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

COMMISSION ON WATER RESOURCE MANAGEMENT

March 15, 2022
Honolulu, Oʻahu

Approval of Surface Water Reservation of 6.0914 Million Gallons per Day For the Department of Hawaiian Home Lands and Amend the Interim Instream Flow Standards for Waikolu Stream For the Surface Water Hydrologic Unit of Waikolu (4003), Molokaʻi

SUMMARY OF REQUEST

Staff is requesting that the Commission on Water Resource Management (Commission) consider the recommendations to:

1. Approve the request for a surface water reservation of 6.0914 million gallons per day (mgd) for the Department of Hawaiian Home Lands (DHHL) to meet their foreseeable future non-potable water needs in the Hoʻolehua and Kalamaʻula tracts serviced by the Molokai Irrigation System and the Mountain Water System from Waikolu Stream; and

2. Amend the interim instream flow standards (interim IFS) for one stream in the Waikolu surface water hydrologic unit:

   WAIKOLU HYDROLOGIC UNIT (4003): Waikolu Stream

LOCATION MAP

See Figure 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 Hawaiʻi Supreme Court emphasized that "instream flow standards serve as the primary mechanism by which the Commission is to discharge its duty to protect and promote the entire range of public trust purposes dependent upon instream flows." 94 Haw. 97, 148, 9 P.3d 409, 460. This submittal is proposing to address interim IFS on one stream in Molokaʻi.

Item B-5

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 offstream 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.

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 near the mouth and medicinal plants in the high elevation. 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. 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 Hawaii 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[1] (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 principle" in protecting the resource[2]. 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.[3] The

[1] 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.)
[2] 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.
[3] Ibid.

"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.

In developing the interim IFS recommendations, staff has attempted to remain consistent in weighing all the instream and noninstream uses of each stream 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 the data presented here. 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).

§174C-101(a), HRS, also authorizes water reservations for DHHL, whether or not the area has been designated a water management area:

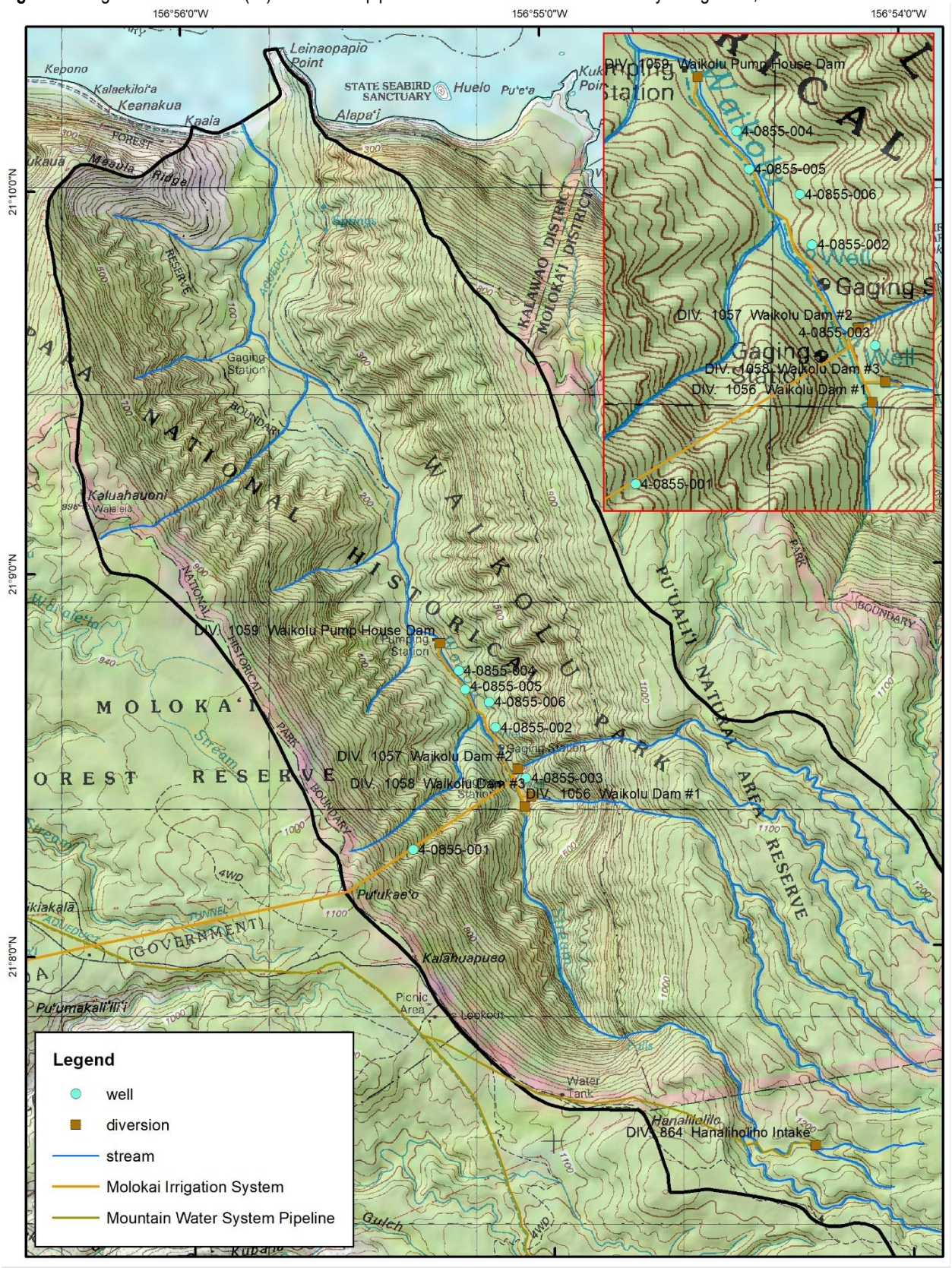
Decisions of the commission on water resource management relating to the planning for, regulation, management, and conservation of water resources in the State shall, to the extent applicable and consistent with other legal requirements and authority, incorporate and protect adequate reserves of water for current and foreseeable development and use of Hawaiian home lands as set forth in section 221 of the Hawaiian Homes Commission Act.

Lastly, in September 2018 when the Commission approved ground water reservations for DHHL, it was recommended that reservations for surface waters should be done in concert with staff’s establishment of instream flow standards, which will involve the collection of the data and information necessary to vet the amounts to be reserved and can be balanced with other public trust purposes.

This submittal will provide:

1. A historical perspective of surface water use in central Molokaʻi and a summary of instream uses for the Waikolu (4003) hydrologic unit.
2. An assessment of water available from Waikolu hydrologic unit.
3. A summary of the available information with regards to the reservation of non-potable water for the Department of Hawaiian Home Lands.

Figure 1. Registered diversions (ID) and ditches/pipelines associated with the Waikolu hydrologic unit, Molokai.



HISTORICAL CONTEXT

Waikolu
Located in the lush, wet north shore east of Kalaupapa, Waikolu Valley once supported a permanent population who grew wetland kalo and traded with the populations in Kalawao and Kalaupapa. Kalo terraces can still be found at multiple locations throughout the valley. In 1865, however, the government bought all the kuleana in Kalawao and lower Waikolu (800 acres) and relocated the people to government land at Honomuni on the east end of the island as part of the Hansen's disease settlement development. As early as 1919, a plan was produced by Honolulu Board of Water Supply engineer Fred Ohrt to divert Waikolu Stream to Kalaupapa, with a second version suggesting a pipeline all the way to Hoʻolehua. The pipeline was constructed of ductile iron and diverted stream water from about the 300 foot elevation to Kalaupapa. In 1925, Jorgen Jorgensen, the superintendent of public works for the territory, proposed a 103,600 foot tunnel from Wailau, Pelekunu, and Waikolu streams to the central plains. Multiple plans were proposed to bring water from windward Molokaʻi to the central region in the 1940s, but not until a severe drought in 1953 was a plan proposed by the Hawaiʻi Irrigation Authority that would ultimately be built as the Molokaʻi Irrigation System (MIS).

In the early 1900s, a pipeline was constructed from a tributary of Waikolu Stream as part of the Mountain Water System (MWS). This 4-inch pipeline diverts water from approximately the 3800 ft elevation at the Hanalilolilo intake and transmits it to the main transmission pipeline from Kawela to the first reservoir.

Waihanau
Waihanau Stream drains northwest from the East Molokaʻi Volcano and flows into Kalaupapa. Previous US Geological Survey (USGS) studies in 1903 and 1939 quantified much greater flows in Waihanau than exist today, potentially the result of changing climate and forest cover. A concrete dam and intake was built in the 1920s at an elevation of 2,250 ft a.s.l. that diverted water from Waihanau Stream by gravity on DHHL-owned land through a series of tunnels and pipes to Kauluwai. This was one of two DHHL diversions identified in the 1966 DLNR report[4]. In its 1989 EIS application for a new diversion from Waihanau and transmission pipeline (that never got built), R.W. Meyer Ltd. stated that DHHL had not used the water since the early 1970s and considered the source to be a reserve. However, the presence of the existing infrastructure makes reactivation a viable source to support additional water deliveries to DHHL.

Central Molokai
Kualapuʻu, Hoʻolehua and Pālāʻau were all historically known as a prime region for growing sweet potatoes. The large number of archeological sites, including heiau, petroglyphs, stone walls, and terraces, both in valley bottoms and uplands along with Land Commission Awards suggest that this region supported a moderately-sized Hawaiian population prior to colonization.

Rudolph W. Meyer, a German engineer, crossing the Pacific to California for the gold rush, was delayed so much that he missed the most prosperous years and decided to remain in Hawaiʻi. Meyer first worked as a surveyor for the government and eventually married Dorcas Malama Waha, the daughter of a *kaukaualiʻi* at Pūkoʻo and lived at Kalaʻe. He later built a diversified

[4] State of Hawaiʻi. 1966. Water Resources Development Molokai. Department of Land and Natural Resources Division of Water and Land Development, Bulletin B16, Honolulu, Hawaiʻi.

agricultural family farm. It was Meyer who brought the first kiawe seed to Molokai in the 1850s and planted it in the plains below the tree line of Kalaʻe to provide summer forage when grasses were dormant. Kiawe spreads by itself and soon dominated weāst Molokai landscape. Meyer also oversaw the construction of the pipeline that brought water from Waikolu Stream westward to the dry Kalaupapa region.

In 1859, Alexander Liholiho, as Kamehameha IV, bought 46,500 acres of government land at Kaluakoʻi and started raising sheep, noting the success of livestock following the introduction of kiawe. He hired Meyer as his ranch manager.

The High Chief Kapuaiwa, who later became Kamehameha V, also owned a cattle ranch in the early 1800s on Molokai. From 1863 until his death in 1872, Kamehameha V merged his lands with his predecessor's, expanded cattle operations, and introduced axis deer for pleasure hunting. He also had Meyer and his sons plant 10,000 coconut palms in Kaunakakai. Upon his death, the ranch lands passed to his half-sister, Princess Keʻelikolani. Bernice Pauahi Bishop, cousin of Keʻelikolani, then inherited title to the Molokai Ranch as the last descendant of the Kamehameha dynasty. She also hired Meyer as the ranch manager.

With the Great Māhele, in the 1850s and 1860s, large parcels of land were also bought and sold, first to aliʻi, followed by a growing number of haole leasing and buying for grazing. The shift to livestock grazing quickly degraded large areas of kula land that had been used for potato farming for hundreds of years. William Lee of the Royal Hawaiian Agricultural Society wrote that "overstocking of our pastures and the almost universal want of fences" was a "universal evil"[5]. With the destruction of the native vegetation throughout the watershed, soil moisture declined, leading to an increase in surface runoff and soil erosion and the drying out of perennial spring flows at the mouths of gulches along the southern coast of Mauna Loa and East Molokai.

In 1875, Charles Bishop was granted the land of Kaluakoʻi previously owned by Kamehameha IV. These lands were merged with his wife's, Mrs. Bishop's ranch, and they also employed Meyer as the ranch manager.

Following the Reciprocity Treaty signed by President Grant and King Kalākaua, Meyer began planting sugarcane in the bottoms of several gulches, where seasonal rainfall was sufficient to sustain the crop. Meyer's modest sugar plantation made a good profit for the small investment, but always remained just one of the many Meyer family farming operations.

