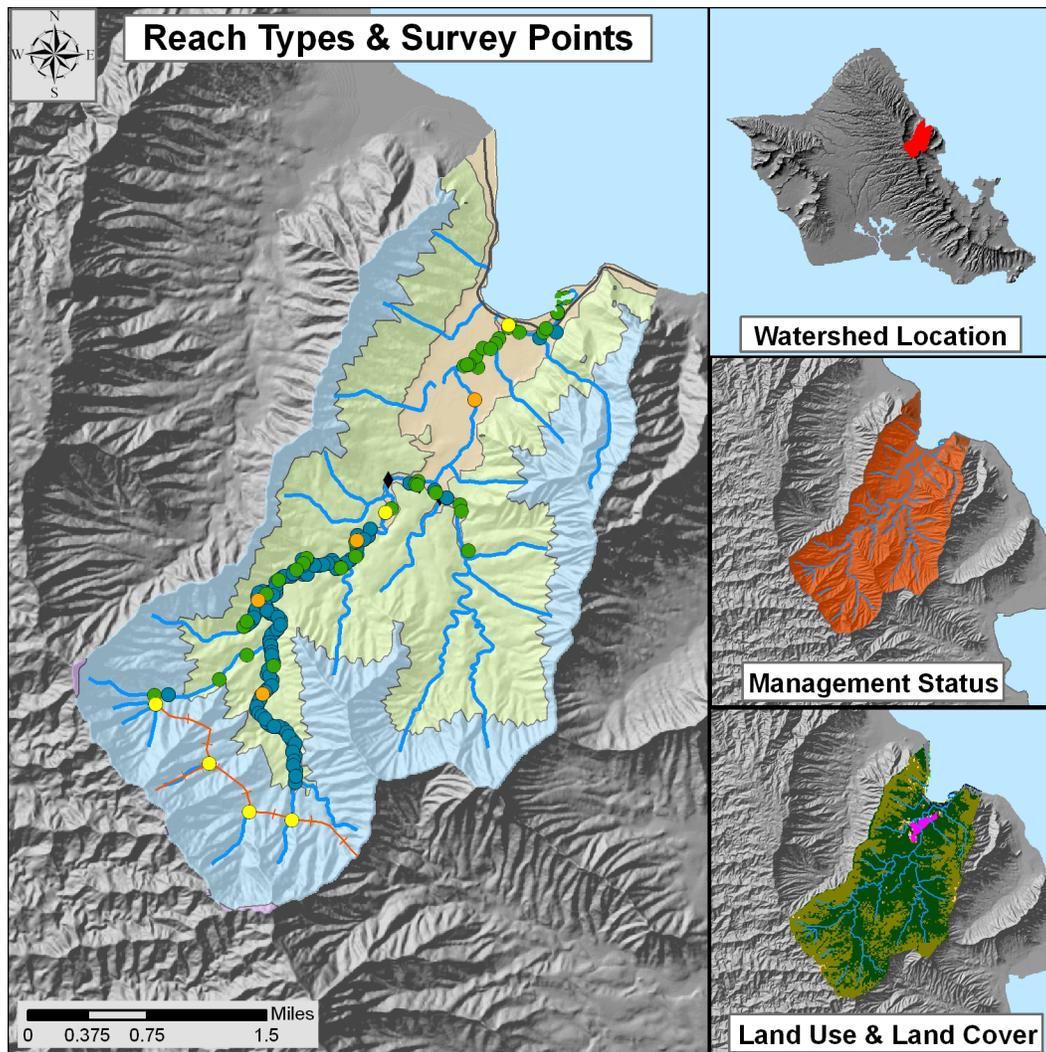


Kahana, O'ahu



WATERSHED FEATURES

Kahana watershed occurs on the island of O'ahu. The Hawaiian meaning of the name is "cutting". The area of the watershed is 8.5 square mi (22.1 square km), with maximum elevation of 2641 ft (805 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: 0.9% agricultural, 98.2% conservation, 0% rural, and 0.9% 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>
0.1	0.0	94.4	0.0	3.0	0.0		2.5

