Preliminary Water Balance for the Lahaina Aquifer Sector Area Island of Maui

DRAFT

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1 Abstract

2 Introduction

The Island of Maui is comprised of five hydrologic regions that are distinguished by the combination of their natural setting and the developed infrastructure for water resources. Each of these regions is further subdivided into surface water units and groundwater units.

Weather data for the Island is comprised of a handful of meteorological stations independently operated by the USGS and the University of Hawaii (OTHERS?) in the Hawaii Mesonet system which is locally administered by the University of Hawaii, Water Resources Research Center. Figure 1 shows the USGS HUC-10 regions on the Island of Maui as well as location of the Mesonet stations.

2.1 Lahaina Aquifer Sector Area (LASEA)

As stated in [CWRM, 2023], the LASEA is defined by both surface water hydrologic units, designated with watershed unit codes (WUC), and groundwater hydrologic units, designated with groundwater unit codes (GUC, as used in this paper). In 2022, the LASEA was deemed to be both a Surface Water and Ground Water Management Area (WMA) by the Hawai'i Commission on Water Resource Management (CWRM). This action placed authority for issuing surface water and groundwater use permits (WUPs) in the hands of the State of Hawaii with the CWRM as its agent; consistent with the State of Hawai'i Water Code. The relevant language is excerpted here.

> Lahaina Aquifer Sector Area: The Chair of the Commission on Water Resource Management has recommended to designate the Lahaina Aquifer Sector Area (ASA), Maui, as a Surface and Ground Water Management Area under Section 174C-41. The proposed Lahaina ASA Surface Water Management Areas include the Honokōhau (6014), Honolua (6013), Honokahua (6012), Kahana (6011), Honokōwai (6010), Wahikuli (6009), Kahoma (6008), Kaua'ula (6007), Launiupoko (6006), Olowalu (6005), and Ukumehame (6004) surface water hydrologic units. The proposed Lahaina ASA Ground Water Management Areas include the Honokōhau (60201), Honolua (60202), Honokōwai (60203), Launiupoko (60204), Olowalu (60205), Ukumehame (60206) ground water hydrologic units. On June 14, 2022, the Commission accepted the Findings of Fact and Chairperson's Recommendation to designate the Lahaina Aquifer Sector Area as both a Surface Water and Ground Water Management Area. A public notice was issued on July 29, 2022, and published in The Maui News issue of August 6, 2022. Applications for water use permits to continue an existing use of surface or ground water had to be filed with the Commission within a period of one year from the effective date of designation, that is between August 6, 2022 (the date this Public Notice is published) and no later than August 7, 2023 (as August 5, 2023 fell on a Saturday). The Commission is currently reviewing filed water use permit applications for both existing and new uses. Applications for new uses of both ground or surface water may continue to be filed with the Commission. More information is available online at: https://dlnr.hawaii.gov/cwrm/groundwater/gwma/lahaina/.

3 Methods

3.1 Estimation of Water Use

In order to estimate water use, metering data was obtained from Carollo Engineering (J. Ortega, personal communication) at the direction of County of Maui, DWS director (J. Stufflebean). The data are described in detail in section 4.5. These were combined with (1) tax parcel data (County of Maui), (2) watershed unit code (WUC) data (CWRM), (3) zoning data for land-use (County of Maui). The polygons from the tax parcel and zoning shapefiles were intersected using the *st_intersection* function of the R package, *sf*. That resulting shapefile was then intersected with the WUC shapefile. The procedure to do this is shown here and is taken from the AN310.R function in the *wbmaui* R package.

```
I01 = st_intersection(PARCELS, ZONING)
I02 = st_intersection(I01, WUC)
I03 = st_collection_extract(I02, "POLYGON")
```

The last step is required to convert the resulting multi-polygon file (I02) to a simple polygon file (I03) in order to write out the new shapefile with the combined set of attributes.

The tax-map-key (tmk) field was used to sequentially merge these datasets to intersect the polygons from each shapefile thereby combining the attributes as metadata. The result was a dataset with these critical variables for each parcel:

$$< \text{tmk}, \text{zn\_clss}, \text{WUC}, \text{gisacrs}, \text{GPD(Months 01-11)} >$$

This association of data, a data vector, enables the calculation of the eleven-month mean and standard deviation of GPD for each combination of zoning classification (zn_clss) and WUC. The County of Maui uses this approach to water use projection in [Blumenstein et al., 2021] as a means of estimating water use. However, that approach does not account for the spatial variability that is found across the WUCs for the same zoning classification: most notably the large resorts and hotels. So the location of the parcel is a covariate of water use in addition to the zoning. This will be discussed further in the Results.

We refer to these data vectors as parcel-level, *water use profiles*: there is a corresponding data vector for the *water supply profile* of each parcel. When integrated, they are referred to as parcel-level, *water balance profiles*.

Since the metering data are only for the areas serviced by the County of Maui DWS, the mean values and WUC were used to merge the corresponding GPD estimates into the non-DWS service area parcels. This provides a consistent basis of water use estimates but it is based on the assumption of similar water use, by zoning classifiction, across service areas. This may not be valid since, for example, the Kaanapali hillside is in a non-DWS service area and it is the location of hundreds of 1-7M$ single family residences. Some of those have individual irrigation systems and some are HOA-provisioned. Consequently, refinement of this estimation method would likely improve the accuracy for this area and possibly others. At present there is no access to the non-DWS water utilities' data for validation.

Land that is zoned for agriculture is the dominant zoning classification in the LASEA. However, this class includes much residential land-use that has been developed on Ag land for a variety of reasons. This mixed use requires a method to separate large, fallowed areas that are legacy of the plantation era on Maui, from the developed Ag lands to avoid over-estimating water use based on the Ag zoning. To accomplish this, the Ag class was filtered based on the attribute *gisacrs*. Preliminary analysis of this zoning class revealed that areas of [0-100] acres contained most, if not all, of the developed Ag land and excluded the fallowed fields. Consequently, tax parcels zoned as Ag with acreage greater than 100 acres was excluded from the estimation of water use. It may be the case that this land eventually will have irrigation requirements for wildfire control but, for the time being, those requirements are not included in this analysis.

3.2 Estimation of Water Supply

4 Data

4.1 Precipitation
4.2 Surface Water
4.3 Groundwater
4.4 Developed Water Supply
4.5 Water Use

Table from p.10, Lahaina Aquifer Sector, WUDP

1. Diversions, Declared Use 1989, Reported Water Diverted 2011-2015: CWRM Reports. Discharges (Q figures): USGS Scientific Investigations Report 2016-5103. Kuleana parcels-MDWS interpretation of location based on Office of Hawaiian Affairs GIS data,

2. 2009. Est. Water Use-interpretation of 1989 Dec. of Water Use (Individuals):

3. Interpreted and summarized by MDWS based on 1989 Declarations of Water Use, Circular 123, Volumes 1 and 2, CWRM, September 1992, for individuals (excludes municipal, commercial, quasi-public, homeowner association landscape irrigation, etc.); duplicated claims of use are counted once; livestock watering operations are not counted.

4. Declarations and MDWS interpretation has not been verified by CWRM.

4.6 Tax Parcels

Maui tax parcels are maintained in two separate ways:

1. online GIS shapefile (https://files.hawaii.gov/dbedt/op/gis/data/maucotmk.shp.zip) and

2. online ownership file (https://www.mauicounty.gov/DocumentCenter/View/8072/RPT-Ownership-Data)

3. property owners and mailing addresses (https://www.mauicounty.gov/DocumentCenterii.asp?FID=230)

These must be joined to assess property ownership and changes. The ownership file is updated frequently so they are maintained separately.