In 1880, three small sugar plantations operated on Molokai: two in East Molokai at Kamalō and Moanui, and Meyer's in Kalaʻe. Kamalō Sugar Company grew cane on approximately 100 acres from Kawela to Kamalō, relying on groundwater pumped from shallow wells. Most of central and western Molokai was used for cattle grazing and by 1884, Meyer managed 5,000 head of cattle moving among 200,000 acres (approximately 40 acres per head).

In 1897, Charles M. Cooke and other Honolulu businessmen purchased 70,000 acres of land from the trustees of Princess Pauahi Bishop's estate and took control of the Molokai Ranch.

[5] Graham. 2018. p. 76

A 1903 USGS study[6] quantified the seasonal streamflow at particular elevations to identify the availability of surface water for the central Molokai Region. These estimates are provided in Table 1.

In 1908, Cooke bought out his partners and with his son, George P. Cooke, raised cattle and farming sweet potato, eventually forming Molokai Ranch, ltd (Molokai Ranch).

Table 1. 1903 estimated average seasonal streamflow values in cubic feet per second (million gallons per day) for streams at the given elevations, Molokaʻi, Hawaiʻi. (Source: Lindgren, 1903) [Flows are in cubic feet per second (million gallons per day]

Stream name	Elevation (ft)	Wet Season (Nov-Jun)	Dry Season (Jun – Aug)
Waihanau	2,046	5.02 (3.25)	1.55 (1.00)
Waialeia	2,760	0.46 (0.30)	0.15 (0.10)
Waikolu (Hanalilolilo)	3,600	1.93 (1.25)	0.46 (0.30)
Kahapakai	2,000	0.39 (0.25)	0.23 (0.15)
Mokamoka	2,200	0.31 (0.20)	0.15 (0.10)
Luahine Fork (Manawainui)	2,350	0.31 (0.20)	0.12 (0.075)
Kamiloloa (Kaunakakai)	3,050	0.43 (0.275)	0.15 (0.10)
Makakupaia (Kaunakakai)	2,650	0.66 (0.425)	0.23 (0.15)
West Fork Kawela	3,220	0.31 (0.20)	0.08 (0.05)
East Fork Kawela	3,220	1.86 (1.20)	0.46 (0.30)

In 1917, a diversion was established by Cooke on ʻŌhiʻalele (now called Hanalilolilo), a tributary of Waikolu Valley, and water was conveyed by wooden pipes bound with wire to the tanks at Poholua. This improved the existing supply from Lualohe stream, which was augmented by two development tunnels (tunnel 9 and tunnel 10) under Lualohe Hill.

In 1919, the Hawaiian Homes Commission Act brought into reality the wishes of the 1919 Legislature of the Territory of Hawaiʻi which advocated for the rehabilitation of Hawaiians. Realizing that irrigation would be a problem in the development of Hawaiian Homes Commission lands, the Act was written to include a section which would authorize the Hawaiian Homes Commission to undertake and carry out general water development.

In 1922, the civil engineer for the Hawaiian Homes Commission, Jorgen Jorgensen, surveyed a pipeline from the East Kawela gulch to Poholua using wooden pipes three inches in diameter. This line was completed in 1923[7]. In 1931, another civil engineer, Hugh Howell, supervised the construction of the one-million gallon concrete reservoir between Pohulua and Mauna Hui. By 1933, a replacement pipeline was proposed starting at the 2,700 ft elevation in East Kawela. This pipeline was constructed of transite and completed in 1935.

Del Monte operated a pineapple plantation in Hoʻolehua for many decades, leasing land from the State of Hawaii, Castle & Cooke, and Molokai Ranch and primarily relying on surface water.

[6] Lindgren, W. 1903. The Water Resources of Molokai, Hawaiian Islands. U.S. Geological Survey Water-Supply and Irrigation Paper No. 77.
[7] Cooke, G.P. 1949. Moolelo O Molokai: A Ranch Story of Molokai. Honolulu Star Bulletin, Honolulu.

Del Monte created a partnership with homestead owners whereby the owners were contracted to plant and harvest pineapple for Del Monte and Del Monte provided the infrastructure. Del Monte received approximately 25% of the water from the Molokai Ranch mountain water system. However, due to the limited availability of water during drought, Del Monte drilled a well (now called well 17) in 1951 to meet the potable water needs of its plantation and to provide backup irrigation water when insufficient surface water was available.

Molokai Irrigation System

There was a clear need for non-potable water to service the homesteaders and other agricultural needs, especially following a severe drought in the 1950s. The Hawaii Irrigation Authority hired H.A.R. Austin and H.T. Stearns to study methods for developing and delivering water for irrigation of the Hawaiian Homes Commission Lands in central Molokaʻi, publishing a report in 1954[8]. The report outlined a phased approach to construction of the system, although only phase one was ever built.

Construction of the multi-phase Molokai Irrigation System (MIS) started in 1961 and the entire MIS was completed in 1967 with funding from the Federal Small Reclamation Projects Act. The first phase of the MIS was designed to deliver surface and groundwater from Waikolu Valley to Kualapuʻu and Hoʻolehua. The project features four surface water diversions, six wells, a 5-mile long concrete-lined tunnel for transmission and access to Waikolu Valley from Kaunakakai, and the associated pipelines to transmit the water to a 1.4 billion gallon reservoir at Kualapuʻu (Figure 3). The distribution system in Hoʻolehua consists of approximately 20 miles of pipelines, a pumping station, and associated structures. The original design was to support the irrigation needs of 13,650 acres. The USGS has monitored streamflow in Waikolu prior to and after MIS construction and at the East (1966-2002) and West (1965-2005) portals following MIS construction. Flow duration statistics at these stations are provided in Table 2. By 1969, work had begun to study the implementation of subsequent phases[9], although no additional construction was funded until two new wells were dug in Waikolu Valley in the 1980s. Additional phases were envisioned to connect stream diversions from watersheds East of Waikolu but have never been built.

Originally, three wells were drilled for the project. Two wells in the valley, Well 23 (1,000 gpm pump) at 875 in elevation and Well 24 (1,000 gpm pump) at 970 ft in elevation, and one well in the tunnel, Well 22 (1,040 gpm). In 1988, two additional wells were drilled below Well 23, Well 5 (800 gpm pump) at an elevation of 795 ft and Well 6 (1,000 gpm pump) at an elevation of 766 ft. The additional wells provide for a greater period of dike compartment recharge between pumping cycles and thus increasing the reliability of system operation.

The Dole line was interconnected with the Molokai Irrigation System (MIS) and water was metered into the MIS and distributed at Puʻunana from the MIS.

In 1976, the Kaluakoʻi development began and a water system that supplied water from Mauna Loa to Kaluakoʻi became Molokai Public Utilities, Inc in 1981. The development consisted of a

[8] Austin, H.A.R., and Stearns, H.T. 1954. Report to the Hawaii Irrigation Authority covering methods for development and delivery of water for irrigation of Hawaiian Homes Commission Lands at Hoolehua Island of Molokai.
[9] Parsons Brinckerhoff-Hirota Associates. 1969. Waikolu and Pelekunu Valleys Water Resources Feasibility Study.

202-unit hotel, resort condo residences and resort homes. The domestic and landscape irrigation needs were met with a single system that combined water from the mountain water system and Well 17 water (via the MIS) and was treated at Puunana. Originally, the Kaluakoʻi development utilized the MIS transmission system to deliver water to Mahana, where it was pumped up to the butyl-lined reservoirs at Puʻunana. The Kaluakoʻi development now utilizes water exclusively from Well 17 via a new pipeline completed in 2017.

Table 2. Natural and diverted streamflow records in cubic feet per second, cfs (million gallons per day, mgd) for various locations and periods of record in Waikolu Valley and the Molokai Tunnel. [WY = water year]

station ID	Station name	Period of Record	Mean Daily Flow	Q_{50}	Q_{70}	Q_{90}
16405100	Molokai Tunnel at East Portal (diverted flow)	7/1966 – 9/02	4.83 (3.12)	3.70 (2.39)	2.30 (1.49)	1.10 (0.71)
16405300	Molokai Tunnel at West Portal (diverted flow)	7/1965 – 2/05	7.32 (4.73)	6.10 (3.94)	4.80 (3.10)	3.10 (2.00)
16405300	Molokai Tunnel at West Portal (diverted flow)	WY1970-WY1980	5.55 (3.58)	4.60 (2.97)	3.5 (2.26)	2.8 (1.81)
16405300	Molokai Tunnel at West Portal (diverted flow)	WY1995-WY2005	8.17 (5.28)	6.90 (4.46)	5.80 (3.75)	4.56 (2.95)
16405500	Waikolu Stream at 900ft (natural flow*)	6/1956 – 12/64	9.07 (6.27)	4.80 (3.10)	3.30 (2.13)	1.90 (1.23)
16405500	Waikolu Stream at 900ft (regulated flow)	1/1965 – 9/03	5.37 (3.47)	1.10 (0.71)	0.70 (0.45)	0.00 (0.00)
16405400	Waikolu St at 650ft (natural flow*)	7/1920 – 9/23	15.38 (9.94)	8.50 (5.49)	6.20 (4.01)	4.68 (3.02)
16415000	Waikolu St blw Pipe	7/1919 – 12/64	19.16 (12.38)	12.00 (7.76)	9.30 (6.01)	7.30 (4.72
16415000	Waikolu St blw Pipe	1/1965 – 11/96	16.24 (10.49)	8.90 (5.75)	7.00 (4.52)	5.00 (3.23)
4-125	Waikolu Stream above MIS	9/2017 – 11/21	2.43 (1.57)	1.86 (1.20)	1.43 (0.92)	1.16 (0.75)

*Mountain water system diversion active

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 3. The only diversions in the Kawela, Kaunakakai, Manawainui, and Waikolu hydrologic units were registered by Molokai Ranch (File Reference: MOLOKAI RANCH) or the Department of Agriculture (File Reference: STATE DOA MOL).

In 1990, Del Monte ended their lease of 2,500 acres of Molokai Ranch land and ceased pineapple operations.

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, including Waikolu Stream.

Table 3. Registration ID, diversion ID, diversion name, stream name, and additional information for stream diversions to the Mountain Water System and the Molokai Irrigation System, Molokai.

Hydrologic Unit	Registrant	Diversion ID	Diversion name	Stream name	1992[1] 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	Loalohi	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
Waikolu	STATE DOA MOL	1056	Dam #1	Waikolu		Main Intake
Waikolu	STATE DOA MOL	1057	Dam #2	Waikolu		Tributary 1 Intake
Waikolu	STATE DOA MOL	1058	Dam #3	Waikolu		Tributary 2 Intake
Waikolu	STATE DOA MOL	1059	Dam #4	Waikolu		Pump House Dam

[1]based on field notes and calculations from site visits in 1992 and 1993.

A summary of the mountain water sources as described in 1982 and more recent (2000-present) monitoring is provided in Table 4. No meters existed until Molokai Ranch installed one above the first reservoir and on the pipeline from the Hanalilolilo intake in the 1990s. The Dole Line system had its own transmission pipeline and water from the Ranch line could be sent to the Dole line. However, the Dole line is currently not used. A schematic of the stream diversions, wells, pipelines, and transmission tunnels in relation to existing or historic stream and pipeline gages/meters is provided in Figure 2.

Following the cessation of pineapple cultivation in Mauna Loa, Molokai Ranch has focused on providing water for landscape irrigation, for industrial purposes in Maunawainui Industrial Park, and for diversified agriculture and livestock operations on and outside of lands leased from Molokai Ranch, including Molokai Ranch's own livestock operations and other entities in the Kualapuʻu and Kalaʻe regions. Some of Molokai Ranch's land is leased by Bayer (formerly Monsanto) but receives water from the MIS for seed corn production.

Table 4. Historic flow statistics of the Mountain Water System. [All flows in million gallons per day, mgd]

	1982 Estimates[10]			Reported 2000-02, 2004-05, 2019-P			
Ranch Line	**Drainage Area (mi²)**	**Minimum Flow**	**Maximum divertible flow**	**Mean daily flow**	**Q_{50}**	**Q_{70}**	**Q_{90}**
East Kawela[1]	0.52	0.52	0.50	0.224	0.223	0.113	0.021
West Kawela	0.086	0.000	0.10	not in use			
Kamoku Gulch	0.13	0.015	0.15	not in use			
Hanalilolilo (Waikolu)	0.11	0.015	0.15	0.122	0.095	0.050	0.001
Dole Line							
Lualohe Gulch[2]	0.23	0.00	0.10	0.139	0.118	0.059	0.040
Kalihi Gulch[2]	0.10	0.00	0.07	0.053	0.012	0.008	0.001
	1982 total	0.11	0.7-0.8				
		2000-02, 2004-05 total		0.690	0.601	0.460	0.350
		2019-Present total		0.372	0.373	0.189	0.023

[1]it is not clear if the East Kawela Tributary intake was active during any of this reporting
[2]intakes have been inactive since 2005; data reflect only flows diverted when active

Since 2015, staff have made 27 site visits to Molokaʻi to investigate Waikolu, Kaunakakai, Manawainui, and Kawela hydrologic units as detailed in Exhibit 1.

