached to a line;" "first coconut husk attached to an *'ahi* fishline, the others being *poli* (bosom), and *manamana* (fingers);" Also the funnel or cone of a *hina'i* fish trap (Kamakau 1976:83). See "*ka nuku o ka pua'a*" for yet another meaning.

Nukunukuā'ūla (Also *Nukuā'ūla, Nukuwā'ula*) Net mesh size of approximately 1/2 inch.

O'a A hard wood (*Colubrina oppositifolia*), favored for fishing spears and *melomelo* sticks.

'Ōhao "To tie...lau nets together."

'Ohe "All kinds of bamboo" also used to refer to a fishing pole, typically of bamboo.

'Ō he'e "Octopus spearing, to spear octopuses."

'Ōi'a (Also *I'a 'ō, Ke 'ō*) Fishing spear; fish spearing

Oka "Variant of *Kumuoka* net."

'Ōka'i "Cords on the mouth of a fish net, as for *iheihe* fish. Small oblong net connecting two larger fish nets."

'Ōkilohe'e Kahaulelio uses this term to refer to a method of catching octopus in shallow water using a *nohu*blossom lure. For Pukui and Elbert this is used as a synonym for the modern *kilo he'e*.

Olonā "A native shrub (*Touchardia latifolia*) with large ovate, fine-toothed leaves...formerly the bark was valued highly as the source of a strong durble fiber," the most desired fiber for the production of fishing line used in baited line fishing, snares, nets, and hook and line fishing

'Ōmau "A barbless fishhook."

'Ōmuku lau A short piece of net as might be used to block the entrance to a fish weir (Kamakau 1976:88).

'Ōnohilehua "A mother-of-pearl lure that was said to catch fish by day or night without fail."

'Ōpelu According to Tau'a (HFN August 1990:7), this was 'a canoe used specifically for catching *'ōpelu*.'

Pā "Mother-of pearl shell (*Pinctada margaritifera*); pearl-shell lure; fishhook" "Section of net attached to a bag in certain types of fishing."

Pā ā eo "a successful *pā* lure."

Pā ānuenue Rainbow or variegated *pā* or pearl shell lure used when the sun was higher.

Paeaea "To fish with a light pole offshore; pole fishing", Beckley and Kahaulelio state there were seven divisions of *paeaea* fishing, Kahaulelio names six types after their target species. One is unnamed because it was simply light 'bamboo-pole-type-fishing' for a variety of small shallow reef species of fish. It appears that what unites the forms of *paeaea* fishing is the use of a pole, the angler being on the land, and the target species being relatively modest. As Kahaulelio relates, *paeaea* fishing for lobsters could utilize a relatively 'heavy' *aku* fishing pole.

Paeaea 'A'ama Snaring *'a'ama* (*Grapsus sp.*) rock crabs by the eye stalk with a forked pole snare.

Paeaea 'ōhiki Catching *'ōhiki (Ocypode)* ghost crabs on the beach with a line baited with a *nohu* (*Tribulus cistoides)* blossom.

Paeaea 'O'opu Hooking *'O'opu* with a small pole, line and hook in streams.

Paeaea Moi Hooking *moi* (threadfin fish) with a light pole, hook and line from shore.

Paeaea Ula Hooking lobster with a pole, hook, and line from sea cliffs at night.

Paeaea Uhu Angling for *uhu* (parrotfish) from shore using hook, line, and pole with sea urchins for chum and bait.

Paehumu "Taboo enclosure." Such a wall or fence sometimes surrounded *ko'a* fishing shrines (Kamakau 1976:64).

Pāhau snowy *pā* pearl-shell lure used in the early morning.

Pahele (also *pāhelehele*) "A snare, noose, trap"

Pāhelehele puhi Snaring of eels by hand or with a pole and noose snare.

Pāhi aku "Bonito hook."

Pāhoe "To paddle;" a method of *ulua* fishing by trolling a line behind a canoe and attracting the fish with the *kāpapa ulua* technique and by trailing stinking vegetables.

Pāhola "To stupify fish by drugging with *'auhuhu*, the poison spreading (*pāhola*) through the water."

