STATE OF HAWAIʻI | KA MOKUʻĀINA ʻO HAWAIʻI
DEPARTMENT OF LAND AND NATURAL RESOURCES | KA ʻOIHANA KUMUWAIWAI ʻĀINA
COMMISSION ON WATER RESOURCE MANAGEMENT | KE KAHUWAI PONO
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STAFF SUBMITTAL

for the meeting of the
COMMISSION ON WATER RESOURCE MANAGEMENT

July 26, 2023
Honolulu, Hawaiʻi

Request to Authorize the Chairperson to
Enter into a Joint Funding Agreement with U.S. Geological Survey
To Conduct A Seepage Analysis on Waikoloa Stream, Hawaiʻi; and

Declare that Project is Exempt from Environmental Assessment Requirements under
Hawaii Revised Statutes Chapter 343, and Hawaii Administrative Rules Chapter 11-200.1

SUMMARY OF REQUEST

Staff requests that the Commission on Water Resource Management (Commission) authorize the Chairperson to enter into a Joint Funding Agreement (JFA) with the U.S. Geological Survey (USGS) to conduct a seepage analysis at one (1) high-priority stream on Hawaiʻi Island.

BACKGROUND

Under the State Water Code (Code), Chapter 174C, Hawaiʻi Revised Statutes (HRS), the Commission has the responsibility of establishing Instream Flow Standards (IFS) on a stream-by-stream basis whenever necessary to protect the public interest in the waters of the State. Early in its history, the Commission recognized the complexity of establishing IFS for the State's estimated 376 perennial streams and instead set interim IFS at "status quo" levels. These interim IFS were defined as the amount of water flowing in each stream (with consideration for the natural variability in stream flow and conditions) at the time the administrative rules governing them were adopted in 1988 and 1989.

The Hawaiʻi Supreme Court, upon reviewing the Waiāhole Ditch Contested Case Decision and Order, held that such "status quo" interim IFS were not adequate to protect streams and required the Commission to take immediate steps to assess stream flow characteristics and develop quantitative interim IFS for affected Windward Oʻahu streams, as well as other streams statewide. The Hawaiʻi Supreme Court also 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."

The Commission is tasked with establishing instream flow standards by analyzing "the importance of the present or potential instream values with the importance of the present or potential uses of water for non-instream purposes, including the economic impact of restricting such uses." While the Code outlines the instream and offstream uses to be analyzed, it assumes that hydrological conditions will also be analyzed as part of setting IFS. The complexity lies in the variability of local surface water conditions that are dependent upon a wide range of factors, including, but not limited to rainfall, geology, topology and human impacts, as well as the availability of such information.

In striving to fulfill the mandates of the Code and the Hawai'i Supreme Court, the Commission staff has proceeded to focus on priority areas in developing measurable instream flow standards. One such priority area is the Wai'ula'ula Watershed that includes the perennial streams Kohākōhau and Waikoloa flowing from Kohala Mountain.

Commission staff hope to better understand the seepage gains and losses in Waikoloa Stream that are expected to affect surface water availability and instream uses of water. Instream flow standards are established to meet specific management objectives but quantifying the surface water-groundwater interactions across stream networks is needed to ensure recommendations are justifiable. Seepage analyses are also important for quantifying the effects of surface-water diversions on groundwater recharge and for evaluating whether groundwater withdrawals impact base flow.

A seepage analysis consists of streamflow measurements collected on the same day at specific sites along a stream under stable-flow conditions to determine the magnitude of streamflow gains and losses. Stream reaches can either gain water (groundwater discharge into stream) or lose water (stream discharge into groundwater body), depending on the altitude of the water table relative to the streambed. Seepage analyses are useful for characterizing the spatial distribution of flow along a stream, including the identification of flowing and dry stream reaches. When coupled with low-flow discharge estimates at sites along the same stream, results of a seepage analysis can provide natural water-availability information for stream reaches and help determine whether the stream flows continuously from the mountain to the ocean (mauka to makai flow).

