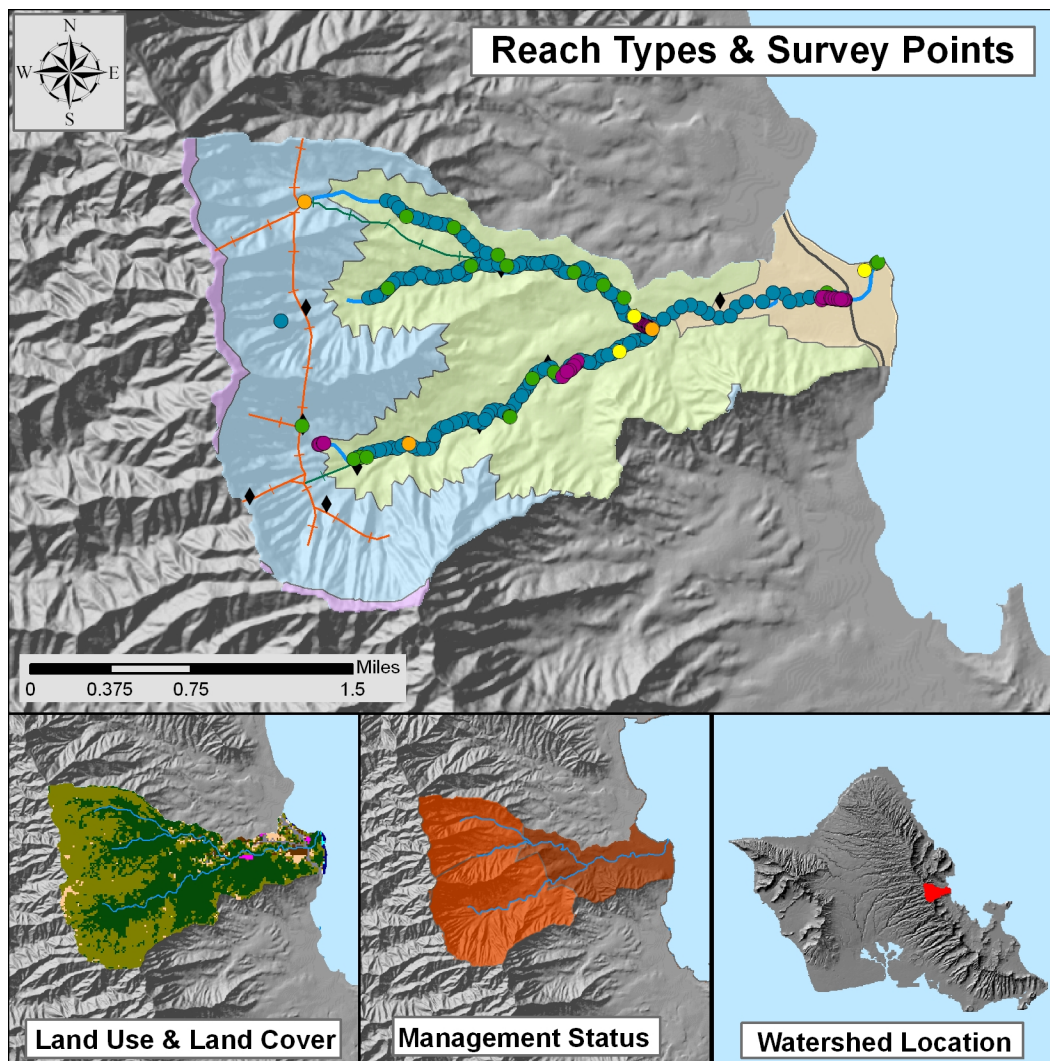


## Waiāhole, O‘ahu



### WATERSHED FEATURES

Waiāhole watershed occurs on the island of O‘ahu. The Hawaiian meaning of the name is “mature *āhole* (a fish) water”. The area of the watershed is 4 square mi (10.4 square km), with maximum elevation of 2743 ft (836 m). The watershed’s DAR cluster code is 4, meaning that the watershed is medium size, steep in the upper watershed, and with embayment. The percent of the watershed in the different land use districts is as follows: 19.7% agricultural, 78.7% conservation, 0% rural, and 1.5% 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>	<u>Federal</u>	<u>State</u>	<u>OHA</u>	<u>County</u>	<u>Nature Conservancy</u>	<u>Other</u>	<u>Private</u>
0.0	0.2	47.3	0.0	23.7	0.0		28.8