At an informational (Exhibit 2) briefing presented to the Commission at the regularly scheduled Commission meeting February 15, 2022 (Exhibit 3), the Commission received substantial testimony in support of the establishment of interim IFS (Exhibit 4).

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 perennial in the higher elevations, as high-level perched discharge, but surface water is lost by to groundwater seepage into the more permeable basalts in the lower stream channel and only during peak flow events do these streams reach the ocean. The longest record of continuous streamflow on the island occurs at USGS station 16400000 on Halawa Stream (Figure 3). The USGS has maintained a station (16415000) above the EF Kawela intake (Diversion 867) since November 2018 (Figure 6). In cooperation with the National Parks Service, the Commission has maintained a continuous streamflow monitoring station (CWRM 4-125) on Waikolu Stream above the MIS since 2018. Flow statistics at this location are provided in Table 2.

[10] Tom Nance. 1982. Molokai Water Systems Plan. Prepared for the Maui County Department of Water Supply. Belt Collins, & Associates.

Figure 2. Schematic diagram of diversions (ID), wells, ditches and pipelines as part of the Molokai Irrigation System and the Mountain Water System, Moloka'i.

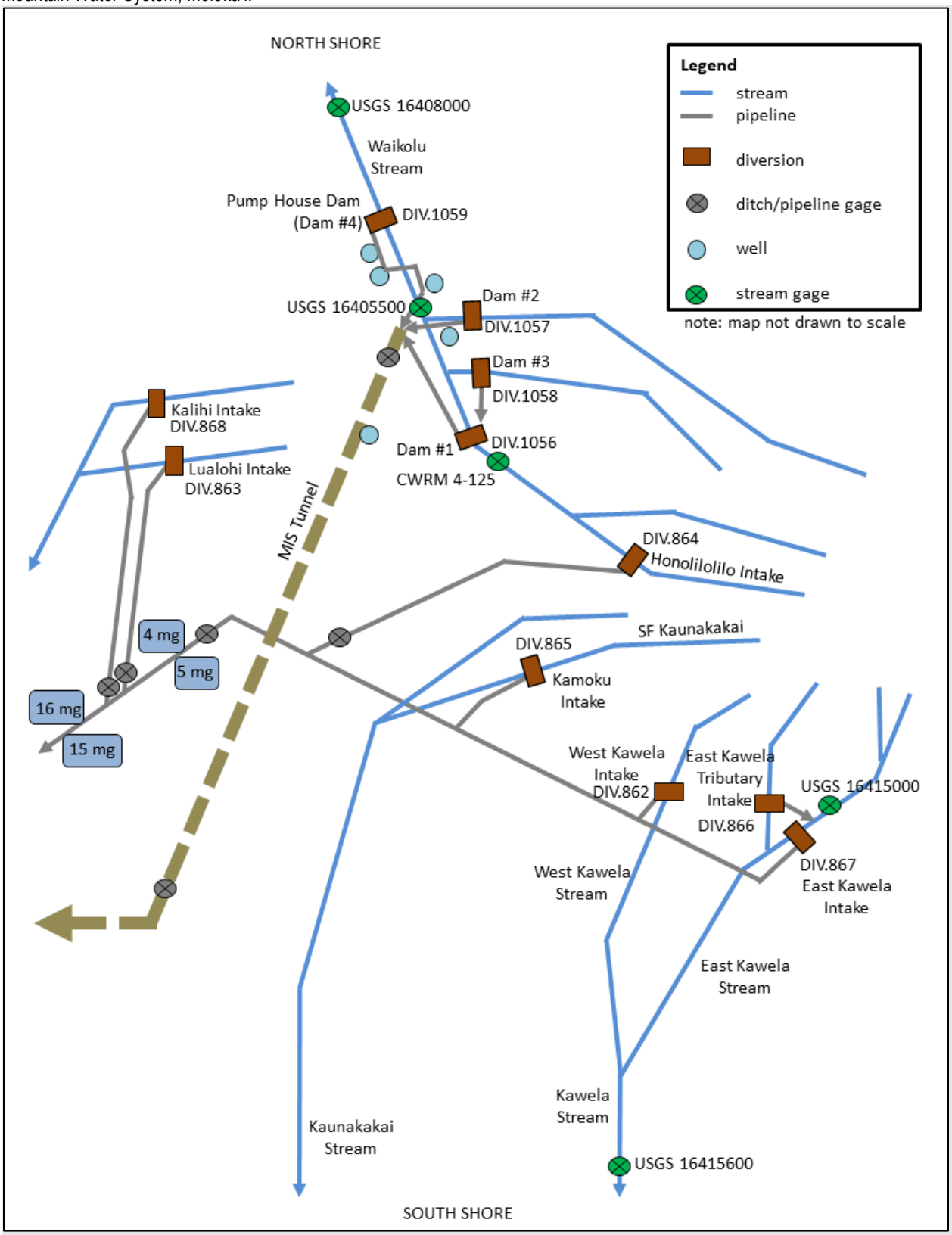
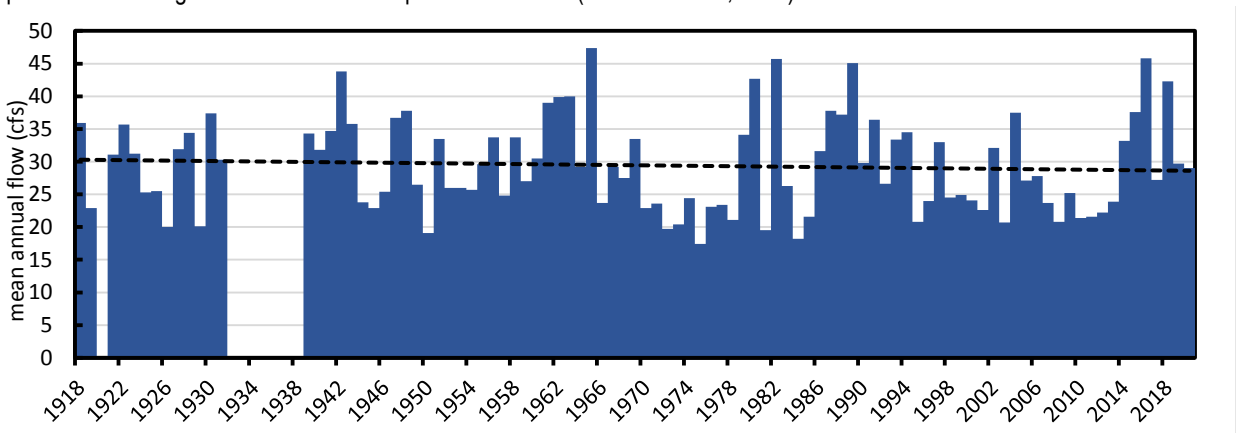


Figure 3. Mean annual flow (million gallons per day, mgd) at USGS station 16400000 on Halawa Stream, Molokai. Line represents linear regression trend over the period of record. (Source: USGS, 2020)



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 without field data (Table 5). 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.

Commission staff measured a flow of approximately 0.008 cfs (0.005 mgd) on East Kawela Tributary and 0.0209 cfs (0.014 mgd) LB SF Kaunakakai at Kamoku intake when East Kawela Stream was flowing at approximately Q_{90} (0.138 cfs, 0.095 mgd), providing additional confidence in the model.

Table 5. Estimated natural median (Q_{50}) and low-flow (Q_{70} to Q_{90}) values available at each registered diversion for the Molokai Ranch mountain water system. [cfs = cubic feet per second; (mgd = million gallons per day)]

Stream	estimation method	Q_{50}	Q_{70}	Q_{90}	Q_{95}
East Kawela	Continuous	0.52 (0.34)	0.26 (0.17)	0.13 (0.08)	0.10 (0.06)
East Kawela Tributary	Model	0.015 (0.01)	0.004 (0.0025)	0.0012 (0.0008)	0.0010 (0.0006)
West Kawela	Partial-Record	0.045 (0.029)	0.016 (0.010)	0.0054 (0.004)	0.004 (0.002)
Kamoku	Partial-Record	0.051 (0.033)	0.017 (0.011)	0.006 (0.004)	0.004 (0.002)
Hanalilolilo	Model	0.274 (0.177)	0.109 (0.070)	0.053 (0.034)	0.027 (0.017)
Ranch line	**total**	0.959 (0.620)	0.438 (0.283)	0.209 (0.135)	0.101 (0.065)
Kalihi	Model	0.0088 (0.0057)	0.0021 (0.0014)	0.0006 (0.0004)	0.0005 (0.0003)
Lualohe	Model	0.116 (0.075)	0.061 (0.039)	0.042 (0.027)	0.037 (0.024)
Dole line	**total**	0.044 (0.081)	0.068 (0.044)	0.041 (0.0274)	0.038 (0.0243)

Groundwater Pumping from Waikolu Valley

Waikolu Stream gains flow from mauka to makai due to spring discharge from numerous dikes (Figure 4). Of the four MIS intakes, Dam #1, with a capacity of 15.5 mgd, can be gravity fed to the transmission tunnel. Dam #3 has an unknown capacity and water is gravity fed to Dam #1. Dam #2 has a capacity of 4.3 mgd and can be gravity fed to the tunnel. Dam #4 is below the tunnel portal and pumps must be used to push water uphill. Three pumps are located in the pump house and the pumps are used in some combination when there is sufficient demand and supply to warrant the electrical costs. There are six wells in Waikolu Valley also attached to the tunnel via pipelines, with five installed pumps (one is a monitoring well). The wells can only be operated for short periods of time as they pump water out of dike compartments with limited capacity and may affect groundwater discharge to streams if sufficiently drained. There is approximately 2.0 cfs (1.3 mgd) of groundwater gains in the transmission tunnel from East to West portal.

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 Molokai, 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 5). 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 Molokai has experienced a 5 to 10% per decade decline in dry season rainfall.

Figure 4. Streamflow gains measured by USGS during seepage runs that span multiple dates for different reaches for Waikolu Stream, Molokai.

