STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
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STAFF SUBMITTAL

For the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

November 20, 2018
Lahaina, Maui

Amended Interim Instream Flow Standards
For the Surface Water Hydrologic Unit of
Kahoma (6008): Kahoma and Kanahā streams

LOCATION MAP: See Figure 1

SUMMARY OF REQUEST:

Staff is requesting that the Commission consider the recommendations for amending the interim instream flow standard (interim IFS) for two streams within the Kahoma surface water hydrologic unit in the region of West Maui:

KAHOMA (6008): Kahoma Stream
KAHOMA (6008): Kanahā Stream

BACKGROUND:

The State Water Code (Code), Chapter 174C, Hawaii 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 two streams in West Maui.

The current interim IFS for the streams being considered were established by way of Hawaii Administrative Rules (HAR) §13-169-44, which, in pertinent part, reads as follows:

> Interim instream flow standard for West Maui. The Interim Instream Flow Standard for all streams on West Maui, 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 December 31, 1987. Thus, the status quo interim IFS, in effect, grandfathered all then-existing diversions that were registered with the Commission in subsequent years. Following the initial registration of stream diversions works, any new or substantially modified stream diversion works structure required a permit for construction and amendment to the interim IFS.

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 ("*Waiāhole* I"), the Hawai'i 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.

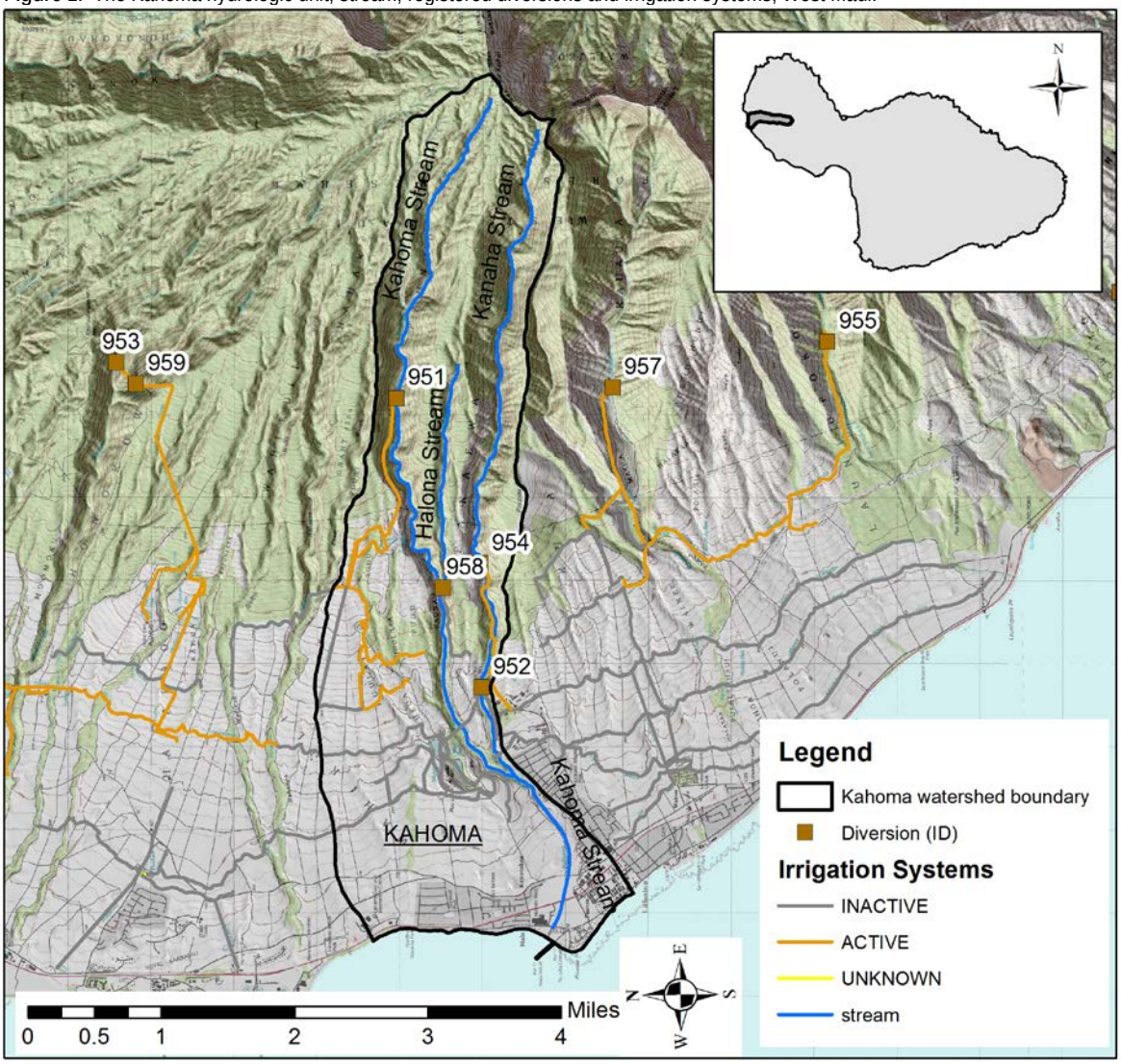
"Noninstream use" means the use of stream water that is diverted or removed from its stream channel and includes the use of stream water outside of the channel for domestic, agricultural, and industrial purposes.

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 statewide. This framework involves an assessment of natural flow conditions for the current

climate period (1984-2013), an analysis of the instream uses protected by the State Water Code, the existing and planned off stream uses of surface water, and the availability of water from multiple sources.

The assessment of instream uses for West Maui has been separated into multiple phases, the first of which addressed interim instream flow standards for the Ukumehame (6004), Olowalu (6005), Launiupoko (6006) and Kaua'ula (6007) hydrologic units in March 2018. This phase will focus on the two streams in the Kahoma (6008) hydrologic unit (Figure 1).

Figure 1. The Kahoma hydrologic unit, stream, registered diversions and irrigation systems, West Maui.



HISTORIC CONTEXT:

Lahaina was once a large Hawaiian population center and the streams in Kahoma were diverted through an intricate auwai system to support wetland and dryland agriculture. Missionaries began establishing themselves in Lahaina in the early 1800s. In 1831, Lahainaluna School was

founded, supporting a vibrant educational and agricultural program. In 1839, Lahainaluna School received an agreement for water from the Kingdom of Hawai‘i to support both potable and non-potable water needs. With water, the school developed a strong diversified agricultural education program. Following the development of a commercial sugarcane industry in the mid- to late-1800s, water was diverted as part of an industrial irrigation system. Lahaina Sugar Company, founded in 1861, and Pioneer Sugar Mill, founded in 1862, relied on native owners of *kuleana* lands and foreign owners of larger tracks to grow and supply cane needed for processing into sugar. These two companies consolidated in 1870, but the partnership of James Campbell and Henry Turton ended and new investors (Hackfeld and Company, forerunner to American Factors Corporation) provided much needed financial support. Not until 1895 was Pioneer Mill Co., Ltd. (Pioneer Mill) formed. By developing land and water resources and expanding mill operations, the plantation grew, needing to import a labor force from China, Japan, Portugal, the Philippines to complement the Hawaiian community. Pioneer Mill cleared and leveled lands mauka of Lahaina for sugarcane cultivation and then expanded the irrigation of these fields using water diverted from Kahoma and Kanahā streams, among many sources, through an elaborate system of tunnels, ditches, and reservoirs.

In 1904 and then again in 1906, an agreement was reached between Pioneer Mill, State of Hawai‘i Department of Education Lahainaluna High School (LHS), and the government department of water supply (DWS) to distribute water from Kanahā Stream for various end uses (parties). Pioneer Mill needed a source of water below 450 parts per million (ppm) chloride for industrial use (boiler feed operation to process sugarcane) which they could not get from groundwater pumped from their shaft-type wells, the public needed a source of drinking water supply maintained by DWS, and LHS needed water for domestic (potable) and agricultural uses (non-potable). This agreement continued to work until Maui DWS needed to improve the treatment of surface water to acceptable public health standards, and wanted to build a new water treatment facility (WTF) above LHS. In 1982, prior to construction of the WTF, the parties agreed to update the agreement as detailed in Table 1. The delivery of water to each party was to occur at a rebuilt concrete distribution box.

