PRIMARY URBAN CENTER
WATERSHED MANAGEMENT PLAN

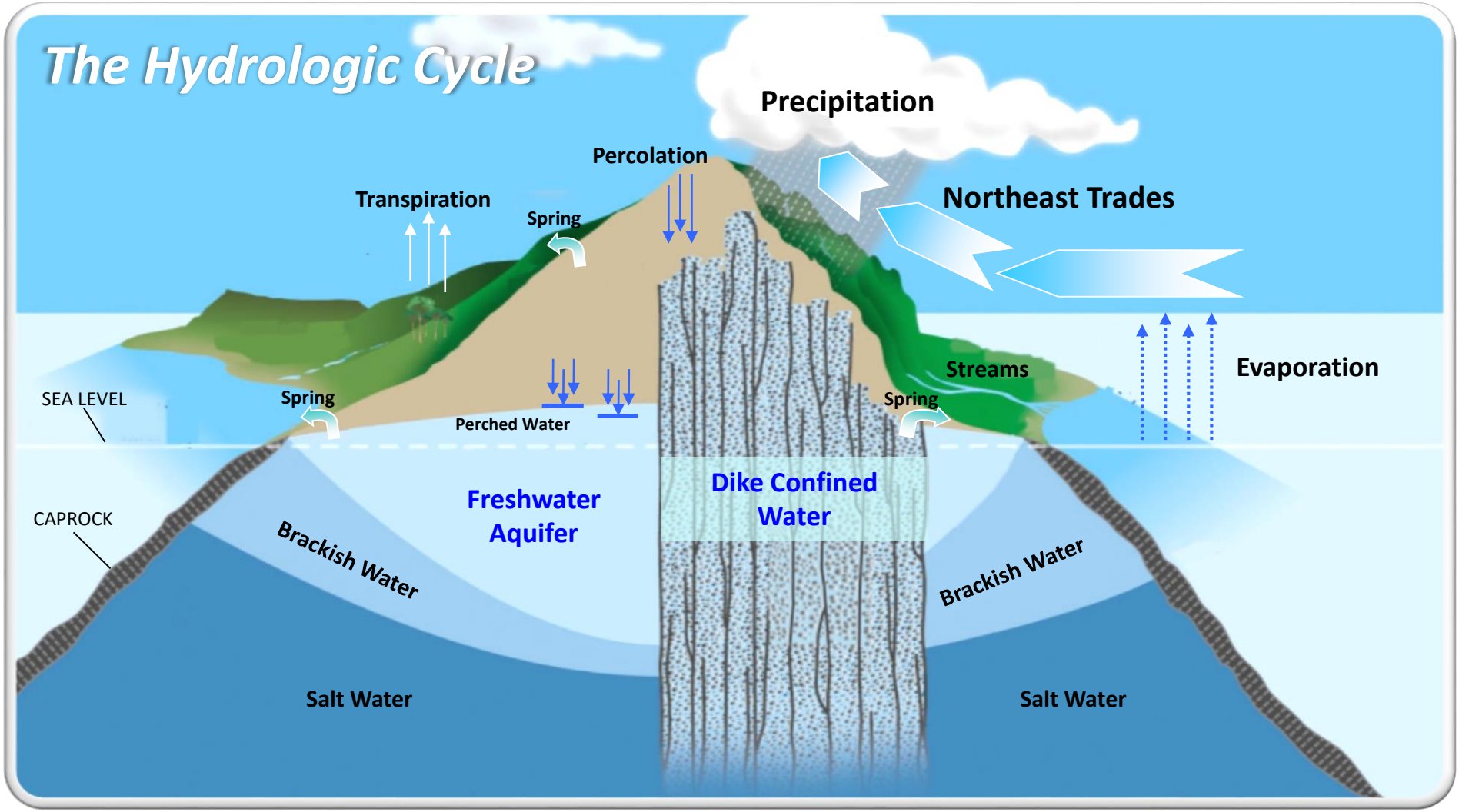
Community Meeting #2
Current & Projected Water Use