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>
0.0	0.0	97.5	2.5

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	1.0	0.09	0.23
Cultivated	0.0	0.00	0.00
Grassland	0.7	0.06	0.14
Scrub/Shrub	40.3	3.44	8.91
Evergreen Forest	56.1	4.80	12.42
Palustrine Forested	0.0	0.00	0.00
Palustrine Scrub/Shrub	0.0	0.00	0.00
Palustrine Emergent	1.1	0.10	0.25
Estuarine Forested	0.0	0.00	0.00
Bare Land	0.1	0.01	0.03
Unconsolidated Shoreline	0.1	0.01	0.03
Water	0.5	0.04	0.10
Unclassified	0.0	0.00	0.00

STREAM FEATURES

Kahana is a perennial stream. Total stream length is 18.4 mi (29.7 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>	<u>Lower</u>	<u>Middle</u>	<u>Upper</u>	<u>Headwaters</u>
4.2	0.0	70.7	25.2	0.0

The following stream(s) occur in the watershed:

Huilua fishpond Kahana Kāwā Keaniani Pu'upiei

BIOTIC SAMPLING EFFORT

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

1961	1969	1970	1980	1990	1995	2000
2002	2003	2006				

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	1	3	0	5	0
DAR Observation	0	0	2	0	0
DAR Point Quadrat	0	18	231	2	0
DAR Rapid BioAssessment	1	1	0	0	0
HDFG	0	1	3	0	0
Published Report	18	11	15	1	0

BIOTA INFORMATION

Species List

Native Species

Crustaceans *Atyoida bisulcata*
Grapsus tenuicrustatus
Macrobrachium grandimanus
Macrobrachium sp.
Metopograpsus thukuhar
Palaemon debilis
Palaemon pacificus
Palaemon sp.
Podophthalmus vigil
Portunus sanguinolentus
Thalamita crenata

Fish *Abudefduf abdominalis*
Abudefduf sordidus
Acanthurus triostegus
Acanthurus xanthopterus
Albula sp.
Arothron hispidus
Atherinomorus insularum
Awaous guamensis
Bathygobius cocosensis
Bothus mancus
Bothus pantherinus
Carangid sp.
Carangoides ferdau
Caranx ignobilis
Diodon holocanthus
Diodon hystrix
Eleotris sandwicensis
Epinephelus sp.
Fistularia commersonii
Gobiid sp.
Kuhlia sandwicensis

Native Species

Insects *Campsicnemus brevipes*
Dasyhelea hawaiiensis
Limonia jacobus
Megalagrion hawaiiense
Megalagrion leptodemas
Megalagrion nigrohamatum
nigrolineatum
Megalagrion sp.
Microvelia vagans
Saldula exulans
Scatella cilipes
Scatella clavipes
Scatella oahuense
Tipulid sp.

	<i>Kuhlia xenura</i>
	<i>Lentipes concolor</i>
	<i>Mugil cephalus</i>
	Mugilid sp.
	<i>Mulloidichthys flavolineatus</i>
	<i>Oxyurichthys lonchotus</i>
	<i>Parupeneus porphyreus</i>
	<i>Saurida gracilis</i>
	<i>Seriola dumerili</i>
	<i>Sicyopterus stimpsoni</i>
	<i>Sphyraena barracuda</i>
	<i>Stenogobius hawaiiensis</i>
	<i>Synodus ulae</i>
	<i>Tylosurus crocodilus</i>
Snails	<i>Neritina granosa</i>
	<i>Neritina vespertina</i>
Worms	Hirudinean sp.
	<i>Oligochaete sp.</i>

