



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

April 19, 2022  
Honolulu, O'ahu

Address Portions of Complaint Against Waste by Molokai Ranch,  
Filed by Moloka'i No Ka Heke (CDR.5310.4),  
By Amending Interim Instream Flow Standards  
For the Surface Water Hydrologic Units of  
Kawela (4037), Kaunakakai (4039), and Manawainui (4041), Moloka'i

SUMMARY OF REQUEST

Staff is requesting that the Commission consider the recommendations for amending the interim instream flow standard (interim IFS) for three streams in the Kawela surface water hydrologic unit, one stream in the Kaunakakai surface water hydrologic unit, and two streams in the Manawainui surface water hydrologic unit and the abandonment of three diversions in these hydrologic units, Moloka'i:

KAWELA HYDROLOGIC UNIT (4037): East Kawela Stream, East Kawela Tributary Stream, and West Kawela Stream

MANAWAINUI HYDROLOGIC UNIT (4041): SF Kuhuaawi Stream at Lualohe Intake

LOCATION MAP See Exhibit 1

LEGAL AUTHORITY

The Code 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. 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. This submittal is proposing to address interim IFS on six streams in Molokai.

The current interim IFS for the streams being considered were established by way of Hawai‘i Administrative Rules (HAR) §13-169-48, which, in pertinent part, reads as follows:

*Interim instream flow standard for Molokai. The Interim Instream Flow Standard for all streams on Molokai, 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 effective date was October 8, 1988. Thus, the status quo interim IFS, in effect, grandfathered all then-existing diversions that were registered with the Commission by May 31, 1989. Following the initial registration of stream diversion works, any new or substantially modified stream diversion works required a permit for construction as well as an amendment to the interim IFS. Molokai Ranch filed for the registration of seven stream diversions.

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”).

“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.

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).

“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 developed a framework for setting measurable instream flow standards statewide. This framework involves an assessment of natural flow conditions for the current climate period, an analysis of the instream uses protected by the State Water Code, the existing and planned uses of water, and the availability of water from multiple sources. The analysis for establishing interim IFS incorporates a balancing of the public trust uses with reasonable and beneficial uses. The primary cultural practices affected by changing hydrology is the gathering of limu and nearshore species, the gathering of medicinal and culturally important plants in the higher elevations, the operation of loko i'a, the right to a continual flow of water for pule. There is much interest in restoring groundwater recharge via downstream flows to protect springflow at the mouth of Kawela. Reductions in streamflow have also limited the availability of habitat for native aquatic biota including amphidromous species and the protection of habitat for endemic damselflies, some of which are threatened or endangered. In *McBryde Sugar Co v. Robinson*, the Hawai'i Supreme Court identified riparian rights as "the right to use water flowing without prejudicing the riparian rights of others and the right to the natural flow of the stream without substantial diminution in the shape and size given it by nature". 54 Haw. at 198, 504 P.2d at 1344. 54 Haw. 174, 504 P.2d 1330. Further, the Hawai'i Supreme Court affirmed the unity of the hydrological cycle such that surface and groundwater represent an integrated source of water, and "where surface and groundwater can be demonstrated to be interrelated as parts of a single system, established surface water rights may be protected against diversions that injure those rights whether the diversion is of surface water or groundwater." *Reppun v. Board of Water Supply*, 65 Haw. at 531, 656 P.2d 57 at 79.

The public trust is a state constitutional doctrine which "continues to inform the Code's interpretation, define its permissible 'outer limits,' and justify its existence. . . (T)he Code does not supplant the protections of the public trust doctrine." *Waiāhole I*, 94 Hawai'i at 133, 9 P.3d at 445. The State Supreme Court has described "the public trust relating to water resources as the authority and duty 'to maintain the purity and flow of our waters for future generations and to assure that the waters of our land are put to reasonable and beneficial uses (*emphases in original*)." *Waiāhole I*, 94 Hawai'i at 138, 9 P.3d at 450. "'Reasonable-beneficial use' means the use of water in such a quantity as is necessary for economic and efficient utilization, for a purpose, and in a manner which is both reasonable and consistent with the state and county land use plans and the public interest." HRS § 174C-3.

The Hawai'i Constitution requires the Commission both to protect natural resources and to promote their use and development. "The state water resources trust thus embodies a dual mandate of 1) protection and 2) maximum reasonable and beneficial use." *Waiāhole I*, 94 Hawai'i at 139, 9 P.3d at 451. The purposes or protected uses of the water resources trust are: 1) maintenance of waters in their natural state, 2) domestic water use of the general public, in particular, protecting an adequate supply of drinking water, 3) the use of water in the exercise of Native Hawaiian traditional and customary rights, and 4) the reservation of water enumerated by the State Water Code. *Waiāhole I*, 94 Hawai'i at 136-37, 9 P.3d at 448-58; *In re Wai'ola o Moloka'i, Inc.* ("Wai'ola"), 103 Hawai'i 401, 431, 83 P.3d 664, 694 (2004).

"In this jurisdiction, the water resources trust also encompasses a duty to promote the reasonable and beneficial use of water resources in order to maximize their social and economic benefits to

the people of the state...(We) have indicated a preference for accommodating both instream and offstream uses where feasible...(and) reason and necessity dictate that the public trust may have to accommodate offstream diversions inconsistent with the mandate of protection, to the unavoidable impairment of public instream uses and values.” *Waiāhole I*, 94 Hawai‘i at 139, 141-42, 9 P.3d at 451, 453-54.

There are no absolute priorities under the Public Trust Doctrine. “Given the diverse and not necessarily complementary range of water uses, even among public trust uses alone, (the Court) consider(s) it neither feasible nor prudent to designate absolute priorities between broad categories of uses under the water resources trust. There are no absolute priorities between uses under the water resources trust...(and) the Commission inevitably must weigh competing public and private water uses on a case-by-case basis, according to any appropriate standards provided by law (emphasis added).” *Waiāhole I*, 94 Hawai‘i at 142, 9 P.3d at 454. The public trust creates an affirmative duty of the Commission “to take the public trust into account in the planning and allocation of water resources, and to protect public trust uses whenever feasible<sup>1</sup> (emphasis added).” *Waiāhole I*, 94 Hawai‘i at 141, 9 P.3d at 453.

The water code does not place a burden of proof on any particular party; instead, the water code and case law interpreting the code have affirmed the Commission's duty to establish interim IFS that 'protect instream values to the extent practicable' and 'protect the public interest.'" *In re 'Īao Ground Water Management Area High-Level Surface Water Use Permit Applications and Petition to Amend Interim Instream Flow Standards of Waihe'e River and Waiehu, 'Īao, and Waikapu Streams Contested Case Hearing ("Nā Wai 'Ehā")*, 128 Hawai‘i 228, 258, 287 P.3d 129, 159 (2012)), citing *In re Water Use Permit Applications ("Waiāhole II")*, 105 Hawai‘i 1, 11, 93 P.3d 643, 653 ((2004)); and HRS §174C-71((2))(A)). In setting an interim IFS, the Commission "need only reasonably estimate instream and offstream demands." *Nā Wai 'Ehā*", 128 Hawai‘i at 258, 287 P.3d at 159 (2012)); "*Waiāhole I*", 94 Hawai‘i at 155 n. 60, 9 P.3d at 467 n. 60. "In requiring the Commission to establish instream flow standards at an early planning stage, the Code contemplates the designation of the standards based not only on scientifically proven facts, but also on future predictions, generalized assumptions, and policy judgments." *Waiāhole I*, 94 Hawai‘i at 155, 9 P.3d at 467.

Further, Article 12, §7 of the Hawai‘i Constitution states that: “The State reaffirms and shall protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua`a tenants who are descendants of native Hawaiians who inhabited the Hawaiian Islands prior to 1778, subject to the right of the State to regulate such rights.”

Where scientific evidence is preliminary and not yet conclusive regarding the management of fresh water resources, it is prudent to adopt the "precautionary principles" in protecting the

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<sup>1</sup> The Court refers to the term “feasible” as a balancing of benefits and costs and not to mean “capable of achievement.” (*Waiāhole I*, 94 Hawai‘i, at 141 n. 39; 9 P.3d, at 453 n. 39.)

resource<sup>2</sup>. That is, where there are present or potential threats of serious damage, lack of full scientific certainty should not be a basis for postponing effective measures to prevent environmental degradation. . . In addition, where uncertainty exists, a trustee's duty to protect the resource mitigates in favor of choosing presumptions that also protect the resource.<sup>3</sup> The "precautionary principle" appears in diverse forms throughout the field of environmental law. . . The Hawai'i Supreme Court confirmed that the principle, in its quintessential form, states: at minimum, the absence of firm scientific proof should not tie the Commission's hands in adopting reasonable measures designed to further the public interest. "*Waiāhole I*", 94 Hawai'i at 155 n. 60 p.13.

Based upon the best available information presented in the Instream Flow Stream Assessment Report (IFSAR), along with the oral and written comments received through the public review process and provided in the informational submittal presented to the Commission at the regularly scheduled meeting on February 15, 2022 (see Exhibit 2), staff have developed a recommendation that seeks to balance public trust uses and the reasonable and beneficial needs of non-public trust uses. 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 one unit, 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 chapter 174C), and the statutes which are used to implement these laws (HRS) are applied equally.

The State Water Code (Code), Chapter 174C, Hawaii Revised Statutes (HRS), provides that the Commission shall have jurisdiction statewide to hear any dispute regarding water resource protection, water permits, or constitutionally or otherwise legally protected water interests. HRS §13-167-23. If any person files a complaint with the Commission that any other person is wasting or polluting water, or is making a diversion, withdrawal, impoundment, consumptive use of waters or any other activity occurring without a permit where one is required, the Commission shall cause an investigation to be made, take appropriate action, and notify the complainant thereof. HRS §13-167-82. Further, the Commission may take jurisdiction of and resolve any disputes regarding water resource protection, water permits, or constitutionally protected water interests. HRS §13-167-3(4).

Understanding that the availability of hydrologic data in these streams is limited, as new data are developed, decisions may be revised by a future Commission action. Due to the complex and dynamic nature of Hawai'i'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 Code.

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<sup>2</sup> Commission on Water Resource Management. 1997. In the Matter of Water Use Permit Applications, Petitions for Interim Instream Flow Standard Amendments, and Petitions for Water Reservations for the Waiāhole Ditch Combined Contested Case Hearing. Final Decision & Order. CCH-OA-95-01.

<sup>3</sup> Ibid.

## SUMMARY OF DATA

The Moloka‘i community frequents the perennial portions of the streams in the Kawela, Kaunakakai, and Manawainui hydrologic units for their recreational and aesthetic values and to carry out traditional and cultural practices that include the gathering of medicinal and culturally important riparian plants. Further, freshwater flowing as springs in the Kawela hydrologic unit supports culturally important fishing and gathering practices along the coastline, including nearshore species for subsistence, the gathering of varieties of limu, and the management of loko pu‘uone and loko kuapā, variations of loko i‘a found near Kawela. Historically, Kawela was famous as a place of “Pu‘uhonua”, a special refuge and safety for the island of Moloka‘i. Kawela supported a large population center and the stream ranked outstanding (4 of 4) for its cultural values by the Hawaii Stream Assessment. Fishing, hunting, and gathering are prevalent subsistence practices. The community also perpetuates religious and spiritual traditions. For example, Kawela features prominently in pule, while others gather fresh water for ho‘okupu. A summary of these practices is provided in Table 1. These practices, and their ecological resources, necessitate a continual flow of water that supports the persistence of aquatic and riparian biota.

In 1987, with the passage of the State Water Code, all wells and stream diversions had to be registered with the Commission by May 31, 1989. Registered diversions accepted by the Commission in the hydrologic units considered here are listed in Table 2. The only stream diversions in the Kawela, Kaunakakai, and Manawainui hydrologic units were registered by Molokai Ranch (File Reference: MOLOKAI RANCH).

On July 1, 2019, Earthjustice, on behalf of No Ka Heke, filed a petition to amend the interim IFS on seven streams and a waste complaint against Molokai Properties, the new owner of Molokai Ranch.

The Mountain Water System consists of three diversions in the Kawela hydrologic unit (Figure 1), one diversion in the Kaunakakai hydrologic unit (Exhibit 1), one diversion in the Waikolu hydrologic unit (Exhibit 1), and two diversions in the Manawainui hydrologic unit (Figure 2). No meters existed until Molokai Ranch installed one above the first reservoir and on the pipeline from the Hanalilolilo intake in the 1990s. The interconnected relationship among diversions, streams, pipelines, and meters is provided in Figure 3. Since 2015, staff have made 27 site visits to Moloka‘i to investigate Waikolu, Kaunakakai, Manawainui, and Kawela hydrologic units as detailed in Exhibit 3.

**Table 1.** Summary of cultural practices and resources associated with Kawela, Kaunakakai, and Manawainui hydrologic units.

| <b>Cultural Practice</b>                 | <b>Cultural Resource</b>   | <b>Area/Location</b>  |
|--|--|-----------------------|
| Fishing                                  | ‘o‘opu   | in stream             |
|  | wī   | ma uka                |
|  | prawn  | muliwai               |
|  | ‘ōpae  |                       |
|  | ‘anae  |                       |
|  | pāpa‘i   |                       |
| hinana                                   |  |                       |
| Gathering & Fishing                      | ‘ohe for hina‘i  | ma uka                |
|  | ‘ie‘ie for hina‘i  |                       |
| Gathering                                | pōhaku to make papa ku‘i ‘ai wai, for ho‘okupu, i.e., for makahiki | ma uka along stream   |
|  | maile  | ma uka                |
|  | mokihana   |                       |
|  | ohia for makaha  |                       |
|  | hulu manu  |                       |
|  | Gathering & Lā‘au Lapa‘au (Hawaiian medicine)                      | ‘ōlena                |
| ‘ie‘ie for treatment of ‘ea and pa‘ao‘ao |  |                       |
| koali                                    |  |                       |
| kukui                                    |  |                       |
|  | noni   | ma uka & along kuāuna |
| Lei                                      | palapalai  | ma uka                |
|  | maile  |                       |
|  | mokihana   |                       |
|  | nā‘ū   |                       |
|  | hāpu‘u   |                       |
|  | pepeiao  |                       |
| Preparing/eating food                    | ‘uala, mai‘a, ‘ulu, kō   | hale                  |

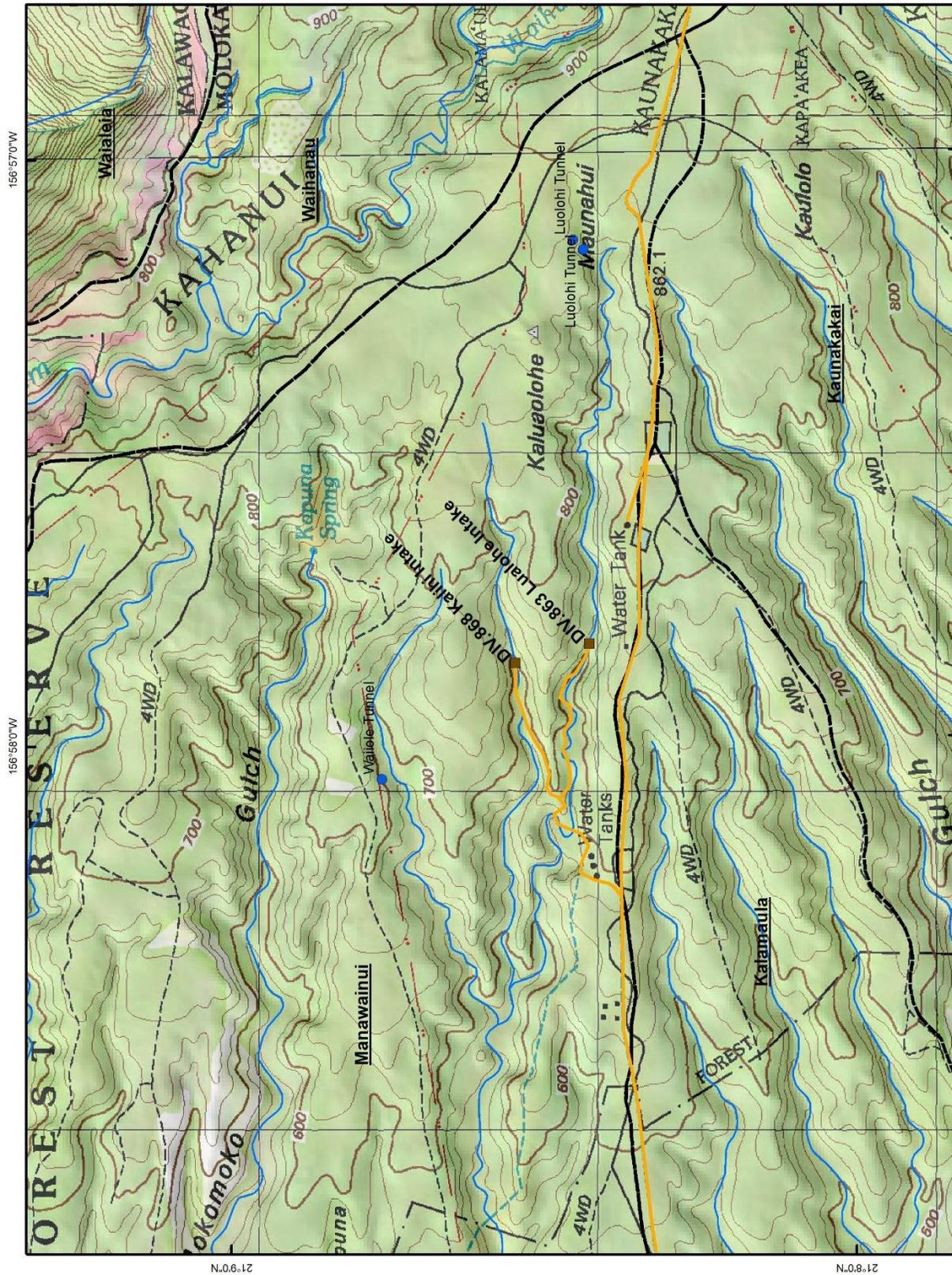
**Table 2.** Registration ID, diversion ID, diversion name, stream name, and additional information for stream diversions to the Mountain Water System, Molokai.