Table 1. 1982 priority agreement for the distribution of water diverted from the Kanahā Stream by Diversion 954 by Pioneer Mill Company, Maui Department of Water Supply (DWS), and Lahainaluna High School. [million gallons per day, mgd]

Distribution Priority	Amount	End User
First	17.7% of total water	Lahainaluna HS
Second	0.50 mgd	Maui DWS
Third	0.80 mgd	Pioneer Mill
Fourth	0.30 mgd	Maui DWS
Fifth	Excess flow up to a total of 1.5 mgd	Maui DWS
Sixth	Additional excess flow	Pioneer Mill

In 1987, with the passage of the State Water Code (HRS 174C), all wells and stream diversions had to be registered with the Commission on Water Resource Management (Commission) by May 31, 1989. Registered diversions accepted by the Commission in the Kahoma hydrologic

unit are listed in Table 2. As was often the case, multiple parties registered the same physical structure in separate diversion registrations. The most upstream intake on Kanahā Stream (954) was co-registered by Pioneer Mill Company (FileRef: PIONEER MILL) and Maui DWS (FileRef: MAUI DWS) with Hans Michel (FileRef: H MICHEL) and Lahainaluna High School (FileRef: LAHAINALUNA HS) registering off stream uses. Hans Michel, registered two pipes (one 2 inch and one 1.25 inch) that are connected to the Maui DWS pipeline and Lahainaluna High School registered the concrete box that distributes water at the end of the pipeline. When Pioneer Mill went out of business, the operation of the Kanahā Stream intake and pipeline was turned over to the Maui DWS. Following the closure of Pioneer Mill, the operation of the Kahoma Stream diversion (951) and irrigation systems continued as an agreement between the diversion landowner (Kamehameha Schools Bishop Estate, now Kamehameha Schools, KS) and the new end user (Kahoma Land Holdings, Inc). Following complaints from community members who wanted to restore loʻi kalo cultivation in Kahoma Valley on *kuleana* parcels, KS restored most of the water at diversion 951 back to the stream. A downstream diversion on Kahoma Stream below the confluence with the Halona tributary (Halona Intake, diversion 958) was not functional when KS purchased the property and KS formally abandoned it in 2008.

On March 16, 2011, 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 the Lahaina District, Maui. The agreement was then signed on June 21, 2011 and the study took place between 2011 and 2013. This agreement supported fieldwork, data analysis, and writing resulting in the production of a USGS Scientific Investigations Report (SIR) 2014-5087.

Table 2. Registrant, diversion ID, diversion name, stream, and additional information in the Kahoma hydrologic unit, West Maui.

Registrant	Diversion ID	Diversion name	Stream name	Additional information
PIONEER MILL	951	Kahoma Intake	Kahoma	Active; Intake on land owned by Kamehameha Schools
PIONEER MILL	954	Kanahā Intake	Kanahā	Active; Maui County DWS operates intake
PIONEER MILL	958	Halona Intake	Kahoma	Discontinued/abandoned
PIONEER MILL	952	Lahainaluna Intake	Kanahā	Discontinued/abandoned
HANS MICHEL	853	2" pipe from Kanahā pipeline	Kanahā	Active; Off-stream registration; Diversion source is same as 954
HANS MICHEL	854	1.25" pipe from Kanahā pipeline	Kanahā	Active; Off-stream registration; Diversion source is same as 954
MAUI DWS		Kanahā Intake	Kanahā	Active; Diversion source is same as 954
MAUI DWS	761	Kanahā Distribution Box	Kanahā	Active; Off-stream registration; Distributes water form 954
LAHAINALUNA HS		Kanahā Distribution Box	Kanahā	Active; Off-stream registration; Diversion source is same as 954 Structure is same as 761

In the USGS SIR, Cheng (2014) established partial-record gaging stations in conjunction with index stations and record augmentation modeling to estimate natural low-flow duration

discharges above major active diversions. Seepage runs were also conducted to examine current (2012-2013) surface water-ground water interactions. Following the publication of this report, staff began analyzing historic and current data in support of the production of Instream Flow Assessment Reports for each hydrologic unit in West Maui.

A lack of streamflow has continued to impede water uses on *kuleana* lands, including traditional and customary gathering practices, the cultivation of taro, and the recreational use of water, especially along Kanahā Stream. Informal complaints (e.g., phone calls, letters, emails) regarding the lack of streamflow in this region have been numerous (Table 3).

Table 3. Summary of complaints associated with the Kahoma hydrologic units in West Maui to commission staff.

STREAM	Date	Description of Complaint
Kahoma	April 2008	West Maui Land Co is selling water; Water needed for loʻi in Kahoma Valley
	June 2008	No water flowing in Kahoma Stream because of diversions
	September 2008	No water in Kahoma stream
	July 2012	Kahoma flood control project on Kuleana lands
	October 2018	Kahoma streamflow needed to support loʻi complex
Kanahā	June 2008	No water flowing in Kanahā Stream because of diversions
	September 2008	No water in Kanahā Stream; Maui DWS was taking all the water and releasing overflow downstream
	October 2018	Need mauka to makai flow in Kanahā Stream

In October 2016, Commission staff began to reach out to irrigation managers, community groups, land owners, and stakeholders in order to better understand the current state of water management and to gather information regarding instream uses in West Maui. In December 2016, staff began conducting field investigations with managers and stakeholders, evaluating instream uses, and surveying stream resources (Table 4). Based upon the best available information, as 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 Maui (East Maui, Nā Wai ʻEhā).

As in those decisions, the Commission staff has relied upon the basic tenets of adaptive management, which are to: 1) Establish management objectives; 2) Implement management decisions; 3) Monitor effectiveness of decisions; 4) Evaluate results of management; and 5) Revise management decisions as necessary[1].

Should initial management decisions need further amendment, they can be revised and the process repeated. This is a learning process that can be repeated over and over, until a sound management decision is reached. Due to the complex and dynamic nature of Hawaii's stream systems, adaptive management affords the Commission the ability to proceed in making reasonable management decisions and ensuring that impacts are minimized in the face of uncertainty, thus allowing the Commission to proceed responsibly while advancing the clear intentions of the State Water Code.

[1] Adapted from The Instream Flow Council, 2004, p.126.

Table 4. Summary of field investigations, by date, taken by Commission staff in support of amendment to the interim instream flow standards for West Maui. [KS = Kamehameha School; KR = Kahoma Ranch; HM = Hans Michel.; MDWS = Maui Department of Water Supply]

Date	Description
Nov 30, 2016	Meeting with KS and KR
Jan 10, 2017	Kahoma site visit with KR employees
Feb 1, 2017	Meeting with MDWS
Mar 10, 2017	Kanahā site visit with HM; meeting with Hawaii Water Service
Mar 31, 2017	Kahoma debris dam site visit
April 1, 2017	Presentation at Maui Cultural Lands community meeting
May 20, 2017	Kahoma site visit with community members
Aug 21, 2017	Kahoma site visit with DAR
Oct 2, 2017	Flow measurement in Kahoma Stream
Oct 27, 2017	Flow measurement in Kahoma Stream
Nov 30, 2017	Flow measurement in Kahoma Stream
Dec 12, 2017	Flow measurement in Kahoma Stream
Dec 28, 2017	Flow measurement in Kahoma Stream
Jan 1, 2018	KR reforestation plan submitted
Mar 6, 2018	Flow measurement in Kahoma Stream
Mar 26, 2018	Kanahā Stream loʻi restoration site visit with HM and community members
Apr 11, 2018	Meeting with KS to discuss Kahoma Stream diversion
Aug 13, 2018	West Maui Water Resources Management Meeting in Lahaina with MDWS, DHHL, others
Aug 14, 2018	Flow measurement in Kahoma Stream
Aug 30, 2018	West Maui Ridge2Reef Community Meeting
Sept 7, 2018	Meeting with MDWS
Oct 5, 2018	Meeting with Kahoma stakeholder
Oct 9, 2018	Community fact-gathering meeting in Lahaina: Kahoma hydrologic unit
Oct 15, 2018	Flow measurement in Kahoma Stream

ISSUES/ANALYSIS:

This section of the submittal begins with general considerations of issues that broadly apply to the development of an IFS. A discussion then follows of the unique hydrologic environment, the instream uses, and the noninstream uses of water. The general considerations are followed by a simplified schematic diagram and assessment summary for each stream. The summary and diagram identify key points from the IFSAR while summarizing the hydrologic characteristics and is by no means intended to substitute for the information compiled in the report.

