

Ichthyological survey of selected
ponds on the Island of Hawai'i

prepared for HAVO

23 pp

Prepared by Anne M. Brasher

October 1996

A baseline reconnaissance survey was conducted in selected ponds in four areas on the Island of Hawai'i: Kaloko-Honokohau, Punalu'u, Kapoho and Hilo (Figure 1). Ponds were sampled both quantitatively (using minnow traps) and qualitatively (using dipnets) during May 1996 (Table 1). The purpose of this survey was to obtain baseline data on the abundance of introduced fish in these ponds.

As time permitted, qualitative sampling of crustaceans and snails was also conducted. It should be noted that the qualitative surveys were not meant to be comprehensive, but rather to provide an initial description of the species present. Further, more thorough surveys are recommended and should also cover insects and smaller invertebrates not included here.

Traps were baited with moist cat food and placed in each pond for one hour. The number of traps used was based on the size of the pond. While the traps were in the pond, a qualitative survey was conducted, using dipnets to collect samples of each of the different species observed. Ponds that were too shallow for traps were sampled only using dipnets. This report describes the native and introduced fish, crustaceans and snails present in each pond (Tables 2-5), as well as their relative abundance at locations where traps were used (Tables 6-9). Appendix A describes status and synonyms for the species collected. Rough sketches

are provided in Appendix B to indicate location of the more obscure ponds.

Alan Friedlander (University of Hawai'i) and Walter Watson (National Park Service) provided assistance in the field. Mike Yamamoto (Division of Aquatic Resources) and Arnold Suzumoto (Bishop Museum) helped identify the fish. Robert Cowie (Bishop Museum) helped identify the snails and Lu Eldredge (Bishop Museum) helped identify the crustaceans.