Pahu "Gillnet used in shallow water."

Pai "A funnel-shaped wickerbasket used for catching shrimps and small fish, so called because it was lifted *(pai)* from the water."

Pa'i (pa'ipa'i) "To slap" or "clap" the water so as to drive or herd fish

Pa'i malau "A fleet of canoes fishing for *aku* with the *malau*, bait carrier."

Pā i'a Weirs or fish walls, large permanent structures used to trap or facilitate the capture of fish.

Pā'i'o "Fishhook baited with flesh; to remove flesh from bones, as of fish."

Pākā (Pākā pōhaku) "Sinker on a fish line for deep sea fishing; to fish with hook and line but no pole, as *ulua*"

Pakahi (uhu pakahi) Kahaulelio's term used for a decoy fish used to attract *uhu*; perhaps a variant of *pākali,* "a decoy."

Pākali "To decoy fish by doling out bait little by little; a decoy."

Pakauele "General name for small fish that are easily caught by hand, as *manini, lauhau, pāo'o.*"

Pā kau ulua "Hook for *ulua* fish."

Pāki'iki'i "Small dip net used in fishing in shallows."

Pākū "Curtain, screen,...partitions before openings of deep-sea bag nets." Seemingly wing nets used to turn fish into a central *papa* or bag net. Kamakau (1976:62) states "The *pākū* nets were two other ['lead'] nets, one for each side, twenty fathoms long, more or less, and two fathoms or more high, fastened with ropes to each side of the bag."

Pāku'iku'i "To splash by beating the water" as to drive fish into a net. A method of fishing with a long net (Kamakau 1976:60).

Pāku'ipai "Shrimp net" also called *pāloa.*

Pale kū hope "Variations of the *pākū*nets (Kamakau 1976:63)." Perhaps a specific reference to one of the two *pākū.*

Pale kū ihu "Variations of the *pākū* nets (Kamakau 1976:63)." Perhaps a specific reference to one of the two *pākū.*

Pāloa "Long seine, as used for mullet," Also same as *pāku'ipai.* Also a fence or gill net.

Palu (ka palu o ka maunu) "Fish bait made of fish head or stomach, also used for chumming" A "lesser method of fishing (Kamakau 1976:64)."

Pā mae "Pearl shell lure with variegated colors, as of red, white, and blue."

Panipani "Small outrigger canoe." According to Tau'a (HFN August 1990:7), this was a canoe 'manned by three to five men that carried one to two fishing poles.' The practice of closing off holes and crevices where fish might seek shelter prior to netting or poisoning.

Pana i'a "Fishing spear shot from a bow; to shoot fish thus;" bow fishing.

Papa "Middle portion of a fishing net, bag net"; "Stone used as a sinker for *lūhe'e* fishing."

Papa 'aumaiewa A bag net (Kamakau 1976:60). Same as *Aumaiewa*?

Papa ho'olewalewa A bag net (Kamakau 1976:60). Same as *Papa lewalewa*?

Papa hului "Same as *hului*, a fishing net."

Papa lau 'apo A bag net (Kamakau 1976:60). Same as *Lau 'apo'apo*?

Papa lau lele A bag net (Kamakau 1976:60). Same as *Lau lele*?

Papa lewalewa "Net used in deep water with the *melomelo* club."

Papa lu'u maomao A bag net (Kamakau 1976:60). Same as *'upena maomao*?

Papa lu'u uhu A bag net (Kamakau 1976:60). Same as *'upena kākā uhu*?

Papa 'ohua nukunui A bag net (Kamakau 1976:60).

Papa waha nui "Large bag-like net used for *akule* fish." "Wide-mouthed bag net. (Kamakau 1976:60)"

Pāpo'o "To dive to the opening of a *papa* net in fishing."

Pā uhi "A mother-of-pearl bonito hook used when the sun was bright and high."

Pepeiao "Long nets 30 to 37 meters deep, attached to each side of the *'upena kolo*, bag net."

Peku "To kick" or drive with the feet small fish such as *'iāo* in the shallows.

