STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
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STAFF SUBMITTAL

COMMISSION ON WATER RESOURCE MANAGEMENT

March 16, 2021
Honolulu, Hawaiʻi

Amended Interim Instream Flow Standards
For the Surface Water Hydrologic Unit of Lāwaʻi (2050)
Lāwaʻi Stream at Lāwaʻi Ditch, Kauaʻi

SUMMARY OF REQUEST:

Staff is requesting that the Commission consider the recommendations for amending the interim instream flow standard (interim IFS) for one stream in the Lāwaʻi surface water hydrologic unit in Southeast Kauaʻi:

LĀWAʻI (2050): Lāwaʻi Stream

LOCATION MAP: See Figure 1

BACKGROUND:

The State Water Code (Code), Chapter 174C, Hawaiʻi Revised Statutes (HRS), provides that the Commission may adopt interim IFS on a stream-by-stream basis or a general IFS applicable to all streams within a specified area. This submittal seeks to address one stream in Southeast Kauaʻi.

The current interim IFS for the stream being considered was established under Hawaii Administrative Rules (HAR) §13-169-48, which, in pertinent part, reads as follows:

> Interim instream flow standard for Kauaʻi. The Interim Instream Flow Standard for all streams on Kauai, as adopted by the commission on water resource management on June 15, 1988, shall be that amount of water flowing in each stream on the effective date of this standard, and as that flow may naturally vary throughout the year and from year to year without further amounts of water being diverted off stream through new or expanded diversions, and under the stream conditions existing on the effective date of the standard…

The current interim IFS became effective on October 8, 1988. Following the initial registration of stream diversions works, any new or substantially modified stream diversion works structure requires a permit for construction and amendment to the interim IFS.

LEGAL AUTHORITY

Under the Code, the Commission has the responsibility of establishing IFS on a stream-by-stream basis whenever necessary to protect the public interest in the waters of the State. In the 2000 appellate ruling on the first Waiāhole Ditch Contested Case Decision and Order[1] ("*Waiāhole* I"), the Hawaiʻi Supreme Court emphasized that "instream flow standards serve as the primary mechanism by which the Commission is to discharge its duty to protect and promote the entire range of public trust purposes dependent upon instream flows." 94 Haw. 97, 148, 9 P.3d 409, 460. The Code defines an instream flow standard as a "quantity or flow of water or depth of water which is required to be present at a specific location in a stream system at certain specified times of the year to protect fishery, wildlife, recreational, aesthetic, scenic, and other beneficial instream uses." *See* HRS §174C-3 ("Definitions"). In considering a petition to amend an interim instream flow standard, the Code directs the Commission to "weigh the importance of the present or potential instream values with the importance of the present or potential uses of water for noninstream purposes, including the economic impact of restricting such uses." HRS §174C-71(2)(D).

"Instream use" means beneficial uses of stream water for significant purposes which are located in the stream and which are achieved by leaving the water in the stream. Instream uses include, but are not limited to:

1) Maintenance of fish and wildlife habitats;
2) Outdoor recreational activities;
3) Maintenance of ecosystems such as estuaries, wetlands, and stream vegetation;
4) Aesthetic values such as waterfalls and scenic waterways;
5) Navigation;
6) Instream hydropower generation;
7) Maintenance of water quality;
8) The conveyance of irrigation and domestic water supplies to downstream points of diversion; and
9) The protection of traditional and customary Hawaiian rights.

"Noninstream use" means the use of stream water that is diverted or removed from its stream channel and includes the use of stream water outside of the channel for domestic, agricultural, and industrial purposes.

Since the establishment of the Stream Protection and Management Branch in July 2002, the Commission has been developing a framework for setting measurable instream flow standards

[1] *In re Water Use Permit Applications*, 94 Hawaiʻi 97, 9 P.3d 409 (2000).

statewide. This framework involves an assessment of natural flow conditions, an analysis of the instream uses protected by the State Water Code, the existing and planned non-instream reasonable and beneficial uses of surface water, and the availability of water from alternative sources.

The assessment of instream uses for the Lāwaʻi watershed will address the interim IFS for Lāwaʻi Stream below diversion 812 (Figure 1).

HISTORICAL CONTEXT

The *ahupuaʻa* of Lāwaʻi is west of Kōloa in the *moku* of Kona in Southeast Kauaʻi.

The McBryde Sugar Co., Ltd. (McBryde Sugar) operated from 1899 to 1996, with lands extending along the southern coast of Kauaʻi from Eleʻele to Kōloa. McBryde Sugar was formed by the merging of Eleele Plantation, McBryde Estate, and Koloa Agricultural Company. From the beginning, the lack of water and extremely rocky terrain were limitations to the company's success. To increase water availability, pumps were used to bring surface water from Hanapēpē Valley and groundwater up to the plantation. Hydroelectric power plants were built on Wainiha and Wahiawa streams to meet the large electrical demands of these pumps. Hanapēpē, Wahiawa, and Lāwaʻi streams were each diverted to irrigate sugarcane. To attract European laborers, homestead lands in Lāwaʻi Valley and Kalāheo were developed, encouraging diversified agriculture. The Lāwaʻi Ditch was used to bring water from Lāwaʻi Stream to Kōloa and McBryde Sugar-owned land to grow sugar cane.

With the passage of the State Water Code, existing wells and stream diversions were registered with the Commission by May 31, 1989, [2] with the instream flow standard adopted as status quo in 1988 (Table 1). Towards the closure of McBryde Sugar in 1996, the operation of the Lāwaʻi Ditch and its diversion on Lāwaʻi Stream was transferred to McBryde Resources, Inc, (McBryde Resources) a subsidiary of Alexander & Baldwin. Despite the cessation of sugarcane cultivation, streamflow has continued to be diverted by McBryde Resources for irrigation of agriculture and non-potable needs of the Kōloa region. Following the closure of McBryde Sugar, some of the former agricultural lands were converted to residential, resort, or golf course facilities, although lands leased in the Kōloa Agricultural Park by McBryde Resources continues to support coffee and other diversified agriculture. While historically, the region supported some of the oldest and most productive sugarcane plantations, today, the region supports residential, small diversified agriculture, and resort facilities.

[2] In total, there are 14 diversions registered in the Lāwaʻi hydrologic unit, however, four are earthen reservoirs in dry gulches.

Figure 1. USGS topographic map of the Lāwaʻi hydrologic unit, registered diversions (ID) and irrigation systems in Kauaʻi.

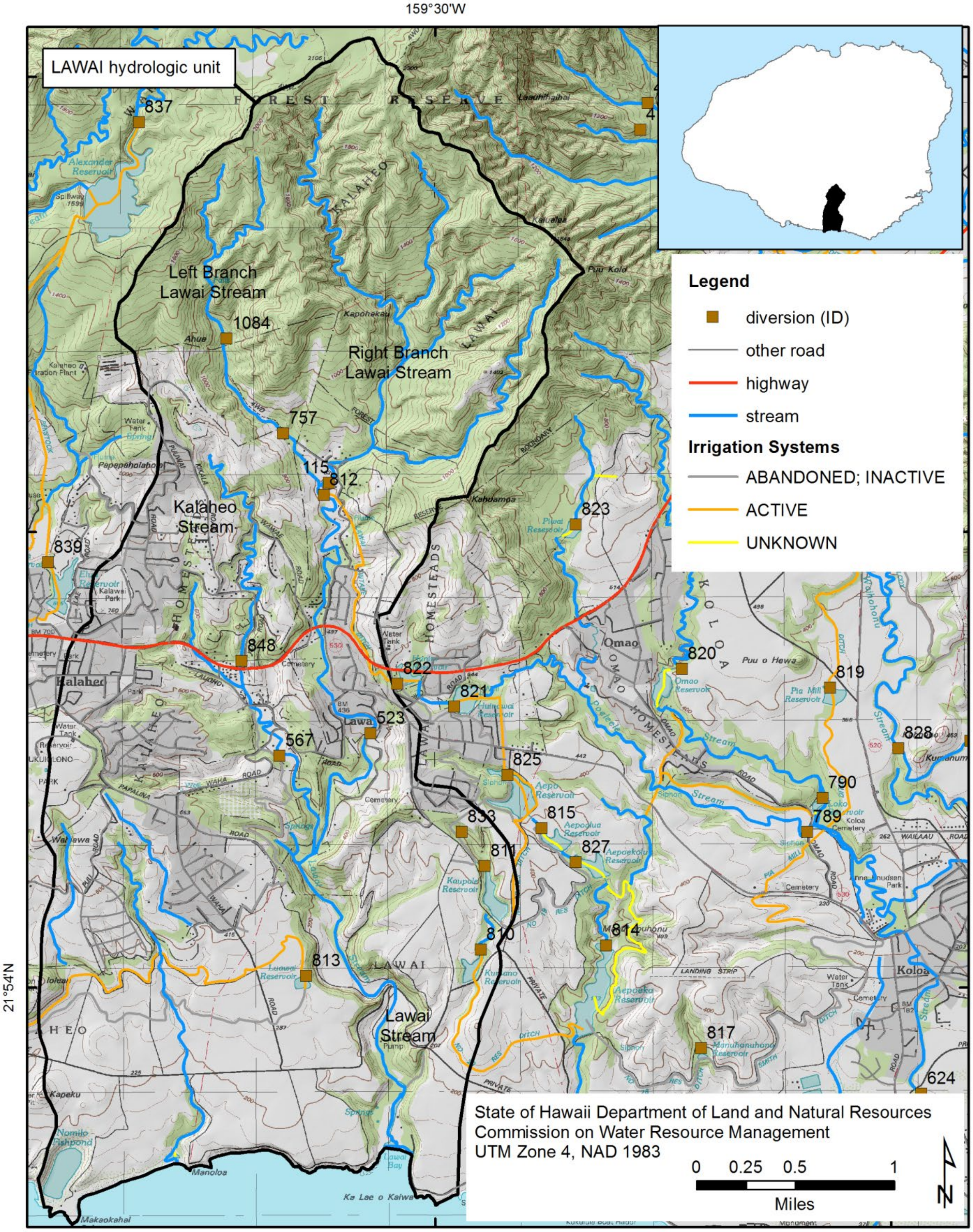


Table 1. Registered diversion ID, file reference name, registrant, tax map key (TMK) number, flow rate, and their registered primary use in or near the Lāwaʻi hydrologic unit. [-- = not available]