Figure 1

ISLAND OF HAWAI'I

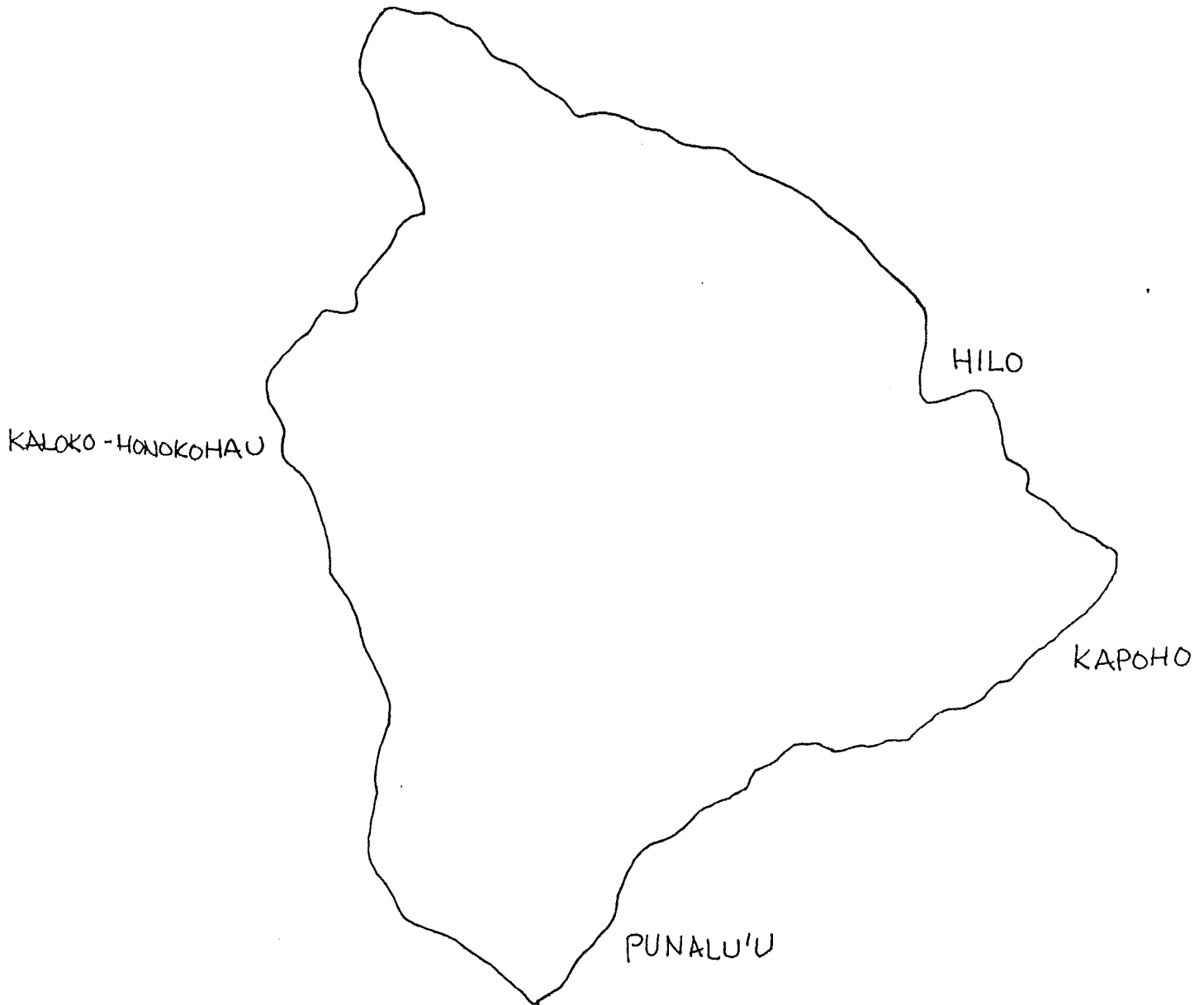


Table 1

LOCATION OF SAMPLING PONDS

KALOKO-HONOKOHAU

<u>STATION I.D.</u>	<u>DESCRIPTION</u>	<u>DATE</u>	<u>SAMPLING METHOD</u>
KH1	*fish pond	5/3/96	5 traps (1:30 pm)
KH2	*006	5/4/96	dip net
KH3	*anchialine pond (sketch)	5/4/96	dip net
KH4	*pond CT2 (Aimakapaa)	5/4/96	2 traps (1:15 pm)
KH5	*three ponds - A (tide pipe)	5/4/96	3 traps (2:00 pm)
KH6	* - B (sketch)	5/4/96	2 traps (2:00 pm)
KH7	* - C	5/4/96	2 traps (2:00 pm)
PT1	*pine trees - #1 (mullet)	5/18/96	5 traps (10:15 am)
PT2	* - #2	5/18/96	1 trap (10:15 am)
PT3	* - #3	5/18/96	1 trap (10:15 am)
PT4	* - #4 (sketch)	5/18/96	1 trap (10:15 am)
PT5	* - #5	5/18/96	dip net
PT6	* - #6	5/18/96	dip net
PT7	* - #7 (red shrimp)	5/18/96	dip net

PUNALU'U

<u>STATION I.D.</u>	<u>DESCRIPTION</u>	<u>DATE</u>	<u>SAMPLING METHOD</u>
PU1	*fish pond	5/7/96	15 traps (10:15 am)
PU2	*golf course (sewage)	5/7/96	dip net
PU3	*A	5/7/96	dip net
PU4	*C	5/19/96	1 trap (10:15 am)
PU5	*D (sketch)	5/19/96	6 traps (9:50 am)
PU6	*E	5/7/96	dip net
PU7	*F	5/19/96	6 traps (12:00 noon)

KAPOHO

<u>STATION I.D.</u>	<u>DESCRIPTION</u>	<u>DATE</u>	<u>SAMPLING METHOD</u>
KP1	* Pond #1	5/10/96	2 traps
KP2	* Pond #2	5/10/96	2 traps
KP3	* Pond #3	5/10/96	2 traps
KP4	* Pond #4	5/10/96	2 traps

HILO

<u>STATION I.D.</u>	<u>DESCRIPTION</u>	<u>DATE</u>	<u>SAMPLING METHOD</u>
BD1	*Banyan Drive fish pond	5/9/96	6 traps (9:40 am)
LL1	*Leileiwi, fish pond	5/6/96	10 traps (11:30 am)
LL2	*Leileiwi, Leon's pond	5/6/96	7 traps (12:00 noon)
BC1	*Bay Clinic -A	5/6/96	5 traps (3:00 pm)
BC2	-B sketch	5/6/96	5 traps (3:00 pm)
BC3	-C	5/6/96	5 traps (3:00 pm)
KE1	*Kealoha marsh	5/9/96	3 traps (12:00 noon)
KE2	*Kealoha restrooms, mauka	5/9/96	3 traps (1:50 pm)
KE3	*Kealoha restrooms, makai	5/9/96	5 traps (1:50 pm)