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

Permanent Biodiversity <u>Protection</u>	Managed for Multiple <u>Uses</u>	Protected but <u>Unmanaged</u>	<u>Unprotected</u>
0.2	0.0	70.9	28.8

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

	<u>Percent</u>	<u>Square mi</u>	<u>Square km</u>
High Intensity Developed	0.0	0.00	0.00
Low Intensity Developed	1.3	0.05	0.14
Cultivated	1.6	0.06	0.17
Grassland	2.7	0.11	0.28
Scrub/Shrub	43.8	1.75	4.54
Evergreen Forest	49.6	1.98	5.14
Palustrine Forested	0.0	0.00	0.00
Palustrine Scrub/Shrub	0.0	0.00	0.00
Palustrine Emergent	0.3	0.01	0.03
Estuarine Forested	0.0	0.00	0.00
Bare Land	0.1	0.00	0.01
Unconsolidated Shoreline	0.1	0.00	0.01
Water	0.5	0.02	0.05
Unclassified	0.0	0.00	0.00

### STREAM FEATURES

Waiāhole is a perennial stream. Total stream length is 6.3 mi (10.1 km). The terminal stream order is 2.

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

<u>Estuary</u>	<u>Lower</u>	<u>Middle</u>	<u>Upper</u>	<u>Headwaters</u>
0.0	20.5	77.4	2.0	0.0

The following stream(s) occur in the watershed:

Uwao                      Waiāhole                      Waianu

### BIOTIC SAMPLING EFFORT

Biotic samples were gathered in the following year(s):

1961      1974      1990      1995      1999      2000      2002  
2003

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

<u>Survey type</u>	<u>Estuary</u>	<u>Lower</u>	<u>Middle</u>	<u>Upper</u>	<u>Headwaters</u>
Damselfly Surveys	0	1	2	0	0
DAR Point Quadrat	0	45	214	0	0
HDFG	0	0	2	1	0
Microhabitat Survey	0	49	17	0	0
Published Report	0	3	17	1	0

**BIOTA INFORMATION**

**Species List**

**Native Species**

<b>Crustaceans</b>	<i>Atyoida bisulcata</i>
	<i>Macrobrachium sp.</i>
	<i>Metopograpsus thukuhar</i>
<b>Fish</b>	<i>Awaous guamensis</i>
	<i>Eleotris sandwicensis</i>
	<i>Kuhlia xenura</i>
	<i>Lentipes concolor</i>
	<i>Mugil cephalus</i>
	<i>Sicyopterus stimpsoni</i>
	<i>Stenogobius hawaiiensis</i>
<b>Snails</b>	Snail sp.
<b>Worms</b>	<i>Namalycastis sp.</i>
	<i>Oligochaete sp.</i>

**Native Species**

<b>Insects</b>	<i>Anax junius</i>
	<i>Campsicnemus brevipes</i>
	<i>Clunio vagans</i>
	Collembola sp.
	<i>Dasyhelea hawaiiensis</i>
	<i>Dasyrhicnoessa insularis</i>
	Empidid sp.
	<i>Hemerodromia sp.</i>
	<i>Hydroptila sp.</i>
	<i>Hyposmocoma sp.</i>
	<i>Limonia jacobus</i>
	<i>Limonia sp.</i>
	<i>Megalagrion hawaiiense</i>
	<i>Megalagrion oceanicum</i>
	<i>Megalagrion sp.</i>
	<i>Microvelia vagans</i>
	<i>Nesogonia blackburni</i>
	<i>Orthocladus sp.</i>
	<i>Procanace bifurcata</i>
	<i>Procanace williamsi</i>
	<i>Procanace wirthi</i>
	<i>Saldula exulans</i>
	<i>Scatella cilipes</i>
	<i>Scatella clavipes</i>
	<i>Scatella hawaiiensis</i>
	<i>Scatella oahuense</i>
	<i>Scatella sexnotata</i>
	<i>Thambemyia acrosticalis</i>

