



Ki'iki'i Stream Biological Surveys
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Biological stream surveys were conducted in the lower reaches of Ki'iki'i Stream below Wahiawa Reservoir, Oahu on June 2, 2021 by DAR and CWRM staff to establish Instream Flow Standards (IFS). Methods used in the collection of data included eDNA water sampling, cast net, visual observations, and High Definition Fish Survey (HDFS) using underwater video camera. Five sites were visited with the assistance of Dole Foods, Inc. and private landowners. Site 1 was at the stream road crossing below the reservoir, Site 2 was at the ditch outflow below the reservoir, Site 3 was above Waialua at the 20 feet elevation above Farrington Highway, Site 4 was the stream road crossing in Kaukonahua Gulch at the 70 feet elevation, and Site 5 is also in Kaukonahua Gulch at the 280 feet elevation. The number of throws for the cast net per site depended on the water depth and open areas. At Site 1: 5 throws were made; Site 2: 2 throws were made; Site 3: 8 throws made; Site 4: 2 throws made; and Site 5: 4 throws made. The water clarity was poor and cloudy at all the 5 sites, but did improve at some of the middle upstream sites. Runs, riffles, and pools were habitats characterized in the 5 sites with mostly runs and pools being more dominate habitats in the upper sites. Two 500 ml bottle eDNA water samples were collected at each of the 5 sites, filtered at the Anuenue Fisheries Research Center, Sand Island and preserved for later analysis. The surveyors were Glenn Higashi and Neal Hazama, and Ayron Strauch.

For the week leading up to the survey, water released below Wahiawa Reservoir into Kaukonahua Stream ranged from 8.5 cubic feet per second (cfs) to 25 cubic feet per second (cfs). Streamflow on June 2 was 10.6 cfs until the flow was reduced at 13:30 to 3.76 cfs. The reduction in flow did not affect the surveys at sites 1-4, as the reduced flow had not reached these downstream locations until after the surveys were completed. However, at survey site 5, streamflow had declined noticeably by the time the survey was completed.

Photos of sites and species observed



Figure 1. Site 1 stream road crossing below the reservoir. Note water level gauge on the right side of the road.



Figure 2. View of Site 1 road crossing from downstream.



Figure 3. Site 1 above road crossing showing Glenn using video camera for underwater fish surveys (HDFS).



Figure 4. Neal throwing cast net in pool at Site 1 just below the road crossing.



Figure 5. Red devil caught on video camera at site 1. Identifiable even with water cloudiness.



Figure 6. Site 2 at the ditch outflow below the reservoir.



Figure 7. Glenn conducting underwater video survey just below the ditch outflow from the reservoir at Site 2.



Figure 8. Site 3 located at the 20 feet elevation above Farrington Highway looking upstream.



Figure 9. Site 3 looking downstream.



Figure 10. Neal throwing net at Site 3.



Figure 11. Above Site 3 Neal preparing to throw net.



Figure 12. Site 4 road crossing with Glenn conducting HDFS survey.



Figure 13. Site 4 looking upstream from road crossing.



Figure 14. Site 4 with Glenn measuring a juvenile o'opu nakea caught with the opae net.



Figure 15. Juvenile o'opu nakea



Figure 16. Site 5 with upstream view. Note improvement on water clarity.



Figure 17. Glenn conducting HDFS survey at Site 5.



Figure 18. Neal stalking before throw net cast.

