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

February 15, 2022
Honolulu, O‘ahu

Status of CDR.5310.4 Combined Petition to Amend the Interim Instream Flow Standards and Allegation of Waste By Moloka‘i No Ka Heke for streams in the Surface Water Hydrologic Units of Waikolu (4003), Kawela (4037), Kaunakakai (4039), and Manawainui (4041), and Reservation of non-potable water for the Department of Hawaiian Home Lands, Moloka‘i

SUMMARY OF REQUEST

No action; for information purposes only.

Presentation to Commission on Water Resource Management (Commission):

1. To address allegations that Molokai Properties Limited (MPL) is wasting surface water diverted by the Mountain Water System from the hydrologic units of Waikolu, Kawela, Kaunakakai, and Manawainui on Moloka‘i;

2. Proposed recommendations for establishing a non-potable water reservation for the Department of Hawaiian Home Lands; and

3. Proposed recommendations to establish interim instream flow standards (interim IFS) for one stream in the Waikolu surface water hydrologic unit, 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:

   WAIKOLU HYDROLOGIC UNIT (4003): Waikolu Stream, Hanalilolilo Stream
   KAWELA HYDROLOGIC UNIT (4037): East Kawela Stream, East Kawela Tributary Stream, and West Kawela Stream
   KAUNAKAKAI HYDROLOGIC UNIT (4039): South Fork Kaunakakai Stream
   MANAWAINUI HYDROLOGIC UNIT (4041): Lualohi Stream, Kalihi Stream

LOCATION MAP See Exhibit 1

Item C1

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 seven 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.

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 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[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.”

[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.)

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 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 "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).

This submittal is for informational purposes only and will provide:

1. A historical perspective of surface water use in central Molokai.

2. An assessment of surface water available to the Molokai Mountain System (MMS) and the Molokai Irrigation System (MIS) and a summary of instream uses for the Waikolu (4003), Kawela (4037), Kaunakakai (4039) and Manawainui (4040) hydrologic units.

[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.

3. An analysis of the withdrawal of surface water for non-instream uses, and the water requirements of these uses.

4. An evaluation of the alternatives available for these uses as well as the existing and planned uses of groundwater from available sources.

5. A summary of the available information with regards to the reservation of non-potable water for the Department of Hawaiian Home Lands.

HISTORICAL CONTEXT

Kaluakoʻi

In mythology, Mauna Loa, the western shield volcano of Molokaʻi, was the original and most sacred school of the ancient ritualistic hula. Hula was founded by Kapo, the elder sister of Pele, who lived on Mauna Loa and taught at the ancient school of Kaʻana. Laka, the nominal patroness of the hula, was an emanation of Kapo. Mauna Loa used to be covered in forests and the small population that lived along the coast were deep-sea fishers and farmed sweet potato farmers in the uplands.

The ahupuaʻa of Kaluakoʻi (literally, adze quarry) was an important region for tools, boasts many shrines for successful fishing, has multiple temple sites, and the community had many holua (bowling places) and konani (checker-stones) games[4]. The last stages of volcanic eruptions on west Molokai occurred approximately 100,000 years ago, with most of the resultant 16 cinder cones produced to the north west of the summit. These cones produced fine-grained basalt that was utilized for adze manufacture.

Kawela

In the ahupuaʻa of Kawela, a Hawaiian village once prospered in Kawela under the shade of "magnificent hala trees"[5]. When whaling was an important industry, most of the kona valleys (including Kawela) sold wheat, poi, rice, potatoes, vegetables, molassess, and fish to the whaling ports, and by 1857, Irish, or white potatoes were being grown in Kawela. Kawea Stream likely flowed more regularly from mauka to makai prior to deforestation following the introduction of livestock and axis deer during the 1800s. Hugh Howell, an engineer, built some of the Molokai Ranch pipelines in the early 1900s to bring water from Kawela to central Molokaʻi.

[4] Handy, E.S.G. and Handy, E.G. 1972. Native Planters in Old Hawaiʻi: Their Life, Lore, and Environment. Bishop Museum Press, Honolulu, Hawaiʻi. p. 514.
[5] Wade Graham. 2018. Braided Waters: Environment and Society in Molokai, Hawaiʻi. University of California Press. p. 79.

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 relocted 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. 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 Molokai to the central region in the 1940s, but not until a severe drought in 1953 was a plan proposed by the Hawaii Irrigation Authority that would ultimately be built as the Molokai Irrigation System (MIS).

Waihanau
Waihanau Stream drains northwest from the East Molokai 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. 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[6]. 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 (sweet potato hill), Hoʻolehua and Palaʻau 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 Pukoʻo and lived at Kalaʻe. He later built a diversified 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 west Molokai landscape. Meyer also oversaw the construction of the pipeline that brought water from Waikolu Stream westward to the dry Kalaupapa region.

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

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 Mahele, in the 1850s and 1860s, large parcels of land were also bought and sold, first to aliʻi, followed by a growing number of haoles 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" and "the single greatest threat to the kingdom's economic well-being."[7] 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 Kalakaua, 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.

After its formation in 1898, American Sugar Company purchased 70,000 acres of land from Cooke, leased land from the government, and built large capacity wells. However, the thin basal lens resulted in a limited groundwater supply which was quickly exhausted, resulting in saltwater

[7] Graham. 2018. p. 76

contamination and forcing the company to abandon its sugar operation. The company sold its land back to Cooke.

From 1898 to 1905, paddocks were introduced on the remaining land to improve range management, wild deer and goats were reduced, and a water distribution system was built to support the ranch. The original ranch system started with stream diversions (eventually called the "Ranch line") in the upper Kawela, Kaunakakai, and Waikolu watersheds, the principal sources being East and West Kawela at 3,600 ft in elevation, to bring water to Ho'olehua (Figure 1). Between 1905 and 1917, a development tunnel was dug into Lualohi hill contributing 30,000 gpd and stream diversion on Lualohi Stream (now referred to as a tributary of the Kuhuawi in the Manawainui hydrologic unit).

A 1903 USGS study[8] 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).

In 1912, a 2.5-inch pipeline was constructed to bring water to a 50-thousand gallon wooden tank in Mauna Loa from the mountain water system. By 1920, the tank was replaced by a concrete reservoir.

Table 1. 1903 estimated average seasonal streamflow values in cubic feet per second (million gallons per day) for streams at the given elevations, Moloka'i, Hawai'i. (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)

The sheep raising on Molokai Ranch was gradually abandoned starting in 1917 due to the over-grazing of pasture with combined cattle-sheep herds.

[8] Lindgren, W. 1903. The Water Resources of Molokai, Hawaiian Islands. U.S. Geological Survey Water-Supply and Irrigation Paper No. 77.

In 1917, a diversion was established by Cooke on Ohialele (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 Lualohi stream, which was augmented by Lualohi Tunnel under Lualohi Hill.

In 1919, the Hawaiian Homes Commission Act brought into reality the wishes of the 1919 Legislature of the Territory of Hawai‘i 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[9]. 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 at starting at the 2,700 ft elevation in East Kawela. This pipeline was constructed of transite and completed in 1935.

In 1923, the Libby, McNeil & Libby Company (Libby) leased land from Molokai Ranch in the Mauna Loa area to plant pineapple.

In 1928, 350 tons of Kiawe honey were produced on Molokai Ranch and sold mostly to Germany. In 1929, of the 68,000 acres of fee simple lands, Molokai Ranch leased 10,000 acres for pineapple and kept 8,000 acres as forest reserve[10]. By this time, they maintained stream diversions at 2,600 feet (later becoming the Dole line) and 3,600 feet (the Ranch line) in the East Molokai mountains. Flow of water to their 1-million gallon concrete reservoir via wooden flume averaged 0.25 mgd. The beef heard of 4,500 head were largely Hereford blood imported from Parker Ranch, although Devon cattle were introduced in 1898 from California. Stocking rates were in the 13 to 15 acre per head range, and after the short breeding season, the cattle were turned to Kiawe pastures in late June along the southern coast.

In 1946, Libby built a domestic water system to serve the pineapple plantation community in Mauna Loa, sourcing water from one tunnel and two stream diversions from Lualohi (now called the Manawainui) watershed (Kalihi and Lualohi intakes) called the “Dole line” via a 3-inch steel and galvanized iron pipeline which feeds three tanks with a total storage of 1.3 million gallons. Libby also built a 4.5 million gallon concrete reservoir adjacent to Molokai Ranch’s tanks to capture excess flow from the Ranch line. This reservoir would become the Kawela Reservoir.

Del Monte operated a pineapple plantation in Ho‘olehua for many decades, leasing land from the State of Hawaii, Castle & Cooke, and Molokai Ranch and primarily relying on surface water. Del Monte received approximately 25% of the water from the 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.

[9] Cooke, G.P. 1949. Moolelo O Molokai: A Ranch Story of Molokai. Honolulu Star Bulletin, Honolulu.
[10] Henke, L.A. 1929. A Survey of Livestock in Hawaii. University of Hawaii Press, Honolulu.

In 1959, a 6-inch and 8-inch pipeline were constructed from the Poholua tank to the east below the mountain water system to Pu‘unana, in order to pump water up to Mauna Loa town. When the pineapple plantation ceased operation, the Dole Line reverted to Molokai Ranch.

In the late 1960s, a 5-million gallon asphalt fiber-lined reservoir was constructed in Pu‘unana and a 5-million gallon asphalt fiber-lined reservoir at Lualohi was built. While not metered, average usage from the mountain water system in 1982 was estimated at 75,000 gpd in Mauna Loa town, 15,000 gpd in Kipu, and 10,000 in Manawainui (0.100 mgd).

The MIS tunnel was constructed in the early 1960s and the entire MIS was completed in 1967 through fundng from the Federal Small Reclamation Projects Act to bring water from Waikolu valley to Ho‘olehua. The Dole line was interconnected with the Molokai Irrigation System (MIS) and water was metered into the MIS and distributed at Pu‘unana from the MIS.

In 1968, the State of Hawaii Land Use Commission approved the rezoning of 3,305 acres from agriculture to urban as the first increment for the total development of the Kaluako‘i Resort Community proposed by a joint venture between Molokai Ranch and Louisiana Land and Exploration Company.

In 1976, the Kaluako‘i development began and a water system that supplied water from Mauna Loa to Kaluako‘i became Molokai Public Utilities, Inc in 1981. The development consisted of a 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 Kaluako‘i development utilized the MIS transmission system to deliver water to Mahana, where it was pumped up to the butyl-lined reservoirs at Pu‘unana. This system now exclusively utilizes water from Well 17 via a new pipeline completed in 2017.

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 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.

In March 1993, the Dole line was linked to the MIS such that excess water diverted from streams could be banked in the Kualapu‘u Reservoir for future use. In August 1993, the balance of the Dole line from the MIS was connected to the County Department of Water Supply’s water system to provide potable water to Maunaloa Town.

In 1996, Molokai Ranch began to redevelop Maunaloa Town by demolishing some of the original plantation houses for newer construction. At this time a triplex movie theater was constructed.

Table 2. 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.

In 1997, Molokai Ranch shut down its wildlife safari park west of Moomomi and completed the Paniolo Camp, the first of multiple campgrounds it constructed in West Molokai. In 1998, Molokai Ranch began construction of an $11 million lodge facility in Mauna Loa town.

In 2002, Sheraton returned to manage and market the two Molokai Ranch hotels, but in 2007, the hotel and resort facilities ceased operations due to a lack of profitability. In the following years, Molokai Ranch was sold to an investment group based in Singapore and renamed Molokai Properties, limited (Molokai Properties).

On July 1, 2019, EarthJustice, on behalf of No Ka Heke, filed a petition to amend the interim IFS on six streams and a waste complaint against Molokai Properties.

Figure 1. Registered diversions (ID) and ditches/pipelines identified in and nearby the Kawela hydrologic unit as part of the Ranch line of the Molokai Ranch mountain water System, Molokai.

