

# **Maui County**

## **Water Use and Development Plan**

### **Update**

*Board of Water Supply*  
*Briefing*

January 19, 2017  
Maui County Department of Water Supply

# Presentation Outline

- Status & Timeline
- Regulatory Framework
- Management Framework
- Planning Scenarios
- Water Resource Availability
- Water Use & Demand
- Resource Adequacy
- Next Steps

# Status & Timeline

## Maui Island

- Public meetings, Targeted Stakeholder Meetings
- Public Workshops .....
- Brief CWRM/Board of Water Supply.....
- Draft Plan Internal Review.....
- 3<sup>rd</sup> Round Public Meetings Preliminary Strategies
- Board of Water Supply Draft Plan Review.....**
- County Council/CWRM Final Plan Approval.....

## Moloka'i

- Commence process.....

Winter 2015

Spring 2016

Summer 2016

Fall 2016

Fall/Winter 2016

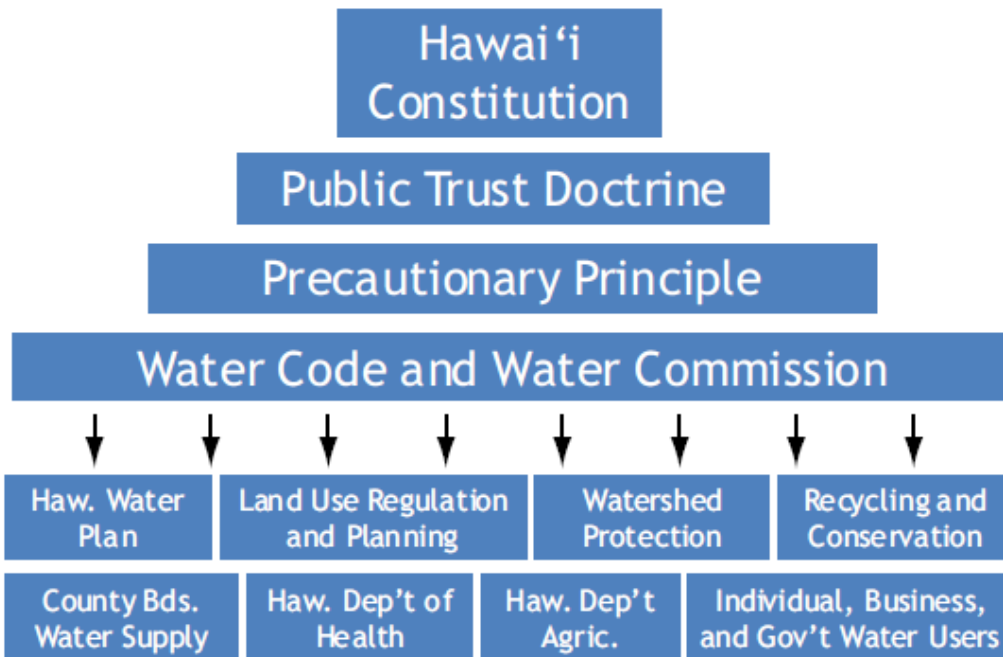
Winter 2016/Spring 2017

Spring/Summer 2017

2017

# State Regulatory Framework

The WUDP provides advice to CWRM regarding the planning, management, conservation, use, development, and allocation of surface water and ground water resources.