Penu (Also *Penupenu* and *Pepenu*) "To dunk," as a baited hook (Aweau,

May 1995:28).

Pīkoi "Wooden floats attached to upper or head cord of gill nets."

Pīkoni "Cord attaching floats to a fishing net."

Pilipili he'e "Thin ends of octopus tentacles" used for bait. "Octopus or squid ink sac (*'ala'ala*) molded about a fishhook for bait."

Pōhākialoa (Ko'a pōhākialoa) Stone used as a land mark, as of a land boundary, or for locating a fishing ground; stone with a knob at the top used as a weight for deep-sea fishing Kamakau (1976:78) compares them to a poi pounder in shape. fishing grounds about 260 m. deep" Kamakau (1976:75) says these fishing grounds went as deep as four hundred fathoms (*lau anana*)?!" Same as *kialoa*, "fishing grounds."

Pōhākialoa puka Long stones with holes in them used as sinkers.

Poho aho "Container for fishing lines."

Pohona "Bend, as in a U-shaped fishhook."

Pōki'i "Name of the canoe of the owner of the net used in *mālolo* or *iheihe* fishing."

Poli "Coconut husk attached to a fishing line," specifically the second of three husks tied on an *'ahi* fishing line (the *poli* is between the *manamana* and the *nuku*.

Po'o Front, head or bow of a lure (part attached to the trolling line and closest to the canoe). Same as *ihu*.

Po'o lawai'a Head fisherman in charge of group endeavors, seemingly a synonym for *"Lawai'a nui."*

Pou "Part of snood lashing on composite hooks, as for bonitos; sometimes shaft of a hook is so called."

Pouono "Fishing net." (No data.)

Pōuouo ('Upena Pōuouo) "Bag net with meshes two fingers wide, similar to but larger than the *luelue*."

Pū "Rope or line, as attached to sticks in an *'ōpelu*net." The junction of the sticks holding open a dip net such as the *'upena kākā uhu* attached to the *hānai* cord (Kamakau 1976:67).

Pua Same as *olopua*, "a large native tree (*Osmanthus sandwicensis*)"

whose wood was used for *melomelo* sticks. "A fish hook for turtles." "Spawn, fry", or young fish.

Puapua — Same as *'āpua*; "Fishhook shank" perhaps more acurately the knob, tail, or head on the end of the shank to which the snood was attached. 'Tail' on an octopus lure (the cowry shell is attached at the tail and the snood) (Kamakau 1976:78).

Puhi — "Sticks supporting a *pāku'iku'i* net, called the *puhi nui* and the *puhi 'u'uku* (or *puhi iki*). Nets forming the *'upena papa* had the same names."

Puka ihu — Perforation in the thick end of a pearl-shell lure to which the snood was attached.

Pula — "Leafy branch, as of coconut, pandanus, or 'ilima, used as a broom to drive fish into a net and to poke into reef crevices in order to frighten out the fish." Also a name for a reeking mass of vegetable food (*'ai*) towed behind a canoe to attract fish. Also, according to the Fornander source (1919: Vol. VI, Pt. 1:182), a name applied to the dependent *hala* and *'ākia* leaves on a *lau* line, but "properly the word *pula* applies to the *lau* portion adjoining the net collecting the driven fish."

Pūlale — "Same as *pula*."

Puna — "Coral...coral rubber" as might be used to ground down a fish hook blank in fish hook manufacture.

Puni — "A fine-meshed net." Same as *nae* and *naepuni*.

Pūpū — "To draw or gather together; to draw tight, as a fishing net." The fine meshed, terminus or end of a *'upena papa* or bag net. "Rim of the end pocket, *mole*" (Kamakau 1976:61).

Pupua — "Tuft of dried *ti* leaves on end of an octopus lure."

Pu'u i'a — "A string of fish, as on a *ti* leaf."

Pu'umana — "A new mesh added in the enlargement of a net."

Ua — Kamakau (1976:61) discusses nets made of *ua* which is glossed (1976:89) as "the Samoan name for the paper mulberry *Broussonetia papyrifera*" or *wauke*. It seems odd that Kamakau would use a Samoan name for *wauke*.