**Introduced Species**

<b>Clams</b>	<i>Corbicula fluminea</i>
<b>Crustaceans</b>	<i>Hyalella azteca</i>
	<i>Macrobrachium lar</i>
	<i>Procambarus clarkii</i>

**Introduced Species**

<b>Insects</b>	<i>Brachydeutera ibari</i>
	<i>Canaceoides angulatus</i>
	<i>Cheumatopsyche analis</i>
	<i>Cheumatopsyche pettiti</i>

<b>Fish</b>	<i>Clarias fuscus</i>	Chironomid larvae	
	<i>Poecilia reticulata</i>	<i>Cricotopus bicinctus</i>	
	<i>Poecilia sphenops</i>	<i>Dixa longistyla</i>	
	Poeciliid sp.	<i>Hydroptila arctia</i>	
	<i>Tilapia sp.</i>	<i>Hydroptila potosina</i>	
	unidentified poeciliid	<i>Ischnura posita</i>	
	<i>Xiphophorus helleri</i>	<i>Ischnura ramburi</i>	
	<i>Xiphophorus sp.</i>	<i>Limonia advena</i>	
	<b>Snails</b>	<i>Helisoma sp.</i>	<i>Orthemis ferruginea</i>
		Lymnaeid sp.	<i>Pantala flavescens</i>
<i>Melania sp.</i>		<i>Syntormon flexible</i>	
<i>Melanooides tuberculata</i>			
<i>Planorbella duryi</i>			
<b>Worms</b>	<i>Pomacea canaliculata</i>		
	<i>Bothriocephalus acheilognathi</i>		
	<i>Camallanus cotti</i>		
	<i>Dugesia sp.</i>		

**Species Size Data: Species size (inches) observed in DAR Point Quadrat Surveys.**

<u>Scientific Name</u>	<u>Status</u>	<u>Minimum Size</u>	<u>Maximum Size</u>	<u>Average Size</u>
<i>Corbicula fluminea</i>	Introduced	0.25	0.5	0.3
<i>Atyoida bisulcata</i>	Endemic	0.5	2.5	1.3
<i>Macrobrachium lar</i>	Introduced	1	7	4.2
<i>Macrobrachium sp.</i>	Unknown	0.38	0.75	0.5
<i>Eleotris sandwicensis</i>	Endemic	1.75	6	4.4
<i>Kuhlia xenura</i>	Endemic	1	5	2.7
<i>Sicyopterus stimpsoni</i>	Endemic	4	4	4.0
<i>Stenogobius hawaiiensis</i>	Endemic	1.5	4	2.4
<i>Awaous guamensis</i>	Indigenous	0.75	7.5	3.7
<i>Mugil cephalus</i>	Indigenous	3	10	7.4
<i>Clarias fuscus</i>	Introduced	6	6	6.0
<i>Poecilia reticulata</i>	Introduced	0.5	2	1.0
<i>Poecilia sphenops</i>	Introduced	0.25	4	1.2
Poeciliid sp.	Introduced	0.25	1.5	1.1
<i>Xiphophorus helleri</i>	Introduced	0.5	4	1.8
<i>Pomacea canaliculata</i>	Introduced	0.13	0.75	0.4

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

<u>Scientific Name</u>	<u>Status</u>	<u>Estuary</u>	<u>Low</u>	<u>Mid</u>	<u>Upper</u>	<u>Headwaters</u>
<i>Atyoida bisulcata</i>	Endemic			2.16		
<i>Eleotris sandwicensis</i>	Endemic		0.05			
<i>Kuhlia xenura</i>	Endemic		0.45	0.25		
<i>Stenogobius hawaiiensis</i>	Endemic		0.05			
<i>Awaous guamensis</i>	Indigenous		0.1	0.25		
<i>Mugil cephalus</i>	Indigenous		0.15			