March 2018

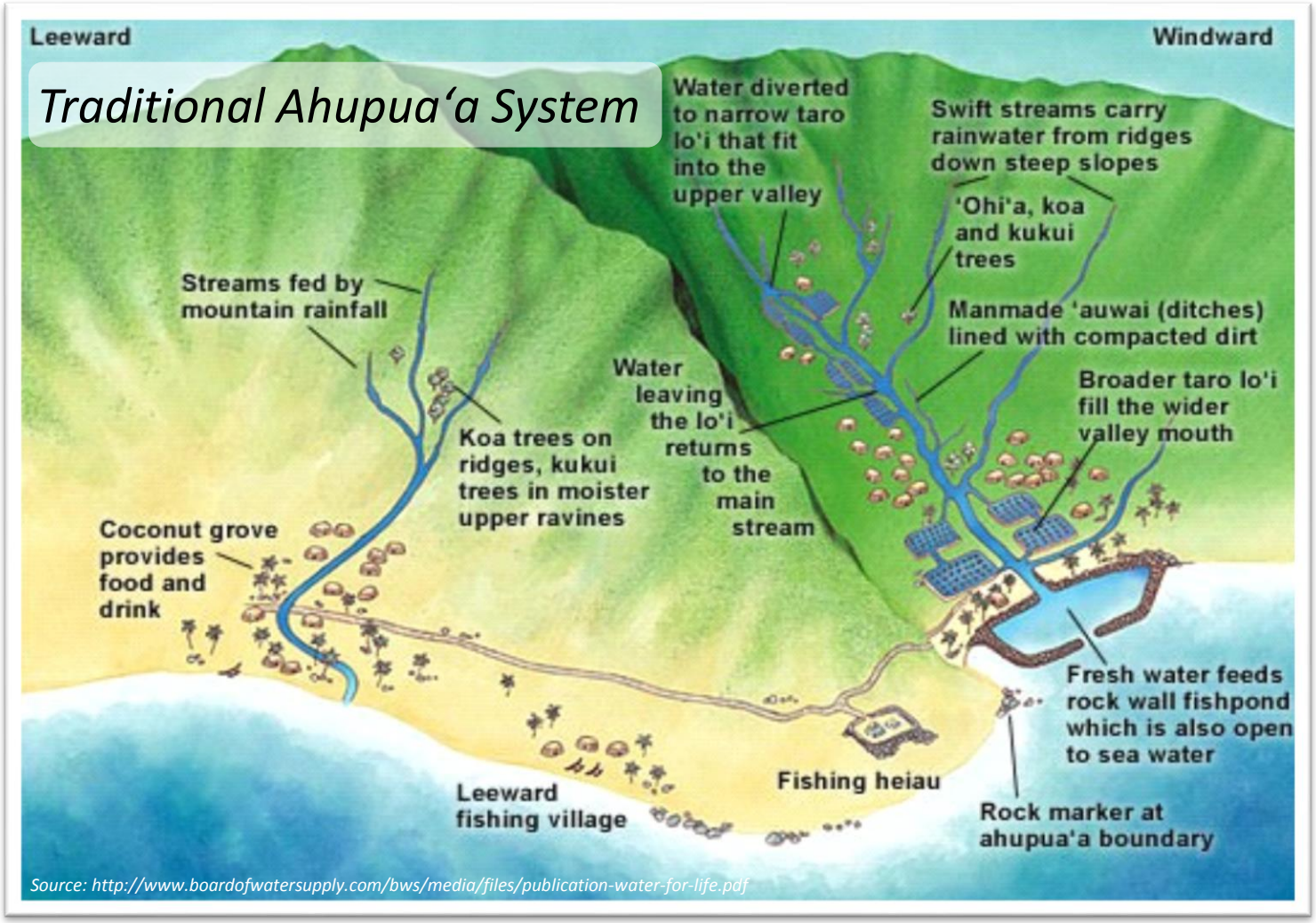
PRESENTATION TOPICS

- Introduction & Project Overview
- Primary Urban Center (PUC) Water Resources & Systems
- Current Water Demand & Projections for Future Water Demand
- Potential Water Supply Options
- Next Steps