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 presented in the IFSAR, 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, the various instream and noninstream uses of water, and the logistical challenges of instituting an interim IFS. Whether attempting to compare stream characteristics across multiple hydrologic units or within a single one, no single principal or equation determines the rate of flow restoration. However, the principals established by the State Constitution, the laws dictating the

Hawai‘i State Water Code (HRS 174C), and the statutes which are used to implement these laws (HRS) are applied equally.

The first step in developing an interim IFS is assessing the hydrology of the hydrologic unit. Streams are largely characterized by different hydrologic and geologic components that affect flow regimes, particularly the ground water-surface water interactions and rainfall-driven runoff. The amount of water flowing in a given stream is also affected by regional climate variations (e.g., rainfall, fog drip, solar radiation). The quantity and quality of data available for each stream that is reflective of these geologic and hydrologic characteristics varies considerably from stream to stream. For streams with long-term continuous data, the process for developing an interim IFS may be greatly different from that for streams with limited hydrologic data. For example, baseflow[2] can be determined using continuously recorded data while record-augmentation is used with partial-record gaging stations to estimate low-flow characteristics.

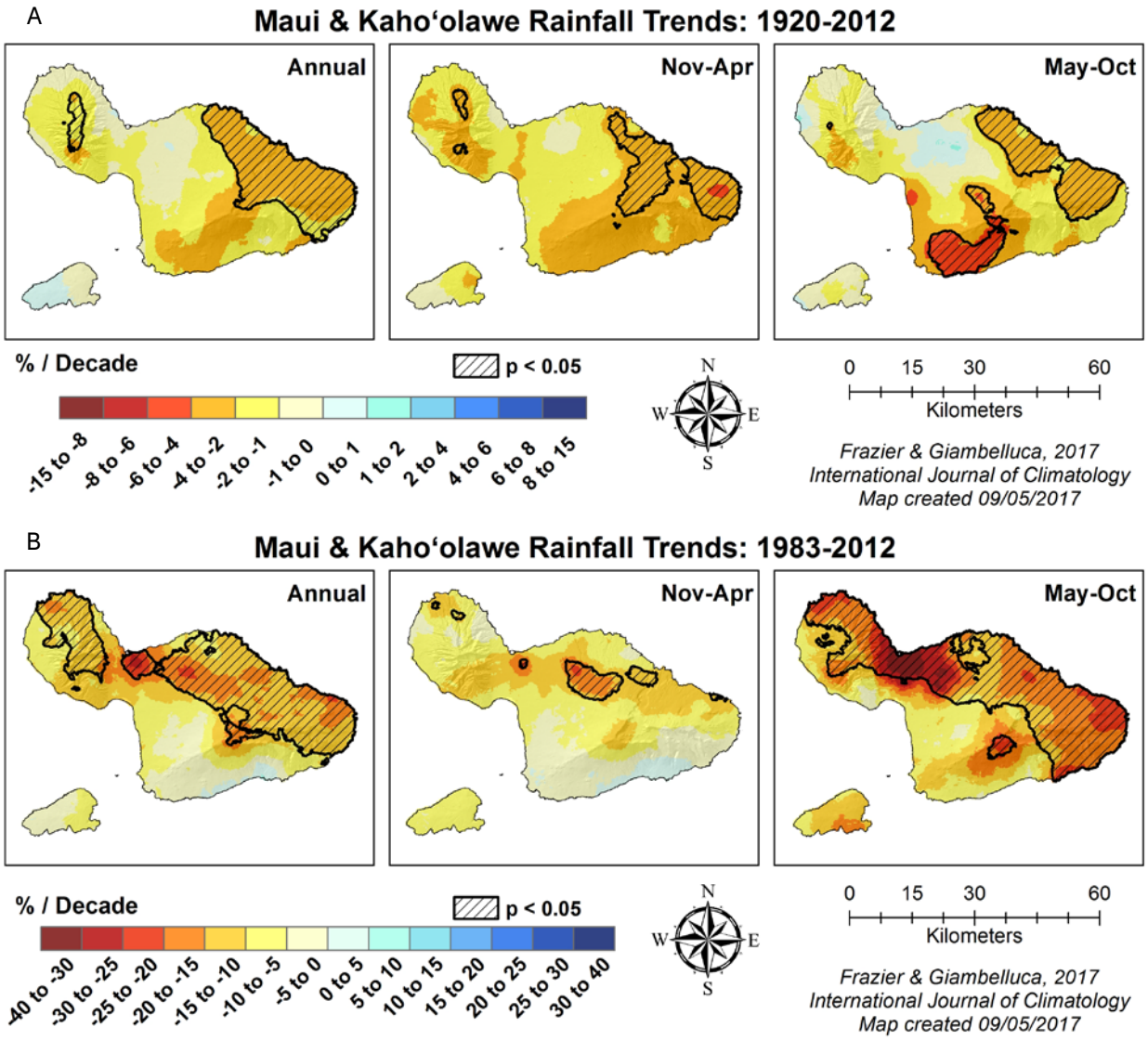
Ground water-surface water interactions influence the extent of gaining and losing stream reaches. A gaining reach is where the streambed intersects the underlying water table and ground water contributes to streamflow as seepage or springs. A losing reach is where the streambed is above the water table and water infiltrates into the streambed and recharges the aquifer, sometimes leaving the stream dry. A stream can also become dry from prolonged periods of little or no rainfall as the water table drops below the streambed. In this case, adequate rainfall is necessary to restore the interaction between surface and ground water, and to return base flow in the stream.

In West Maui, streams generally have losing reaches in the lower elevations but have considerable groundwater gains from springs and development tunnels in the upper elevations. A common misconception is that flow restoration from diversion ditches is immediately followed by continuous flow downstream from the point of release all the way to the coast (analogous to turning on the faucet). For a stream that is losing, restored flow infiltrates underground once it reaches the losing section, and flow is often absent downstream of the losing reach. In some cases, flow will become continuous only after enough water has infiltrated the streambed and raised the water table, allowing base flow to be maintained by equilibrium with sub-surface flow. In other cases, the restored stream will remain dry at low-flows where the water table drops below the elevation of the stream bed.

Long-term (1920-2012) and recent (1983-2012) trends in rainfall indicate significant declines in rainfall across areas of West Maui, particularly during the dry season (Fraizer and Giambelluca 2017). Declines in rainfall are coupled with a long-term decline in surface water availability and groundwater recharge (Figure 3). Future projections in rainfall suggest a continued decline in streamflow. The estimated streamflow that supports nearly 100% habitat restoration is assumed to be the Q_{70} flow, the magnitude of flow that occurs at least 70 percent of the time, as determined by previous fieldwork on Maui (Oki et al. 2010).