Uhina — "Throw or cast net."

Uhipa'a "Mother-of-pearl hook that might be used at any time of day."

Uhiuhi A hard wood (*Mezoneuron kauaiense*) favored for fishing spears and shark hooks.

'Uī'uī Open, baited, vertical-pull *hīna'i* baskets used in deep water to catch *'uī'uī* fish.

'Ulei A hard wood (*Osteomeles anthyllidifolia*), favored for fishing spears

Uluna "Center part of a net, as of a large *'upena iheihe* (net used for *iheihe* fish)."

Ununa Same as *Uluna*.

Uluulu (Also *ulūlu*) "Diving or scoop net, its mouth being held open with two sticks;" "sea cavern" - Kahaulelio particularly associates the snaring of small sharks by the tail while they lie in sea caverns with *lawai'a uluulu* or sea cavern fishing.

'Umi (*'umi o ka lau*) The joining of the two *lau* lines in *lau kapalili* fishing.

Umu "A heap of rocks placed in the sea for small fish such as the *manini* to hide in: this was surrounded by a net and the fish were caught." Also *ahu* and *imu*.

Una "Same as *haha kā 'upena* (net gauge or spacer) so called because some were made of turtle shell."

'Uo "Seizing turns in lashing" as of a hook.

'Ūpalupalu "A type of fishing; translated by Emerson as "ordinary angling."

'Upena "Fishing net."

'Upena 'a'ai 'ōpelu A baited vertical-pull bag net used to catch *'ōpelu* fish.

'Upena ahuulu "Same as *'Upena uluulu*." A scoop net with two parallel sticks for a frame.

'Upena 'āki'iki'i "Dip net."

'Upena 'akuku "Net held open by supporting stick."

'Upena ani Draw net.

'Upena 'apo'apo "Gill net."

'Upena apoapoa Beckley (1883:12) states this was a gill net used to surround fish and then the water was beaten to drive the fish into the net

'Upena hali'i olalo "Floored nets" included such types as the *lau lele, lau 'apo, wahanui, ho'olewalewa* and *melomelo* (Kamakau 1976:61).

'Upena honu "Turtle net."

'Upena ho'olei "Throwing net"

'Upena ho'olewalewa "Gill net stretched at high tide across fish runs in shallow water."

'Upena ho'omoemoe "Set net," typically a gill net set and left overnight.

'Upena ho'opuni Same as *ho'opuni* "A fine meshed net" used to 'surround' (*puni*) fish. Used in this report as a generic term for various types of seine and surround nets which impound fish, rather than gill them.

'Upena hō una "Net made of fibers of *hau* and *'ahu'awa*."

'Upena 'iāo "Net for *'iāo* bait fish.

'Upena kā'e'e "Hand net hanging on an ellipsoidal wooden frame with one end pointed, used for *'ōhua* and other inshore fish; to use this net or a skirt of a dress in this type of fishing."

'Upena kā he'e (Also *'upena kā'e'e*) "Scoop or hand net."

'Upena kākā 'opule "Dip nets for...*'opule* fishes (Kamakau 1976:60)."

'Upena kākā uhu "Dip nets for *uhu* (Kamakau 1976:60)."

'Upena kā wa'a "Net about forty fathoms long used in deep sea fishing with canoes."

'Upena kiloi "Throwing net."

'Upena kiola "Throwing net."

'Upena kō lau "Seine." Same as *hukilau*

'Upena kolo "Immense bag net said to be from 16 to 24 fathoms deep."

'Upena ku'u "Gill net, set net."

'Upena ku'u akule "Gill nets such as that for *akule*. (Kamakau 1976:60)"

'Upena lu'elu'e Same as "*Luelue*? (Kamakau 1976:60)."