Introduced Species

Amphibians	<i>Bufo marinus</i>
	Ranid sp.
Crustaceans	<i>Macrobrachium lar</i>
	<i>Macrobrachium rosenbergii</i>
	<i>Procambarus clarkii</i>
	<i>Scylla serrata</i>
Fish	<i>Clarias fuscus</i>
	<i>Gambusia affinis</i>
	<i>Hypostomus watwata</i>
	<i>Limia vittata</i>
	<i>Lutjanus fulvus</i>
	<i>Poecilia latipinna</i>
	<i>Poecilia reticulata</i>
	<i>Poecilia sphenops</i>
	<i>Sarotherodon melanotheron</i>
	<i>Tilapia sp.</i>
	unidentified poeciliid
	<i>Valamugil engeli</i>
	<i>Xiphophorus helleri</i>
Snails	Lymnaeid sp.
	<i>Melania sp.</i>
	<i>Melanooides tuberculata</i>
	Physid sp.
	Thiarid sp.
Worms	<i>Dugesia sp.</i>

Introduced Species

Insects	<i>Buenoa pallipes</i>
	<i>Cheumatopsyche analis</i>
	Chironomid larvae
	<i>Cricotopus bicinctus</i>
	<i>Crocothemis servilia</i>
	<i>Culex pervigilans</i>
	<i>Hydroptila potosina</i>
	<i>Ischnura ramburi</i>
	<i>Orthemis ferruginea</i>
	<i>Pantala flavescens</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>
Ranid sp.	Introduced	2	2	2.0
<i>Atyoida bisulcata</i>	Endemic	1	2.5	1.4
<i>Macrobrachium lar</i>	Introduced	1	10	3.2
<i>Kuhlia xenura</i>	Endemic	2.5	4	3.2
<i>Lentipes concolor</i>	Endemic	3	3	3.0
<i>Sicyopterus stimpsoni</i>	Endemic	1.5	2.75	2.3
<i>Stenogobius hawaiiensis</i>	Endemic	3.25	4	3.8
<i>Awaous guamensis</i>	Indigenous	1	7.5	3.3
Gobiid sp.	Indigenous	1	1	1.0
<i>Poecilia reticulata</i>	Introduced	0.5	2	1.0
unidentified poeciliid	Introduced	1	1	1.0
<i>Xiphophorus helleri</i>	Introduced	1	4.25	1.8
<i>Neritina granosa</i>	Endemic	1.5	2	1.8

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			0.11	0.06	
<i>Kuhlia xenura</i>	Endemic			0.02		
<i>Lentipes concolor</i>	Endemic				0.03	
<i>Neritina granosa</i>	Endemic			0.01		
<i>Sicyopterus stimpsoni</i>	Endemic			0.01	0.03	
<i>Stenogobius hawaiiensis</i>	Endemic		0.24			
<i>Awaous guamensis</i>	Indigenous			0.06	0.22	
Gobiid sp.	Indigenous			0.01		
<i>Macrobrachium lar</i>	Introduced		0.3	0.72	0.06	
<i>Poecilia reticulata</i>	Introduced		2.04			
Ranid sp.	Introduced		0.18			
unidentified poeciliid	Introduced		0.06			
<i>Xiphophorus helleri</i>	Introduced		3.3	0.23		

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	P	P	
<i>Macrobrachium grandimanus</i>	Endemic	P	P	P		
<i>Eleotris sandwicensis</i>	Endemic	P	P	P		
<i>Kuhlia xenura</i>	Endemic	P	P	P		
<i>Lentipes concolor</i>	Endemic				P	
<i>Oxyurichthys lonchotus</i>	Endemic	P				
<i>Parupeneus porphyreus</i>	Endemic	P				