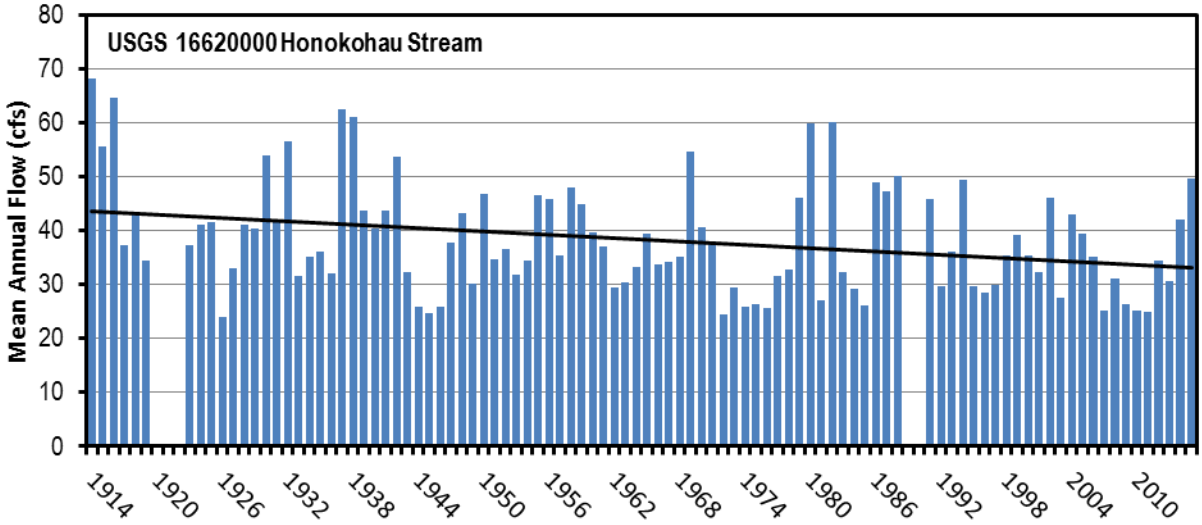
[2] baseflow is the groundwater contribution to surface flow

Figure 2. Annual, wet season (Nov-Apr) and dry season (May-Oct) rainfall trends for the 1920-2012 (A) and 1983-2012 (B) periods, Maui. Hashed line areas represent significant trend over the period.
(with permission from Frazier and Giambelluca, 2017)



The next step to developing an IFS 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 taro 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 priority is always given to the four public trust purposes of water: (1) Water in its natural state; (2) Water used for traditional and customary practices; (3) water for domestic uses; (4) water reserved for the Department of Hawaiian Home Lands. If there is sufficient water to meet the instream uses, then off stream uses can be considered. The process is to be based upon best available information when weighing the present or potential, instream and noninstream uses.

Figure 3. Mean annual flow (cubic feet per second, cfs) at USGS station 16620000 on Honokohau Stream, West Maui. Line represents linear regression trend over the period of record.



Hydrologic Considerations: The hydrologic characteristics of a stream are critical to determining the interim IFS recommendation. These characteristics indicate the effects of geology and soils on the flow of water in the stream. The Kahoma hydrologic unit has two streams (Kahoma and Kanahā) which merge at about the 300 ft elevation to form the main Kahoma Stream. Low-flow duration discharge characteristics for Kahoma and Kanahā streams above the main active diversions are provided in Table 5. While median flows (Q_{50}) are greater in Kahoma Stream compared to Kanahā Stream, the lowest flows (Q_{90}) are greater in Kanahā Stream, reflecting differing groundwater contributions to base flow.

Table 5. Estimated natural median (Q_{50}) and low flow (Q_{60} to Q_{90}) values for two streams in the Kahoma hydrologic unit on West Maui above the main diversion (from Cheng 2014). [cfs = cubic feet per second; mgd = million gallons per day]

Stream	Estimated natural-flow Q_{50}	Estimated natural-flow Q_{60}	Estimated natural-flow Q_{70}	Estimated natural-flow Q_{80}	Estimated natural-flow Q_{90}
Kahoma	5.8 cfs (3.75 mgd)	5.6 cfs (3.62 mgd)	5.4 cfs (2.59 mgd)	4.9 cfs (3.49 mgd)	2.9 cfs (1.87 mgd)
Kanahā	4.9 cfs (3.17 mgd)	4.7 cfs (3.04 mgd)	4.5 cfs (2.91 mgd)	4.3 cfs (2.78 mgd)	4.1 cfs (2.65 mgd)

Kahoma and Kanahā streams are gaining in the uppermost reaches in the watershed, but in the reach immediately below the main diversions on each stream, from about 1,850 ft in elevation in Kahoma and 1,050 ft in Kanahā, to the ocean, the streams have losing reaches. Using seepage runs, USGS estimated seepage loss below diversion 951 on Kahoma Stream to be between 0.62 and 1.18 cfs per mile (0.40 and 0.76 mgd per mile). Similarly, there was an estimated 0.60 cfs per mile (0.39 mgd per mile) seepage loss below diversion 954 on Kanahā Stream. There is approximately 3.40 miles between diversion 951 on Kahoma Stream and the confluence with Kanahā Stream. There is approximately 1.85 miles between diversion 954 on Kanahā Stream and the confluence with Kahoma Stream. Given the estimated seepage loss, approximately 0.72 mgd is lost in Kanahā Stream between the diversion and the confluence with Kahoma Stream. The auwai that feeds the lo‘i complex in Kahoma Valley is approximately 2.25 miles below diversion 951. Given an estimated seepage loss of 0.58 mgd per mile, approximately 1.31 mgd

is lost in Kahoma Stream between the diversion and the loʻi complex. USGS estimated that Kahoma Stream would naturally flow to the confluence with Kanahā Stream at least 85-95% of the time (and recent evidence suggests 100% of the time). Kanahā Stream was estimated to naturally flow to the confluence with Kahoma Stream at least 95% of the time (Cheng 2014). In losing reaches, streamflow recharges the groundwater.

Finally, another factor in the selection of interim IFS sites, though not necessarily hydrologic in nature, is the accessibility of each proposed site for monitoring and regulation by Commission staff. For this hydrologic unit, the major diversion on Kahoma Stream is situated at a high elevation (1,850 ft), limiting accessibility, and monitoring stations may need to be located at a lower elevation. This is less so with Kanahā Stream (1,050 ft).

Availability of Alternative Sources: The availability of alternative water sources to meet the needs of off stream uses is considered. The Kahoma hydrologic unit is part of the Lahaina Aquifer System and is bisected by two aquifer sectors: Launiupoko and Honokōwai. The sustainable yields, current 12-month moving average, and 10-year average for these aquifer sectors are provided in Table 7. The Lahaina Water Treatment Facility (WTF) is part of the Lahaina-Nāpili County Water System, which includes the Māhinahina WTF (receives water from Honokōhau Stream via Honokōhau Ditch), and twelve production wells (Table 8). The two largest groundwater users from the Lahaina Aquifer System is Maui DWS (mostly for domestic use) and Hawaiʻi Water Service (mostly for resort use).

Table 7. Current sustainable yields for aquifer sectors in the Lahaina Aquifer System in West Maui, current (2017) 12-month moving average (MAV) pumping, and 10-year average pumping (million gallons per day, mgd).

Sector	Sustainable Yield (mgd)	12-month MAV (mgd)	10-year average (mgd)
Ukumehame	2.0	0.043	0.030
Olowalu	2.0	0.104	0.064
Launiupoko	7.0	0.864	0.679
Honokōwai	6.0	3.568	3.288
Honolua	8.0	2.561	2.448
Honokōhau	9.0	0.000	0.000

Instream Use Considerations: The maintenance of instream flows is important for the protection of traditional and customary Hawaiian rights, as they relate to the maintenance of stream (e.g., hīhīwai, ʻōpae, ʻoʻopu) and riparian (vegetation) resources for gathering, recreation within streams, and the cultivation of taro. While the traditional Hawaiian ahupuaʻa concept is based on the premise of mauka-to-makai flow, it is difficult to fully represent in words the depth of the cultural aspects of streamflow, including traditions handed down through the generations regarding gathering, ceremonial and religious rites, and the ties to water that are pronounced in Hawaiian legend. The landscape, economy, and people of the island of Maui have changed considerably in the last several decades, with many people affected by the use of surface water.

Table 8. Maui County DWS Lahaina-Napili water system sources, current (2017) 12-month moving average (MAV), and maximum capacity. [million gallons per day, mgd)

Source	Hydrologic Unit	12-month MAV (mgd)	Maximum Capacity (mgd)	Notes
Lahaina WTF	Kahoma	1.706	2.1	
Māhinahina WTF	Honokōwai	1.744	3.0	
Waipuka 1	Kahoma	0.000	0.324	
Waipuka 2	Kahoma	0.095	0.360	
Kanahā Well 1	Kahoma	0.059	0.360	
Kanahā Well 2	Kahoma	0.044	0.360	
DHHL Honokōwai	Honokōwai	0.000		Developed by DHHL for potable needs on DHHL homesteads
Māhinahina	Honokōwai	---	---	Well drilled in 2011 but deemed unsuccessful; not usable
Kahana	Honolua	---	---	Still in development; no pump, electricity, pipe lines or tanks
Nāpili A	Honolua	0.225	1.000	
Nāpili B	Honolua	0.575	1.008	
Nāpili C	Honolua	0.874	1.430	
Honokahua A	Honolua	0.000	0.710	
Honokahua B	Honolua	0.396	1.008	

The maintenance and restoration of stream habitat benefits from continuous streamflow. Streams in Maui are recognized as important habitats for native Hawaiian stream animals. With a few exceptions, diversions often capture almost all base flow and an unknown amount of total streamflow in each stream, decreasing flow downstream of the diversion and sometimes causing streams to go dry. The dry reaches that are often found immediately downstream from the diversions can inhibit species migration. Diversion structures themselves often impede the downstream movement of larvae of native stream species (entrainment) and the upstream movement of adults (recruitment). This prevents the upstream migration of native stream animals, restricts surviving adult animals to the disconnected deep pools, and causes post-larvae recruits to be stranded at the stream mouth.