ID	File reference	Registrant	Year Built	TMK	flow rate (mgd)	Primary Use	type
115	COFFMAN R	Richard Coffman	1963	4-2-5-002:007	0.0072	diversified agriculture	pipe in Lāwaʻi Stream
523	HOP HING CO	David Chang	--	4-2-5-004:002	0.005	diversified agriculture	pump in Lāwaʻi Stream
567	KANEKO T	Rancho Kaneko	--	4-2-3-002:023	0.001	livestock pasture as needed	pump in Kalaheo Stream
757	MATIAS S	Kauai Stables	--	4-2-4-002:007	--	3 acres of diversified agriculture	dam in Lāwaʻi Stream at Margo's Pond
810	MCBRYDE SUGAR	Randy Hee	1902	4-2-6-003:028	storm water (49 mg)	Kumano Reservoir	Reservoir 20 in Kekee Gulch
811	MCBRYDE SUGAR	Randy Hee	1958	4-2-6-003:030	storm water (73 mg)	Kaupale Reservoir	Reservoir 21 in Kekee Gulch
812	MCBRYDE SUGAR	Randy Hee	1925	4-2-5-002:018	1.65	Irrigation	Lāwaʻi Ditch intake on Lāwaʻi Stream
813	MCBRYDE SUGAR	Randy Hee	1915	4-2-3-010:010	storm water (9 mg)	Lua wai Reservoir	Reservoir 15 from Pump 3 Ditch
822.2	MCBRYDE SUGAR	Randy Hee	1920	4-2-5-004:026	storm water (14 mg)	Hanini Reservoir	Reservoir 7 from Lāwaʻi Ditch
833	MCBRYDE SUGAR	Adam Killerman	--	4-2-6-003:030	1.00	diversified agriculture	504 Spring
848	MEDEIROS G	Gilbert Medeiros	1882	4-2-4-001:016	--	0.22 acres of *loʻi* kalo	Kalaheo *auwai*
1084	SWAIN AM&TP	Anna May N Palama Swain	--	4-2-4-003:019	--	--	unused
1409	NATL TROP BOT	Gregory Koob	1980	4-2-5-004:030	--	landscaping	Four-house Canyon Dam on tributary
1410	NATL TROP BOT	Gregory Koob	--	4-2-5-004:030	--	landscaping	Maidenhair Falls dam on tributary
1411	NATL TROP BOT	Gregory Koob	1920s	4-2-5-004:030	--	landscaping	Stillwater Dam

McBryde Sugar and then McBryde Resources maintained continuous flow monitoring stations on the Lāwaʻi Ditch for extended periods of time: data at the ditch outlet into Hanini Reservoir were reported during the registration period, while ditch flow just below the intake on Lāwaʻi Stream is currently reported monthly (Table 2).

Table 2. Off-stream ditch gaging in million gallons per day (mgd) for the Lāwaʻi Ditch.

Station name	period of record	mean (±SD) flow (mgd)	median flow (mgd)
Lāwaʻi Ditch at Hanini Reservoir Flume	Jan 1983-Dec 1987	1.65 (± 1.25)	1.40
Lāwaʻi Ditch at Lāwaʻi Intake	Jan 2016-Jun 2019	0.56 (± 0.32)	0.49

In the fall of 2013, a flood event cut a new channel along the right bank around diversion 812 and repairs were made to the concrete structure to maintain the original head behind the diversion dam. Commission staff has received a number of informal and formal complaints and inquiries (e.g., phone calls, letters, emails) regarding instream flow standards for this stream (Table 3).

Table 3. Summary of complaints and inquiries to commission staff associated with the Lāwaʻi stream in the Lāwaʻi Hydrologic Unit, East Kauaʻi.

Date	Description of Complaint
January 2019	Low-flow in stream due to McBryde Resources diversion
July 2018	Low-flow in stream due to McBryde Resources diversion
September 2015	Modification to stream channel and discharge of fill
September 2013	Unpermitted stream channel alteration and stream diversion works
February 2013	Unpermitted stream diversion works
October 2010	Low-flow in stream due to McBryde Resources diversion

On April 29, 2015, the Commission authorized the Chairperson to enter into a Joint Funding Agreement between the Commission and the United States Geological Survey (USGS) for a cooperative study to assess low-flow characteristics for streams in Southeast Kauaʻi, spanning watersheds from Wailua to Hanapēpē (USGS Low-Flow Study). A cooperative agreement with USGS was signed on May 5, 2015. Fieldwork was completed in early 2020 and the study was published in December 2020 (USGS Scientific Investigations Report 2020-5128[3]).

In October 2015, Commission staff began to contact irrigation managers, community groups, land owners, ʻAha Moku representatives and stakeholders in order to better understand the current state of water management and to gather information regarding instream uses in Southeast Kauaʻi. In March 2018, staff began conducting field investigations with managers and stakeholders, installing stream monitoring stations, and surveying stream resources (Table 4).

Based upon the best available information, as presented in the Instream Flow Standard Assessment Report (IFSAR)[4] and provided in this submittal, staff has developed a recommendation that seeks to protect instream uses while providing for some noninstream uses. The recommendations provided herein have also been developed in consideration of interim IFS values that were adopted by the Commission for previous areas of Kauaʻi (i.e., Waimea Watershed Agreement) and Maui (i.e., West Maui). As in those decisions, the Commission staff has relied upon the basic tenets of adaptive management, which are to: 1) Establish management

[3] https://pubs.er.usgs.gov/publication/sir20205128
[4] https://dlnr.hawaii.gov/cwrm/surfacewater/ifs/2050-lawai/

objectives; 2) Implement management decisions; 3) Monitor effectiveness of decisions; 4) Evaluate results of management; and 5) Revise management decisions as necessary[5]. Should initial management decisions need further amendment, the decisions can then be revised and the process repeated. Due to the complex and dynamic nature of Hawaiʻi's stream systems, adaptive management affords staff the ability to proceed in making reasonable management decisions and ensuring that impacts are minimized in the face of uncertainty, thus allowing staff to proceed responsibly while advancing the clear intentions of the State Water Code.

Table 4. Summary of field investigations and meetings, by date, taken by Commission staff in support of amendment to the interim instream flow standards for Lawai Stream, Kauaʻi.

Date	Description
Nov 2020	Lāwaʻi Stream measurements
Jun 2020	Lāwaʻi Stream measurements
Nov 2020	Lāwaʻi Stream measurements
Jun 2020	Lāwaʻi Stream measurements
Feb 2020	Lāwaʻi Stream measurements
Dec 2019	Lāwaʻi Stream measurements
July 2019	Lāwaʻi Stream measurements
Mar 2019	CWRM Site Visit: National Tropical Botanical Garden diversions
Feb 2019	Lāwaʻi Stream measurements
Feb 2019	CWRM Site Visit: Lāwaʻi Ditch Intake and Reservoirs with McBryde Resources, Inc
Dec 2018	Lāwaʻi Stream measurements
Oct 2018	Lāwaʻi Stream measurements
Sept 2018	Lāwaʻi Stream measurements
Aug 2018	Lāwaʻi Stream measurements
July 2018	Lāwaʻi Stream measurements
May 2018	CWRM Site Visit: Lāwaʻi Stream with community/ʻAha Moku
Jun 2017	Lāwaʻi Stream measurements
Oct 2017	CWRM Site Visit with USGS
Oct 2015	CWRM Site Visit: Stream channel alteration

<u>ISSUES/ANALYSIS</u>:

This section of the submittal begins with general considerations of issues that broadly apply to the development of an interim IFS for any stream. The general considerations are followed by a simplified schematic diagram and assessment summary.

In developing the interim IFS recommendations, staff has attempted to remain consistent in weighing all of the instream and noninstream uses of each stream based upon the best available information, along with the oral and written comments received through the public review process. This process is challenging due to the unique nature of each stream. Further, the unique

[5] Adapted from Annear, T., I. Chisholm, H. Beecher, A. Locke, P. Aarrestad, C. Coomer, C. Estes, J. Hunt, R. Jacobson, G. Jöbsis, J. Kauffman, J. Marshall, K. Mayes, G. Smith, R. Wentworth, and C. Stalnaker. 2004. Instream Flows for Riverine Resource Stewardship, Revised Edition. Instream Flow Council, Cheyenne, WY. 268 pp.

values of each stream cannot simply be plugged into a formula to determine the interim IFS. Issues such as accessibility, ground water gains or surface water losses, the number and type of downstream users, the presence of non-native aquatic species, or the condition of the riparian habitat or estuary all factor into the proposed recommendation.

The first step in developing the interim IFS is assessing the specific hydrologic characteristics of the hydrologic unit. Streams are largely characterized by the different geologic components that affect flow regimes, particularly the amount and distribution of rainfall-runoff and groundwater contribution to streamflow. The amount of water flowing in a given stream is also affected by regional climate variations (e.g., rainfall, fog drip, solar radiation) and the topography defining the catchment area. The quantity and quality of data available that is reflective of these geologic and hydrologic characteristics varies considerably from stream to stream. For streams with available measured data, the process for developing an interim IFS may be greatly different from that of streams with limited hydrologic data. Lāwaʻi Stream, for example, does not have any long-term records of natural or regulated (diverted) stream flow.

The next step is to weigh often competing instream and noninstream uses of water against the amount of water available to accommodate the needs of these uses. Again, the quantity and quality of information varies from stream to stream. This step is further complicated by the tremendous variability of instream and noninstream uses across and within surface water hydrologic units. For example, one stream may support extensive *loʻi kalo* cultivation while another may primarily support domestic uses. The potential of the stream and hydrologic unit to support additional water use in the future has also been considered. The public trust uses of water identified are: (1) water in its natural state; (2) water for traditional and customary practices; (3) water for domestic uses; and (4) water for the Department of Hawaiian Home Lands. The process is based upon best available information when weighing the present or potential, instream and noninstream uses.