4.7 Data Sources

4.7.1 USGS SUTRA Groundwater Model

USGS Iao+ sir2021-5113
USGS Lahaina sir2012-5010

5 Results

6 Discussion

7 Conclusions

References

Bert L Hatton, Civil Engineer. Hydromania: A Pioneer Mill Water Source Primer. Report, Pioneer Mill Company, Limited, October 1976.

Eva Blumenstein, Pam Townsend, B. Alex Buttaro, Alexander de Roode, and Lori Delbello. Maui Island Water Use and Development Plan DRAFT . Technical report, Maui County Department of Water Supply, 2021.

CWRM. Water resource bulletin. Technical report, COMMISSION ON WATER RESOURCE MANAGEMENT — KE KAHUWAI PONO — DEPARTMENT OF LAND AND NATURAL RESOURCES — KA ʻOIHANA KUMUWAIWAI ʻĀINA—, December 2023.

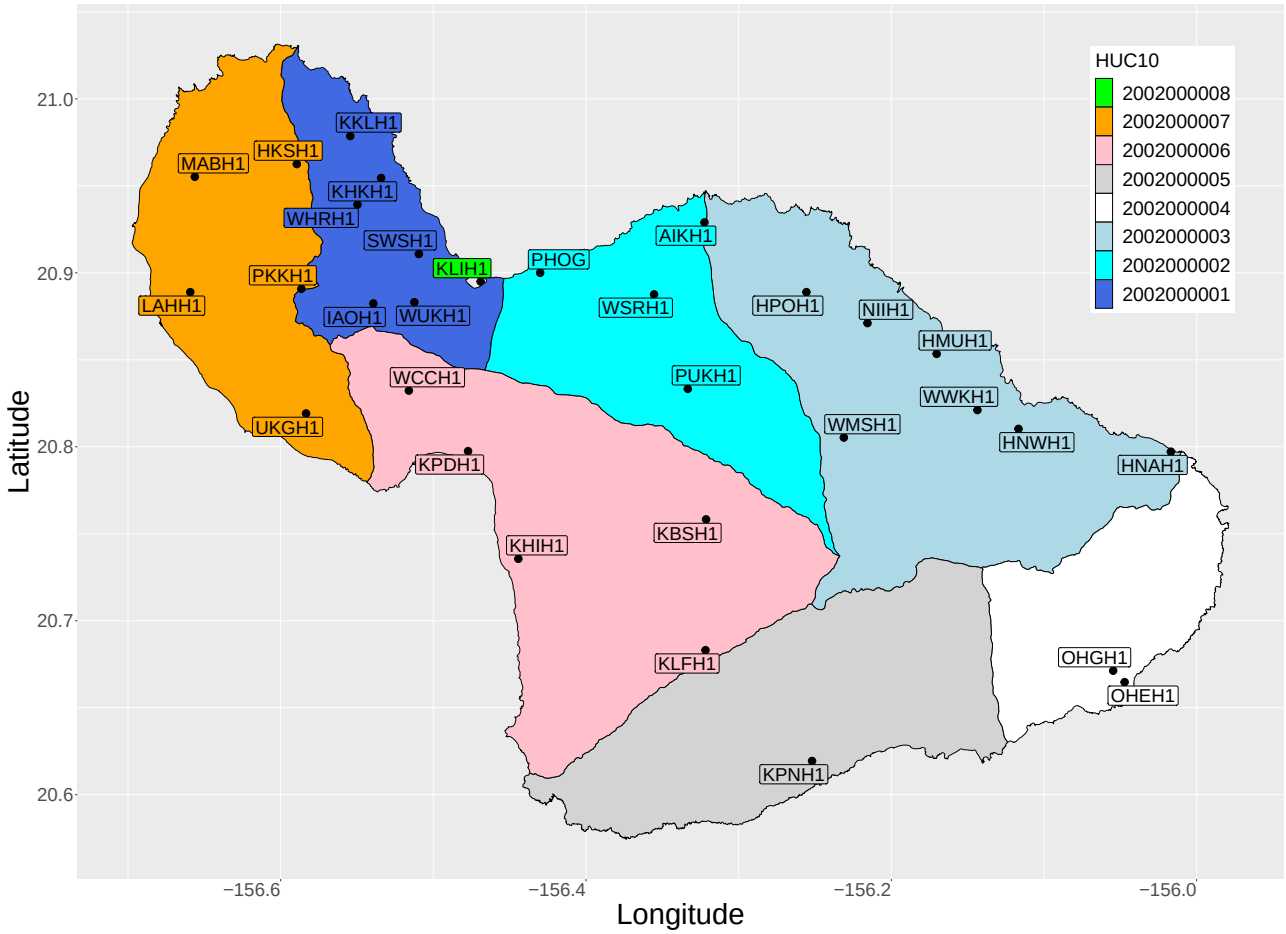

Figure 1: HUC10 watershed boundaries and HADS Mesonet station locations (from Iowa State Environmental Mesonet.