## Public Trust Doctrine

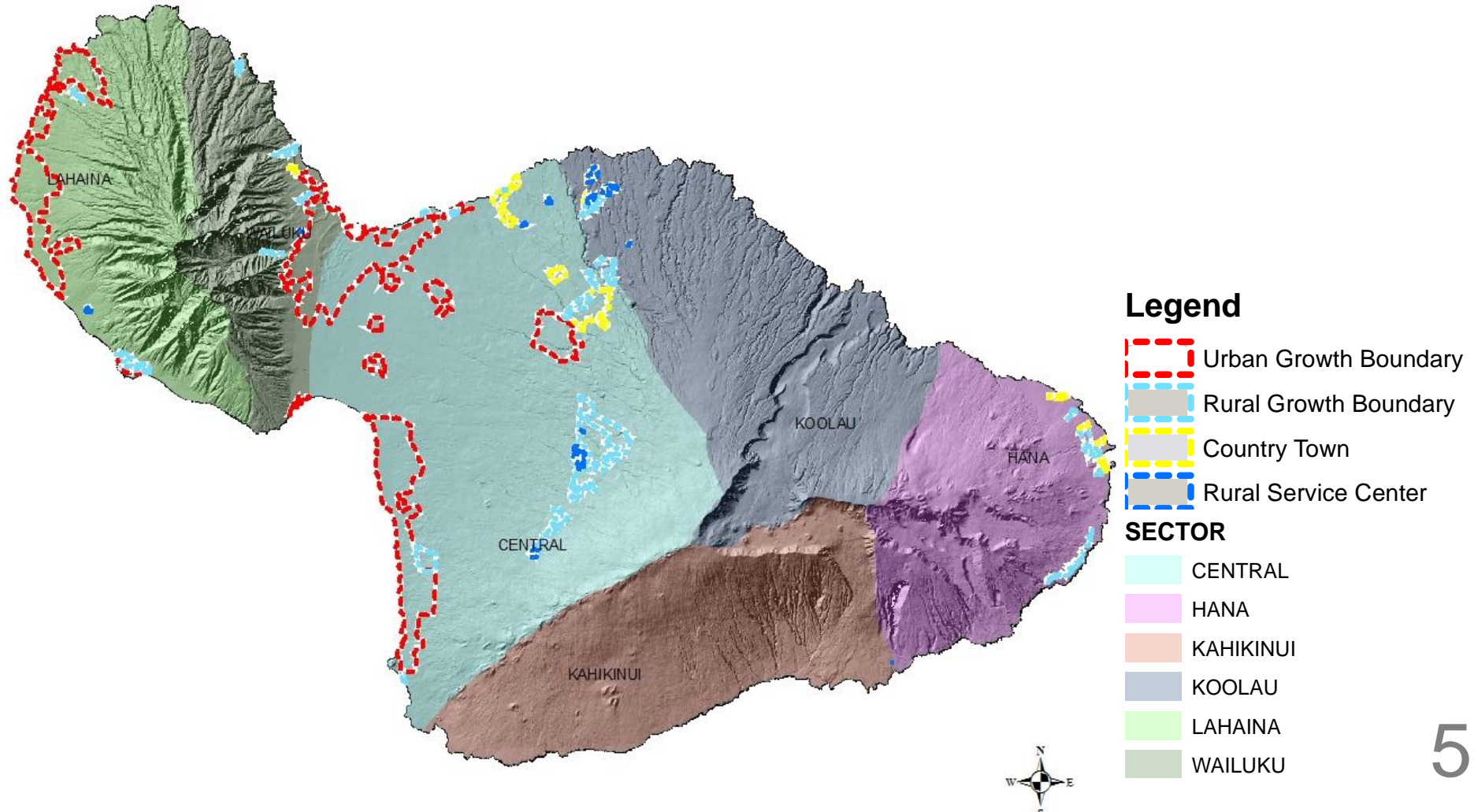
- Maintenance of waters in their natural state;
- Domestic water use of the general public, particularly drinking water;
- The exercise of Native Hawaiian and traditional and customary rights, including appurtenant rights; and
- Reservations of water for Hawaiian Home Land allotments.

## Native Hawaiian Water Rights

- Hawaii Constitution Article XII Section 7: Protect all rights, customarily and traditionally exercised for subsistence, cultural and religious purposes and possessed by ahupua'a tenants
- HRS § 174C-101: Traditional and customary rights of ahupua'a tenants ... shall not be abridged or denied by this chapter
- Supreme Court Ka Pa'akai O Ka 'Aina v. Land Use Commission: Agencies protect native Hawaiian customary and traditional practices to the extent feasible

# County Regulatory Framework

- Aid the County in the conservation, development, and use of the water resources of the County
- Set forth the allocation of water to land use through the development of policies and strategies which shall guide the County in its planning, management, and development of water resources to meet projected demands
- Consistency with Maui General Plan; Community Plans; and other Policy Plans including DHHL



# Management Framework

## Issues and Concerns:

- East/Hana: The impacts of water transport from East Maui streams on the ecosystem and public trust and other local uses. Relates to alternative ways to meet the future water needs of dependent regions.
- West/Lahaina: Alternative ways to meet the future water needs of public trust and other local uses in the region given increased growth, climatic changes and potential decreased water supplies, while managing resources in a sustainable way.
- Central/South: Alternative ways to meet the future water needs of all water uses and users in the region given increased growth especially in south Maui and reduced water transport from East Maui streams and Na Wai 'Eha.
- Upcountry: Alternative ways to provide reliable supply to the region including the potential for increased storage, given increased growth, climatic changes, and highly variable water supply in the face of reduced transport.