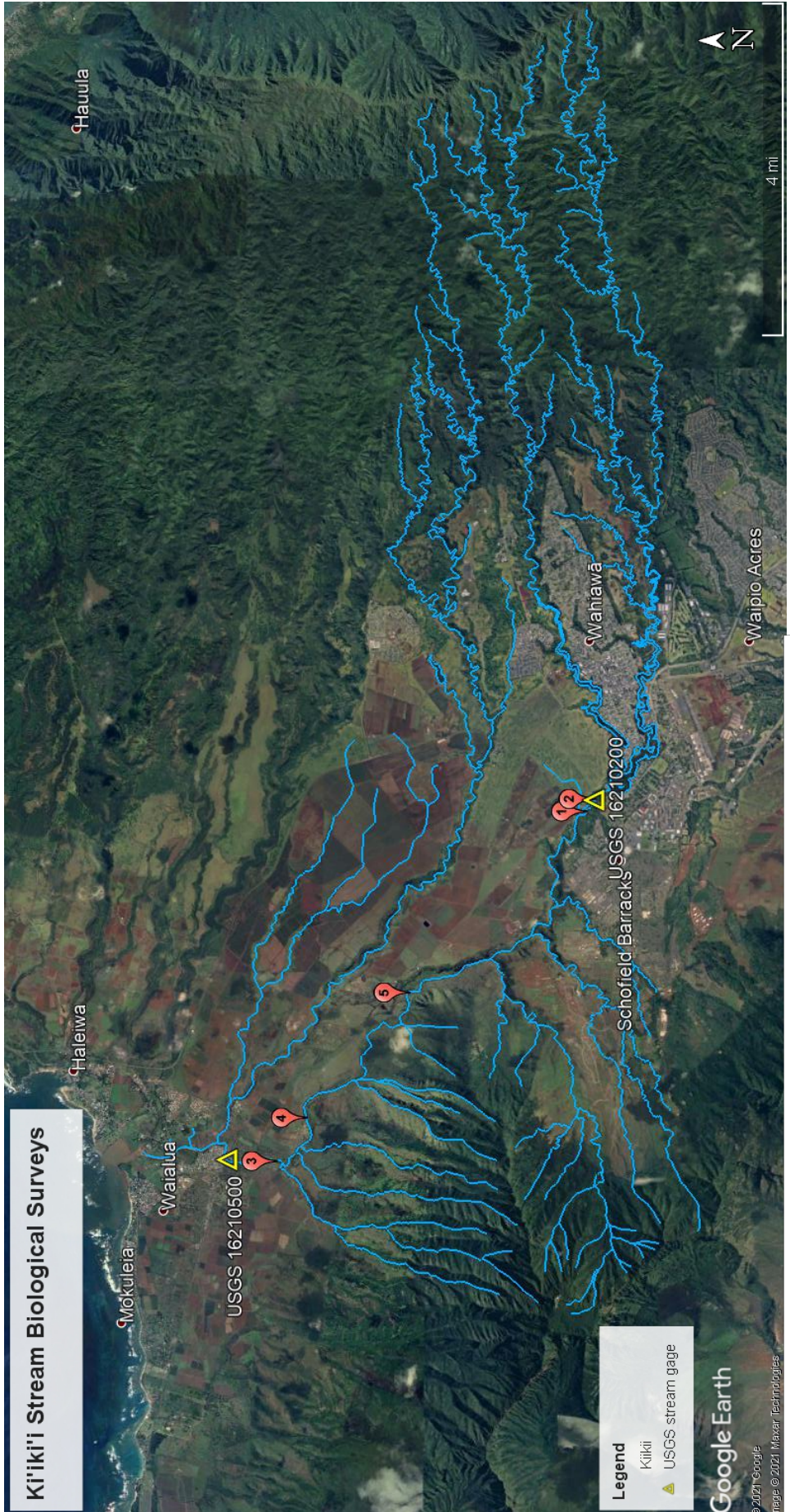


Figure 19. Map of Biological Survey Sites

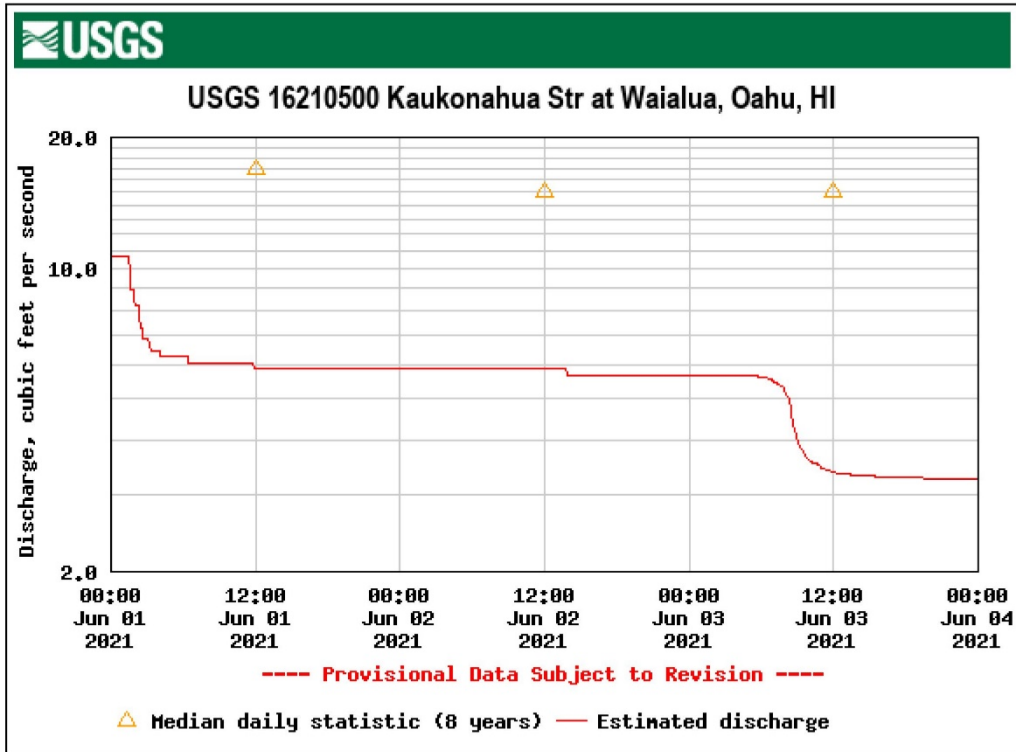


Figure 20. Streamflow from USGS 16210500 stream gage at Waialua, Oahu.