| Hydrologic Unit | Registrant    | Diversion ID | Diversion name        | Stream name                      | 1992 <sup>1</sup> Quantity Diverted (mgd) | Additional information  |
|-----------------|---------------|--------------|-----------------------|----------------------------------|---|---|
| Kawela          | MOLOKAI RANCH | 867          | East Kawela           | East Kawela                      | 0.562                                     | Main Kawela intake  |
| Kawela          | MOLOKAI RANCH | 866          | East Kawela Tributary | Unnamed Tributary to East Kawela | 0.067                                     | Diverted flow transported by pipeline to East Kawela above intake           |
| Kawela          | MOLOKAI RANCH | 862          | West Kawela           | West Kawela                      | 0.067                                     | Diverted flow transported by pipeline to junction with East Kawela pipeline |
| Kaunakakai      | MOLOKAI RANCH | 865          | Kamoku                | SF Kaunakakai                    | 0.071                                     | Diverted flow transported by pipeline to junction with Kawela pipeline      |
| Waikolu         | MOLOKAI RANCH | 864          | Hanalilolilo          | Waikolu                          | 0.130                                     | Diverted flow transported by pipeline to junction with Kawela pipeline      |
| Manawainui      | MOLOKAI RANCH | 863          | Loalohe               | SF Kuhuaawi                      | 0.270                                     | Diverted flow transported by pipeline to junction with Ranch Line           |
| Manawainui      | MOLOKAI RANCH | 868          | Kalihi                | SF Kuhuaawi                      | 0.071                                     | Diverted flow transported by pipeline to junction with Ranch Line           |

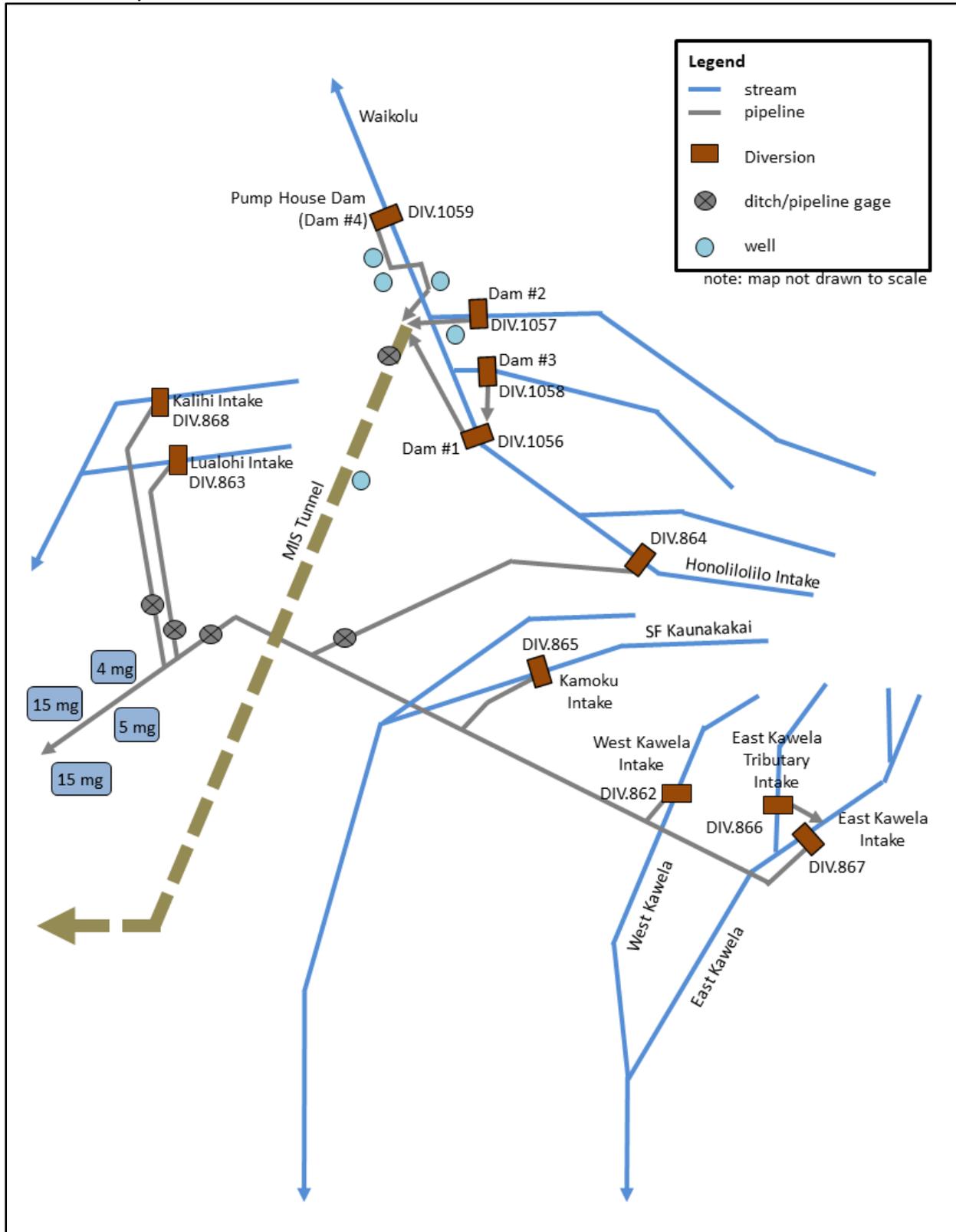
<sup>1</sup>based on field notes and calculations from site visits in 1992 and 1993.



**Figure 2.** Registered diversions (ID) and ditches/pipelines identified in and nearby the Manawainui hydrologic unit as part of the Mountain Water System, Moloka'i.



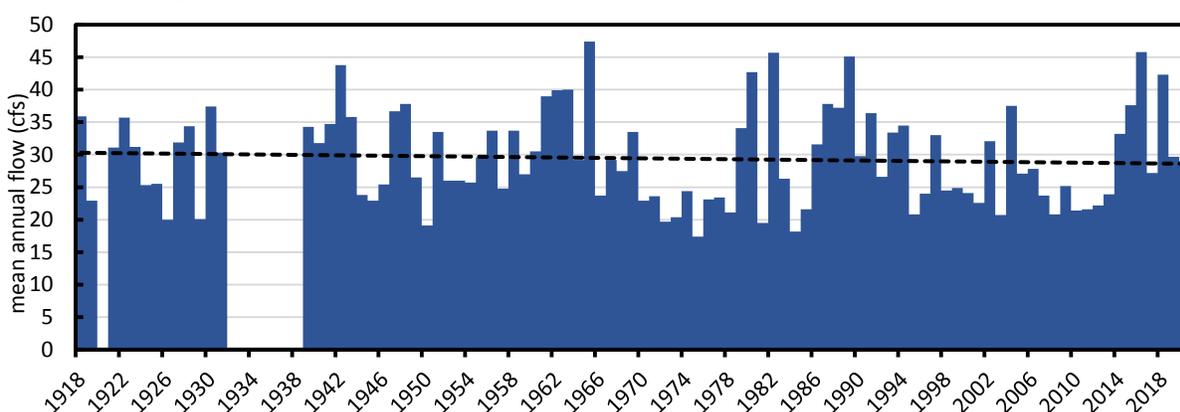
**Figure 3.** Schematic diagram of diversions (ID), wells, ditches and pipelines as part of the Molokai Irrigation System and the Mountain Water System, Moloka'i.



## HYDROGEOLOGIC CONTEXT

Virtually all streamflow on Molokai originates in the East Molokai Mountains and flows north and east to the ocean. The major drainage basins are Waikolu, Pelekunu, Wailau, and Halawa valleys. These valleys are deeply incised, exposing high-elevation dike-confined groundwater storage that contributes to perennial flow to the ocean. Rainfall events contribute to the saturation of high elevation swamp environments and runoff results in flashy hydrographs. Streams in the southern and western sides of East Molokai Volcano flow perennially in the higher elevations, as high-level perched discharge, but surface water is lost to groundwater seepage into the more permeable basalts in the lower stream channel and only during peak flow events do these streams currently reach the ocean. The longest record of continuous streamflow on the island occurs at USGS station 16400000 on Halawa Stream (Figure 4). In the Kawela hydrologic unit, there are two main tributaries: the East Fork and West Fork. The USGS has maintained a station (16415000) above the EF Kawela intake (Diversion 867) since November 2018. Figure 5 provides an example water year (2021) of mean daily flow in East Fork Kawela Stream above diversion 867 and the daily flow diverted at the intake.

**Figure 4.** Mean annual flow (million gallons per day, mgd) at USGS station 16400000 on Halawa Stream, Molokai. Line represents linear regression trend over the period of record. (Source: USGS, 2020)



Using hydrological modeling techniques with rainfall, basin area, continuous streamflow monitoring, and partial-record gaging stations, low-flow duration streamflow metrics were developed for the catchments that contribute to stream diversions (Table 4). Diverted flow for various periods of record are also provided in Table 4. Modeled results predicted low-flow duration estimates with a high degree of accuracy based on the Nash-Sutcliffe Efficiency Index (NSE) and coefficient of determination ( $R^2$ ):  $Q_{50}$  NSE = 0.975,  $R^2 = 0.994$ ;  $Q_{70}$  NSE = 0.996,  $R^2 = 0.996$ ;  $Q_{90}$  NSE = 0.997,  $R^2 = 0.997$ ;  $Q_{95}$  NSE = 0.941,  $R^2 = 0.998$ . However, extreme low-flow conditions are affected by small differences in topography, rainfall, vegetation, and geology that are not captured in the model and may affect surface flow on any given day. There are two development tunnels (tunnel 9 and tunnel 10) located in Lualohe Gulch at 2,780 ft and 2,800 ft a.s.l, respectively, discharging 30,000 gpd and 300 gpd, respectively<sup>4</sup>. These tunnels were dug

<sup>4</sup> Stearns, H.T., MacDonald, G.A. 1947. Geology and Ground-water Resources of the Island of Molokai. Hawaii Division of Hydrography Bulletin 11. p. 73.

into ash beds in the upper member of the East Molokai volcanic series. These tunnels increase the flow above that estimated based on modeling as none of the other streams monitored have development tunnels. Estimated flow in Lualohe has been updated to reflect this.

On January 22, 2022, Commission staff measured a flow of approximately 0.008 cfs (0.005 mgd) on East Kawela Tributary and 0.0209 cfs (0.014 mgd) on LB SF Kaunakakai at the Kamoku intake when East Kawela Stream was flowing at approximately Q<sub>90</sub> (0.138 cfs, 0.095 mgd), reinforcing the model results.

On February 27, 2022, Commission staff measured a flow of 0.038 cfs (0.0245 mgd) at Lualohe Stream and 0.0075 cfs (0.0048 mgd) on LB SF Kaunakakai at the Kamoku intake when East Kawela Stream was flowing at approximately Q<sub>95</sub> (0.1055 cfs, 0.068 mgd), further supporting the model results.

**Table 4.** Estimated natural median (Q<sub>50</sub>) and low-flow (Q<sub>70</sub> to Q<sub>90</sub>) values available at each registered diversion for the Mountain Water System. [mgd = million gallons per day] note: differing periods of record for various statistics

| Stream                             | Period of Record | method         | Q <sub>50</sub> | Q <sub>70</sub> | Q <sub>80</sub> | Q <sub>90</sub> | Q <sub>95</sub> |
|------------------------------------|------------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| East Kawela                        | 2018-21          | continuous     | 0.340           | 0.170           | 0.120           | 0.080           | 0.040           |
|                                    | 2019-22          | metered        | 0.280           | 0.153           | 0.124           | 0.026           | 0.019           |
| East Kawela Tributary <sup>^</sup> | 2018-21          | model          | 0.01            | 0.0025          | 0.002           | 0.001           | <0.001          |
|                                    |                  | metered        |                 |                 | not in use      |                 |                 |
| West Kawela <sup>^</sup>           | 2018-21          | partial-record | 0.03            | 0.010           | 0.006           | 0.004           | 0.002           |
|                                    |                  | metered        |                 |                 | not in use      |                 |                 |
| Kamoku <sup>^</sup>                | 2018-21          | partial-record | 0.033           | 0.011           | 0.007           | 0.004           | 0.002           |
|                                    |                  | metered        |                 |                 | not in use      |                 |                 |
| Hanalilolilo                       | 2018-21          | model          | 0.177           | 0.070           | 0.046           | 0.034           | 0.017           |
|                                    | 2019-22          | metered        | 0.111           | 0.045           | 0.007           | 0.001           | 0.001           |
| Kalihi <sup>^</sup>                | 2018-21          | model          | 0.0057          | 0.0014          | 0.001           | 0.0004          | 0.0003          |
|                                    | 2000-04          | metered        | 0.012           | 0.008           | 0.007           | 0.001           | 0.001           |
| Lualohe <sup>*^</sup>              | 2018-21          | model*         | 0.072           | 0.039           | 0.032           | 0.027           | 0.024           |
|                                    | 2000-04          | metered        | 0.118           | 0.059           | 0.035           | 0.026           | 0.019           |

\*plus the addition of water from two development tunnels

<sup>^</sup>not in use as of 2005

### Groundwater-Surface Water Interactions in Kawela

Saturated high-elevation wetland soils support perennial flow in the uppermost reaches of Kawela, Kaunakakai, and Manawainui streams (Figure 6). Kawela stream gains flow as the gulch incises thin ash layers of the upper member of the East Molokai Volcanic Series that support perched water. In the transition to the lower member series at about 1500 ft in elevation, streamflow begins to lose surface flow to groundwater recharge of the basal aquifer. During baseflow conditions, 100% of the surface flow is recharging the basal lens. The basal aquifer

historically supported coastal springs, wetlands, and nearshore ecosystems through submarine groundwater discharge, although surface and groundwater withdrawals and landcover change have negatively affect the natural discharge. Current estimated groundwater discharge to nearshore environments and important subsistence gathering and fishing sites are identified in Figure 11. Archaeological evidence suggests the stream regularly flowed ma uka to ma kai prior to the Great Māhele.

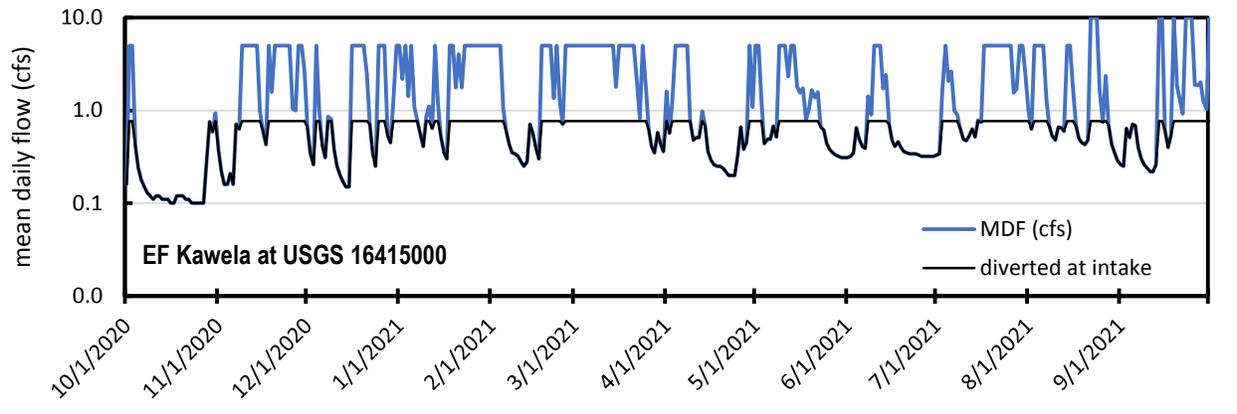
To better characterize the availability of groundwater for the Kawela Plantation Estates development, the time domain electromagnetic (TDEM) surface geophysical technique was used to map the fresh/saline groundwater interface in 1995<sup>5</sup> and 2006<sup>6</sup>. In summary, soundings were made along two survey lines which extended from an elevation of approximately 1,300 elevation to 2,700 ft elevation approximately parallel to Kawela Gulch on either side as well as a perpendicular line at approximately 525 ft elevation. Below approximately 2,100 ft the fresh/saline water interface was mapped in both lines. In the line west of Kawela Gulch, a significant thickening of the basal groundwater lens occurred between elevations of 1,470 ft and 2,100 ft. indicating a change in horizontal hydrologic permeability likely as a result of lateral permeability changes caused by vertical dikes. This also coincides with the approximate transition from the upper to lower member of the East Molokai Volcanics. Above approximately 2,100 ft, TDEM did not map the saline/fresh groundwater interface. Based on this, the fresh/saline interface is likely below 750 ft below sea level. Although it is probable that volcanic dike damming structures occur either at the higher elevation soundings or immediately down slope from them, it is unknown if high level groundwater is present at these upper elevation sites. In the line perpendicular to the gulch, the area with the thickest basal lens was approximately 1,000 ft east of the East Kawela Gulch and is likely gaining the most influx of groundwater recharge from the Kawela streams.

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<sup>5</sup> Tom Nance. 1995. Final Report: Geophysical Survey Performed on the Island of Molokai, State of Hawaii. Blackhawk Geosciences, Golden, Colorado. Project Number 9131.

<sup>6</sup> Tom Nance. 2006. Time domain electromagnetic surveys for assisting in determining the groundwater resources on Kawela Plantation Property, Island of Molokai. Blackhawk Geosciences, Golden, Colorado. Project Number 5017.