<i>Sicyopterus stimpsoni</i>	Endemic		P	P	P
<i>Stenogobius hawaiiensis</i>	Endemic	P	P		
<i>Campsicnemus brevipes</i>	Endemic			P	
<i>Dasyhelea hawaiiensis</i>	Endemic			P	
<i>Limonia jacobus</i>	Endemic			P	
<i>Megalagrion hawaiiense</i>	Endemic		P	P	P
<i>Megalagrion leptodemas</i>	Endemic		P		
<i>Megalagrion nigrohamatum nigrolineatum</i>	Endemic		P		P
<i>Megalagrion sp.</i>	Endemic		P	P	
<i>Microvelia vagans</i>	Endemic			P	
<i>Saldula exulans</i>	Endemic			P	
<i>Scatella cilipes</i>	Endemic			P	
<i>Scatella clavipes</i>	Endemic			P	
<i>Scatella oahuense</i>	Endemic			P	
<i>Neritina granosa</i>	Endemic		P	P	
<i>Neritina vespertina</i>	Endemic		P		
<i>Grapsus tenuicrustatus</i>	Indigenous	P			
<i>Metopograpsus thukuhar</i>	Indigenous	P	P		
<i>Palaemon debilis</i>	Indigenous	P	P		
<i>Palaemon pacificus</i>	Indigenous	P			
<i>Podophthalmus vigil</i>	Indigenous	P			
<i>Portunus sanguinolentus</i>	Indigenous	P			
<i>Thalamita crenata</i>	Indigenous	P			
<i>Abudefduf abdominalis</i>	Indigenous	P			
<i>Abudefduf sordidus</i>	Indigenous	P			
<i>Acanthurus triostegus</i>	Indigenous	P			
<i>Acanthurus xanthopterus</i>	Indigenous	P			
<i>Arothron hispidus</i>	Indigenous	P			
<i>Awaous guamensis</i>	Indigenous	P	P	P	P
<i>Bathygobius cocosensis</i>	Indigenous	P			
<i>Bothus mancus</i>	Indigenous	P			
<i>Bothus pantherinus</i>	Indigenous	P			
Carangid sp.	Indigenous	P	P		
<i>Carangoides ferdau</i>	Indigenous	P			
<i>Caranx ignobilis</i>	Indigenous	P			

<i>Diodon holocanthus</i>	Indigenous	P			
<i>Diodon hystrix</i>	Indigenous	P			
<i>Fistularia commersonii</i>	Indigenous	P			
Gobiid sp.	Indigenous		P	P	
<i>Kuhlia sandvicensis</i>	Indigenous	P	P		
<i>Mugil cephalus</i>	Indigenous	P	P		
Mugilid sp.	Indigenous	P	P		
<i>Mulloidichthys flavolineatus</i>	Indigenous	P			
<i>Saurida gracilis</i>	Indigenous	P			
<i>Seriola dumerili</i>	Indigenous	P			
<i>Sphyaena barracuda</i>	Indigenous	P	P		
<i>Synodus ulae</i>	Indigenous	P			
<i>Bufo marinus</i>	Introduced		P		
Ranid sp.	Introduced		P		
<i>Macrobrachium lar</i>	Introduced	P	P	P	P
<i>Macrobrachium rosenbergii</i>	Introduced	P			
<i>Procambarus clarkii</i>	Introduced		P		
<i>Scylla serrata</i>	Introduced	P	P		
<i>Clarias fuscus</i>	Introduced		P	P	
<i>Gambusia affinis</i>	Introduced		P		
<i>Limia vittata</i>	Introduced	P	P		
<i>Lutjanus fulvus</i>	Introduced	P			
<i>Poecilia latipinna</i>	Introduced	P			
<i>Poecilia reticulata</i>	Introduced		P	P	
<i>Sarotherodon melanotheron</i>	Introduced	P			
<i>Tilapia sp.</i>	Introduced	P			
unidentified poeciliid	Introduced	P	P		
<i>Valamugil engeli</i>	Introduced	P			
<i>Xiphophorus helleri</i>	Introduced	P	P	P	
<i>Buena pallipes</i>	Introduced				P
<i>Cheumatopsyche analis</i>	Introduced		P	P	
Chironomid larvae	Introduced				P
<i>Cricotopus bicinctus</i>	Introduced				P
<i>Crocothemis servilia</i>	Introduced		P		
<i>Culex pervigilans</i>	Introduced				P

<i>Hydroptila potosina</i>	Introduced		P
<i>Ischnura ramburi</i>	Introduced		P
<i>Orthemis ferruginea</i>	Introduced	P	
<i>Pantala flavescens</i>	Introduced		P
<i>Melania sp.</i>	Introduced	P	P
Physid sp.	Introduced	P	P
<i>Palaemon sp.</i>	Undetermined	P	
<i>Albula sp.</i>	Undetermined	P	
<i>Epinephelus sp.</i>	Undetermined	P	
Tipulid sp.	Undetermined		P
Hirudinean sp.	Undetermined	P	P
<i>Oligochaete sp.</i>	Undetermined	P	P
<i>Macrobrachium sp.</i>	Unknown	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): Outstanding

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.