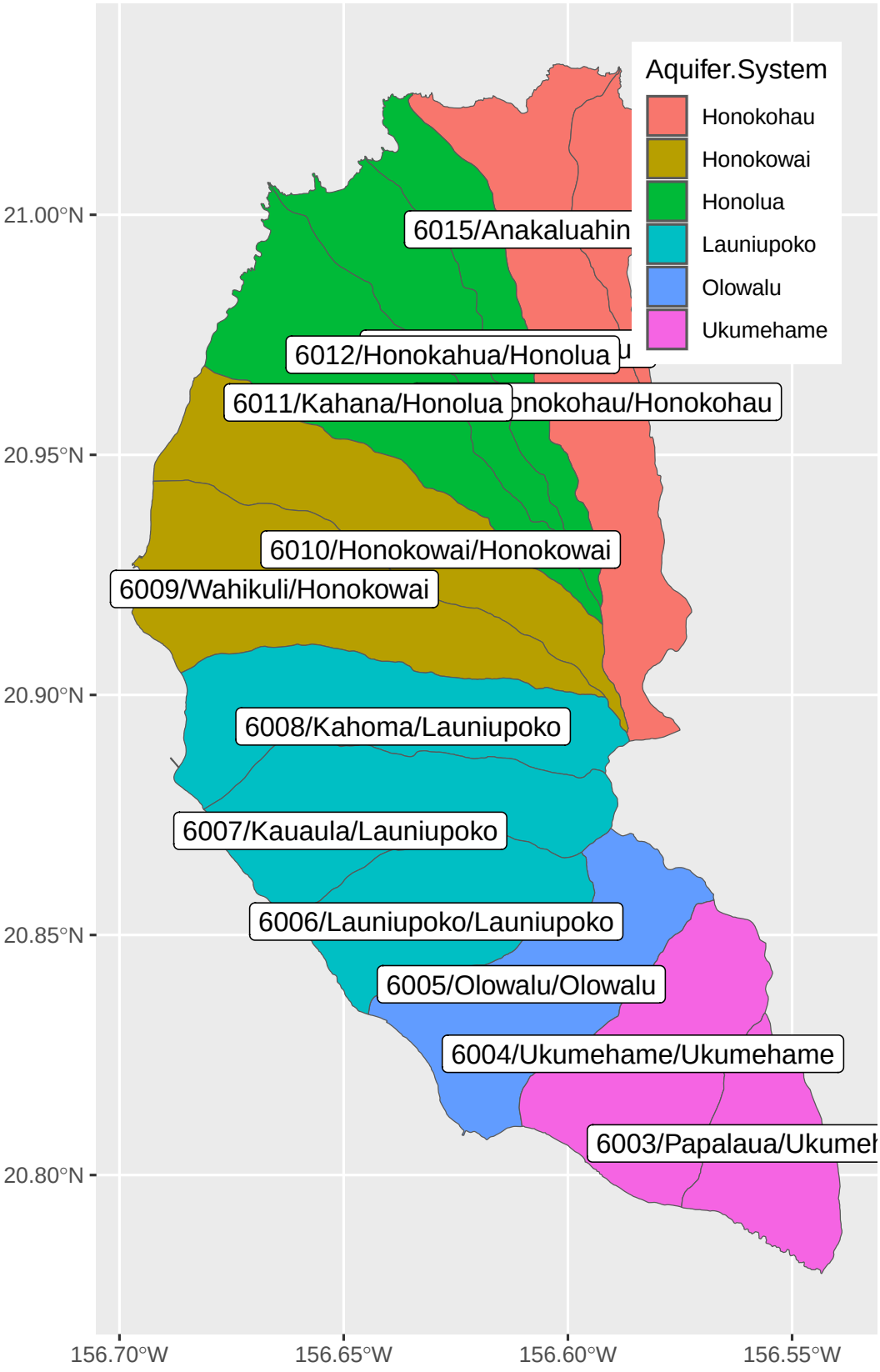

Figure 2: Watershed unit codes (WUC) with watershed name and aquifer system.

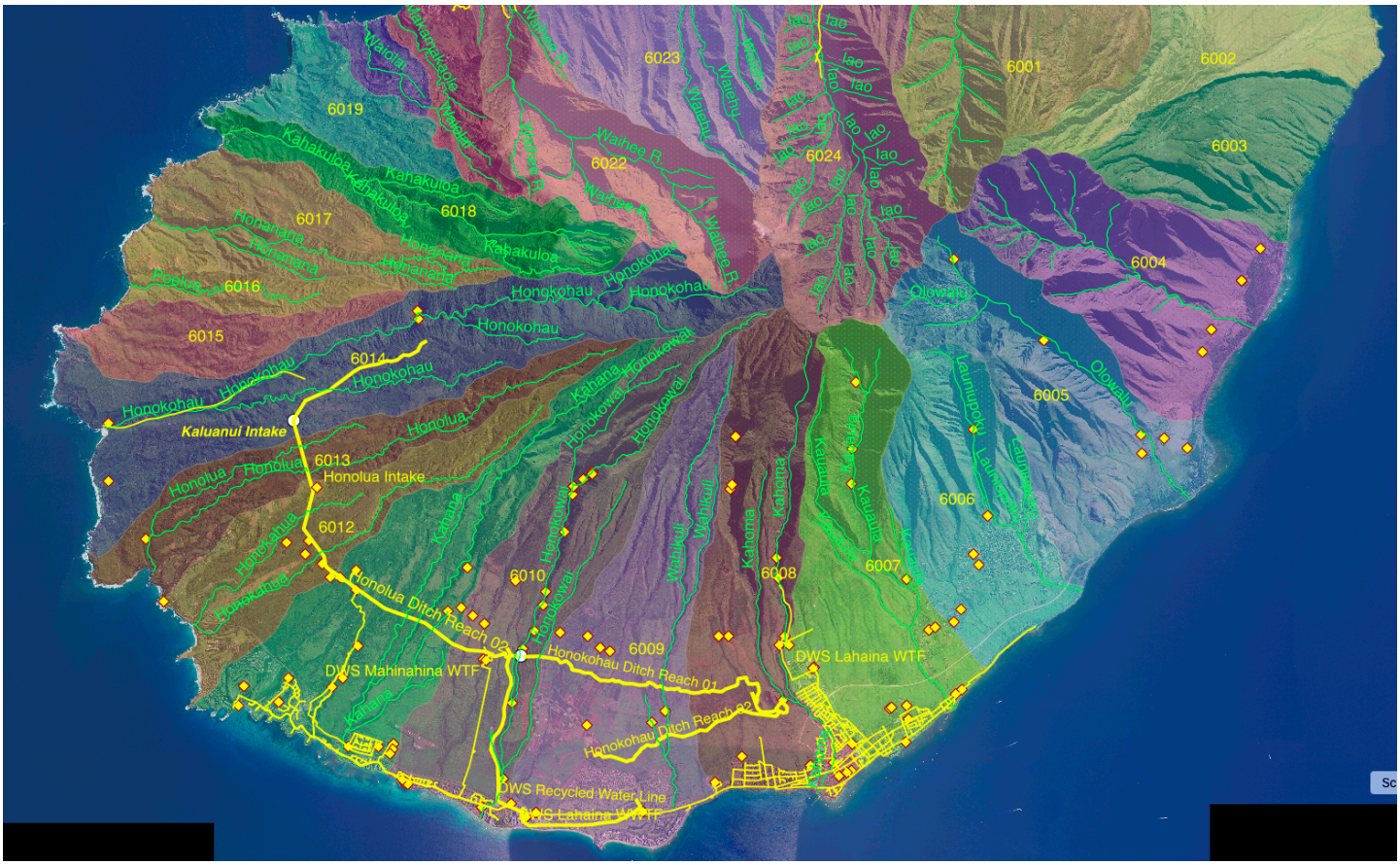

Figure 3: LASEA developed infrastructure including results from Hydromania [Bert L Hatton, Civil Engineer, 1976].