## Values and Principles

- Ecologically holistic and sustainable
- Based on ahupua'a management principles
- Legal, science and community-based
- Action-oriented

## Planning Objectives

Sustainability	Availability
Water Resources	Quality
Streams	Reliability
Environment	Efficiency
Equity	Cost
DHHL	Equity
Agriculture	Conformity
Cultural Resources	Viability

# Management Framework

Criteria	Planning Objectives							
	Sustainability Resources Streams Environment	Ag	Equity DHHL Culture	Availability	Quality	Reliability	Efficiency Cost	Plan Viability Conformity
Groundwater sustainable yield levels are maintained over time	X			X				X
Stream flows restored to level to support stream ecosystems	X		X	X				X
Watersheds protected from invasive animals and plants	X			X				
Interim flow standards adopted for watersheds	X		X					
Scientific studies for aquifer systems complete (support science-based SY)	X							
Water resources and water system use is based on aquifer recharge and stream flows under drought conditions	X		X		X	X		
Chloride levels in wells remain stable (salt water intrusion)	X	X		X	X	X	X	
Use of recycled water increased	X			X		X		
Graywater and catchment systems installed	X			X				
Infrastructure projects increase recycled water use and stormwater capture	X			X				
Watershed collaboration increased	X			X				X
Native Hawaiian community consultation process instituted			X					X
Per capita water use decreased	X			X		X	X	
MDWS prioritize DHHL needs over lower priority needs			X					



# Management Framework

Criteria	Planning Objectives							
	Sustainability Resources Streams Environment	Ag	Equity DHHL Culture	Availability	Quality	Reliability	Efficiency Cost	Plan Viability Conformity
Potable and irrigation systems water loss decreased	X			X			X	
Potable water use for nonpotable needs decreased	X							
Community water education increased	X						X	
Incentives for water conservation increased	X			X			X	
Drinking water standards met at all times				X	X	X		
Aquifer health maintained	X				X			
Public system water shortages to serve existing customers avoided				X		X		
Public water supply drought shortages avoided				X		X		
Contingencies in place to support water supply systems functions during emergency conditions				X		X		
Renewable energy use increased						X	X	
Water is available to timely serve development in MIP			X	X				X
Implementation plan for WUDP is incorporated into County budget and CIP planning						X		X
Strategies to meet all needs incorporated into WUDP			X					X