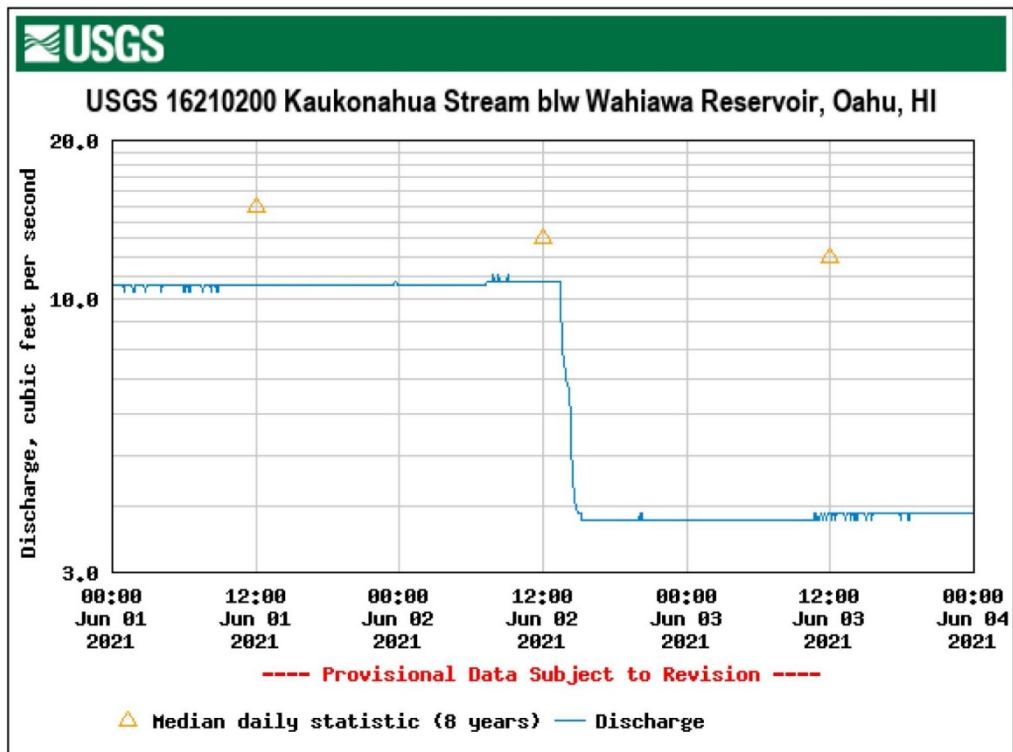


Figure 21. Streamflow from USGS 16210200 stream gage below Wahiawa Reservoir, Oahu.

Table 1. Summary of species caught or observed at the stream sites

Site	Species	Count	Size Range (mm)	Habitat Type	Occurrence	Collection method
1	Carp (<i>Cyprinus carpio</i>)	2	335.6	pool	P	observation
	Red devil (<i>Amphilophus citrinellum</i>)	5	102-152	pool	P	camera
	Jewelcichlid (<i>Hemichromis elongatus</i>)	1	63.5	pool	P	camera
	Suckermouth catfish (<i>Hypostomus</i> c.f. <i>watwata</i>)	8	190-222	pool	P	cast net
	Jewelcichlid (<i>Hemichromis elongatus</i>)	1	107	pool	P	cast net
2	Jewelcichlid (<i>Hemichromis elongatus</i>)	1	50.8	run/pool /riffle	P	camera
	Jewelcichlid (<i>Hemichromis elongatus</i>)	1	120	run/pool /riffle	P	cast net
3	Jewelcichlid (<i>Hemichromis elongatus</i>)	1	63.5	run	P	camera
	Tahitian prawn (<i>Macrobrachium lar</i>)	1	152.4	run	P	camera
	Jewelcichlid (<i>Hemichromis elongatus</i>)	1	126	run	P	cast net
	Suckermouth catfish (<i>Hypostomus</i> c.f. <i>watawata</i>)	7	170-220	run	P	cast net
	crawfish (<i>Procambarus clarkii</i>)	2	70-90	run	P	cast net
4	O'opu nakea (<i>Awaous hawaiiensis</i>)	5	25.4	pool	P	Observation/camera /opae net
5	O'opu nakea (<i>Awaous hawaiiensis</i>)	1	31.75	run/pool	P	camera
	Crawfish (<i>Procambarus clarkii</i>)	1	50.8	run/pool	P	camera
	Toad tadpoles (<i>Bufo marinus</i>)	25+	10-12	run/pool	A	camera

Occurrence:

P=Present (1-9); C=Common (10-19); A=Abundant (20+)

Table 2. Site locations

Site	Coordinates		Description	Elevation (FT)
	Latitude (DD)	Longitude (DD)		
1	21.50132	158.05309	Stream road crossing below reservoir	750
2	21.50005	158.05095	Ditch outflow below the reservoir	760
3	21.55633	158.12067	Above Farrington Highway	20
4	21.55111	158.11220	Stream road crossing in Kaukonahua Gulch	70
5	21.53270	158.08800	End of dirt road in Kaukonahua Gulch	280
USGS_16210500	21.50025	158.051083	Kaukonahua Stream gage at Waialua	15
USGS_16210200	21.565306	158.120361	Kaukonahua Stream gage below Wahiawa Reservoir	760