<i>Clarias fuscus</i>	Introduced		0.02
<i>Corbicula fluminea</i>	Introduced	0.15	0.05
<i>Helisoma sp.</i>	Introduced		0.09
<i>Macrobrachium lar</i>	Introduced	0.1	0.46
<i>Melania sp.</i>	Introduced	0.05	0.19
<i>Poecilia reticulata</i>	Introduced		0.76
<i>Poecilia sphenops</i>	Introduced		0.58
<i>Pomacea canaliculata</i>	Introduced	0.05	0.09
<i>Xiphophorus helleri</i>	Introduced	0.45	2.97
<i>Macrobrachium sp.</i>	Unknown	0.3	

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

<u>Scientific Name</u>	<u>Status</u>	<u>Estuary</u>	<u>Lower</u>	<u>Middle</u>	<u>Upper</u>	<u>Headwaters</u>
<i>Atyoida bisulcata</i>	Endemic			P	P	
<i>Eleotris sandwicensis</i>	Endemic		P			
<i>Kuhlia xenura</i>	Endemic		P	P		
<i>Sicyopterus stimpsoni</i>	Endemic		P			
<i>Stenogobius hawaiiensis</i>	Endemic		P			
<i>Campsicnemus brevipes</i>	Endemic			P		
<i>Clunio vagans</i>	Endemic				P	
<i>Dasyhelea hawaiiensis</i>	Endemic			P		
<i>Hyposmocoma sp.</i>	Endemic			P	P	
<i>Limonia jacobus</i>	Endemic			P	P	
<i>Megalagrion hawaiiense</i>	Endemic				P	
<i>Megalagrion oceanicum</i>	Endemic			P		
<i>Megalagrion sp.</i>	Endemic			P	P	
<i>Microvelia vagans</i>	Endemic			P		
<i>Nesogonia blackburni</i>	Endemic			P		
<i>Orthocladius sp.</i>	Endemic		P			
<i>Procanace bifurcata</i>	Endemic			P		
<i>Procanace williamsi</i>	Endemic		P			
<i>Procanace wirthi</i>	Endemic			P	P	
<i>Saldula exulans</i>	Endemic			P	P	
<i>Scatella cilipes</i>	Endemic			P		
<i>Scatella clavipes</i>	Endemic			P		
<i>Scatella hawaiiensis</i>	Endemic			P		
<i>Scatella oahuense</i>	Endemic			P	P	

<i>Thambemyia acrosticalis</i>	Endemic	P		
<i>Metopograpsus thukuhar</i>	Indigenous		P	
<i>Awaous guamensis</i>	Indigenous	P	P	
<i>Mugil cephalus</i>	Indigenous	P		
<i>Anax junius</i>	Indigenous		P	
<i>Dasyrhicnoessa insularis</i>	Indigenous	P	P	
<i>Limonia sp.</i>	Indigenous		P	
<i>Scatella sexnotata</i>	Indigenous	P		
<i>Namalycastis sp.</i>	Indigenous		P	
<i>Corbicula fluminea</i>	Introduced	P	P	
<i>Hyalella azteca</i>	Introduced		P	
<i>Macrobrachium lar</i>	Introduced	P	P	
<i>Procambarus clarkii</i>	Introduced		P	P
<i>Clarias fuscus</i>	Introduced		P	
<i>Poecilia reticulata</i>	Introduced	P	P	P
<i>Poecilia sphenops</i>	Introduced		P	
Poeciliid sp.	Introduced	P		
<i>Xiphophorus helleri</i>	Introduced	P	P	P
<i>Xiphophorus sp.</i>	Introduced		P	
<i>Brachydeutera ibari</i>	Introduced		P	
<i>Canaceoides angulatus</i>	Introduced	P		P
<i>Cheumatopsyche analis</i>	Introduced	P	P	P
Chironomid larvae	Introduced	P		
<i>Cricotopus bicinctus</i>	Introduced	P	P	
<i>Hydroptila potosina</i>	Introduced		P	
<i>Ischnura posita</i>	Introduced		P	
<i>Ischnura ramburi</i>	Introduced	P	P	
<i>Limonia advena</i>	Introduced		P	
<i>Orthemis ferruginea</i>	Introduced		P	
<i>Pantala flavescens</i>	Introduced		P	
<i>Syntormon flexible</i>	Introduced	P		
<i>Helisoma sp.</i>	Introduced		P	
Lymnaeid sp.	Introduced		P	
<i>Melania sp.</i>	Introduced	P	P	
<i>Melanooides tuberculata</i>	Introduced		P	