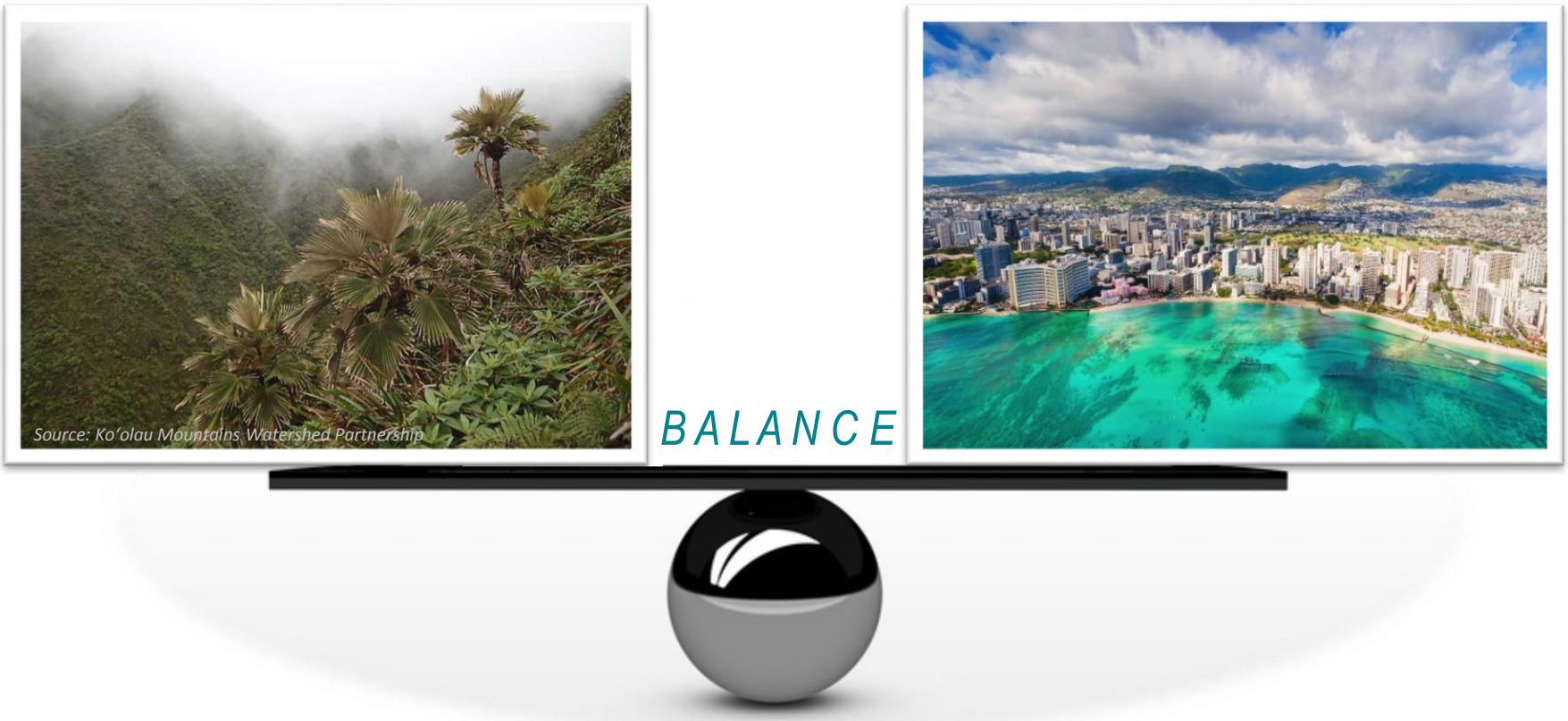
Introduction: O'ahu's Water Story



Introduction: O'ahu's Water Story

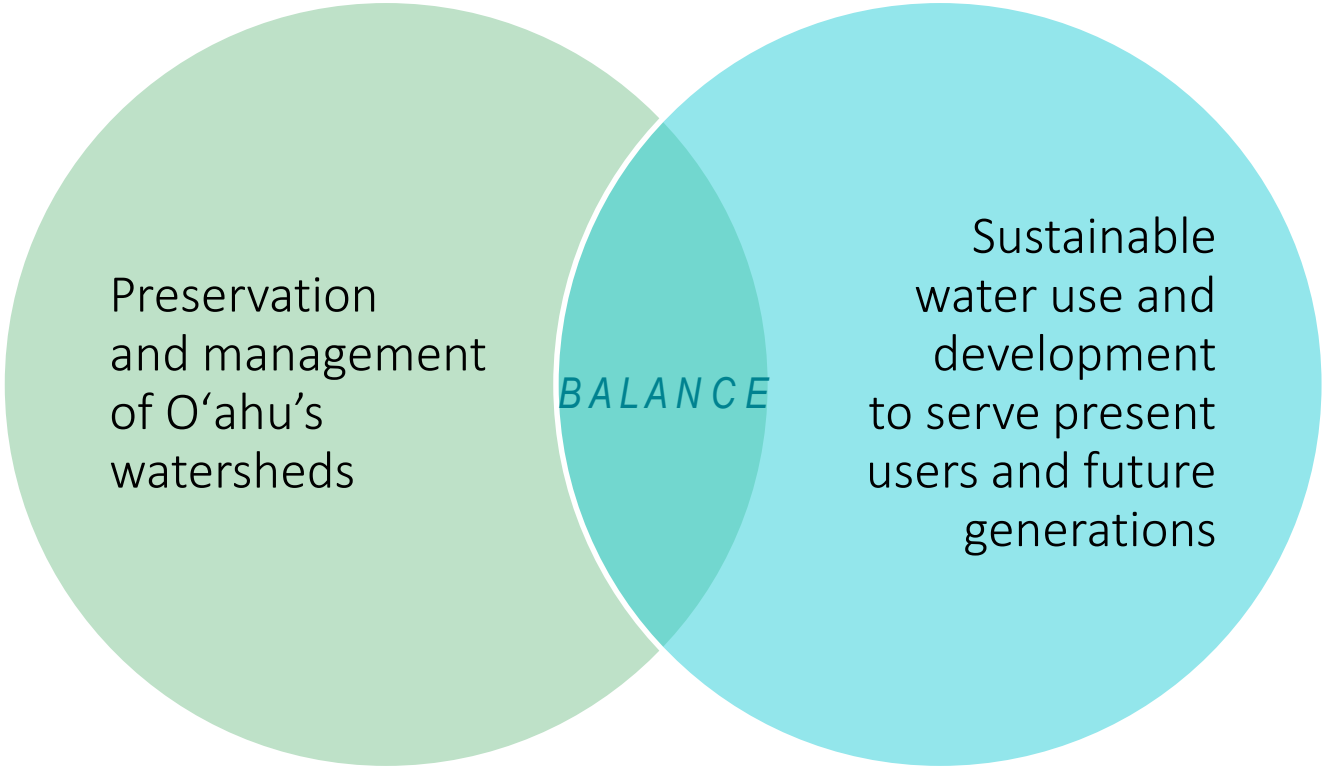


How can we protect our water resources for modern-day O‘ahu?