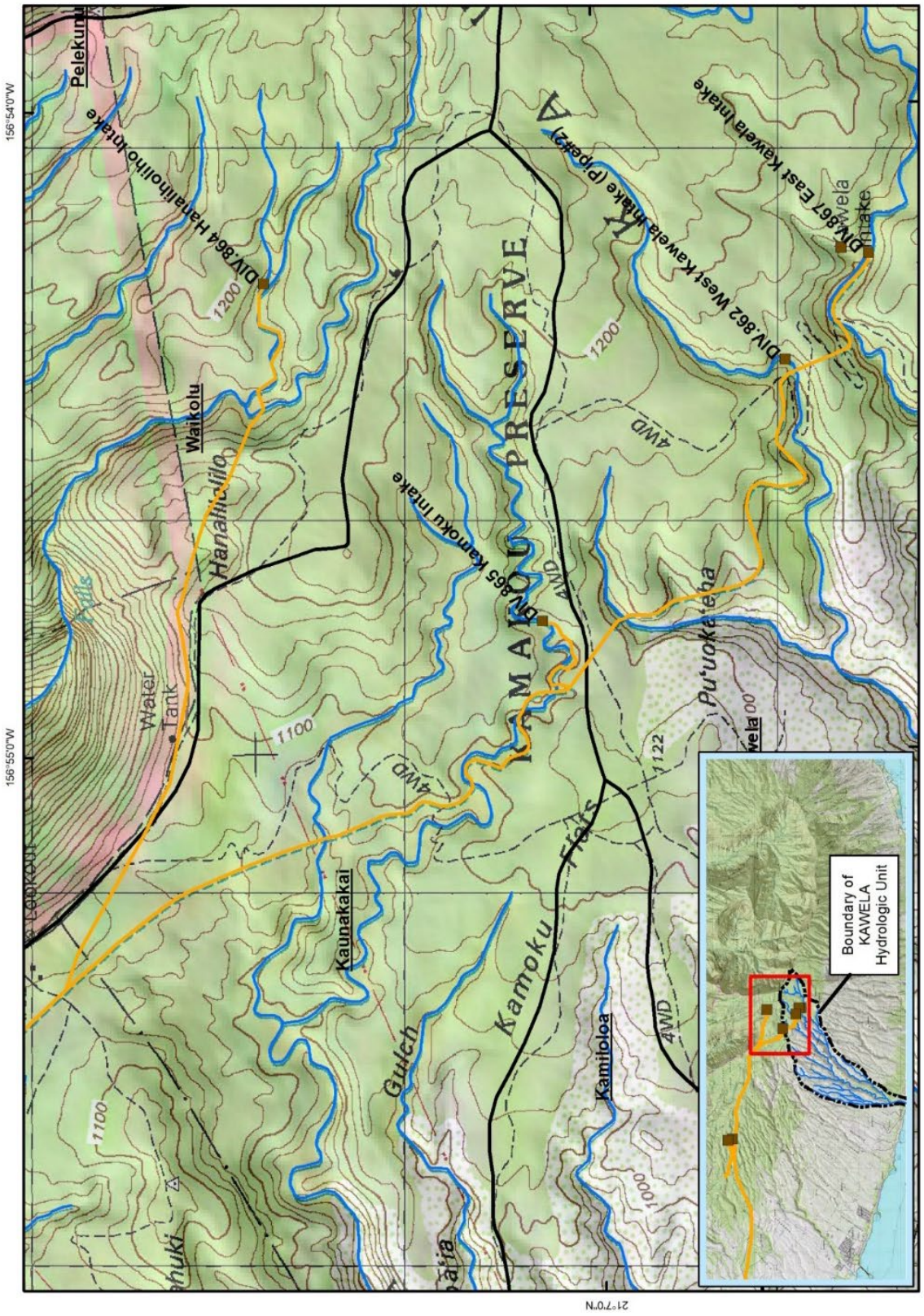
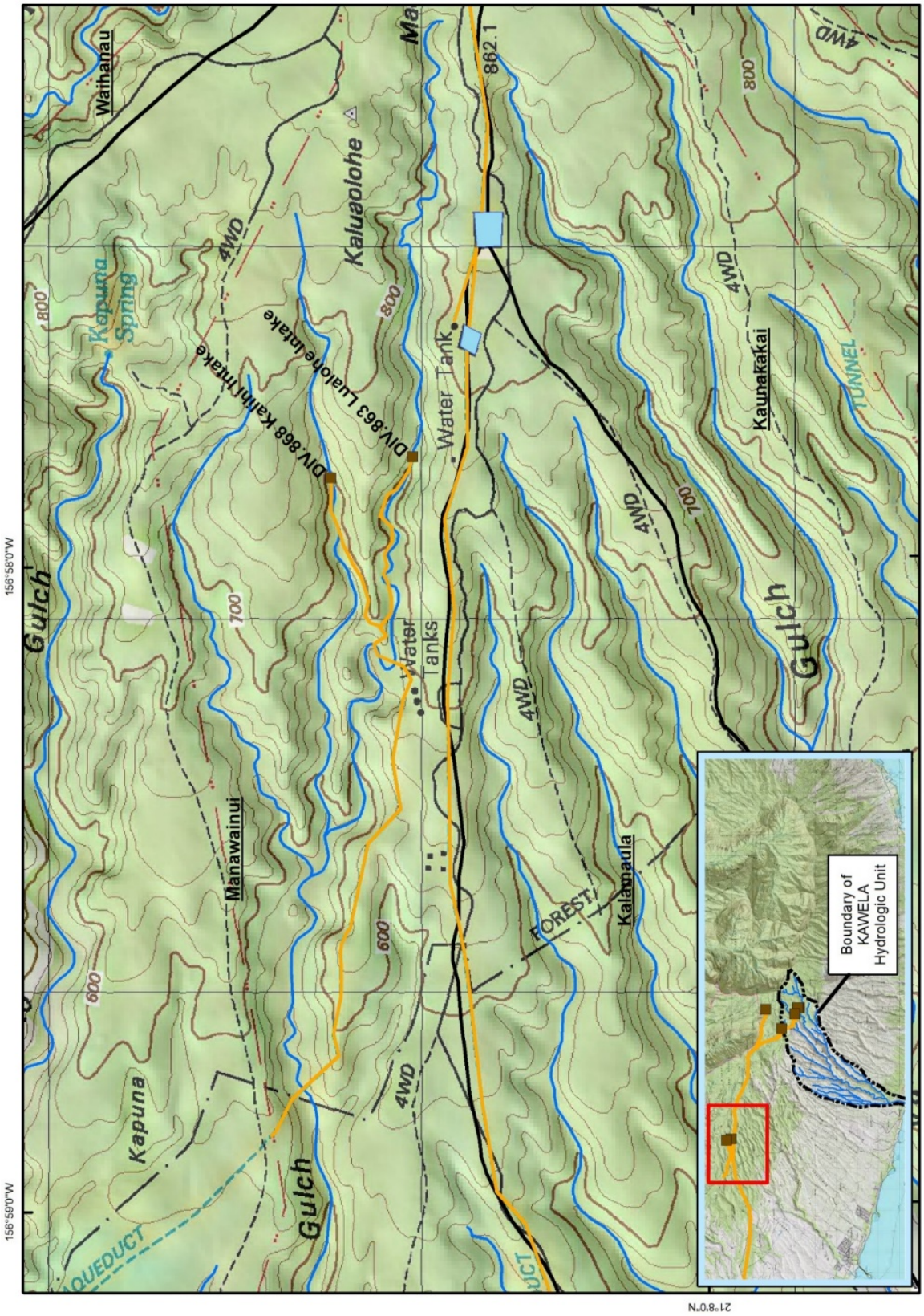


Figure 2. Registered diversions (ID) and ditches/pipelines identified in and nearby the Kawela hydrologic unit as part of the Dole Water Line Section of the Molokai Ranch mountain water system, Molokai.



A summary of the mountain water sources as described in 1982 is provided in Table 3. 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 unused.

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 Kualapu'u and Kala'e regions. Some of Molokai Ranch's land is leased by Bayer (formerly Monsanto) but receives water from the MIS for seed corn production.

Table 3. Historic statistics of the Molokai Ranch mountain water system. [All flows in million gallons per day, mgd]

	1982 Estimates[11]			Reported 2000-02, 2004-05, 2019-P			
Ranch Line	**Drainage Area (mi^2)**	**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							
Lualohi 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

Molokai Irrigation System

Construction started in 1961 for the first phase of the multi-phase Molokai Irrigation System (MIS) to bolster the agricultural economy on the Island of Moloka'i. The first phase of the MIS was designed to deliver surface and groundwater from Waikolu Valley to Kualapu'u and Ho'olehua. Additional phases were envisioned to connect stream diversions from watersheds East of Waikolu but have never been built. The project features four surface water diversions in Waikolu Valley, 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 Kualapu'u (Figure 3). The distribution system in Ho'olehua 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

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

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 4.

Table 4. 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

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.

Since 2015, staff have made 26 site visits to Moloka‘i to investigate Waikolu, Kaunakakai, Manawainui, and Kawela hydrologic units as detailed in Exhibit 2.

Figure 3. Registered diversions (ID), wells, ditches and pipelines as part of the Molokai Irrigation System and the Mountain Water System in the Waikolu hydrologic unit, Moloka'i.

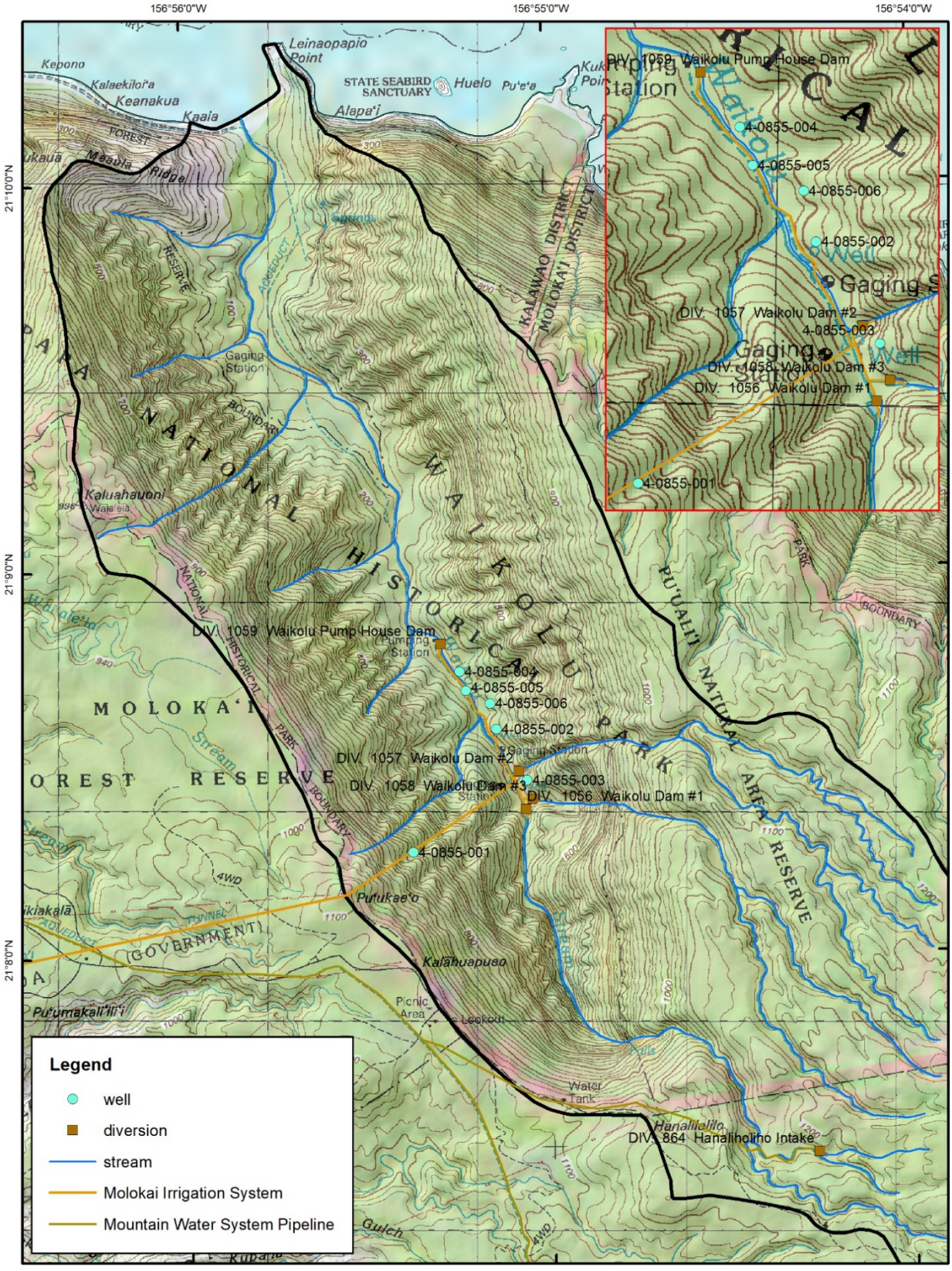
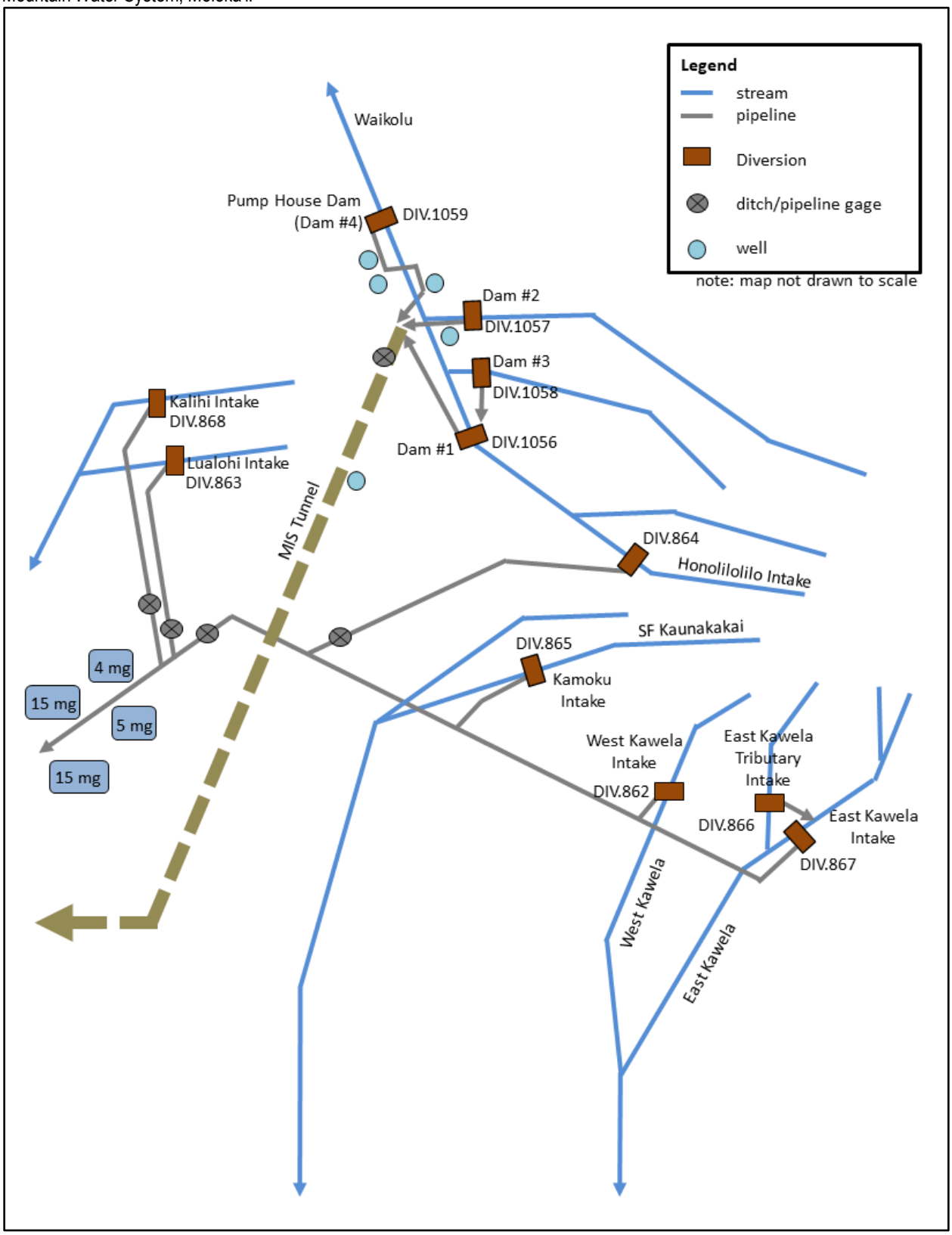


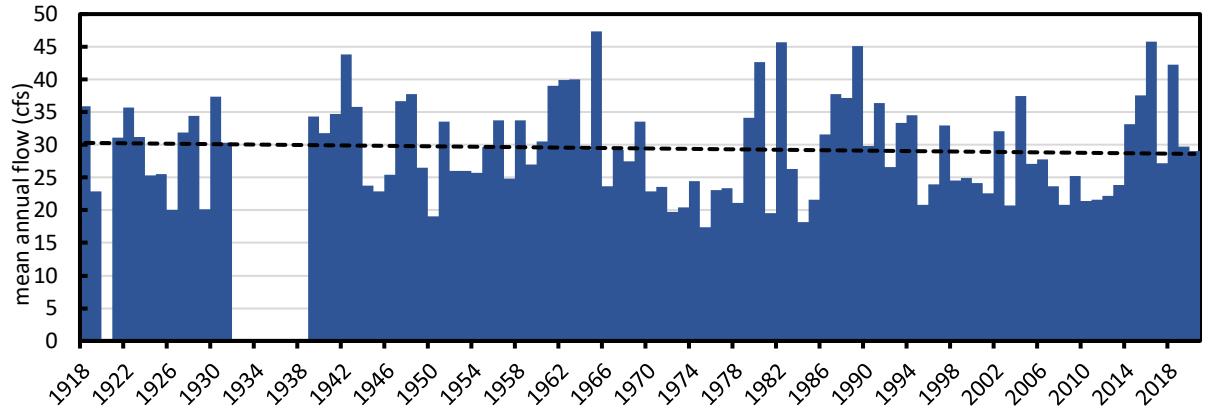
Figure 4. Schematic diagram of diversions (ID), wells, ditches and pipelines as part of the Molokai Irrigation System and the Mountain Water System, Moloka'i.