One seepage run was conducted on Waikoloa Stream in 2021 under moderately high flow conditions (Figure 1). Results from the initial seepage run identified reaches of substantial streamflow gains and losses near Waimea Town. During the initial seepage run, nearly 3 cubic feet per second was being diverted by Hawai'i DWS at Marine Dam (Diversion 464). Below Waimea Town, streamflow declined slightly possibly due to small amounts of seepage loss in one section and gained slightly in another, but these small differences may be due to measurement error or unaccounted for change in hydrologic conditions. Following a discussion with USGS, a second seepage run was recommended targeting select sites and lower flow

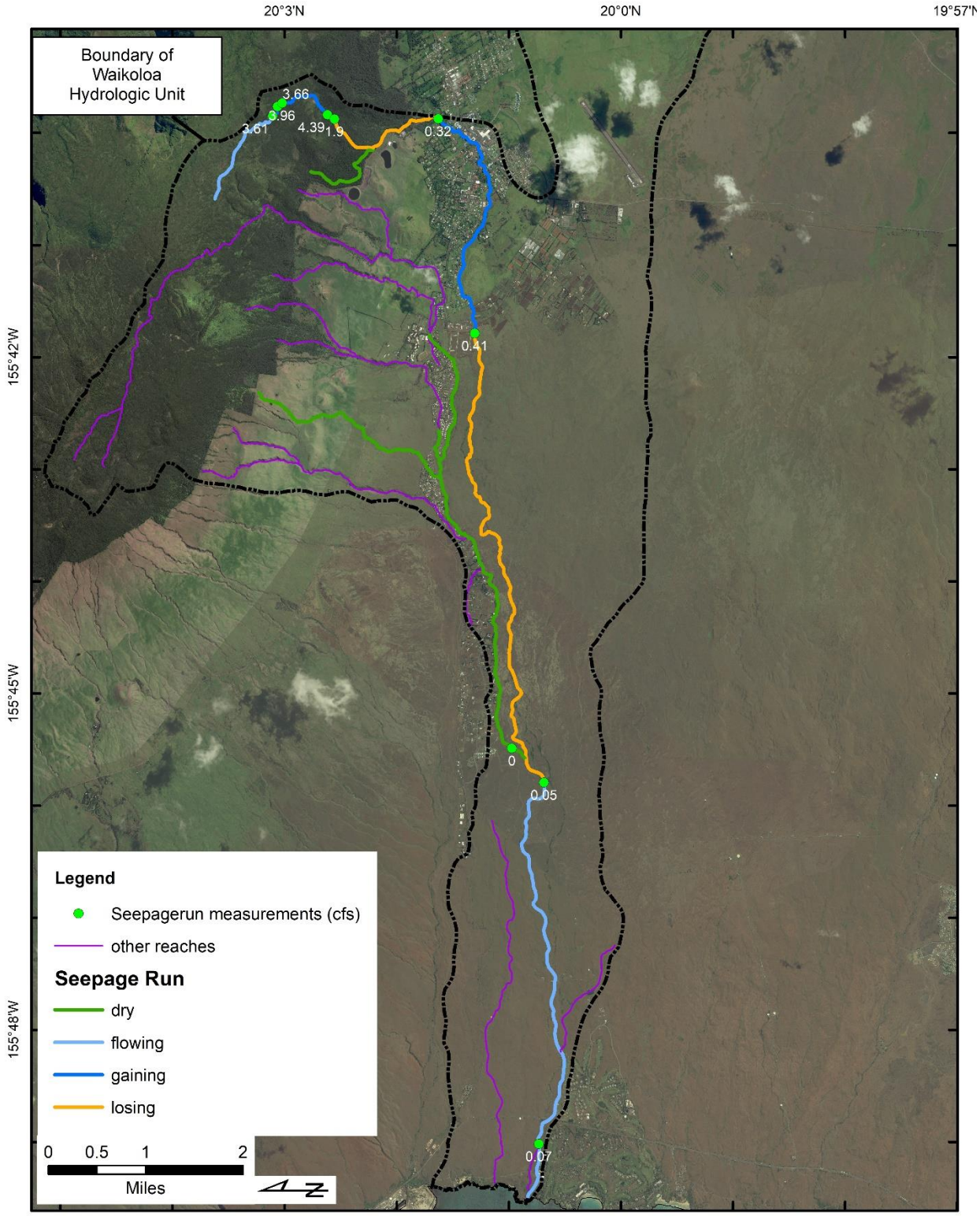
conditions (see Exhibit 1 for Study Proposal). Waikoloa Stream is a high priority stream identified in the USGS Water Resource Monitoring Priority Needs publication[1].