Table 2
SPECIES PRESENT IN KALOKO-HONOKOHAU PONDS

<u>Scientific name</u>	<u>Common name</u>	<u>KH1</u>	<u>KH2</u>	<u>KH3</u>	<u>KH4</u>	<u>KH5</u>	<u>KH6</u>	<u>KH7</u>
FISH								
<u>Acanthurus triostegus</u>	manini	X						
<u>Awaous guamensis</u>	'o'opu naked							
<u>Bathygobius cocosensis</u>	'o'opu							
Cichlidae								
<u>Cyprinus carpio</u>	koi							
<u>Eleotris sandwicensis</u>	'o'opu akupa	X						
<u>Gambusia affinis</u>	mosquito fish	X						
<u>Kuhlia sandvicensis</u>	aholehole	X						
<u>Mugil cephalus</u>	ama'ama	X						
<u>Oreochromis mossambicus</u>	tilapia							
<u>Poecilia latipina</u>	sailfin molly							
<u>Poecilia reticulata</u>	guppy		X	X	X			X
<u>Poecilia sp.</u>	top minnow							
<u>Poecilia sphenops</u>	top minnow							
<u>Poecilia vittata</u>	Cuban molly	X						
<u>Sargocentron xanthrythrum</u>	ala'ih							
<u>Sarotherodon melanotheron</u>	tilapia							
<u>Sicyopterus stimpsoni</u>	'o'opu nopili							
CRUSTACEANS								
<u>Halocaridina rubra</u>	'opae ula			X				X
<u>Macrobrachium grandimanus</u>	'opae oeha 'a							
<u>Macrobrachium lar</u>	Tahitian prawn							
<u>Palaemon debilis</u>	'opae huna	X			X			
Palaemonidae								
<u>Procambarus clarkii</u>	crayfish							
MOLLUSCS								
Lymnaeidae								
<u>Melanoides tuberculata</u>								
<u>Tarebia granifera</u>								
<u>Theodoxus cariosus</u>		X						
<u>Theodoxus vespertina</u>	hapawai							
Thiaridae								
			X		X		X	
OTHER								
<u>Corbicula fluminea</u>	asiatic clam							

<u>Scientific name</u>	<u>Common name</u>	<u>PT1</u>	<u>PT2</u>	<u>PT3</u>	<u>PT4</u>	<u>PT5</u>	<u>PT6</u>	<u>PT7</u>
FISH								
<u>Acanthurus triostegus</u>	manini	X						
<u>Awaous guamensis</u>	'o'opu naked							
<u>Bathygobius cocosensis</u>	'o'opu							
Cichlidae								
<u>Cyprinus carpio</u>	koi							
<u>Eleotris sandwicensis</u>	'o'opu akupa							
<u>Gambusia affinis</u>	mosquito fish	X	X	X	X	X	X	
<u>Kuhlia sandwicensis</u>	aholehole							
<u>Mugil cephalus</u>	ama'ama							
<u>Oreochromis mossambicus</u>	tilapia							
<u>Poecilia latipina</u>	sailfin molly							
<u>Poecilia reticulata</u>	guppy							
<u>Poecilia sp.</u>	top minnow							
<u>Poecilia sphenops</u>	top minnow							
<u>Poecilia vittata</u>	Cuban molly							
<u>Sargocentron xanthrythrum</u>	ala'ih							
<u>Sarotherodon melanothron</u>	tilapia							
<u>Sicyopterus stimpsoni</u>	'o'opu nopili							
CRUSTACEANS								
<u>Halocaridina rubra</u>	'opae ula							?
<u>Macrobrachium grandimanus</u>	'opae oeha 'a							
<u>Macrobrachium lar</u>	Tahitian prawn							
<u>Palaemon debilis</u>	'opae huna							
Palaemonidae								
<u>Procambarus clarkii</u>	crayfish							
MOLLUSCS								
Lymnaeidae								
<u>Melanoides tuberculata</u>								
<u>Tarebia granifera</u>								
<u>Theodoxus cariosus</u>								
<u>Theodoxus vespertina</u>	hapawai							
Thiaridae								
		X				X	X	
OTHER								
<u>Corbicula fluminea</u>	asiatic clam							