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 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 5). 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 4.

Figure 5. 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)
Lualohi	Model	0.064 (0.042)	0.020 (0.013)	0.008 (0.005)	0.005 (0.003)
Dole line	**total**	0.0731 (0.0473)	0.0226 (0.0146)	0.0084 (0.0054)	0.0056 (0.0036)

Groundwater-Surface Water Interactions in Kawela

Saturated high-elevation wetland soils support perennial flow in the uppermost reaches of Kawela (Figure 8). 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 elevation., streamflow begins to lose surface flow to groundwater recharge of the basal aquifer. 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.

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[12] and 2006[13]. 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.

[12] Tom Nance. 1995. Final Report: Geophysical Survey Performed on the Island of Molokai, State of Hawaii. Blackhawk Geosciences, Golden, Colorado. Project Number 9131.
[13] 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 6. Mean daily flow (cubic feet per second) remaining in stream and diverted by the intake on the East Fork Kawela Stream at 3,650 ft for water year (WY) 2019 (top) 2020 (middle), and 2021 (bottom).

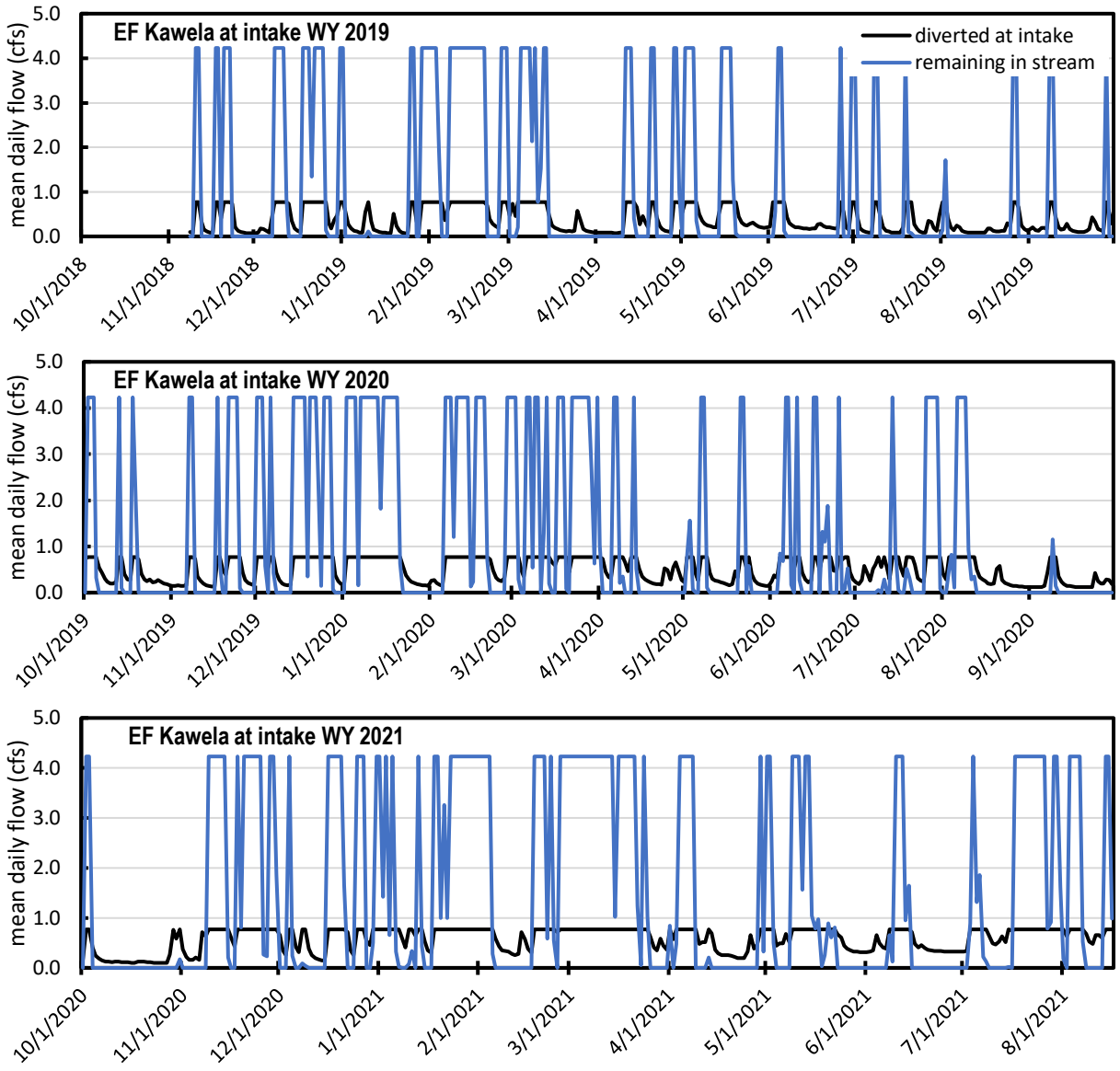
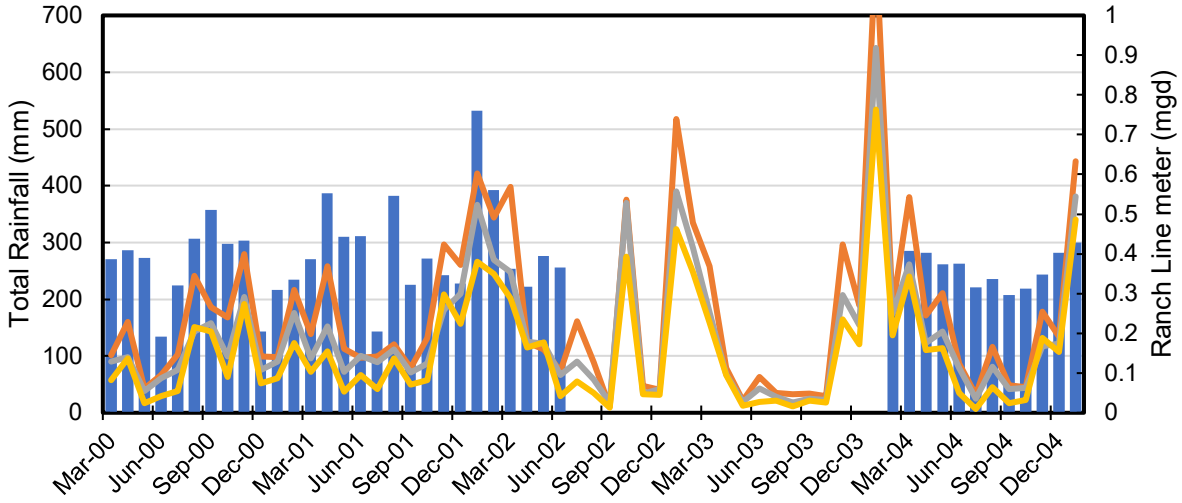


Figure 7. Monthly total rainfall (mm) for the Kawela (grey), Kaunakakai (yellow), and Waikolu (orange) hydrologic units from 2000 to 2005 with overlapping metered total diverted flow of the ranch line.



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.

Groundwater Pumping from Waikolu Valley

Waikolu Stream gains flow from mauka to makai due to spring discharge from numerous dikes (Figure 8). 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.

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. 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[14]. 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.

[14] Water Resource Associates, 1999. Waikolu Stream Biological and Hydrological Monitoring Study, Molokaʻi, Hawaiʻi. prepared for the Hawaii Department of Agriculture.

Figure 7. Streamflow gains and losses measured by USGS during seepage runs in 2010 that span multiple dates for different reaches.

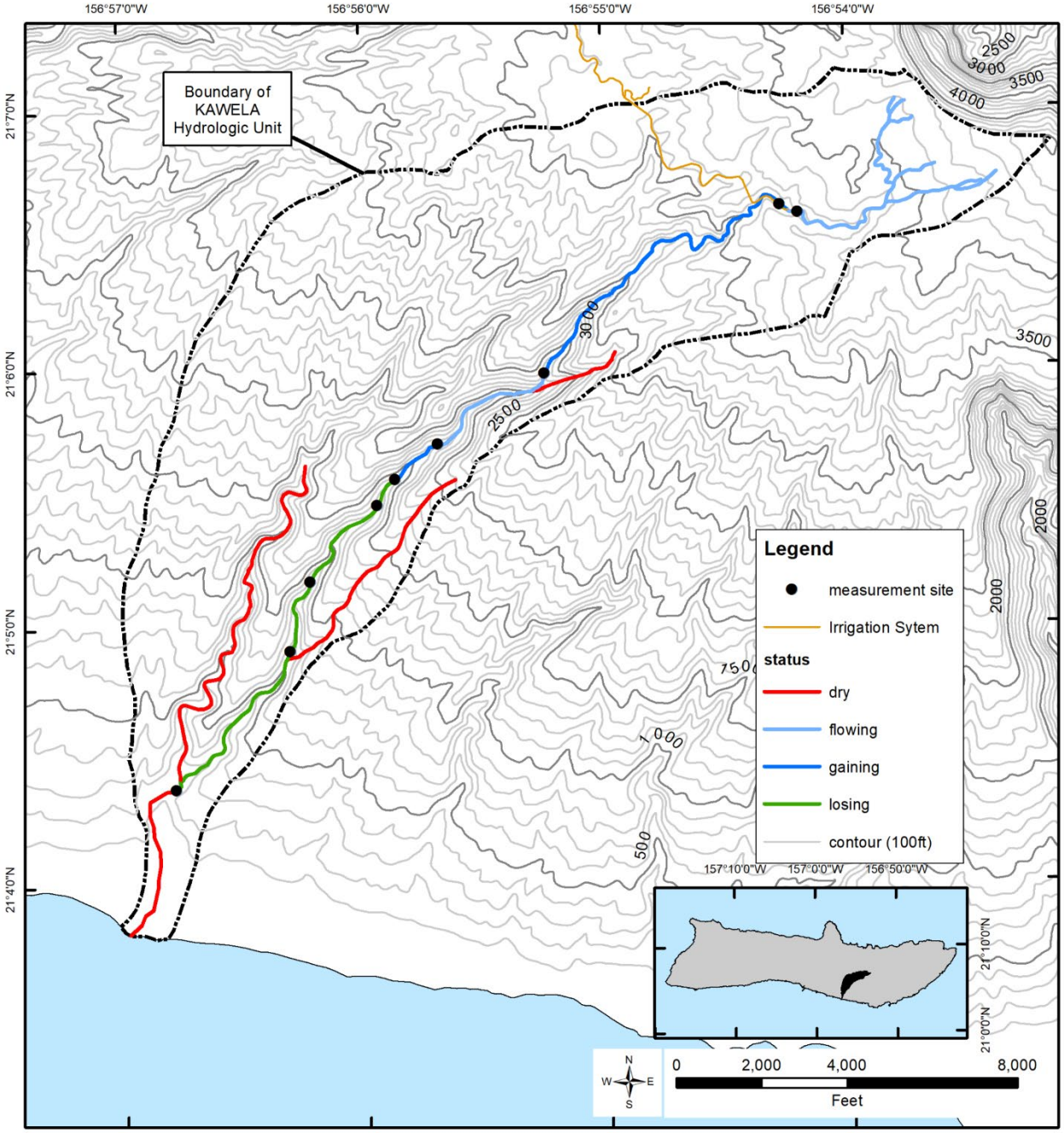
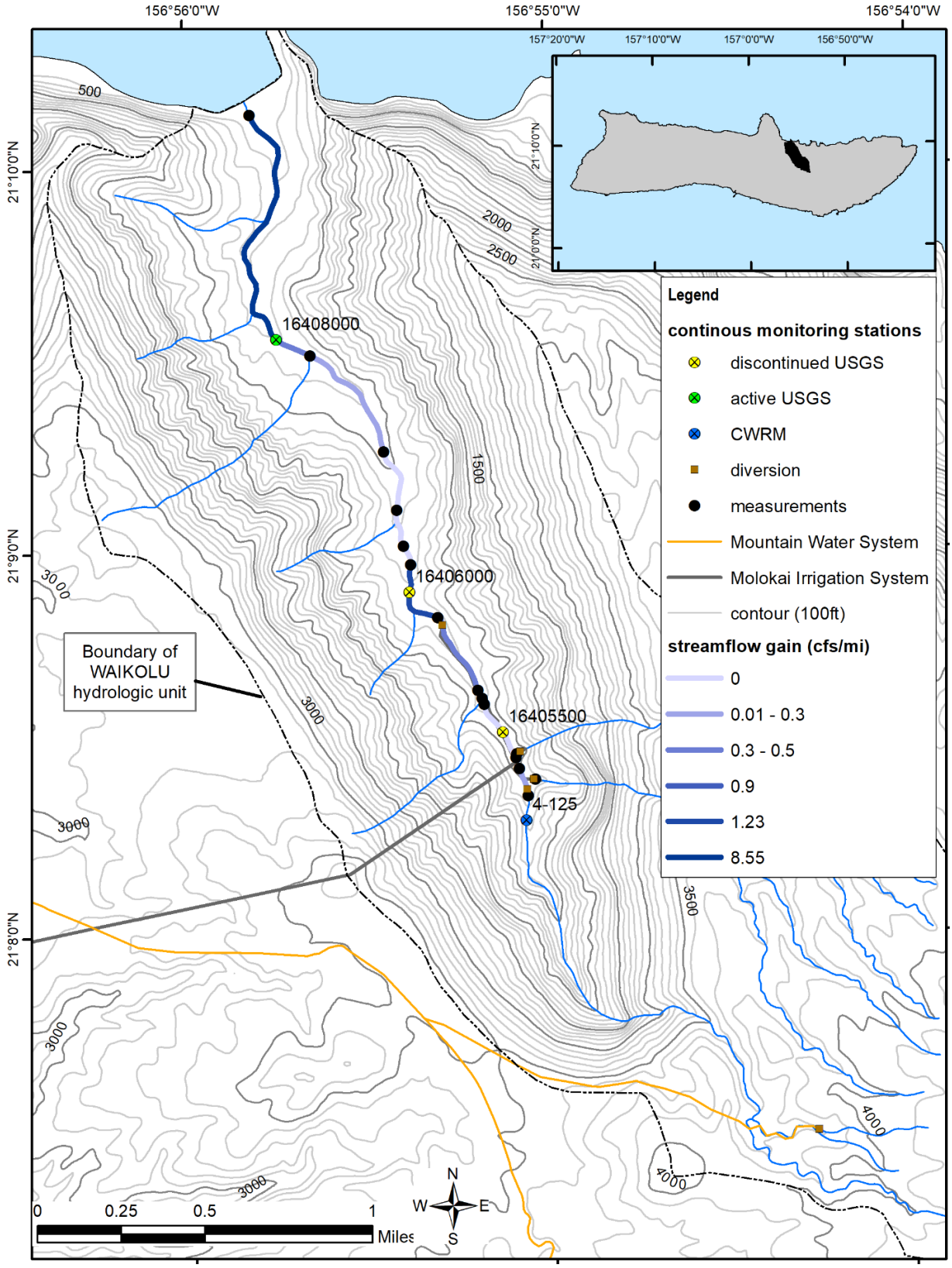


Figure 8. Streamflow gains measured by USGS during seepage runs that span multiple dates for different reaches for Waikolu Stream, Molokai.