# Planning Scenarios

Evaluate future water resources and demands over the planning horizon 2015-2035

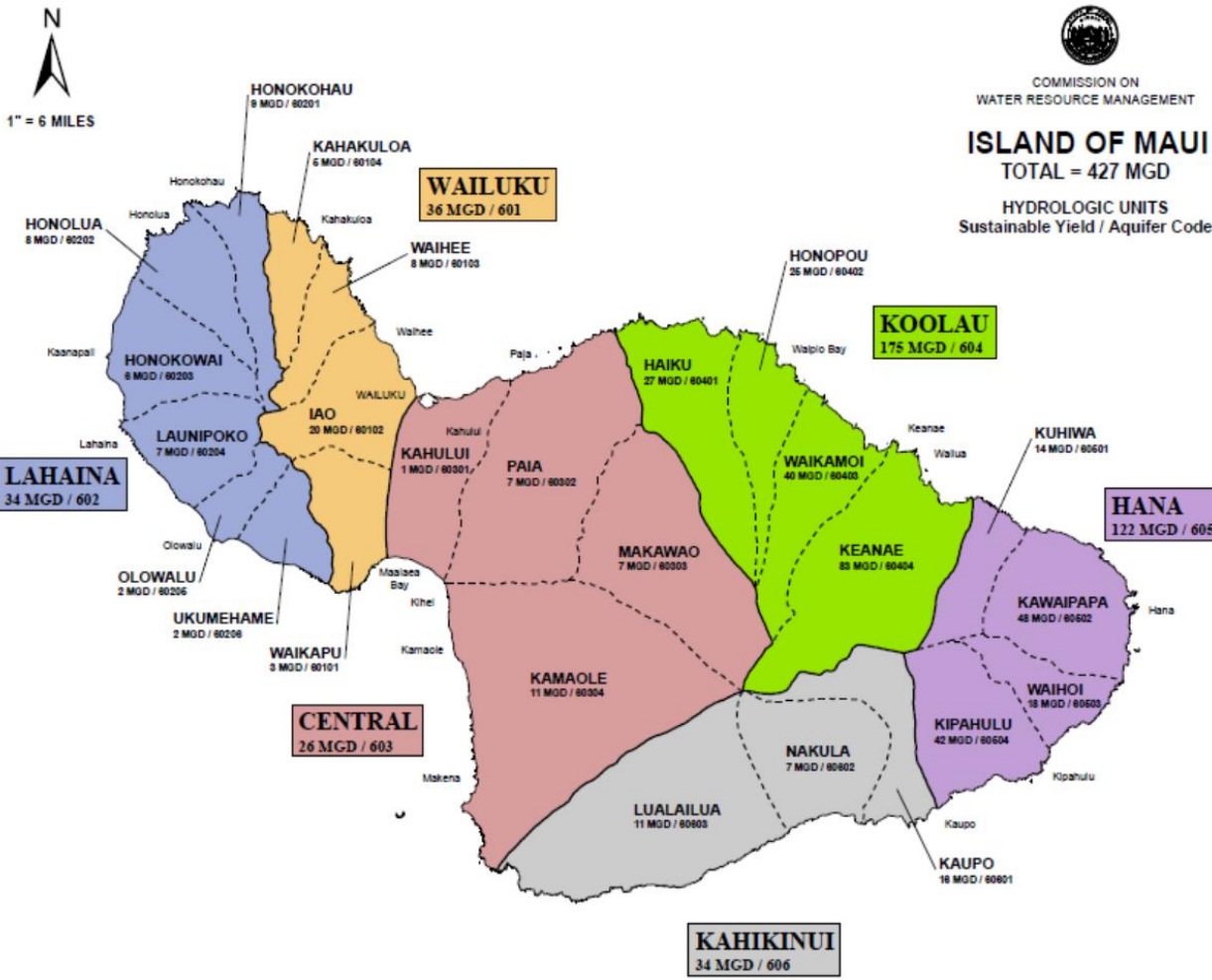
**Population Based Water Demand Scenario:** Based on the population growth rates for each community plan area in the Maui Island Plan, with updated growth rates in the 2014 Socio-Economic Forecast. Takes into account all water sectors excluding large agricultural demands which are not correlated with population growth. High and Low Cases are generated based on Socio-Economic Forecast. Projected agricultural water demand over the 20-year period is then added as a separate component for a comprehensive assessment of water demands.

**Land Use Full Build Out Scenario:** An alternative scenario projects water demand based on full development of the County General Plan, County Zoning and DHHL land use plans over an undetermined period

**Drought and Climate Change:** Uncertainty about natural climate and weather patterns, and about relationships among factors, make regional and long-term predictions very complex. *Climate Change Adaptation Priority Guidelines* incorporated to increase resilience and reduce vulnerability to risks related to climate change.

**Agricultural Water Demand Scenario:** Uncertainty about agricultural products market and regional crop water demand, the transition of sugarcane lands to other crops, potential future use of kuleana lands, and associated legal issues relating to water rights and priorities of use. Scenarios rely on stated assumptions and best data available.