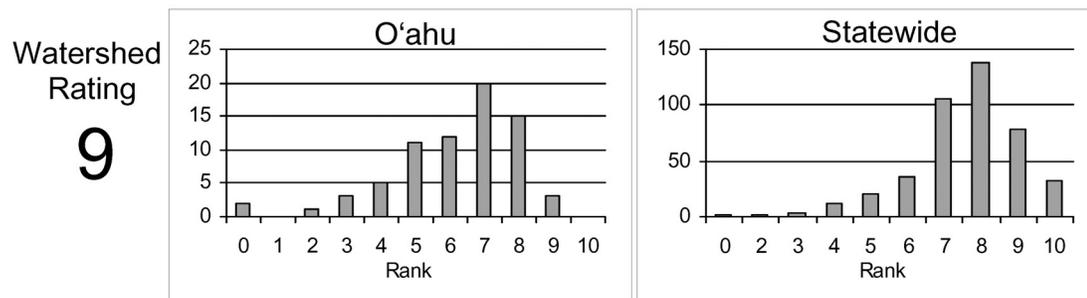
Native Insect Diversity <u>> 19 spp.</u>	Native Macrofauna <u>Diversity > 5 spp.</u>	Absence of Priority 1 <u>Introduced</u>
No	Yes	No
Abundance of Any <u>Native Species</u>	Presence of Candidate <u>Endangered Species</u>	Endangered Newcomb's <u>Snail Habitat</u>
No	Yes	No

CURRENT WATERSHED AND STREAM RATINGS

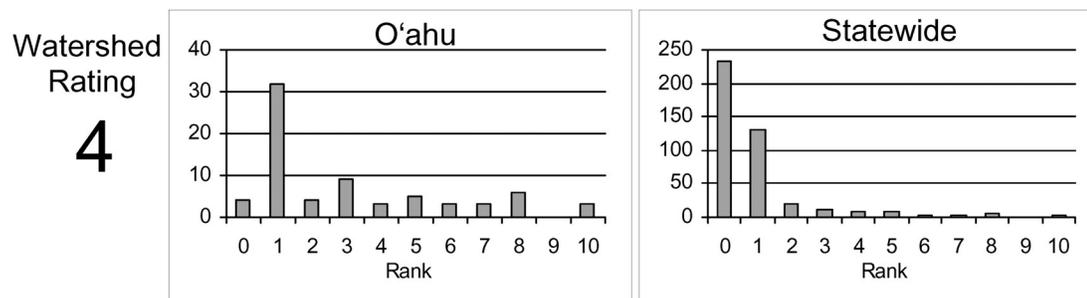
The current watershed and stream ratings are based on the data contained in the DAR Aquatic Surveys Database. The ratings provide the score for the individual watershed or stream, the distribution of ratings for that island, and the distribution of ratings statewide. This allows a better understanding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

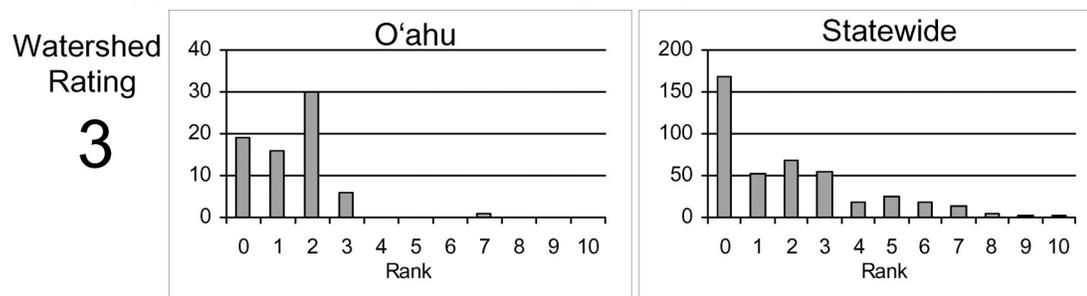
Land Cover Rating: Rating is based on a scoring system where in general forested lands score positively and developed lands score negatively.