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 9). Since 1983, Hoʻolehua 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.

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, ʻōpae, ʻoʻopu) 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 ahupuaʻa has mauka-to-makai 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 Kawela and Waikolu streams.

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 and coastal environments. Restoration of downstream flow will also increase the frequency of mauka-to-makai flow, maintaining greater connectivity among stream reaches that support native amphidromous species, improve recreational value, and aesthetic value.
Surface flow in each stream supports a high density of threatened and endangered riparian plants. These streams also support five damselfly species, some of which are threatened or endangered: *Megalagrion pacificum*, *Megalagrion hawaiiense*, *Megalagrion xanthomelas, Megalagrion blackburni* and *Megalagrion calliphya*.

Waikolu Stream gains flow from mauka to makai, supporting 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 loʻi exist below 400 ft in elevation. Springs along Waikolu Stream also support *M. hawaiiense*, *M. blackburni* and *M. calliphya*.

Figure 9. 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)

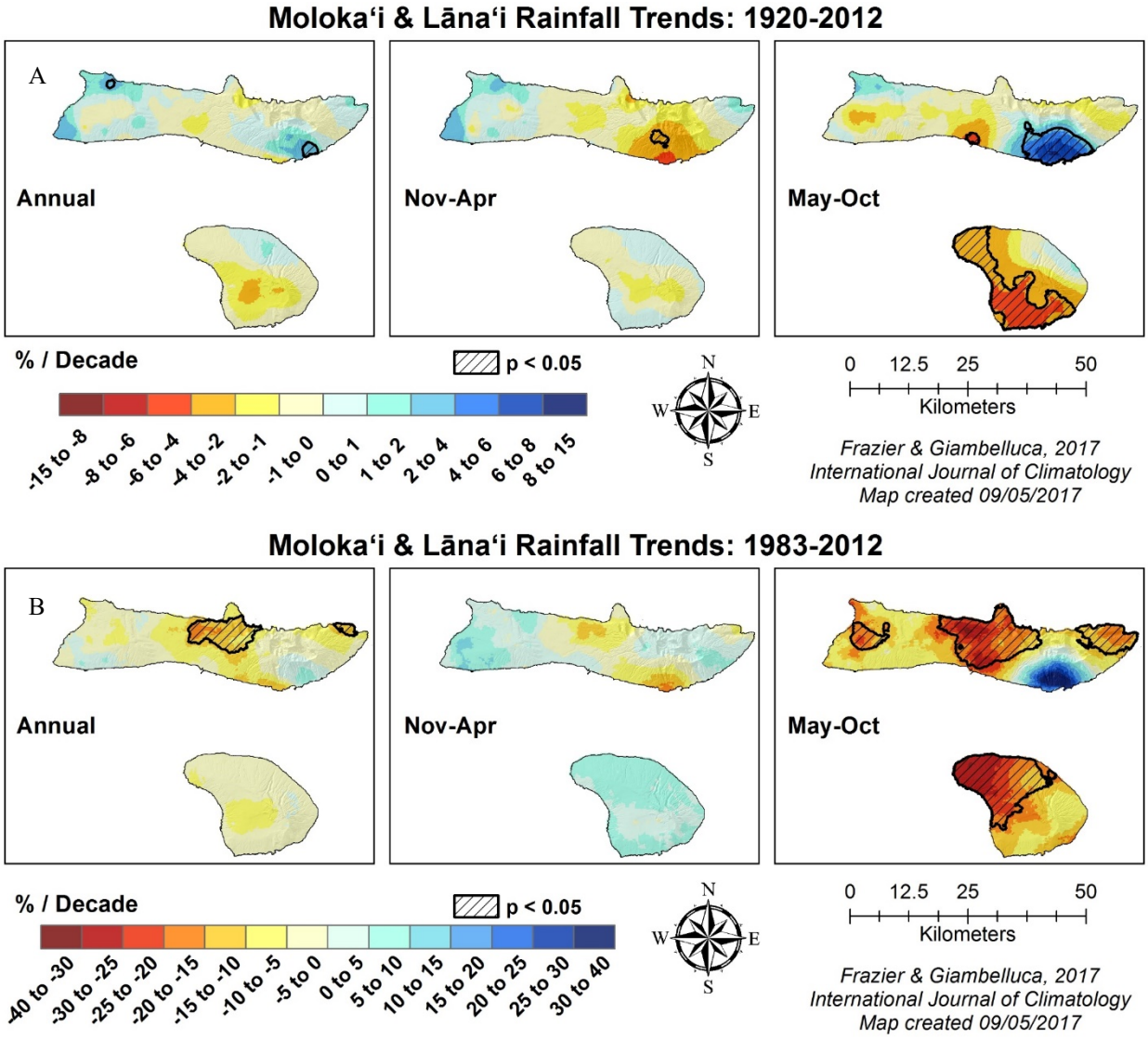


Table 6. Hawaii Stream Assessment results for the Kawela, and Waikolu streams, Molokaʻi.

Biological Resources	**Kawela**	**Waikolu**
Final Rank	Limited (2 of 4)	Outstanding (4 of 4)
Alamoo	--	Yes
Nakea	--	Yes
nopili	--	Yes
Hihiwai	--	Yes
# NG2	--	3
Cultural Resources	**Kawela**	**Waikolu**
Final Rank	Outstanding (4 of 4)	Substantial (3 of 4)
taro cultivation	no	historic
# archaeological sites	15	1
density	High	Moderate
valley significance	Pre-contact, excellent examples, important information, culturally noteworthy	Pre-contact, important information, culturally noteworthy
Riparian Resources	**Kawela**	**Waikolu**
Final Rank	Substantial (3 of 4)	Substantial (3 of 4)
Detrimental species	mangrove, pigs, deer, goats	hau, pigs, deer, goats
% native forest	--	30%
Presence of recovery habitat	--	--
# T&E birds	--	0
# of rare plants	--	2
Wetlands	--	--
Recreational Resources	**Kawela**	**Waikolu**
Final Rank	Outstanding (4 of 4)	Outstanding (4 of 4)
Opportunities	Camping, hiking, fishing, swimming, hunting, scenic views	Camping, hiking, hunting, parks, scenic views
Regional rank	1	

NON-INSTREAM USE CONSIDERATIONS

The current ranch water system is composed of many different water systems that have been integrated over the years including surface water sources originally built by DHHL. 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 Hoʻolehua 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 (including the Del Monte Well 17 and Kaluakoʻi system) were historically interconnected, and included connectivity to the MIS, although the later was disconnected in 2018. A new pipeline from Well 17 to west Molokai (connecting to

Mauna Loa and Kaluakoʻi) has eliminated the need to use the MIS and treat the combined flow of surface and groundwater at the Puʻunana Water Treatment Facility. The Dole Line was also connected to the MIS, however this connection has since been severed.

In total, the MWS consists of 7 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 average 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 14. Some non-potable needs in Kaluakoi are currently met with potable water from Well 17 due to the lack of parallel infrastructure to supply non-potable water.

Monitoring of diverted flow

The East Kawela tributary intake (Diversion 866) and transmission pipeline that brought water to East Kawela above Diversion 867 intake has not been operational since at least 2015. West Kawela Intake (Diversion 862), Kamoku Intake (Diversion 865), Kalihi Intake (Diversion 868), and Lualohi Intake (Diversion 863) have also not been used since 2015.

The Molokai Ranch intake on East Kawela is a 10-inch pipeline with a maximum capacity of 0.77 cfs (~0.5 mgd). Based on this, the mean daily flow currently diverted and currently remaining in the stream can be depicted in Figure 6.

Monitoring flow data provided by Molokai Ranch and Molokai Properties for individual intakes is only available for the Kalihi (Diversion 868) and Lualohi (Diversion 863) intakes on the Dole Line and the Hanalilolilo intake (Diversion 864) on the Ranch Line. The combined flow from East Kawela (Diversion 867) and West Kawela (Diversion 862) intakes is monitored after the contribution from Hanalilolilo, which allows for estimates of the combined 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 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). 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).

Other Water Systems Owned by Molokai Properties

Molokai Properties owns Well 17 (purchased from Del Monte), which supplies potable water to some customers in the Kualapuʻu, Kalaʻe, Manawainui Industrial Park, Maunaloa town, and Kaluakoʻi development. At the end of 2017, a new pipeline was installed to directly deliver potable water from Well 17 to west Molokai, and the mountain water system was discontinued. The estimated current and planned potable water needs supplied by Well 17 as provided by

Molokai Properties are listed in Table 11. 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.

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 7 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 7. 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

ISSUES/ANALYSIS

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

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.

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.

End uses of Molokai Properties Water Systems

The mountain water system and the well 17 water sources provide for the non-potable and domestic needs of Molokai Properties, but are also managed to provide for the delivery of water to lessees of Molokai Properties, developments of Molokai Properties, lessees of other neighboring landowners, and other users within the service area (including residences, businesses, non-profits, and the County of Maui) as defined by their Public Utility Commission accepted service area.

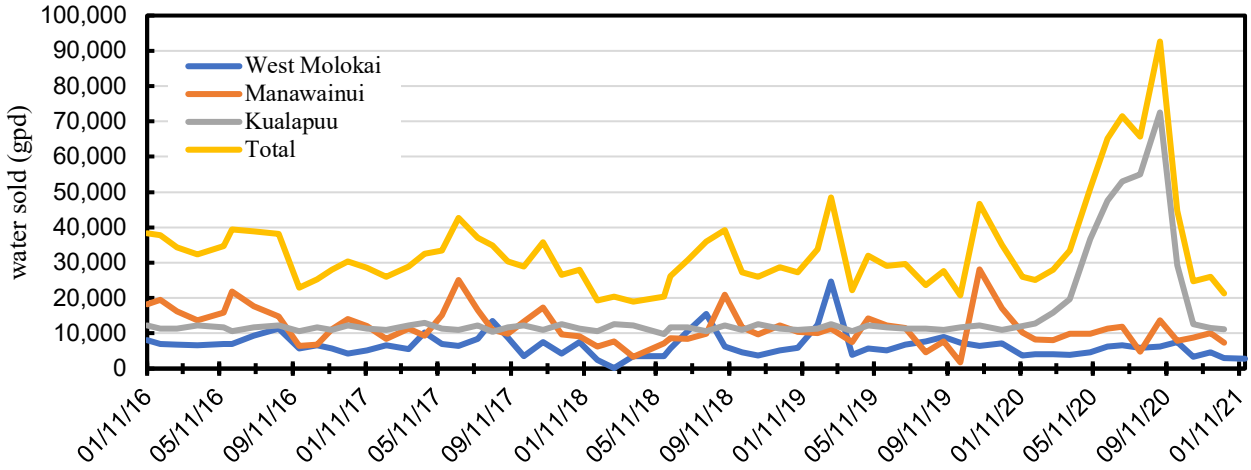
Molokai Properties has three subsidiary utilities: Waiola O Molokai (WOM), Molokai Public Utilities, Inc (MPU), and Mosco, Inc. Mosco is the wastewater utility, while WOM and MPU are water delivery utilities. The WOM utility operates a potable water system that services the Kalae, Kualapu‘u, Ho‘olehua, Mainawainui, Mauna Loa, and Kaluako‘i areas, now soley 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 Reservoir.

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 10. 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.

Availability of Suitable Grazing Lands

Range and pasture lands are diverse types of land where the primary vegetation produced is herbaceous plants and shrubs. The lands provide forage for beef and dairy cattle, sheep, goats, horses, and other domestic livestock. The primary economic outputs of rangelands are livestock production, but successful management can also play a major role in watershed health. Well managed range and pasture lands can provide environmental values including essential ecosystem services such as clean water, carbon sequestration, wildlife habitat, and recreational opportunities. Scenic, cultural, and historic values of these lands may also provide quality of life values. In Hawai‘i, approximately 25 percent of the total land mass is range or pastureland. Historic use and management of grazing lands occurred without the benefit of grazing land science. Further, many lands that were originally designated as rangeland due to a lack of sufficient rainfall to support cultivated agriculture (i.e., dry lands) have experienced a significant decline in seasonal and annual rainfall since the 1920s[15].

Figure 10. Monthly non-potable water sold by system and in total from the mountain water system. [flow in average gallons per day (gpd)].



Soil texture, combined with rainfall, are factors that influence the type of plant community that can be supported for grazing. Molokai Properties’ lands are predominantly silty clay (~40%) and silty clay loam (~20%), and extremely stony silty clay loam (~14%). Common grasses that can be supported on these soils and their average percent dry matter are: kikuyu grass (25%), pangola grass (22%), guinea grass (24%), signal grass (26%), and california grass (21%)[16]. Other grasses available include green panic, giant guinea, and buffalo grass. Due to a lack of

[15] Frazier, A.B., Giambelluca, T.W., 2017. Spatial trend analysis of Hawaiian rainfall from 1920 to 2012. International Journal of Climatology, 37(5): 2522-2531.
[16] Thorne, M.S., Stevenson, M.H., 2007. Stocking Rate: The most important tool in the toolbox. University of Hawai‘i at Mānoa Cooperative Extension Service, Pasture and Range Management. PRM-4.

rainfall, pasture grass does not grow well on Moloka‘i and additional livestock feed is imported from the mainland during dry conditions. For example, in 2012, 662,000 pounds of cattle and horse feed was purchased through the farm supply cooperative[17].

The fragile soil classification for agriculturally-zoned soils on land owned by Molokai Properties is summarized in Table 8. The largest portion of the Molokai Properties land was not rated, and approximately 50% of the land was classified as fragile or moderately fragile. A moderate classification would imply that under low vegetative cover on gently sloping to very steep slopes, under very dry conditions on moderately steep slopes, or even low vegetative cover under wet conditions, there is poor soil quality resulting is less productivity. Fragile soils have poor quality with low vegetative cover under wet or dry conditions, especially on moderately steep or very steep slopes. Thus, much of the agriculturally-zoned soils owned by Molokai Properties is not suitable for supporting range vegetation.

Table 8. Area and percent of available land by soil fragility index classification for agriculturally zoned land owned by Molokai Properties. (Source: USDA-NRCS, 2003)

classification	Area (square miles)	Percent (%)
slightly fragile	1.985	2.61%
moderately fragile	14.545	19.14%
fragile	23.951	31.52%
extremely fragile	0.614	0.81%
not rated	34.898	45.92%

Drought Vulnerable Soils

Even with average or slightly less than average precipitation, some soils are prone to drought and drought stress affects plant growth. Several conditions can allow this to happen. Most influential may be a relative lack of effective precipitation, as is estimated by subtracting the mean annual precipitation from an estimate of the annual evapotranspiration. Also, a soil may have an inherently low ability to store water. This is typical of sandy or shallow soils or soils having a high content of rock fragments. In this case, even though there may be significant rainfall, the soil matrix does not retain sufficient water for crop growth.