# Water Resource Availability: Groundwater



- The primary source of supply for the majority of water users on the island served by both county-owned and private public water systems.
- Replenished by rainfall including fog recharge and classified as a renewable resource. The amount of groundwater that can be developed is limited by the amount of natural recharge
- The groundwater sustainable yield (SY) is the maximum rate that groundwater can be withdrawn without impairing the water source as determined by the Commission on Water Resource Management

# Water Resource Availability: Groundwater

- Sustainable yield of basal aquifers represents the maximum aquifer pumping rate assuming optimal placement of wells and pump sizes
- Drought conditions significantly impact recharge compared to average climate conditions, with a projected mean 23% decrease in annual recharge
- Withdrawals are also limited by:
  - Water use permit allocations in water management areas
  - Water quality/groundwater contamination
  - Development cost and risk

<b>Aquifer Sector</b>	<b>2008 SY</b>	<b>Drought Recharge Reduction (%)</b>
Wailuku	36	29%
Lahaina	34	24%
Central	26	25%
Ko'olau	175	21%
Hāna	122	19%
Kahikinui	34	37%
Total	427	

# Water Resource Availability: Surface Water

- There are 90 perennial streams in Maui, 82 of which have been diverted to some extent
- Supplies a small proportion of drinking water island-wide but is a significant source of supply in West Maui and Upcountry.
- Availability is uncertain due to multiple factors effects of diversions on the ecosystem, lack of numerical instream flow standards, lack of gages and legal issues.
- The CWRM’s mandate is to establish instream flow standards (IFS) that will protect instream uses while allowing for reasonable and beneficial offstream use

<b>Flows and IIFS</b>	<b>Low Q50</b>	<b>Low Q70</b>	<b>Low Q90</b>	<b>Q90</b>
<b>Na Wai Eha</b>	<b>63</b>	<b>49</b>	<b>31</b>	<b>31</b>
<b>East Maui</b>	<b>44</b>	<b>25</b>	<b>14</b>	<b>14</b>
<b>Lahaina (USGS)</b>	<b>40</b>	<b>31</b>	<b>22</b>	<b>22</b>
<b>Total</b>	<b>147</b>	<b>105</b>	<b>68</b>	<b>68</b>
				<b>IIFS (or Q90)</b>
<b>Na Wai Eha CWRM 2010</b>	<b>69</b>	<b>55</b>	<b>43</b>	<b>35.4</b>
<b>East Maui CC 1/15/16 CWRM</b>				
<b>H.O.</b>	<b>40</b>		<b>19</b>	<b>40</b>
<b>Lahaina (USGS)</b>	<b>40</b>	<b>31</b>	<b>22</b>	<b>22</b>
<b>Total</b>	<b>149</b>	<b>86</b>	<b>84</b>	<b>97</b>

Reported Diversions, 2011-2015 Ave.

IIFS (Best Guess): East Maui 1/16/15 Hearing Officer+Q90Lahaina+Q90NaWaiEha

Issue: IIFS only represent a portion of the streams

IIFS versus Q on streams covered by the IIFS

# Alternative Water Resources

## Recycled Wastewater

WWRF	Treatment Level	WWRF Design Capacity	Recycled Water Produced	Recycled Water Used	% of Total Produced Used	% of Design Capacity Used	Application
Wailuku-Kahului	R-2	7.9	4.7	0.25	5.3%	3.2%	None
Kihei	R-1	8	3.6	1.5	41.5%	18.7%	Golf Course, Ag, Dust Control, Landscape, Fire Protection
Makena (Private)	R-1	0.75	0.08	0.08	10.6%	10.6%	Golf Course
Pukalani (Private)	R-1	0.29	0.19	0.19	100%	65.5%	Landscape
Haleakalā (Private)		N/A	0.18	N/A	N/A	N/A	Closed loop system; Sanitary purposes
Lahaina	R-1	9	3.84	0.88	22.9%	9.8%	Golf Course, Landscape, Nursery, Agriculture
<b>Total</b>		<b>25.9</b>	<b>12.6</b>	<b>2.65</b>			

**Rainwater Catchment:** Feasible where consistent rainfall

**Stormwater Reuse :** Capture and reuse of surface water runoff can provide non-potable water uses. Range in technologies: source reuse (ex. rain barrels and cisterns); small lot reuse (ex. vegetated infiltration basins), stormwater capture (injection well), stormwater storage (ex. detention basin), stormwater distribution (ex. ditch or pipe network)

