DAR Watershed Code: 82032

### Hakalau, Hawai'i



### WATERSHED FEATURES

Hakalau watershed occurs on the island of Hawai'i. The Hawaiian meaning of the name is "many perches". The area of the watershed is 9.4 square mi (24.4 square km), with maximum elevation of 4062 ft (1238 m). The watershed's DAR cluster code is 3, meaning that the watershed is medium small, steep in the upper watershed, and with some embayment. The percent of the watershed in the different land use districts is as follows: 37% agricultural, 61.8% conservation, 0% rural, and 1.3% urban.

Land Stewardship: Percentage of the land in the watershed managed or controlled by the corresponding agency or entity. Note that this is not necessarily ownership.

<u>Military</u>	Federal	<u>State</u>	<u>OHA</u>	<u>County</u>	Nature Conservancy	Other Private
0.0	1.1	32.0	0.0	0.0	0.0	66.8

Land Management Status: Percentage of the watershed in the categories of biodiversity protection and management created by the Hawaii GAP program.

Permanent Biodiversity	Managed for Multiple	Protected but	
Protection	Uses	<u>Unmanaged</u>	<u>Unprotected</u>
1.1	0.0	23.6	75.3

Land Use: Areas of the various categories of land use. These data are based on NOAA C-CAP remote sensing project.

	Percent	<u>Square mi</u>	<u>Square km</u>
High Intensity Developed	0.0	0.00	0.01
Low Intensity Developed	0.2	0.02	0.04
Cultivated	2.3	0.22	0.57
Grassland	17.1	1.61	4.17
Scrub/Shrub	8.7	0.82	2.12
Evergreen Forest	71.4	6.73	17.43
Palustrine Forested	0.0	0.00	0.00
Palustrine Scrub/Shrub	0.0	0.00	0.00
Palustrine Emergent	0.0	0.00	0.00
Estuarine Forested	0.0	0.00	0.00
Bare Land	0.2	0.02	0.05
Unconsolidated Shoreline	0.0	0.00	0.01
Water	0.1	0.01	0.02
Unclassified	0.0	0.00	0.00

#### **STREAM FEATURES**

Hakalau is a perennial stream. Total stream length is 29.9 mi (48.1 km). The terminal stream order is 3.

## **Reach Type Percentages: The percentage of the stream's channel length in each of the reach type categories.**

<u>Estuary</u>	Lower	Middle	<u>Upper</u>	Headwaters
0.0	2.3	10.0	70.2	17.5

The following stream(s) occur in the watershed: Hakalau Kamaee Wa'awa'a

#### **BIOTIC SAMPLING EFFORT**

Biotic samples were gathered in the following year(s):								
1967	1980	1989	1990	1991	1992	1993		
1994	1995	1997	1998	2000	2001			

Distribution of Biotic Sampling: The number of survey locations that were sampled	in the
various reach types.	

<u>Estuary</u>	Lower	Middle	<u>Upper</u>	Headwaters
0	422	0	0	0
0	6	0	0	0
0	43	40	89	0
0	1	1	2	0
0	26	0	42	0
7	6	3	4	0
	<u>Estuary</u> 0 0 0 0 0 7	Estuary Lower   0 422   0 6   0 43   0 1   0 26   7 6	EstuaryLowerMiddle04220060043400110260763	EstuaryLowerMiddleUpper0422000600043408901120260427634

### **BIOTA INFORMATION**

Species List									
Native Species	S		Native Species						
Crustaceans	Atyoida bisulcata		Insects	Megalagrion sp.					
	Macrobrachium grand	limanus		Telmatogeton sp	).				
Fish	Awaous guamensis								
	Eleotris sandwicensis								
	Gobiid sp.								
	Kuhlia sandvicensis								
	Kuhlia sp.	Kuhlia sp.							
	Kuhlia xenura								
	Lentipes concolor								
	Mugil cephalus								
	Sicyopterus stimpson	i							
	Stenogobius hawaiier	nsis							
Snails	Neritina granosa								
	Neritina vespertina								
Worms	Myzobdella lugubris								
Introduced Sp	ecies		Introduced Species						
Crustaceans	Macrobrachium lar Procambarus clarkii		Insects	Chironomid larva	ae				
Fish	Poecilia reticulata								
	Xiphophorus helleri								
Worms	Bothriocephalus ache	ilognathi							
	Camallanus cotti								
	Cystobranchus								
Species Size D	ata: Species size (inch	es) observ	ed in DAR Poi	nt Quadrat Surv	eys.				
Scientific Name	<u>e</u> <u>Statu</u>	<u>s</u>	Minimum Size	Maximum Size	Averag				
Atvoida hisulca	ta Endo	mic	0.75	1 75	1				