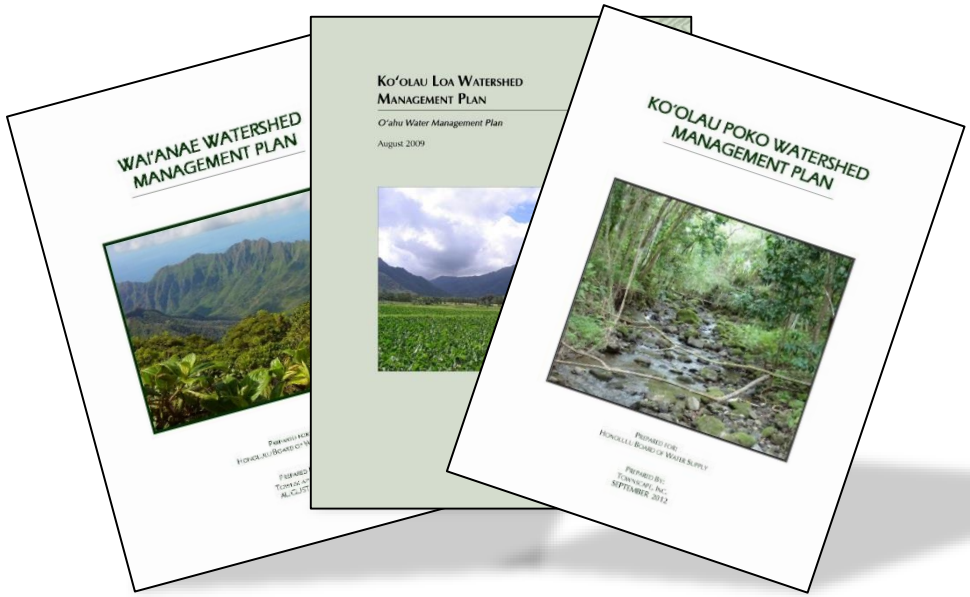
Overall Management Plan Goal

*To formulate an environmentally holistic, community-based, and economically viable watershed management plan that will provide a **balance** between:*