**Desalination:** Seawater, brackish water or treated wastewater can be processed through several desalination methods. Brine disposal and cost have posted significant impediments

# Resource Availability & Use

<b>Resource</b>	<b>Available</b>	<b>Used</b>	<b>Balance</b>
<b>Groundwater</b>	427	91	336
Potable Uses		29	
Nonpotable Uses		62	
<b>Surface Water</b>	Undetermined	362	
Potable Uses		11	
Nonpotable Uses		351	
<b>Recycled Water</b>	26	3	23

# Demand Projections Water Use Rates

**Land use based build-out:** Based on water system standards 2002 *Water System Standards*, Domestic Consumption Guidelines and applied to equivalent zoning district. Residential use rates adjusted based on empirical consumption data. Agricultural use rates adjusted to comport with the Agricultural WUDP.

**Department of Hawaiian Homelands:** Water system standards applied to DHHL land use designations

**Population growth based:** Projected based on actual demand, compared to historic use. Range includes high and low growth alternatives per 2014 Socio-Economic Forecast

**Diversified Agriculture:** Average per acre water use based on Department of Ag water rates and CWRM

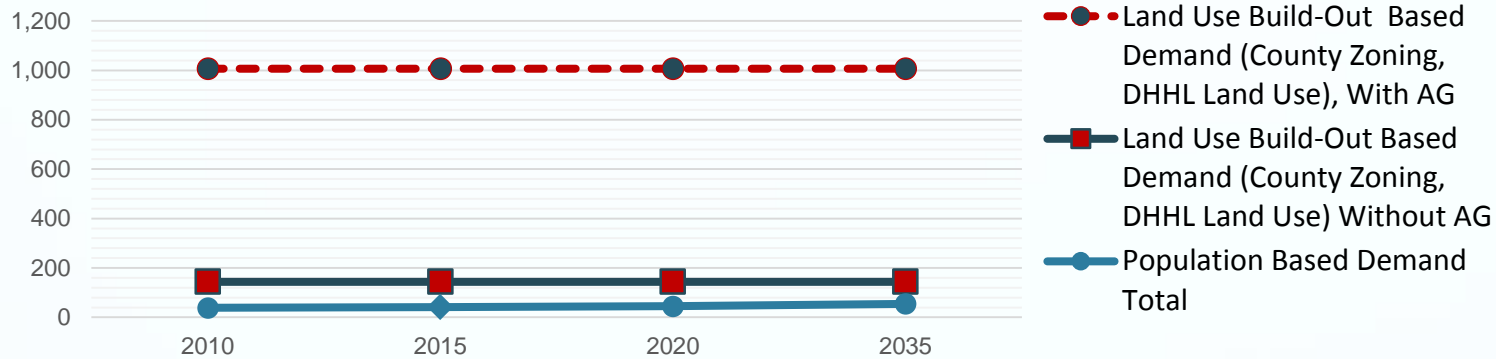
**Lo'i Kalo:** Per acre water inflow into lo'i and consumptive use based on CWRM data/contested cases

**HC&S Lands:** Potential use categories: Diversified crops, Irrigated Pasture, Biofuel, Monocrops and Forestry. Range include HC&S crop specific rates per the March 2016 "Diversified Agricultural Plan" and DOA crop specific rates