The USGS statewide low-flow study by Cheng (2016[2]) at existing or discontinued USGS stations also organized all the existing seepage runs conducted by USGS in Hawai‘i into one location. Following this publication, the USGS conducted numerous seepage runs to characterize groundwater-surface water interactions in streams across regions with no data or limited data in support of the ongoing low-flow study at ungagged locations. These then supported the Cheng (2021) study which identified priority streams that need seepage runs for the State of Hawai‘i. Generally, a seepage-analysis data collection was identified for streams in surface-water priority areas and streams in hydrogeologically unique areas. The latter generally have a continuous streamflow-gaging station, or a partial-record station selected for the monitoring program. If a stream satisfied these two criteria and has existing seepage-analysis data collected more than 10 years ago, additional seepage-analysis measurements that reflect more recent flow conditions are needed. Streams with established interim instream-flow standards requiring flow releases from diversion intakes are also selected for additional seepage-analysis measurements to characterize effects of flow releases on streamflow. Seepage analysis measurements made under various flow conditions can characterize a range of seepage gains and losses. Successive seepage analysis measurements can characterize seepage gain and loss patterns of the stream and could be indicative of localized changes in groundwater levels.

All priority streams selected for seepage runs should be done approximately every 10 years, or sooner if there has been a change in hydrologic conditions (e.g., establishment of interim instream flow standard, change in groundwater pumpage). A robust and comprehensive data collection program would fund 5-8 seepage runs each year across the state such that each priority stream was targeted every 10 years. Due to fiscal constraints, seepage runs are funded on an "as needed" basis to improve our understanding of the consequences of management decisions and to make revisions to management decisions. For example, in 2020, the Commission funded seepage runs in West Maui on 9 streams following the establishment of interim instream flow standards.

[1] https://pubs.er.usgs.gov/publication/sir20205115
[2] https://pubs.er.usgs.gov/publication/sir20165103

Figure 1. USGS seepage run results on Waikoloa Stream from 2021. Green dots are flow measurements in cubic feet per second.



SCOPE OF SERVICES AND FUNDING

The attached proposal seeks to complete seepage-analysis discharge measurements on one (1) high-priority stream, Waikoloa Stream on Hawai‘i island. Waikoloa Stream is currently diverted for municipal use and seepage-analysis data is limited. This effort will include documenting results of the Waikoloa Stream seepage run in a USGS Data Release.

One (1) year is required to complete the seepage analysis. The total cost of this seepage analysis is $21,300 (Commission ($11,300) and USGS ($10,000)). Every effort will be made to plan seepage-analysis discharge measurements during dry-weather, low-flow conditions. However, unforeseen weather changes during measurement days may affect the representativeness of discharge measurements or cause the mid-day abandonment of the measurements.

FUNDING

The funds for the Commission's share of the work ($11,300) are available from the Department's FY 2024 Budget, LNR 404, Water Resources Program. Funding for the seepage analyses work will come from the Commission's general fund, special fund, or a combination of both, depending upon available funding.