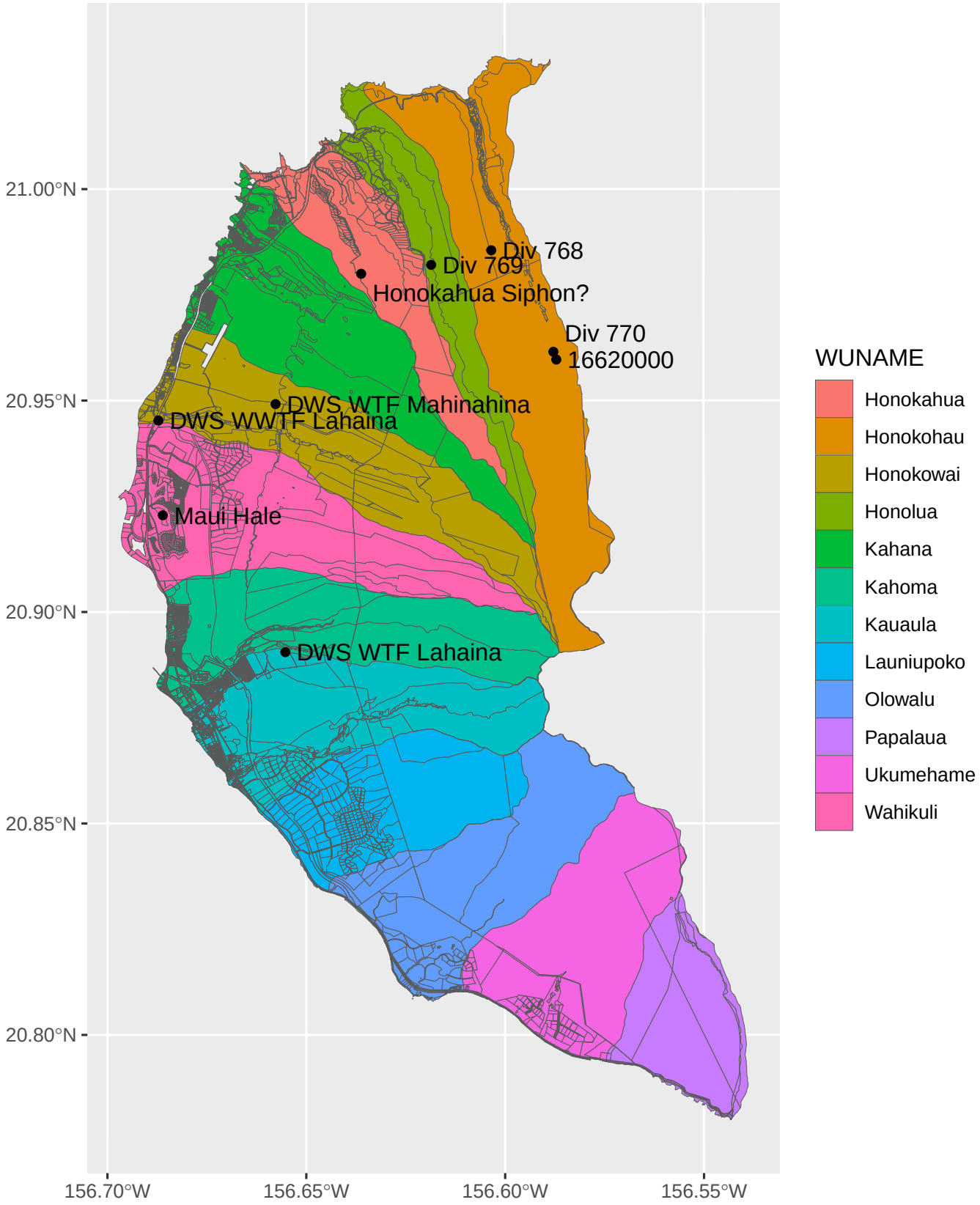

Figure 4: LASEA developed infrastructure including results from Hydromania [Bert L Hatton, Civil Engineer, 1976].

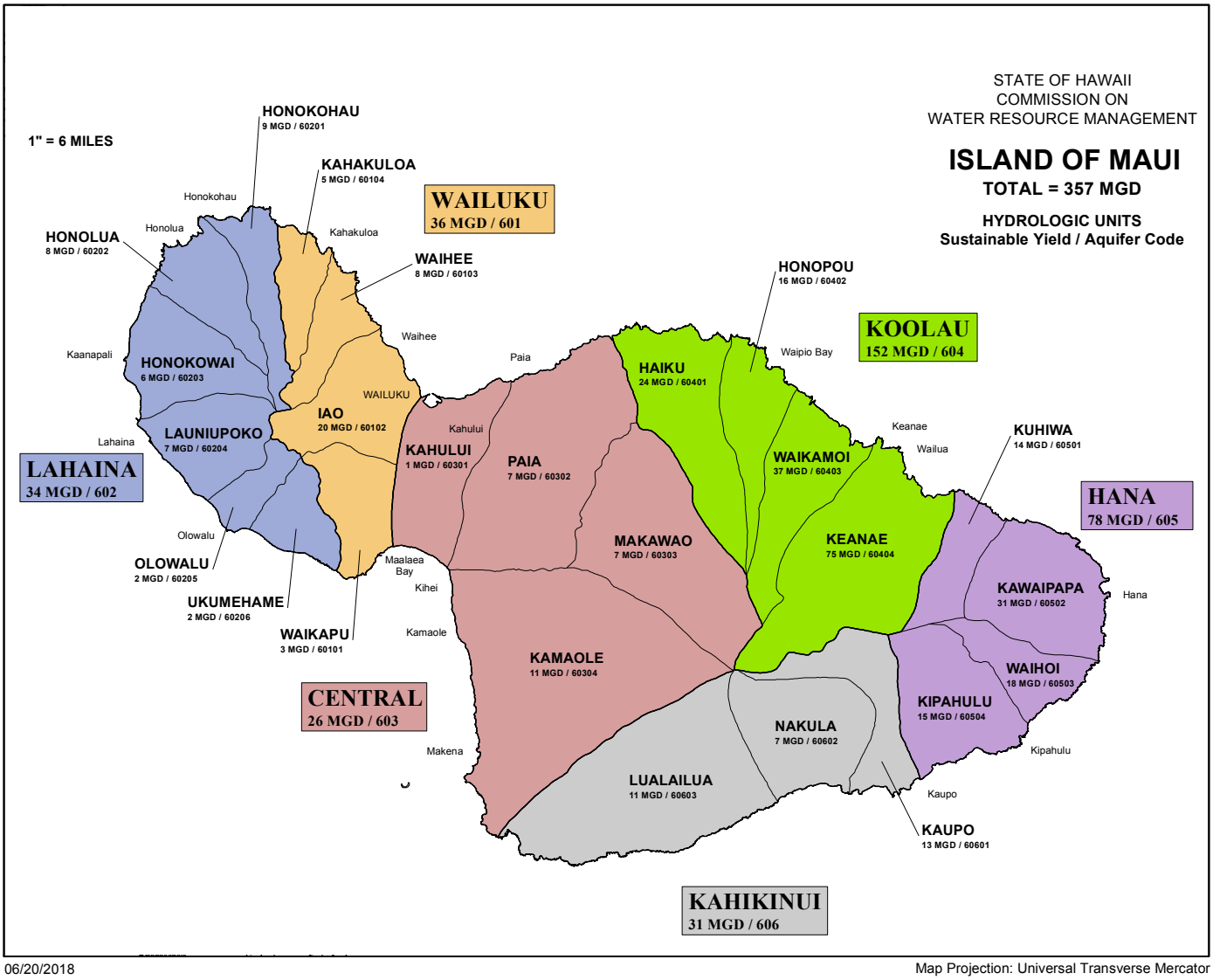

Figure 5: Groundwater hydrologic unit codes (GUC) with aquifer identification and boundaries.