Scientific Name	<u>Status</u>	Minimum Size	Maximum Size	Average Size
Atyoida bisulcata	Endemic	0.75	1.75	1.2
Macrobrachium lar	Introduced	0.75	5	3.4
Eleotris sandwicensis	Endemic	3	229	89.6
Kuhlia xenura	Endemic	3	4	3.8

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Lentipes concolor	Endemic	0.63	18	2.7
Sicyopterus stimpsoni	Endemic	0.5	100	6.7
Stenogobius hawaiiensis	Endemic	13	13	13.0
Awaous guamensis	Indigenous	0.5	160	8.8
Gobiid sp.	Indigenous	0.5	1.25	0.7
Kuhlia sp.	Indigenous	25	150	42.0
Mugil cephalus	Indigenous	1	1	1.0
Neritina granosa	Endemic	0.5	33	3.2
Neritina vespertina	Endemic	4	19	8.3

# Average Density: The densities (#/square yard) for species observed in DAR Point Quadrat Surveys averaged over all sample dates in each reach type.

Scientific Name	<u>Status</u>	<u>Estuary</u>	Low	Mid	<u>Upper</u>	<b>Headwaters</b>
Atyoida bisulcata	Endemic				3.21	
Eleotris sandwicensis	Endemic		0.02			
Kuhlia xenura	Endemic		0.25			
Lentipes concolor	Endemic		0.89	0.13	1.61	
Neritina granosa	Endemic		0.32	0.35	0	
Sicyopterus stimpsoni	Endemic		3.71	1.3		
Awaous guamensis	Indigenous		1.06	1.77		
Gobiid sp.	Indigenous		0.42	0.38		
Mugil cephalus	Indigenous		0.1			
Macrobrachium lar	Introduced		0.17	0.79	0.07	

#### **Species Distributions: Presence (P) of species in different stream reaches.**

Scientific Name	<u>Status</u>	<u>Estuary</u>	Lower	<u>Middle</u>	Upper Headwaters
Myzobdella lugubris	Cryptogenic		Р		
Atyoida bisulcata	Endemic		Р	Р	Р
Macrobrachium grandimanus	Endemic		Р		
Eleotris sandwicensis	Endemic	Р	Р	Р	
Kuhlia xenura	Endemic		Р		
Lentipes concolor	Endemic	Р	Р	Р	Р
Sicyopterus stimpsoni	Endemic	Р	Р	Р	Р
Stenogobius hawaiiensis	Endemic	Р	Р	Р	
Megalagrion sp.	Endemic		Р	Р	Р
Neritina granosa	Endemic		Р	Р	Р
Neritina vespertina	Endemic		Р		
Awaous guamensis	Indigenous	Р	Р	Р	
Gobiid sp.	Indigenous		Р	Р	
Kuhlia sandvicensis	Indigenous	Р	Р	Р	
Kuhlia sp.	Indigenous		Р		
Mugil cephalus	Indigenous		Р		
Telmatogeton sp.	Indigenous				Р

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Telmatogeton sp.	Indigenous			Ρ
Macrobrachium lar	Introduced	Р	Р	Ρ
Procambarus clarkii	Introduced	Р	Р	
Poecilia reticulata	Introduced	Р		
Xiphophorus helleri	Introduced	Р	Р	
Chironomid larvae	Introduced			Ρ
Bothriocephalus	Introduced	Р		
Camallanus cotti	Introduced	Р		
Cystobranchus	Introduced	Р		

#### **HISTORIC RANKINGS**

Historic Rankings: These are rankings of streams from historical studies. "Yes" means the stream was considered worthy of protection by that method. Some methods include non-biotic data in their determination. See Atlas Key for details.