ENVIRONMENTAL REVIEW (CHAPTER 343)

Under Hawaii Revised Statutes (HRS) §343-5(a), an EA shall be required for actions, as summarized in part below, that propose:

(1) use of state land or county lands, or the use of state or county funds;
(2) use within any land classified as a conservation district;
(3) use within a shoreline area;
(4) use within any historic site as designated in the National Register or Hawaii Register;
(5) use within the Waikiki area of O‘ahu;
(6) any amendments to existing county general plans where the amendment would result in designations other than agriculture, conservation, or preservation;
(7) any reclassification of any land classified as a conservation district;
(8) construction of new or the expansion or modification of existing helicopter facilities within the State, that may affect: (A) any land classified as a conservation district; (B) a shoreline area; or (C) any historic site as designated in the National Register or Hawai‘i Register;
(9) any (A) wastewater treatment unit, except an individual wastewater system or a wastewater treatment unit serving fewer than fifty single-family dwellings or the equivalent; (B) Waste-to-energy facility; (C) Landfill; (D) Oil refinery; or (E) Power-generating facility.

Hawaii Revised Statutes (HRS) Chapter 343 is triggered due to the use of State funds. However, Chapter 343 does not apply because this is a data collection and research study.

Hawaii Administrative Rule §11-200.1-16(a) provides that "*each agency, through time and experience, may develop its own exemption list consistent with both the letter and intent expressed in this subchapter and in chapter 343, HRS, of: (1), Routine activities and ordinary functions within the jurisdiction or expertise of the agency that by their nature do not have the potential to individually or cumulatively adversely affect the environment more than negligibly and that the agency considers to not rise to the level of requiring chapter 343, HRS, environmental review.*"

The Commission's Comprehensive Exemption List, concurred with by the Environmental Council on January 5, 2021, provides for Exemption Type 5, "*Basic data collection, research, experimental management, and resource and infrastructure testing and evaluation activities that do not result in a serious or major disturbance to an environmental resource*;" Part 1, "*Conduct surveys or collect data on existing environmental conditions (e.g., water flow, water quality, hydrologic conditions, geologic conditions, rainfall amounts, etc.).*"

RECOMMENDATION

Staff recommends that the Commission:

1. Authorize the Chairperson to enter into a Joint Funding Agreement between the Commission on Water Resource Management and the U.S. Geological Survey to conduct seepage-analysis discharge measurements one (1) high-priority stream for a period of one (1) year until June 30, 2024. This Joint Funding Agreement in the amount of $21,300 will be shared by the Commission ($11,300) and the U.S. Geological Survey ($10,000).

2. Authorize the Chairperson to make such further amendments or modifications of the contract agreement (consistent with the terms set forth above) as may be necessary to accomplish the goals described here, provided that any amendment or modification does not require additional Commission funding.

3. Request that Hawai‘i Department of Water Supply comply with any stream diversion operational needs USGS deems necessary to conduct a successful seepage run.

4. Declare that the project is exempt from EA requirements under HRS Chapter 343 and HAR Chapter 11-200.1

The terms of this agreement may be subject to the availability of funding and the approval of the Chairperson and the Department's Deputy Attorney General. Contract execution would be done in accordance with Chapter 103D, HRS, and Chapter 3-122, Hawai‘i Administrative Rules.

Ola i ka wai,

M. KALEO MANUEL
Deputy Director

Exhibits
1. U.S. Geological Survey, Pacific Islands Water Science Center, Proposal, June 2023.

APPROVED FOR SUBMITTAL:

DAWN N. S. CHANG
Chairperson

Implementation of Water-Resource Monitoring Program: Revisiting the Waikoloa Seepage Run on Hawai‘i Island to Improve Understanding of Surface Water and Groundwater Interactions

U.S. Geological Survey, Pacific Islands Water Science Center, Honolulu, Hawai‘i
June 2023