Table 3
SPECIES PRESENT IN PUNALU'U PONDS

<u>Scientific name</u>	<u>Common name</u>	<u>PU1</u>	<u>PU2</u>	<u>PU3</u>	<u>PU4</u>	<u>PU5</u>	<u>PU6</u>	<u>PU7</u>
FISH								
<u>Acanthurus triostegus</u>	manini							
<u>Awaous guamensis</u>	'o'opu nakea	X					X	X
<u>Bathygobius cocosensis</u>	'o'opu							
Cichlidae								
<u>Cyprinus carpio</u>	koi	X	X					
<u>Eleotris sandwicensis</u>	'o'opu akupa							X
<u>Gambusia affinis</u>	mosquito fish	X	X				X	X
<u>Kuhlia sandvicensis</u>	aholehole							
<u>Mugil cephalus</u>	ama'ama					X		
<u>Oreochromis mossambicus</u>	tilapia	X						X
<u>Poecilia latipina</u>	sailfin molly	X						
<u>Poecilia reticulata</u>	guppy							
<u>Poecilia sp.</u>	top minnow					X		
<u>Poecilia sphenops</u>	top minnow							
<u>Poecilia vittata</u>	Cuban molly	X						X
<u>Sargocentron xanthrythrum</u>	ala'ih							
<u>Sarotherodon melanotheron</u>	tilapia					X		
<u>Sicyopterus stimpsoni</u>	'o'opu nopili			X			X	
CRUSTACEANS								
<u>Halocaridina rubra</u>	'opae ula							
<u>Macrobrachium grandimanus</u>	'opae oeha 'a			X		X		
<u>Macrobrachium lar</u>	Tahitian prawn	X		X		X		X
<u>Palaemon debilis</u>	'opae huna							
Palaemonidae								
<u>Procambarus clarkii</u>	crayfish							X
MOLLUSCS								
Lymnaeidae								
<u>Melanooides tuberculata</u>						X	X	
<u>Tarebia granifera</u>						X		X
<u>Theodoxus cariosus</u>						X		X
<u>Theodoxus vespertina</u>	hapawai					X		
Thiaridae								
		X					X	
OTHER								
<u>Corbicula fluminea</u>	asiatic clam	X						X

Table 4
SPECIES PRESENT IN KAPOHO PONDS

<u>Scientific name</u>	<u>Common name</u>	<u>KP1</u>	<u>KP2</u>	<u>KP3</u>	<u>KP4</u>
FISH					
<u>Acanthurus triostegus</u>	manini				
<u>Awaous guamensis</u>	'o'opu nakea				
<u>Bathygobius cocosensis</u>	'o'opu				
<u>Cichlidae</u>		X			
<u>Cyprinus carpio</u>	koi				
<u>Eleotris sandwicensis</u>	'o'opu akupa			X	X
<u>Gambusia affinis</u>	mosquito fish				X
<u>Kuhlia sandvicensis</u>	aholehole				
<u>Mugil cephalus</u>	ama'ama				
<u>Oreochromis mossambicus</u>	tilapia				
<u>Poecilia latipina</u>	sailfin molly				
<u>Poecilia reticulata</u>	guppy				
<u>Poecilia sp.</u>	top minnow			X	
<u>Poecilia sphenops</u>	top minnow	X			
<u>Poecilia vittata</u>	Cuban molly				
<u>Sargocentron xanthrythrum</u>	ala'ih				
<u>Sarotherodon melanothron</u>	tilapia				
<u>Sicyopterus stimpsoni</u>	'o'opu nopili				
CRUSTACEANS					
<u>Halocaridina rubra</u>	'opae ula				
<u>Macrobrachium grandimanus</u>	'opae oeha 'a				
<u>Macrobrachium lar</u>	Tahitian prawn				
<u>Palaemon debilis</u>	'opae huna				
<u>Palaemonidae</u>					
<u>Procambarus clarkii</u>	crayfish				
MOLLUSCS					
<u>Lymnaeidae</u>					
<u>Melanoides tuberculata</u>					
<u>Tarebia granifera</u>					
<u>Theodoxus cariosus</u>					
<u>Theodoxus vespertina</u>	hapawai				
<u>Thiaridae</u>					
OTHER					
<u>Corbicula fluminea</u>	asiatic clam				