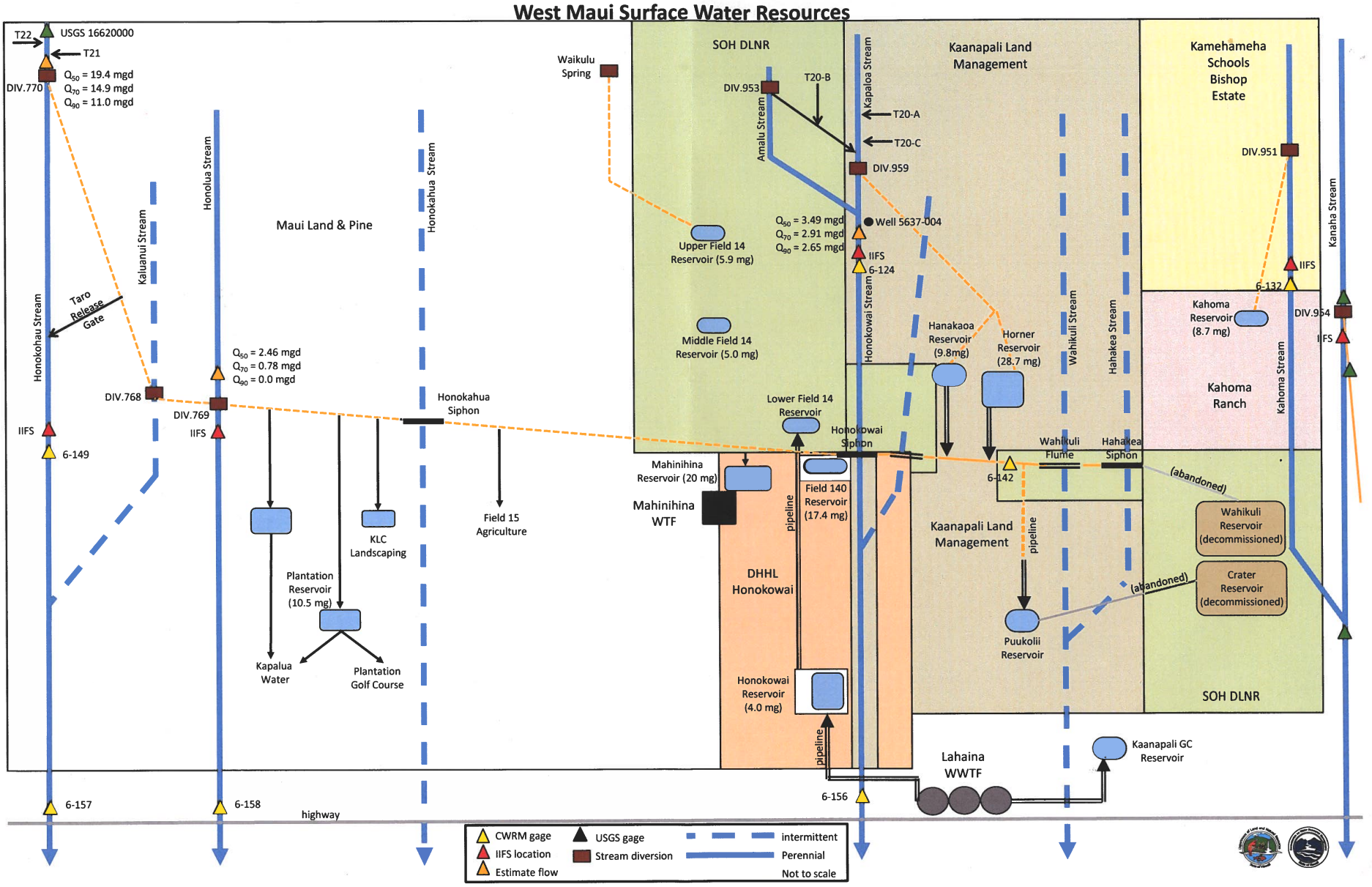

Figure 6: Developed water supply infrastructure for West Maui.

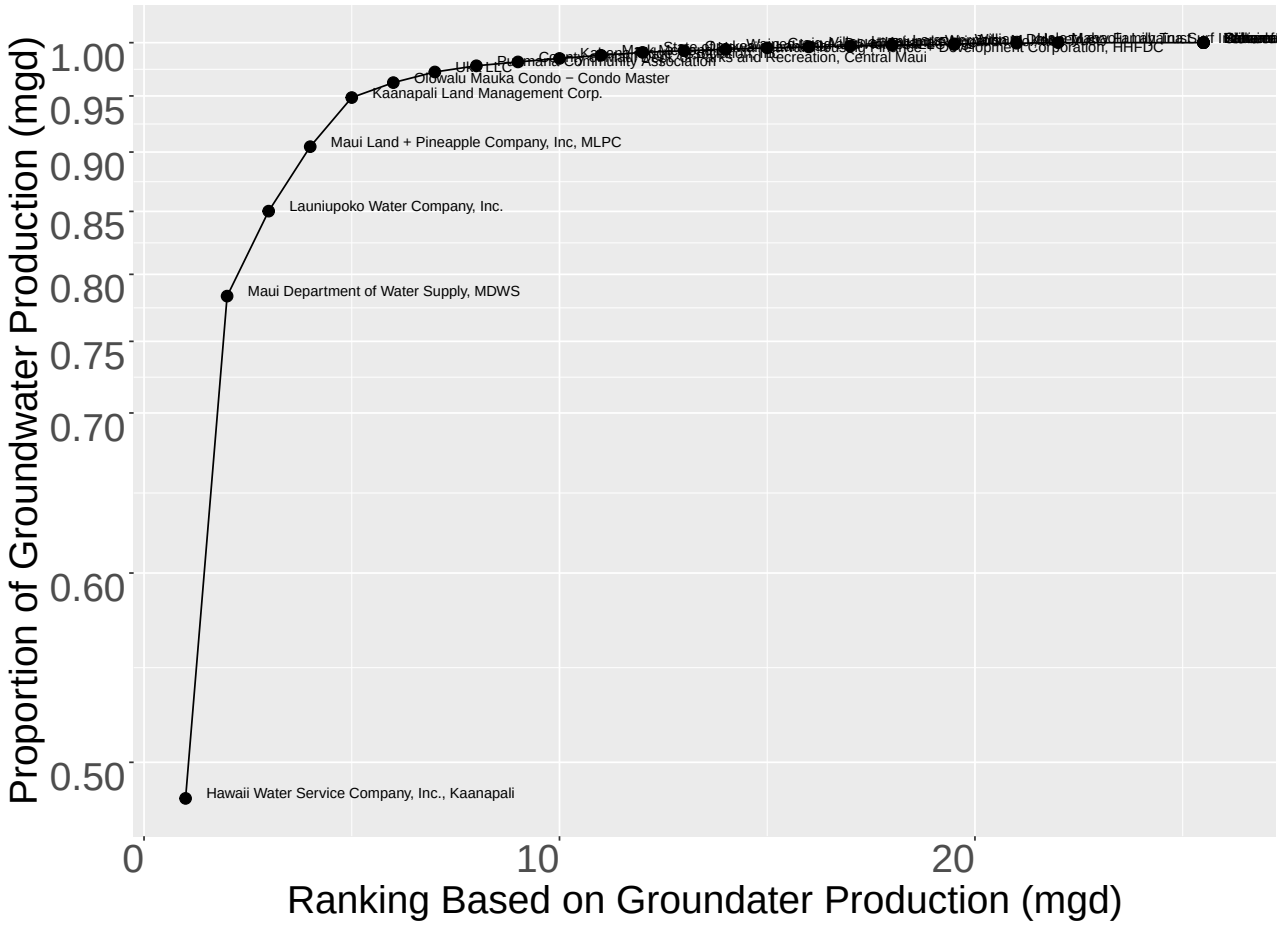

Figure 7: Largest groundwater producers in the Lahaina Aquifer Sector Area.