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

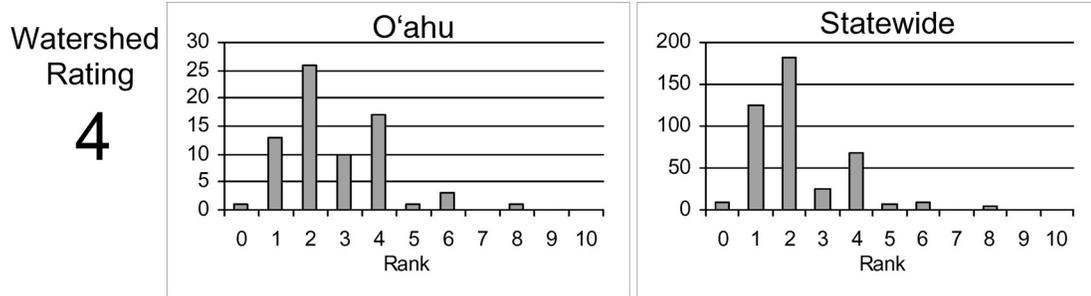


Stewardship Rating: Rating is based on a scoring system where higher levels of land and biodiversity protection within the watershed score positively.

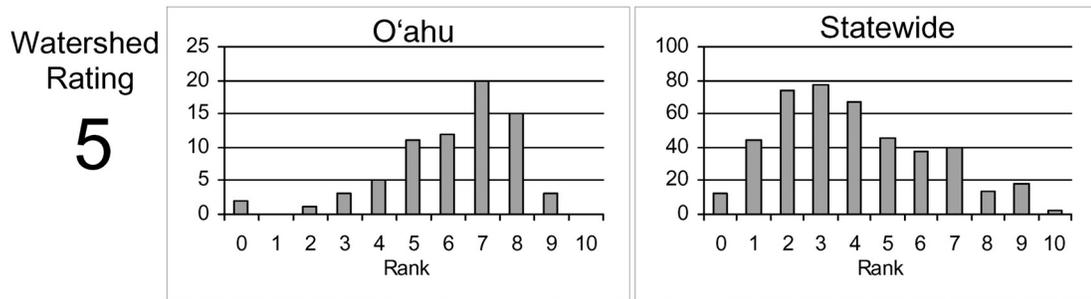


WATERSHED RATING (Cont): Kahana, O'ahu

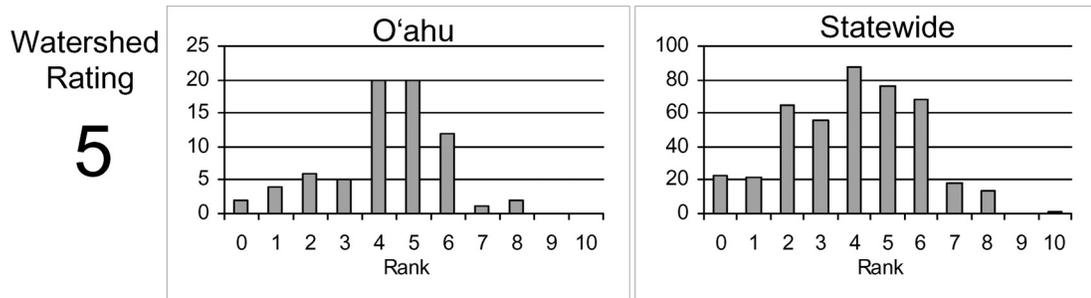
Size Rating: Rating is based on the watershed area and total stream length. Larger watersheds and streams score more positively.