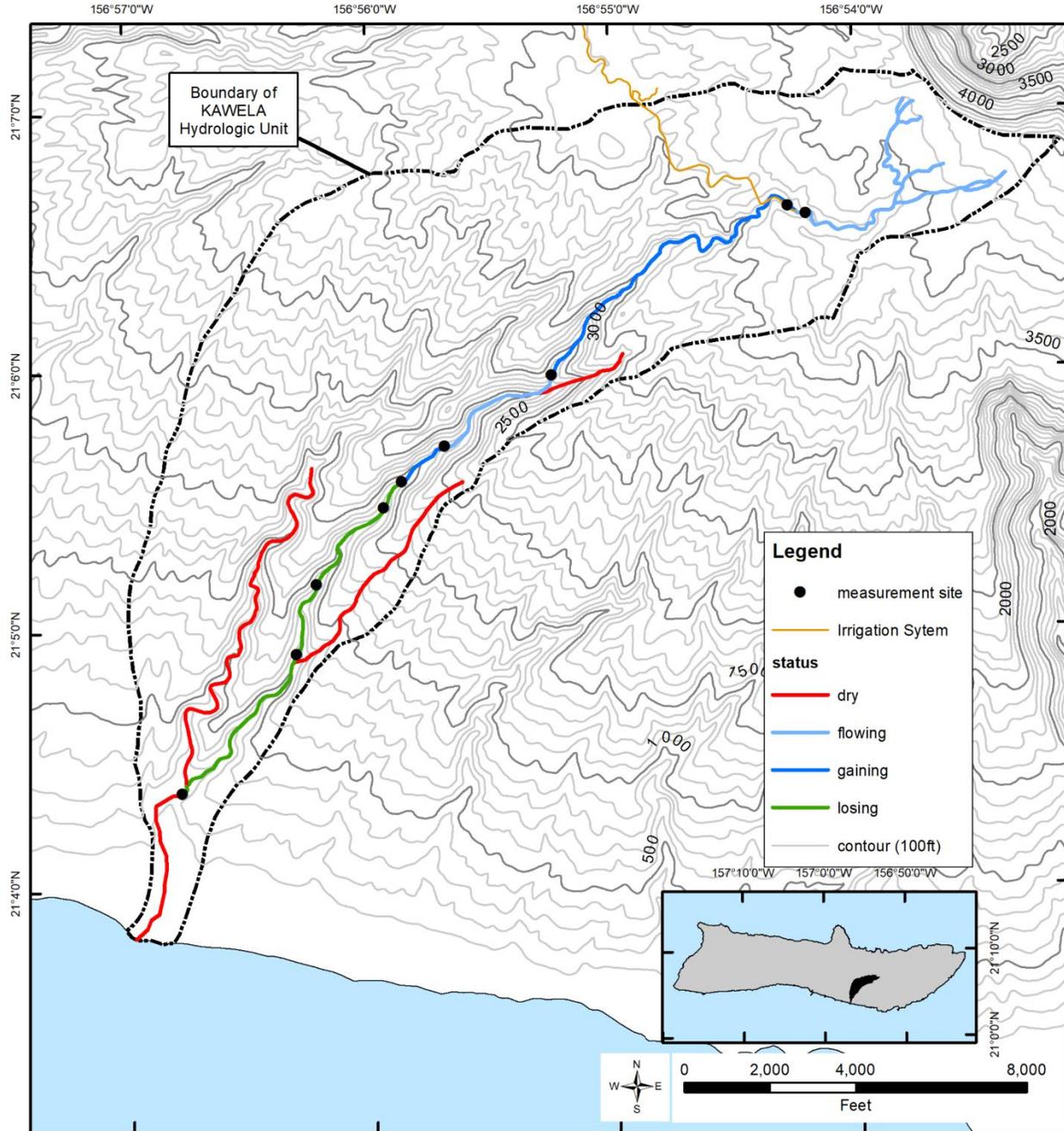
**Figure 5.** Mean daily flow (MDF) in cubic feet per second (cfs) in East Kawela Stream at USGS 16415000 and diverted by the intake on the East Fork Kawela Stream at 3,650 ft for water year 2021.



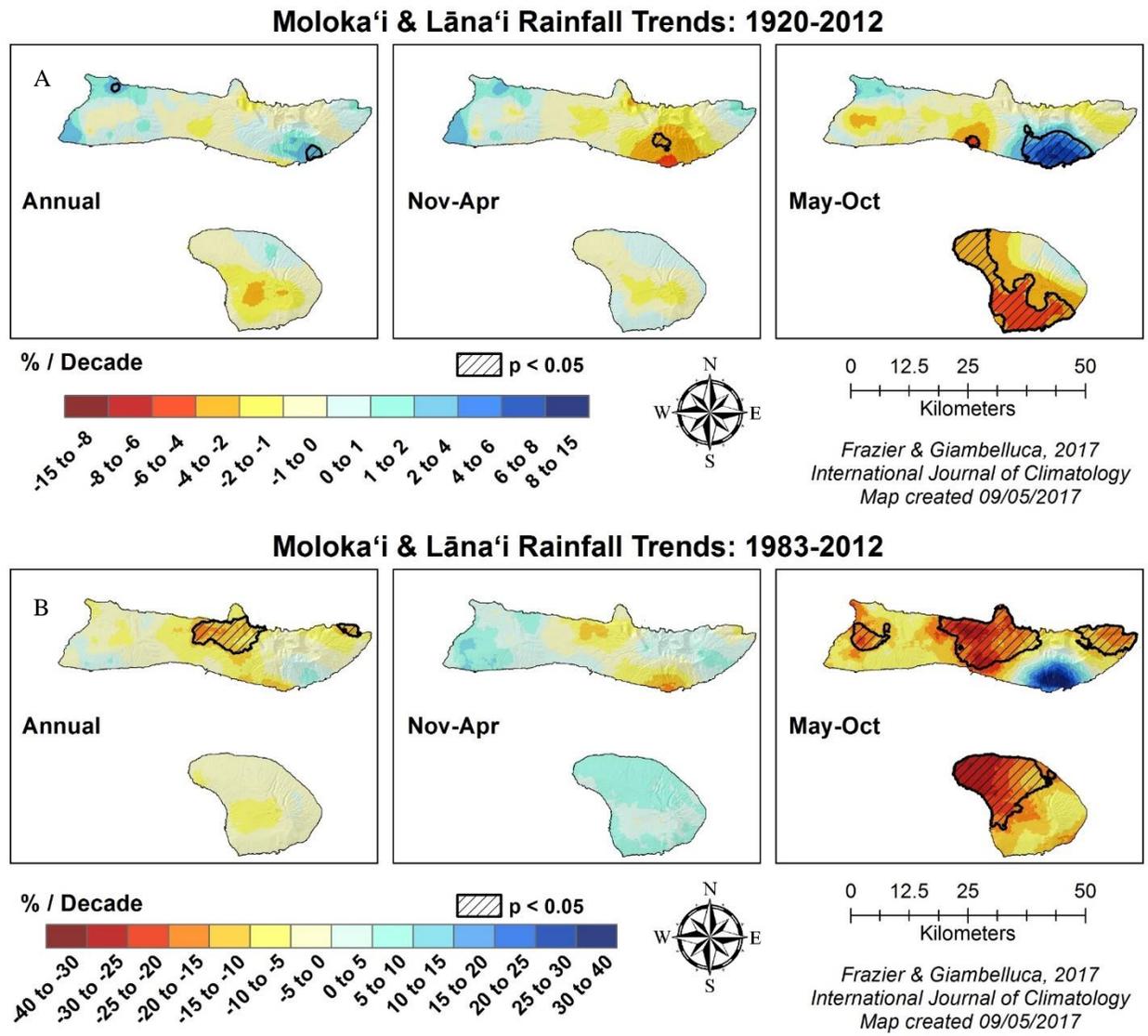
### Long-term trends in rainfall and streamflow

The climate has profound influences on the hydrologic cycle and in the Hawaiian Islands, shifting climate patterns have resulted in an overall decline in rainfall and streamflow. Rainfall trends are driven by large-scale oceanic and atmospheric global circulation patterns including large-scale modes of natural variability such as the El Nino Southern Oscillation and the Pacific Decadal Oscillation, as well as more localized temperature, moisture, and wind patterns (Frazier and Giambelluca, 2017; Frazier et al, 2018). Long-term trends in surface water on Molokai are difficult to assess as few monitoring stations have continuous records for sufficient length of time. Using monthly rainfall maps, Frazier and Giambelluca (2017) identified regions that have experienced significant ( $p < 0.05$ ) long-term decline in annual, dry season, and wet season rainfall for differing periods of record. On Moloka'i, some areas have experienced a significant decline in annual and seasonal rainfall in the 1920 to 2012 period, and for large parts of the island from 1983 to 2012 (Figure 7). Since 1983, Ho'olehua region has experienced a significant ( $p < 0.05$ ) decline in annual (5 to 20% per decade) and dry season (20 to 40% per decade) rainfall. Similarly, west Moloka'i has experienced a 5 to 10% per decade decline in dry season rainfall.

**Figure 6.** Streamflow gains and losses measured by USGS during seepage runs in 2010 that span multiple dates for different reaches.



**Figure 7.** Annual, wet season (Nov-Apr) and dry season (May-Oct) rainfall trends for the 1920-2012 (A) and 1983-2012 (B) periods, Molokai and Lanai. Hashed line areas represent significant trend over the period. (with permission from Frazier and Giambelluca, 2017)



**SPECIFIC INSTREAM USE CONSIDERATIONS**

The maintenance of instream flows is important for the protection of traditional and customary Hawaiian practices as they relate to the maintenance of stream (e.g., hīhīwai, ‘ōpae, ‘o‘ōpu) and riparian (vegetation) resources for gathering for consumption and medicinal uses, recreation within streams, and the cultivation of kalo or other traditional crops. The traditional Hawaiian ahupua‘a has ma uka to ma kai flow sufficient to sustain the environment and community. Many religious and cultural practices utilize riparian vegetation that benefits from continual flow. Table 1 provides a summary of resources and traditional and customary practices associated with these streams. Further the gathering of culturally important nearshore species benefits from freshwater spring flow that is negatively affected by stream and groundwater withdrawals. Table 5 provides a summary of the Hawaiian Stream Assessment results for the Kawela watershed.

Surface flow in Kawela improves groundwater recharge of the lower member of East Molokai Volcanics, which benefits the maintenance of stream and nearshore habitat, including spring flow to fish ponds. Restoration of downstream flow will also increase the frequency of ma uka to ma kai flow, maintaining greater connectivity among stream reaches that support native amphidromous species, improve recreational value, and aesthetic value. The Kawela hydrologic unit supports a diversity of amphidromous species as detailed in the Division of Aquatic Resources (DAR) Watershed Atlas Report attached to the IFSAR. Surface flow in these streams supports a high density of threatened and endangered riparian plants as well as five damselfly species, some of which are threatened or endangered: *Megalagrion pacificum*, *Megalagrion hawaiiense*, *Megalagrion xanthomelas*, *Megalagrion blackburni* and *Megalagrion calliphya*, as identified in Figure 8.

**Table 5.** Hawaii Stream Assessment results for the Kawela, streams, Moloka‘i.

| <b>Biological Resources</b> | <b>Rank</b>   | <b>Riparian Resources</b>     | <b>Rank</b>   |
|-----------------------------|---|-------------------------------|---|
| Final Rank                  | Limited (2 of 4)  | Final Rank                    | Substantial (3 of 4)                                      |
| ‘Alamo‘o                    | present   | Detrimental species           | mangrove, pigs, deer, goats                               |
| Nākea                       | present   | % native forest               | --  |
| Nōpili                      | --  | Presence of recovery habitat  | --  |
| Hīhīwai                     | --  | # T&E birds                   | --  |
| # NG2                       | --  | # of rare plants              | --  |
|                             |   | Wetlands                      | --  |
| <b>Cultural Resources</b>   | <b>Rank</b>   | <b>Recreational Resources</b> | <b>Rank</b>   |
| Final Rank                  | Outstanding (4 of 4)  | Final Rank                    | Outstanding (4 of 4)                                      |
| taro cultivation            | no  | Opportunities                 | Camping, hiking, fishing, swimming, hunting, scenic views |
| # archaeological sites      | 15  | Regional rank                 | 1   |
| density                     | High  |                               |   |
| valley significance         | Pre-contact, excellent examples, important information, culturally noteworthy |                               |   |

## NON-INSTREAM USE CONSIDERATIONS

The presence of the mountain water system (MWS) adds considerable complexity to the Commission's role in weighing instream and noninstream uses. This is largely due to the transfer of water from one hydrologic unit to another, but also the importance of the system to both agriculture and industrial water supply in Ho'olehua and west Molokai and in the consideration of economic impacts. It is also important to consider the consequences of system operation relative to public trust uses of water. Further, the potable and non-potable systems that now fall under Molokai Property's usage were historically interconnected and included connectivity to the Molokai Irrigation System (MIS). A new pipeline from Well 17 to west Molokai (connecting to Mauna Loa and Kaluako'i) has eliminated the need to use the MIS. The Dole Line was also connected to the MIS, however this connection has since been severed.

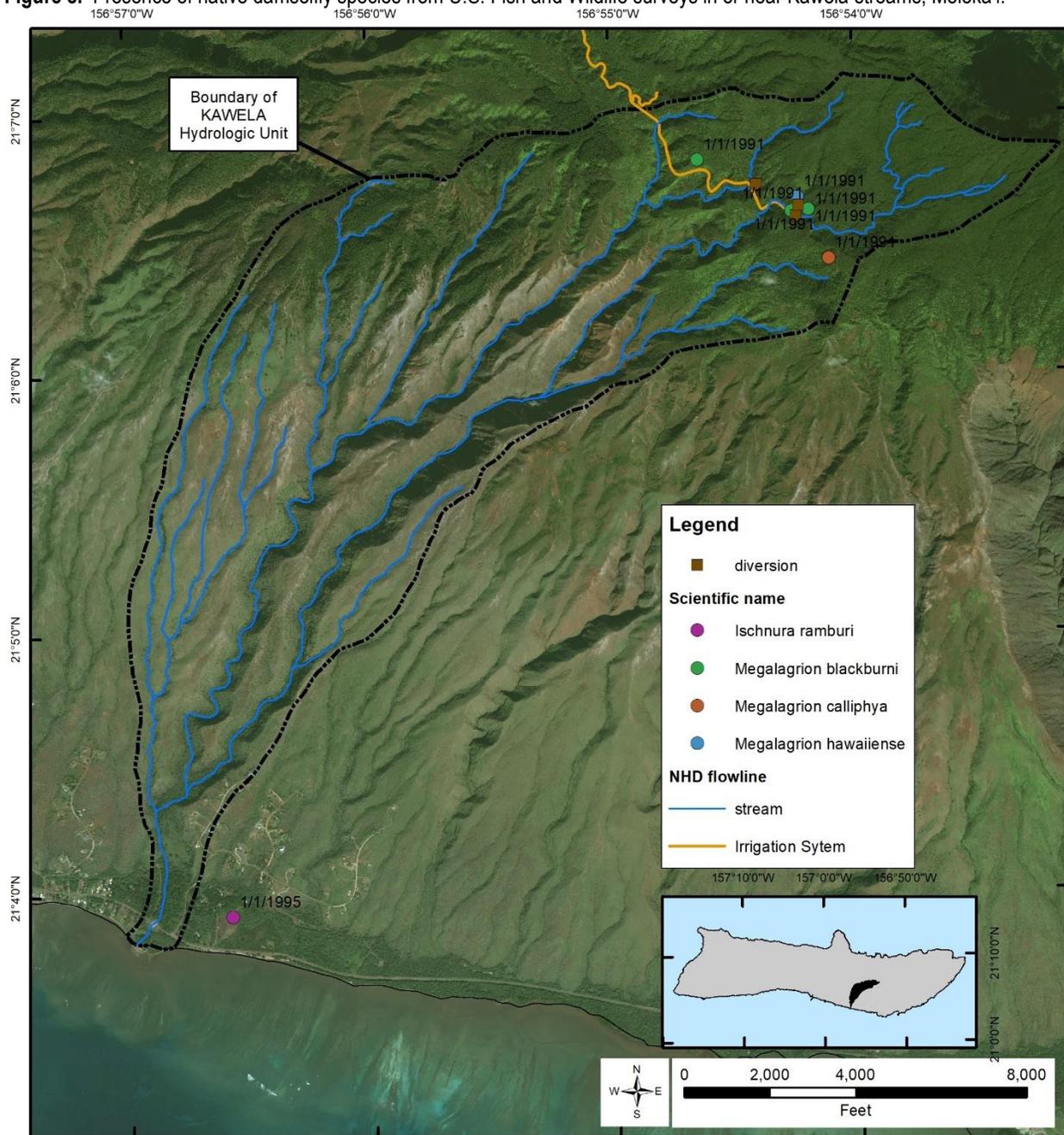
### **Mountain Water System**

In total, the MWS consists of seven separate intakes, a number of large and small reservoirs, booster pump stations, transmission pipelines, and tanks. The system primarily captures surface water from Kawela and Waikolu watersheds, with smaller diversions from Kaunakakai and Manawainui watersheds. The total non-potable reservoir capacity is 49,450,000 gallons, split between the 5,000,000 and 4,000,000 gallon reservoirs at the top of the system, the two newly built and lined 15,000,000 gallon reservoirs immediately below these reservoirs, and three reservoirs in west Molokai: the 7,000,000 gallon Puunana Reservoir, the 250,000 gallon Puunana Agricultural tank, and the 3,200,000 gallon Mauna Loa Reservoir. In 2004, Molokai Ranch estimated is December daily mean usage of non-potable water as 70,000 gpd. All current metered non-potable water uses as provided by Molokai Properties are identified in Table 9. Some non-potable needs in Kaluako'i are currently met with potable water from Well 17 due to the lack of parallel infrastructure to supply non-potable water. From 2016 to 2020, the mean daily usage of non-potable water (excluding Kualapu'u Ranch) was 41,790 gpd. During the last few months of 2020, Kualapu'u Ranch started receiving approximately 20,000 gpd for a new hemp farm, bringing the mean daily usage up to approximately 62,000 gpd. However, as of February 2022, Kualapu'u Ranch has discontinued its hemp production.

### **Monitoring of diverted flow**

The East Kawela tributary intake (Diversion 866) and transmission pipeline has not been operational since at least 2005. West Kawela Intake (Diversion 862), Kamoku Intake (Diversion 865), Kalihi Intake (Diversion 868), and Lualohe Intake (Diversion 863) have also not been in use since 2005.

**Figure 8.** Presence of native damselfly species from U.S. Fish and Wildlife surveys in or near Kawela streams, Moloka'i.



Monitoring flow data provided by Molokai Ranch and Molokai Properties for individual intakes is only available for the Kalihi (Diversions 868) and Lualohe (Diversions 863) intakes and the Hanalilolilo intake (Diversions 864). The flow from East Kawela (Diversions 867) intake is monitored after the contribution from Hanalilolilo, which allows for estimates of the East Kawela flow after removing the Hanalilolilo flow. While available data are limited in duration, the diverted flow for varying periods of time is provided in (Table 3). Mean daily flow values are available from 11/7/2018 to 9/30/2021 at USGS 16415000 on East Fork Kawela Stream. Based on this stream flow record and intake capacity, the mean amount diverted from East

Kawela Stream for this period was 0.36 cfs (0.23 mgd). There were 58% of days that had zero flow remaining immediately below the East Kawela diversion. The minimum mean daily flow recorded at USGS 16415000 was 0.06 cfs (0.04 mgd).