<i>Planorbella duryi</i>	Introduced		P
<i>Pomacea canaliculata</i>	Introduced	P	P
<i>Dugesia sp.</i>	Introduced		P
Empidid sp.	Undetermined		P
<i>Hydroptila sp.</i>	Undetermined		P
Snail sp.	Undetermined		P
<i>Oligochaete sp.</i>	Undetermined		P
<i>Macrobrachium sp.</i>	Unknown	P	P

## 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): Moderate

U.S. Fish and Wildlife Service High Quality Stream (1988): No

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.

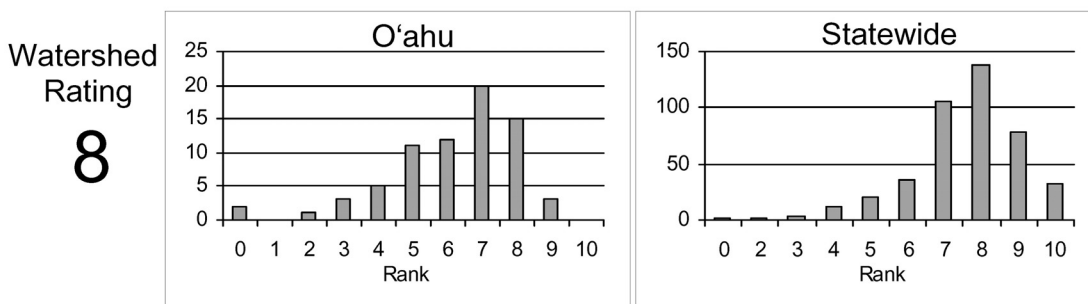
Native Insect Diversity <u>&gt; 19 spp.</u>	Native Macrofauna <u>Diversity &gt; 5 spp.</u>	Absence of Priority 1 <u>Introduced</u>
Yes	Yes	No
Abundance of Any <u>Native Species</u>	Presence of Candidate <u>Endangered Species</u>	Endangered Newcomb's <u>Snail Habitat</u>
Yes	Yes	No

### CURRENT WATERSHED AND STREAM RATINGS

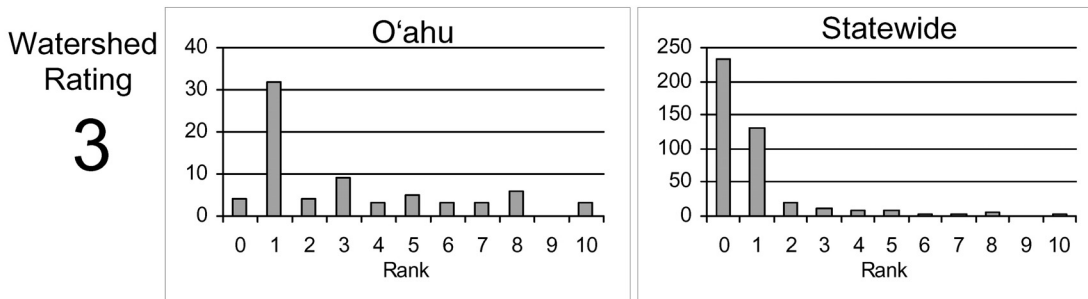
The current watershed and stream ratings are based on the data contained in the DAR Aquatic Surveys Database. The ratings provide the score for the individual watershed or stream, the distribution of ratings for that island, and the distribution of ratings statewide. This allows a better understanding 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: Waiāhole, O‘ahu