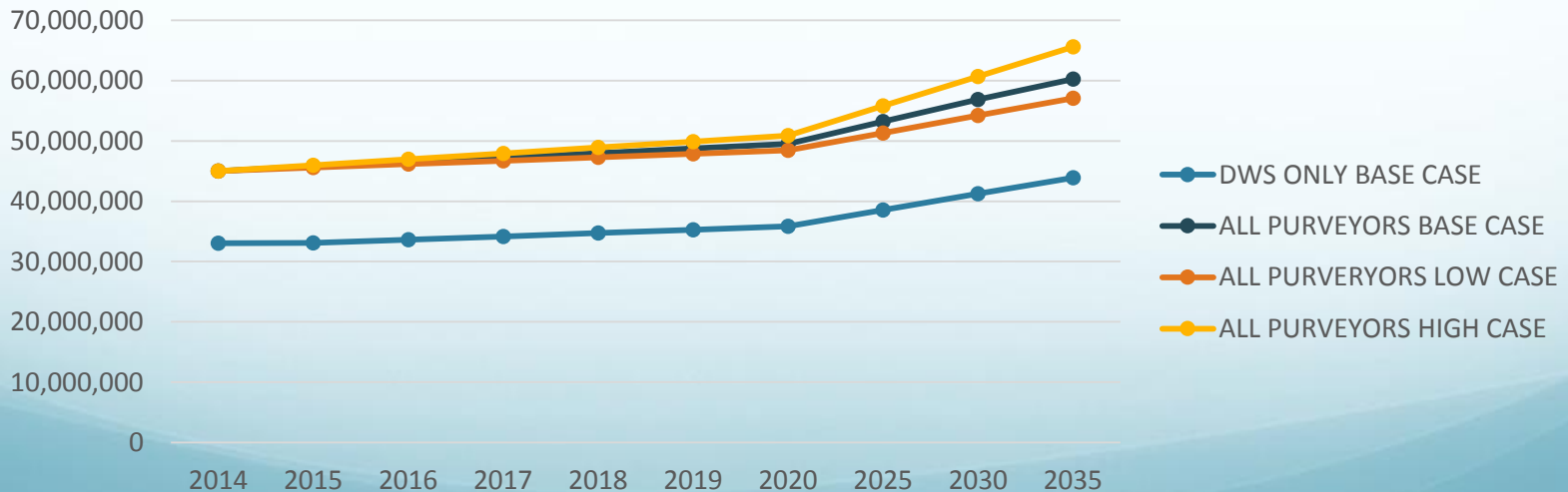


# Projected Demand Scenarios

Maui Island Population Growth and Land Use Build-Out Based Demand, 2010-2035 (MGD)



Maui Island Population Growth Based Demand 2014 - 2035 (GAL)  
Not including Major AG Use



# Projected Agricultural Demand

Agricultural Use	Total MGD
Kuleana/Lo'i Kalo	10.89 – 15.52
Department of Hawaiian Homelands	31
Diversified Ag	20.86 – 25.0
HC&S lands	22.5 – 124.45