'Upena lu'ulu'u	"Small net, baited, weighted down, and set on the sea floor; fishermen dived (*lu'ulu'u*) to bring it up."
'Upena mā'i'o	"Net made of hau fiber.
'Upena mālolo	"a form of bag net (Kamakau 1976:60)."
'Upena mānalo	A "sweet net" free from defilement in which "the fish would enter it and go to sleep (*hiamoe*) not scattering about and being restless (Kamakau 1976:64-65)."
'Upena manō	"Shark net;" basically a heavy duty gill net.
'Upena maomao	"A large net used in deep water with the *melomelo* lure."
'Upena melomelo	A bag net (Kamakau 1976:60).
'Upena mōkū	"Net that is baited and left in the sea, as for *pāpa'i* crabs."
'Upena 'ōhua palemo	"Net used for young *palemo"* (*uhu* or parrotfish).
'Upena 'ōpelu	Same as *'upena 'a'ai 'ōpelu* A baited, vertical-pull bag net used to catch *'ōpelu*fish.
'Upena pāki'i ki'i	"Same as *'Upena 'āki'iki'i*." a dip net.
'Upena pāloa	Same as *"pāloa"*.
'Upena papa	"Bag net, said to be a combination of three nets, with the *puhi nui* at the opening (meshes two or more fingers in width), then the *puhi iki* (meshes half as large), and at the end the *pūpū*, which was also called the *mole*."
'Upena pāpa'i	Net for catching *pāpa'i* crabs. Also *'upena mōkū"*
'Upena pili	"Two nets attached to either side of the opening of the *pāku'iku'i"*
'Upena po'o	"Bag net."
'Upena pōuouo	same as *Pōuouo*.
'Upena uluulu	"A scoop net with two parallel sticks for a frame."
Wa'a	"Canoe, paddlers."
Wa'a kau	"Head fisherman's canoe."
Wa'a kau hī	"Canoe for fishing aku."

Wa'a kau lua "Double canoe."

Wa'a pā "Skiff, rowboat."

Wa'a pāhoa (*Wa'akūpāhoa*) "A long thin canoe." According to Tau'a (HFN August 1990:7), this 'fishing canoe was narrow and deep with sides straight up and down.'

Wa'ewa'e Head fisherman in charge of *Kū'ula* stone gods."

Waha "Opening" of a net.

Wā i'a "Season of abundant fish."

Waihona makau Fishhook receptacle.

Wailuku "Name reported for an *ulua* fishing line."

Walahe'e Same as Alahe'e A hard wood (*Canthium odoratum*), favored for fishing spears and net spreaders.

Wauke Mulberry plant (*Broussonetia papyrifera*) fiber occasionally used in fishing line.

Wēlau "Pole" a larger form of fishing spear used primarily by men.

X. References Cited

Aweau, Donald S.
1995 "*Ho'omanamana* (Superstitious)," *Hawaii Fishing News*, June 1995, (Vol. 21 # 5).

Aweau, Donald S.
1995 "'Ahi (Hawaiians and the Sea)," *Hawaii Fishing News*, March 1995, (Vol. 25, # 2).

Beckley, Emma M.
1883 *Hawaiian Fisheries and Methods of Fishing*, Honolulu, U. S. Fish Commission, Bulletin 6, (13):245-250.

Bennett, Wendell Clark
1930 *Hawaiian Heiaus*, Ph.D. dissertation, The University of Chicago,

Bingham Hiram
1847 *A Residence of Twenty-one Years in the Sandwich Islands*, Hezekiah Huntington, Hartford and New York.

Buck Peter H.
1964. *Arts and Crafts of Hawaii*, Volume VII: Fishing B. P. Bishop Museum, Special Publication 45.

Campbell, Archibald
1822 Voyage Round the World from 1806 to 1812, Third American Edition,

Cobb, Scott
1902 *Commercial Fisheries of the Hawaiian Islands*, U.S. Fish Commission Report for 1901.Government Printer, Washington D. C.

Cobb, Scott
1905 *The Commercial Fisheries of the Hawaiian Islands in 1903*, U.S. Fish Commission Report for 1904, Government Printer, Washington D. C.

Cox, J. Halley with William H. Davenport
1988 *Hawaiian Sculpture* (Revised Ed.), U. H. Press, Honolulu, HI.

Department of Land and Natural Resources, Division of Aquatic Resources
1993 *Kaho'olawe Island Marine Resources Inventory*, Honolulu, HI.