Other instream uses that must be considered include maintenance of water quality (e.g., temperature, dissolved oxygen, turbidity), instream hydropower, the aesthetic value of water flowing in a stream, and ecosystem services (e.g., supporting riparian species of value, streambank stability, biogeochemical cycling, groundwater recharge).

There are approximately 31.8 acres (0.0497 square miles) of parcels identified in the Kahoma hydrologic unit along the Kahoma and Kanahā streams that have Land Commission Awards (LCA) or Government Grants (GR). Each tax map key (TMK) parcel is identified with its respective overlapping LCA or GR.

Noninstream Use Considerations: The current active plantation diversion on Kahoma Stream (registration 951) was originally built to irrigate sugarcane for Pioneer Mill. Today, diversion 951 on Kahoma Stream is located on land owned by KS (tax map key number 4-5-022:001). Water diverted from this stream is currently used for non-potable needs of Kahoma Ranch, a subsidiary of Kahoma Land Company, LLC which supports diversified agriculture and ecotourism. Kahoma Ranch offers outdoor recreation opportunities through ATV tours, zip lining and swimming in Kahoma Reservoir. The Kahoma Ranch Reforestation Plan, requests approximately 113,000 gpd (0.113 mgd) to support the irrigation needs of fruit orchards, hardwood tree silviculture and reforestation efforts. The plan suggests that a six-acre parcel of land will be transformed each year and need irrigation for approximately 3 years. At least 21 acres will be actively irrigated for agriculture and restoration along with other farming needs (e.g., 240 fruit trees and 20 cattle). In the Kahoma hydrologic unit, Kahoma Ranch holds 7.81 acres of unclassified, 190.7 acres of prime, and 251.1 acres of other agricultural lands based on the Agricultural Lands of Importance designation. Table 9 provides a summary of the major noninstream water uses and average water diverted from each stream.

Table 9. Estimated current water use for Kahoma and Kanahā streams in West Maui. [IWREDSS = Integrated Water Requirement Estimation Decision Support System; mgd = million gallons per day]

Stream	Water User	Method	Current estimated use (mgd)	Future estimated use (mgd)
Kahoma	Kahoma Ranch	IWREDDS	0.113	0.113
	Loʻi complex at 500 ft	IWREDDS	0.20	0.30
Kanahā	Hans Michel pasture irrigation/livestock/ diversified agriculture (6 acres)	IWREDDS	0.03	0.03
	Lahainaluna High School (29 acres)	estimate	0.01	0.10
	Maui DWS	gaged use	1.67	2.10

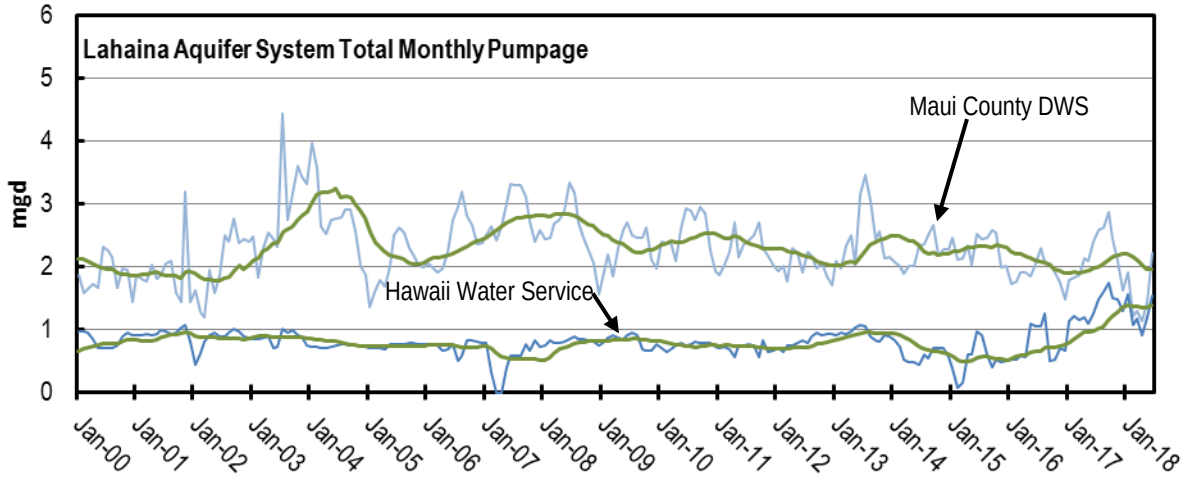
The current active diversion (registration 954) on Kahanā Stream is maintained by Maui DWS. A pipeline transports non-potable water from the diversion to a concrete distribution box above Lahainaluna High School (LHS). Two registrations by H. Michel exist for water from the pipeline for diversified agricultural usage on a total of 6.14 acres in Kanahā Valley (approximately 20,000 gallons per day, 0.02 mgd). At the distribution box, non-potable water was distributed to Maui DWS, LHS, and Pioneer Mill Company. Maui DWS operates the Lahaina Water Treatment Facility (WFT) supporting domestic homes, commercial buildings, small commercial agriculture and a few agriculturally-zoned parcels (Table 10).

The Lahaina WTF was paid for in part with funds from the State Department of Education (DOE) in exchange for 100,000 gallons of potable water per day to Lahainaluna High School (LHS) at no charge. The State Water Systems Standards (2002) requires 60 gallons of water per student per day. At approximately 1,000 students, the potable water needs of LHS are 60,000 gallons per day (0.06 mgd). The non-potable water demands for LHS have changed substantially over the years, but there is an increasing interest in re-establishing livestock and kalo as part of the agricultural program. The original stream registration for LHS was for irrigating 29 acres of land. At the 3,400 gallons per acre per day standard for diversified agriculture, full production would require 98,600 gallons per day (0.0986 mgd).

Table 10. Maui County DWS Lahaina-Napili System 2014 average consumption by category. [million gallons per day, mgd]

Category	Consumption (mgd)	Percent of Total (%)
Domestic	5.082	94.3
Industrial	0.153	2.6
Municipal	0.14	2.4
Agricultural	0.005	0.1
Irrigation	0.005	0.1
Military	0.002	<0.1
Unknown	0.002	<0.1

Figure 4. Total monthly pumpage (million gallons per day, mgd) from the Lahaina Aquifer System for Maui County Department of Water Supply (public) and Hawaii Water Service (private), West Maui.



Assessment Summary: Kahoma Stream

Hydrology. Natural low-flow duration discharge characteristics were determined for Kahoma Stream by Cheng (2014) using a partial-record gaging station at the1,850 feet elevation above diversion 951 and an index station on Honokōhau Stream (USGS 16620000). The estimated median flow is 3.75 mgd and 90th percentile exceedance flow is 1.87 mgd. Following discussions with the landowner Kamehameha Schools and operator (Kahoma Ranch), water was voluntarily restored to the stream in 2011. Based on the available information and repeated field investigations, the stream reach below the main diversion is continually wetted all the way to the confluence with Kanahā Stream and flows to the ocean 100% of the time. The stream loses approximately 1.31 mgd from the diversion to the loʻi complex at 500 feet in elevation. Below the confluence with Kanahā Stream, the stream enters a debris basin, where the stream is then channelized to the ocean. The flow needed for continuous mauka to makai streamflow to the confluence with Kanahā Stream is 1.3 mgd.