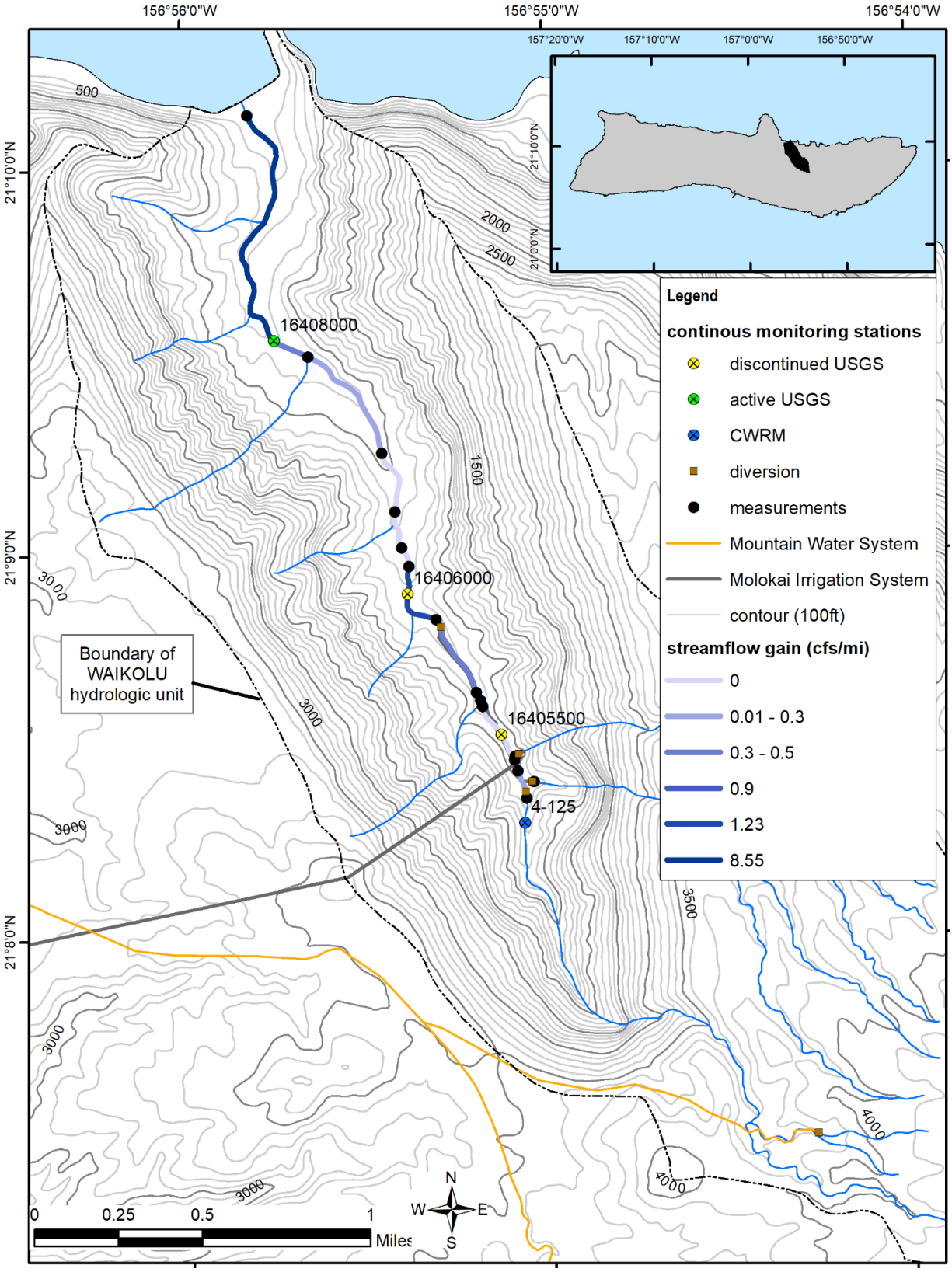
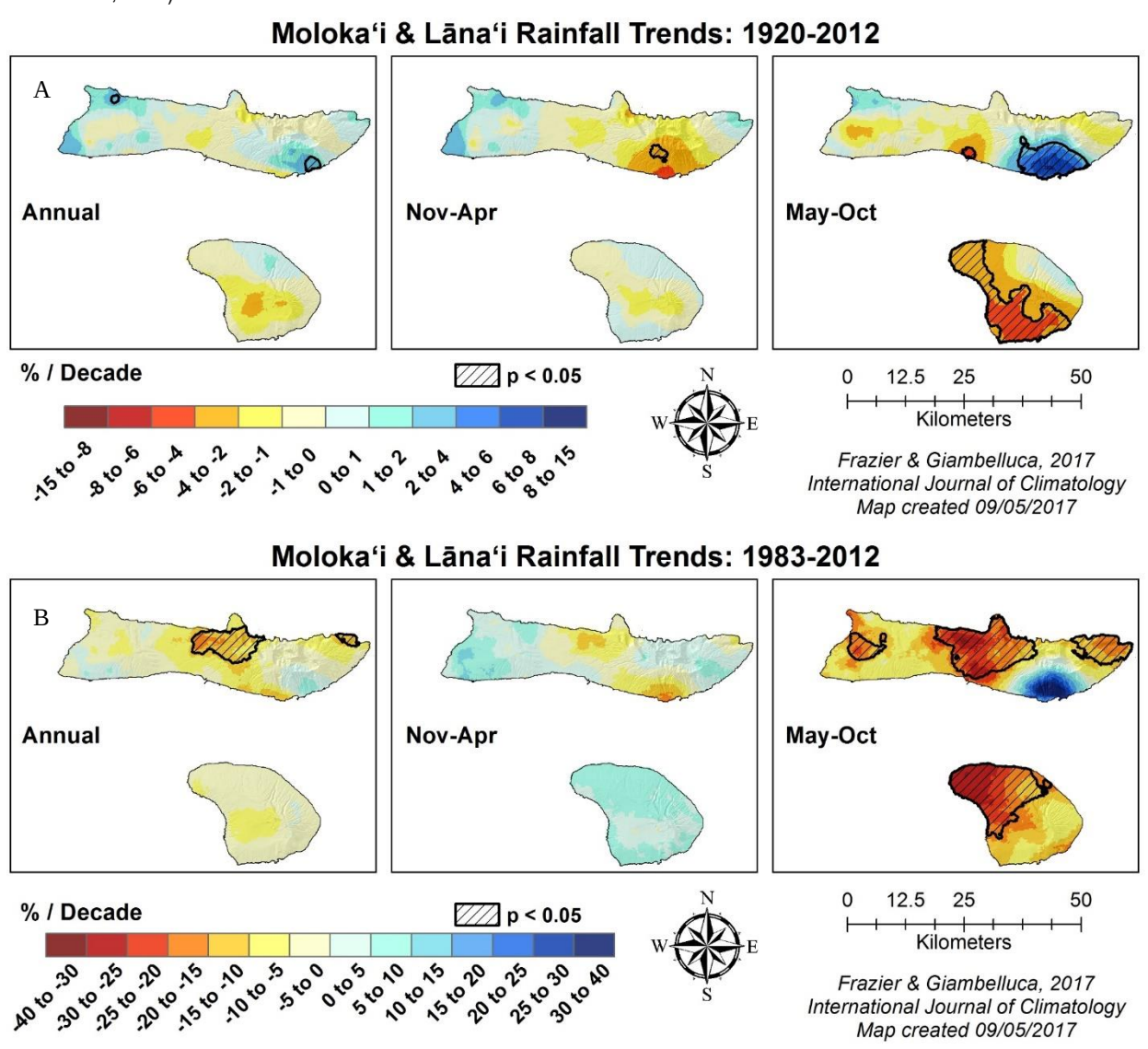


Figure 5. Annual, wet season (Nov-Apr) and dry season (May-Oct) rainfall trends for the 1920-2012 (A) and 1983-2012 (B) periods, Molokai and Lanai. Hashed line areas represent significant trend over the period. (with permission from Frazier and Giambelluca, 2017)



ISSUES/ANALYSIS

The next step to developing an interim IFS is to balance often-competing 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.

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‘opu) 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. One source of data is the Hawaiian Stream Assessment. Table 6 provides a summary of the Hawaiian Stream Assessment results for Waikolu Stream. Waikolu Stream supports one of the highest quality examples of an aquatic community in the state. By ensuring connectivity at Dam #1 and Dam #4 and a flow of water between them, the entire ecosystem will be protected. Remains of lo‘i exist below 400 ft in elevation. Springs along Waikolu Stream also support native damselfly species, *Megalagrion hawaiiense*, *Megalagrion blackburni* and *Megalagrion calliphya*.

Table 6. Hawaii Stream Assessment results for the Waikolu stream, Molokaʻi.

Biological Resources	**Waikolu**
Final Rank	Outstanding (4 of 4)
Alamoo	Yes
Nakea	Yes
nopili	Yes
Hihiwai	Yes
# NG2	3
Cultural Resources	**Waikolu**
Final Rank	Substantial (3 of 4)
taro cultivation	historic
# archaeological sites	1
density	Moderate
valley significance	Pre-contact, important information, culturally noteworthy
Riparian Resources	**Waikolu**
Final Rank	Substantial (3 of 4)
Detrimental species	hau, pigs, deer, goats
% native forest	30%
Presence of recovery habitat	--
# T&E birds	0
# of rare plants	2
Wetlands	--
Recreational Resources	**Waikolu**
Final Rank	Outstanding (4 of 4)
Opportunities	Camping, hiking, hunting, parks, scenic views
Regional rank	

NON-INSTREAM USE CONSIDERATIONS

Molokai Irrigation System

The MIS is owned and operated by the State Department of Agriculture, Agriculture Resource Management Division. The system includes 250 current service connections which serves a total acreage of approximately 3,360 acres. The surface and groundwater sources and their hydrological effects on Waikolu Stream are provided in Figure 6. Non- homestead users of the MIS have been placed on mandatory restrictions of up to 30 percent for several of the past 10 years due to changing rainfall patterns (severe drought), and source development in adjacent eastern valleys has not been developed and will not be put into place for any time in the foreseeable future.

The 1943 Act creating the Molokaʻi Water Board stated that the "lessees of the Hawaiian Homes Commission shall have the right to have their water needs, domestic and agricultural, first satisfied before any water shall become available for sale to any other person or persons, and, in

the event that there is no surplus over and above the needs of said lessees, then said lessees shall be entitled to have the whole thereof."[11]

When construction began, the estimated water available from the MIS was 7.6 mgd: 4.4 mgd from stream diversion, 1.8 mgd developed by the transmission tunnel, 1.0 mgd from surface pumps at Dam #4, and 1.4 mgd from wells. System losses were estimated to be approximately 1.0 mgd (13%). However, due to the high costs of electricity, the surface water pumps and groundwater wells are not activated except during exceptional circumstances. In 1986, DLNR estimated a total system loss of about 1 mgd, with the largest component being evaporation from the reservoir[12].

In 1955, it was specified that homesteaders would have a two-thirds right to the Molokai Irrigation System water[13]. This provision remains in current law, as follows:

> "To the extent that the same may be necessary from time to time for the satisfaction of teir water needs, domestic and agricultural, the Hawaiian Homes Commission and lessees of the Hawaiian Homes Commission shall at all times, upon actual need therefor being shown to the board, have a prior right to two-thirds of the water developed for the irrigation and water utilization project by the tunnel development extending to Waikolu Valley, which is planned by the board as the first stage of the project."[14]

In response to concerns that the 2,200 ft stream section between Dam #1 and Dam #4 imposes a barrier to upstream migratory pathways, the DOA installed an 18-inch wide steel plate across the intake grate on Dam #1 in 1996. As a result, juvenile ʻoʻopu and ʻōpae can navigate to the headwater reaches above Dam #1 (Figure 6). This same section is also dewatered at times by the pumping of Wells 23 and 24, leaving little or no habitat for native aquatic species. By contrast, pumping wells 5 and 6 have little effect on perennial flow in Waikolu Stream, as the adjacent downstream dike compartment supports spring flow that provides substantial habitat[15]. Well 21 in the MIS tunnel draws water from a separate dike compartment than what is incised by Waikolu Stream, but because the water may naturally seep into the tunnel, this well is not used as often.