**Kuleana/Lo'i Kalo:** Range based on 2015 Ag Baseline and CWRM IIFS proceedings. Accounts for stream taro use

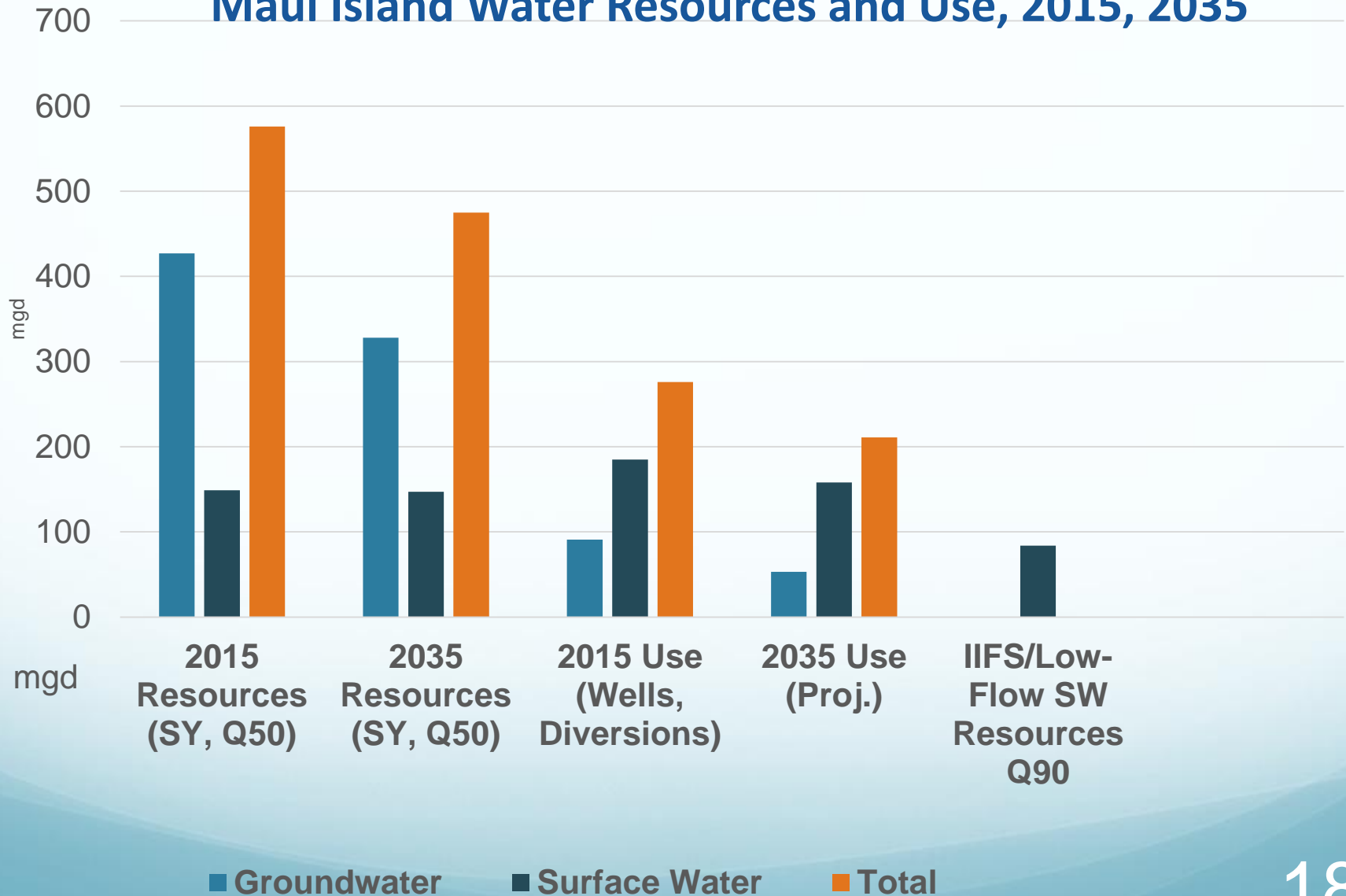
**DHHL:** DHHL's regional and island plans. Non potable demands for ag and pastoral use.

**Diversified Ag:** Range based on 2015 Ag Baseline and 20% increase, includes Kula Ag Park Expansion. Not including sugarcane and taro

**HC&S lands:** Range based on low to high scenarios: low: 25% of Important Ag Lands farmed; high: 100% of Important Ag Lands farmed. (HC&S "Diversified Agricultural Plan", 100% of plantation acreage represents 107.79 mgd)

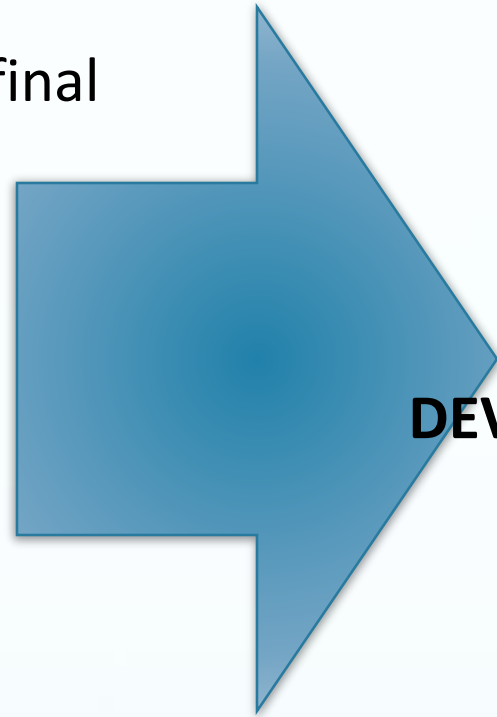
# Water Resource Adequacy

## Maui Island Water Resources and Use, 2015, 2035



# Next steps...

- Incorporate findings from final round of public workshops
- Refine regional strategies (Sector Reports)
- Recommendations and Implementation



**MAUI ISLAND  
WATER USE &  
DEVELOPMENT PLAN  
DRAFT**

<http://co.maui.hi.us/2051/Maui-Island-Water-Use-Development-Plan>

**Mahalo!**

Maui County DWS  
Water Resources & Planning