SUMMARY

In cooperation with the CWRM, the U.S. Geological Survey (USGS) and the University of Hawai‘i Water Resources Research Center developed a Hawai‘i water-resource monitoring program––composed of rainfall, streamflow, and groundwater data collection—that meets State needs for water-resource assessment, management, and protection in Hawai‘i. The surface-water data-collection program identifies 104 streams needing seepage-run measurements. Seepage runs are identified for streams in surface-water priority areas and streams in areas where understanding of hydrogeological conditions is limited. In response to this water-resource monitoring program, a seepage run on Hawaii island in the Waikoloa Stream was completed on October 27, 2021. The seeapge run indicated that there was one section below Marine Dam but above Waimea town that lost flow to the subsurface while the next reach below the town to the measurement site near the Waimea Transfer Station gained water from the subsurface. The CWRM, responsible for establishing instream-flow standards to protect the public interest in Hawai‘i’s water resources, would like to comfirm the pattern and magnitude of the results of the October 2021 seepage run before taking action on an instream-flow standard for Waikoloa Stream.

The objective of this effort is to improve understanding of surface water and groundwater interactions, which is consistent with the implementation of the State’s water-resource monitoring program. Seepage runs are used to better understand the effects of restoration efforts, land-use change, and groundwater conditions on streamflow and are useful for characterizing the spatial distribution of streamflow gains and losses along stream reaches. Seepage runs are also useful for evaluating the effects of surface-water diversion on recharge and whether groundwater withdrawals can impact base flow. Selected seepage-run discharge measurements on Waikoloa Stream on Hawai‘i island will be re-occupied to comfirm the pattern and magnitude of the results of the October 2021 seepage run.

One year is required to complete the seepage run and document results of the seepage run in a USGS Data Release at a cost of $21,300, which will be cost-shared by the CWRM ($11,300) and the USGS ($10,000). This information is important for the development and implementation of interim instream-flow standards to protect instream uses in the study stream, and can help regulators, stakeholders, and the public make informed decisions related to surface-water use in Hawai‘i.

EXHIBIT 1

Implementation of Water-Resource Monitoring Program: Revisiting the Waikoloa Seepage Run on Hawai‘i Island to Improve Understanding of Surface Water and Groundwater Interactions

U.S. Geological Survey
Pacific Islands Water Science Center
Honolulu, Hawai‘i

June 2023

BACKGROUND

A fundamental component of water-resource management and protection is an effective monitoring program that considers the spatial and temporal scale of data-collection needs, current and future water-resource issues, data quality and accessibility, and cost effectiveness of acquiring the data. In cooperation with the Hawai‘i State Commission on Water Resource Management (CWRM), the U.S. Geological Survey (USGS) and the University of Hawai‘i Water Resources Research Center (UH-WRRC) developed a Hawai‘i water-resource monitoring program—composed of rainfall, streamflow, and groundwater data collection—that meets State needs for water-resource assessment, management, and protection in Hawai‘i (Cheng and others, 2021). Priority areas for rainfall data collection were identified by the UH-WRRC researchers and priority areas for data collection with respect to surface-water and groundwater resources were identified by CWRM, County water departments, and other stakeholders. Current and foreseeable issues related to water-resource management and climate-change impacts were used to develop a set of criteria for evaluating data-collection sites for the monitoring program and a set of goals the program should achieve. Data-collection sites in the monitoring program were divided into two data-collection networks: (1) a resource-management network to determine effects of water- and land-use changes on surface-water and groundwater resources, and (2) a climate-response network to determine effects of climate change on rainfall, surface-water, and groundwater resources in representative hydrogeologic settings. Data-collection strategies associated with the data-collection sites include a combination of continuous long-term monitoring to evaluate trends and climate-change impacts, and occasional and periodic intensive monitoring to enhance spatial understanding of hydrologic conditions and to address water-resource issues in priority areas. Development of the monitoring program fulfills the 2019 Water

Resource Protection Plan Action Plan, Goal 1, Project 1.1, Task 1.1.1 (State of Hawai‘i, 2019, p. 59–60).