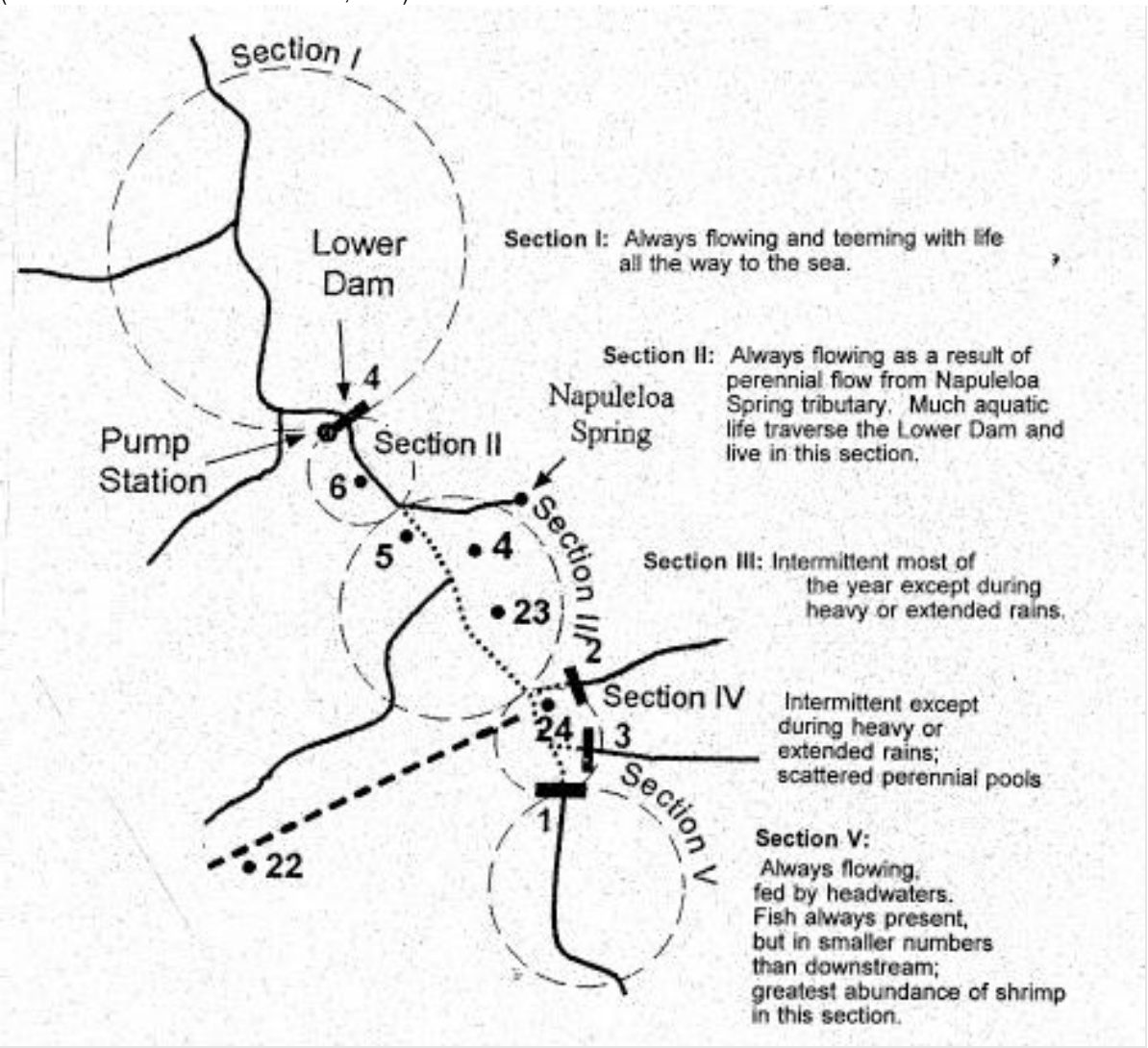
From January 2010 to June 2020, metered end uses of MIS water totaled a mean of 2.386 mgd (range 0.886 to 3.915 mgd) with a median of 2.397 mgd. Mean annual evaporation from Kualapuʻu Reservoir (87.36 acres) is 0.5246 mgd.

Pump test results at Well 23 and Well 24 indicate that these wells interfere with streamflow after about 4.25 ft, and 1.25 ft of drawdown, respectively (Figure 7). This equates to the pumpage of about 145,000 gallons (2.4 hrs x 1005 gpm) and 360,000 gallons (6 hrs x 1000 gpm), respectively. When these wells are utilized for longer periods of time, they draw down streamflow such that the stream becomes intermittently dry[16]. During the 1990s, Well 23 and

[11] 1943. Hawaii Session Laws, Act 227
[12] 1986. Department of Land and Natural Resources Division of Water and Land Development, "Fact Sheet: Molokai Irrigation System".
[13] 1955. Hawaii Session Laws, Act 164.
[14] Hawaii Rev. Stat. Sec 175-4.
[15] Water Resource Associates, 1999. Waikolu Stream Biological and Hydrological Monitoring Study, Molokaʻi, Hawaiʻi. prepared for the Hawaii Department of Agriculture.
[16] Water Resource Associates. 1999.

Well 24 were pumped for 4 hrs, respectively. By contrast, it took 30+ days of continual pumpage of Well 5 and Well 6 to see a noticeable effect on streamflow at the lower pumphouse, indicating that different dike compartments are accessed.

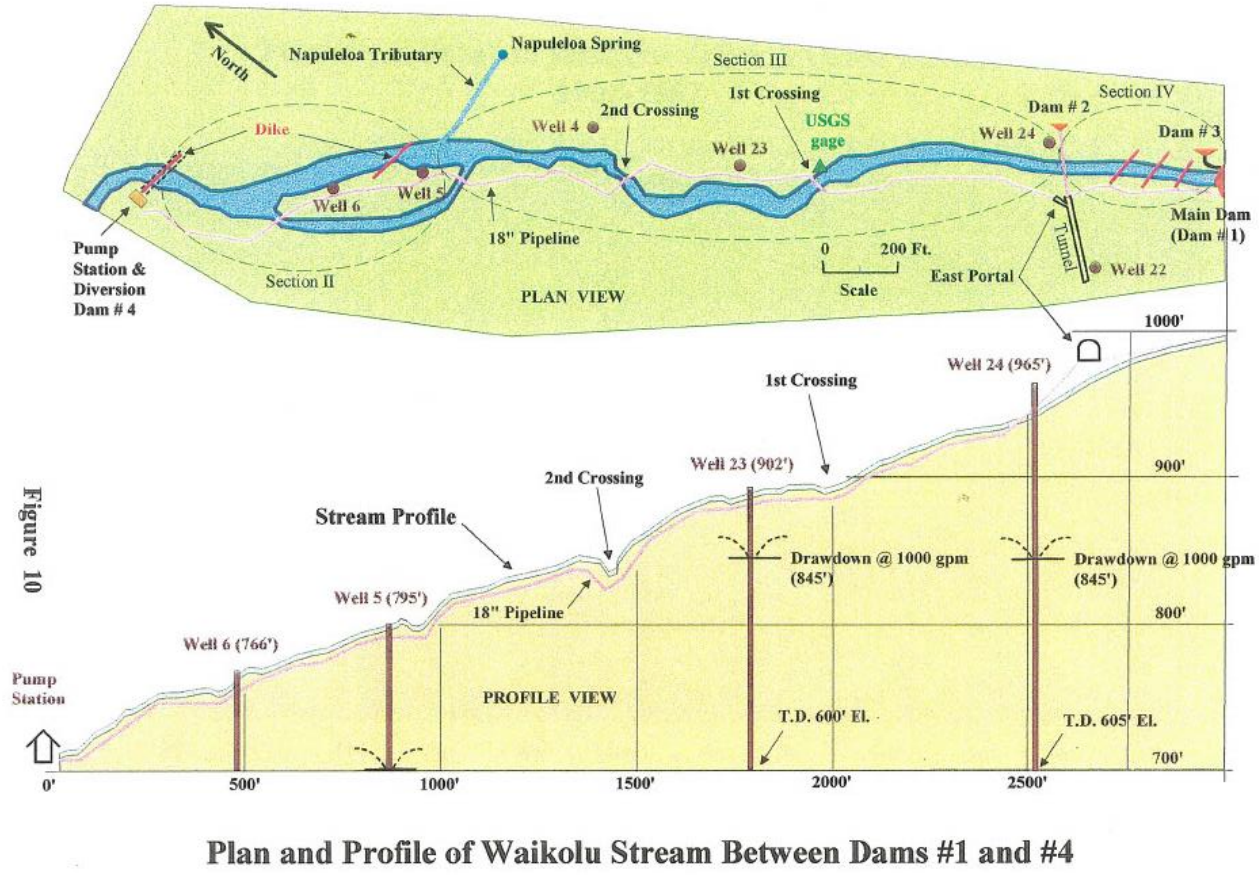
Figure 6. Summary of hydrological and biological consequences of MIS operation in Waikolu Valley, Molokai. (Source: Water Resource Associates, 1999)



A survey of farmers in the MIS service area in the mid-1980s highlighted perceived problems with it's management: 1) the reservoir wasn't being filled during periods of high rainfall; 2) poor operation of the system resulted in blocked air-relief and blow-off valves or clocked intakes causing water to flow into Kaunakakai Gulch; 3) snails and tilapia breeding in the reservoir clogged sprinklers, drip tubes, and filters, increasing water pressure and causing irrigation lines to burst[17].

[17] Kahane, J.D. 1987. The Molokai Irrigation System: A Management Study. Legislative Reference Bureau, State of Hawaii. Report 3457-A

Figure 7. Elevational profile with well locations in relation to surface water diversions, springs, and the USGS gaging station, Waikolu, Molokai. (Source: Water Resource Associates, 1999)

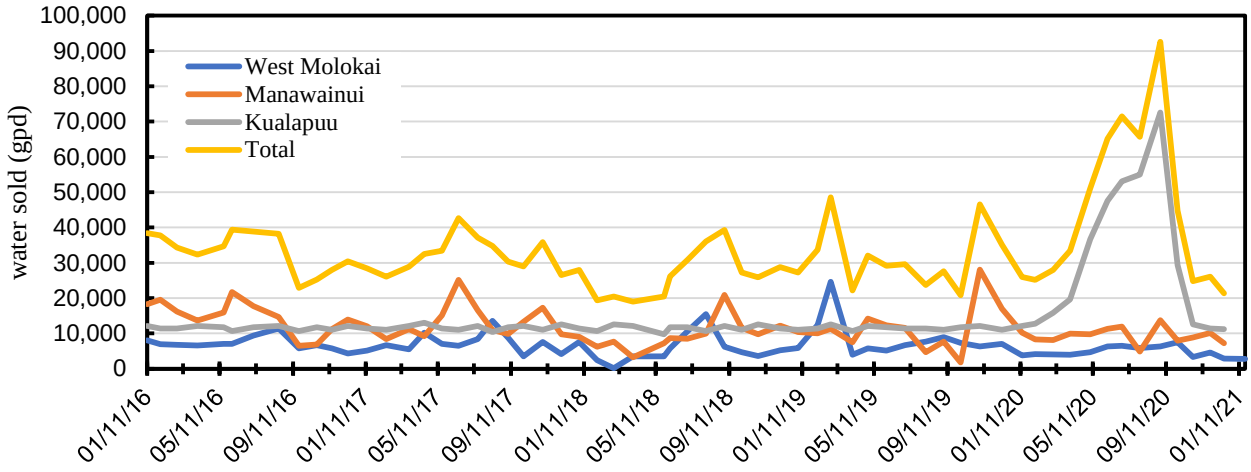


Monitoring of diverted flow in the Mountain Water System

Monitoring flow data provided by for individual intakes is only available for the Kalihi (Diversion 868) and Lualohe (Diversion 863) intakes on the Dole Line and the Hanalilolilo intake (Diversion 864) on the Ranch Line. The flow from East Kawela (Diversion 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 4). Mean daily flow values are available from 11/7/2018 to 8/16/2021 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) and the mean amount remaining in the stream was 0.33 cfs (0.21 mgd), the mean of flows for dates with runoff in excess of the diversion capacity. However, 58% of days 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).

Molokai Properties has submitted their monthly metered end uses for each service area for 5 years (Figure 8). Mean daily use was approximately 34,000 gpd for the entire period, ranging from 18,962 gpd to 48,560 gpd. Mean daily use from in 2020 increase to approximately 45,800 gpd, ranging from 21,378 gpd to 92,644 gpd as a result of deliveries to Kualapuʻu Ranch for a new hemp farm. However, the hemp farm was discontinued in February 2022, after one year.

Figure 8. Monthly non-potable water sold by system and in total from the mountain water system. [flow in mean gallons per day (gpd)].



Irrigation Needs of Diversified Agriculture

The State of Hawaii Department of Agriculture uses a baseline irrigation rate of 3,400 gallons per acre per day (gad) to calculate the irrigation water demand for diversified agriculture. While this average may be applicable across a broad range of soil and climate conditions using particular irrigation practices with some crops, it does not help in the estimation of the actual water demands for crops grown in the field.

The Commission funded the development of a GIS-based software program that utilizes the state of Irrigation Water Requirement Estimation Decision Support System, IWREDSS (State of Hawaii, Commission on Water Resource Management, 2015b) was developed by the College of Tropical Agriculture and Human Resources, University of Hawaii at Manoa for the State of Hawaii. IWREDSS is an ArcGIS-based numerical simulation model that estimates irrigation requirements (IRR) and water budget components for different crops grown in the Hawaiian environment. The model accounts for different irrigation application systems (e.g., drip, sprinkler, flood), and water application practices (e.g., field capacity versus fixed depth). Model input parameters include rainfall, evaporation, soil water holding capacities, depth of water table, and various crop water management parameters including length of growing season, crop coefficient[18], rooting depth, and crop evapotranspiration.