Maintenance of Fish and Wildlife Habitat. Initial surveys in 2017 found an abundance of ʻoʻopu nakea (*Awaous stamineous*), most of which were in the 1- to 3-inch size class indicating a

healthy reproductive population. Follow-up site visits have identified all five species of native stream fish, although formal surveys have not been conducted.

Outdoor Recreational Activities. Kahoma has excellent outdoor recreational usage. Ecotourism on Kahoma Ranch is popular among tourists, providing ATV tours, zip-line adventures, scenic views, and swimming. Recent restoration of flow to Kahoma Stream has benefited the community by providing a source of freshwater for swimming and recreation. The Hawaii Stream Assessment classified the recreational resources of Kahoma regionally "outstanding" with both hiking and scenic views providing a "substantial" rating.

Maintenance of Ecosystems. The riparian resources of Kahoma were not classified as "outstanding" by the Hawaii Stream Assessment and Kahoma did not have "substantial" riparian resources. Much of the riparian habitat is dominated by non-native trees and shrubs which have a negative impact on the ecosystem. Streamflow returning to the ocean supports a diversity of nearshore and intertidal species, improving the fisheries and muliwai. Over 50 percent of the hydrologic unit is composed of alien vegetation largely due to the clearing of lands for agriculture, urbanization, and the presence of non-native ungulates. About 30 percent of the hydrologic unit is in the West Maui Natural Area Reserve - Honokōwai Section. Stream restoration will provide substantial benefits to the near-shore environment while also helping to recharge the aquifer.

Aesthetic. Now that Kahoma Stream supports continual mauka to makai flow, there is greater aesthetic value, although there is limited public access to view the stream.

Maintenance of Water Quality. Kahoma Stream is classified by the Department of Health 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 Hawaii, Clean Water Act §303(d), although there was insufficient data to support any conclusions. Sufficient water is needed to keep stream temperatures low enough to support loʻi kalo cultivation.

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

Protection of Traditional and Customary Hawaiian Rights. Before restoration in 2011, insufficient flow affected taro cultivation and traditional gathering in Kahoma Valley. There is currently one auwai from an undocumented diversion supplying sufficient water for three loʻi, but as many as 3 additional loʻi have been cleared and are ready to be planted. Loʻi size is approximately 1.0 acres. Using a consumptive demand of 13,540 gallons per acre per day (gpad) and a flow-through demand of 200,000 gpad, the instream loʻi kalo water demand is 213,540 gallons per day (gpd) or 0.213 mgd. Additional undocumented diversions may exist downstream based on public testimony. The return of native freshwater fish following mauka to makai restoration now supports traditional gathering of these species.

Noninstream Uses. Approximately 0.113 mgd of non-potable water from Kahoma Stream is anticipated to be used for diversified agriculture. This water supports reforestation, silviculture, fruit orchards, and cattle.

Table 10. TMK Parcels, parcel owners, and associated Land Commission Awards (LCA) or Government Grants (Gr) along Kahoma Stream.

TMK	Owner	Size (acers)	LCA/Gr
2450160090000	KAHOMA LAND LLC	3.48	LCA 6541, LCA 8520:2.2, LCA 8520:3, LCA 8520:3, LCA 7625, LCA 6412:1, LCA 6412:2, LCA 7713:26, LCA 355:3, LCA 6620:1
2450170070000	GUTH, JOSHUA APALAHAMA	1.562	LCA 6413, LCA 8559 B:26.2, LCA 7724:2
2450180010000	KAHOMA LAND LLC	3.42	Gr 962:1, LCA 5483:5, LCA 474:2, CLA 470:4, LCA 9950:1, LCA 9950:2, LCA 8559 B:26.10, LCA 10431:1, LCA 5912:4
2450180050000	KAHOMA LAND LLC	6.54	LCA 7713:25, LCA 7713:26, LCA 9780 B:1
2450180080000	KAHOMA LAND LLC	1.44	LCA 6061:6, LCA 9795:3, LCA 9795:4, LCA 5483:5, LCA 486:3, LCA 470:3, LCA 470:4, LCA 9950:1, LCA 9793:4, LCA 10474:8.2, LCA 5912:4
2450180090000	DEAN, JOSHUA I	0.47	LCA 6061:5, LCA 466:2, LCA 8515:3.2, LCA 8559 B:26.8, LCA 8559 B:26.9
2450180110000	KAHOMA LAND LLC	4.214	LCA 6061:5, LCA 7713:26, LCA 9812 D, LCA 477 F:1, LCA 466:1, LCA 466:2, LCA 8515:3.2, LCA 8559 B:26.7, LCA 8559: B:26.8, LCA 8559 B:26.9, LCA 6621, LCA 6052.3
2450180130000	KAHOMA LAND LLC	0.46	LCA 486:3
2450190020000	KAHOMA LAND LLC	0.38	LCA 7713:26, LCA 5107:2, LCA 6403:1
2450190030000	BISHOP BP TRUST ESTATE	0.3	LCA 488, LCA 7713:26, LCA 5107:2, LCA 1001:3
2450190060000	KAHOMA LAND LLC	1.21	LCA 488, LCA 2924:3, LCA 7713:26, LCA 5107:2, LCA 1001:3, LCA 6484:1, LCA 9780 B:2, LCA 2762:1, LCA 6403:1
2450190100000	KAHOMA LAND LLC	0.65	LCA 6410:2, LCA 7713:26, LCA 6484:1
2450190110000	BISHOP BP TRUST ESTATE	0.12	LCA 7713:26
2450190130000	BISHOP BP TRUST ESTATE	0.78	LCA 7713:26, LCA 2538:3
2450190140000	KAHOMA LAND LLC	0.86	LCA 7713:26, LCA 1001:2, LCA 2538:3, LCA 2538:4
2450190150000	KAHOMA LAND LLC	1.59	LCA 1001:, LCA 7582:3, LCA 10431:2
2450190160000	KAHOMA LAND LLC	0.53	LCA 7713:26, LCA 7716:11.2
2450190170000	BISHOP BP TRUST ESTATE	0.39	LCA 7713:26, LCA 7716:11.2
2450190170000	BISHOP BP TRUST ESTATE	0.58	LCA 7713:26, LCA 7716:11.2
2450190180000	KAHOMA LAND LLC	1.23	LCA 488, LCA 7713:26, LCA 1001:3
2450200010000	BISHOP BP TRUST ESTATE	2.5	LCA 7713:26,
2450200020000	KAHOMA LAND LLC	0.3	LCA 7713:26, 6484:2
2450200030000	KAHOMA LAND LLC	1.03	LCA 7713:26, LCA 2871:2
2450200040000	BISHOP BP TRUST ESTATE	0.16	LCA 7713:26, LCA 4804:3
2450200050000	KAHOMA LAND LLC	0.37	LCA 7713:26, LCA 4804:3
2450200060000	KAHOMA LAND LLC	1.06	LCA 7713:26, LCA 2871:1, LCA 5107:2

Assessment Summary: Kanahā Stream

Hydrology. Natural low-flow duration discharge characteristics were determined for Kanahā Stream by Cheng (2014) using a partial-record gaging station at the1,050 feet elevation above diversion 954 and an index station on Hālawa Stream (USGS 16400000). The estimated median flow is 3.75 mgd and 90th percentile exceedance flow is 1.87 mgd. The flow needed for continuous streamflow past diversion 954 to the confluence with Kahoma Stream is 0.72 mgd.

Maintenance of Fish and Wildlife Habitat. There is currently no continuous flow past diversion 954. Native stream biota (*Awauous stamineou,* ʻoʻopu nakea) live above diversion 954 and restoration of mauka to makai flow would benefit connectivity and recruitment to high quality upstream habitat.

Outdoor Recreational Activities. The Hawaii Stream Assessment classified the recreational resources of Kanahā as "substantial". Recreational opportunities included hiking, fishing, hunting, swimming, and scenic views. About 43.3 percent of the hydrologic unit is conservation land, with a small portion of this in the West Maui Forest Reserve and another portion in the West Maui Natural Area Reserve (Panaʻewa Section).

Maintenance of Ecosystems. The riparian resources of Kahoma were not classified as "outstanding" by the Hawaii Stream Assessment and Kahoma did not have "substantial" riparian resources. Much of the riparian habitat is dominated by non-native trees and shrubs which have a negative impact on the ecosystem. Streamflow returning to the ocean supports a diversity of nearshore and intertidal species, improving the fisheries and muliwai. Over 50 percent of the hydrologic unit is composed of alien vegetation largely due to the clearing of lands for agriculture, urbanization, and the presence of non-native ungulates.