GEOLOGIC CHARACTERISTICS

Kauaʻi is the most geologically complex island of the main Hawaiian Islands, but subsurface geohydrologic information is not as well developed as in other areas of Hawaiʻi[6]. The Lāwaʻi hydrologic unit is composed of two geologic formations: tholeiitic Waimea Canyon Basalt of the Nāpali Formation; and the heterogeneous Kōloa Volcanics composed of massive lava flows of highly alkali olivine basalt, nephelinite, melilitite, and basanite (Figure 2). The Napali Formation is a thick accumulation of many thin lava flows created during the shield-building phase of Kauaʻi and is highly permeable, but generally found in irregular north-south bands in Lāwaʻi.[7] The basal aquifer occurs in this formation, although wells drilled below Kōloa Volcanics show head elevations ranging from 30-140 feet above sea level, suggesting mixed basal and high-level conditions. Deeply buried dikes are likely to influence transmissivity and submarine groundwater discharge. Kōloa Volcanics includes eroded sediment and weathered

[6] Gingerich, S.B. 1999. Estimating transmissivity and storage properties from aquifer tests in the Southern Lihue Basin, Kauai, Hawaii. US Geological Survey Water-Resources Investigations Report 99-4066.
[7] Macdonald, G.A., Davis, D.A., Cox, D.C. 1960. Geology and ground-water resources of the island of Kauai. Hawaii Division of Hydrography Bulletin 13, 212p.

lava flows, ash, tuff, and cinder overlaying the Waimea Canyon Basalt, mainly along the coastal areas.[8] The thick, dense lava flows and intercalated sediments of the Kōloa Volcanics are considered moderately permeable.[9] Towards the coast, the valley is partly filled with alluvium and rejuvenated-stage volcanic rocks forming a flattened valley floor.[10] These sediments vary widely in hydraulic properties but generally have conductivities several orders of magnitude lower than that of lava-flow aquifers, but similar to that of deeply weathered basalt.[11]

Perched water bodies in thin, shallow Kōloa Volcanic series contribute numerous springs and seeps, especially where the rocks are incised by stream channel formation. These are likely to contribute to the surface flow of small streams. Many wells in the Kōloa Aquifer System are drilled into these perched bodies at lower elevations (Table 5). In a test hole (T-6) near Lāwaʻi, a perched water table in the Nāpali Formation was found standing 120 feet above sea level at a depth of 390 feet. Most wells in Southeast Kauai develop water from the Kōloa Volcanics, but permeability varies widely and high permeability is localized to only a few locations.[12] High-level water is not consistent due to the highly varied thickness and distribution of the lavas and do not make for a reliable source. Dike-impoundments may be present in the mountainous north part of the Lāwaʻi watershed but not in well-defined patterns.

In the vicinity of Lāwaʻi, groundwater occurs 60 to 140 feet above sea level in the lava flows of the Nāpali Formation, but depending on the ground surface elevation, the depth to the basal aquifer could be 300 feet or more.[13] The high basal head in the Nāpali Formation are the result of the impounding effects of the weathered coastal Kōloa Volcanics. For example, Shaft 3 (well 2-5330-001) in Lāwaʻi Valley connected 31 drilled wells with tunnels 10 to 15 feet below sea level to a sump pump, averaging about 1.2 mgd. The tunnels also received surface water from Lāwaʻi Stream, although sediment has likely plugged many of the tunnels.[14] The National Tropical Botanical Garden (NTBG) continues to use the well for irrigation needs in Lāwaʻi.

Total pumpage and sustainable yield for the Kōloa Aquifer System is provided in Figure 3. Kauaʻi County operates 12 groundwater wells in the Kōloa Aquifer System with a total installed pump capacity of 16.034 mgd and a 10-year average pumpage of 3.785 mgd. Other users have an installed pump capacity of 21.344 mgd and a 10-year average freshwater pumpage of 0.929 mgd.

[8] Macdonald et al. 1960.
[9] Macdonald et al. 1960.
[10] Izuka, S.K., Engott, J.A., Rotzoll, K., Bassiouni, M., Johnson, A.G., Miller, L.D., Mair, A. 2015. Volcanic aquifers of Hawaiʻi—Hydrogeology, water budgets, and conceptual models. USGS SIR 2015-5164.
[11] Lau, L.S., Mink, J.F. 2006. Hydrology of the Hawaiian Islands. University of Hawaiʻi Press.
[12] Izuka, S.K., Oki, D.S. 2001. Numerical simulation of ground-water withdrawals in the Southern Lihue Basin, Kauai, Hawaii. Water-Resources Investigations Report 2001-4200.
[13] Macdonald et al. 1960.
[14] Macdonald et al. 1960.

Table 5. Well number, name, owner, elevation, pump capacity (million gallons per day, mgd), and 10-year mean pumpage (mgd) for the Kōloa Aquifer System, Kaua‘i. [ABN = abandoned; AGR = Agriculture; UNU = unused; IRR = irrigation; MUNCO = municipal county; MUNPR = municipal private; DOM = domestic; NTBG = National Tropical Botanical Garden]

well number	well name	well owner	ground elevation (ft)	well depth (ft)	pump capacity (mgd)	2009-2018 pumpage (mgd)	water use
2-5226-001	Kaluahonu	Hyatt Regency	26	105	0.648	0.005	IRR
2-5226-002	Secondary Source	Hyatt Regency	11	60	2.880	0.000	UNU
2-5227-002	Waiohai	Marriott	7	27	0.072	0.000	IRR
2-5327-003	Makale'a	Timothy Beckman Trust	80	105	0.052	0.000	IRR
2-5330-001	Lawai Shaft 3 Pump 6	NTBG	26	41	0.194	0.102	AGR
2-5425-015	Koloa F	Kauai Dept of Water	130	377	1.728	0.478	MUNCO
2-5426-001	Koloa Mill A	Grove Farm Co	190	191	--	0.000	ABN
2-5426-003	Koloa	Grove Farm Co	222	576	--	0.000	IRR
2-5426-004	Koloa C	Kauai Dept of Water	157	393	1.728	0.352	MUNCO
2-5426-005	Koloa D	Kauai Dept of Water	222	420	1.728	0.485	MUNCO
2-5427-001	Koloa A	Kauai Dept of Water	245	455	1.728	0.570	MUNCO
2-5427-002	Koloa B	Kauai Dept of Water	245	503	0.806	0.000	MUNCO
2-5427-003	Koloa E	Kauai Dept of Water	244	511	1.008	0.436	MUNCO
2-5428-001	Omao Well	McBryde Resources Inc	249	970	--	0.000	UNU
2-5526-001	Kaluahonu	Grove Farm Co	355	1,010	5.710	0.000	AGR
2-5527-001	Kahoano	Grove Farm Co	358	1,030	5.360	0.000	AGR
2-5529-003	Poelele Pump	McBryde Resources Inc	464	719	5.000	0.827	AGR
2-5530-001	Lawai Cannery	McBryde Resources Inc	499	622	--	0.000	TH
2-5530-002	Kauai Pine Pump	McBryde Resources Inc	440	750	2.200	0.000	AGR
2-5530-003	Lawai 1	Kauai Dept of Water	594	695	0.612	0.181	MUNCO
2-5530-004	Lawai 2	Kauai Dept of Water	662	810	0.792	0.213	MUNCO
2-5531-001	Kalaheo	Kauai Dept of Water	630	952	--	0.000	UNU
2-5628-001	Koloa 610 K-55	Poipu Ranch LLC	439	910	5.360	0.000	IRR
2-5629-001	Piwai 2	Kauai Dept of Water	648	775	1.512	0.275	MUNCO
2-5629-002	Piwai 3	Kauai Dept of Water	656	770	1.512	0.161	MUNCO
2-5631-001	Kalaheo A	Kauai Dept of Water	887	1,125	1.440	0.296	MUNCO
2-5631-002	Kalaheo B	Kauai Dept of Water	892	1,030	1.440	0.338	MUNCO
2-5631-003	Brydeswood 1	A&B Properties, Inc	1,003	1,245	--	0.000	MUNPR

Figure 2. Geology, irrigation systems, reservoirs, and registered wells of the Lāwaʻi hydrologic unit, Kauai.