Understanding that water demand is highly site, weather, application, and crop dependent, IWREDSS can still provide a useful approximation of water needs. The simulation was used to estimate the IRR for four types of crops grown on Molokai in three different TMK parcels: 2-5-2-024:010 (a DHHL parcel in Hoʻolehua); 2-5-2-001:009 (a DOA parcel in Hoʻolehua); and 2-5-2-012:004 (a Molokai Properties parcel in Hoʻolehua). The 1:5 year drought IRR for dryland kalo, papaya, seed corn, and coffee are approximately 2100 gallons per acre per day (Table 7). The model calculates IRR based on long-term rainfall records available at the weather stations located nearest to the fields. Thus, the estimated IRR represents an average value for given drought scenarios as opposed to average or wet year conditions. However, the estimated IRR for

[18] Crop coefficient is an empirically derived dimensionless number that relates potential evapotranspiration to the crop evapotranspiration. The coefficient is crop-specific.

the relative drought year frequencies could be extrapolated to represent the highest demand scenarios. Alternatively, water demand per tree can be used based on the number of trees planted. Figure 9 provides a description of the existing agricultural uses of Central Molokai.

Table 7. Mean drip irrigation demand estimates for various crops grown in central Molokai based on IWREDSS scenarios modeled using the trickle drip irrigation method given a 10 ft depth to water table. Irrigation Requirement (IRR) value in gallons per acre per day (gpad).

		1 in 5-year drought water demand (gpad)		
crops	**irrigation method**	**TMK 252012004**	**TMK 252001009**	**TMK 252024010**
coffee	Trickle Drip	1951	2103	2026
seed corn	Trickle Drip	2025	2108	2076
dryland kalo	Trickle Drip	2039	2113	2101
papaya	Trickle Drip	709	774	750

AVAILABILITY OF ALTERNATIVE SOURCES

Molokaʻi is a water management area and current groundwater withdrawals for Maui County, DHHL, and Molokai Properties in the Hoʻolehula and Kualapuʻu region all occur in the Kualapuʻu 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 10). 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.

Figure 9. 2015 Baseline Agricultural Land Use map for central Moloka'i with parcels highlighted currently in the MIS service area.

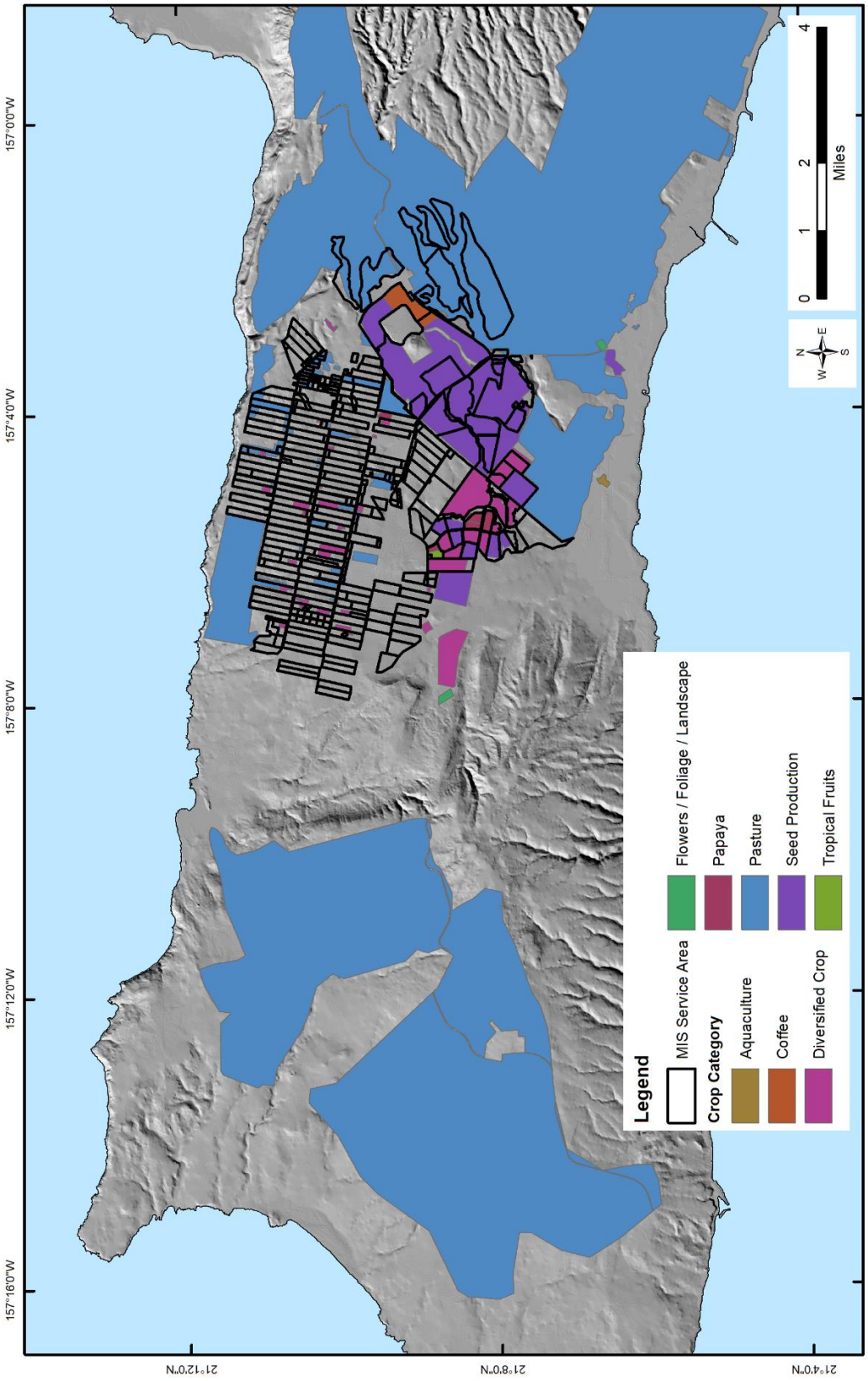
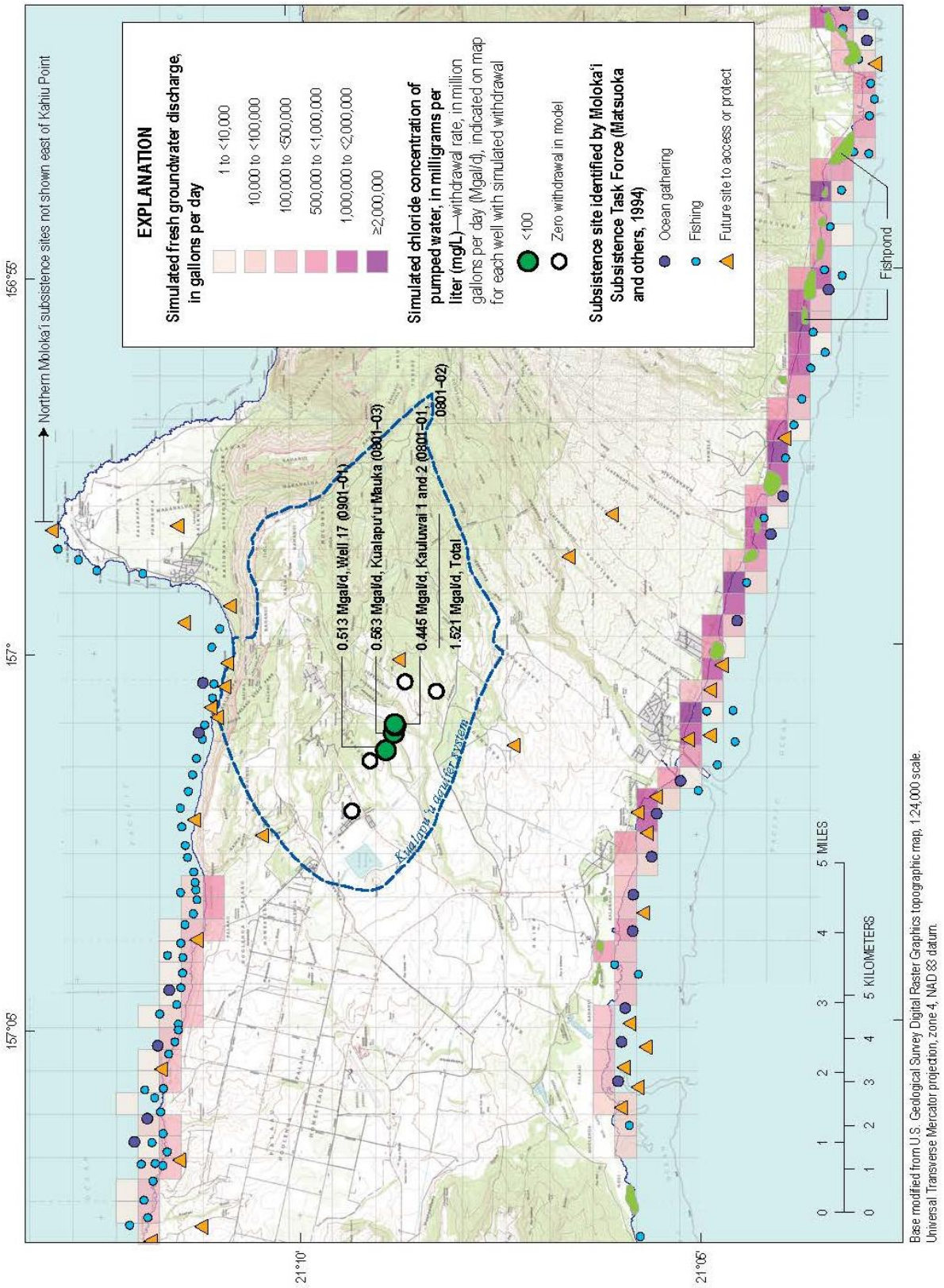


Figure 10. Baseline groundwater withdrawal rates from wells and fresh groundwater discharge along coastal regions of central Molokai. (Source: Oki et al., 2019).



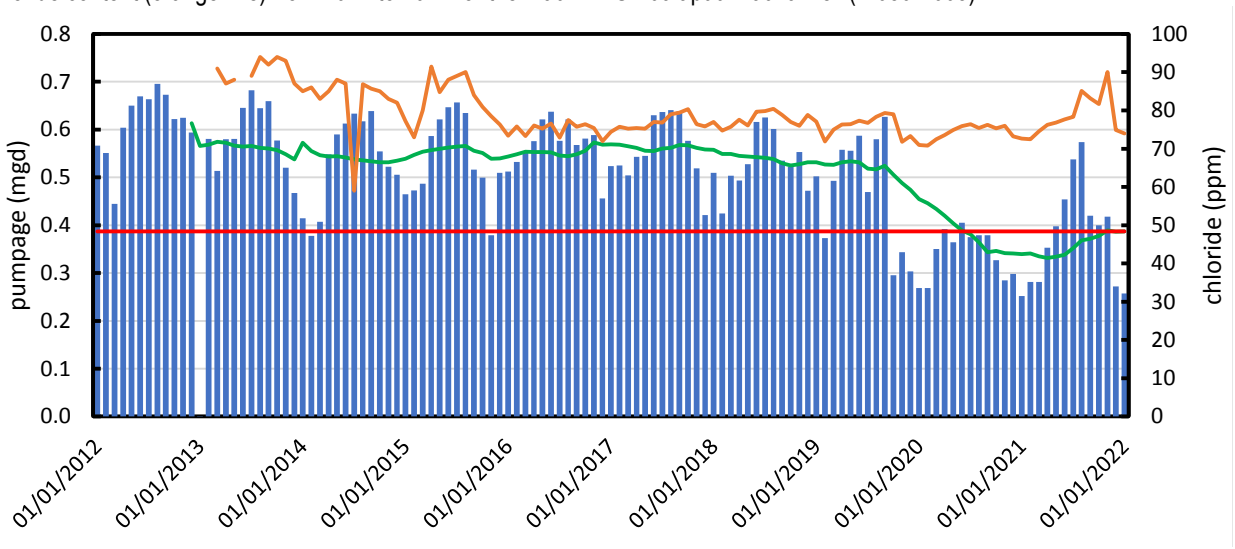
OTHER PUBLIC TRUST USES OF WATER

Maui County Municipal System

Maui County DWS operates a municipal water system that relies upon groundwater from one well in the Kawela hydrologic unit. In 1966, the county operated a drinking water source that supplied demand all the way to the Kaunakakai region via a gravity-fed pipeline[19]. This source was dependent on surface runoff captured at Makaeleʻele Dam, located at the 2,365 feet elevation above Kalaʻe 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 a Maui-type well in Kawela constructed by the American Sugar Company in 1920 (Kawela Shaft).