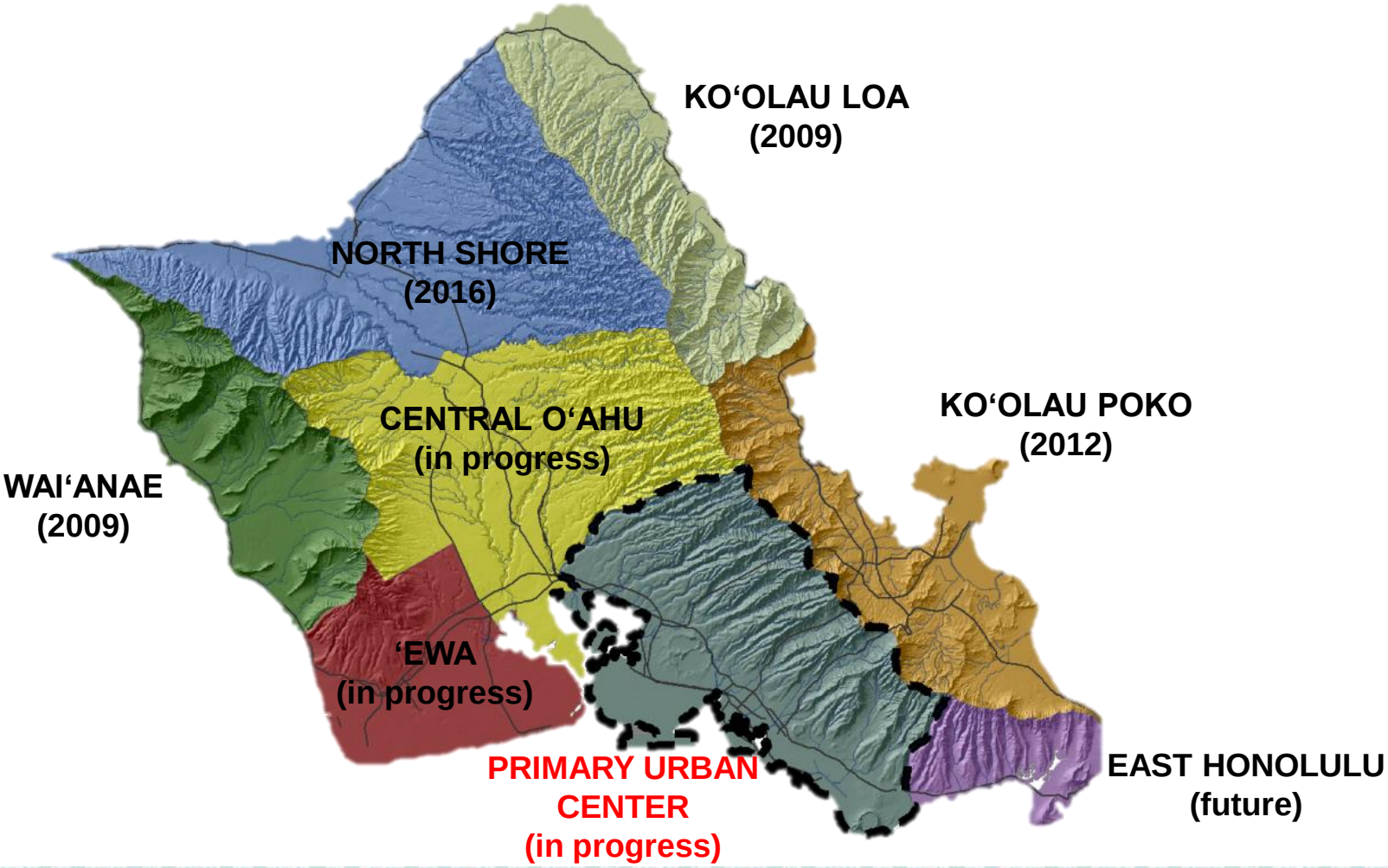


Watershed Management Plans:
Applying Ahupua'a Concepts

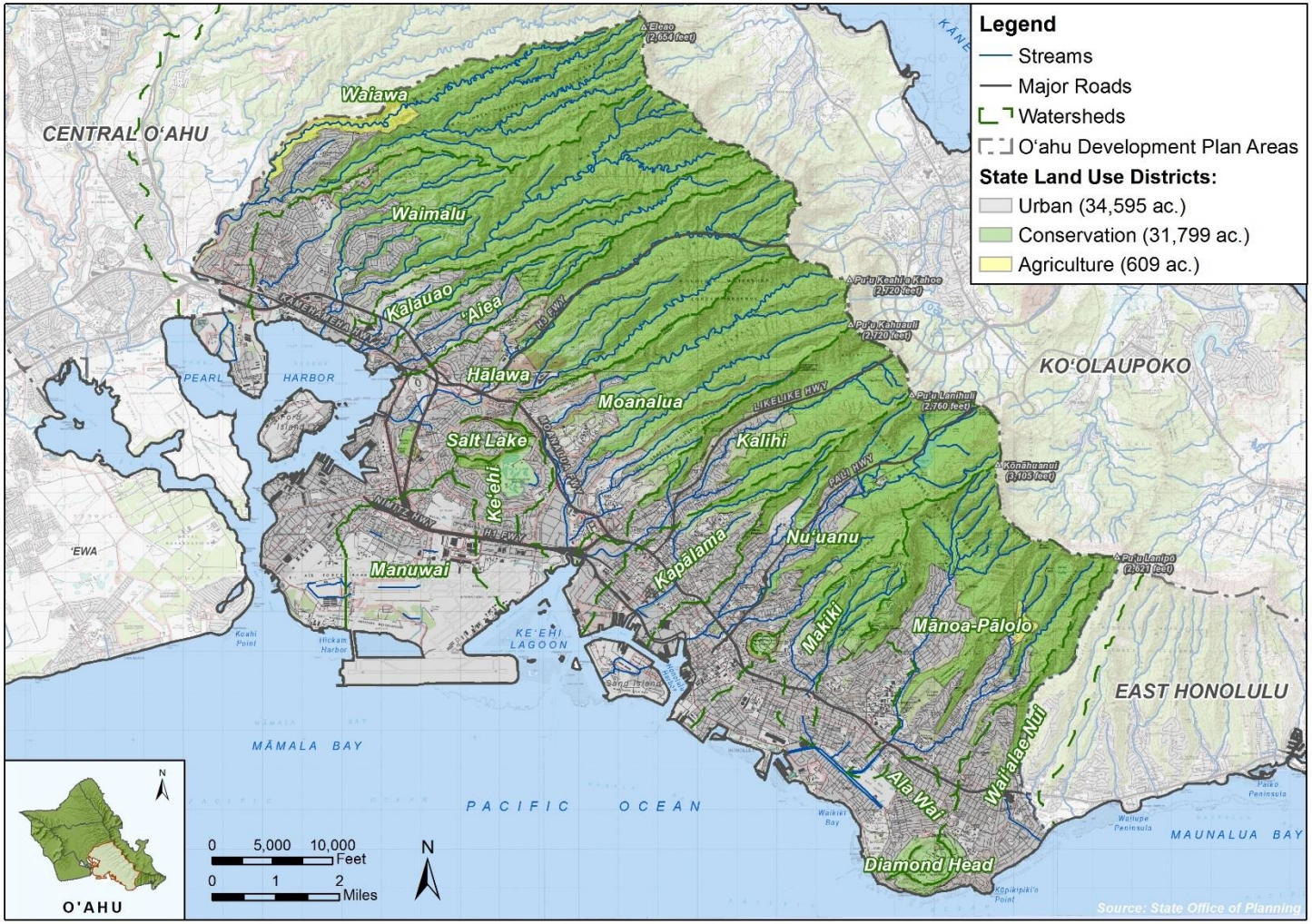
- Environmentally holistic
- Inter-relationship of resources
- Community-based
- Sustainable
- Kuleana



O‘ahu Water Management: Watershed Management Plans



Primary Urban Center (PUC)



PUC Quick Facts:

- Kaimukī/Kahala to Pearl City
- ~105 square miles (1/6 of O‘ahu)
- ~440,000 people
- 17 Watersheds
- 16 Ahupua‘a
- 17 Neighborhood Boards
- 47% of the PUC is in Conservation (State Land Use District)

The General Plan of the City and County of Honolulu directs future growth and development to the Primary Urban Center and the ‘Ewa district.