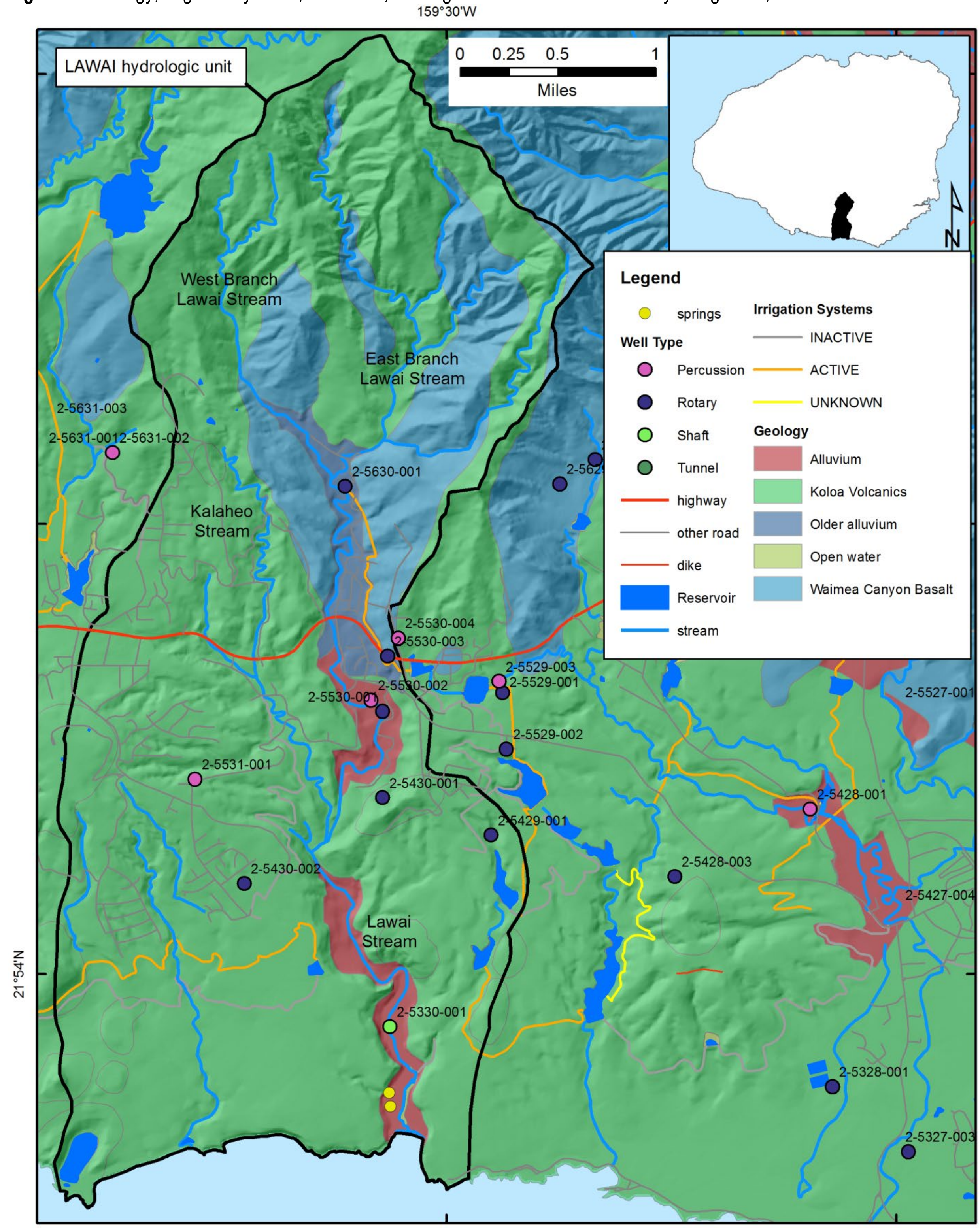
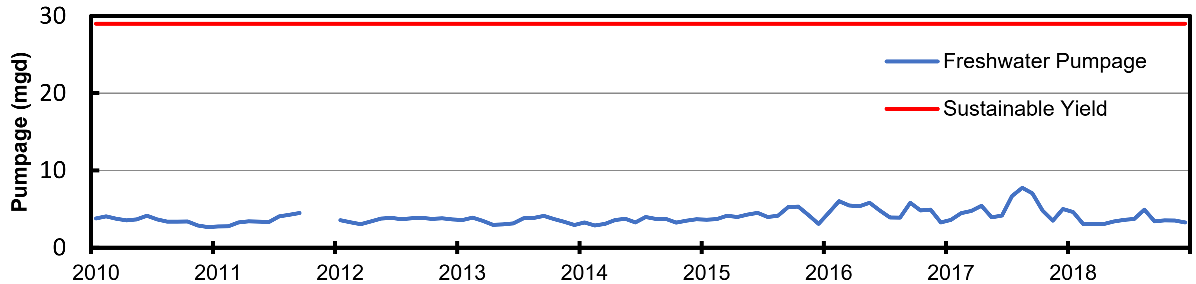


Figure 3. Mean daily pumpage (million gallons per day, mgd) and sustainable yield from 2010 to 2018 for the Kōloa Aquifer System, Kauaʻi.



SPECIFIC HYDROLOGIC CONSIDERATIONS

The hydrologic characteristics of a stream are critical to determining the interim IFS recommendation. These characteristics indicate the effects of geology, climate, and soils on the flow of water. Of great importance is the concept of a gaining or losing (i.e., groundwater recharging) stream reach. A gaining reach is typically interpreted as where the streambed intersects the underlying water table and groundwater contributes to streamflow as seepage or springs. On Kauaʻi, streams are generally gaining from their headwater reaches at high elevations all the way to the lower elevation reaches. In Lāwaʻi, considerable groundwater gains occur from springs emanating from perched bodies that have been incised by the eroding stream channel. The USGS seepage run on Lāwaʻi Stream identified locations and quantities of gains in surface flow (Figure 4).

Continuous mauka to makai flow is estimated to naturally occur 100-percent of the time in the main stem of Lāwaʻi Stream. However, no long-term continuous gaging stations have existed in the watershed. From 1939 to 1940, USGS made nine low-flow stream measurements on Lāwaʻi Stream, 0.2 miles upstream of Kaumualiʻi Highway, during diverted conditions with a mean flow of 0.23 cfs (0.15 mgd), ranging from 0.14 cfs (0.09 mgd) to 0.38 cfs (0.25 mgd). This likely represents the seepage gain in the stream and leakage below Diversion 812. USGS operated station 16052500 on Lāwaʻi Stream at 37 ft above sea level from 1963-1972, monitoring regulated flow conditions. The magnitude of the median (Q_{50}), Q_{70}, and Q_{90} flows at this location were 2.90 cfs (1.87 mgd), 1.88 cfs (1.22 mgd), and 0.81 cfs (0.52 mgd), respectively.

As part of the USGS Low-Flow Study, a continuous low-flow monitoring station was installed on the right branch of Lāwaʻi Stream (station 16052400), just above the confluence with the left branch, to monitor natural flow. Using flow-duration values developed for the right branch of Lāwaʻi Stream, flow-duration values for the left branch and for Lāwaʻi Stream at Diversion 812 can be estimated based on flow yield and catchment size. Flow duration value estimates are provided in Table 6. The contribution of the left branch of Lāwaʻi Stream on 9/19/2019 was 0.14 cfs (0.09 mgd) when flow at 16052400 was at Q_{90} and on 11/21/2019 was 0.21 cfs (0.14 mgd) when flow at 16052400 was at Q_{84}, suggesting these estimates are accurate.

Table 6. Estimated natural low-flow duration exceedance values for locations in the Lāwaʻi hydrologic unit for the 1961-2019 period of record (RB Lāwaʻi Stream at USGS 16052400; LB Lāwaʻi Stream based on yield from proportional watershed size). [cubic feet per second (million gallons per day)]

Station	Drainage Area (mi^2)	MAP (in)	Q_{50}	Q_{55}	Q_{60}	Q_{65}	Q_{70}	Q_{75}	Q_{80}	Q_{85}	Q_{90}
RB Lāwaʻi Stream	2.17	108	3.0 (1.94)	2.4 (1.55)	2.2 (1.42)	1.7 (1.10)	1.3 (0.84)	1.2 (0.78)	0.87 (0.56)	0.63 (0.41)	0.53 (0.34)
LB Lāwaʻi Stream	0.91	94.7	1.26 (0.81)	1.01 (0.65)	0.92 (0.60)	0.71 (0.46)	0.55 (0.35)	0.50 (0.33)	0.36 (0.24)	0.26 (0.17)	0.22 (0.14)
Lāwaʻi Stream at Lāwaʻi Ditch Intake	3.34	103	4.26 (2.75)	3.41 (2.20)	3.12 (2.02)	2.41 (1.56)	1.85 (1.19)	1.70 (1.10)	1.23 (0.80)	0.89 (0.58)	0.75 (0.49)

Another factor in the selection of an interim IFS site is appropriateness of the site selection for monitoring and regulation by Commission staff. The stream channel immediately below the Lāwaʻi Ditch Intake (Diversion 812) is not suitable for monitoring. However, 0.68 miles downstream, at an old bridge, the channel is straight with an appropriate gage pool suitable for monitoring streamflow. In July 2018, a staff plate was installed at this location (CWRM gage 2-194) and measurements made at this location are provided in Table 7. In August 2018, a continuous monitoring station was installed at this location and mean daily flow is provided in Figure 6. Mean daily flow at this station from April to August 2019 was 1.25 mgd.

Table 7. Flow measurements at CWRM gaging station 2-194 on the Lāwaʻi Stream below the Lāwaʻi Ditch intake, in Lāwaʻi Ditch below intake, and the combined flow. [values in cubic feet per second (million gallons per day)]

Date	Lāwaʻi Stream blw diversion	Lāwaʻi Ditch	Total	Estimated Percentile Flow
7/24/2018	0.90 (0.58)			
7/30/2018	4.4 (2.85)			
9/11/2018	3.5 (2.3)			
10/26/2018	0.03 (0.02)			
12/5/2018	1.9 (1.20)			
2/5/2019	1.7 (1.12)			
3/1/2019	0.58 (0.37)			
7/30/2019	1.2 (0.77)	0.67 (0.44)	1.87 (1.21)	Q_{75}
11/5/2019	0.30 (0.19)			
2/6/2020	2.1 (1.36)	2.1 (1.36)	4.2 (2.72)	Q_{52}
2/24/2020	0.99 (0.64)	0.92 (0.59)	1.91 (1.23)	Q_{72}
6/1/2020	1.02 (0.65)			
6/8/2020	1.3 (0.87)			
11/2/2020	0.65 (0.42)	0.49 (0.32)	1.14 (0.74)	Q_{83}

Figure 5. Gaining reaches (in cubic feet per second per mile, cfs/mi) based on seepage run results from USGS fieldwork August 26, 2019 on Lāwaʻi Stream, Kauaʻi.