Aesthetic. Kanahā Stream does not currently support substantial aesthetic value due to the lack of streamflow. Flow restoration is expected to increase the aesthetic value of the stream.

Maintenance of Water Quality. Kanahā Stream is classified by the Department of Health 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 Hawaii, Clean Water Act §303(d), although there was insufficient data to support any conclusions. Sufficient water is needed to keep stream temperatures low enough to support loʻi kalo cultivation.

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

Protection of Traditional and Customary Hawaiian Rights. Currently, only higher flow events produce streamflow past diversion 954 and insufficient flow is affecting the cultivation of loʻi kalo in Kanahā Valley. With continuous mauka to makai streamflow, native biota that are gathered traditionally will return. Based on TMK parcels, as much as 16.48 acres exist in the valley for agriculture, although in practice, only about 3.34 acres are potentially available for loʻi cultivation below diversion 954 (Table 11). Assuming a consumptive demand of 13,540 gpad and a flow through standard of 200,000 gpad applied to 3.34 acres, the total consumptive

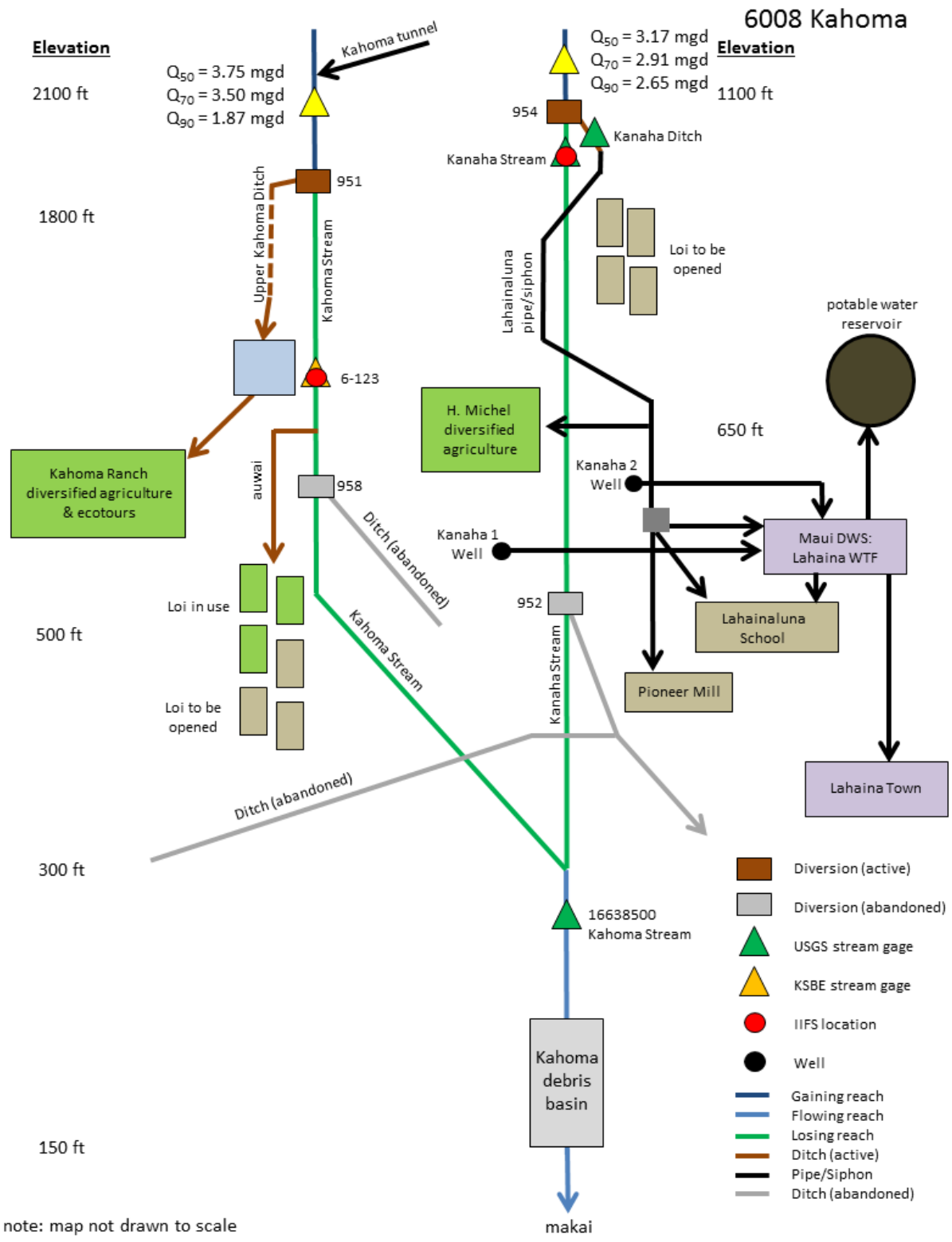
demand for loʻi kalo in this region is 45,224 gallons with a flow through demand of 670,000 gallons (0.67 mgd).

Noninstream Uses. Kanahā Stream is diverted at the 1,050 ft elevation by Maui Department of Water Supply using a large diversion structure. Diverted water is piped from the intake to an elevation of 790 feet where the Maui DWS distribution box distributes water to Maui DWS Lahaina WTF, Lahainaluna High School, and to a pipeline that fed Pioneer Mill's industrial mill. Before the distribution box, water is conveyed to H. Michel via a 1.25 inch and a 2 inch pipeline connection. The estimated water demand for pasture irrigation is 6,790 gpad equating to a total existing use of approximately 30,000 gallons per day (0.03 mgd). The Maui DWS Lahaina WTF produced an average of 1.65 mgd (standard deviation 0.22 mgd) from 2009 to 2018. This water is primarily (~95%) used for domestic water supply.

Table 11. TMK parcels, their owner, size, and associated Land Commission Awards (LCA) or Government Grants (Gr) along the Kanahā Stream.

TMK	Owner	Size (acers)	LCA/Gr/RP
2460170070000	KELIIKULE, JOSEPH KELIIKULE, RACHEL MICHEL, HANS F/EMILY ANN TRUST NAVOR RACHAEL F K ETAL	0.19	LCA 11216:15, LCA 3422 B:1, Gr 723
2460170010000	KEAHI, PAUL KEKAI MOSES H EST LAA, EMMA DEC'D MICHEL, HANS F/EMILY ANN TRUST WILLIAM, KEAHI	1.74	LCA 7713:25, Gr 723, LCA 6711:1, LCA 6391:2 Gr 8218, LCA 3422 B:1
2460170140000	MICHEL, HANS F/EMILY ANN TRUST	0.98	LCA 7713:25, 11216:15, LCA 6391:2
2460170020000	CHUN, REGINA MELE KAHALEPUNA KAHALEPUNA, RODNEY HANANI RALAR, NOHEALANI HOLUAMOKU	0.43	LCA 11216:15, LCA 486 C:3, LCA 10968:2
2460170040000	MICHEL, HANS F/EMILY ANN TRUST	1.33	LCA 11216:15, LCA 58:2.2, LCA 486 C:3, LCA 2777, LCA 2320:3
2460170050000	MICHEL, HANS F/EMILY ANN TRUST	0.85	LCA 11216:15, LCA 58:2.2
2460170060000	MICHEL, HANS F/EMILY ANN TRUST	1.20	LCA 3424 B:3, LCA 11216:15, LCA 7587:2.3, LCA 4320:2
2460170080000	MICHEL, HANS F/EMILY ANN TRUST	0.67	LCA 3424 B:3, LCA 11216:15
2460170090000	MICHEL, HANS F/EMILY ANN TRUST	1.52	LCA 11216:15.3, LCA 11216:15
2460170100000	MICHEL, HANS F/EMILY ANN TRUST	1.05	LCA 962:3, LCA 6787:2, LCA 11216:15
2460170110000	ADAMS, RENEE K TRUST	2.13	LCA 11216:15.2, LCA 11216:15
2460170120000	MICHEL, HANS F/EMILY ANN TRUST	4.39	LCA 3702:2.1, LCA 10667:3, LCA 8452:4.3, LCA 11216:15, LCA 11216:15.2

Figure 5: Simplified schematic diagram for the hydrologic unit of Kahoma.