PROBLEM

The CWRM has the responsibility of establishing instream-flow standards on a stream-by-stream basis whenever necessary to protect the public interest in the waters of the State (State Water Code, Hawai‘i Revised Statutes, chapter 174C, section 71). Originally, the CWRM established interim instream-flow standards at status quo levels, which were defined as the amount of water flowing in each stream, considering the natural variability of streamflow, without further amounts of water being diverted offstream through new or expanded diversions existing at the time the administrative rules were adopted in 1988 and 1989 (Hawai‘i Administrative Rules, chapter 169, section 13-169-48). These interim instream-flow standards did not have quantitative flow values and allowed diversions existing at the time of their adoption to continue operating. Additional information could be filed with the CWRM to reduce or increase diversion, through a modification of the interim instream-flow standards. Upon reviewing a CWRM decision related to interim instream-flow standards for streams in eastern O‘ahu, the Hawai‘i Supreme Court deemed “status quo” interim instream-flow standards inadequate and required quantitative interim instream-flow standards to be established (State of Hawai‘i, 2000). Within the last two decades, the CWRM has compiled best available information—hydrology, and instream and offstream uses—on streams of concern to develop quantitative interim instream-flow standards upon receipt of a petition to amend an existing interim instream-flow standard.

Currently, the CWRM is gathering best available information to develop quantitative interim instream-flow standards for Waikoloa Stream, Hawai‘i (fig. 1). The CWRM is interested in understanding and determining the effects of flow restoration, land-use change, and groundwater conditions on streamflow. Seepage analyses (seepage runs) are important for evaluating the effects of surface-water diversion on recharge and whether groundwater withdrawals can impact base flow.

The surface-water data-collection program (Cheng and others, 2021) identifies 104 streams needing seepage-run discharge measurements. Seepage runs are identified for streams in surface-water priority areas and streams in areas where understanding of hydrogeological conditions is limited. Identified streams include those that have undergone hydrologic change

since previous seepage-run discharge measurements were made and those where information is needed on the effects of diversions on streamflow. Seepage runs conducted under various flow conditions can help to develop an understanding of the range of seepage gains and losses. The CWRM identified 57 priority streams (table 1) from the 104 streams in the monitoring program for seepage-run discharge measurements. This list of priority streams includes steams where flow has been partially restored to comply with established quantitative interim instream-flow standards and streams being considered for quantitative instream-flow standard development.

OBJECTIVES AND SCOPE

One goal of the State's surface-water data-collection program is to better understand the effects of restoration efforts and groundwater conditions on streamflow. To meet this goal, seepage runs are needed on selected streams. Seepage runs are used to better understand the effects of restoration efforts, land-use change, and groundwater conditions on streamflow and are useful for characterizing the spatial distribution of streamflow gains and losses along stream reaches. Seepage runs are also useful for evaluating the effects of surface-water diversion on recharge and whether groundwater withdrawals can impact base flow. The objective of this effort is to improve understanding of surface water and groundwater interactions on Waikoloa Stream on Hawai'i Island, which is consistent with the implementation of the State's water-resource monitoring program. Selected seepage-run discharge measurements on Waikoloa Stream will be re-occupied to comfirm the pattern and magnitude of the results of the October 2021 seepage run (Pagaduam and others, 2023).

APPROACH

A seepage run consists of streamflow measurements collected on the same day at specific sites along a stream under stable-flow conditions to determine the magnitude of streamflow gains and losses. Stream reaches can either gain water (groundwater discharge into stream) or lose water (stream discharge into an underlying groundwater body), depending on the altitude of the water table relative to the streambed. When coupled with low-flow duration discharge estimates at sites along the same stream, results of a seepage run may be useful for understanding water-

availability information for stream reaches and help determine whether the stream flows continuously from the mountain to the ocean (mauka to makai flow).

Permission to access study streams will be acquired from landowners and diversion-ditch operators. Some discharge-measurement sites from previous seepage runs may not be needed for seepage runs conducted as part of this study.

Results of seepage runs conducted as part of this study will be documented in a USGS ScienceBase data release. Seepage gains and losses along a reach will be computed as the difference between the upstream and downstream discharges, excluding major tributary inflows and return flows, and diversions of water within the reach.