Table 5
SPECIES PRESENT IN HILO PONDS

<u>Scientific name</u>	<u>Common name</u>	<u>BD1</u>	<u>LL1</u>	<u>LL2</u>	<u>BC1</u>	<u>BC2</u>	<u>BC3</u>
FISH							
<u>Acanthurus triostegus</u>	manini		X				
<u>Awaous guamensis</u>	'o'opu nakea		X			X	X
<u>Bathygobius cocosensis</u>	'o'opu	X					
Cichlidae							
<u>Cyprinus carpio</u>	koi			X			
<u>Eleotris sandwicensis</u>	'o'opu akupa		X		X	X	X
<u>Gambusia affinis</u>	mosquito fish	X		X			
<u>Kuhlia sandvicensis</u>	aholehole		X		X	X	
<u>Mugil cephalus</u>	ama'ama	X		X			
<u>Oreochromis mossambicus</u>	tilapia						
<u>Poecilia latipina</u>	sailfin molly						
<u>Poecilia reticulata</u>	guppy						
<u>Poecilia sp.</u>	top minnow		X				
<u>Poecilia sphenops</u>	top minnow			X			
<u>Poecilia vittata</u>	Cuban molly						
<u>Sargocentron xanthrythrum</u>	ala'ih				X		
<u>Sarotherodon melanothron</u>	tilapia						
<u>Sicyopterus stimpsoni</u>	'o'opu nopili					X	X
CRUSTACEANS							
<u>Halocaridina rubra</u>	'opae ula						
<u>Macrobrachium grandimanus</u>	'opae oeha 'a			X			
<u>Macrobrachium lar</u>	Tahitian prawn				X	X	X
<u>Palaemon debilis</u>	'opae huna	X					
<u>Palaemonidae</u>		X	X				
<u>Procambarus clarkii</u>	crayfish						
MOLLUSCS							
Lymnaeidae							
<u>Melanoides tuberculata</u>							
<u>Tarebia granifera</u>		X					
<u>Theodoxus cariosus</u>							
<u>Theodoxus vespertina</u>	hapawai	X					
<u>Thiaridae</u>		X					
OTHER							
<u>Corbicula fluminea</u>	asiatic clam						

<u>Scientific name</u>	<u>Common name</u>	<u>KE1</u>	<u>KE2</u>	<u>KE3</u>
FISH				
<u>Acanthurus triostegus</u>	manini			
<u>Awaous guamensis</u>	'o'opu nakea		X	
<u>Bathygobius cocosensis</u>	'o'opu			
Cichlidae				
<u>Cyprinus carpio</u>	koi			
<u>Eleotris sandwicensis</u>	'o'opu akupa		X	X
<u>Gambusia affinis</u>	mosquito fish	X	X	
<u>Kuhlia sandvicensis</u>	aholehole			
<u>Mugil cephalus</u>	ama'ama			
<u>Oreochromis mossambicus</u>	tilapia			
<u>Poecilia latipina</u>	sailfin molly	?		
<u>Poecilia reticulata</u>	guppy			
<u>Poecilia sp.</u>	top minnow		X	X
<u>Poecilia sphenops</u>	top minnow	X		
<u>Poecilia vittata</u>	Cuban molly			
<u>Sargocentron xanthrythrum</u>	ala'ih			
<u>Sarotherodon melanotheron</u>	tilapia			
<u>Sicyopterus stimpsoni</u>	'o'opu nopili		X	
CRUSTACEANS				
<u>Halocaridina rubra</u>	'opae ula			
<u>Macrobrachium grandimanus</u>	'opae oeha 'a		X	X
<u>Macrobrachium lar</u>	Tahitian prawn			
<u>Palaemon debilis</u>	'opae huna		X	X
Palaemonidae			X	
<u>Procambarus clarkii</u>	crayfish			
MOLLUSCS				
Lymnaeidae				
<u>Melanoides tuberculata</u>				
<u>Tarebia granifera</u>				
<u>Theodoxus cariosus</u>				
<u>Theodoxus vespertina</u>	hapawai		X	X
Thiaridae		X		
OTHER				
<u>Corbicula fluminea</u>	asiatic clam			