Topographic and climatic characteristics can be present to mitigate a soil's drought tendencies. Some soils exist on water-gathering portions of the landscape and can thus support more plant growth than their similar neighbors because of runoff. Some soils have a water table present within the rooting zone during the growing season to supply plant water needs. Finally, some soils exist in a climate where precipitation is much higher than evapotranspiration and the soil is nearly always moist. This can occur in cool climates at high elevations. Mean annual rainfall on Molokai Property-owned agriculturally-zoned land is provided in Figure 11.

Rating class terms indicate the extent to which the soils are vulnerable to drought. Numerical ratings indicate the degree of vulnerability associated with each soil or site feature. The ratings

[17] de Sa, R., Emmerman, D., Veysey, D., 2013. Livestock Production on Moloka‘i Island, Hawai‘i. Yale School of Forestry & Environmental Studies.

are shown in decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature imparts the greatest degree of vulnerability (1.00) and the point at which the soil feature helps to mitigate drought vulnerability (0.00).

The drought vulnerability classification for agriculturally zoned soils on land owned by Molokai Properties is summarized in Table 9. Approximately 61% of the land is classified as severely drought vulnerable and approximately 95% of their land is classified as at least drought vulnerable or worse under current climate conditions.

Table 9. Area and percent of available land by drought vulnerability classification for agriculturally zoned land owned by Molokai Properties. (Source: USDA-NRCS, 2003)

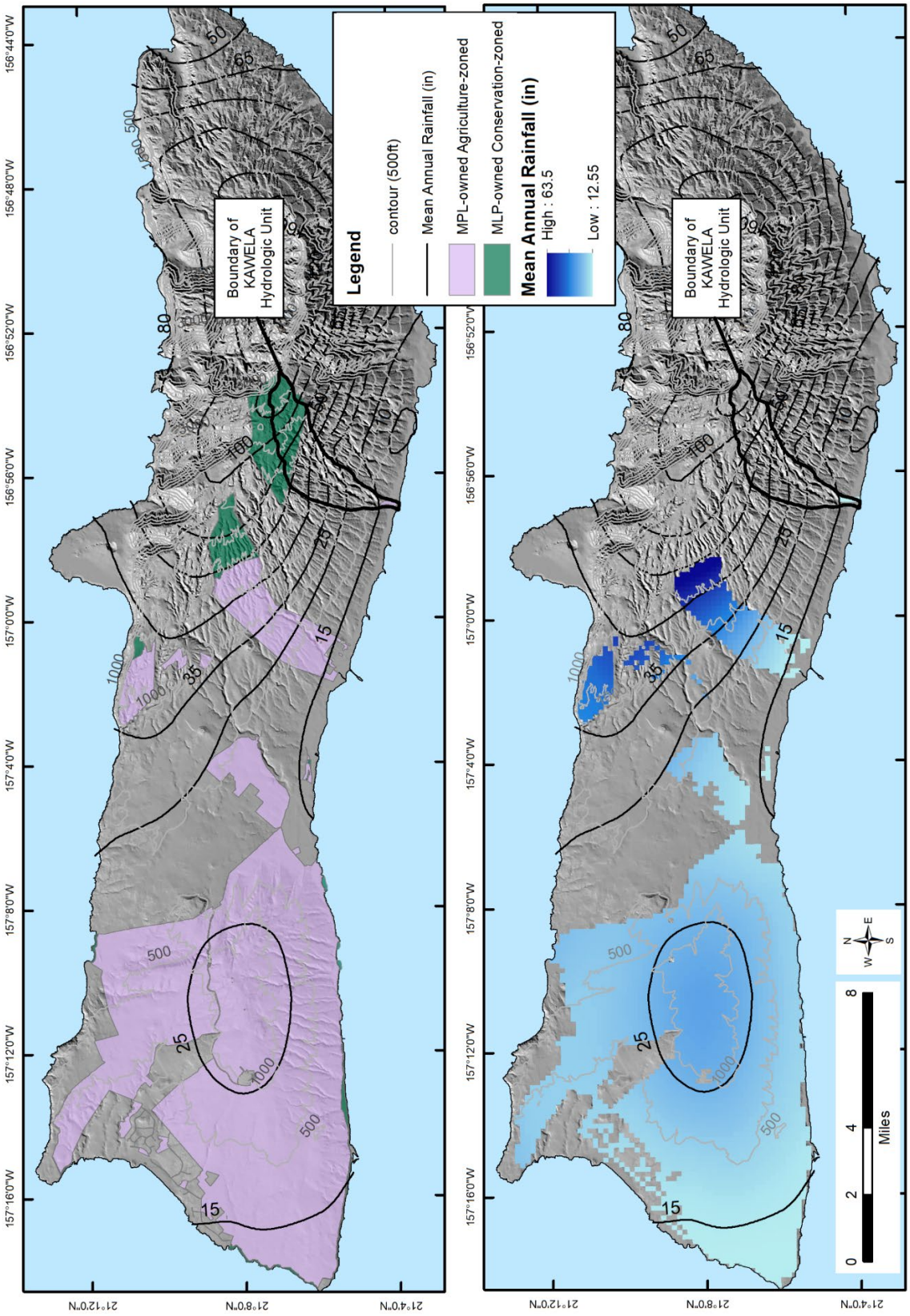
classification	Area (square miles)	Percent (%)
slightly drought vulnerable	4.169	5.49%
drought vulnerable	25.496	33.56%
moderately drought vulnerable	0.159	0.21%
severely drought vulnerable	46.122	60.71%
water	0.023	0.03%

Sustainability of Stocking Rate Based on Forage Available

Approximately 58,000 acres of land is used for grazing on Molokai, with most of this occurring in the arid western end of the island. Soils on the island were grouped by the Soil Conservation Service (precursor to the Natural Resources Conservation Service) into four pasture groups which produce similar amounts of vegetation and require similar management (Soil Conservation Service, 1972).

The soils type in the parcels used by Molokai Properties for cattle ranching almost exclusively fall into Pasture Group II, with the Molokai-Lahaina association soils and unimproved pasture. Pasture Group II consists of soils on alluvial fans, terraces, and low uplands that developed in alluvium, volcanic ash, and weathered igneous rocks. They tend to be 20 to 60 inches deep and slope from 0 to 35%. These soils tend to be in mid elevation regions up to 1,600 feet a.s.l. and in regions with annual rainfall between 15 and 35 inches with good drainage. The vegetation in unimproved pasture produces anywhere from 700 to 1,700 pounds of dry forage per acre per year, with 75% or more produced during the wet season. If the pasture is improved with buffel grass, guinea grass, or haole koa, the pasture could produce 1,400 to 2,600 pounds of dry forage per acre per year.

Bulls (x1.4 AUE) need 1,295 pounds per month forage, cows (x1.07 AUE) need 988 pounds per month forage and weans (x0.7 AUE) need 547 pounds per month, animal unit equivalents (AUE). From 2013 to 2021, Molokai Properties ranching operation has averaged 1016 AUE, ranging from 514 to 17301, with a forage demand that averaged 855,520 pounds per month, ranging from 458,768 to 1,495,423 pounds per month, annually.


Legend
contour (500ft)
Mean Annual Rainfall (in)
MPL-owned Agriculture-zoned
MLP-owned Conservation-zoned
Mean Annual Rainfall (in)
High : 63.5
Low : 12.55
Boundary of KAWELA Hydrologic Unit
Boundary of KAWELA Hydrologic Unit
Miles
0
2
4
8
N
E
S
W
156°44'0"W
156°48'0"W
156°52'0"W
156°56'0"W
157°0'0"W
157°4'0"W
157°8'0"W
157°12'0"W
157°16'0"W
21°12'0"N
21°8'0"N
21°4'0"N

Since 2014, Molokai Properties has used 16,560 acres of land for cow-calf operations. Under the best of circumstances (1700 pounds of dry weight per acre per year), at a 25% harvest efficiency, this would produce approximately 7,038,000 pounds of forage per year, or 586,500 pounds per month. Based on the availability of forage, the Molokai Properties cow-calf operation exceeded the available forage for ideal conditions six out of nine years from 2013 to 2021. This likely contributed to the death or premature slaughter of hundreds of cows.

Stocking Rate Based on Previous Ranching Operations

Molokai Properties lessee Sakugawa and Sons averages approximately 10 acres per head. Assuming a head is equal to an animal equivalent unit, with 16,560 acres, the maximum stocking rate under ideal conditions should range from approximately 1,300 to 1,656 animal units.

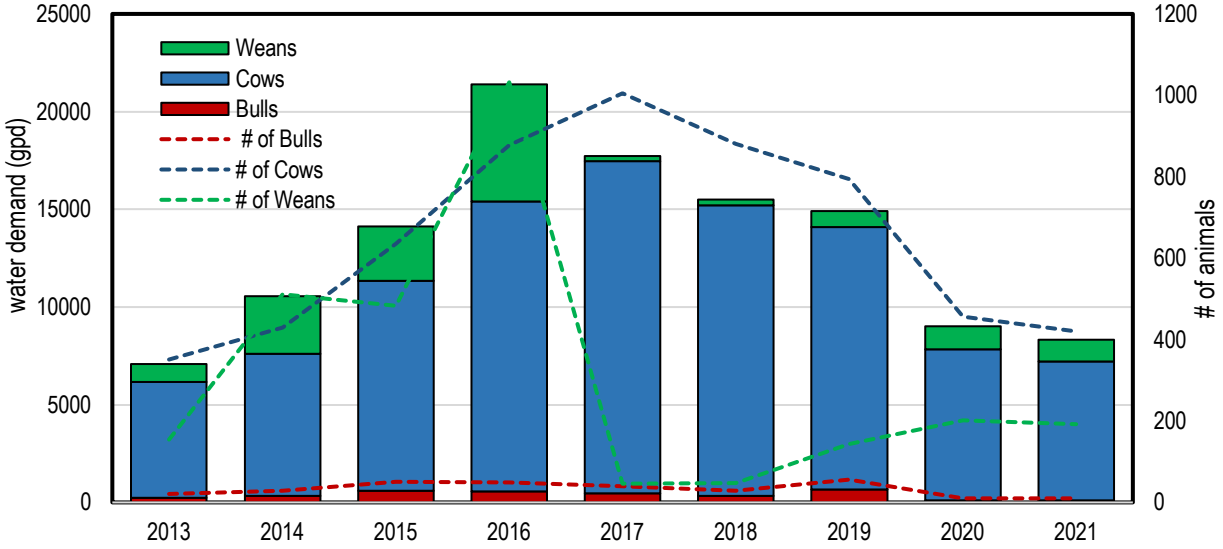
Historic stocking rates by Molokai Ranch include 1,019 head in 1906 and 878 head in 1907 for 70,000 acres (rates of 68.7 acres per head and 79.7 acres per head). Until Molokai Ranch started leasing lands to Libby, McNeill and Libby on Kaluakoʻi (7,246.26 acres) or to California Packing Corportation at Kualapuʻu and Kapali (3,541.52 acres) for raising pineapples, Molokai Ranch had 64,101 acres fee simple land and 25,324 acres of Government lands available for grazing[18]. In a survey published in 1929[19], Molokai Ranch's stocking rate in 1928 was approximately 40 acres per head. At 40 acres per head, Molokai Properties only as sufficient acreage for 414 head.

Water Demand of Cattle

Few studies have fully documented water use by beef cattle. Available data suggest that the water requirement of beef cattle is closely tied to the animal's size, the moisture content of their feed or forage, the external environmental conditions (e.g., air temperature, humidity), and if the animal is lactating (if female). Weight gains of pastured beef animals are greater if there is consistent water supply. Dry cows, bred heifers, and bulls need as little as 5.8 gallons per day (gpd) or as much as 14.3 gpd, but typically need around 10 gpd. The water requirement of lactating cows with calves ranges from 11.4 gpd to 17.7 gpd[20]. When air temperature exceeds 80°F, a 400-pound growing beef calf requires 6.7 gpd compared to only 5.0 gpd when the temperature is at 60°F. When relative humidity increases, water requirements decrease. Mean annual temperature for Molokai Properties agriculturally zoned lands ranges from approximately 70 to 76°F. Thus, on an annual basis, a 400-pound growing beef calf requires approximately 5.8 gpd, a pregnant cow requires approximately 9.7 gpd, a lactating cow requires approximately 16.9 gpd, and a mature bull requires approximately 11.7 gpd[21]. Assuming all cows are lactating (and thus require the greatest amount of water) estimated water requirements for the Molokai Properties cow-calf operation are provided in Figure 12. The average total annual water demand from 2014 to 2019 was 13,181 gallons per day or 0.0138 mgd and ranged from 7,077 to 21,397 gallons per day.

[18] Cooke, G.P., 1949. Moolelo o Molokai: A Ranch Story of Molokai.
[19] Henke, 1929.
[20] National Research Council, 2000. The nutritional requirements of beef cattle. 7th revised edition. Washington, D.C.
[21] National Research Council, 2000

Figure 12. Annual number of bulls, cows, and weans and total annual water requirements for Molokai Properties cow-calf operation from 2013 to 2021.