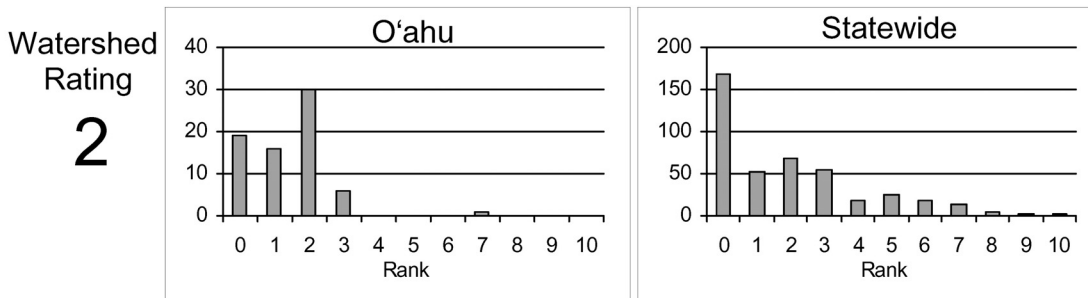
Land Cover Rating: Rating is based on a scoring system where in general forested lands score positively and developed lands score negatively.



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



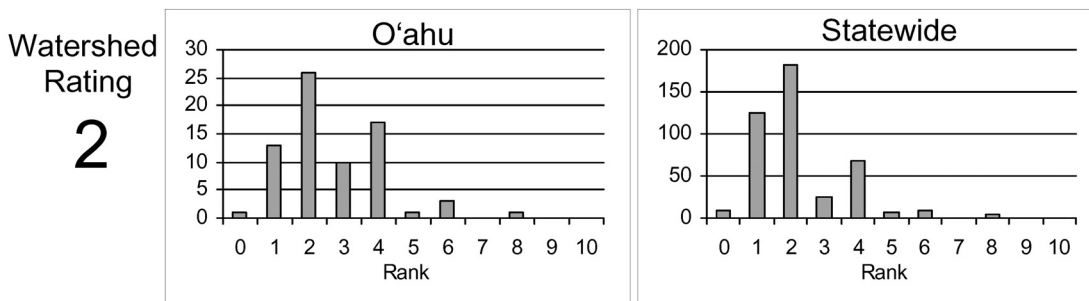
Stewardship Rating: Rating is based on a scoring system where higher levels of land and biodiversity protection within the watershed score positively.



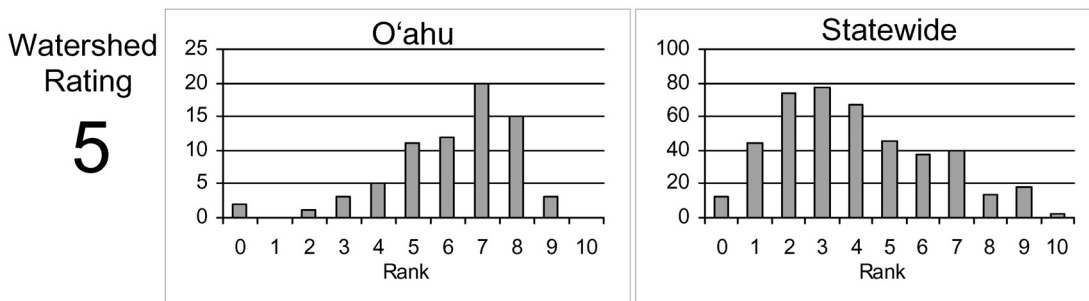


**WATERSHED RATING (Cont): Waiāhole, O‘ahu**

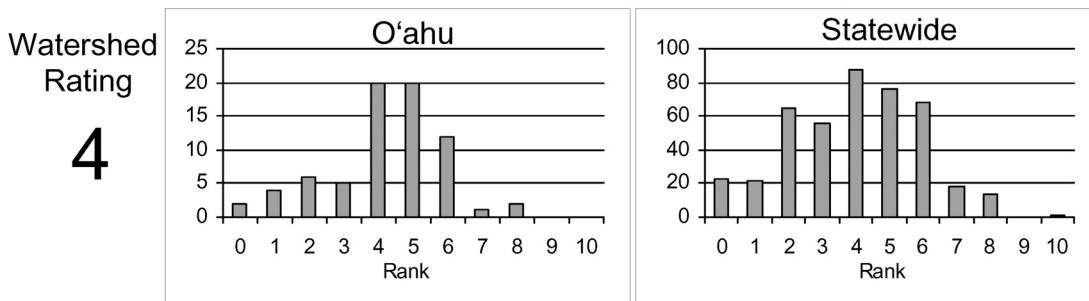
Size Rating: Rating is based on the watershed area and total stream length. Larger watersheds and streams score more positively.