**Mountain Water System Reservoir Storage**

Molokai Properties existing non-potable water use is approximately 42,000 gpd. There is a maximum of 33,000 gpd of water lost due to evaporation from interconnected reservoirs. This results in approximately 75,000 gpd existing non-potable water use. There is approximately 90,000 gpd existing non-potable needs in Kaluako‘i (currently met with potable water from Well 17). If these needs are met with non-potable water, staff estimates Molokai Properties has a future non-potable water demand of approximately 171,000 gpd. The Mountain Water System has a total active reservoir capacity of approximately 50 million gallons. At 50% of capacity, the reservoirs can provide approximately 333 days of storage at current use rates and 146 days of storage at future planned use rates, without additional inflow from streams. At 80% of capacity, the reservoirs can provide approximately 533 days of storage at current use rates and 134 days of storage at future planned use rates, without additional inflow from streams.

The Mountain Water System’s storage capacity can also be utilized to meet some of the non-potable needs of other public trust uses, particularly that of the DHHL Kalama‘ula track, through which the Mountain Water System transmission pipeline crosses.

**Water Lost Due to Evaporation From Reservoir Surfaces**

The active reservoirs associated with the MWS are lined, but substantial evaporative loss is occurring due to the exposure to solar radiation and high winds. Table 6 identifies the individual characteristics of each MWS reservoir and the total annual water lost when the reservoirs are at full capacity. Because surface area diminishes as capacity decreases due to the angle of the reservoir sides, the total annual water lost may be slightly less.

**Table 6.** Characteristics of active reservoirs associated with the Mountain Water System. [note: Maunaloa Reservoir is covered and part of the potable water system]

| Reservoir            | Elevation (ft) | Area at full capacity (acres) | Actual Annual evaporation (in) | Annual Water Lost (mg) | Mean Daily Water Lost (gpd) |
|----------------------|----------------|-------------------------------|--------------------------------|------------------------|-----------------------------|
| Kawela               | 2710           | 1.595                         | 36.81                          | 1.594                  | 4368                        |
| Dole                 | 2640           | 0.684                         | 37.47                          | 0.696                  | 1908                        |
| Mountain Reservoir 1 | 1940           | 2.700                         | 43.49                          | 3.189                  | 8737                        |
| Mountain Reservoir 2 | 1900           | 2.626                         | 44.77                          | 3.192                  | 8745                        |
| Puunana              | 1305           | 1.836                         | 23.80                          | 1.187                  | 3251                        |
| Maunaloa             | 1200           | 0.692                         | n/a                            | 0                      | 0                           |
| Livestock Reservoirs | 900            | 3.922                         | 21.48                          | 2.288                  | 6268                        |
| total                |                |                               |                                |                        | 33,277                      |

**Other Water Systems Owned by Molokai Properties**

Molokai Properties owns Well 17 (Well No. 4-0901-001) which supplies potable water to some customers in the Kualapu‘u, Kalae, Manawainui Industrial Park, Maunaloa town, and Kaluako‘i development. The estimated current and planned potable water needs supplied by Well 17 as provided by Molokai Properties are listed in Table 8. While the Kaluako‘i development has not

grown as originally planned and the original hotel and golf course have closed down, there are long-term plans to rebuild the resort and additional home sites are already zoned.

## ISSUES/ANALYSIS

The next step to developing an interim IFS is to balance instream and noninstream uses of water, which may include public trust uses, 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 non-instream uses across and within surface water hydrologic units. For example, one stream may support extensive *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 four public trust uses of water include: (1) Water in its natural state; (2) Water used for traditional and customary practices; (3) Water for domestic uses; and (4) Water reserved and used by the Department of Hawaiian Home Lands. The process is to be based upon best available information when balancing the present or potential, instream and non-instream uses.

In developing the interim IFS recommendations, staff has attempted to remain consistent in balancing 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 one unit, no single principal or equation determines the rate of flow restoration. However, the principals established by the State Constitution, the Hawai‘i State Water Code (HRS 174C), administrative rules, and case law interpreting all of the above, are applied appropriately. Further, while water in its natural state is a public trust use, so is water needed to meet the needs of DHHL and domestic needs of the general public.

The analysis of waste must take into consideration the suitability of a particular water use, the reasonable water needs of that use, the efficiency of the system to meet that use, and the consequences of that use on public trust uses of water.

### **The Interim IFS and Diversion Abandonment**

In order to promote the recognized public trust purposes of water, including the protection of the recognized instream values as specified in the Code, a continual flow of water must be established past each diversion. In streams with baseflow maintained by substantial groundwater discharge (i.e., EB NF Wailua River at USGS 16068000), median baseflow is equivalent to a flow between the  $Q_{70}$  and  $Q_{80}$  of total flow<sup>7</sup>. By contrast, in streams that originate from perched water draining high-elevation bog environments (i.e., Waialae Stream at USGS 16019000), median baseflow is equivalent to a flow between  $Q_{80}$  and  $Q_{90}$  of total flow<sup>8</sup>. The perennial

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<sup>7</sup> Cheng, C.L. 2020. Low-flow characteristics of streams from Wailua to Hanapepe, Kaua‘i, Hawai‘i. U.S. Geological Survey Scientific Investigations Report 2020-5128. 57 p.

<sup>8</sup> Cheng, C.L. 2020. Low-flow characteristics of streams from Wailua to Hanapepe, Kaua‘i, Hawai‘i. U.S. Geological Survey Scientific Investigations Report 2020-5128. 57 p.

streams diverted by the MWS fall under the latter, being supported by small, perched water bodies and seepage flowing from the swamp. For these reasons, establishing an interim IFS at  $Q_{80}$  maintains 100% of the baseflow in the stream. Particular streams with registered diversions have not been diverted by the MWS (e.g., East Kawela tributary, West Kawela) since at least 1997, when the transmission line was replaced. Therefore, abandonment is recommended.

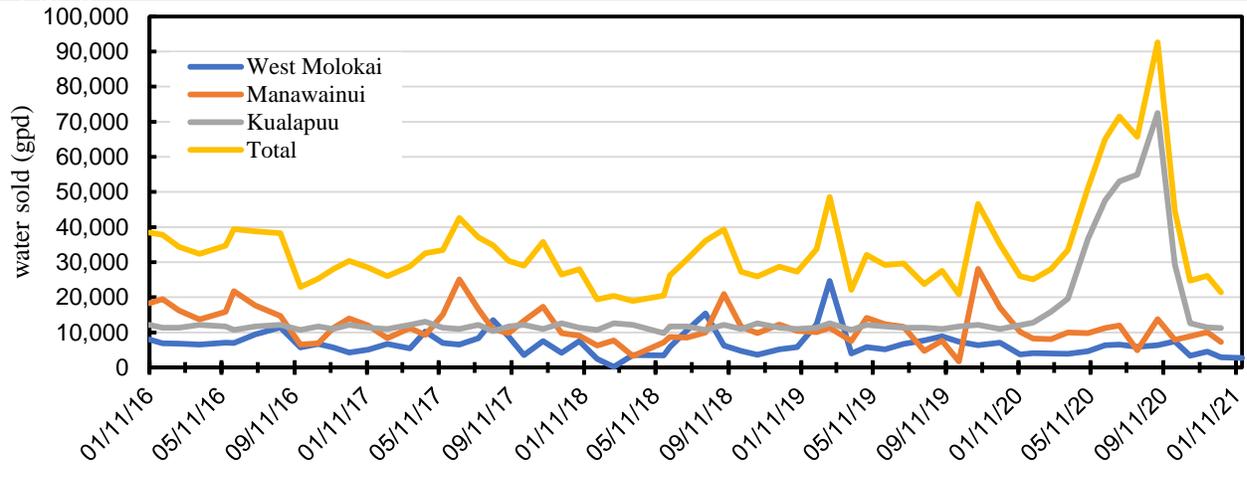
By establishing an interim IFS at the  $Q_{80}$  flow, 20% of the time zero water will be available for non-instream uses. In order to maintain the 75,000 gpd of current demand (i.e., 42,000 gpd of use + 33,000 gpd of evaporative loss) as well as the demand of potential public trust uses (i.e., domestic and DHHL), a volume of water greater than this demand must be diverted during higher flow periods to support storage for use during low-flow periods.

### **End Uses of Molokai Properties Water Systems**

Molokai Properties has three subsidiary utilities: Waiola O Molokai (WOM), Molokai Public Utilities, Inc (MPU), and Mosco, Inc. Mosco is the wastewater utility, while WOM and MPU are water delivery utilities. The WOM utility operates a potable water system that services the Kalae, Kualapu'u, Ho'olehua, Manawainui, Mauna Loa, and Kaluako'i areas, now solely delivering water from Well 17. MPU has provided water service in the Kaluako'i area in west Moloka'i since 1981. When Molokai Properties ceased operations of its hotel and resort facilities in 2007, it could no longer afford to manage both utilities at a loss and tried to sell them. The PUC intervened and allowed a temporary rate increase until the utilities could apply for a permanent rate increase. Two reasons why these water utilities are so expensive to run is that: 1) the sources are very far from many of the end uses, necessitating the repair and maintenance of many tens of miles of pipelines, some of which are very old; and 2) both systems require the use of costly booster pumps to distribute water to their end uses. For the year 2010, WOM had 4,580 service connections and billed 50,000,000 gallons, resulting in an average usage of 10,900 gallons per connection. Once the Mauna Loa Lodge and Kaluako'i resorts were closed, the costs to treat water at Puunana declined precipitously (e.g., it was as high as \$140,860 in 2004). Once the potable pipeline connecting Well 17 to Mauna Loa was completed, there was no need to operate the Puunana WTF and non-potable water is being piped directly to Mauna Loa.

Water from the non-potable mountain water system is delivered to various customers in three distinct areas by Molokai Properties: West Molokai, Manawainui Industrial Area, and Kualapu'u. The variability in water delivery is depicted in Figure 9. The West Molokai customers also includes the livestock water demands of Molokai Properties. The large increase in demand in 2020 is the result of deliveries to Kualapu'u Ranch for a new hemp agricultural business referenced above, which has also ceased operations in February 2022.

**Figure 9.** Monthly non-potable water sold by system and in total from the mountain water system. [flow in average gallons per day (gpd)].



### AVAILABILITY OF ALTERNATIVE SOURCES

In the State of Hawai‘i Supreme Court Ruling<sup>9</sup> on the contested case hearing on the water use permit application filed by Kukui (Molokai) (a water utility of Molokai Ranch and now Molokai Properties), the Supreme Court ruled that the Commission failed to consider the feasibility of alternative sources of water needed to balance the distribution of scarce public trust resources. While the Commission ordered Kukui (Molokai) to complete an analysis of the use of non-potable water to meet non-potable needs in the Kaluako‘i Development in its final Decision & Order, such an analysis has not been submitted to the Commission. Commission staff considers surface water already transmitted to Mauna Loa town, which could then be delivered by gravity to the Kaluako‘i Development, as a viable alternative to groundwater. The interrelationship between potable and non-potable water supplies, the various utilities, and their services areas for Molokai Properties is provided in Figure 10.

Moloka‘i is a water management area and groundwater withdrawals for Maui County, DHHL, and Molokai Properties all occur in the Kualapu‘u aquifer system within half a mile of each other. There is high potential of increased upconing among the wells such that saltwater intrusion will affect the viability of a water source. Further, reductions to submarine groundwater discharge may have negative consequences for coastal ecosystems (Figure 11). The Commission also seeks to use water for its most appropriate purpose; that is groundwater for human consumption and surface water for non-potable irrigation needs.

### Groundwater Alternative: Well 17 Water Use Permit Application by Molokai Properties

In their latest water use permit application (WUPA) for Well 17 (Well No. 4-0901-001), Molokai Properties identified existing and planned potable water uses. While the application only specifies the water sourced from Well 17, there are non-potable water deliveries to these same uses within the various service areas. The total and per unit average daily need of existing and planned uses by service area for potable and non-potable water is identified in Table 7. Most of

<sup>9</sup> Supreme Court of the State of Hawai‘i. No. 24856. Appeal from the Commission on Water Resource Management (Case No. CCH MO97-1). December 26, 2007.

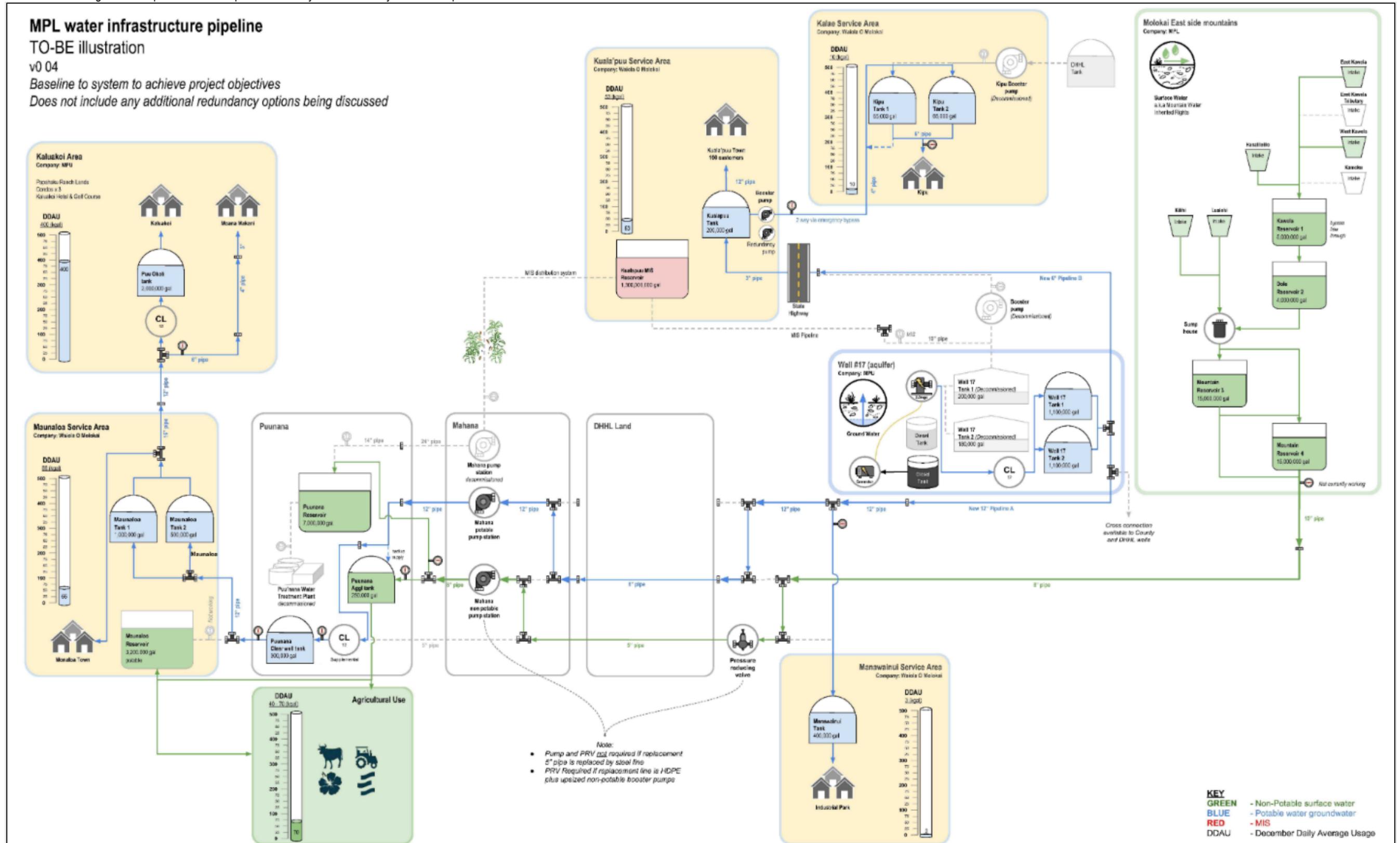
the existing metered uses are below Maui County water demand estimate standards with the exception of the Kaluako‘i Resort Residences, which have an average of 1,288 gpd per unit. This use is described by Molokai Properties in their WUPA as both domestic consumption and irrigation of landscaping and agriculture in agriculturally zoned parcels. However, in 1968, the State Land Use Commission approved the rezoning of 3,305 acres of land in the Kaluako‘i region from agriculture to urban for the first phase of the Kaluako‘i Resort Development; and no parcels in the resort are zoned agriculture.

There are multiple locations where potable water is being used to meet non-potable needs: Kipu Golf Course Office Area landscaping (area unknown); Kaluako‘i Hotel landscaping (18.12 acres); Kaluako‘i Resort Condo landscaping (35.448 acres); Kaluako‘i Resort Residences (using 2x the county residence rate). Further, there are some inconsistencies in water use reporting for the Manawainui Industrial Park, which was historically fed only by the mountain water system. The three current tenants in the Manawainui Industrial Park (Tri-L, Space Options, and Swenson Construction) now have metered usage of both potable and non-potable water. Tri-L is a concrete manufacturer whose 5-year average usage of 13,338 gpd is described as 30% office (4,001 gpd) and 70% from surface water (9,337 gpd) but their non-potable metered usage is 7,358 gpd. While the current total water use reflects the use with much of the existing Kaluako‘i Resort closed, the estimated existing water demand in Table 7 reflects if the built resort infrastructure were restored as originally built and reopened. Overall, Molokai Properties estimated total existing potable water use is 447,878 gpd (0.448 mgd). However, the Kaluako‘i Resort landscaping and Kaluako‘i Hotel landscaping 96,152 gpd (0.096 mgd) demand is currently met with potable water. With appropriate infrastructure, the residential landscaping and the currently closed Kaluako‘i golf course water use could be met with non-potable water available from the Mauna Loa Reservoir or the reused water provided by the wastewater treatment facility, or a combination of both. Thus, the reasonable potable demand is only 357,360 gpd.