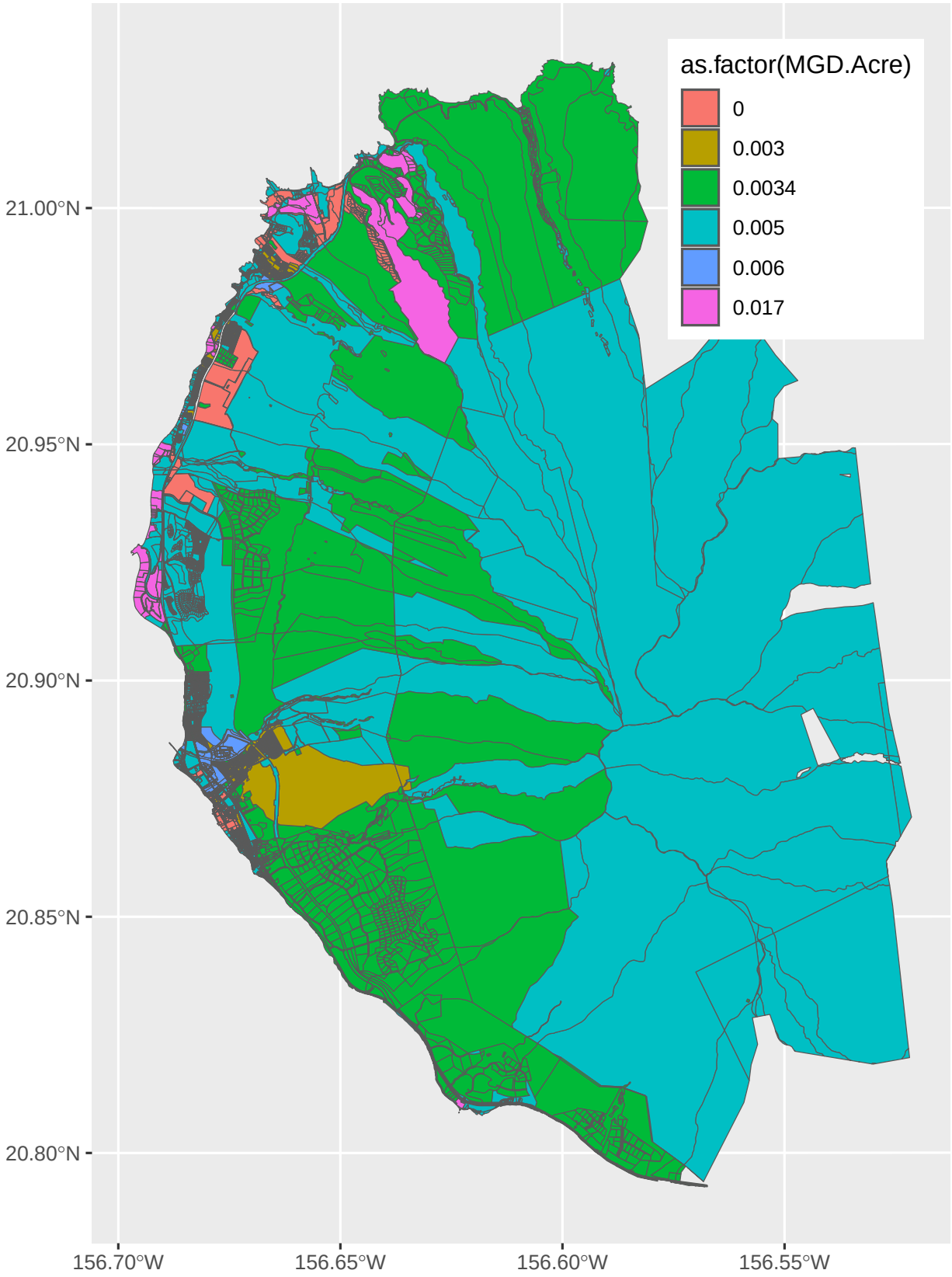

Figure 8: Water use rate (mgd) by tax parcel and zoning.

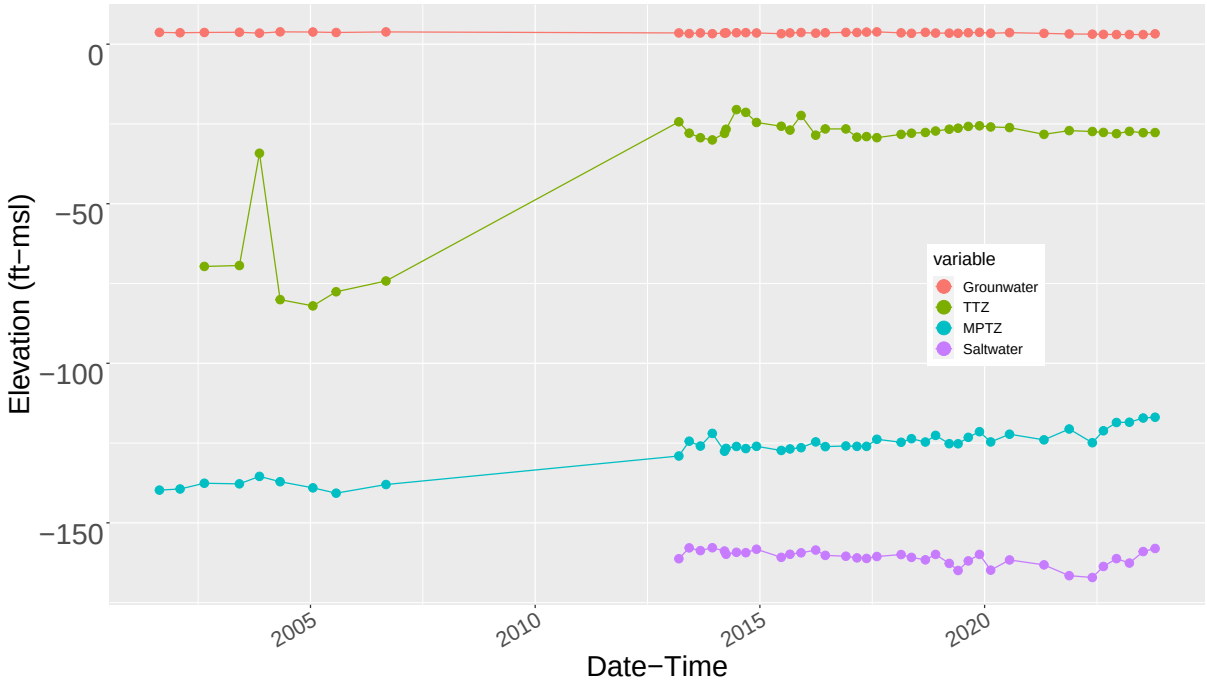

Figure 9: Salt water intrusion into aquifer at Mahinahina Deep Monitoring Well from CTD 2023-10-17.

Table 1: Tabulation of County of Maui Department of Water Supply metered data (gallons per day, gpd) by zoning class and WUC with overall mean, standard deviation (sd), and coefficient of variation (cv). Note that non-DWS service areas are not included in the data so the corresponding WUCs are absent.