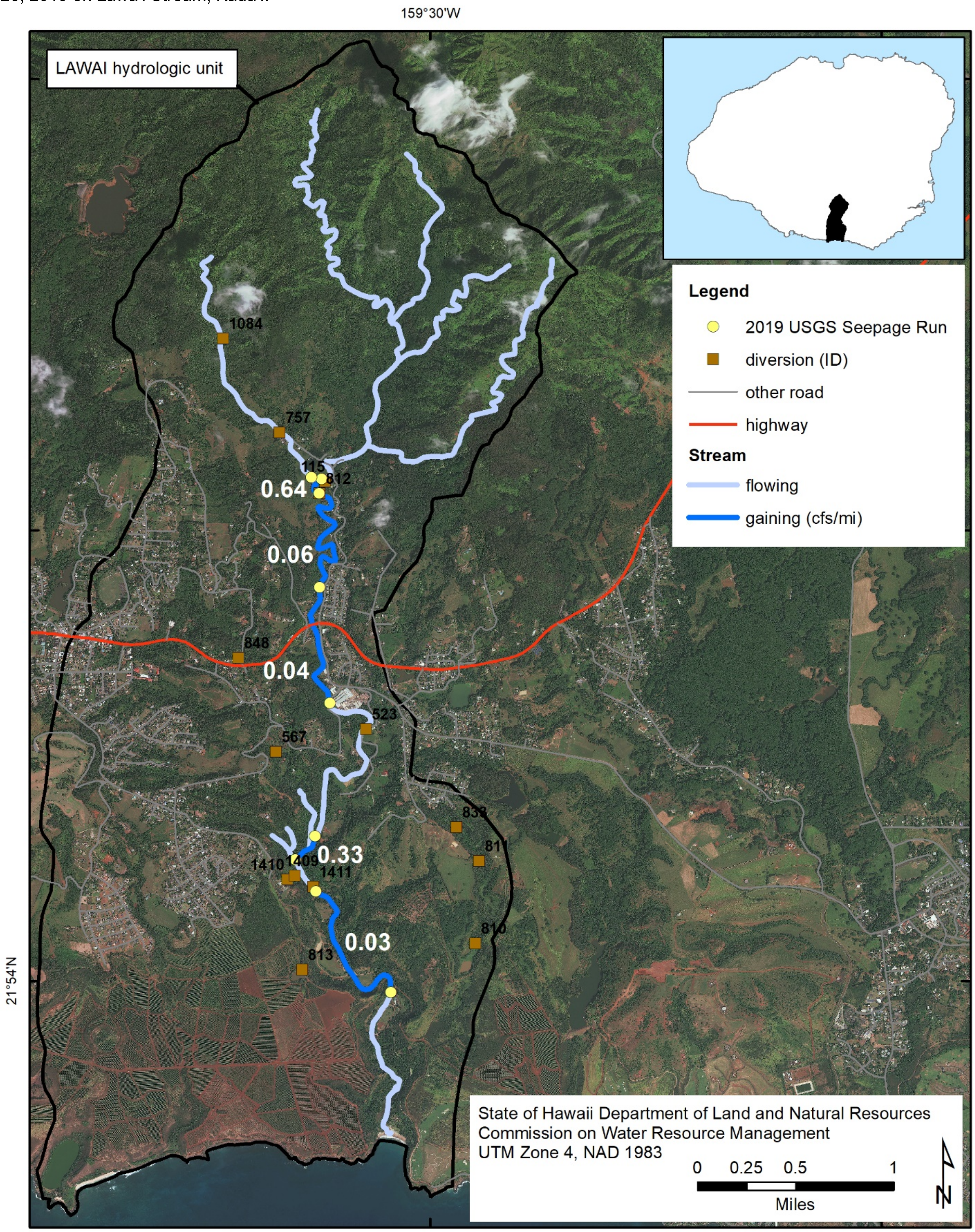
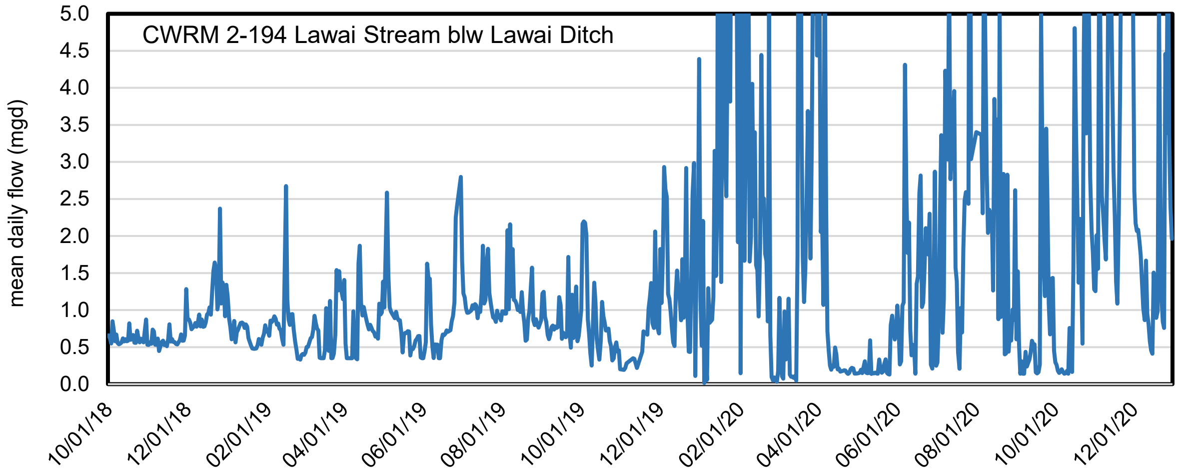


Figure 6. Mean daily flow (million gallons per day, mgd) at the CWRM monitoring station Lāwaʻi Stream below Lāwaʻi Ditch Intake (2-194).



REGISTERED NONINSTREAM USES

Diversion 115
Richard Coffman registered a diversion to irrigate 3.5 acres of diversified agriculture, specifically for nursery, banana, and citrus. His son-in-law, Keith Silva, now operates it for nursery, bananas, and hemp, using approximately 7,200 gallons per day.

Diversion 523
Hop Ching Co. registered a diversion to irrigate 2 acres of land for landscaping and bananas. The diversion was estimated to draw 5,000 gallons of water each month. They also planned to have aquaculture (catfish) at the time. Commission staff were unsuccessful at verifying the continued use of this diversion.

Diversion 567
Toshio Kaneka registered a 3.5 hp pump from Kalaheo Stream via a 2" pipe for watering livestock and to irrigate 3 acres of pasture during summer months. Commission staff were unsuccessful at verifying the continued use of this diversion.

Diversion 757
Shyrl Matias registered "Margo's Pond" on Lāwaʻi Stream, a diversion constructed of stone, to irrigate 3 acres of diversified agriculture and pasture using approximately 1,000 gallons per day in the summer months as needed. Commission staff were unsuccessful at verifying the continued use of this diversion.

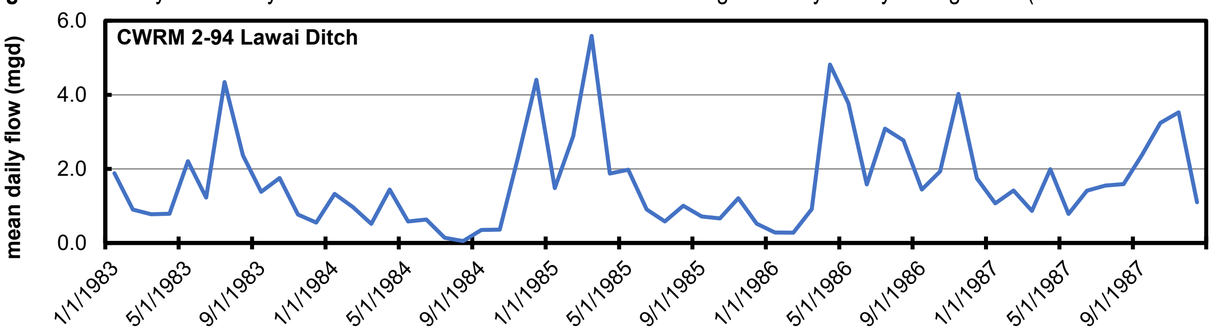
Diversions 810 (Kumano Reservoir), 811 (Kaupale Reservoir), 813 (Lua wai Reservoir), and 822 (Hanini Reservoir)
McBryde Sugar registered these four reservoirs since the dam captures runoff from storm water. Kumano Reservoir (49 million gallon capacity) and Kaupale Reservoir (73 million gallon

capacity) receives water from Kekee Gulch; Luawai Reservoir (9 million gallon capacity) from Pump 3 Ditch; and Hanini Reservoir (14 mg capacity) from Lāwaʻi Ditch.

Diversion 812

McBryde Sugar built this concrete and rock dam to supply water for sugarcane irrigation for their Kōloa fields. Registered mean and median water use in the 1980s was 1.65 mgd and 1.40 mgd, respectively (Figure 7). McBryde Resources currently uses this diversion for irrigation needs in the Kōloa and Poʻipū region. Below the Huinawai Reservoir, the ditch is replaced by two pipelines: one 12-inch to the McBryde Agricultural Park, and one 18-inch to Kauai Coffee Company leased lands. The McBryde Agriculture Park (Ag Park) is 220 acres with 20 tenant lots, although only six were leased in 2019. The current metered water demand for diversified agriculture within the Agricultural Park is approximately 0.264 mgd, although this is expected to fluctuate with rainfall and the number of leased parcels. Kauai Coffee Company is the greatest user in the Agricultural Park, with an estimated 0.143 to 0.202 mgd of use. The Lāwaʻi Ditch is connected to multiple reservoirs which have the capacity to service non-potable water for a variety of uses, including agricultural irrigation, golf course and resort irrigation, and sub-division irrigation. The NTBG also gets water from this system, with approximately 0.055 mgd used in 2019. The current land-use zoning identifies the agriculturally zone lands, golf courses, and urbanized areas of the Kōloa- Poiʻpū region, which are within the service area of the reservoirs fed by the Lāwaʻi Ditch (Figure 8).

Figure 7. Monthly mean daily flow in Lāwaʻi Ditch at Hanini Reservoir as registered by McBryde Sugar Co. (Source: REG.812.2)



Uses that rely upon the Lāwaʻi Ditch benefit from a series of inline reservoirs which provide storage. Water diverted from Lāwaʻi Stream during peak flows can be captured by the reservoirs and used during low-flow periods. The 2015 Agricultural baseline study[15] identified the acreage of agriculture within the Lāwaʻi service area (Table 8).

[15] Perroy, R.L., Melrose, J., Cares, S. 2016. The evolving agricultural landscape of post-plantation Hawaiʻi. Applied Geography, 76: 154-162.

Figure 8. Current land use zoning, current (2015) agricultural use, and golf courses in the Lāwaʻi-Poʻipū-Koloa region relative to the Lāwaʻi Ditch and Reservoir system, Kauaʻi.