Maui County DWS has one well in the Kualapuʻu Aquifer System (4-0801-003) and has a water use permit for 0.387 mgd. Recent monthly pumpage, 12-month moving average, and monthly chloride content for well 4-0801-003 is provided in Figure 11.

Figure 11. Monthly pumpage (blue bar), 12-month moving average (green line), water use permit allocation (red line), and chloride content (orange line) from 2012 to 2021 for the Maui DWS Kualapuu Mauka well (4-0801-003).



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[20]. 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 Hoʻolehua, some of which is serviced by the Molokai Irrigation System (Figure 12). Other nearby tracts include the Kalamaʻula, Kapaʻakea tracts along the southern coast. There was a non-potable DHHL water

[19] State of Hawaii, 1966.
[20] PBR Hawaii, 2004. Maui Island Plan: Prepared for State of Hawaii, Department of Hawaiian Home Lands, 340 p.

system which diverted water from Waihanau Stream to Kalaʻe and Kualapuʻu as recently as 1982, although that system is not currently being used. Water was diverted from the Waihanau stream at 2,264 feet in elevation through 2,800 feet of tunnel to an intake structure in Kahapaʻakai Gulch. From there, it is delivered through an 8-inch and 6-inch pipeline to one 2-million gallon steet 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 Hoʻolehua 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 Kalanianaole colony on the southern coastal area and 220,000 gpd used in the Hoolehua area, not including water delivered by the MIS[21].

While the MIS was built to primarily serve the non-potable water needs of the DHHL homesteads on Hoʻolehua, there is no existing reservation of water from the system for DHHL. The MIS is not managed to meet the non-potable agricultural needs of the Kalamaʻula tract and an alternative source is needed. The original Hawaiian Homes Commission water system withdrew water from East Kawela and the Right Branch of the North Fork Kaunakakai Stream (Kamiloloa Stream) at 3,100 ft in elevation. As a public trust purpose, DHHL has the right to reserve water from any source.

EXISTING DHHL WATER RESERVATIONS

Thus far, the Commission has established a total of 29 potable and non-potable water reservations, all for DHHL, in both water management areas and non-designated water management areas.

Table 12 shows the previous water reservations made by administrative rule in water management areas, pursuant to HRS §174C-49(d) or by Commission action prior to the publication of the State Water Projects Plan 2017 Update.

Table 8. DHHL Water Reservations prior to the State Water Projects Plan 2017 Update.
[WMA = Water Management Area]

Approval Process	Island	Location	Effective Date	Reservation (mgd)
§13-171-61	Oʻahu	Waipahu-Waiawa WMA	02/18/1994	1.724
§13-171-62	Oʻahu	Waimānalo WMA	02/18/1994	0.124
§13-171-63	Molokaʻi	Kualapuʻu WMA	06/10/1995	2.905*
CWRM Action	Hawaiʻi	Keauhou Aquifer	08/17/2015	3.398

* Per HAR §13-171-63, this amount shall be in excess of the existing uses of water on Hawaiian Home Lands as of the effective date of this rule (Eff. June 10, 1995)

STATE WATER PROJECTS PLAN 2017 UPDATE

More recently, reservation actions were supported by preliminary findings in the most recent update of the State Water Projects Plan, which was formally adopted by the Commission on May 16, 2017. The State Water Projects Plan is the component of the Hawaiʻi Water Plan that documents the water needs of all State agencies over a 20-year planning horizon. The

[21] State of Hawaii. 1966.

Engineering Division of the Department of Land and Natural Resources is responsible for the development and update of the State Water Projects Plan. In addition to inventorying the existing and future water needs for State projects, through the State Water Projects Plan, Engineering Division also promotes partnerships and cost sharing to coordinate water development projects and water infrastructure improvements of potentially competing State agencies. Based on the State Water Projects Plan, Engineering Division pursues legislative funding to support new source development through Capital Improvement Project requests and administers a water credit allocation program for State agencies. Implementation of the State Water Projects Plan in close coordination with the County Water Use and Development Plan is needed to ensure orderly authorization and development of new State sources and water system infrastructure.

Initially adopted in 1990 and revised in 2003, a third update of the State Water Projects Plan was completed and adopted in 2017[22]. Due to funding constraints, the Engineering Division focused this most recent State Water Projects Plan update exclusively on DHHL. DHHL was selected because: 1) they are the largest landowner amongst State agencies and thus could have the most significant impact on water resource development and use, and 2) DHHL water needs are an identified public trust purpose under the State Constitution and Water Code.

The Engineering Division and its consultant worked extensively with DHHL staff to identify priority tracts and proposed phasing over the 20-year planning horizon and to determine the breakdown of each tract in terms of residential units and agricultural acreages. The 20-year timeframe is established under HAR §13-170-42(c), which requires the State Water Projects Plan to consider a 20-year projection period for analysis purposes.

Potable water requirements were calculated by correlating DHHL's land use designations to an equivalent zoning designation in the County Water System Standards (or other applicable standards when necessary) and applying the respective unit rate (Exhibit 1). All demands from the domestic component of homesteading (Residential, Subsistence Agriculture, Pastoral) and municipal (Community Use, Commercial, Industrial) land use designations were considered to be potable.

Non-potable requirements were considered to be irrigation demands for agricultural land use designations (Subsistence, Supplemental, and General Agriculture) and stock water (sustenance water for livestock) for the Pastoral land use designation. Agricultural non-potable demands were calculated using a unit rate of 3,400 gallons per acre per day, as recommended by the Department of Agriculture's Agricultural Water Use and Development Plan. Based on published studies, a livestock watering unit rate of 20 gallons per head per day was used for Pastoral land use designations. The unit rate non-potable requirements are shown in Exhibit 2.

[22] Engineering Division also received separate funding to update the State Water Projects Plan for the North Kona region on the island of Hawai'i, as well as for a comprehensive statewide update. The statewide update will incorporate the 2017 update (which documents DHHL water needs) as well as the regional update for North Kona in order to develop comprehensive and coordinated water development strategies that consider and coordinate the needs and plans of all State agencies.

A range of forecasts - high, medium, and low – were developed for both potable and non-potable end use water demands. Variability was achieved by adjusting project development data while keeping water demand unit rates fixed. Examples of adjustments included varying unit buildout rates, utilizing different unit density rates, and using different percentages of utilization of the total area for development. However, while the range of water demands for the various end uses were assessed, only the medium demand projections by water source (e.g., aquifer system areas to be developed) were provided.

The 2017 update of the State Water Projects Plan provides a sound basis and rationale for water reservations statewide for DHHL for both potable needs (groundwater) and non-potable needs (surface water) by hydrologic unit. After discussions with DHHL staff, it was decided that the establishment of additional water reservations begin with potable groundwater needs in non-designated areas on the islands of Kauaʻi, Maui, Lānaʻi, and Hawaiʻi for the following reasons:

- DHHL's needs within designated ground water management areas on the island of Oʻahu are most likely to be met through the Honolulu Board of Water Supply's (HBWS) integrated municipal water system. As shown in Table 1, DHHL has existing reservations from the Waipahu-Waiawa and Waimanalo Aquifer System Areas on Oʻahu. As DHHL tracts are developed, these reservations are to be converted to water use permits and transferred to the HBWS for water service. DHHL has no current plans to pursue new source development and does not plan to operate new water systems on Oʻahu. According to DHHL, DHHL is already in discussions with HBWS to service DHHL tracts on Oʻahu and has received verbal commitment from HBWS. HBWS is in the process of updating its Water Use and Development Plan, and the regional watershed management plans for the Primary Urban Center, ʻEwa District, and Central Oʻahu are currently underway and should incorporate DHHL needs and strategies based on the 2017 State Water Projects Plan.

- DHHL's needs within non-designated aquifer system areas on the island of Oʻahu (Waiʻanae Sector Area) will also be met through the Honolulu Board of Water Supply's (HBWS) integrated municipal water system. DHHL will rely on HBWS for new source development in the Waiʻanae Sector Area. DHHL is already in discussions with HBWS to service DHHL tracts on Oʻahu and has received verbal commitment from HBWS.

- Besides Oʻahu, the only other areas that are currently designated as a groundwater management area is the island of Molokaʻi, and the ʻĪao Aquifer System on Maui. As shown in Table 1, there is an existing water reservation for DHHL for the Kualapuʻu Ground Water Management Area for 2.677 mgd in addition to existing uses (0.595 mgd).

- Staff's preliminary review of non-potable surface water needs in the 2017 State Water Projects Plan indicate that in some cases, where there are available streamflow records, proposed future needs exceed the available flow in the stream. In most cases, however, there is no available streamflow data to compare with the proposed water needs.

- Additionally, current information on other existing off-stream uses is lacking. Therefore, reservations for surface waters should be done in concert with staff's establishment of

instream flow standards, which will involve the collection of the data and information necessary to vet the amounts to be reserved.

On June 20, 2017, the Commission approved a reservation of 6.903 mgd of non-potable water from the Waimea Surface Water Hydrologic Unit, on the island of Kauaʻi, for DHHL's 15,061 acres of land mauka of the mana plain, which were historically fed by the Kōkeʻe Ditch with water diverted from Kōkeʻe, Kauaikinanā, Kawaikōī, and Waiakoali streams during the operation of the Kekaha Sugar Company. This reservation was filed on April 25, 2017 following the April 18, 2017 Commission-approved Waimea Watershed Agreement Mediated Settlement. This reservation supersedes DHHL's previous petition for 33.145 mgd filed with the Commission on November 17, 2015.

On October 16, 2018, the Commission approved a reservation of 0.513 mgd of non-potable water from the Wailua Surface Water Hydrologic Unit, on the island of Kauaʻi, for non-potable water needs of DHHL's lands East of Kālepa Ridge.

On March 27, 2020, the Commission approved a reservation of 1.600 mgd non-potable water from four tributaries of the Wailuku River (i.e., ʻĀwehi, Aale, Laualu, Kapehu) and established interim IFS of natural flow (ʻĀwehi Stream), 2.1 mgd (Aale Stream), 2.2 mgd (Laualu Stream), and 6.0 mgd (Kapehu Stream) immediately below the Forest Reserve Boundary.

On May 18, 2021, the Commission approved a reservation of 2.00 mgd non-potable water from Honokōhau Stream to meet their foreseeable future non-potable water needs in Honokōwai.

On July 20, 2021, the Commission approved a water use permit for 0.595 mgd from the Kualapuʻu groundwater management area and reduced its existing reservation by that amount.

Table 13 shows all water reservations established via Commission action in non-designated water management areas, pursuant to HRS §174C-101(a).

There is currently no DHHL reservation for non-potable water used on Molokai, although as previously discussed, 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, Hoʻolehua and Kalamaʻula tracks are primarily zoned agriculture and rural, with an existing potable water demand of 0.635 mgd, although the DHHL Hoʻolehua Water System facility capacity is only 0.576 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.

A substantial amount of non-potable is needed to meet the reasonable water 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 demand of 3.353 mgd, well below the designed mean flow of the MIS.

To service the Kalamaʻula tract, the MIS would have to be expanded and additional sources or conservation measures identified. Currently, the non-DHHL users of the MIS have been on mandatory restrictions of up to 30% for much of the 2006-2016 period, making expansion not practical. The 2017 SWPP update identified a 4.72 mgd existing non-potable water demand water for DHHL in Hoʻolehua with no non-potable water used in the Kalamaʻula tract. The long-term estimated non-potable water demand was 5.3599 mgd for Hoʻolehua and 0.7316 mgd for Kalamaʻula resulting in a total demand for the region of 6.0914 mgd.

CONSISTENCY WITH THE HAWAII WATER PLAN

The Hawaiʻi Water Plan is the State's long-range water plan, and staff believe it is important that water reservations, water use permits, and interim instream flow standards be consistent with, and have basis in, the Hawaiʻi Water Plan (HWP). Under the current planning framework, the State Water Projects Plan outlines the water needs for State projects (in this case for DHHL), identifies potential supply options, and feeds into the County Water Use and Development Plans. This enables State water needs to be integrated with the needs of all other use sectors (i.e., military, municipal, private, and agriculture) within each county into a comprehensive resource development strategy and implementation plan. However, county updates to their Water Use and Development Plan are often not as frequent, comprehensive, or timely to provide for such reservations as needed. As previously described, the 2017 Update to the State Water Projects Plan identifies the non-potable water needs of DHHL.