Department of the Navy
1983 *"Kaho'olawe Cultural Study: Hawaiian Archipelago"*

Ellis, William
1969 *Polynesian Researches: Hawaii*, Charles Tuttle, Tokyo.

Emory, Kenneth P.
1969 *The Island of Lanai*, B. P. Bishop Museum Bulletin 12, Honolulu, HI.

Fornander, Abraham
1919 *Fornander Collection of Hawaiian Antiquities and Folk-Lore*, Volume V, Part II, Revised translations and notes by Thomas G. Thrum, Memoirs of the Bernice P. Bishop Museum, Honolulu, Hi.

Fornander, Abraham
1969 *An Account of the Polynesian Race its Origins and Migrations*, Charles E. Tuttle Co.

Goto, Akira
1986 *Prehistoric Ecology and Economy of Fishing in Hawaii: An Ethnoarchaeological Approach*, Ph.D. dissertation, University of Hawai'i at Mānoa, Honolulu, Hi.

Gaffney, Rick
1995 "Kaho'olawe Conservation Planning," *Hawai'i Fishing News*, Vol. 21, No. 9 October.

Hommon, Robert
1976 *The Formation of Primitive States in Pre-Contact Hawai'i*, Ph.D. dissertation, University of Arizona, Tucson, Az.

Hosaka, Edward Y.
1944 Sports Fishing in Hawaii, Bonds, Honolulu, Hi.

'Ī'ī, John Papa
1959 Fragments of Hawaiian History, Bishop Museum Press, Honolulu, HI.

Jones, Maude
1938 "Whaling in Hawaiian Waters," *Paradise of the Pacific*, Volume 50 No. 4, April 1938.

Kahaulelio, A. D.
1902 "Fishing Lore," *Nupepa Ku'oko'a*, Feb.28 - July 4, 1902.

Kamakau Samuel M.
1976 *The Works of the People of Old*, B. P. Bishop Museum Special Publication, 61, Honolulu, HI.

Kamakau, Samuel Manaiakalani
1964 Ruling Chiefs of Hawai'i, Kamehameha Schools Press, Honolulu, HI.

Kamakau, Samuel Manaiakalani
1964 *Ka Po'e Kahiko: The People of Old*, The Bishop Museum, Sp. Publication 51, Bishop Museum Press, Honolulu, HI.

Kaho'olawe Conveyance Commission
1993 *Kaho'olawe Island: Restoring a Cultural Treasure*, Honolulu, HI.

Kaho'olawe Reserve Commission.
1995 *Kaho'olawe Use Plan* (Draft), Honolulu, HI.

Kikuchi William K.
1976 "Prehistoric Hawaiian Fishponds" Science V. 193 p. 295-299

King, Robert D.
1942 *"Districts in the Hawaiian Island," Reprinted from University of Hawaii Research Publication No. 11, and Revised to June 30, 1942)*

MacKellar Jean Scott
1956 Hawaii Goes Fishing, Graphic Books, New York.

Malo, David
1951 Hawaiian Antiquities B. P. Bishop Museum Special Publication 2, Honolulu, HI.

McAllister, J.G.
1933a *Archaeology of Kaho'olawe*, Bishop Museum, Bulletin 115, Honolulu.

McAllister, J.G.
1933b *Archaeology of O'ahu*, Bishop Museum, Bulletin 104, Honolulu.

Newman, Stell T.
1970 *Makai-Mauka Fishing and Farming on the Island of Hawaii*, Ph.D. dissertation University of Hawai'i at Mānoa, Honolulu, HI.

Pfeffer, Michael T.
1995 "Distribution and Design of Pacific Octopus Lures: the Hawaiian Octopus Lure in Regional Context", *Hawaiian Archaeology*, Volume 4, Society for Hawaiian Archaeology.

Pukui, Mary Kawena
1983 *Olelo No'eau: Hawaiian Proverbs and Poetical Sayings*, Bishop Museum Special Publication No.71, Bishop Museum Press, Honolulu, Hi.

Pukui, Mary K., Samuel H. Elbert and Esther Mookini
1974 *Place Names of Hawaii*, University of Hawaii Press, Honolulu, Hi.