Zoning	Overall (gpd)			WUC (11-month, mean gpd)						
				6007	6008	6009	6010	6011	6012	6014
	mean	sd	cv							
A-1 Apartment	3267	1696	0.52	2069	5771	.	2810	2418	.	.
A-2 Apartment	3061	1586	0.52	.	2529	.	4844	1808	.	.
AG Agriculture	2041	2061	1.01	1119	822	6292	2978	878	1837	365
B-2 Business - Community	4974	3793	0.76	1027	3357	.	5580	9934	.	.
B-3 Business - Central District	4680	NA	NA	.	.	.	4680	.	.	.
CID Napili Bay Civic Improvement District	2525	NA	NA	.	.	.	.	2525	.	.
D-1 Duplex	1280	1163	0.91	458	.	.	.	2102	.	.
H Hotel	19392	13542	0.70	9816	.	.	28968	.	.	.
H-1 Hotel	14877	NA	NA	14877	.	.	.	.	.	.
H-2 Hotel	21057	14053	0.67	.	.	.	30994	11120	.	.
H-M Hotel	29536	34300	1.16	627	.	77283	30994	9239	.	.
HD-1 Historic District 1	4502	1940	0.43	3129	5874	.	.	.	.	.
HD-2 Historic District 2	3029	2539	0.84	1233	4824	.	.	.	.	.
Interim	2903	2074	0.71	3319	3430	.	.	5758	1837	171
M-1 Light Industrial	1698	697	0.41	.	2347	1786	.	962	.	.
M-2 Heavy Industrial	3182	3282	1.03	861	5503	.	.	.	.	.
OS-2 Open Space Active	5905	NA	NA	.	.	.	5905	.	.	.
P-1 Public/Quasi-Public	266	98	0.37	.	.	197	335	.	.	.
PD Project District	1265	54	0.04	.	.	1303	.	1227	.	.
PK Park	21859	NA	NA	.	.	.	21859	.	.	.
PK(GC) Park-Golf Course	304	NA	NA	.	.	.	.	304	.	.
R-0 Residential	525	NA	NA	.	.	.	525	.	.	.
R-1 Residential	511	117	0.23	611	593	.	358	483	.	.
R-2 Residential	831	162	0.19	833	759	.	679	1055	.	.
R-3 Residential	2443	2221	0.91	1337	811	6315	2196	1554	.	.
Road	8127	17808	2.19	843	859	44467	1482	993	.	119

Table 2: Water balance for the Lahaina Aquifer Sector Area.

	Aquifer.System																				
	Honolua						Honokowai				Launiupoko				Olowalu		Ukumehame				
	WUC						WUC				WUC				WUC		WUC				
	6015	6014	6013	6012	6011	Total	6010	6009	6008	Total	6008	6007	6006	Total	6005	Total	6004	6003	Total	All
	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD
CategoryA	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum
Supply	0.00	2.94	-0.86	1.09	5.83	8.99	1.47	2.36	0.70	4.54	-0.10	4.20	0.73	4.84	1.73	1.73	0.08	.	0.08	20.17
Use	.	.	-0.09	-0.34	-2.00	-2.43	-1.63	-2.29	.	-3.92	-1.65	-2.48	-0.25	-4.38	-0.26	-0.26	-0.12	-0.02	-0.14	-11.24
Net Water	0.00	2.94	-0.95	0.74	3.83	6.57	-0.16	0.07	0.70	0.62	-1.75	1.72	0.48	0.45	1.47	1.47	-0.05	-0.02	-0.07	8.93

Table 3: Water balance for the Lahaina Aquifer Sector Area.

		Aquifer.System																			
		Honolua						Honokowai				Launiupoko				Olowalu		Ukumehame			
		WUC						WUC				WUC				WUC		WUC			
		6015	6014	6013	6012	6011	Total	6010	6009	6008	Total	6008	6007	6006	Total	6005	Total	6004	6003	Total	All
		MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD
CategoryA	CategoryB	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum
Supply	Groundwater	.	.	.	1.09	2.21	3.29	1.19	1.57	.	2.76	0.29	0.72	0.33	1.33	0.10	0.10	0.08	.	0.08	7.56
	Interbasin.Transfer	.	-2.00	-0.86	.	2.00	-0.86	0.29	0.29	0.29	0.86	-0.39	0.39	.	0.00	.	.	.	.	.	0.00
	Recycled.Water	.	.	.	.	.	.	.	0.50	.	0.50	.	.	.	.	.	.	.	.	.	0.50
	Surface.Water	0.00	4.94	0.00	.	1.62	6.56	0.00	.	0.42	0.42	.	3.10	0.41	3.51	1.62	1.62	0.00	.	0.00	12.11
	All	0.00	2.94	-0.86	1.09	5.83	8.99	1.47	2.36	0.70	4.54	-0.10	4.20	0.73	4.84	1.73	1.73	0.08	.	0.08	20.17
Use	Landuse	.	.	-0.09	-0.34	-2.00	-2.43	-1.63	-2.29	.	-3.92	-1.65	-2.48	-0.25	-4.38	-0.26	-0.26	-0.12	-0.02	-0.14	-11.24
	All	.	.	-0.09	-0.34	-2.00	-2.43	-1.63	-2.29	.	-3.92	-1.65	-2.48	-0.25	-4.38	-0.26	-0.26	-0.12	-0.02	-0.14	-11.24
	Net Water	0.00	2.94	-0.95	0.74	3.83	6.57	-0.16	0.07	0.70	0.62	-1.75	1.72	0.48	0.45	1.47	1.47	-0.05	-0.02	-0.07	8.93

Table 4: Water balance for the Lahaina Aquifer Sector Area.