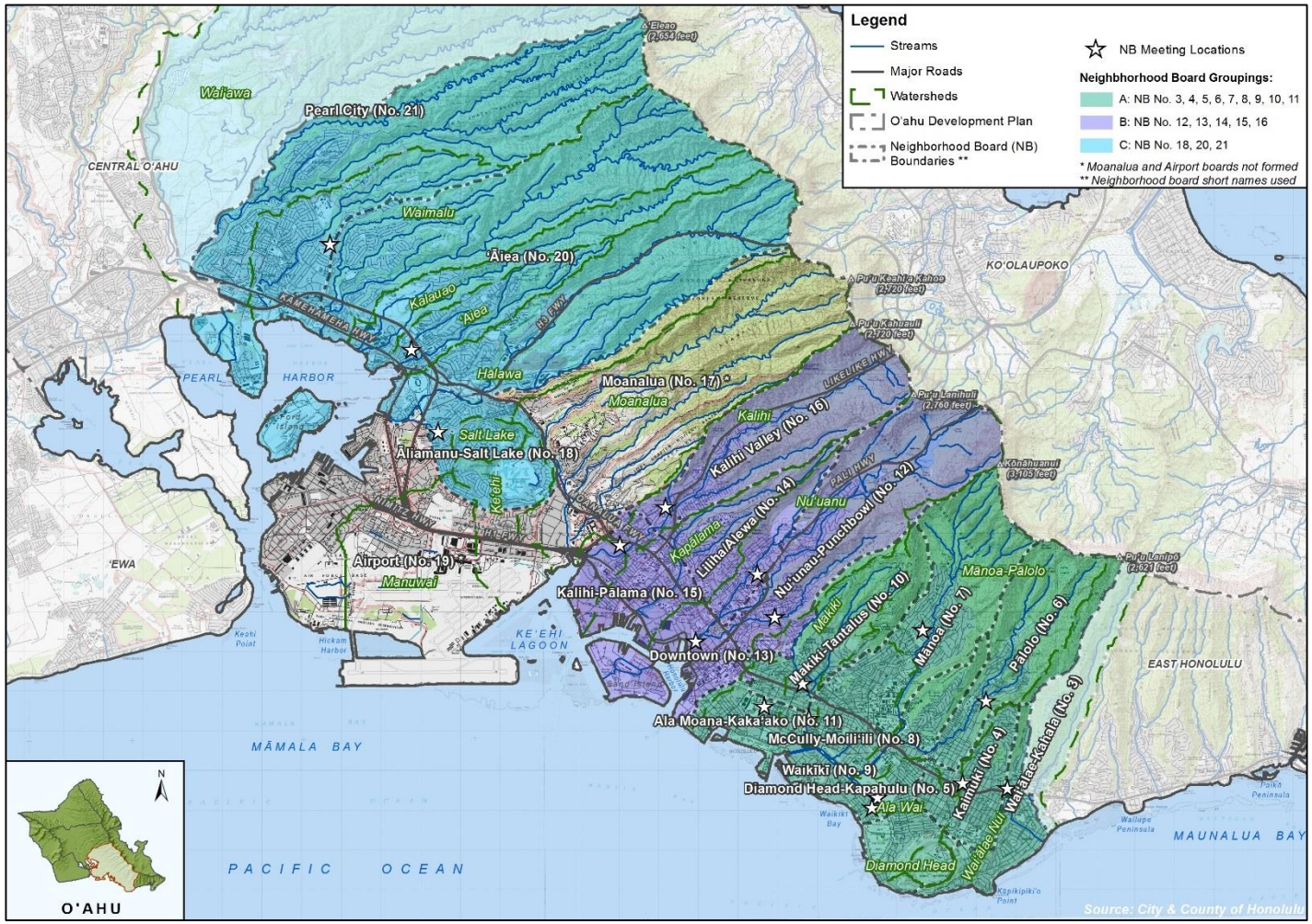
PUC WMP Stakeholder Outreach

17 Neighborhood Boards + **4 Series of Community Meetings (12 total meetings)**

Community Meeting Schedule

1st Series (May 2017)	2nd Series (March 2018)	3rd Series (Summer 2018)	4th Series (4th Qtr 2018)
• PUC Watershed Overview and Critical Issues	• PUC Water Use and Future Water Demands	• PUC Watershed Projects and Strategies	• PUC WMP Public Review Draft