Reeve, Rowland
1993 *Nā Wahi Pana o Kaho'olawe: Storied Places of Kaho'olawe*, Consultant Report No. 17, Prepared for the Kaho'olawe Conveyance Commission, Honolulu, HI.

Reichel, Keali'i
1993 *Traditional Fishing Practices and Uses of Waters Surrounding Kaho'olawe*, Kaho'olawe Conveyance Commission, Honolulu, Hi.

Samwell, David Journal.
1967 In the *Journals of Captain James Cook on his Voyages of Discovery. J. C. Beaglehole*, ed. Vol. 3: The Voyage of the Resolution and Discovery 1776-1780, part 2, Cambridge University Press.

Scobie, R. A.
1949 *The Technology and Economics of Fishing in Relation to Hawaiian Culture*, M.A. thesis, London School of Economics.

Sinoto, Yoshiko H.
1962 "Chronology of Hawaiian Fishhooks" *Journal of the Polynesian Society* 71:162-166.

Sinoto, Yoshiko H.
1976 *Hawaiian Fishhook Classification and Coding Systems (revised in 1975)*, Ms. B. P. Bishop Museum, Honolulu, HI.

Sterling Elspeth and Catherine C. Summers
1978 *Sites of Oahu*, B. P.Bishop Museum, Honolulu, Hi.

Stokes, John F. G.
1906 "An Account of Hawaiian Nets and Nettings," In *Mat and Basket Weaving of Ancient Hawaiians*, William T. Brigham ed., B. P. Bishop Museum Memoir, Vol. 2, No. 2.

Stokes, John F. G.
1909 Field Notebook (Ms.), Bishop Museum Anthropology Department, Honolulu, HI.

Stokes, John F. G.
1921 *Fish Poisoning in the Hawaiian Islands*, B. P. Bishop Museum Occasional Papers 7 (10): 210-233.

Summers Catherine C.
1971 *Molokai: A Site Survey*, B. P. Bishop Museum Pacific Anthropological Records, No. 14.

Tau'a Keli'i
1986 "The Endangered Honu and 'Ea," *Hawai'i Fishing News*, (Vol. 11, #9), October 1986.

Tau'a Keli'i
1985 "Miloli'i Provides One of a Kind Experience," *Hawai'i Fishing News*, (Vol. 10, #10, November 1985

Tau'a Keli'i
1984 "Born on Kaho'olawe," *Hawai'i Fishing News*, (Vol. 9, #7), August 1984

Tau'a Keli'i
1983 "Halawa 'Opihi," *Hawai'i Fishing News*, (Vol. 8, #7), August 1983.

Tau'a Keli'i
1983 "Huelo Trails," *Hawai'i Fishing News*, (Vol. 8, #3), April 1983.

Tau'a Keli'i
1982 "'Upena poepoe: Throw nets," *Hawai'i Fishing News*, (Vol. 7, #11), December 1982.

Tau'a Keli'i
1982 "Hawaiian Fishing Almanac," *Hawai'i Fishing News*, (Vol. 7 # 1), February 1982.

Thrum, Thomas G.
1913 "Honolulu's Share in the Pacific Whaling Industry of By-gone Days." *Hawaiian Annual*, 47-68.

Thrum, Thomas G.
1890 "Hawaiian Maritime History," *Hawaiian Annual*, 67-68.

Thrum, Thomas G.
1932 *The Hawaiian Annual of 1931*, Honolulu, HI.

Titcomb, Margaret
1952 *Native Use of Fish in Hawaii*, Memoir 29, Polynesian Society, Wellington, N.Z.

Titcomb, Margaret
1979 *Native Use of Marine Invertebrates in Old Hawaii*, University of Hawaii Press, Honolulu, HI.

Valeri, Valerio
1985 *Kingship and Sacrifice: Ritual and Society in Ancient Hawaii*, University of Chicago Press, Chicago.

Waterhouse H.
1899 "Deep Sea Fishing," *Hawaiian Almanac and Annual*, Thos. G. Thrum ed.

APPENDIX A: *KO'A* OF KAHO'OLAWE