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 13. 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 Molokai 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."[22]

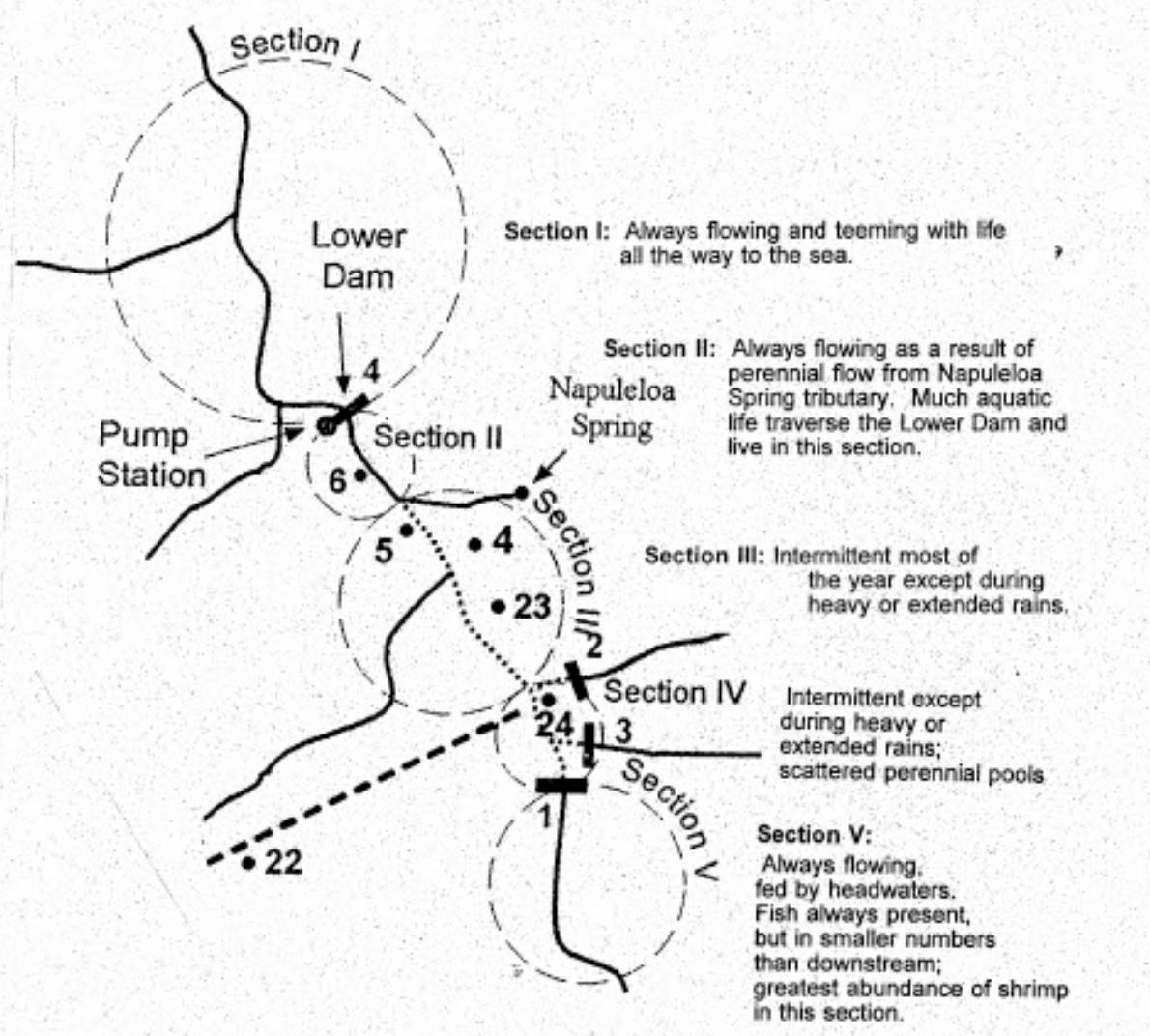
When construction began, the estimated water available from the MIS was 7.6 mgd: 4.4 mgd from stream diversion, 1.8 mgd developed by the transmission tunnel, 1.0 mgd from surface pumps at Dam #4, and 1.4 mgd from wells. System losses were estimated to be approximately 1.0 mgd (13%). However, due to the 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[23].

[22] 1943. Hawaii Session Laws, Act 227
[23] 1986. Department of Land and Natural Resources Division of Water and Land Development, "Fact Sheet: Molokai Irrigation System".

In 1955, it was specified that homesteaders would have a two-thirds right to the Molokai Irrigation System water[24]. 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-thids 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."[25]

Figure 13. Summary of hydrological and biological consequences of MIS operation in Waikolu Valley, Molokai. (Source: Water Resource Associates, 1999)

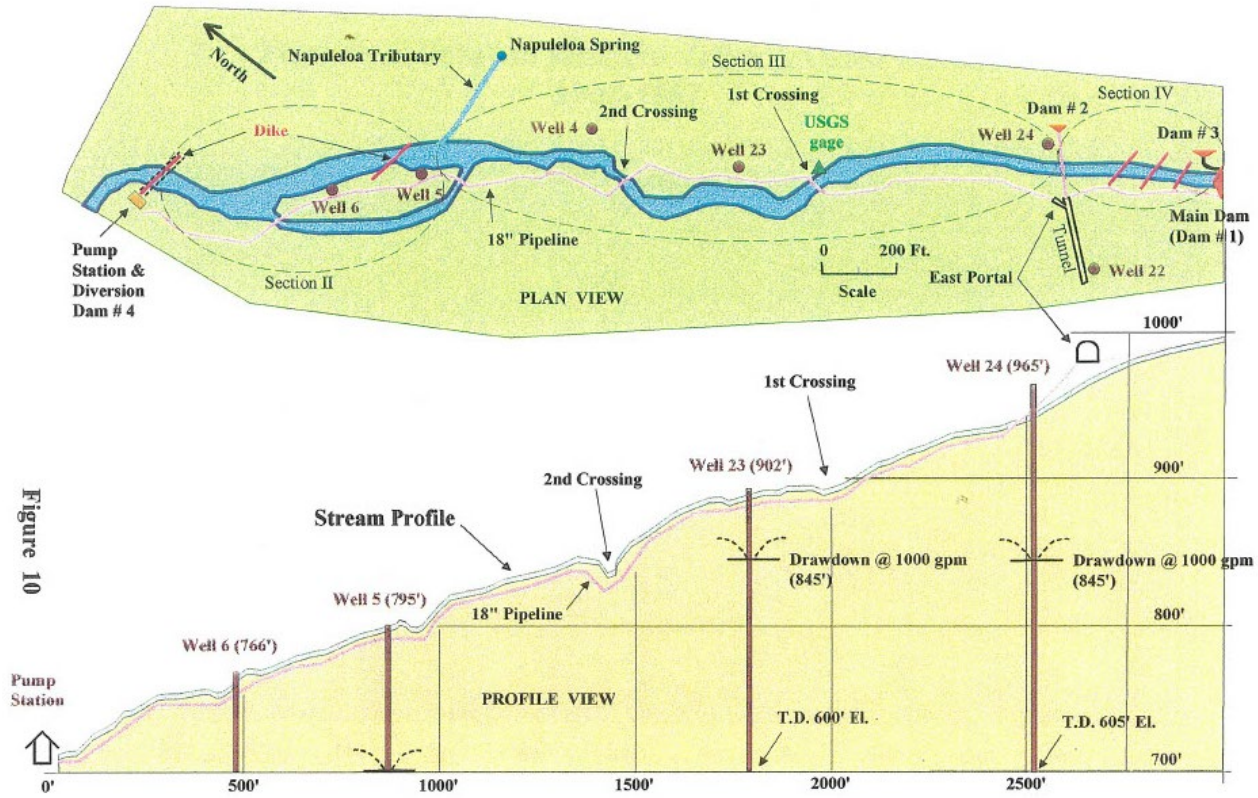


From January 2010 to June 2020, metered end uses of MIS water totaled a mean of 2.386 mgd (range 0.886 to 3.915 mgd) with a median of 2.397 mgd. Mean annual evaporation from Kualapu'u Reservoir (87.36 acres) is 0.5246 mgd.

[24] 1955. Hawaii Session Laws, Act 164.
[25] Hawaii Rev. Stat. Sec 175-4.

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 14). 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[26]. During the 1990s, Well 23 and 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 14. Elevational profile with well locations in relation to surface water diversions, springs, and the USGS gaging station, Waikolu, 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[27].

[26] Water Resource Associates. 1999.
[27] Kahane, J.D. 1987. The Molokai Irrigation System: A Management Study. Legislative Reference Bureau, State of Hawaii. Report 3457-A

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.

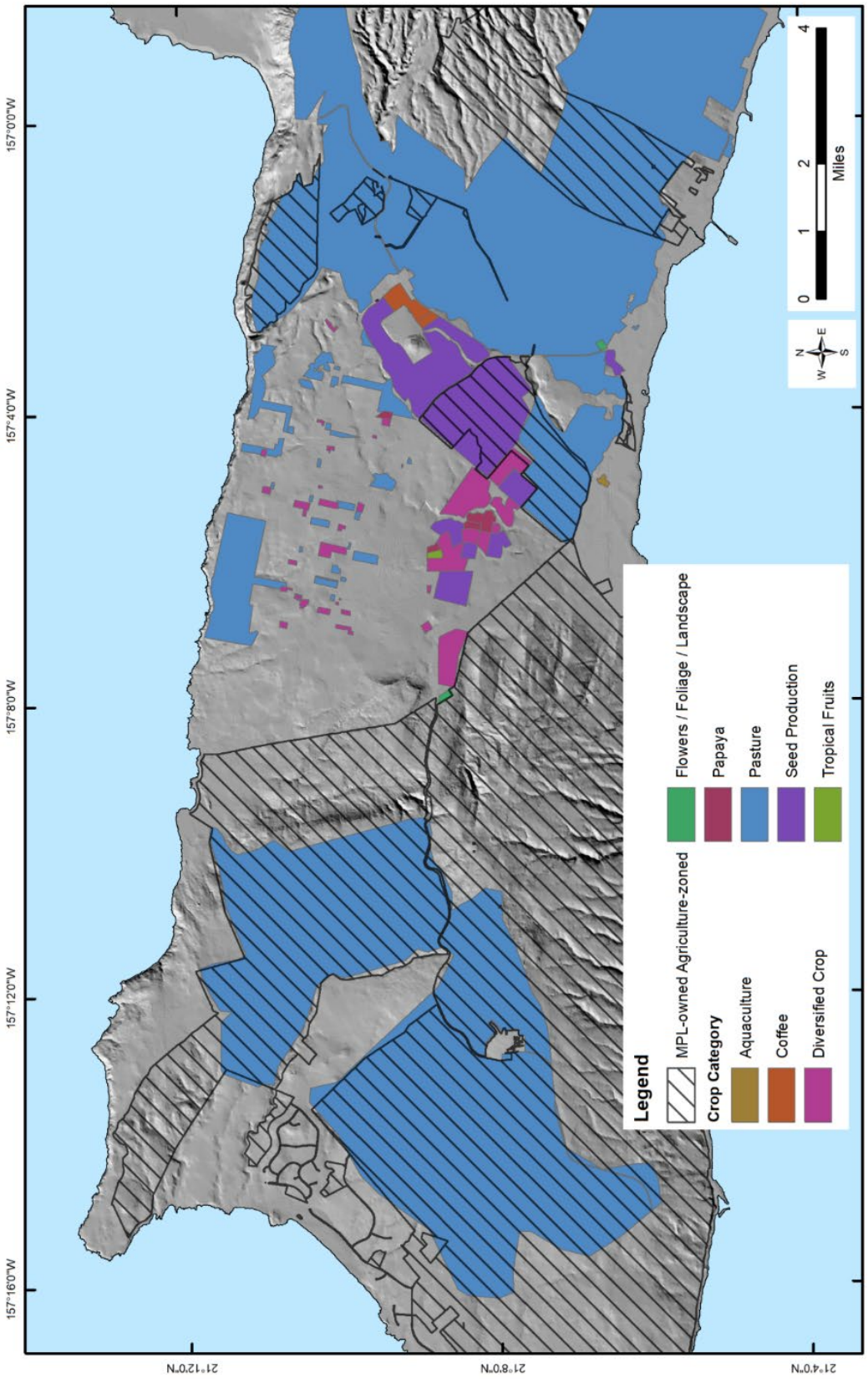
The Commission funded the development of a GIS-based software program the utilizes the state of Irrigation Water Requirement Estimation Decision Support System, IWREDSS (State of Hawaii, Commission on Water Resource Management, 2015b) was developed by the College of Tropical Agriculture and Human Resources, 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[28], 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 Ho‘olehua); 2-5-2-001:009 (a DOA parcel in Ho‘olehua); and 2-5-2-012:004 (a Molokai Properties parcel in Ho‘olehua). The 1:5 year drought IRR for dryland kalo, papaya, seed corn, and coffee are approximately 2100 gallons per acre per day (Table 10). 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 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 15 provides a description of the existing agricultural uses of Central Molokai.

Table 10. 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

[28] Crop coefficient is an empirically derived dimensionless number that relates potential evapotranspiration to the crop evapotranspiration. The coefficient is crop-specific.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0
1
2
4
Miles
N
E
S
W
Legend
MPL-owned Agriculture-zoned
Crop Category
Aquaculture
Coffee
Diversified Crop
Flowers / Foliage / Landscape
Papaya
Pasture
Seed Production
Tropical Fruits

AVAILABILITY OF ALTERNATIVE SOURCES

In the State of Hawai‘i Supreme Court Ruling[29] 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 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 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 17.

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 16). 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, 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 11. Most of 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 Well 17 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, but was recently connected to the potable water system. The three current tenants in the Manawainui Industrial Park (Tri-L, Space Options, and Swenson Construction) have metered usage of both potable and non-potable water. Tri-L is a concrete manufacturer whose 5-year

[29] 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.

average usage of 13,338 gpd is described as 30% office (4,001 gpd) and 70% from surface water (9,337 pgd) but their non-potable metered usage is 7358 gpd. While the current total water use reflects the use with much of the existing Kaluakoʻi Resort closed, the estimated existing water demand 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 Kaluakoʻi Resort landscaping and Kaluakoʻi Hotel landscaping 90,518 gpd (0.0905 mgd) demand is currently met with potable water. The resident landscaping and the currently closed Kaluakoʻi 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.

Recycled Water Alternative

When the Kaluakoʻi hotel was open, treated water from the Kaluakoʻi wastewater treatment facility (WWTF) was available to support some of the non-potable irrigation needs of Kaluakoʻi 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 Kaluakoʻi golf course and was operating at 25% capacity.

Figure 16. Baseline groundwater withdrawal rates from wells and fresh groundwater discharge along coastal regions of central Molokai. (Source: Oki et al., 2019).

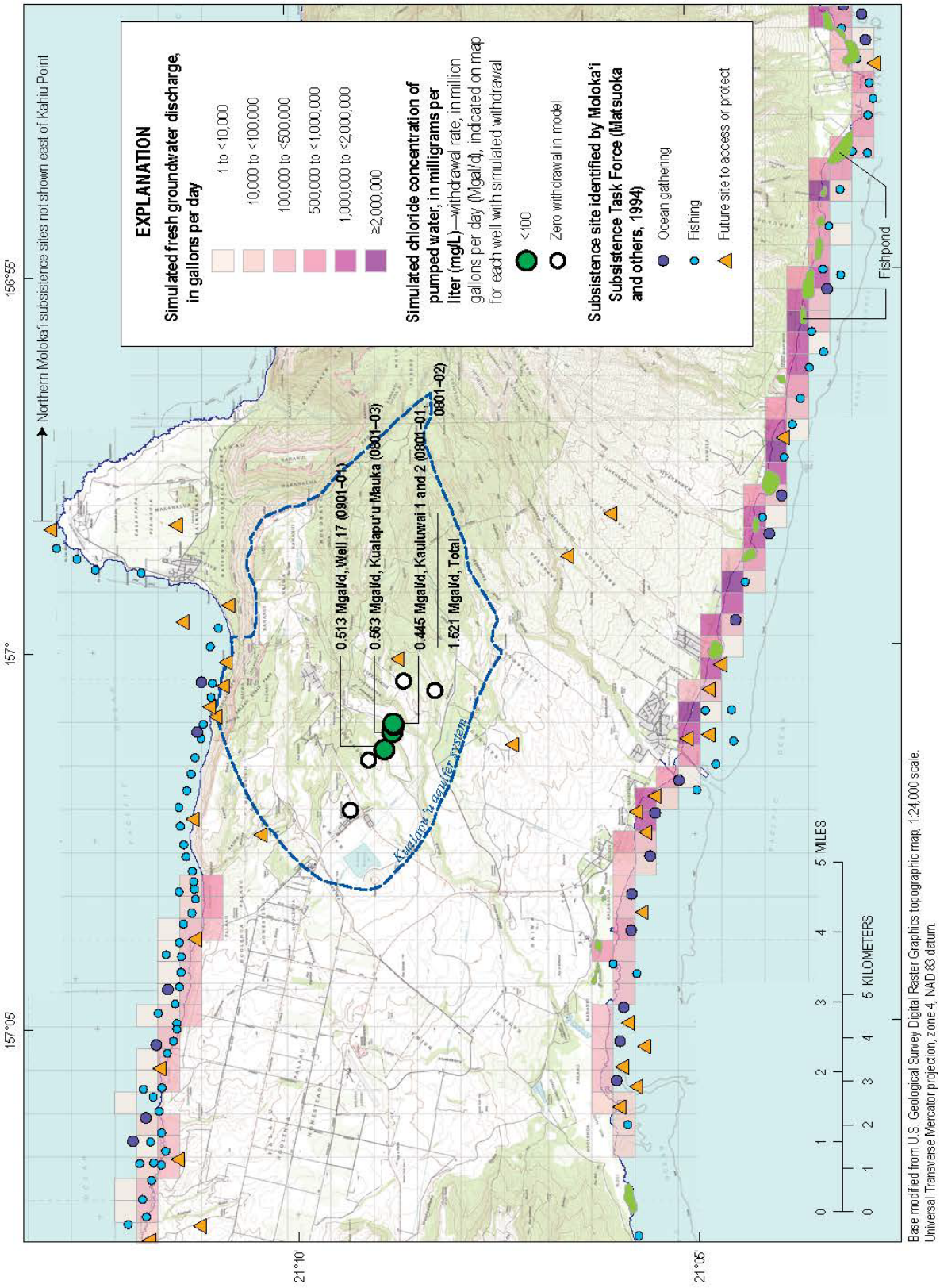


Figure 17. Schematic diagram of the potable and non-potable water systems owned by Molokai Properties as of 2021.