Table 6
FISH ABUNDANCE IN KALOKO-HONOKOHAU PONDS

<u>STATION</u>	<u>SPECIES</u>	<u>NUMBER</u>
KH1		
TRAP #1	<u>Eleotris sandwicensis</u>	1
TRAP #2	<u>Kuhlia sandvicensis</u>	1
TRAP #3	none	
TRAP #4	none	
TRAP #5	<u>Eleotris sandwicensis</u>	1
	<u>Poecilia vittata</u>	1
KH2	no traps	
KH3	no traps	
KH4		
TRAP #1	<u>Poecilia reticulata</u>	131
TRAP #2	<u>Poecilia reticulata</u>	103
KH5		
TRAP #1	<u>Poecilia reticulata</u>	425
TRAP #2	<u>Poecilia reticulata</u>	337
TRAP #3	<u>Poecilia reticulata</u>	215
KH6		
TRAP #1	<u>(Halocaridena rubra)</u>	
TRAP #2	<u>(Halocaridena rubra)</u>	
KH7		
TRAP #1	<u>Poecilia reticulata</u>	149
TRAP #2	<u>Poecilia reticulata</u>	170
PT1		
TRAP #1	<u>Gambusia affinis</u>	2
TRAP #2	<u>Gambusia affinis</u>	2
TRAP #3	<u>Gambusia affinis</u>	103
TRAP #4	<u>Gambusia affinis</u>	98
TRAP #5	<u>Gambusia affinis</u>	125

<u>STATION</u>	<u>SPECIES</u>	<u>NUMBER</u>
PT2		
TRAP #1	<u>Gambusia affinis</u>	105
PT3		
TRAP #1	<u>Gambusia affinis</u>	25
PT4		
TRAP #1	<u>Gambusia affinis</u>	118
PT5	no traps	
PT6	no traps	
PT7	no traps	

Table 7
FISH ABUNDANCE IN PUNALU'U PONDS

<u>STATION</u>	<u>Poecilia vittata</u>	<u>Poecilia latipina</u>	<u>Gambusia affinis</u>
PU1			
TRAP #1	434	12	5
TRAP #2	433	3	
TRAP #3	104	24	22
TRAP #4	361	1	
TRAP #5	118	6	
TRAP #6	197	3	10
TRAP #7	223	9	6
TRAP #8	150	7	
TRAP #9	204	1	4
TRAP #10	417	3	1
TRAP #11	215	5	6
TRAP #12	379	3	
TRAP #13	189	2	6
TRAP #14	274	1	4
TRAP #15	226	5	2

<u>STATION</u>	<u>SPECIES</u>	<u>NUMBER</u>
PU2 no traps		
PU3 no traps		
PU4		
TRAP #1	none	
PU5		
TRAP #1	none	
TRAP #2	none	
TRAP #3	none	
TRAP #4	none	
TRAP #5	none	
PU6 no traps		
PU7		
TRAP #1	none	
TRAP #2	none	
TRAP #3	none	
TRAP #4	<u>Eleotris sandwicensis</u>	2
TRAP #5	<u>Eleotris sandwicensis</u>	1

note: minnows observed outside of traps #4, #5 and #6

Table 8
FISH ABUNDANCE IN KAPOHO PONDS

<u>STATION</u>	<u>SPECIES</u>	<u>NUMBER</u>
KP1		
TRAP #1	<u>Poecilia sphenops</u>	1
TRAP #2	none	
KP2		
TRAP #1	none	
TRAP #2	none	
KP3		
TRAP #1	<u>Eleotris sandwicensis</u>	3
TRAP #2	<u>Eleotris sandwicensis</u>	3
	<u>Poecilia sp.</u>	4
KP4		
TRAP #1	<u>Eleotris sandwicensis</u>	1
TRAP #2	<u>Gambusia affinis</u>	6

Table 9
FISH ABUNDANCE IN HILO PONDS

<u>STATION</u>	<u>SPECIES</u>	<u>NUMBER</u>
BD1		
TRAP #1	(minnows outside trap)	
TRAP #2	<u>Gambusia affinis</u>	1
TRAP #3	<u>Gambusia affinis</u>	75
	<u>Bathygobius cocosensis</u>	3
TRAP #4	<u>Gambusia affinis</u>	2
	<u>Bathygobius cocosensis</u>	2
TRAP #5	<u>Gambusia affinis</u>	2
TRAP #6	<u>Gambusia affinis</u>	56