RECOMMENDATION:

KAHOMA STREAM RECOMMENDATIONS:

The Kahoma Stream diversion (951) at 1,850 feet in elevation originally supported sugarcane cultivation by Pioneer Mill Company but is now used by Kahoma Ranch. This diversion is located on land owned by KS. Diversion 958 at an elevation of 650 feet on Kahoma Stream was formally abandoned in place by KS in 2008. In 2011, a majority of stream water from Kahoma Stream was restored back to the stream to support instream uses downstream of the diversion, including supporting the cultivation of taro lo‘i and protecting aquatic ecosystems. The stream supports many native aquatic species of substantial ecological and cultural importance as well as recreational and aesthetic value. After a number of years of continuous streamflow, the community restored lo‘i at an elevation of 500 ft in 2016, kalo was planted in 2017 and first harvested in 2018. Above diversion 951, USGS estimated that the median natural streamflow (Q_{50}) is 3.75 mgd and that the natural 90th percentile flow (Q_{90}) is 1.87 mgd. Streamflow is estimated to naturally flow mauka to makai 100-percent of the time. There is approximately 1.3 mgd of seepage loss between the diversion and the confluence with Kanahā Stream. In order to balance instream and noninstream uses for Kahoma Stream, restored flow should result in suitable instream habitat, enough water to support lo‘i development at a sufficiently cold temperature, and continuous mauka to makai flow. It is assumed that the aesthetic and recreational values will be maintained if sufficient instream habitat is restored.

Staff recommends that one measurable interim IFS be established for Kahoma Stream:

- Proposed Interim IFS: The interim IFS at an elevation of 1,850 feet, below diversion 951, shall be 3.49 mgd, equivalent to the Q_{70} exceedance flow. This will guarantee at least 2.08 mgd reaches the 650 feet elevation on Kahoma Stream, above the lo‘i complex, except during low-flow periods, in which the flow in the stream will be the natural flow and no water will be diverted off stream. Due to the uncertainty of existing hydrogeologic conditions of Kahoma Stream, should an estimated flow of 3.49 mgd not be sufficient to meet the instream habitat needs, the interim IFS may be revised by a future Commission action. This interim IFS allows Kahoma Ranch to meet their 0.113 mgd non-potable water demand at least 65-percent of the time with surface water.

In addition to the General Recommendations listed below, staff recommends approval of the following adaptive management strategies for the hydrologic unit of Kahoma:

- Complete after-the-fact permitting for undocumented diversions for lo‘i.
- Due to the lack of data concerning streamflow gain and loss below Kahoma diversion 951 and the confluence with Kanahā Stream, additional seepage run streamflow measurements are needed. Follow up surveys of stream habitat structure (depth, width, velocity) are needed to support any revised future Commission action.

KANAHĀ STREAM RECOMMENDATIONS:

Originally, Kanahā Stream was diverted for multiple uses at diversion 954, including supporting livestock agriculture, drinking water supply, Lahainaluna School’s agricultural program, and Pioneer Mill Company’s industrial operations. Currently, the diversion is managed by Maui DWS to support the municipal water system. H. Michel registered an off-stream use of water from diversion 954 for diversified agriculture on 6.1 acres of land requiring approximately

30,000 gallons per day (0.03 mgd). Diversion 952 on Kanahā Stream at an elevation of 580 feet, is no longer functional and considered abandoned in place. Above diversion 954 on Kanahā Stream, at an elevation of 1,050 feet, USGS estimated that the median natural streamflow (Q_{50}) is 3.17 mgd and that the natural 90th percentile flow (Q_{90}) is 2.65 mgd. Kanahā Stream is estimated to naturally flow mauka to makai at least 95-percent of the time. In order to balance instream and noninstream uses for Kanahā Stream, restored flow should result in continuous mauka to makai flow with enough water to support loʻi kalo cultivation. With restoration, the stream could support native aquatic species of substantial ecological and cultural importance as well as recreational and aesthetic value.

Staff recommends that one measurable interim IFS be established for Kanahā Stream:

- Proposed Interim IFS: The interim IFS below diversion 954 on Kanahā Stream, shall be a flow of 0.8 mgd. This represents the flow necessary for continual mauka to makai flow in addition to the projected consumptive demand of 3.34 acres of loʻi kalo, with 0.67 mgd of flow through also contributing to downstream flow. This interim IFS is expected to continue to meet the noninstream water needs of H. Michel (0.03 mgd), Lahainaluna High School (0.10 mgd), and Maui DWS (1.65 mgd) approximately 90 percent of the time; except when streamflow drops below the estimated 90th percentile flow of 2.65 mgd. Following the immediate release of 0.8 mgd, Maui DWS will have three years to develop an alternative groundwater source before the interim IFS will increase to 1.55 mgd in January 2022.

In addition to the General Recommendations listed below, staff recommends approval of the following adaptive management strategies for Kanahā Stream:

- Due to the lack of data concerning streamflow loss and natural streamflow below the diversion, additional monitoring of natural streamflow is recommended about the diversion.

GENERAL RECOMMENDATIONS:

Staff recommends approval of the following adaptive management strategies for interim instream flow standards being considered:

IMPLEMENTATION

- Staff shall seek to enforce the provisions of the State Water Code should any unauthorized, non-registered or non-permitted diversions be discovered in the course of its fieldwork. Staff recommends that all owners of unauthorized diversion works structures contact staff to file the necessary applications to seek compliance with all permitting requirements set forth by the Code.
- Staff shall continue to coordinate with Kahoma Ranch, Kamehameha Schools, Maui Department of Water Supply, Lahainaluna High School, and kuleana water users to identify and determine appropriate actions with regard to attaining the proposed interim IFS values downstream of existing diversion structures.
- Staff shall continue to assess existing conditions and the status of all diversions, in coordination with the Division of Aquatic Resources, to determine if any modifications are possible to improve habitat conditions for stream biota.

- Any party diverting water from a stream shall be responsible to maintain system efficiencies, minimize offstream water losses, and minimize impacts to the natural stream resource.

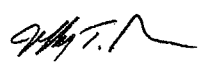
MONITORING

- Staff shall monitor streamflow by installing and maintaining stream or ditch gaging stations or coordinating with USGS if needed at appropriate stream or ditch locations.
- Periodic biological surveys shall be conducted, subject to available funding, to monitor the response of stream biota to post-interim IFS implementation.
- Anyone claiming to be negatively impacted as a result of the adopted interim IFS shall monitor and document, in cooperation with staff, the impact upon instream or noninstream uses, including economic impacts. Data shall be provided to staff to substantiate any claims.
- Likewise, anyone claiming that negative impacts are a direct result of actions (i.e., diverting too much water, violating the interim IFS) caused by another party, shall monitor and document the impact upon instream or noninstream uses, including economic impacts. Data shall be provided to staff to substantiate any claims.
- All claimants shall cooperate with staff in conducting appropriate investigations and studies, particularly with regard to granting access to stream channels and private property related to such investigations, subject to the provisions of the State Water Code, Chapter 174C, HRS.

EVALUATION

- Within three 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.
- Staff shall assess the implementation of these strategies on an as-needed basis, as may be necessary upon consultation with the affected parties.
- Should there be changes to the operational status of Kahoma Ranch, KS, Lahainaluna High School, H. Michel, or Maui DWS and/or any substantial changes in water needs as determined by the Commission or Commission staff, staff shall reassess the interim IFS for streams affected by the irrigation system.

Respectfully submitted,



JEFFREY T. PEARSON, P.E.
Deputy Director

Note: Exhibits 1 and 2 are available from the Commission website at
http://dlnr.hawaii.gov/cwrm/surfacewater/ifs/kahoma_ifs/

Exhibit 1 Instream Flow Standard Assessment Report for Kahoma Hydrologic Unit 6008, PR-2018-08
Exhibit 2 Compilation of Public Review Comments, PR-2018-09

APPROVED FOR SUBMITTAL:

Suzanne Q. Case

SUZANNE CASE
Chairperson