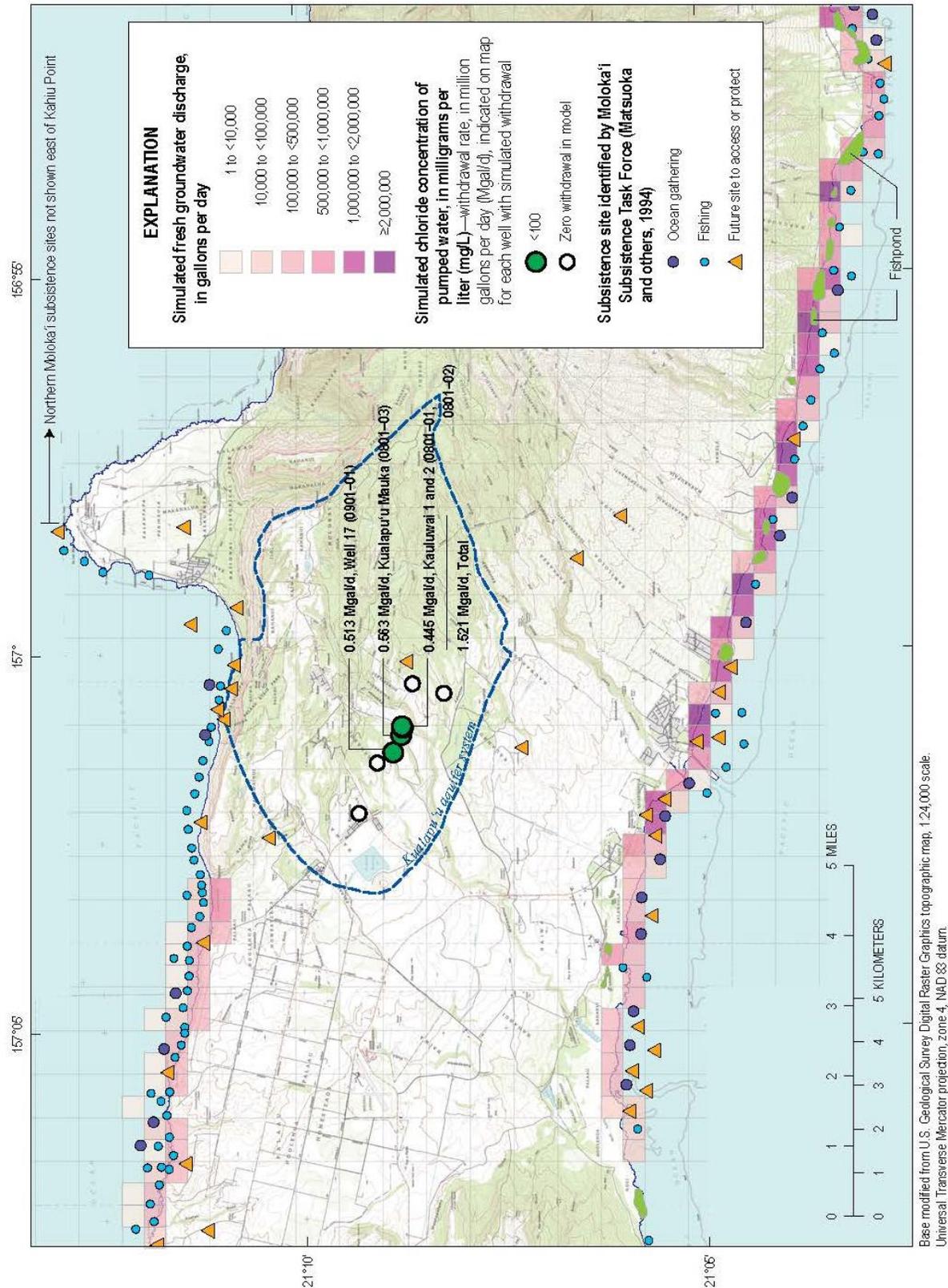
### **Recycled Water Alternative**

When the Kaluako‘i hotel was open, treated water from the Kaluako‘i wastewater treatment facility (WWTF) was available to support some of the non-potable irrigation needs of Kaluako‘i including the golf course and resort landscaping. The facility consists of two 50,000 gpd treatment units and a 60,000 gpd unit. The maximum mean daily flow capacity is 160,000 gpd. In 2000, the former resort owner Kukui (Molokai) Inc., was found in violation of federal sewage standards since 1989. In the 2004 PUC docket (03-0400) for the utility operator, the system consisted of 351 residential customers, 5 single-family customers in Molokai Fairways subdivision, 346 multi-family/hotel customers in 3 associations, and the Kaluako‘i golf course and was operating at 25% capacity.

Figure 10. Schematic diagram of the potable and non-potable water systems owned by Molokai Properties as of 2021.



**Figure 11.** Baseline groundwater withdrawal rates from wells and fresh groundwater discharge along coastal regions of central Molokai. (Source: Oki et al., 2019).



**Table 7.** Estimated existing and planned potable and non-potable water uses sourced from Well 17 (potable) and the Molokai Ranch mountain water system (non-potable) for Molokai Properties utilities. All values in gallons per day (gpd) [note: WOM = Waiola O Molokai; MPU = Molokai Public Utilities; ac = acres] \*based on 5-year average monthly meter readings for potable (2013-2017) or non-potable (2016-2021)

| Service Area<br>(Utility) | Use                                  | units    |         | Water Use Rate*  |             | Existing Total Water Use* |                     | Planned Total Water Use |             |
|---------------------------|--------------------------------------|----------|---------|------------------|-------------|---------------------------|---------------------|-------------------------|-------------|
|                           |                                      | Existing | Planned | Potable          | Non-Potable | Potable                   | Non-Potable         | Potable                 | Non-Potable |
| <b>Kala'e (WOM)</b>       |                                      |          |         |                  |             |                           |                     |                         |             |
|                           | Kipu Residences                      | 18       | 7       | 439              |             | 7,906                     |                     | 10,975                  |             |
|                           | Kipu Golf Course Office Area         | 1        | 0       | 629              |             | 629                       |                     | 629                     |             |
| <b>Kualapu'u (WOM)</b>    |                                      |          |         |                  |             |                           |                     |                         |             |
|                           | Residences                           | 122      | 42      | 196              |             | 23,877                    |                     | 32,144                  |             |
|                           | Reed House                           | 1        |         |                  | 6,069       |                           | 6,069               |                         | 6,069       |
|                           | Shafer House                         | 1        |         |                  | 6,069       |                           | 6,069               |                         | 6,069       |
|                           | County Park                          | 1        | 0       | 1,047            |             | 1,047                     |                     | 2,332                   |             |
|                           | Aka'ula School                       | 1        |         | 236              |             | 236                       |                     | 529                     |             |
|                           | Commercial businesses                | 5        | 1       | 1,010            |             | 5,052                     |                     | 6,060                   |             |
|                           | Kualapuu Ranch <sup>1</sup>          |          |         |                  |             |                           | 20,000              |                         |             |
| <b>Manawainui (WOM)</b>   |                                      |          |         |                  |             |                           |                     |                         |             |
|                           | Manawainui Industrial Park           | 3        | 16      | 933              |             | 2,798                     | 775                 | 17,727                  | 775         |
|                           | Swenson (business)                   | 1        | 0       |                  |             | 480                       | 768                 |                         | 768         |
|                           | Space Options (business)             | 1        | 0       |                  |             | 1,519                     | 1,117               |                         | 1,117       |
|                           | Tri-L (concrete)                     | 1        | 0       |                  |             | 13,338                    | 7,359               |                         | 7,359       |
|                           | The Gas Co.                          |          |         |                  |             |                           | 3                   |                         | 3           |
|                           | Maui Electric Co.                    |          |         |                  |             |                           | 827                 |                         | 827         |
|                           | Goodfellow Inc (office)              |          |         |                  |             |                           | 567                 |                         | 567         |
|                           | Goodfellow Inc (crusher)             |          |         |                  |             |                           | 0                   |                         | 0           |
|                           | Oliwai Pastures/Kamakana Farms       |          |         |                  |             |                           | 137                 |                         | 137         |
|                           | Molokai Sea Farms                    |          |         |                  |             |                           | 4,033               |                         | 4,033       |
|                           | County of Maui baseyard <sup>2</sup> |          |         |                  |             | 6,666                     | 500                 | 6,666                   | 500         |
| <b>Maunaloa (WOM)</b>     |                                      |          |         |                  |             |                           |                     |                         |             |
|                           | Molokai Ranch Livestock water        |          |         |                  |             |                           | 13,181              |                         | 13,181      |
|                           | Neighborhood Residences              | 143      | 323     | 251              |             | 37,192                    |                     | 81,073                  |             |
|                           | Molokai Land Trust                   |          |         |                  |             |                           | 122                 |                         | 122         |
|                           | Sakugawa & Sons (livestock; ac)      |          |         |                  |             |                           | 185                 |                         | 185         |
|                           | ARInc (lessee)                       |          |         |                  |             |                           | 78                  |                         | 78          |
|                           | Kaupoa Camp                          | 80       | 0       | 112              |             | 8,950                     |                     | 8,950                   |             |
|                           | Kolo Camp                            | 20       | 0       | 38               |             | 761                       |                     | 761                     |             |
|                           | Paniolo Camp                         | 80       | 0       | 40               |             | 3,225                     |                     | 3,225                   |             |
|                           | Lodge                                | 22       | 0       | 359              |             | 7,903                     |                     | 7,903                   |             |
| <b>Kaluako'i (MPU)</b>    |                                      |          |         |                  |             |                           |                     |                         |             |
|                           | Papohaku Beach Park                  | 1        | 0       | 12,176           |             | 12,176                    |                     | 12,176                  |             |
|                           | Papohaku Beach Access                | 5        | 1       | 377              |             | 1,883                     |                     | 2,262                   |             |
|                           | Kaluakoi Resort Condos               | 124      | 350     | 350 <sup>4</sup> |             | 43,400                    |                     | 122,500                 |             |
|                           | Kaluakoi Resort Landscaping (ac)     | 35.448   | 0       |                  | 1,753       |                           | 62,140 <sup>3</sup> |                         | 62,140      |
|                           | Kaluakoi Hotel units                 | 148      | 0       | 350 <sup>4</sup> |             | 51,800                    |                     | 51,800                  |             |
|                           | Kaluakoi Hotel Landscaping (ac)      | 15.12    | 18.12   |                  | 1,877       |                           | 28,378 <sup>3</sup> |                         | 34,012      |
|                           | Kaluakoi GC Facilities               | 5        | 0       | 600 <sup>4</sup> |             | 3,000                     |                     | 3,000                   |             |
|                           | Kaluakoi Resort Residences           | 106      | 325     | 1,228            |             | 130,188                   |                     | 399,100                 |             |
|                           | Kaluakoi Condos                      | 0        | 284     | 350 <sup>4</sup> |             | 0                         | 0                   | 113,750                 |             |
|                           | Kaluakoi Hotel & Apartments          | 0        | 481     | 350 <sup>4</sup> |             | 0                         | 0                   | 168,350                 |             |
|                           | total                                |          |         |                  |             | 454,544                   | 41,790              | 1,051,912               | 137,942     |

<sup>1</sup>2020 data only (not included in total); <sup>2</sup>from communication with County of Maui; <sup>3</sup>currently being met with potable water from Well 17; included in existing potable water use total; <sup>4</sup>county standard used

## OTHER PUBLIC TRUST USES OF WATER

### **Maui County Municipal System**

Maui Department of Water Supply (DWS) currently operates a municipal water system, including domestic users, that relies upon groundwater from one well in the Kualapu‘u aquifer system and one in the Kawela aquifer system. In 1966, the county once operated a surface water system that supplied potable water all the way to the Kaunakakai region via a gravity-fed pipeline<sup>10</sup>. This source was dependent on surface runoff captured at Maka‘ele‘ele Dam, located at the 2,365 feet elevation above Kalae in the Mokomoko Gulch below Kapuna Spring. Approximately 55,000 gpd was supplied by this system while the remainder of water demand was met via the Maui-type well (now called Kawela Shaft) constructed by the American Sugar Company in 1920.

### **Hawaiian Home Lands**

A component in the assessment of water use includes an analysis of the water needs of the Department of Hawaiian Home Lands (DHHL) parcels within or near the surface water hydrologic unit. The mission of DHHL is to effectively manage the Hawaiian Home Lands trust and to develop and deliver land to native Hawaiians<sup>11</sup>. In June 2005, DHHL published the Molokai Island Plan update, which serves to examine infrastructure needs, provide development cost estimates, and identify priority areas for homestead development. Of the more than 31,000 acres of DHHL land on the island of Molokai, there are none in the Kawela hydrologic unit. Most of DHHL’s land holdings are in the central plateau region of Ho‘olehua, some of which is serviced by the Molokai Irrigation System (Figure 13). Other nearby tracts include the Kalama‘ula, Kapa‘akea tracts along the southern coast. There was once a non-potable DHHL water system which diverted water from Waihānau Stream to Kalae and Kualapu‘u as recently as 1982, although that system is not currently being used. Water was diverted from the Waihānau Stream at 2,264 feet in elevation through 2,800 feet of tunnel to an intake structure in Kahapa‘akai Gulch. From there, it was delivered through an 8-inch and 6-inch pipeline to one 2-million gallon steel tank and two 80,000-gallon redwood storage tanks at Kauluwai then via two 6-inch lines to two 3.5-million gallon concrete reservoirs in Ho‘olehua for homesteads. In 1966, the DHHL groundwater source (USGS Well 16) was used only as a supplemental source since energy costs to pump the well were great. The system averaged 285,000 gpd with 65,000 gpd for Kalaniana‘ole colony on the southern coastal area and 220,000 gpd used in the Ho‘olehua area, not including water delivered by the MIS<sup>12</sup>. Historically, DHHL also operated a stream diversion in Kamiloloa Gulch on the SF Kaunakakai Stream.

The State Legislation has clarified that lessees of the Hawaiian Homes Commission receives priority usage from the MIS and that two-thirds of the diverted water would be distributed to DHHL beneficiaries for domestic and agricultural uses. In the 2017 State Water Projects Plan (SWPP) Update, Ho‘olehua and Kalama‘ula tracks are primarily zoned agriculture and rural, with an existing potable water demand of 0.635 mgd. Some demand is met with water from the Maui DWS system. The 2017 SWPP update projected a 0.6338 mgd potable water demand for the two tracts by 2021 and 0.7926 mgd potable water demand for long-range planning.

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<sup>10</sup> State of Hawaii, 1966.

<sup>11</sup> PBR Hawaii, 2004. Maui Island Plan: Prepared for State of Hawaii, Department of Hawaiian Home Lands, 340 p.

<sup>12</sup> State of Hawaii, 1966.

A substantial amount of non-potable water is needed to meet the reasonable needs of DHHL. This demand can be met with water from the MIS, an unused non-potable system that diverts water from Waihānau, or water from the Mountain Water System. In the 2004 Update to the Agriculture Water Use and Development Plan, the MIS served approximately 235 customers with a mean daily non-potable demand of 3.353 mgd.

To service the Kalama‘ula tract, the MIS would have to be expanded and additional sources or conservation measures identified. The long-term estimated non-potable water demand was 5.3599 mgd for Ho‘olehua and 0.7316 mgd for Kalama‘ula resulting in a total demand for the region of 6.0914 mgd.

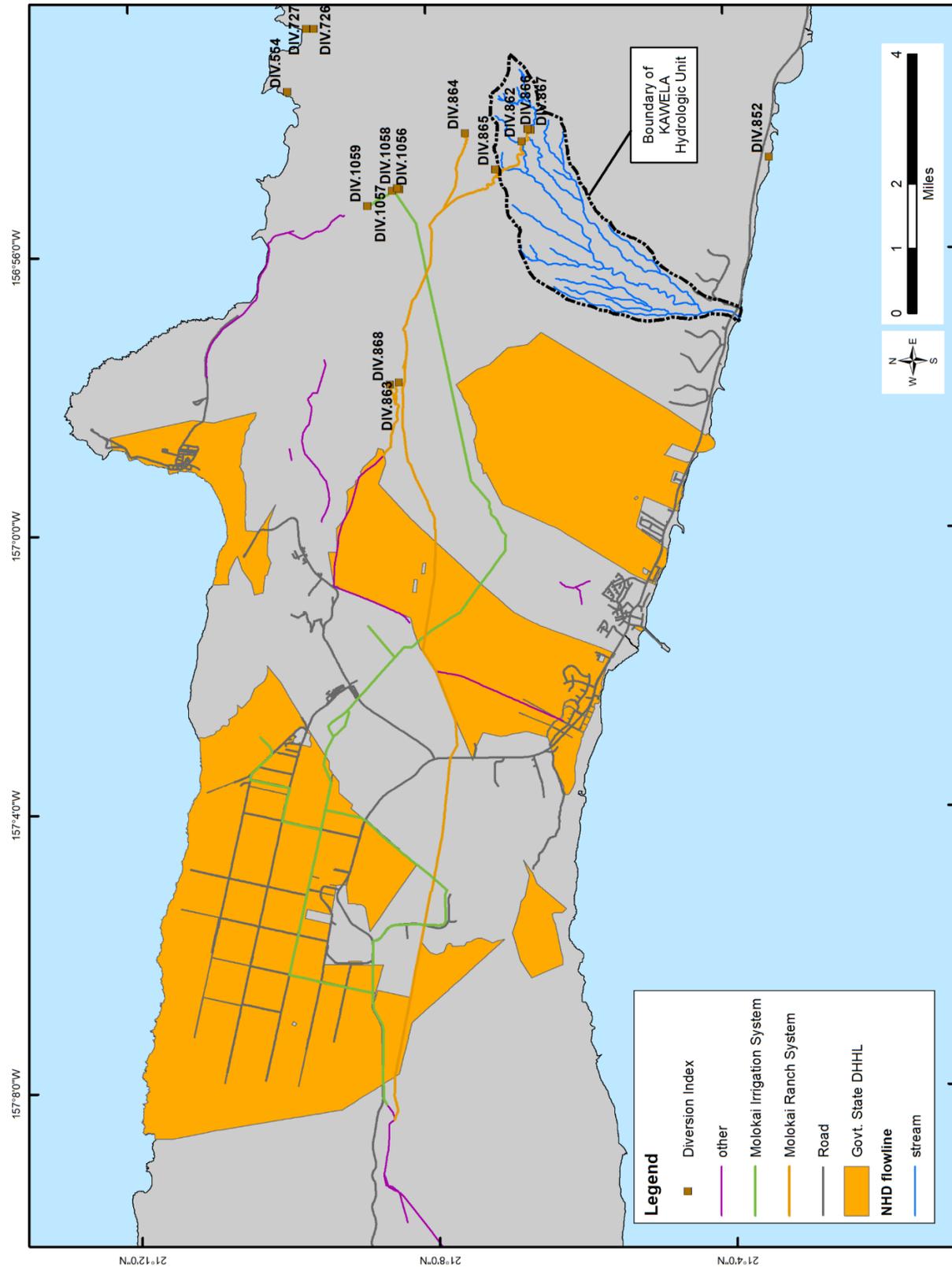
## ANALYSIS OF POTENTIAL ACTION ALTERNATIVES

At the regularly scheduled Commission meeting March 15, 2022 staff presented two submittals that proposed instream flow standards, surface water reservations for the DHHL, and the abandonment of unused diversions associated with the Mountain Water System and the Molokai Irrigation System (Exhibit 14 and Exhibit 15). The Commission received testimony requesting the full abandonment of diversion 867 on East Kawela Stream (Exhibit 16). The Commission requested that staff evaluate additional alternatives to that presented in the March 15 meeting. In response, Commission staff have provided two supplementary analyses: (1) an analysis of the availability of water if the East Kawela diversion were abandoned; and (2) an analysis of the magnitude of flow at exceedance values greater than  $Q_{50}$  in East Kawela (i.e., less common high flow events) and the availability of water from East Kawela with an interim IFS of the  $Q_{50}$  value of 0.336 mgd.