<u>STATION</u>	<u>SPECIES</u>	<u>NUMBER</u>
----------------	----------------	---------------

LL1

TRAP #1	none	
TRAP #2	<u>Eleotris sandwicensis</u>	1
TRAP #3	none	
TRAP #4	none	
TRAP #5	none	
TRAP #6	none	
TRAP #7	none	
TRAP #8	none	
TRAP #9	none	
TRAP #10	none	

note: minnows observed in this pond but not trapped

LL2

TRAP #1	<u>(Macrobrachium grandimanus)</u>	
TRAP #2	<u>(Macrobrachium grandimanus)</u>	
TRAP #3	<u>(Macrobrachium grandimanus)</u>	
TRAP #4	none	
TRAP #5	none	
TRAP #6	none	
TRAP #7	none	

BC1

TRAP #1	none	
TRAP #2	none	
TRAP #3	none	
TRAP #4	none	
TRAP #5	<u>Eleotris sandwicensis</u>	1

BC2

TRAP #1	<u>Eleotris sandwicensis</u>	1
TRAP #2	none	
TRAP #3	none	
TRAP #4	none	
TRAP #5	none	

<u>STATION</u>	<u>SPECIES</u>	<u>NUMBER</u>
BC3		
TRAP #1	none	
TRAP #2	none	
TRAP #3	none	
TRAP #4	none	
TRAP #5	none	
KE1		
TRAP #1	<u>Poecilia sphenops</u>	29
	<u>Gambusia affinis</u>	1
TRAP #2	<u>Poecilia sphenops</u>	5
TRAP #3	<u>Poecilia sphenops</u>	124
	<u>Gambusia affinis</u>	7
KE2		
TRAP #1	none	
TRAP #2	<u>Eleotris sandwicensis</u>	1
TRAP #3	none	
KE3		
TRAP #1	none	
TRAP #2	<u>Eleotris sandwicensis</u>	1
TRAP #3	none	
TRAP #4	none	
TRAP #5	none	