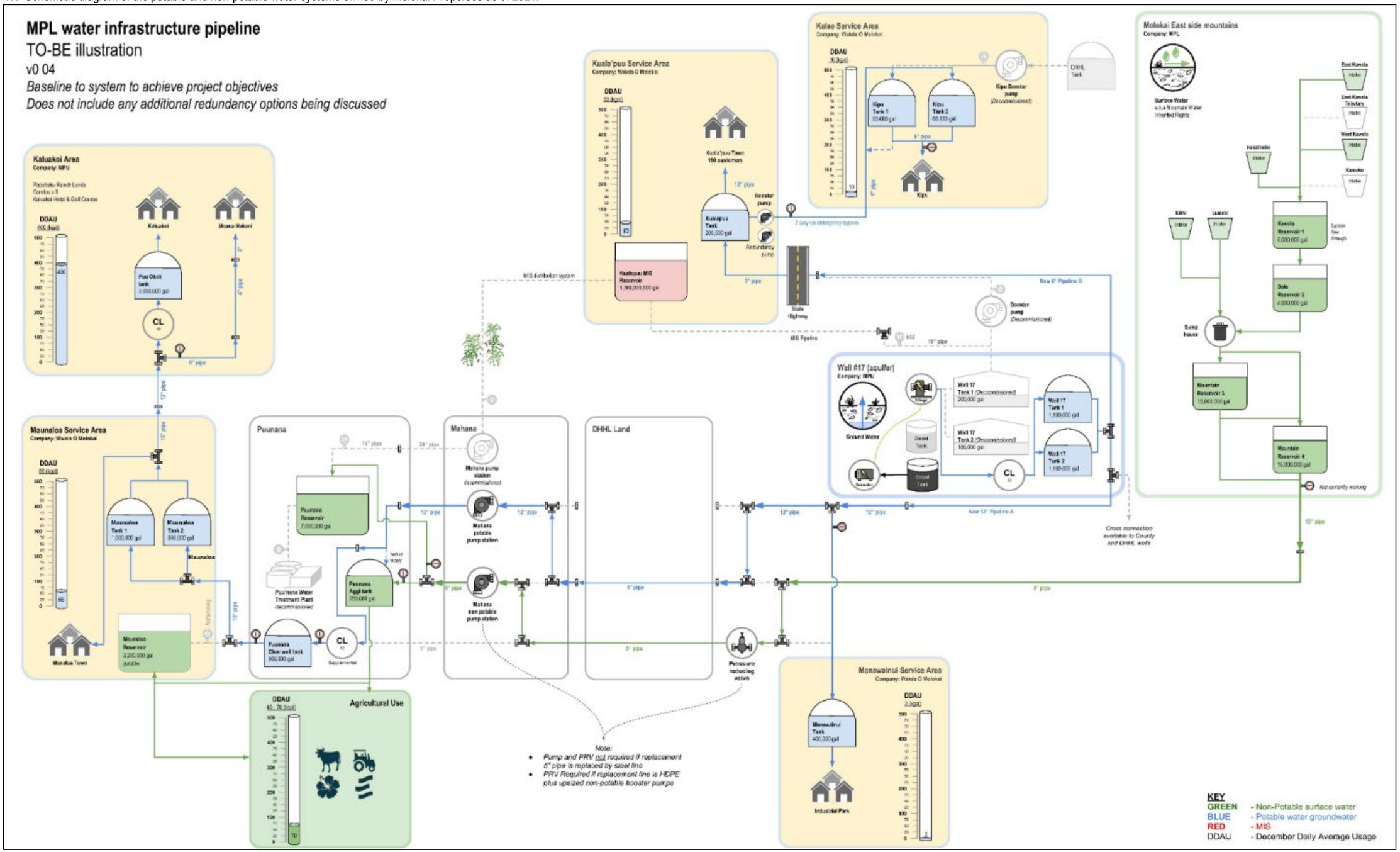


Table 11. Estimated existing and planned potable and non-potable water uses sourced from Well 17 (potable) and the Molokai Ranch mountain water system (non-potable) for Molokai Properties utilities. All values in gallons per day (gpd) [note: WOM = Waiola O Molokai; MPU = Molokai Public Utilities; ac = acres] *from County of Maui

Service Area (Utility)	Use	units		Water Use Rate[1]		Existing Total Water Use[1]		Planned Total Water Use	
		Existing	Planned	Potable	Non-Potable	Potable	Non-Potable	Potable	Non-Potable
Kala'e (WOM)									
	Kipu Residences	18	7	439		7,906		10,975	
	Kipu Golf Course Office Area	1	0	629		629		629	
Kualapu'u (WOM)									
	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[2]						20,000		
Manawainui (WOM)									
	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[2]						137		137
	Molokai Sea Farms[2]						4,033		4,033
	County of Maui baseyard*					6,666	500	6,666	500
Maunaloa (WOM)									
	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	
Kaluako'i (MPU)									
	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[4]		43,400		122,500	
	Kaluakoi Resort Landscaping (ac)	35.448	0		1,753		62,140[3]		62,140
	Kaluakoi Hotel units	148	0	350[4]		51,800		51,800	
	Kaluakoi Hotel Landscaping (ac)	15.12	18.12		1,877		28,378[3]		34,012
	Kaluakoi GC Facilities	5	0	600[4]		3,000		3,000	
	Kaluakoi Resort Residences	106	325	1,228		130,188		399,100	
	Kaluakoi Condos	0	284	350[4]		0	0	113,750	
	Kaluakoi Hotel & Apartments	0	481	350[4]		0	0	168,350	
	total					454,544	61,790	1,051,912	137,942

[1]based on 5-year average monthly meter readings for potable (2013-2017) or non-potable (2016-2021); [2]2020 data only
[3]currently being met with potable water from Well 17; included in existing potable water use total.
[4]county standard used

OTHER PUBLIC TRUST USES OF WATER

Maui County Municipal System
The Maui County DWS municipal water system relies on water pumped from the Kawela aquifer system in the Kawela hydrologic unit to support domestic and agricultural water uses in the Kaunakakai region.

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[30]. 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).

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[31]. 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 17). Other nearby tracts include the Kalamaʻula, Kapaʻakea tracts along the southern coast. There was a non-potable DHHL water 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 stream at 2,264 feet in elevation through 2,800 feet of tunnel to an intake structure in Kahapaakai 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[32].

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 cannot meet the non-potable agricultural needs of the Kalamaʻula tract and an alterative source is needed. The original Hawaiian Homes Commission water system withdrew water from East Kawela, and Right Branch of the South Fork Kaunakakai Stream at 3,100 ft in elevation. As a public trust purpose, DHHL has the right to reserve water from any source.

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

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 12. 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	O'ahu	Waipahu-Waiawa WMA	02/18/1994	1.724
§13-171-62	O'ahu	Waimānalo WMA	02/18/1994	0.124
§13-171-63	Moloka'i	Kualapu'u WMA	06/10/1995	2.905*
CWRM Action	Hawai'i	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 Hawai'i Water Plan that documents the water needs of all State agencies over a 20-year planning horizon. The 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[33]. Due to funding constraints, the Engineering Division focused

[33] 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

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.

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 Kaua'i, Maui, Lana'i, and Hawai'i for the following reasons:

- DHHL's needs within designated ground water management areas on the island of O'ahu 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 O'ahu.

order to develop comprehensive and coordinated water development strategies that consider and coordinate the needs and plans of all State agencies.

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 Waihanau, 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.

Figure 17. Location of DHHL parcels in Central Molokai

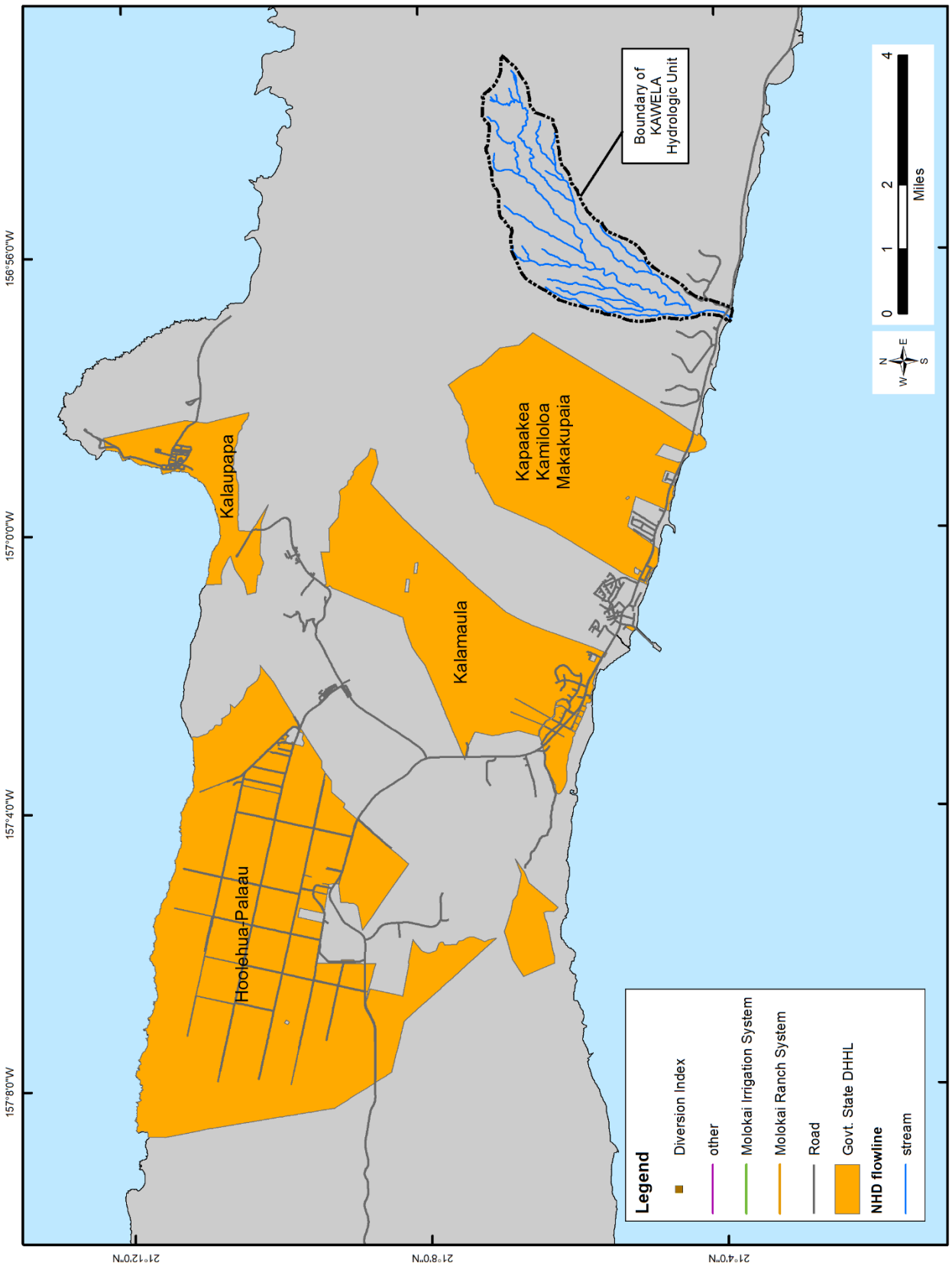


Table 13. DHHL Water Reservations in Non-Designated Water Management Areas

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

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 consisten 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.

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. Upon the designation of any of the hydrologic units as surface water management areas, staff will initiate review and rule-making pursuant to HRS §174C-49(d) and Hawaii Administrative Rule §13-171-60(b).

RECOMMENDATIONS

Based on the above, and all applicable authority, the draft recommendations to be considered by the Commission at a later meeting are:

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, Molokai; subject to two-thirds of the availability of water transported through the West Portal of the MIS.
   - This reservation includes 0.15 mgd diverted by the Mountain Water System from the Kawela, Kaunakakai, Waikolu, and Manawainui hydrologic units that can be delivered to the Kalama‘ula tract via the Manawainui Industrial Park pipeline or another acceptable pipeline. The Kalama‘ula tract has an anticipated demand of 0.7316 mgd of non-potable water, and the difference should be made up with water from the MIS. The 0.15 mgd is approximately 50% of the available water anticipated to be available during low-flow conditions.

   IMPLEMENTATION
   - Staff at DHHL will work with Molokai Properties to best determine how to transmit water from the Mountain Water System to the Kalama‘ula tract.

   MONITORING
   - Molokai Properties will meter the pipeline to the DHHL Kalama‘ula tract.
   - The State DOA must maintain a real-time ditch gage at the former USGS 1640550 station at the West Portal and report daily flow values to the Commission.

2. 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.

3. 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

4. PROPOSED ACTION: MODIFICATION TO DAM #4
   - Staff recommends that there be a continuous wetted flow in Waikolu Stream at MIS Dam #1 and 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.

   IMPLEMENTATION

- 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 will work with the State DOA and the community to verify that the interim IFS is being met.

5. 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.

   MONITORING
   - 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
   - Staff shall continue to evaluate the instream values below the Hanalilolilo Intake to determine if a future interim IFS is necessary.