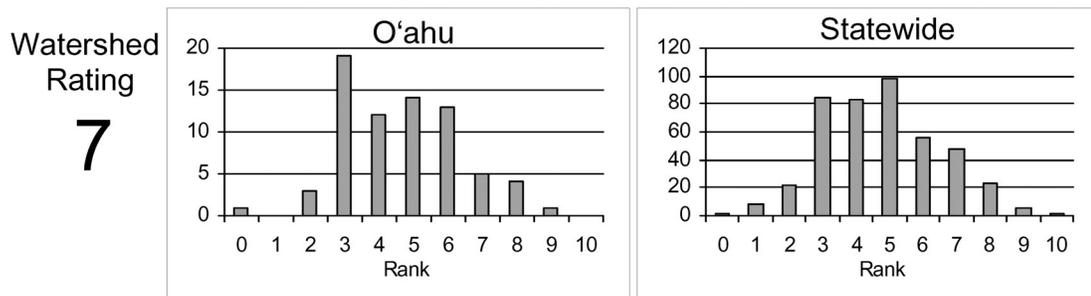
Wetness Rating: Rating is based on the average annual rainfall within the watershed. Higher rainfall totals score more positively.



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.



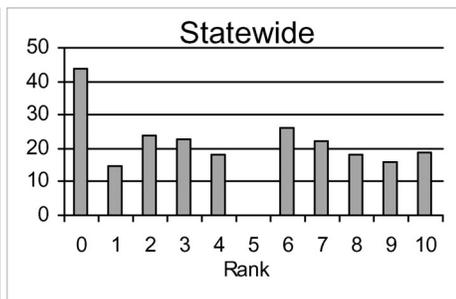
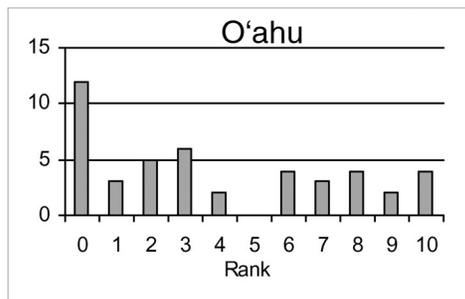
Total Watershed Rating: Rating is based on combination of Land Cover Rating, Shallow Waters Rating, Stewardship Rating, Size Rating, Wetness Rating, and Reach Diversity Rating.



BIOLOGICAL RATING: Kahana, O'ahu

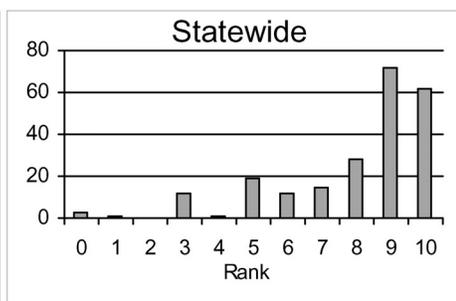
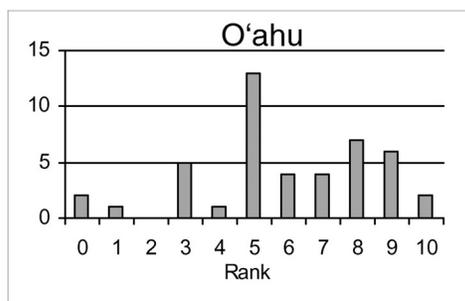
Native Species Rating: Rating is based on the number of native species observed in the watershed.

Stream Rating
10



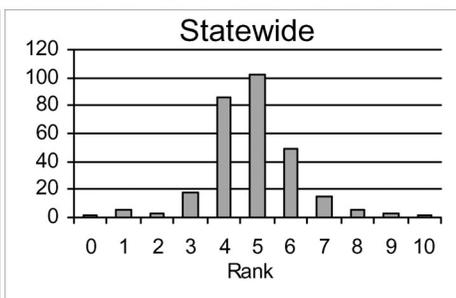
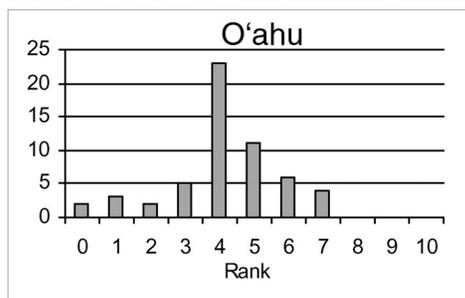
Introduced Genera Rating: Rating is based on the number of introduced genera observed in the watershed.