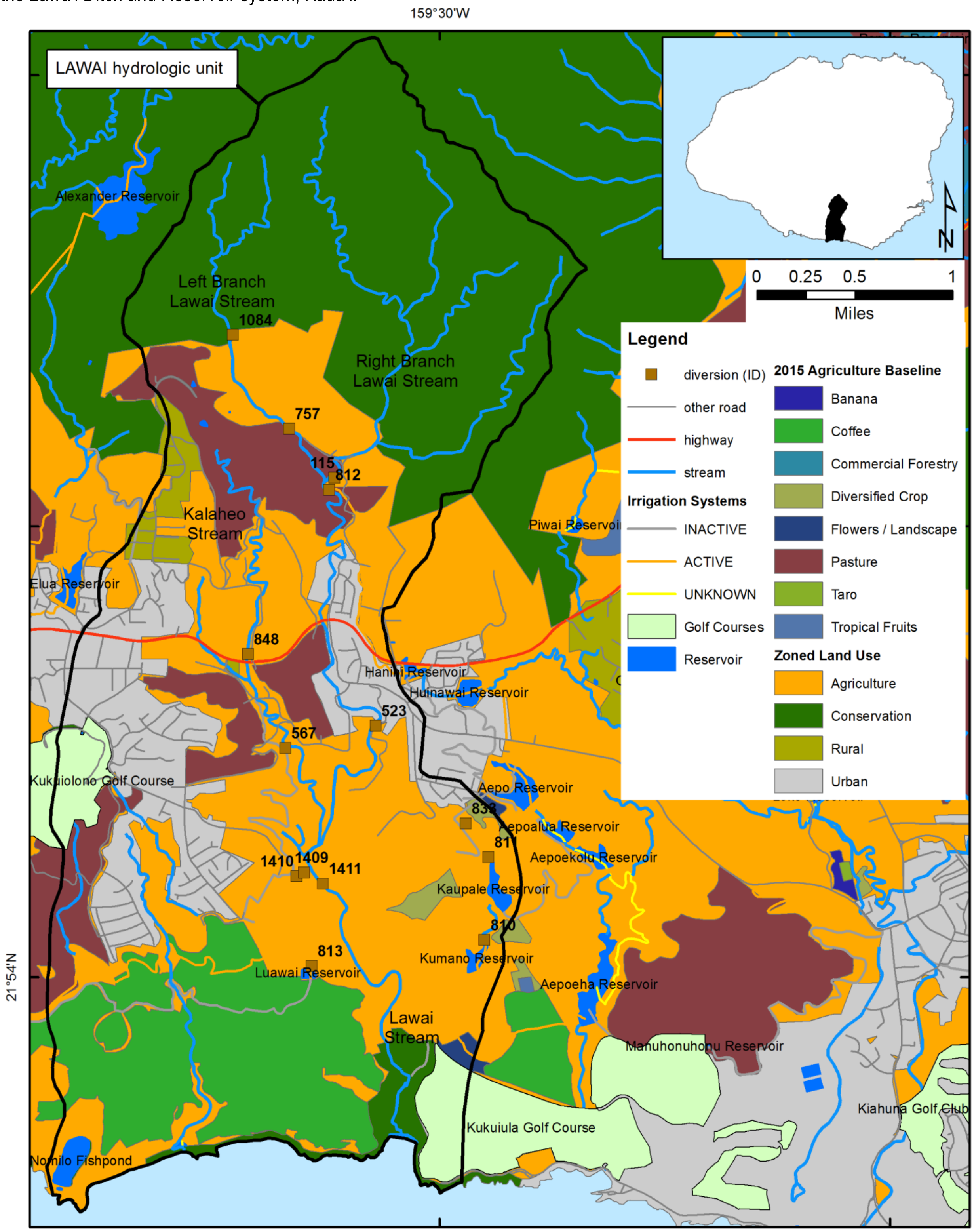


Table 8. Crop type, acreage, estimated water use (gallons per acre per day, gpad) range (minimum, min, maximum, max), and total water demand within the service area of the Lāwaʻi Ditch including the use from the National Tropical Botanical Garden (Source: Perroy, 2015)

	Area (acres)	Water Use Min-Max (gpad)	Total Min-Max (mgd)
pasture	427	--	
coffee	97	1471-2079	0.143-0.202
flowers/foliage/landscape	38.5	1808-2655	0.070-0.102
Diversified crops	48.7	1500-2100	0.073-0.102
Tropical fruits	2.9	1471-2079	0.004-0.006
NTBG			0.055
		Total =	0.345-0.467

Diversion 833
McBryde Resources registered 504 Spring as a diversion for the irrigation of watercress. It is currently listed as "abandoned."

Diversion 848
Gilbert Medeiros registered the diversion and *ʻauwai* water from Kalahia Puukalulu Stream to irrigate approximately 0.22 acres of *loʻi kalo*. Commission staff were unsuccessful at verifying the continued use of this diversion.

Diversion 1084
Anna May Palama Swain registered her rights claim for an *ʻauwai* from Kaneahua Stream (left branch of Lāwaʻi Stream), although at the time of registration, there was no existing usage of water.

Diversion 1409 (Four-House Canyon Dam) and 1410 (Maidenhair Falls Dam)
The National Tropical Botanical Garden registered these two dams on a small tributary formed by spring flow and runoff along the eastern ridge of Lāwaʻi Valley. The springs emanate from perched water bodies in the thin Koloa Volcanic series and do not contribute much to the natural flow of Lāwaʻi Stream. The water is used for landscape irrigation of the NTBG.

Diversion 1411 (Stillwater Dam)
The NTBG used to pump water from Lāwaʻi Stream at this diversion to irrigation the botanical gardens. However, water is now gravity fed from Luawai Reservoir at the end of Pump 3 Ditch (from Hanapēpē River) to meet this irrigation demand and no water is used from this diversion.

IMPACT TO HAWAIIAN HOME LANDS

The Department of Hawaiian Home Lands (DHHL) does not have any land holdings in or near Lāwaʻi which would benefit from either instream flow standards or the use of water through the Lāwaʻi Ditch.

IMPACT TO MUNICIPAL WATER SUPPLY

The Lāwaʻi Stream does not provide water for the County of Kauaʻi Department of Water Supply municipal system, nor does it provide water for any private potable water systems.

AVAILABILITY OF ALTERNATIVE WATER SUPPLIES

Groundwater
While it is the Commission's policy that outside of water management areas water use should be matched to the quality of water needed, the Water Code does not preclude potable groundwater use for agriculture, landscape and golf course irrigation, or other non-potable needs. Currently, groundwater is used to meet many non-potable needs in Kōloa, whose sustainable yield is 29 mgd. The Poelele Pump (well 2-5529-003) is located immediately next to Huniawai Reservoir on the Lāwaʻi Ditch and is currently used to supplement surface water to meet non-potable water needs in the Poʻipū-Kōloa region, especially where streamflow is not reliable due to seasonally varied rainfall patterns. The installed pump capacity for this well is 5.00 mgd and from 2015-2020, pumpage averaged 0.812 mgd and ranged from 0.00 to 3.00 mgd, but was only used in 55% of months (Figure 9). A number of irrigation wells along the Kōloa-Poʻipū coast pump brackish water for golf course irrigation.

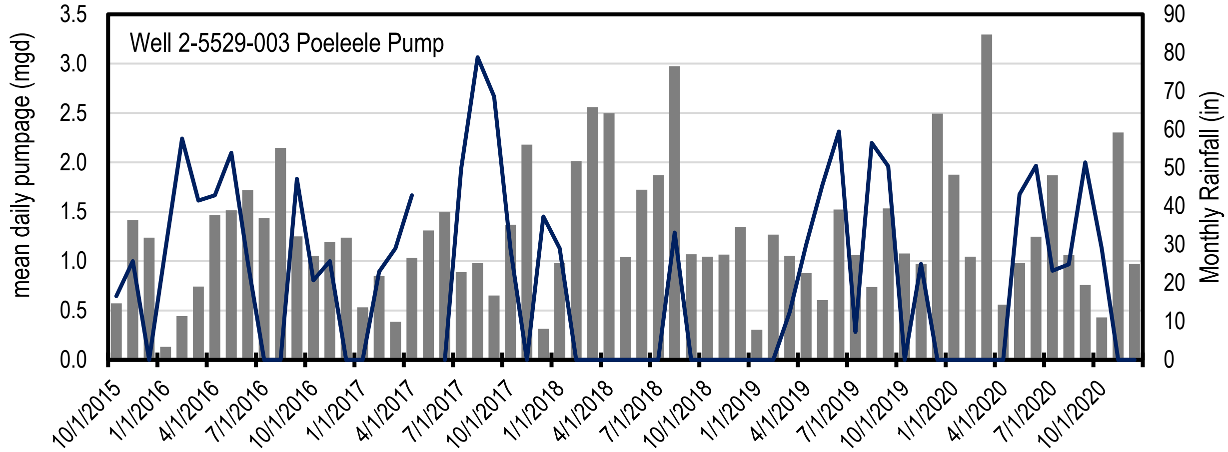
If these wells and agricultural activities are on lands owned by the applicant and the lands are not in a groundwater management area, then, under the common law, the applicant has correlative rights to use the potable well water for agricultural irrigation on the overlying lands, and the Commission has no permitting authority to regulate that use other than the use must be reasonable. (*Koʻolau Agricultural Co., Ltd v. Commission on Water Resource Management*, 83 Hawaiʻi 484, 491, 927 P.2d 1367, 1374 (1996).)

The Commission finds that in prioritizing among non-potable trust resources, its choice is not limited to one or the other, but instead is based on a balancing of competing interests. Operationally, this may mean the use of both non-potable and potable resources, which can only be determined by an analysis of the specific circumstances of each case to determine the amount of each competing resource which is "practicably available."

Recycled Water
It is the Commission's policy to promote the viable and appropriate use of recycled water insofar as it does not compromise beneficial uses of existing water resources. While the Hawaiʻi State Department of Health has jurisdiction and authority over wastewater reclamation and reuse in Hawaiʻi, and the Commission does not have the authority to mandate recycled water use, the availability of recycled water as an alternative to surface water use is carefully considered. Moreover, an alternative is not "practical" if it is capable of achievement at any cost. The Commission has the duty "to protect public trust uses whenever <u>feasible</u> (*emphasis added*)," which the Court has stated does not mean "capable of achievement" but a "<u>balancing of benefits and costs</u>." (*Waiāhole I,* 94 Hawaiʻi at 141 and n. 39, 9 P.3d at 453 and n. 39.) Similarly, practicability must be determined after a balancing of benefits and costs after considering costs,

technology, and logistics. So even if technology and logistics hurdles can be overcome, the Commission could still find the alternative not practicable due to costs.