### **1. Analysis of Water Available with the Abandonment of Diversion 867 on East Kawela**

The abandonment of diversion 867 on East Kawela (mean divertible flow approximately 0.22 mgd) will limit the total amount of water available for non-instream uses. Currently only diversion 867 and diversion 864 on the Hanalilolilo tributary of Waikolu Stream (mean divertible flow approximately 0.15 mgd) are connected to the mountain water system. While water diverted by diversion 864 may meet current demands of Molokai Properties, without any water from diversion 867 on East Kawela, insufficient diversion and transmission capacity is available from Hanalilolilo to fill up the reservoirs during high flow periods to meet the non-potable water needs of both Molokai Properties and DHHL.

Figure 13. Location of DHHL parcels in Central Molokai



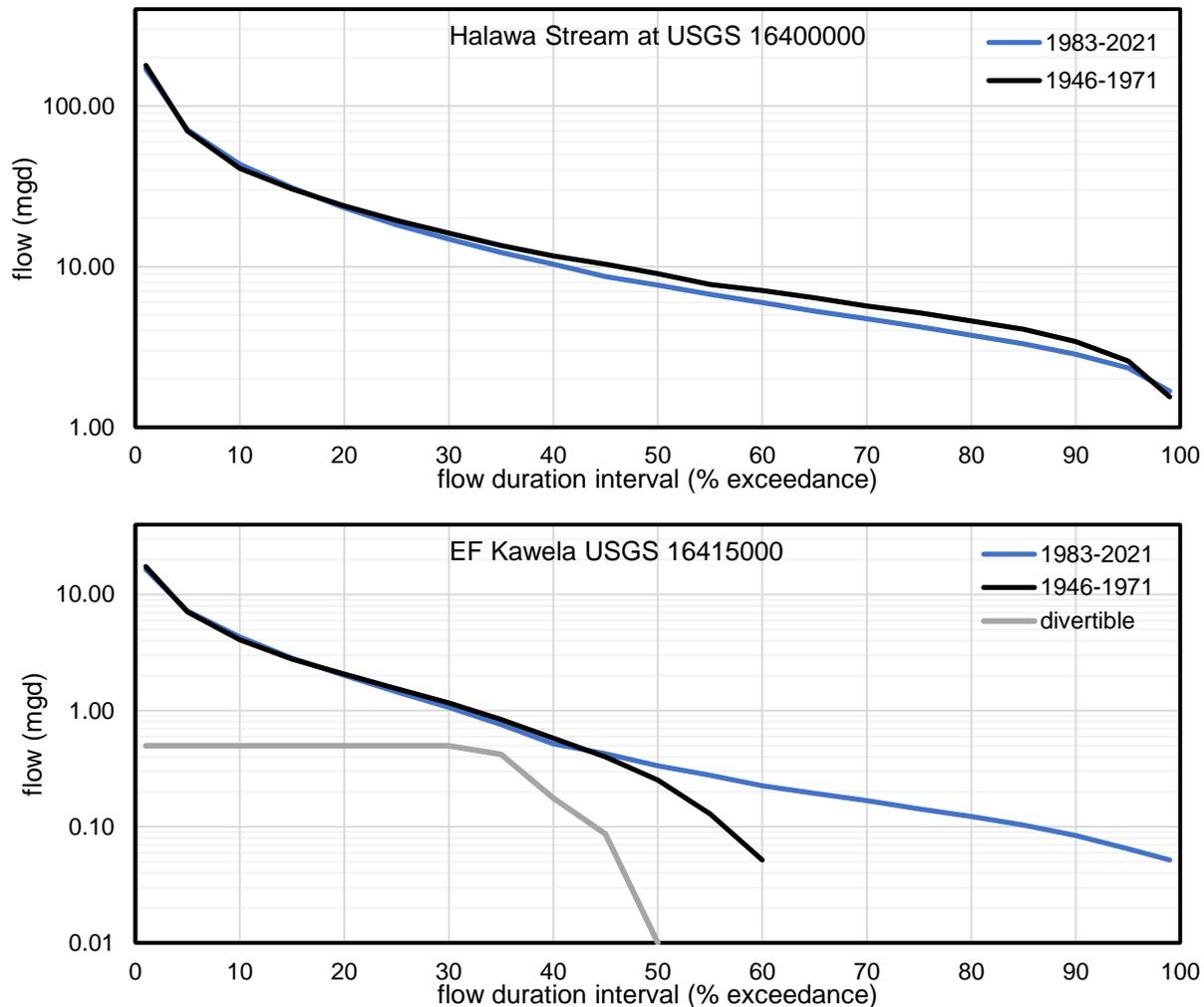
## **2. Analysis of Water Available with an Interim IFS of $Q_{50}$ (0.336 mgd) on East Kawela**

At the East Kawela Intake, current continuous monitoring of low-flow conditions ( $<Q_{50}$ ) limits the evaluation of available water during higher flow conditions. However, continuous monitoring of streamflow on East Kawela from 1946-1971 provides a record of flow exceedance for streamflows greater than  $Q_{50}$ . Using the overlapping continuous monitoring record of Halawa Stream at USGS 16400000, the magnitude of higher flow exceedance values for East Kawela can be estimated (Figure 14). Staff estimates that 30% of the time, the intake capacity of 0.50 mgd will be exceeded and that 20% of the time, some flow between 0 and 0.50 mgd will be available to be diverted as identified in Table 8. Given these flow duration values, staff estimates that on a long-term basis, approximately 0.18 mgd will be available for off-stream use from East Kawela with an interim IFS of the  $Q_{50}$  flow (0.336 mgd).

For example, for the period from September 1, 2021 to November 17, 2021 (78 days), with an interim IFS of 0.336 mgd, water could have been diverted on 38 days (49%) accumulating a total of 14.75 million gallons (Figure 15). This total divertible flow could be stored in the large reservoirs associated with the mountain water system and if used equally across the period, would have resulted in a mean of 0.189 mgd available.

The mean divertible flow in the Hanalilolilo tributary of Waikolu Stream at diversion 864 is approximately 0.15 mgd. Thus, the combined flow available from these two diversions, on a long-term basis, is expected to be approximately 0.339 mgd (339,000 gallons per day). This value is sufficient to meet the current uses of Molokai Ranch (75,000 gallons per day), the planned total uses of Molokai Ranch (171,000 gallons per day), and a reservation of 0.15 mgd (150,000 gallons per day) for DHHL.

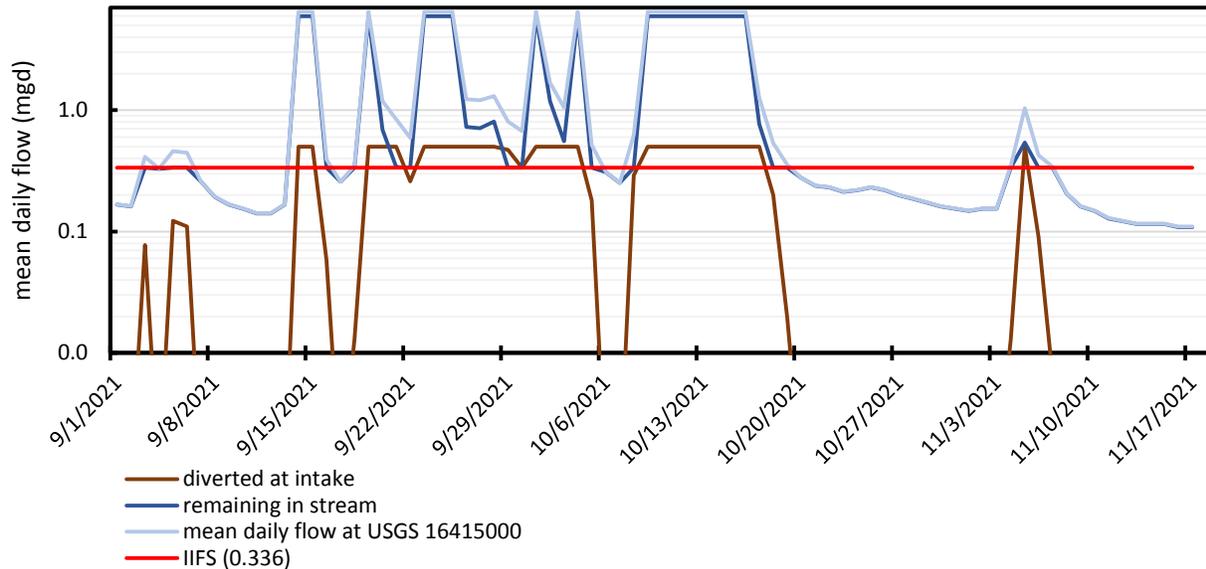
**Figure 14.** Flow duration curve for Halawa Stream at USGS 16400000 for 1946-1971 and 1984-2021 periods of record (top); high flow values for East Fork Kawela at USGS 16415000 from 1946-1971 and estimated for 1984-2021 based on percent change between periods of record for USGS 16400000 (bottom). Total divertible flow available at diversion 867 (capacity 0.5 mgd) with an interim IFS of 0.336 mgd (Q<sub>50</sub>) displayed (bottom).



**Table 9.** Moderate to high-flow exceedance values for Halawa Stream at USGS 16400000 for the 1946-1971 and 1983-2021 periods of record, and the East Kawela Stream at USGS 16415000 for the 1946-1971 period of record. 1983-2021 values for East Fork Kawela Stream estimated based on percent change in values for Halawa Stream. Divertible flow available up to intake capacity of 0.50 mgd.

| Stream           | Period of Record | method     | Q <sub>10</sub> | Q <sub>20</sub> | Q <sub>30</sub> | Q <sub>35</sub> | Q <sub>40</sub> | Q <sub>45</sub> | Q <sub>50</sub> |
|------------------|------------------|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Halawa           | 1946-1971        | continuous | 40.8            | 23.9            | 16.2            | 13.6            | 11.6            | 10.3            | 9.1             |
|                  | 1983-2021        | continuous | 43.3            | 23.3            | 14.9            | 12.3            | 10.3            | 8.9             | 7.8             |
|                  |                  | % change   | 6.2%            | -2.7%           | -8.0%           | -9.5%           | -11.1%          | -16.3%          | -15.0%          |
| East Fork Kawela | 1946-1971        | continuous | 4.07            | 2.07            | 1.16            | 0.84            | 0.58            | 0.40            | 0.34            |
|                  | 1983-2021        | estimated  | 4.32            | 2.01            | 1.07            | 0.76            | 0.52            | 0.43            | 0.28            |
|                  |                  | divertible | 0.50            | 0.50            | 0.50            | 0.42            | 0.18            | 0.09            | 0.00            |

**Figure 15.** Mean daily flow at USGS 16415000 above diversion 867 on East Kawela, diverted at diversion 867, and remaining in stream with an interim IFS (IIFS) of 0.336 million gallons per day (mgd) from September 1, 2021 to November 17, 2021.



### 3. Summary of Alternative Scenarios

Following discussions held at the March 15, 2022 public Commission meeting, four alternatives were evaluated in terms of the potential to balance instream and non-instream public trust uses and the availability of water for reasonable and beneficial uses:

#### Alternative 1: March 2022 Proposed Action

Instream Result: would establish interim IFS of 100% baseflow conditions for East Kawela, Kamoku and Lualohe streams while abandoning East Kawela Tributary, West Kawela, and Kalihi stream diversions

Non-instream Result: would provide sufficient water for current and potential future non-potable water needs of Molokai Properties and DHHL’s reservation

#### Alternative 2: March 2022 Proposed Action + No East Kawela (abandonment of East Kawela diversion 867)

Instream Result: would fully restore East Kawela stream and an interim IFS of 100% baseflow conditions for Kamoku and Lualohe streams while abandoning East Kawela Tributary, West Kawela, and Kalihi stream diversions

Non-instream Result: would provide sufficient water for current water needs of Molokai Properties, but not meet DHHL’s reservation

#### Alternative 3: No East Kawela (abandonment of East Kawela diversion 867)

Instream Result: would fully restore East Kawela stream with no modifications to Kamoku, Lualohe, or Kalihi diversions

Non-instream Result: would provide sufficient water for current water needs of Molokai Properties but only if all other stream diversions were connected to the mountain water system could it meet DHHL’s reservation.

**Alternative 4: Q<sub>50</sub> East Kawela interim IFS + Lualohe interim IFS**

Instream Result: would restore all flows below 0.339 mgd (Q<sub>50</sub>) on East Kawela Stream and an interim IFS of 100% baseflow conditions for Lualohe Stream while abandoning East Kawela Tributary and West Kawela stream diversions, with no modifications to Kamoku and Kalihi diversions

Non-instream Result: would provide sufficient water for current non-potable water needs of Molokai Properties and DHHL’s reservation

Table 9 provides a summary of the alternatives discussed for water available for non-instream use under idealized conditions (i.e., if all registered diversions were connected to the system) and under current system operations. Appendices 18 and 19 provide available divertible low-flow statistics for each stream.

**Table 9.** Management alternatives analyzed by Commission staff by stream diversion

| Alternative | East Kawela                               | East Kawela Tributary | West Kawela   | Kamoku                             | Lualohe                            | Kalihi        | Noninstream uses met |
|-------------|---|-----------------------|---------------|------------------------------------|------------------------------------|---------------|----------------------|
| 1           | IIFS = Q <sub>80</sub><br>(100% baseflow) | FULLY RESTORE         | FULLY RESTORE | Q <sub>80</sub><br>(100% baseflow) | Q <sub>80</sub><br>(100% baseflow) | FULLY RESTORE | MPL + DHHL           |
| 2           | FULLY RESTORE                             | FULLY RESTORE         | FULLY RESTORE | Q <sub>80</sub><br>(100% baseflow) | Q <sub>80</sub><br>(100% baseflow) | FULLY RESTORE | MPL                  |
| 3           | FULLY RESTORE                             | No IIFS               | No IIFS       | No IIFS                            | No IIFS                            | No IIFS       | MPL                  |
| 4           | IIFS = Q <sub>50</sub><br>(>baseflow)     | FULLY RESTORE         | FULLY RESTORE | No IIFS                            | Q <sub>80</sub><br>(100% baseflow) | No IIFS       | MPL+DHHL             |

RECOMMENDED ACTIONS:

Based on the above, and all applicable authority, the Commission staff recommend Alternative 4 with the following specific recommendations:

1. PROPOSED ACTION: INTERIM IFS ON EAST KAWELA STREAM

- Staff recommends an interim IFS of a mean daily flow of 0.53 cfs (0.34 mgd) below the intake on East Kawela Stream at diversion 867. This flow approximately represents the Q<sub>50</sub> flow at USGS 16415000 above the intake. The interim IFS will support the outstanding or substantial recreational, ecological, and cultural resources present in Kawela Stream, including supporting habitat for threatened or endangered damselfly species, amphidromous aquatic biota, and ecologically and culturally important riparian species present in East Kawela Stream. The interim IFS will protect instream public trust uses including water in its natural state needed to support endangered damselflies and riparian plants, groundwater recharge, domestic uses, and water for traditional and customary practices while providing for some non-instream uses of water.

IMPLEMENTATION

- Staff recommends that the intake structure be modified such that the invert to the intake is greater than the diversion dam and only flows greater than 0.34 mgd flow into the intake (e.g., build up the structure around the intake to prohibit low flows from entering).
- Molokai Properties will submit a plan for modifying the intake to be considered by Commission staff within 90 days of Commission action.

MONITORING

- Molokai Properties will report the metered daily flow diverted from the stream monthly and staff will measure streamflow as necessary to ensure compliance.
- Staff will work with Molokai Properties and the community to verify that the interim IFS is being met

ENFORCEMENT

- Staff recommends that the interim IFS be met at all times. Molokai Properties has sufficient storage capacity to meet If insufficient water is available to meet the interim IFS as measured at USGS station 16415000, then no water shall be diverted at diversion 867.

2. PROPOSED ACTION: INTERIM IFS ON SF KUHUAAWI AT LUALOHE INTAKE

- Staff recommends an interim IFS of a mean daily flow of 0.05 cfs (0.032 mgd) below the Lualohe intake at diversion 863 on SF Kuhuaawi Stream. This flow approximately represents the Q<sub>80</sub> flow above the intake. The interim IFS will provide high quality habitat for endemic threatened or endangered damselflies, promote the aesthetic and recreational values of the stream, and support culturally and ecologically important riparian plants.

#### IMPLEMENTATION

- Staff recommends that the diversion be modified such that the intake pipeline only diverts flow greater than the interim IFS at diversion 863.
- Molokai Properties will submit a plan for modifying the outflow to be considered by Commission staff within 90 days of Commission action.

#### MONITORING

- Molokai Properties will report the metered daily flow diverted from the stream monthly and staff will measure streamflow as necessary to ensure compliance.
- Staff will work with Molokai Properties and the community to verify that the interim IFS is being met.

#### ENFORCEMENT

- Staff recommends that the interim IFS be met at all times. If insufficient water is available to meet the interim IFS as measured at the index station on Waihānau at USGS station 16409000 (i.e., when mean daily flow drops below the  $Q_{80}$  flow), then no water shall be diverted at diversion 863.

### 3. PROPOSED ACTION: ABANDONMENT OF STREAM DIVERSION 866 EAST KAWELA TRIBUTARY

- Staff recommends that diversion 866 (East Kawela Tributary intake) be formally abandoned and all associated piping be removed as required by the Commission to provide high quality habitat for endemic threatened or endangered damselflies, promote the aesthetic and recreational values of the stream, increase the available habitat for endemic amphidromous fish, and support culturally and ecologically important riparian plants.

#### IMPLEMENTATION

- Molokai Properties will submit the Stream Diversion Works Permit for abandonment to be considered by Commission staff within 90 days of Commission action.