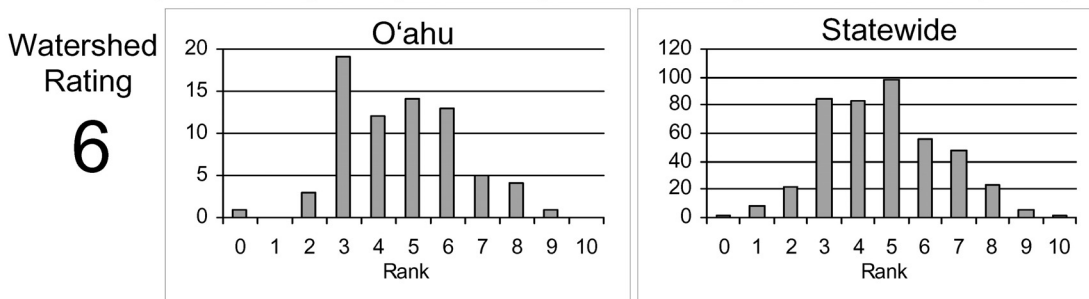
Wetness Rating: Rating is based on the average annual rainfall within the watershed. Higher rainfall totals score more positively.



Reach Diversity Rating: 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.



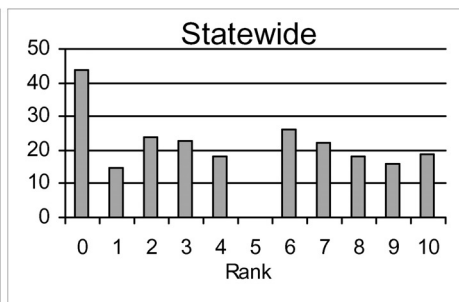
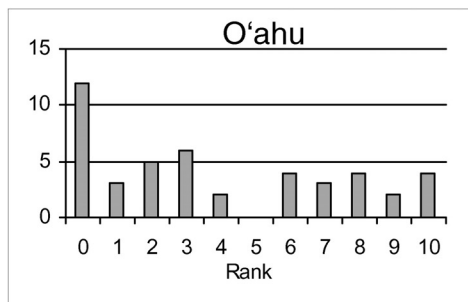
Total Watershed Rating: Rating is based on combination of Land Cover Rating, Shallow Waters Rating, Stewardship Rating, Size Rating, Wetness Rating, and Reach Diversity Rating.



**BIOLOGICAL RATING: Waiāhole, O‘ahu**

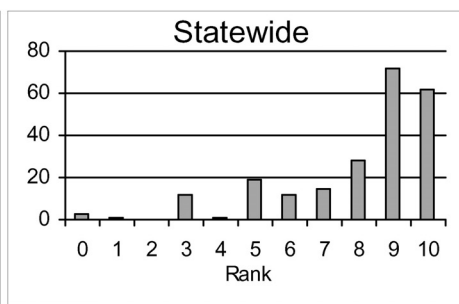
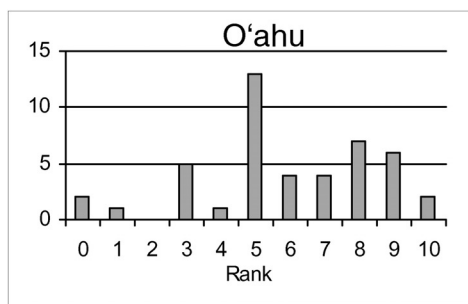
Native Species Rating: Rating is based on the number of native species observed in the watershed.