Figure 9. Monthly reported mean daily pumpage (million gallons per day, mgd) at well 2-5529-003 Poeleele Pump (blue line) and total monthly rainfall (inches, in) at USGS 22042715900201 1047.0 Mt Waiʻaleʻale Rain Gage.



The Kōloa-Poʻipū region is a rapidly growing tourist-centered development which supports golf-courses, resorts, and luxury home development. The region originally relied on decentralized wastewater treatment facilities and injection wells to treat resort wastewater, but in the last decade, the County has built the Kōloa-Poʻipū regional wastewater reclamation facility (Regional WRF). The first phase of the Regional WRF was completed in 2010 with a designed average daily flow (ADF) of 0.6 mgd; the second phase was competed in 2015 to expand the capacity to 1.1 mgd ADF; and the full buildout will have a capacity of 1.7 mgd ADF. The R-1 quality effluent generated by the Regional WRF is used to irrigate a variety of existing golf courses and resorts: Poʻipū Bay Golf Course (0.1 mgd), Kiahuna Golf Club (0.36 mgd), Koloa Landing and the Poʻipū Beach Wyndham Grand Resort Hotel (0.4 mgd), Kukuiʻula Resort and Residential Community, and Kukuiʻula Golf Course.

CONSISTENTCY WITH THE HAWAIʻI WATER PLAN

The Water Resource Protection Plan (WRPP), updated in 2019,[16] provides an outline for the conservation, augmentation, and protection of water resources. The legal framework of the Code for developing interim IFS as outlined in this submittal is covered in more detail and context in the WRPP.

[16] State of Hawaiʻi Commission on Water Resource Management. 2019. Water Resource Protection Plan 2019. Prepared by Townscape, Inc. https://dlnr.hawaii.gov/cwrm/planning/hiwaterplan/wrpp/

<u>Assessment Summary of Instream Uses: Lāwaʻi Stream</u>

Maintenance of Fish and Wildlife Habitat
Historically (pre-plantation), Lāwaʻi Stream provided excellent habitat for native aquatic fauna. Undiverted, Lāwai Stream would naturally provide *mauka* to *makai* streamflow 100% of the time and as such, could provide habitat for freshwater fauna. Previous surveys by the Division of Aquatic Resources (DAR) found that several native species inhabit low and middle elevation reaches in Lāwaʻi, including ʻoʻopu nōpili (*Sicyopterus stimpsoni*), ʻoʻopu nākea (*Awaous guamensis*), ʻoʻopu akupa (*Eleotris sandwicensis*), āholehole (*Kuhlia xenura*), ʻoʻopu naniha (*Stenogobius hawaiiensis*), ʻōpae ʻoehaʻa (*Macrobrachium grandimanus*) and ʻōpae kalaʻole (*Atyoida bisulcata*). However, non-native species such as smallmouth (*Micropterus dolomieu*), tilapia (*Oreochromis* spp.), mosquitofish (*Gambusia affinis*), Mexican molly (*Poecilia Mexicana*) and Tahitian prawn (*Macrobrachium lar*) are commonly found. The Tahitian prawn and African cichlids (*Oreocromis mossambicus*) are both common and extremely omnivorous, competing with native species, preying upon *hinana* (i.e., post-larvae ʻoʻopu and ʻōpae) in the estuary and lower elevation reaches trying to recruit back to the middle and upper elevation stream reaches, and likely suppressing their populations. A more recent survey of the Lower Lāwaʻi Stream[17] provide a comprehensive bioassessment, and rated Lāwaʻi stream habitat as "poor" due to high sediment levels in the stream channel, chronic stream bank instability/erosion, and extreme variability in water flow regimes.

The existence of Stillwater Dam (Diversion 1411) protects high quality habitat for native species from the upstream movement of non-native species. Following an increase in streamflow due to a reduction of diverted flow in 2019 and 2020, ʻoʻopu have been observed in the upper reaches of Lāwaʻi Stream. The lowest reaches of Lāwaʻi Stream are currently dominated by a variety of non-native aquatic species that were purposefully introduced for recreational fishing and consumption. A small population of alien atyid shrimp (*Neocardina denticulate sinensis*) are beginning to gain foothold in the lower reach. Despite a high level of degradation, populations of native aquatic species observed in the lower estuarine reach were relatively robust and improving,[18] likely owing to the groundwater gains in streamflow and a shift from a completely dewatered state at an elevation of 590 feet by diversion 812 to a partially diverted state as a result of the reduction in agriculture. Native ʻoʻopu species (e.g., *Awaous stamineus*, *Eleotris sandwicensis*, *Sicyopterus stimpsoni*) are found in the middle reaches. More consistent flow will improve water quality and fine sediment transport that will benefit native aquatic fauna.

Outdoor Recreational Activities
The Lāwaʻi hydrologic unit supports swimming, hiking, fishing, hunting, scenic views, and nature study activities. Swimming is common in larger pools in Lāwaʻi Stream and its tributaries. There are trails along the stream within the NTBG with hiking opportunities. Hunting takes place in the upper reaches of the watershed. The Hawaii Stream Assessment identified nine recreational opportunities with four high quality experiences, giving it a regional ranking of outstanding (4 out of 4) for the Island of Kauaʻi. Restoration of streamflow will

[17] Kido, M. 2007. A Biological and Habitat Assessment of Lower Lāwaʻi Stream, Kauai. Final Technical Report to the National Tropical Botanical Garden.
[18] Kido, 2007.

protect and increase the appeal of recreational opportunities. Coastal recreational features near the Lāwaʻi hydrologic unit are depicted in Figure 11.

Maintenance of Ecosystems

The Hawaii Stream Assessment indicated the presence of a palustrine wetland and 20% of the Lāwaʻi watershed remains in native forest. A more recent survey characterized Lāwaʻi Stream as a system that supports a deep estuarine reach and associated wetland features before entering into the ocean at Lāwaʻi Bay.[19] Stream restoration will benefit the estuarine habitat and such an environment supports a variety of freshwater and marine species.

The valley is being invaded by hau bush (*hibiscus tiliaceus*) and California grass (*Uroshloa mutica*), with feral pigs feeding on groundcover and uprooting the soil. The valley supports three species of threatened and endangered birds and the NTBG maintains a collection of rare plants from Hawaiʻi and across the tropical Pacific region.

Aesthetic Values

Lāwaʻi Stream supports aesthetic value throughout the watershed, both for the community which lives along its reaches and people that visit the National Tropical Botanical Garden. Increasing the depth and width of streamflow through restoration will improve the aesthetic value of the stream.

Maintenance of Water Quality

Lāwaʻi Stream is classified by the Department of Health (DOH) as Class 1b inland waters in the upper elevations and Class 2 inland waters in the lower elevations. It does not appear on the 2014 List of Impaired Waters in Hawaiʻi, Clean Water Act §303(d), although there was insufficient data to support any conclusions. The abundance of cesspools and non-native mammals in the watershed are likely to contaminate the stream. Restoration of flow will have a small effect on stream temperature below the diversion, but will have little to no effect on microbiological water quality at the mouth of the river. Increased flow may improve the transport of sediment, thus reducing turbidity. From 2001 to 2003, the DOH Clean Water Branch measured various water quality parameters in Lāwaʻi Stream (Table 9).

Table 9. Mean, standard deviation (SD), and sample size of various water quality parameters measured by the State of Hawaii Department of Health Clean Water branch from 2001 to 2003 at one lower (elevation 60 ft a.s.l.) and one upper elevation (1000 ft a.s.l.) site.

	Lower Lāwaʻi			Upper Lāwaʻi		
parameter	Mean	SD	n	Mean	SD	n
DO (%)	102.4	22.6	12	90.6	13.6	11
ORP (mg L^{-1})	336.0	42.4	8	343.6	24.9	7
pH	8.03	0.39	12	7.59	0.22	11
Salinity (mg L^{-1})	0.12	0.04	12	0.08	0.01	11
SpCond (µS cm^{-1})	0.262	0.078	12	0.166	0.025	11
Temp (°C)	23.66	2.66	12	21.89	2.12	11
Turbidity (mg L^{-1})	11.33	10.04	19	21.20	35.13	17

[19] Kido, 2007.

Conveyance of Irrigation and Domestic Water Supplies
Lāwaʻi Stream is not used for the conveyance of irrigation or domestic water supplies.

Protection of Traditional and Customary Hawaiian Rights
The maintenance of instream flows is important for the protection of traditional and customary practices, as they support stream (e.g., hīhīwai, ʻōpae, ʻoʻopu) and riparian (vegetation) resources for gathering. Pre-contact Hawaiian communities cultivated kalo along Lāwaʻi Stream throughout the ahupuaʻa (Figure 10). Many locations have cultural significance and are labeled as such in Figure 10. Land Commission Award claimants may also have legal access to utilize surface water to practice traditional and customary uses of water. The saltwater fish pond in Lāwaʻi, which was also famous for its salt pans, is likely to benefit from an improved estuary.

The Hawaii Stream Assessment archeological summary identified six known archeological sites, but there was limited survey coverage and predictability. The National Register of Historic Places identifies the valley as having excellent examples of particular site types, sites that contain important information, and culturally noteworthy sites.

Lāwaʻi Stream likely supported much wetland kalo, as depicted in Figure 11, although there currently is little kalo in active cultivation. Restoration of streamflow is likely to encourage the rejuvenation of traditional and customary practices throughout the ahupuaʻa.