### 4. PROPOSED ACTION: ABANDONMENT OF STREAM DIVERSION 862 WEST KAWELA STREAM

- Staff recommends that diversion 862 (West Kawela Intake) be formally abandoned and all associated piping be removed as required by the Commission to provide high quality habitat for endemic threatened or endangered damselflies, promote the aesthetic and recreational values of the stream, increase the available habitat for endemic amphidromous fish, and support culturally and ecologically important riparian plants.

#### IMPLEMENTATION

- Molokai Properties will submit the Stream Diversion Works Permit for abandonment to be considered by Commission staff within 90 days.

### 5. PROPOSED ACTION: EVALUATION OF UNUSED STREAM DIVERSIONS

- Staff recommends that Molokai Properties evaluate the feasibility of reconnecting currently unused stream diversion 865 on Kamoku Stream, diversion 863 at Lualohe

intake, and diversion 868 at Kalihi intake to make up for the reduced availability of water from East Kawela. Molokai Properties will return to the Commission within 180 days to update the Commission on progress of this evaluation. If Molokai Properties determines that it is not feasible to reconnect currently unused stream diversions to the Mountain Water System, then the Commission may request that some or all of those diversions be formally abandoned.

#### IMPLEMENTATION

- With the continued monitoring of streamflow at USGS 16415000 on East Fork Kawela, adjustments to the interim IFS may be made by future Commission action that ensures public trust and reasonable and beneficial uses of water are balanced with stream protection. The actions proposed in this submittal will improve instream flows and groundwater recharge that supports cultural and ecological systems along the coast.
- The Commission recommends that improvements to reduce reservoir evaporation may be made if additional water is required.

Ola i ka wai,



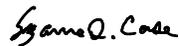
M. KALEO MANUEL  
Deputy Director

#### Exhibits:

1. Map of central Molokai with the Molokai Mountain System and Molokai Irrigation System identified.
2. February 15, 2022, Staff Submittal C1, Informational briefing and draft recommendations (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215C1.pdf>
3. List of Site Visits by Commission Staff to Waikolu, Kawela, Kaunakakai, and Manawainui hydrologic units.
4. June 25, 2002 Commission letter to Molokai Ranch regarding water use reporting for the Molokai Ranch Mountain System
5. July 11, 2002 response from Molokai Ranch
6. July 1, 2019 CDR.5310.4 Earthjustice Petition and Declaratory Order Against Waste (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215C1Ex5.pdf>
7. March 3, 2020 Molokai Properties Response to CDR.5310.4 (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215C1Ex6.pdf>
8. February 2, 2021 Commission letter request for information to Molokai Properties
9. April 12, 2021 response from Molokai Properties (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215C1Ex8.pdf>
10. July 8, 2021 Commission letter request for information to Molokai Properties
11. October 14, 2021 response from Molokai Properties

12. February 15, 2022 , Staff Submittal C1, Presentation (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215C1P.pdf>
13. February 15, 2022 , Staff Submittal C1, Testimony (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215C1T.pdf>
14. March 15, 2022 , Staff Submittal B4 (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215B4.pdf>
15. March 15, 2022 , Staff Submittal B4, Testimony (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220315B4T.pdf>
16. March 15, 2022 , Staff Submittal B5 (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220215B5.pdf>
17. March 15, 2022 , Staff Submittal B5, Testimony (*available online*)  
<https://files.hawaii.gov/dlnr/cwrmsubmittal/2022/sb20220315B5T.pdf>
18. Evaluation of low-flow divertible water under Alternatives 1 and 2
19. Evaluation of low-flow divertible water under Alternatives 3 and 4

APPROVED FOR SUBMITTAL:



SUZANNE D. CASE  
Chairperson

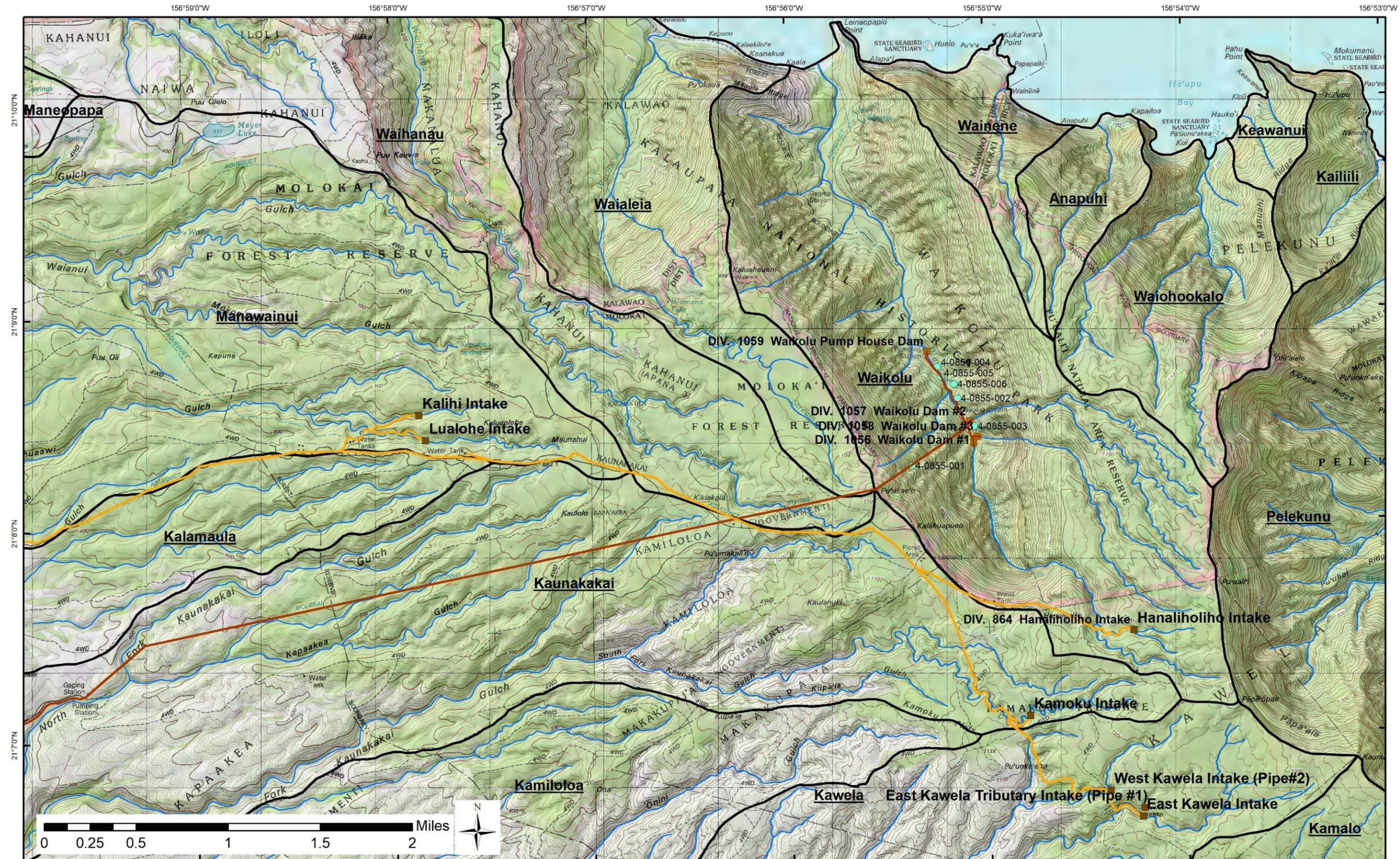


EXHIBIT 3

List of site visits by Commission Staff to Waikolu, Kawela, Kaunakakai, and Manawainui hydrologic units.

| <b>Date</b> | <b>Hydrologic Unit</b>         |
|-------------|--------------------------------|
| 05/02/2016  | Kawela                         |
| 05/03/2016  | Waikolu, Kaunakakai            |
| 05/04/2016  | Manawainui                     |
| 03/01/2017  | Kawela                         |
| 08/29/2017  | Waikolu                        |
| 08/30/2017  | Waikolu                        |
| 08/31/2017  | Waikolu                        |
| 10/05/2017  | Kawela                         |
| 10/06/2017  | Waikolu                        |
| 01/17/2018  | Kawela                         |
| 08/31/2018  | Kawela                         |
| 09/02/2018  | Kawela                         |
| 09/24/2018  | Waikolu                        |
| 03/29/2019  | Kawela                         |
| 04/17/2019  | Waikolu                        |
| 05/20/2019  | Waikolu                        |
| 08/26/2019  | Waikolu                        |
| 04/25/2020  | Waikolu                        |
| 07/15/2020  | Waikolu                        |
| 09/17/2020  | Waikolu                        |
| 11/19/2020  | Waikolu                        |
| 05/27/2021  | Waikolu                        |
| 07/25/2021  | Kawela                         |
| 07/26/2021  | Manawainui                     |
| 01/21/2022  | Waikolu                        |
| 01/22/2022  | Kawela, Kaunakakai             |
| 02/27/2022  | Manawainui, Kaunakakai, Kawela |

April 19, 2022

BENJAMIN J. CAYETANO  
GOVERNOR OF HAWAII



GILBERT S. COLOMA-AGARAN  
CHAIRPERSON

BRUCE S. ANDERSON  
MEREDITH J. CHING  
CLAYTON W. DELA CRUZ  
BRIAN C. NISHIDA  
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA  
DEPUTY DIRECTOR

STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
**COMMISSION ON WATER RESOURCE MANAGEMENT**  
P.O. BOX 621  
HONOLULU, HAWAII 96809

June 25, 2002

Mr. Harold Edwards  
Moloka'i Ranch, Ltd.  
745 Fort Street, #600  
Honolulu, HI 96813

Dear Mr. Edwards:

Moloka'i Ranch Mountain System  
Diversion Records

The Commission is beginning a process to gather information toward setting an interim instream flow standard for Waikolu Stream. One of the tributaries is Hanalilolilo Stream, which you divert. While the flows may seem minor, they should be noted for the record.

In reviewing our records, we find two matters standing in the way of understanding the importance of this diversion. First, your reporting is 28 months in arrears, a matter that should be addressed at your earliest opportunity. Reportage is required under the Water Code, and delinquency may be a violation subject to fines of up to \$1000 per day.

Second, your letter of May 14, 1997 indicates that Hanalilolilo Stream would be separately gaged, but the records submitted to date show it lumped together with East and West Kawela intakes. We understand that the pipeline to Hanalilolilo intake is being replaced, and that perhaps the gaging can now be upgraded. Please provide us with an update of the activities on this project.

Please respond to this letter within thirty (30) days.

If you have any questions, please contact Charley Ice of the Water Commission staff at 587-0251.

Sincerely,

A handwritten signature in black ink, appearing to read "Linnel T. Nishioka".

LINNEL T. NISHIOKA  
Deputy Director

CI:ss

April 19, 2022



MOLOKAI RANCH

RECEIVED  
E JUL 12 AIC: 46

July 11, 2002

Ms Linnel Nishioka  
Deputy Director  
COMMISSION ON WATER RESOURCE MANAGEMENT  
P O Box 621  
Honolulu, Hawaii 96809

Re: Molokai Ranch Mountain System Diversion Records

Please find enclosed records for our stream diversions which we had inadvertently not forwarded to your office. As indicated by the data we were successful in installing a new flow meter for the Hanoliholiho Intake in April 2000 and are now developing regular water use data for this diversion.

We regret our oversight in not reporting these flows. Should you have any further questions, please do not hesitate to have your staff call me at 534-9509.

Very truly yours,

MOLOKAI RANCH, LIMITED

Harold Edwards  
Senior Vice President  
Development Division

HE:ky  
Enclosure

*See record page 46*

April 19, 2022

DAVID Y. IGE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
**COMMISSION ON WATER RESOURCE MANAGEMENT**  
P. O. BOX 621  
HONOLULU, HAWAII 96809

SUZANNE D. CASE  
CHAIRPERSON

KAMANA BEAMER, PH.D.  
MICHAEL G. BUCK  
ELIZABETH A. CHAR, M.D.  
NEIL J. HANNAHS  
WAYNE K. KATAYAMA  
PAUL J. MEYER

M. KALEO MANUEL  
DEPUTY DIRECTOR

February 3, 2021

CERTIFIED MAIL  
RETURN-RECEIPT REQUESTED

*Ref: CDR.5310.4*

Calvert Chipchase  
Cades Schutte LLP  
1000 Bishop Street, Suite 1200  
Honolulu, HI 96813

Aloha Mr. Chipchase:

Thank you for submitting your Complaint / Dispute Resolution Response Form (Response), dated March 23, 2020, to the Commission on Water Resource Management (Commission) addressing the Complaint (CDR.5310.4) filed by Earthjustice on behalf of Moloka'i Nō Ka Heke.

Commission staff have some follow up data requests from Molokai Properties Limited (MPL) to move forward with an analysis of the Complaint. Please prepare your responses to the Commission by Friday, March 5, 2021.

1. As stated in the Response, in 2014 MPL resumed in-house operations of cattle ranching on MPL properties. Can MPL provide to the Commission:
  - a. the acreage of land used by year for ranching;
  - b. the number of head of cattle for that acreage by year;
  - c. the purpose of those cattle (e.g., calf breeding to export for finishing on mainland, local beef production);
  - d. the number of animals bought or sold per year; and
  - e. the grazing management plan MPL utilizes.
2. The interconnection between the MWS and Well 17 as well as the MPL water treatment facility allows for MWS to meet the potable water needs of the MPL utilities. Can you provide a breakdown to the Commission of:

Mr. Calvert Chipchase  
February 3, 2021  
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- a. the PUC-defined service area for the potable and non-potable water systems;
  - b. a map of the water distribution system (e.g., pipelines and reservoirs) that services that area; and
  - c. the monthly metered water use (potable and non-potable) for each sub-area as stated in your response (e.g., West Moloka'i, Kipū, Kualapu'u, Manawainui).
3. In the response, MPL states that they "continue to lease lands and properties for livestock, agricultural, and other uses". Can MPL provide for each lease:
- a. the acreage, tax map key number, usage (e.g, diversified agriculture, aquaculture, seed corn, livestock grazing), and the duration of the lease; and
  - b. the potable and non-potable water usage.
4. The interconnection between the MPL Mountain Water System (MWS) and the Moloka'i Irrigation System (MIS) allows for excess surface flow not needed by the MPL utilities to flow into the MIS for storage. Understanding that the return connection between the MIS and the MPL utility system was disconnected on November 26, 2018, can MPL provide since 1980:
- a. the gaged monthly volume of water from the MWS flowing into the MIS; and
  - b. the gaged monthly volume of water delivered from the MIS to MPL utilities up until November 26, 2018.
5. Further explanation why the MWS is not an alternative to non-potable needs (like landscaping and irrigation) as listed in ground water use permit 1089.

Thank you for your attention to this matter. If you have any questions or need clarification on these questions, please contact Dean Uyeno of our Stream Protection and Management Branch at (808) 587-0234 or by email at dean.d.uyeno@hawaii.gov.

Ola i ka wai,



M. KALEO MANUEL  
Deputy Director

cc: Earthjustice, on behalf of Moloka'i Nō Ka Heke

DAVID Y. IGE  
GOVERNOR OF HAWAII



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
**COMMISSION ON WATER RESOURCE MANAGEMENT**  
P.O. BOX 621  
HONOLULU, HAWAII 96809

SUZANNE D. CASE  
CHAIRPERSON

MICHAEL G. BUCK  
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NEIL J. HANNAHS  
AURORA KAGAWA-VIVIANI, PH.D.  
WAYNE K. KATAYAMA  
PAUL J. MEYER

M. KALEO MANUEL

July 8, 2021

*Ref: CDR.5310.4*

Calvert Chipchase  
c/o Cades Schutte LLP  
1000 Bishop Street, Suite 1200  
Honolulu, HI 96813

Aloha Mr. Chipchase:

Thank you for submitting responses on behalf of Molokai Properties Limited (MPL) dated April 12, 2021 for the request for information dated February 3, 2021 as part of the fact finding necessary for staff at the Commission on Water Resource Management to evaluate the merits of the Complaint/Dispute Resolution (CDR.5310.4) filed by Earthjustice on behalf of Moloka‘i Nō Ka Heke.

Commission staff have some follow up questions and data requests to clarify the initial responses dated April 12, 2021 from MPL to move forward with an analysis of the complaint. Please prepare your responses to the Commission by August 7, 2021.

Commission staff requests answers to the following questions as of June 2021:

1. The provided map identified as map 2 is dated 01/20/2016 and labeled as “Proposed Water Facilities Plan”. Can you identify what has been constructed by June 2021 and what is still “proposed”? In the same referenced map, there is a “new” pipeline from well 17 to the Kaluakoi pipeline. Is this proposed pipeline in addition to the existing non-potable pipeline that connects the mountain water system to Kaluakoi? Where exactly does this pipeline start and stop?
2. Is the Dole pipeline from Kalihi and Lualohe stream diversions still connected to the Molokai Irrigation System?
3. Is the Molokai Irrigation System still interconnected to the non-potable pipeline to Kaluakoi at Mahana?
4. Does the Mahana non-potable pump facility continue to operate?
5. Is the mountain water system still connected to the pipeline to Kaluakoi pipeline?

Calvert Chipchase  
July 8, 2021  
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6. The non-potable water use data from the Puunana Master meter previously provided by MPL includes the totality of water used for Maunaloa Town, Kaluakoi Lodge and Camp, and parks as well as the ranch operations. Please provide a detailed description of the water use not part of the Molokai Ranch ranching operations, such as people served by TMK, landscape or crop irrigation type and acres, and estimated usage (and description) by Maunaloa lodge, camp, and parks that are not individually metered. Please clarify the calculated demand for existing (versus future) uses, acres irrigated, and domestic demand? Does MPL irrigate any fields for forage for cattle?

7. Some of MPL's lessees have cattle ranching operations. How many head of cattle are in each of the lessee's parcel(s)? If exact annual data are not available, what is the maximum number of head? What is the carrying capacity of head of cattle per acre for their specific parcels?

8. Explain why the mountain water system is not a viable alternative to meet the non-potable needs for Kaluakoi in the current water use application for well 17. Could water from both well 17 and the mountain water system be transmitted to West Molokai (Maunaloa/Kaluakoi)?

Ola i ka wai,



M. KALEO MANUEL  
Deputy Director

cc: Molokai Properties Ltd.