			Aquifer.System	Honolua					Honokowai				Launiupoko				Olowalu		Ukumehame			
				WUC					WUC				WUC				WUC		WUC			
				6015	6014	6013	6012	6011	All	6010	6009	6008	All	6008	6007	6006	All	6005	All	6004	6003	All	
				MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD	MGD
CategoryA	CategoryB	CategoryC		sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum	sum
Supply	Groundwater	AGR.Agriculture		.	.	.	.	.	.	.	.	.	.	.	0.01	.	0.01	.	.	.	.	.	0.01
		AGR.Crops + Processing		.	.	.	.	.	.	.	.	.	.	.	0.02	.	0.02	.	.	.	.	.	0.02
		DOM.Single + Multi Low-Rise + High-Rise Households		.	.	.	0.01	.	0.01	.	.	.	.	0.00	.	0.01	0.01	.	.	.	.	.	0.01
		IND.Mining, Dust Control		.	.	.	.	.	.	.	.	.	.	.	0.01	.	0.01	.	.	.	.	.	0.01
		IRR.Golf Course		.	.	.	.	.	.	.	0.33	.	0.33	.	.	.	.	.	.	.	.	.	0.33
		IRR.Landscape/Water Features		.	.	.	.	0.04	0.04	0.00	.	.	0.00	0.04	0.04	.	0.08	0.10	0.10	.	.	.	0.24
		IRR.Parks		.	.	.	.	0.02	0.02	.	.	.	.	.	.	.	.	.	.	.	.	.	0.02
		MUN.County		.	.	.	0.67	0.91	1.58	.	.	.	.	0.25	0.45	.	0.69	.	.	.	.	.	2.27
		MUN.Private (but Public.DOH definition)		.	.	.	0.41	1.23	1.64	1.18	1.24	.	2.42	.	0.19	0.32	0.51	.	.	0.08	.	0.08	4.65
		UNU.Unused		.	.	.	0.00	0.00	0.00	0.00	0.00	.	0.00	0.00	0.00	.	0.00	0.00	0.00	0.00	.	0.00	0.00
		All		.	.	.	1.09	2.21	3.29	1.19	1.57	.	2.76	0.29	0.72	0.33	1.33	0.10	0.10	0.08	.	0.08	7.56
	Interbasin.Transfer	DHHL.Reservation		.	-2.00	.	.	2.00	0.00	.	.	.	.	.	.	.	.	.	.	.	.	.	0.00
		Lahaina.WTF.Distribution		.	.	.	.	.	.	.	.	.	.	0.39	-0.39	.	0.00	.	.	.	.	.	0.00
		Lahaina.WTF.Intake		.	.	.	.	.	.	.	.	.	.	-0.77	0.77	.	0.00	.	.	.	.	.	0.00
		Mahinahina.WTF.Distribution		.	.	.	.	.	.	0.29	.	0.29	0.57	.	.	.	.	.	.	.	.	.	0.57
		Mahinahina.WTF.Intake		.	.	-0.86	.	.	-0.86	.	0.29	.	0.29	.	.	.	.	.	.	.	.	.	-0.57
		All		.	-2.00	-0.86	.	2.00	-0.86	0.29	0.29	0.29	0.86	-0.39	0.39	.	0.00	.	.	.	.	.	0.00
	Recycled.Water	Lahaina.WWTF		.	.	.	.	.	.	.	0.50	.	0.50	.	.	.	.	.	.	.	.	.	0.50
		All		.	.	.	.	.	.	.	0.50	.	0.50	.	.	.	.	.	.	.	.	.	0.50
	Surface.Water	Anakaluahine		0.00	.	.	.	.	0.00	.	.	.	.	.	.	.	.	.	.	.	.	.	0.00
		Honokohau		.	13.54	.	.	.	13.54	.	.	.	.	.	.	.	.	.	.	.	.	.	13.54
		Honokohau Stream IFS		.	-8.60	.	.	.	-8.60	.	.	.	.	.	.	.	.	.	.	.	.	.	-8.60
		Honokowai		.	.	.	.	.	.	0.00	.	.	0.00	.	.	.	.	.	.	.	.	.	0.00
		Honolua		.	.	0.00	.	.	0.00	.	.	.	.	.	.	.	.	.	.	.	.	.	0.00
		Honolua Stream IFS		.	.	0.00	.	.	0.00	.	.	.	.	.	.	.	.	.	.	.	.	.	0.00
		Kahoma		.	.	.	.	.	.	.	.	0.42	0.42	.	.	.	.	.	.	.	.	.	0.42
		Kanaha		.	.	.	.	1.62	1.62	.	.	.	.	.	.	.	.	.	.	.	.	.	1.62
		Kapaloa Stream IFS		.	.	.	.	.	.	0.00	.	.	0.00	.	.	.	.	.	.	.	.	.	0.00
		Kauaula		.	.	.	.	.	.	.	.	.	.	.	3.10	.	3.10	.	.	.	.	.	3.10
		Launiupoko		.	.	.	.	.	.	.	.	.	.	.	.	0.41	0.41	.	.	.	.	.	0.41
		Olowalu		.	.	.	.	.	.	.	.	.	.	.	.	.	.	1.62	1.62	.	.	.	1.62
		Ukumehame		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	0.00	.	0.00	0.00
		All		0.00	4.94	0.00	.	1.62	6.56	0.00	.	0.42	0.42	.	3.10	0.41	3.51	1.62	1.62	0.00	.	0.00	12.11
Use	Landuse	A-1 Apartment		.	.	.	.	-0.10	-0.10	-0.08	.	.	-0.08	-0.09	-0.17	.	-0.26	.	.	.	.	.	-0.44
		A-2 Apartment		.	.	.	-0.08	-0.11	-0.18	-0.29	-0.07	.	-0.36	-0.02	.	.	-0.02	-0.03	-0.03	.	.	.	-0.59
		AG Agriculture		.	.	-0.08	-0.10	-0.30	-0.48	-0.08	-0.22	.	-0.30	-0.32	-0.55	-0.25	-1.12	-0.10	-0.10	-0.12	-0.02	-0.14	-2.24
		B-2 Business - Community		.	.	.	.	-0.04	-0.04	-0.11	.	.	-0.11	-0.14	-0.15	.	-0.29	-0.01	-0.01	.	.	.	-0.44
		B-3 Business - Central District		.	.	.	.	.	.	-0.02	.	.	-0.02	.	.	.	.	.	.	.	.	.	-0.02
		CID Napili Bay Civic Improvement District		.	.	.	.	-0.27	-0.27	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.27
		D-1 Duplex		.	.	.	.	-0.02	-0.02	.	.	.	.	.	-0.01	.	-0.01	.	.	.	.	.	-0.02
		H Hotel		.	.	.	.	.	.	-0.25	-0.18	.	-0.43	.	-0.04	.	-0.04	-0.10	-0.10	.	.	.	-0.57
		H-1 Hotel		.	.	.	.	.	.	.	-0.06	.	-0.06	.	-0.12	.	-0.12	.	.	.	.	.	-0.18
		H-2 Hotel		.	.	.	.	-0.13	-0.13	-0.11	-0.18	.	-0.29	.	.	.	.	.	.	.	.	.	-0.42
		H-M Hotel		.	.	.	.	-0.27	-0.27	-0.06	-0.74	.	-0.81	.	-0.08	.	-0.08	.	.	.	.	.	-1.16
		HD-1 Historic District 1		.	.	.	.	.	.	.	.	.	.	-0.04	-0.30	.	-0.34	.	.	.	.	.	-0.34
		HD-2 Historic District 2		.	.	.	.	.	.	.	.	.	.	-0.03	-0.13	.	-0.16	.	.	.	.	.	-0.16
		M-1 Light Industrial		.	.	.	.	-0.01	-0.01	.	-0.02	.	-0.02	-0.23	.	.	-0.23	.	.	.	.	.	-0.26
		M-2 Heavy Industrial		.	.	.	.	.	.	.	.	.	.	-0.06	-0.08	.	-0.14	.	.	.	.	.	-0.14
		OS-2 Open Space Active		.	.	.	-0.02	.	-0.02	-0.08	.	.	-0.08	.	.	.	.	.	.	.	.	.	-0.11
		P-1 Public/Quasi-Public		.	.	.	.	-0.00	-0.00	-0.00	-0.00	.	-0.00	.	.	.	.	.	.	.	.	.	-0.00
		PD Project District		.	.	.	-0.13	-0.09	-0.22	-0.01	-0.00	.	-0.01	.	.	.	.	.	.	.	.	.	-0.23
		PK Park		.	.	.	.	.	.	-0.26	.	.	-0.26	.	.	.	.	.	.	.	.	.	-0.26
		PK(GC) Park-Golf Course		.	.	-0.00	-0.01	-0.01	-0.02	.	.	.	.	.	.	.	.	.	.	.	.	.	-0.02
		R-0 Residential		.	.	.	.	.	.	-0.03	.	.	-0.03	.	.	.	.	.	.	.	.	.	-0.03
		R-1 Residential		.	.	.	.	-0.28	-0.28	-0.02	.	.	-0.02	-0.26	-0.41	.	-0.67	.	.	.	.	.	-0.96
		R-2 Residential		.	.	.	.	-0.23	-0.23	-0.09	-0.01	.	-0.10	-0.24	-0.34	.	-0.58	-0.01	-0.01	-0.00	.	-0.00	-0.93
		R-3 Residential		.	.	.	.	-0.15	-0.15	-0.15	-0.80	.	-0.95	-0.22	-0.11	.	-0.33	-0.01	-0.01	.	.	.	-1.44
		All		.	.	-0.09	-0.34	-2.00	-2.43	-1.63	-2.29	.	-3.92	-1.65	-2.48	-0.25	-4.38	-0.26	-0.26	-0.12	-0.02	-0.14	-11.24
		Water Balance		0.00	2.94	-0.95	0.74	3.83	6.57	-0.16	0.07	0.70	0.62	-1.75	1.72	0.48	0.45	1.47	1.47	-0.05	-0.02	-0.07	8.93