Stream Rating  
**8**



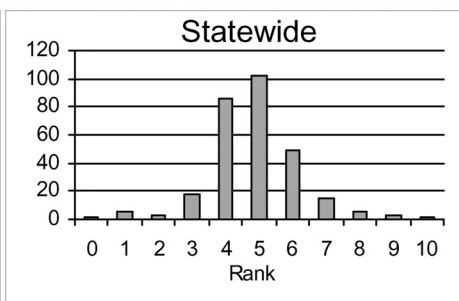
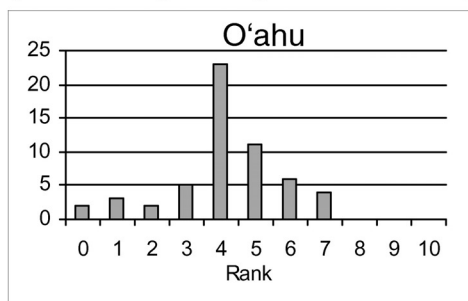
Introduced Genera Rating: Rating is based on the number of introduced genera observed in the watershed.

Stream Rating  
**5**



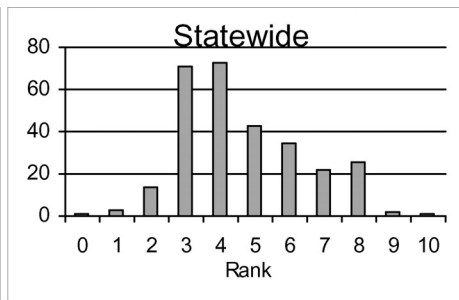
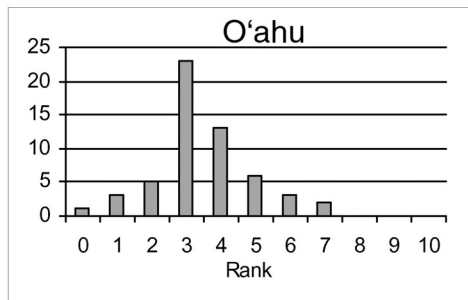
All Species' Score Rating: Rating is based on the Hawaii Stream Assessment scoring system where native species score positively and introduced species score negatively.

Stream Rating  
**4**



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

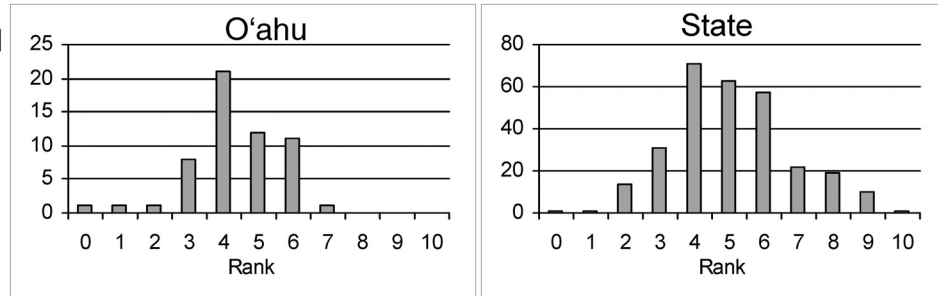
Stream Rating  
**5**



**OVERALL RATING: Waiāhole, O‘ahu**

Overall Rating: Rating is a combination of the Total Watershed Rating and the Total Biological Rating.

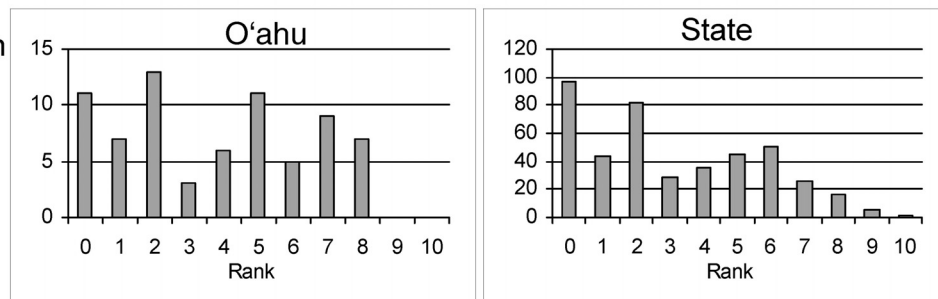
Watershed  
Rating  
**6**



**RATING STRENGTH: Waiāhole, O‘ahu**

Rating Strength: 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.

Information  
Rating  
**8**



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