April 19, 2022

October 14, 2021

**Calvert G. Chipchase**  
Cades Schutte Building  
1000 Bishop Street, Suite 1200  
Honolulu, Hawai'i 96813-4212  
Direct Line: (808) 521-9220  
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Email: cchipchase@cades.com

**BY HAND DELIVERY**

M. Kaleo Manuel  
Deputy Director  
Commission on Water Resource Management  
1151 Punchbowl Street, Suite 227  
Honolulu, Hawai'i 96813

Re: CDR 5310.4

Dear Deputy Director Manuel:

On behalf of Moloka'i Properties Ltd. ("MPL"), I write in response to the letter from the Commission on Water Resource Management (the "**Commission**") dated July 8, 2021, which requested additional information from MPL regarding its Response to the Complaint (CDR 5310.4) dated March 23, 2020 and its Response to the Commission's Request for Information dated April 12, 2021. The Commission's questions and MPL's responses are set out below.

1. The provided map identified as map 2 is dated 01/20/2016 and labeled as "Proposed Water Facilities Plan". Can you identify what has been constructed by June 2021 and what is still "proposed"? In the same referenced map, there is a "new" pipeline from well 17 to the Kaluakoi pipeline. Is this proposed pipeline in addition to the existing non-potable pipeline that connects the mountain water system to Kaluakoi? Where exactly does this pipeline start and stop?

**Response:**

The pipelines identified as "proposed" on Map 2 (Ex. 3 to MPL's Response to the Commission's Request for Information dated April 12, 2021) are a part of MPL's 2016 water facilities upgrade project. They were installed prior to June 2021.

The "new" potable pipeline from Well 17 was also installed prior to June 2021. The line services customers in Manawainui, Maunaloa and Kaluakoi.

The Mountain Water System ("MWS") is not connected to Kaluakoi.

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October 14, 2021  
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2. Is the Dole pipeline from Kalihi and Lualohe stream diversions still connected to the Molokai Irrigation System?

**Response:**

The Kalihi and Lualohe stream diversions are not connected to the Molokai Irrigation System (“MIS”). The diversions are a part of the MWS, but they are not currently active.

3. Is the Molokai Irrigation System still interconnected to the non-potable pipeline to Kaluakoi at Mahana?

**Response:**

The MIS was physically disconnected from the pipeline to Kaluakoi on November 26, 2018.

4. Does the Mahana non-potable pump facility continue to operate?

**Response:**

The Mahana non-potable pump station operates daily and pumps the MWS water to the open reservoir at Puunana. From there, the water is gravity-fed to livestock and agricultural operations on West Moloka‘i.

5. Is the mountain water system still connected to the pipeline to Kaluakoi pipeline?

**Response:**

The MWS is not connected to the Kaluakoi pipelines, as the latter deliver only potable water. No non-potable pipeline services Kaluakoi. Kaluakoi customers are serviced with water from Well 17, which is transmitted by a potable water system that includes the Kaluakoi pipelines.

6. The non-potable water use data from the Puunana Master meter previously provided by MPL includes the totality of water used for Maunaloa Town, Kaluakoi Lodge and Camp, and parks as well as the ranch operations. Please provide a detailed description of the water use not part of the Moloka‘i Ranch ranching operations, such as people served by TMK, landscape or crop irrigation type and acres, and estimated usage (and description) by Maunaloa lodge, camp, and parks that are not individually metered. Please clarify the calculated demand for existing (versus future) uses, acres irrigated, and domestic demand? Does MPL irrigate any fields for forage for cattle?

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**Response:**

We would like to clarify as follows:

- a. There is no lodge or camp in Kaluakoi. There is a resort, known as “Kaluakoi Resort” in Kaluakoi, which includes Kaluakoi Hotel and an adjoining golf course.
- b. There is a lodge and three tentalow camps (Paniolo, Kolo and Kaupoa) in Maunaloa. We believe the Commission’s inquiry regarding “Kaluakoi Lodge and Camp” is in relation to the lodge and tentalow camps in Maunaloa and respond accordingly below.

The Puunana Master meter tracks surface water use on MPL’s properties located in Maunaloa and on the west end of Moloka‘i. Unless surface water is being used by a third-party or lessee of MPL, the use is not tracked by separate meters.

Surface water measured from the Puunana meter is used for livestock, irrigation, and hunting. The Aeronautical Radio, Inc. site, located at TMK 5-1-002:035, averages 29 kgal annually and uses the water for restrooms and other facilities. Molokai Land Trust, located at TMK 5-1-002:060, averages 39 kgal annually and uses the water for agriculture. Puunana House is currently vacant, so there is no usage. Sakugawa and Sons (TMKs 5-1-2:1, 5-1-2:32 – :35) averages 2.28 MG kgal annually and uses the water for its livestock operations.

The Lodge, three tentalow camps and parks in Maunaloa were serviced with surface water, but are now closed and do not use water.

Maunaloa Town has not been and is not presently serviced with surface water.

Kaluakoi Hotel has been and continues to be serviced with only potable water. Although the hotel is closed, water is required for the maintenance of the property and the continuing use of a small portion of the property. The adjoining golf course was previously serviced with a combination of potable water and re-used water from the Kaluakoi WWTP, but is now closed and no longer uses any water.

MPL has updated Exhibit 4 to MPL’s Response to the Commission’s Request for Information dated April 12, 2021 with the above-information, which is enclosed as Exhibit 4-A.

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October 14, 2021  
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With regard to MPL, MPL has commenced installation of infrastructure and equipment for the irrigation of its pastures to improve and restore forage for its cattle. MPL identified six paddocks (located on TMKs 5-1-2:24 and 5-1-2:23) that will receive irrigation for the purpose of its cattle operations. The total area of the six paddocks is 270 acres.

Approximately 27 kgal are necessary to irrigate one acre-inch. Thus, the irrigation of MPL's six paddocks, totaling 270 acres, will require approximately 65 MG for a three-month period, which should provide sufficient time to establish grass. MPL notes that irrigation rates are inversely related to rainfall and available surface water volumes from the MWS.

7. Some of MPL's lessees have cattle ranching operations. How many head of cattle are in each of the lessee's parcel(s)? If exact annual data are not available, what is the maximum number of head? What is the carrying capacity of head of cattle per acre for their specific parcels?

**Response:**

Records of annual head counts for MPL's lessees' cattle ranching operations have not been kept by MPL.

MPL estimates carrying capacities between 5-10 acres/head for its pastures, but this estimate is highly dependent on terrain and conditions. The current drought conditions have led to much lower carrying capacities for all pastures.

MPL's pasture-lessee Sakugawa and Sons advised MPL that they have averaged approximately 400 cows over the past 10-year period, resulting in an average carrying capacity of 10 acres/head. The ongoing drought conditions have left them at a historic low; they are presently carrying only 150 cows.

Increases in herd sizes are dependent on improved weather patterns, and restoration of the damage caused by the on-going drought and destruction from the excessive feral deer populations.

New pasture leases may be added once the drought ends and the pastures recover.

8. Explain why the mountain water system is not a viable alternative to meet the non-potable needs for Kaluakoi in the current water use application for

M. Kaleo Manuel  
October 14, 2021  
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well 17. Could water from both well 17 and the mountain water system be transmitted to West Molokai (Maunaloa/Kaluakoi)?

**Response:**

Both potable water from Well 17 and surface water from the MWS are transported to Maunaloa, each via a separate water system. Only potable water from Well 17 is transported to Kaluakoi. Kaluakoi's irrigation needs have never been determined. Infrastructure to transport non-potable water to Kaluakoi is not in place, and even if such infrastructure were in place, it is unclear whether the surface water volume from the MWS would sufficiently meet Kaluakoi's irrigation needs.

Please let us know whether the Commission requires further information. We are also available to meet in-person or by remote. We continue to look forward to participating in all proceedings related to the Complaint.

Very truly yours,

Calvert G. Chipchase  
for  
CADES SCHUTTE  
A Limited Liability Law Partnership

Enclosure

cc: Client  
Earthjustice (on behalf of Moloka'i Nō Ka Heke)

Non-Potable Water  
Monthly Metered Use

| Act No.      | Book No. | Customer                          | TWIK No.              | Annual Totals |         |         |         |         | Historical Use | Present Use          | Comments   |
|--------------|----------|-----------------------------------|-----------------------|---------------|---------|---------|---------|---------|----------------|----------------------|--|
|              |          |                                   |                       | 2016          | 2017    | 2018    | 2019    | 2020    |                |                      |  |
| West Molokai |          |                                   |                       |               |         |         |         |         |                |                      |  |
| 1600         | 6        | Puunana House                     |                       | 0             | 0       | 0       | 0       | 0       | 0              | None                 | No activity. Tenant terminated service on 6/21/18.   |
| 1700         | 6        | Molokai Land Trust                | 5-1-002:060           | 27            | 42      | 55      | 48      | 22      | 37             | Agriculture          |  |
|              | n/a      | Sakugawa & Sons                   | 5-1-2:15-1:2:32 - :35 | 2,594         | 2,388   | 2,063   | 2,782   | 1,592   | 56             | Livestock            |  |
|              | n/a      | ARInc.                            | 5-1-002:035           | 25            | 32      | 35      | 15      | 40      | 0              | Restrooms/Facilities |  |
|              | n/a      | MPL Cattle                        |                       | 35,718        | 26,793  | 25,905  | 30,590  | 32,280  | 2,603          |                      | Master meter to Puunana                              |
|              | n/a      | Maunaloa LS (Camps, Parks, Lodge) |                       | No Data       | No Data | No Data | No Data | No Data | No Data        |                      | Closed and do not use water.                         |
|              | n/a      | Puunana WTP                       |                       | No Data       | No Data | 0       | 0       | 0       | 0              |                      | MWS and MFS need. WTP placed in stand-by on 12/27/17 |

Molokai Mountain Water System Amended Interim IFS

**Exhibit 18.** Estimated low-flow duration statistics and water available for: (alternative 1) recommended action proposed at the March 15, 2022 Commission meeting; (alternative 2) abandonment of the East Kawela Intake in addition to the recommendations identified at the March 15, 2022 meeting.

[note: does not consider the storage of excess water diverted during flows greater than Q<sub>50</sub> and made available during lower flow periods]

| Alternative 1:<br>March 2022<br>Proposed<br>Action  | flow<br>available<br>at East<br>Kawela<br>Intake | available<br>with<br>IIFS =<br>0.12 | flow<br>available<br>at Kamoku<br>Intake | available<br>with<br>IIFS =<br>0.008 | flow<br>available<br>at Lualohe<br>Intake | available<br>with<br>IIFS =<br>0.027 | flow<br>available at<br>Hanailililo<br>Intake | flow<br>available<br>at Kalihi<br>Intake | available<br>with<br>IIFS =<br>FULL | flow<br>available<br>at West<br>Kawela |  | total<br>available<br>with IIFS* | total<br>available<br>under<br>current<br>operation |
|---|--|-------------------------------------|--|--------------------------------------|---|--------------------------------------|---|--|-------------------------------------|--|--|----------------------------------|---|
| Q <sub>50</sub>                                     | 0.336  | 0.216                               | 0.033                                    | 0.025                                | 0.072                                     | 0.045                                | 0.177   | 0.006                                    | 0.000                               | 0.040                                  |  | 0.463                            | 0.393   |
| Q <sub>70</sub>                                     | 0.168  | 0.048                               | 0.011                                    | 0.003                                | 0.039                                     | 0.012                                | 0.070   | 0.001                                    | 0.000                               | 0.016                                  |  | 0.134                            | 0.118   |
| Q <sub>80</sub>                                     | 0.123  | 0.003                               | 0.007                                    | 0.000                                | 0.032                                     | 0.005                                | 0.046   | 0.001                                    | 0.000                               | 0.006                                  |  | 0.054                            | 0.049   |
| Q <sub>90</sub>                                     | 0.084  | 0.000                               | 0.004                                    | 0.000                                | 0.027                                     | 0.000                                | 0.034   | 0.000                                    | 0.000                               | 0.006                                  |  | 0.034                            | 0.034   |
| Q <sub>95</sub>                                     | 0.040  | 0.000                               | 0.002                                    | 0.000                                | 0.024                                     | 0.000                                | 0.017   | 0.000                                    | 0.000                               | 0.003                                  |  | 0.017                            | 0.017   |
| Alternative 2:<br>March 2022 +<br>No East<br>Kawela | flow<br>available<br>at East<br>Kawela<br>Intake | available<br>with<br>IIFS =<br>FULL | flow<br>available<br>at Kamoku<br>Intake | available<br>with<br>IIFS =<br>0.008 | flow<br>available<br>at Lualohe<br>Intake | available<br>with<br>IIFS =<br>0.027 | flow<br>available at<br>Hanailililo<br>Intake | flow<br>available<br>at Kalihi<br>Intake | available<br>with<br>IIFS =<br>FULL | flow<br>available<br>at West<br>Kawela |  | total<br>available<br>with IIFS* | total<br>available<br>under<br>current<br>operation |
| Q <sub>50</sub>                                     | 0.336  | 0.000                               | 0.033                                    | 0.025                                | 0.072                                     | 0.045                                | 0.177   | 0.006                                    | 0.000                               | 0.040                                  |  | 0.287                            | 0.177   |
| Q <sub>70</sub>                                     | 0.168  | 0.000                               | 0.011                                    | 0.003                                | 0.039                                     | 0.012                                | 0.070   | 0.001                                    | 0.000                               | 0.016                                  |  | 0.101                            | 0.070   |
| Q <sub>80</sub>                                     | 0.123  | 0.000                               | 0.007                                    | 0.000                                | 0.032                                     | 0.005                                | 0.046   | 0.001                                    | 0.000                               | 0.006                                  |  | 0.058                            | 0.046   |
| Q <sub>90</sub>                                     | 0.084  | 0.000                               | 0.004                                    | 0.000                                | 0.027                                     | 0.000                                | 0.034   | 0.000                                    | 0.000                               | 0.006                                  |  | 0.040                            | 0.034   |
| Q <sub>95</sub>                                     | 0.040  | 0.000                               | 0.002                                    | 0.000                                | 0.024                                     | 0.000                                | 0.017   | 0.000                                    | 0.000                               | 0.003                                  |  | 0.020                            | 0.017   |

\*if all registered diversions were connected to the system

Molokai Mountain Water System Amended Interim IFS

**Exhibit 19.** Estimated low-flow duration statistics and water available from the Mountain Water System for: (alternative 3) abandonment of the East Kawela Intake without the implementation of any other interim IFS (IIFS); and (alternative 4) an interim IFS of Q<sub>50</sub> at the East Kawela Intake in addition to some of the recommendations identified at the March 15, 2022 meeting.

[note: East Kawela Tributary assumed to be abandoned and no IIFS for West Kawela in these options; does not consider the storage of excess water diverted during flows greater than Q<sub>50</sub> and made available during lower flow periods]

| Alternative 3:<br>No East Kawela                   | flow available at East Kawela Intake | available with IIFS = FULL  | flow available at Kamoku Intake | available with No IIFS | flow available at Lualohe Intake | available with No IIFS      | flow available at Hanailolilo Intake | flow available at Kalihi Intake | available with No IIFS | flow available at West Kawela |  | total available with IIFS*             | total available under current operation |
|--|--------------------------------------|-----------------------------|---------------------------------|------------------------|----------------------------------|-----------------------------|--------------------------------------|---------------------------------|------------------------|-------------------------------|--|--|---|
| Q <sub>50</sub>                                    | 0.336                                | 0.000                       | 0.033                           | 0.033                  | 0.072                            | 0.072                       | 0.177                                | 0.006                           | 0.006                  | 0.040                         |  | 0.288                                  | 0.177                                   |
| Q <sub>70</sub>                                    | 0.168                                | 0.000                       | 0.011                           | 0.011                  | 0.039                            | 0.039                       | 0.070                                | 0.001                           | 0.001                  | 0.016                         |  | 0.121                                  | 0.070                                   |
| Q <sub>80</sub>                                    | 0.123                                | 0.000                       | 0.007                           | 0.007                  | 0.032                            | 0.032                       | 0.046                                | 0.001                           | 0.001                  | 0.006                         |  | 0.085                                  | 0.046                                   |
| Q <sub>90</sub>                                    | 0.084                                | 0.000                       | 0.004                           | 0.004                  | 0.027                            | 0.027                       | 0.034                                | 0.000                           | 0.000                  | 0.006                         |  | 0.065                                  | 0.034                                   |
| Q <sub>95</sub>                                    | 0.040                                | 0.000                       | 0.002                           | 0.002                  | 0.024                            | 0.024                       | 0.017                                | 0.000                           | 0.000                  | 0.003                         |  | 0.044                                  | 0.017                                   |
| Alternative 4:<br>East Kawela Q <sub>50</sub> IIFS | flow available at East Kawela Intake | available with IIFS = 0.336 | flow available at Kamoku Intake | available with No IIFS | flow available at Lualohe Intake | available with IIFS = 0.027 | flow available at Hanailolilo Intake | flow available at Kalihi Intake | available with No IIFS | flow available at West Kawela |  | total available with IIFS <sup>a</sup> | total available under current operation |
| Q <sub>50</sub>                                    | 0.336                                | 0.000                       | 0.033                           | 0.033                  | 0.072                            | 0.045                       | 0.177                                | 0.006                           | 0.006                  | 0.040                         |  | 0.261                                  | 0.177                                   |
| Q <sub>70</sub>                                    | 0.168                                | 0.000                       | 0.011                           | 0.011                  | 0.039                            | 0.012                       | 0.070                                | 0.001                           | 0.001                  | 0.016                         |  | 0.094                                  | 0.070                                   |
| Q <sub>80</sub>                                    | 0.123                                | 0.000                       | 0.007                           | 0.007                  | 0.032                            | 0.005                       | 0.046                                | 0.001                           | 0.001                  | 0.006                         |  | 0.058                                  | 0.046                                   |
| Q <sub>90</sub>                                    | 0.084                                | 0.000                       | 0.004                           | 0.004                  | 0.027                            | 0.000                       | 0.034                                | 0.000                           | 0.000                  | 0.006                         |  | 0.038                                  | 0.034                                   |
| Q <sub>95</sub>                                    | 0.040                                | 0.000                       | 0.002                           | 0.002                  | 0.024                            | 0.000                       | 0.017                                | 0.000                           | 0.000                  | 0.003                         |  | 0.020                                  | 0.017                                   |

\*if all registered diversions were connected to the system

<sup>a</sup>does not include the contribution of water diverted from East Kawela during higher flow events