6. PROPOSED ACTION: INTERIM IFS ON EAST KAWELA STREAM
   - Staff recommends an interim IFS of a mean daily flow of 0.19 cfs (0.12 mgd) below the intake on East Kawela Stream at diversion 867. This flow approximately represents the Q_{80} 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. The interim IFS will support habitat for threatened or endangered damselfly species present in Kawela Stream.

   IMPLEMENTATION
   - Staff recommends that the release valve on the intake pipeline be modified with a meter to measure the flow rate of water returned to the stream at the intake.
   - Molokai Properties will submit a plan for modifying the outflow to be considered by the Commission within 90 days.

   MONITORING
   - Molokai Properties will report the metered flow returned to the stream 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 USGS station 16415000, then no water shall be diverted at diversion 867.

7. PROPOSED ACTION: INTERIM IFS ON KAMOKU STREAM
   - Staff recommends an interim IFS of a mean daily flow of 0.011 cfs (0.007 mgd) below the Kamakou Intake at diversion 865 on the Left Branch of the South Fork of Kaunakakai Stream. This flow approximately represents the Q_{80} flow above the intake. The interim IFS will support the habitat for endangered damselfly species and riparian vegetation present in Kaunakakai Stream.

   IMPLEMENTATION
   - Staff recommends that the diversion be modified such that the intake pipeline only diverts flow greater than the interim IFS at diversion 865.
   - Molokai Properties will submit a plan for modifying the outflow to be considered by the Commission within 90 days.

   MONITORING
   - Molokai Properties will report the metered flow diverted from the stream 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 East Kawela at USGS station 16415000 (i.e., when mean daily flow drops below the Q_{80} flow), then no water shall be diverted at diversion 865.

8. PROPOSED ACTION: INTERIM IFS ON LUALOHI STREAM
   - Staff recommends an interim IFS of a mean daily flow of 0.012 cfs (0.008 mgd) below the Lualohi intake at diversion 863 on Lualohi Stream. This flow approximately represents the Q_{80} flow above the intake. The interim IFS will support the habitat for threatened or endangered damselfly species present in Lualohi Stream.

   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 the Commission within 90 days.

   MONITORING
   - Molokai Properties will report the metered flow diverted from the stream 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 Waihanau 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.

9. PROPOSED ACTION: ABANDONMENT OF STREAM DIVERION 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.

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

10. PROPOSED ACTION: ABANDONMENT OF STREAM DIVERION 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.

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

11. PROPOSED ACTION: ABANDONMENT OF STREAM DIVERION 868 KALIHI STREAM
    - Staff recommends that diversion 868 (Kalihi 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.

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

CONSEQUENCES OF THESE ACTIONS FOR NON-INSTREAM WATER USE

1. DHHL Reservation
The reservation will protect public trust uses of water and provide non-potable water for subsistence and commercial agriculture in the Hoʻolehua and Kalamaʻula tracks.

2. Mountain Water System diversion abandonments

The abandonment of diversions that have been inactive for decades will not affect the existing or planned uses of non-potable water by Molokai Properties.

3. East Kawela Interim IFS

Molokai Properties existing non-potable water use is approximately 62,000 gpd. There is approximately 33,000 gpd of water lost due to evaporation from interconnected reservoirs. The Mountain Water System has a total active reservoir capacity of 49,450,000 gallons and the daily average evaporative loss from the reservoirs at full capacity is 33,277 gpd. At 50% of capacity, the reservoirs can provide approximately 260.3 days of storage at current use rates and 133.6 days of storage at future planned use rates, without additional inflow from streams. At 80% of capacity, the reservoirs can provide approximately 416.4 days of storage at current use rates and 213.8 days of storage at future planned use rates, assuming no additional inflow from streams.

There is approximately 90,000 gpd existing non-potable needs in Kaluakoʻi (the current non-potable water demands met by Well 17 water). If these needs are met with non-potable water, staff estimates Molokai Properties has a future non-potable water demand of approximately 185,000 gpd. The estimated Q_{50} and Q_{90} streamflow duration available at all streams at the mountain water system intakes are 1.033 cfs (0.667 mgd) and 0.218 cfs (0.141 mgd), respectively. From 2000 to 2002, the Q_{50} and Q_{90} total diverted flow from East Kawela, Hanalilolilo, Kalihi and Lualohi intakes was 0.93 cfs (0.60 mgd) and 0.54 cfs (0.35 mgd), respectively, with a mean of 1.07 cfs (0.69 mgd), based on monthly reported data.

Currently (2019 to 2021), diversion 862 on the West Kawela, diversion 866 on the East Kawela Tributary, diversion 865 (Kamoku intake) on a tributary to the SF Kaunakakai Stream, and diversions 863 (Lualohi intake) and 868 (Kalihi intake) on tributaries in Manuwainui, are not active and have not been for at least 5 years. This has resulted in a Q_{50} and Q_{90} total diverted flow of 0.58 cfs (0.37 mgd) and 0.04 cfs, 0.02 mgd), respectively, and a mean diverted flow of 0.58 cfs (0.37 mgd) for the 2019 to 2021 period.

The current daily rate of water diverted (mean of 370,000 gpd) is approximately 6x the amount used (62,000 gpd) and approximately 4x the amount (95,000 gpd) needed to meet these uses (assuming 33,000 gpd of evaporative loss). An interim IFS of 0.19 cfs (0.12 mgd; 120,000 gpd) below the East Kawela intake provides for continual downstream flow below diversion 867 to support recognized instream uses and groundwater recharge. The interim IFS will affect Molokai Properties ability to divert low flows during the dry season from East Kawela Stream. However, additional water may still be available from other streams and there is more than sufficient storage capacity to be relied upon which can be accumulated during the wet season. The delivery of 150,000 gpd to DHHL as part of their non-potable reservation will support public trust uses that are currently harmed by the removal of water at the Hanalilolilo intake in Waikolu Valley as well as Kawela Stream. Molokai Properties will continue to meet all their present (95,000 gpd) and planned (185,000 gpd) needs at least 70% with a total reduction of 270,000 gpd and with storage of higher wet season flows, should be able to meet their present and future needs 100% of the time.

FORMAL COMPLAINT

Currently, among all users reliant on Molokai Properties utilities, there is an existing average daily potable water demand of 364,026 gpd, with another 90,518 gpd of potable water used for existing irrigation in the Kaluakoʻi Development. There is approximately 62,000 gpd of non-potable use and 33,000 gpd is lost due to evaporation from reservoirs, resulting in a need of 95,000 gpd. With the potential 90,000 gpd of non-potable for Kaluakoʻi, there is the potential for an existing daily average of approximately 185,000 gpd of non-potable use. The available monitoring data for the combined flow from East Kawela and the Hanalilolilo intakes from 2000-present indicates that a mean daily flow of 372,000 gpd (0.372 mgd), a median daily flow of 373,000 gpd (0.373 mgd) and a Q_{70} flow of 189,000 gpd (0.189 mgd) was diverted into the Mountain Water System. The consequences of the actions proposed in this submittal results in a volume of water available for off stream usage that will continue to meet the existing and proposed reasonable future demand as detailed in Table 14.

- The interim IFS proposed 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 in the Waikolu and Kawela hydrologic units while providing for non-instream public trust uses of water. These interim IFS also provide for off-stream uses of water that are reasonable and beneficial uses in the public interest, including making water available for agriculture.
- The actions proposed in this submittal will improve instream flows and groundwater recharge for coastal environments, protect public trust uses of water, and limit waste.
- The Commission recommends that improvements to reduce reservoir evaporation should be made if additional water is required.

Table 14. Mean daily flow and low-flow duration statistics for diverted flow rates under current Implications (including with water from Lualohi on the Dole Line), abandonment of Kalihi Intake, DHHL Reservation, and then East Kawela Interim IFS proposed actions for non-instream water use. [note: does not consider the banking of excess water diverted during flows greater than Q_{50} and stored in reservoirs]

Diverted flows (with Dole line but without Kamoku, West Kawela, or East Kawela Trib)	Current conditions (gpd)	Abandonment of Kalihi Intake	With 0.15 mgd DHHL Reservation	With 0.12 mgd East Kawela Interim IFS	With 0.008 mgd Lualohi Interim IFS
Mean	690,000	637,000	487,000	367,000	359,000
Q_{50}	601,000	589,000	439,000	319,000	311,000
Q_{70}	460,000	452,000	302,000	182,000	174,000
Q_{90}	350,000	349,000	199,000	79,000	71,000
Non-potable uses	**% of time uses met with no restrictions (without including available system storage)**				
Current demand (95,000 gpd)	100%	100%	100%	~85%	~80%
Future demand (185,000 gpd)	100%	100%	100%	~70%	~65%

Ola i ka wai,

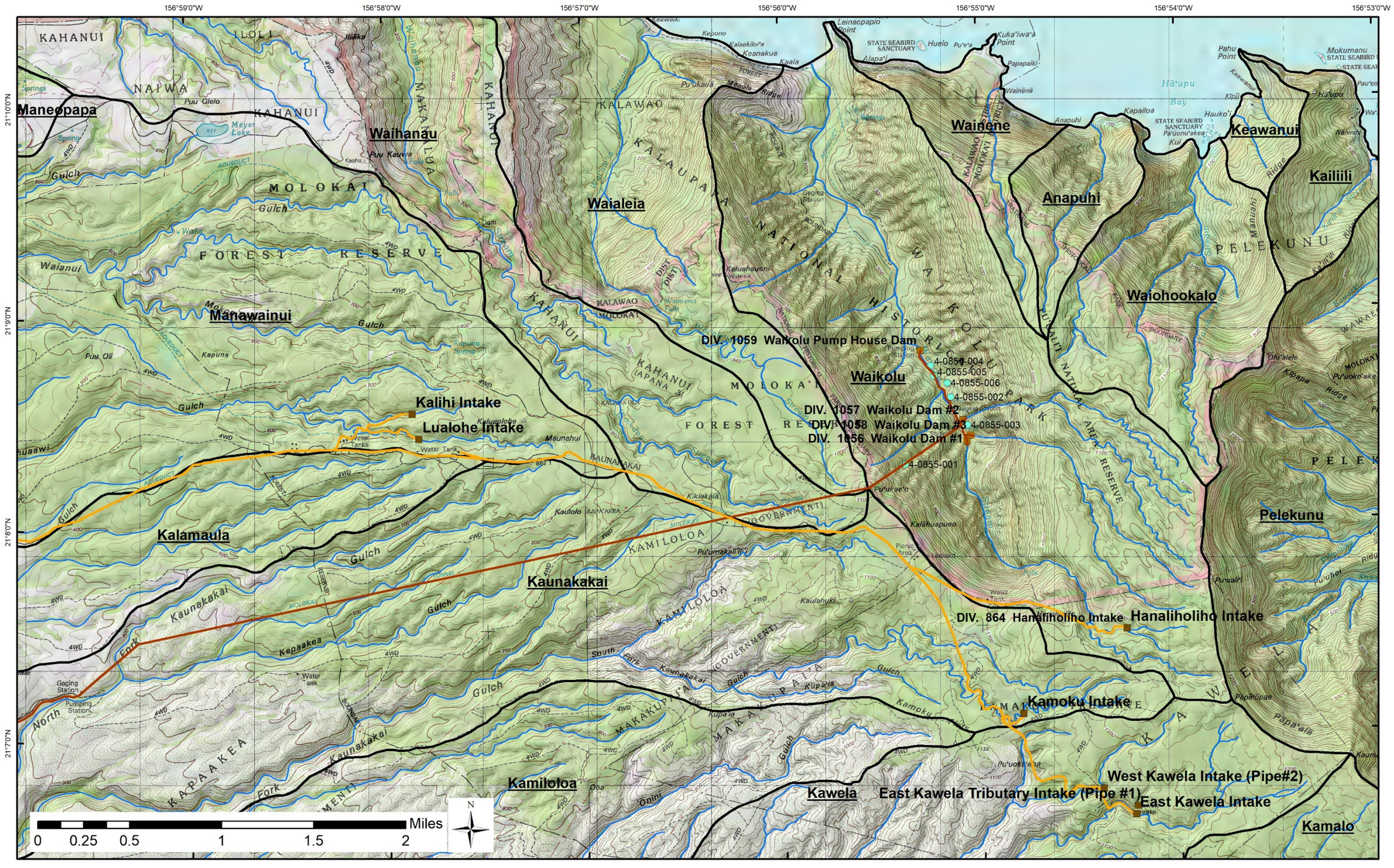
M. KALEO MANUEL
Deputy Director

Exhibits:

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

APPROVED FOR SUBMITTAL:

SUZANNE D. CASE
Chairperson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Maneopapa
Waihanau
Waialeia
Manawainui
Kalihi Intake
Lualohe Intake
Kalamaula
Kaunakakai
Kamiloloa
Wainene
Anapuhi
Keawanui
Kailiili
Waiohookalo
Pelekunu
DIV. 1059 Waikolu Pump House Dam
Waikolu
4-0859-004
4-0855-005
4-0855-006
4-0855-002
DIV. 1057 Waikolu Dam #2
DIV. 1058 Waikolu Dam #3
4-0855-003
DIV. 1056 Waikolu Dam #1
4-0855-001
DIV. 864 Hanaliholiho Intake
Hanaliholiho Intake
Kamoku Intake
West Kawela Intake (Pipe#2)
East Kawela Tributary Intake (Pipe #1)
East Kawela Intake
Kawela
Kamalo
MOLOKAI FOREST RESERVE
KALAUPAPA NATIONAL HISTORICAL PARK
PELEKUNU PRESERVE
Miles
0 0.25 0.5 1 1.5 2
N

EXHIBIT 1

EXHIBIT 2

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

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,

LINNEL T. NISHIOKA
Deputy Director

CI:ss

EXHIBIT 3

MOLOKAI RANCH

10 : 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

See report

Harold Edwards
Senior Vice President
Development Division

HE:ky
Enclosure

Molokai Ranch, Limited • Hawaii Tower • 745 Fort Street, Suite 600 • Honolulu, Hawaii 96813 • Phone (808) 531-0158 • Fax (808) 521-2279
Reservations call toll free 1-877-726-4656 • Fax (808) 534-1606 • www.molokairanch.com

EXHIBIT 4

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

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:

EXHIBIT 7

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

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

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?

EXHIBIT 9

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.

Calvert G. Chipchase
Cades Schutte Building
1000 Bishop Street, Suite 1200
Honolulu, Hawai'i 96813-4212
Direct Line: (808) 521-9220
Direct Fax: (808) 540-5021
Email: cchipchase@cades.com

October 14, 2021

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.

EXHIBIT 10

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 Molokaʻi.

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 Molokaʻi 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?

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.

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 kgals 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

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 Molokaʻi Nō Ka Heke)

Non-Potable Water
Monthly Metered Use

				Annual Totals								
Act No.	Book No.	Customer	TMK No.	2016	2017	2018	2019	2020	Jan 2021	Historical Use	Present Use	Comments
West Molokai												
1600	6	Puunana House		0	0	0	0	0	0	Irrigation	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	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	Livestock	
	n/a	ARInc.	5-1-002:035	25	32	35	15	40	0	Restrooms/Facilities	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 MIS mixed. WTP placed in stand-by on 12/27/17