QUALITY ASSURANCE / QUALITY CONTROL

Discharge measurements from previous seepage runs conducted on study streams have been checked and reviewed following the Pacific Islands Water Science Center quality-assurance and quality-control (QAQC) procedures for surface-water data. To make reliable and accurate discharge measurements for this study, data-quality control standards are followed to reduce potential errors caused by factors that affect the accuracy of a discharge measurement outlined in Rantz and others (1982, p. 179–80). Discharge measurements collected as part of this study will be checked and reviewed following the Pacific Islands Water Science Center QAQC procedures for surface-water data and made available on the USGS NWIS database.

PRODUCTS

Discharge measurements collected as part of the seepage run will be made available on the USGS NWIS database. Results of the seepage run will be published in a USGS Data Release through ScienceBase. Information published in the USGS Data Release will be non-interpretive.

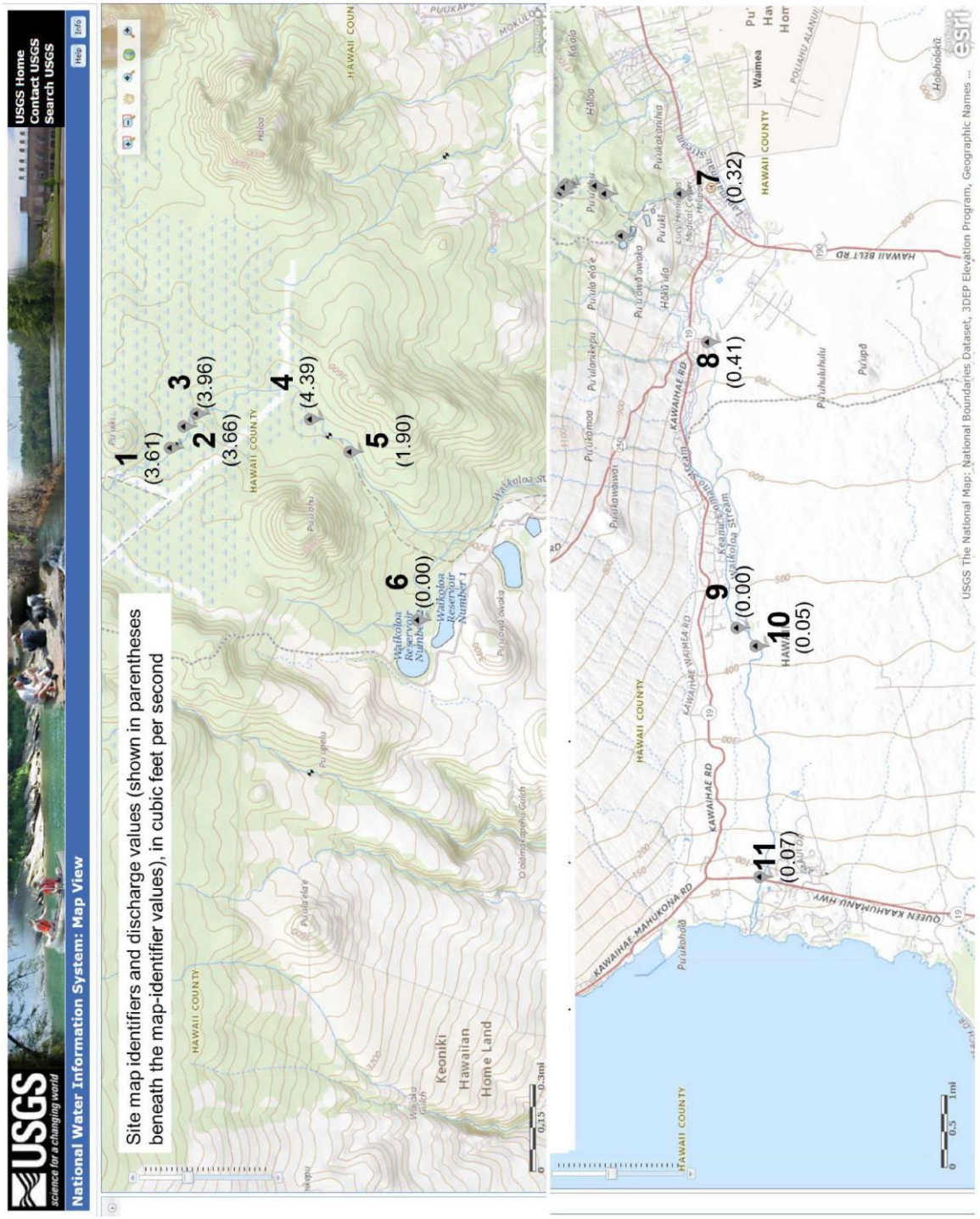


Figure 1. Map of discharge-measurement sites for the seepage run of Waikoloa Stream, Hawai'i, on October 27, 2021, from Pagaduan and others, 2023.

Table 1: Priority streams identified by the CWRM for seepage-analysis discharge measurements.

Kauaʻi
Hanalei River
Kapaʻa Stream
Waimea River
Wainiha River

Oʻahu
Kahana Stream
Kaupuni Stream
Mākaha Stream
Maunawili Stream
Waiāhole Stream
Waiheʻe Stream
Waikāne Stream

West Maui
Honokōhau Stream
Honokōwai Stream
Honolua Stream
Kahoma Stream
Kanahā Stream
Kauaʻula Stream
Olowalu Stream
Ukumehame Gulch
Waiehu Stream
Waiheʻe River
Waikapū Stream
Wailuku River

East Maui
East Wailuaiki Stream
Haʻipuaʻena Stream
Hanawī Stream
Hanehoi Stream
Honomanū Stream
Honopou Stream
Hoʻolawa Stream
Kailua Stream
Kapaula Stream
Kaupakulua Gulch
Kopiliula Stream
Makapipi Stream
Nailiilihaele Stream
Nuaʻailua Stream
ʻOʻopuola Stream