Multi-Attribute Prioritization of Streams - Potential Heritage Streams (1998): No Hawaii Stream Assessment Rank (1990): Outstanding U.S. Fish and Wildlife Service High Quality Stream (1988): Yes The Nature Conservancy- Priority Aquatic Sites (1985): No National Park Service - Nationwide Rivers Inventory (1982): No

## Current DAR Decision Rule Status: The following criteria are used by DAR to consider the biotic importance of streams. "Yes" means that watershed has that quality.

Native Insect Diversity	Native Macrofauna	Absence of Priority 1
> 19 spp.	<u>Diversity &gt; 5 spp.</u>	Introduced
No	Yes	No
Abundance of Any	Presence of Candidate	Endangered Newcomb's
<u>Native Species</u>	Endangered Species	<u>Snail Habitat</u>
No	No	No

#### **CURRENT WATERSHED AND STREAM RATINGS**

The current watershed and stream ratings are based on the data contained in the DAR Aquatic Surveys Database. The ratings provide the score for the individual watershed or stream, the distribution of ratings for that island, and the distribution of ratings statewide. This allows a better understanding of the meaning of a particular ranking and how it compares to other streams. The ratings are standardized to range from 0 to 10 (0 is lowest and 10 is highest rating) for each variable and the totals are also standardized so that the rating is not the average of each component rating. These ratings are subject to change as more data are entered into the DAR Aquatic Surveys Database and can be automatically recalculated as the data improve. In addition to the ratings, we have also provided an estimate of the confidence level of the ratings. This is called rating strength. The higher the rating strength the more likely the data and rankings represent the actual condition of the watershed, stream, and aquatic biota.

#### WATERSHED RATING: Hakalau, Hawai'i

Land Cover Rating: Rating is based on a scoring sytem where in general forested lands score positively and developed lands score negatively.



<u>Shallow Waters Rating</u>: Rating is based on a combination of the extent of estuarine and shallow marine areas associated with the watershed and stream.



<u>Stewardship Rating</u>: Rating is based on a scoring system where higher levels of land and biodiversity protection within the watershed score positively.



#### WATERSHED RATING (Cont): Hakalau, Hawai'i

<u>Size Rating</u>: Rating is based on the watershed area and total stream length. Larger watersheds and streams score more positively.



Wetness Rating: Rating is based on the average annual rainfall within the watershed. Higher rainfall totals score more positively.



<u>Reach Diversity Rating</u>: Rating is based on the types and amounts of different stream reaches available in the watershed. More area in different reach types score more positively.



<u>Total Watershed Rating</u>: Rating is based on combination of <u>Land Cover Rating</u>, <u>Shallow</u> <u>Waters Rating</u>, <u>Stewardship Rating</u>, <u>Size Rating</u>, <u>Wetness Rating</u>, and <u>Reach Diversity Rating</u>.



#### **BIOLOGICAL RATING: Hakalau, Hawai'i**

Native Species Rating: Rating is based on the number of native species observed in the watershed.



Introduced Genera Rating: Rating is based on the number of introduced genera observed in the watershed.



<u>All Species' Score Rating:</u> Rating is based on the Hawaii Stream Assessment scoring system where native species score positively and introduced species score negatively.



<u>Total Biological Rating</u>: Rating is the combination of the <u>Native Species Rating</u>, <u>Introduced</u> <u>Genera Rating</u>, and the <u>All Species' Score Rating</u>.



#### **OVERALL RATING: Hakalau, Hawai'i**

Overall Rating: Rating is a combination of the <u>Total Watershed Rating</u> and the <u>Total Biological</u> <u>Rating</u>.



#### RATING STRENGTH: Hakalau, Hawai'i

<u>Rating Strength</u>: Represents an estimate of the overall study effort in the stream and is a combination of the number of studies, number of different reaches surveyed, and the number of different survey types.



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