Figure 10. Simplified schematic diagram of the Lāwaʻi Stream, registered surface water diversions, ditches, pipelines, reservoirs, and proposed location of the interim IFS in the Lāwaʻi Hydrologic Unit, Kauaʻi. [flows in cubic feet per second (million gallons per day)]

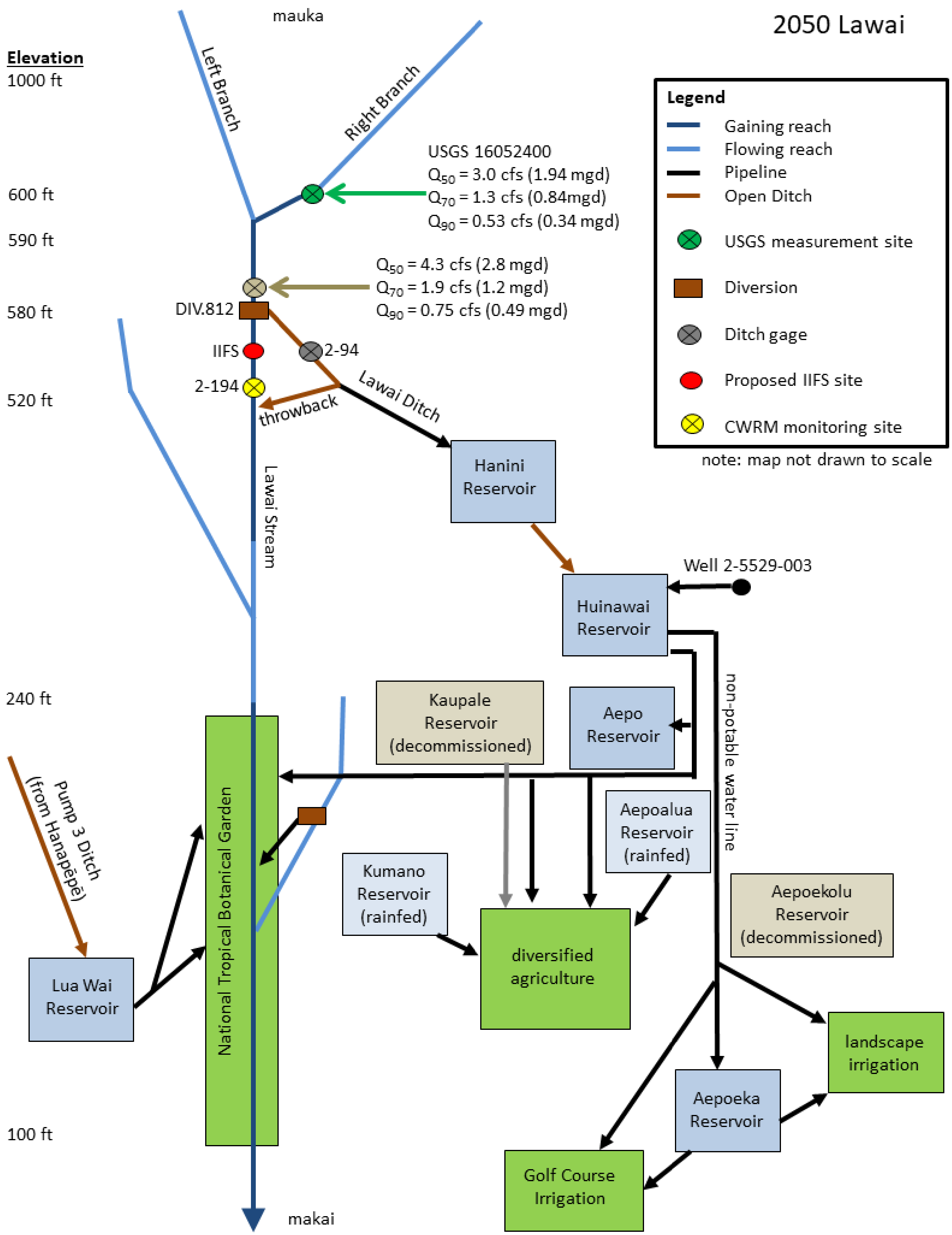
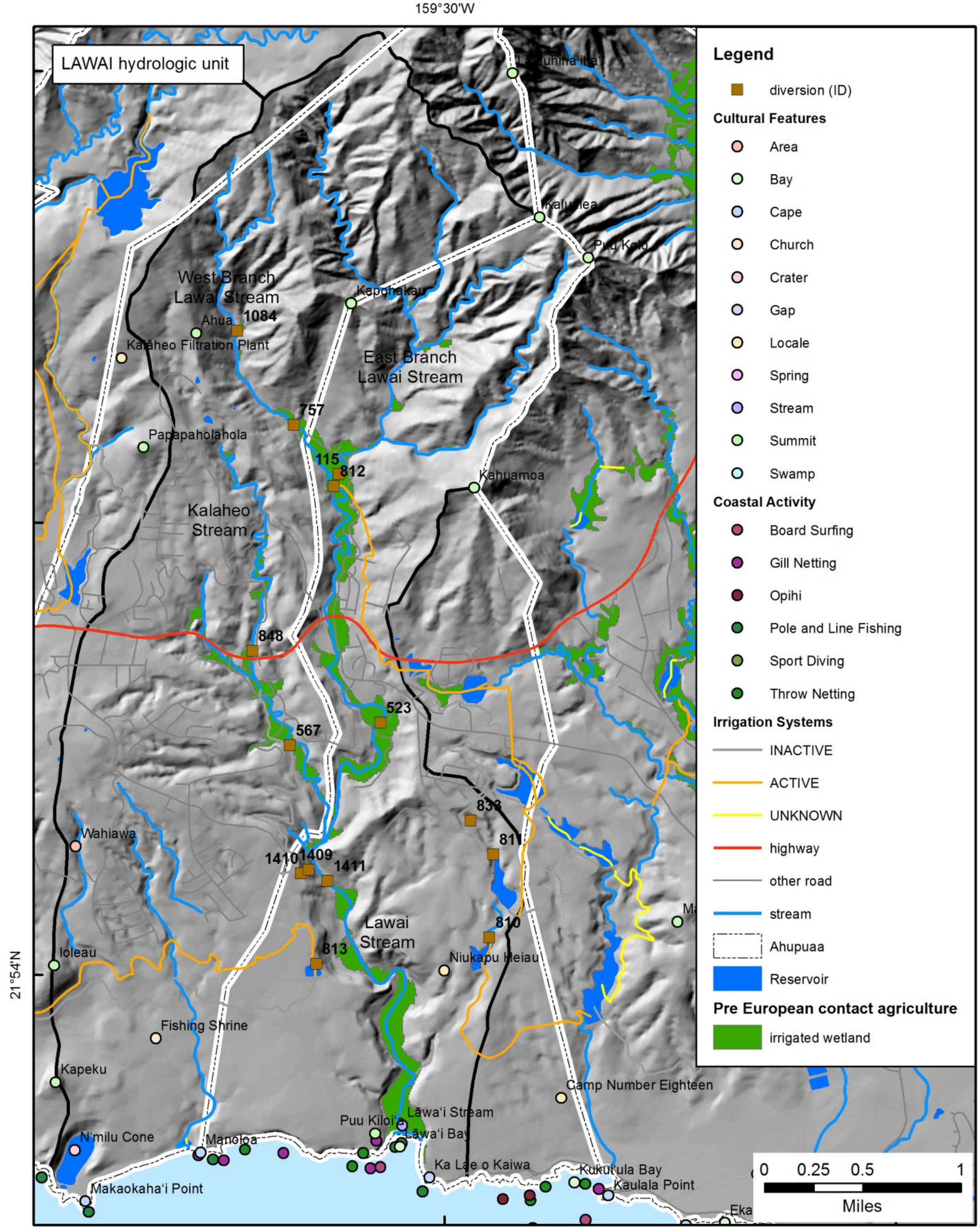


Figure 11. Cultural features, coastal activities, and distribution of pre-European contact agriculture in the Lāwaʻi Hydrologic Unit, Kauaʻi.



ENVIRONMENTAL REVIEW CHAPTER 343, HAWAII REVISED STATUTES

The proposed action does not meet or trigger the applicability requirements under Hawaii Revised Statutes §343-5, therefore an Environmental Assessment is not required.

RECOMMENDATION

- Proposed Action: Amended Interim IFS
  Staff recommends that one measurable interim IFS be established for Lāwaʻi Stream near an altitude of 500 feet, below the Lāwaʻi Ditch Intake (Diversion 812). The interim IFS shall be established at a flow of 2.4 cfs (1.56 mgd). This value represents the estimated 65^{th} percentile flow (Q_{65}) at the diversion. Thus, it is expected that when the flow in Lāwaʻi stream is less than the Q_{65}, no water shall be diverted from the stream in order to protect instream values. At medium flow (4.25 cfs; 2.75 mgd), the Lāwaʻi Ditch can still divert 1.85 cfs (1.19 mgd), which is more than necessary to meet the estimated non-potable needs of the Lāwaʻi Ditch service area (0.5 mgd). Excess flows can also be diverted and stored in the series of reservoirs associated with the Lāwaʻi Ditch. During extreme droughts, backup groundwater is also available for non-potable use in the system. Due to the uncertainty surrounding this value, the interim IFS may be revised by future Commission action as more data is gathered.

IMPLEMENTATION

- Proposed Action: Modification of Diversion 812
  Within 120 days of Commission action, McBryde Resources or their parent company Alexander & Baldwin, shall submit plans to modify the Diversion 812 intake to ensure compliance with the interim IFS. Following submission of a plan, McBryde Resources shall have an additional 120 days to implement the plan to address system infrastructure and management issues.
- Diversion 812 intake will be modified to prohibit the withdrawal of stream water in excess of 3.04 cfs (1.96 mgd), when flows in the stream exceed 5.45 cfs (3.5 mgd), estimated to be the Q_{30} flow in order to provide flushing needed to increase sediment transport and improve fish habitat.
- Commission staff will determine if the proposed modifications will need permitting

MONITORING

- Staff shall maintain a continuous gaging station on Lāwaʻi Stream to monitor compliance with the interim IFS and make periodic measurements to assess the attainability of the interim IFS.
- McBryde Resources will continue to monitor Lāwaʻi Ditch below the Diversion 812 intake.
- McBryde Resources will provide the Commission an annual report that identifies the amount of acreage and crops leased as well as their water usage.

EVALUATION

- Within five years from the date of adoption of an interim IFS, staff shall report to the Commission on the progress of implementing the interim IFS and the application of the adaptive management strategies outlined above, and the impacts of the interim IFS upon instream and noninstream uses.

Ola i ka wai,

M. KALEO MANUEL
Deputy Director

Exhibits:
Note: Exhibits 1 and 2 are available from the Commission website at https://dlnr.hawaii.gov/cwrm/surfacewater/ifs/kauai/2050-lawai/

1. DRAFT Instream Flow Standard Assessment Report PR-2019-05
2. Compilation of Public Review Comments, PR-2021-02

APPROVED FOR SUBMITTAL:

SUZANNE D. CASE
Chairperson