APPENDIX A

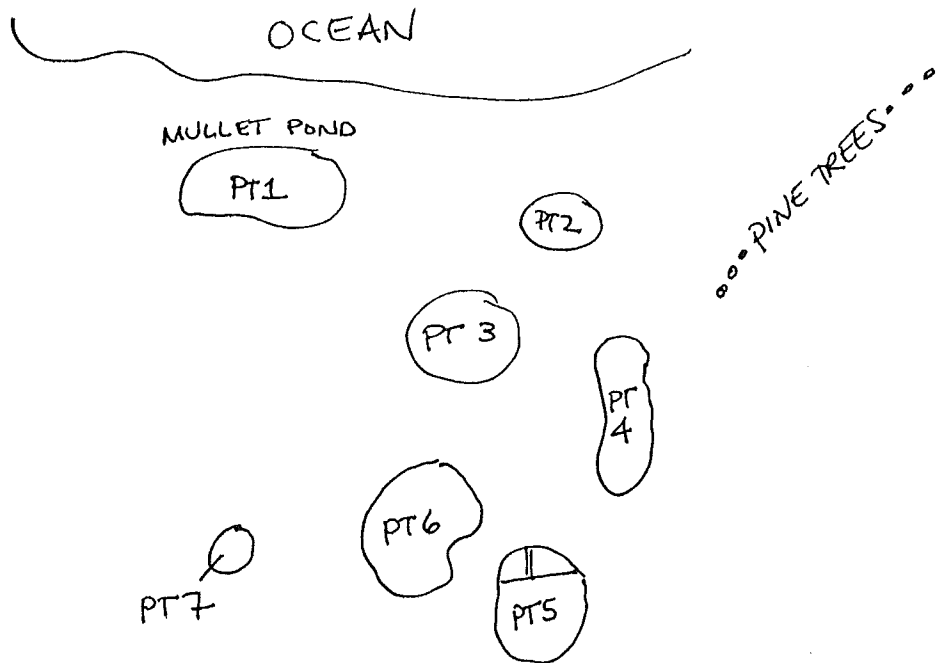
SPECIES LIST

<u>Species</u>	<u>Native</u>	<u>Common Synonyms</u>
FISH		
<u>Acanthurus triostegus</u> (manini)		
<u>Awaous guamensis</u> ('o'opu naked)		<u>Awaous stamineus</u>
<u>Bathygobius cocosensis</u> ('o'opu)		<u>Bathygobius fuscus</u>
Cichlidae	no	
<u>Cyprinus carpio</u> (koi)	no	
<u>Eleotris sandwicensis</u> ('o'opu akupa)		
<u>Gambusia affinis</u> (mosquito fish)	no	
<u>Kuhlia sandvicensis</u> (aholehole)		
<u>Mugil cephalus</u> (ama'ama)		(mullet)
<u>Oreochromis mossambicus</u> (tilapia)	no	<u>Tilapia mossambicus</u>
<u>Poecilia latipina</u> (sailfin molly)	no	
<u>Poecilia reticulata</u> (guppy)	no	
<u>Poecilia</u> sp. (top minnow)	no	
<u>Poecilia sphenops</u> (top minnow)	no	
<u>Poecilia vittata</u> (Cuban molly)	no	
<u>Sargocentron xanthrythrum</u> (ala'ihii)	no	(squirrel fish)
<u>Sarotherodon melanotheron</u> (tilapia)	no	<u>Tilapia melanotheron</u>
<u>Sicyopterus stimpsoni</u> ('o'opu nopili)		
CRUSTACEANS		
<u>Halocaridina rubra</u> ('opae ula)		(red shrimp)
<u>Macrobrachium grandimanus</u> ('opae oeha'a)		
<u>Macrobrachium</u> lar (Tahitian prawn)	no	
<u>Palaemon debilis</u> ('opae huna)		(glass shrimp)
Palaemonidae		
<u>Procambarus clarkii</u> (crayfish)	no	
MOLLUSCS		
Lymnaeidae		
<u>Melanoides tuberculata</u>	?	
<u>Tarebia granifera</u>	?	<u>Thiara granifera</u>
<u>Theodoxus cariosus</u>		
<u>Theodoxus vespertina</u> (hapawai)		
Thiaridae	?	
OTHER		
<u>Corbicula fluminea</u> (asiatic clam)	no	

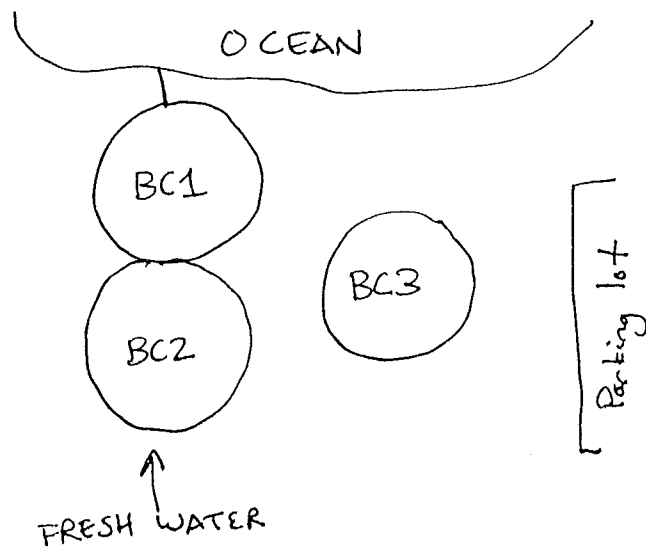
APPENDIX B

LOCATIONS OF SELECTED PONDS

(KALOKO - HONOKOHAU) PINE TREES

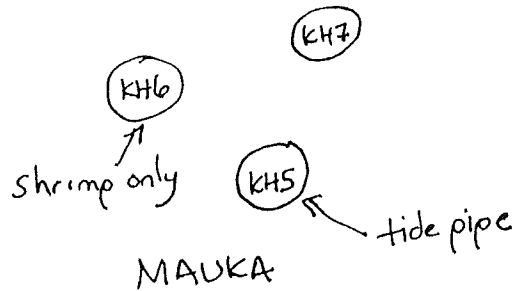


(HILO) BAY CLINIC



(KALOKO-HONOKOHAU) THREE PONDS

MAKAI



— A'IMAKAPA A —

(KALOKO-HONOKOHAU) ANCHIALINE POND