The use of non-potable water by DHHL for subsistence and general agriculture or by Molokai Properties, its lessees, or their utility customers for agriculture, industrial, or livestock uses, are consistent with the State's and County's land use designations and general plans. The County of Maui is currently updating its Water Use and Development Plan (WUDP) for the island of Molokai. The previous plan was developed in 1990 as part of the initial Maui County WUDP. Due to the high priority rights of DHHL under the State Constitution, State Water Code, and Hawaiian Homes Commission Act, staff does not believe it is prudent nor necessary to wait for the county plans to incorporate the needs of DHHL, especially when county priorities are inconsistent with those of DHHL. Should water reservations be approved, staff will inform the counties so that the reservations will be incorporated into the County Water Use and Development Plans as required by law. Reserving water for DHHL promotes the Commission's approach to managing the resource and protecting the public trust through the collaboration and consistency framework provided by the HWP.

Figure 12. Location of DHHL parcels in Central Moloka'i.

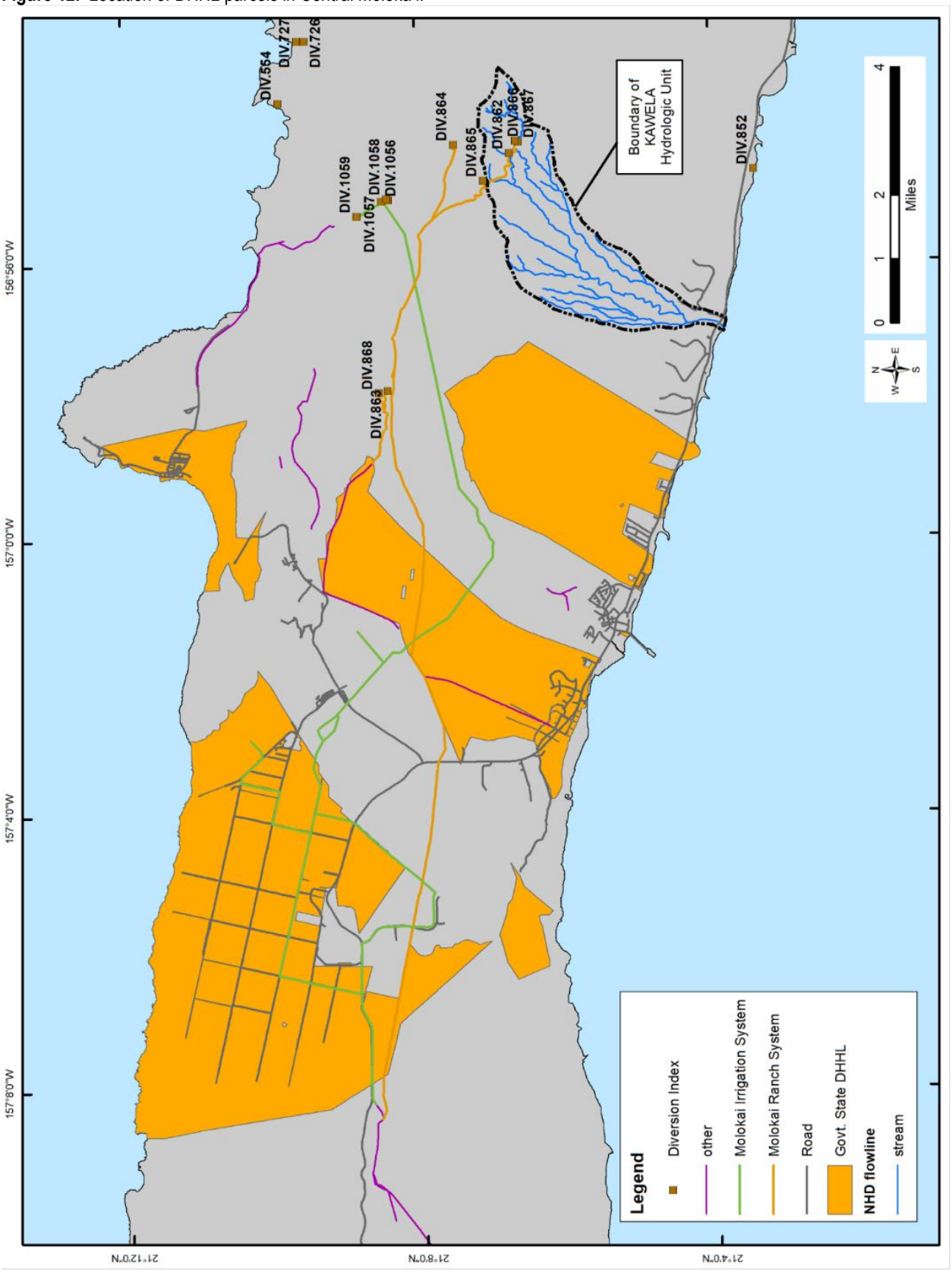


Table 13. DHHL Water Reservations in Non-Designated Water Management Areas

Island	Hydrologic Unit	type	Action Date	Initial Reservation (mgd)	Current Reservation (mgd)
Kauaʻi	Waimea*	non-potable	06/20/2017	6.903	6.903
	Wailua	potable	09/18/2018	0.708	0.708
	Wailua*	non-potable	10/16/2018	0.513	0.513
	Anahola	potable	09/18/2018	1.470	1.470
	Kekaha	potable	09/18/2018	0.336	0.336
	Makaweli	potable	09/18/2018	0.405	0.405
Lanaʻi	Leeward	potable	09/18/2018	0.067	0.067
Maui	Honokōwai	potable	09/18/2018	0.770	0.770
	Kamaʻole	potable	09/18/2018	2.547	2.547
	Keʻanae	potable	09/18/2018	0.003	0.003
	Kawaipapa	potable	09/18/2018	0.118	0.118
	Lualaʻiula	potable	09/18/2018	0.063	0.063
	Honokōhau*	non-potable	5/18/2021	2.000	2.000
Hawaiʻi	Wailuku*	non-potable	03/17/2020	1.600	1.600
	Keauhou	potable	08/17/2015	3.398	3.398
	Hawi	potable	09/18/2018	0.148	0.148
	Māhukona	potable	09/18/2018	3.014	3.014
	Honokaʻa	potable	09/18/2018	0.396	0.396
	Hakalau	potable	09/18/2018	0.083	0.083
	Onomea	potable	09/18/2018	0.250	0.250
	Hilo	potable	09/18/2018	0.492	0.492
	Keaʻau	potable	09/18/2018	1.336	1.336
	ʻŌlaʻa	potable	09/18/2018	0.025	0.025
	Nāʻālehu	potable	09/18/2018	0.185	0.185
	Pāhoa	potable	09/18/2018	0.660	0.660

* Surface Water Hydrologic Unit

IMPLICATIONS OF WATER RESERVATION

Should the Commission approve this water reservation, the water reservation will be documented in the Water Resource Protection Plan, along with the prior-approved water reservations. The reservation will be included in the calculation of authorized planned use for consideration in water management area designation. If any of the hydrologic units are designated as surface water management area, staff will initiate rule-making pursuant to HRS §174C-49(d) and Hawaii Administrative Rule §13-171-60(b) to reserve water for DHHL.

RECOMMENDATIONS

Based on the above, and all applicable authority, the staff recommends the following actions to be considered by the Commission:

1. PROPOSED ACTION: RESERVATION OF WATER FOR DHHL
   - Approve a reservation of surface water for the Department of Hawaiian Home Lands in the amount of 6.0914 mgd from the Waikolu surface water hydrologic unit, Molokaʻi; subject to two-thirds of the availability of water transported through the West Portal of the MIS and measured at USGS 16405300.
   - This reservation includes 0.15 mgd diverted by the Mountain Water System that can be delivered to the Kalamaʻula tract. The Kalamaʻula tract has an anticipated demand of 0.7316 mgd of non-potable water, and the difference should be made up with water from other sources. The 0.15 mgd is approximately 50% of the water available in the Mountain Water System during low-flow conditions and 100% of the water available from the Hanalilolilo intake.

2. PROPOSED ACTION: INTERIM IFS ON WAIKOLU STREAM AT 1050 FEET
   - One interim IFS shall be established on Waikolu Stream at an elevation of 1,050 feet of 1.10 cfs (0.71 mgd) at CWRM station 4-125; i.e., above the Dam #1 intake. The interim IFS will support the outstanding ecological resources present in Waikolu Stream.

3. PROPOSED ACTION: INTERIM IFS ON WAIKOLU STREAM AT 900 FEET
   - One interim IFS shall be established on Waikolu Stream at an elevation of 900 feet, at USGS 16405500 of 0.95 cfs (0.61 mgd); i.e., at the first crossing. The interim IFS will support the outstanding ecological resources present in Waikolu Stream.

4. PROPOSED ACTION: INTERIM IFS ON WAIKOLU STREAM AT 250 FEET
   - One interim IFS shall be established on Waikolu Stream at an elevation of 250 ft, approximately 0.97 miles below Dam #4, of 5.3 cfs (3.5 mgd) and measured at USGS station 16408000. The interim IFS will support the outstanding ecological resources present in Waikolu Stream.

5. PROPOSED ACTION: MODIFICATION TO DAM #4
   - Staff recommends that there be a continuous wetted flow in Waikolu Stream at MIS Dam #4 to maintain habitat connectivity for native aquatic migratory species. Waikolu Stream has outstanding aquatic resources and was identified as a stream worthy of protection based on its diversity of aquatic and recreational resources and its blue-ribbon aquatic resources.

6. PROPOSED ACTION: MODIFICATION TO DOA WATER USE PERMIT 00220
   - State DOA has a WUP (00220) of 3.360 mgd for the Waikolu aquifer system. The approved use of 0.853 mgd in this permit for Well 23 (well 4-0855-002) will be reduced to 0.145 mgd. The approved use of 0.853 mgd for Well 24 (well 4-0855-003) will be reduced to 0.360 mgd. The total WUP will not change.

IMPLEMENTATION

- Staff at DHHL will work with Molokai Properties to best determine how to transmit water from the Mountain Water System to the Kalamaʻula tract.
- Commission staff and DHHL staff will work with DOA staff to ensure publish trust uses of water are protected.
- A steel plate 18 inches wide is already installed on dam #1 across the intake grate; a similar steel plate shall be installed on dam #4.
- USGS station 16408000 is already installed and operational on Waikolu Stream. When streamflow declines below the interim IFS, no water may be pumped from Dam #4.
- Staff at DOA will work with staff at DHHL to address perceived inequities in the use of water from the Kualapuʻu Reservoir to meet the DHHL reservation, including the need to provide increased amounts of non-potable water to homestead lots as well as the use of groundwater from Waikolu Valley to support DHHL beneficiaries.

MONITORING

- Molokai Properties will meter the pipeline to the DHHL Kalamaʻula tract.
- The State DOA must maintain a real-time ditch gage at the former USGS 16405300 station at the West Portal and report daily flow values to the Commission.
- Staff shall continue to monitor streamflow by funding USGS 16408000 on Waikolu Stream at 250 ft in elevation and at a location 0.2 miles above the MIS Dam #1 (at CWRM 4-125).
- State DOA shall fund the re-establishment of USGS station 16405500 at 900 ft in elevation below the MIS Dam #1.

EVALUATION

- The actions proposed in this submittal will protect instream values, and balance public trust uses of water.
- The Commission recommends that improvements to reduce reservoir evaporation should be made if additional water is required.

Ola i ka wai,

M. KALEO MANUEL
Deputy Director

Exhibits:

1. List of Site Visits by Commission Staff to Waikolu, Kawela, Kaunakakai, and Manawainui hydrologic units.
2. February 15, 2022, Staff Submittal C1, Informational briefing and draft recommendations (*available online*) https://files.hawaii.gov/dlnr/cwrm/submittal/2022/sb20220215C1.pdf
3. February 15, 2022 , Staff Submittal C1, Presentation (*available online*) https://files.hawaii.gov/dlnr/cwrm/submittal/2022/sb20220215C1P.pdf
4. February 15, 2022 , Staff Submittal C1, Testimony (*available online*) https://files.hawaii.gov/dlnr/cwrm/submittal/2022/sb20220215C1T.pdf

APPROVED FOR SUBMITTAL:

SUZANNE D. CASE
Chairperson

EXHIBIT 1

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

Date	Hydrologic Unit
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, Kawela, Kaunakakai