Stream Rating
1



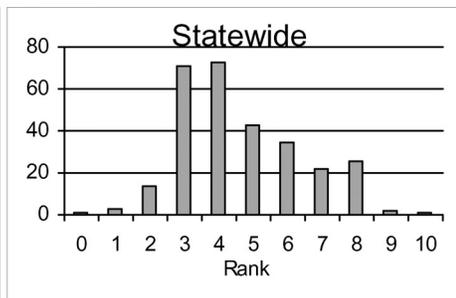
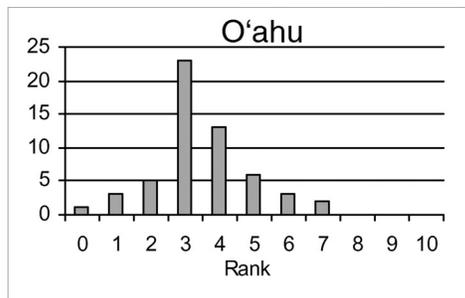
All Species' Score Rating: Rating is based on the Hawaii Stream Assessment scoring system where native species score positively and introduced species score negatively.

Stream Rating
7



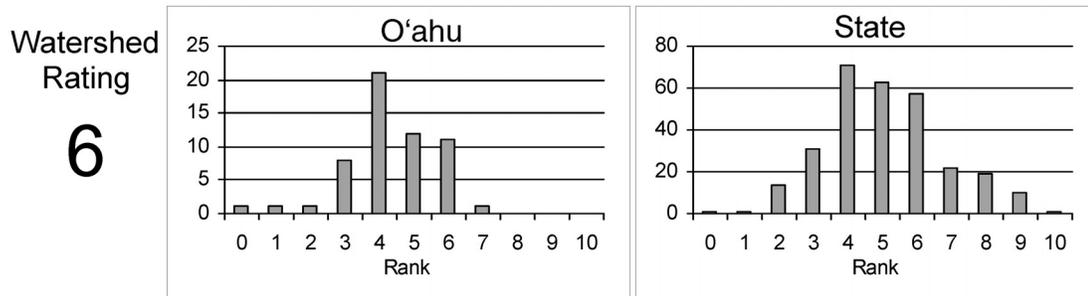
Total Biological Rating: Rating is the combination of the Native Species Rating, Introduced Genera Rating, and the All Species' Score Rating.

Stream Rating
5

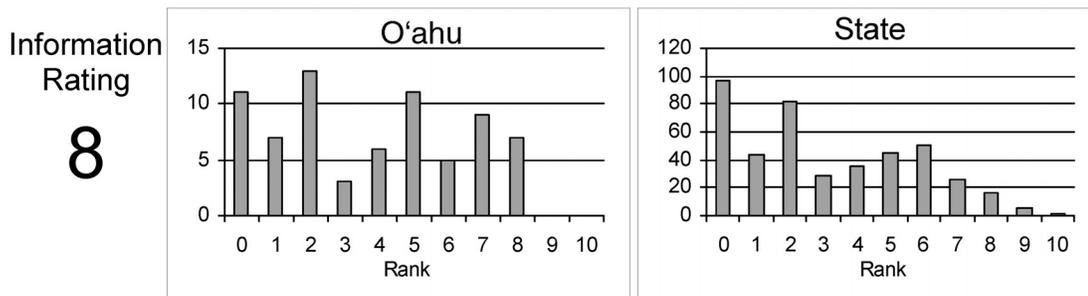


OVERALL RATING: Kahana, O'ahu

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

**RATING STRENGTH: Kahana, 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.

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