Palauhulu Stream
Piʻinaʻau Stream
Puaʻakaʻa Stream
Punalau Stream
Puohokamoa Stream
Waikamoi Stream
Wailuanui Stream
Waiohue Stream
Waiokamilo Stream
West Wailuaiki Stream

Molokaʻi
Kaunakakai Gulch
Kawela Gulch
Waikolu Stream

Hawaiʻi
Alakahi Stream
Kawainui Stream
Waiākea Stream
Waikoloa Stream
Wailoa Stream
Wailuku River

TIMELINE

The major tasks and associated period of activity for this study are summarized in table 2. It is anticipated that planning for this study will begin on July 1, 2023. This project schedule assumes USGS personnel can travel for field work in the summer of 2023; delays due to COVID-19 travel restrictions and inappropriate weather conditions may delay task schedules and project completion.

Table 2. Major tasks and associated period of activity.

	Quarter			
Task	**1**	**2**	**3**	**4**
Plan seepage analyses	X	X		
Acquire landowner permission	X	X		
Conduct seepage analyses		X	X	
Prepare USGS Data Release		X	X	
Publication				X

BUDGET

One year is required to complete the seepage run and document the results of the seepage run in a USGS Data Release at a cost of $21,300, which will be cost-shared by the CWRM ($11,300) and the USGS ($10,000). Every effort will be made to plan seepage-run discharge measurements during dry-weather, low-flow conditions. However, unforeseen weather changes during measurement days may affect the representativeness of discharge measurements or cause the mid-day abandonment of the measurements.

Labor includes salary and indirect costs for leave, facilities, and overhead assessments. Science support includes indirect costs for project management, technical services, and report processing fees. A breakdown of the budget is provided in table 3.

Table 3. Budget summary.

Category	**Total cost**
Labor	$ 10,500
Travel	$ 3,000
Field supplies	$ 100
Overhead costs	$ 7,700
Total	**$ 21,300**
USGS	$ 10,000
CWRM	$ 11,300

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