Neighborhood Board Groupings for Community Meetings

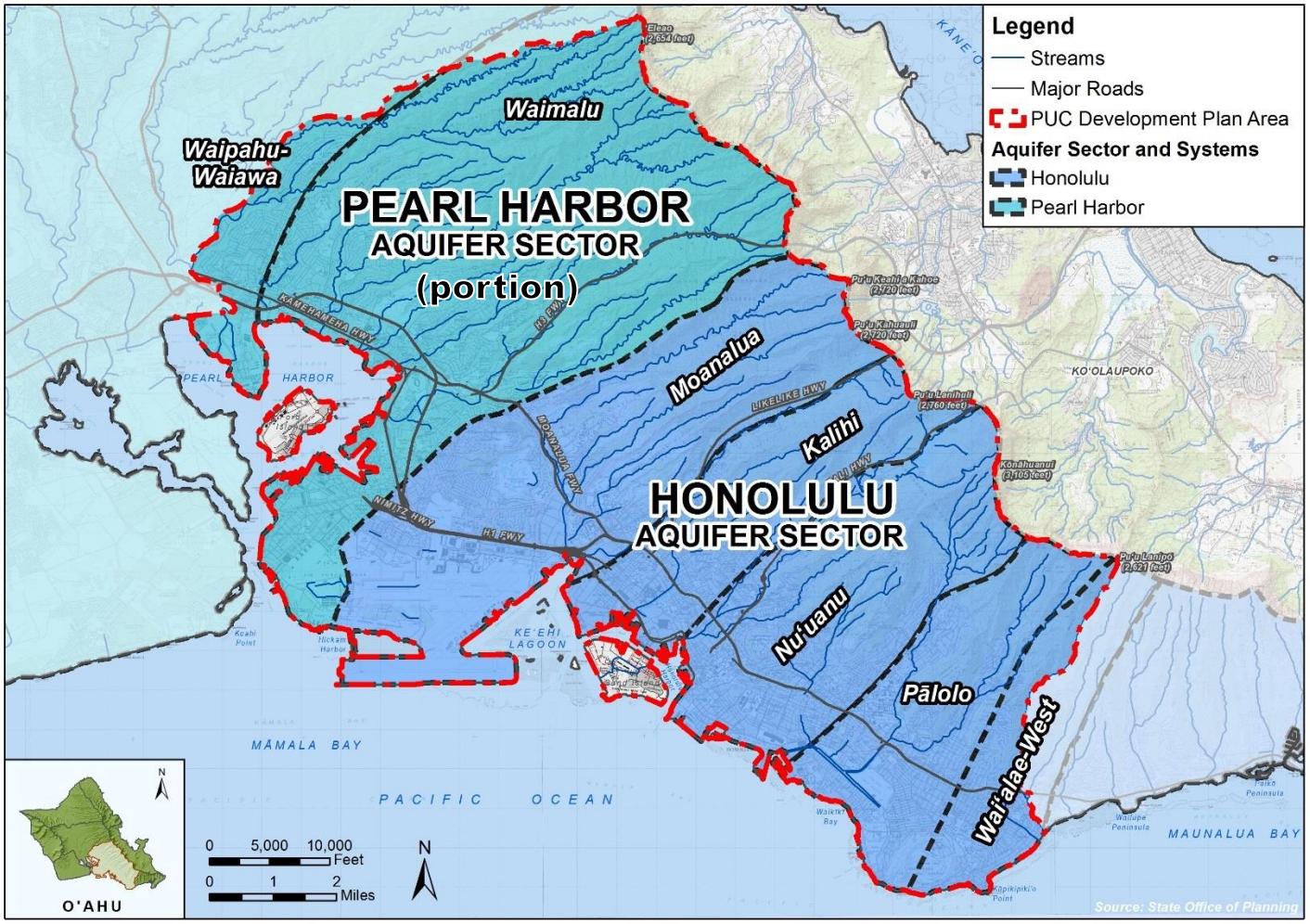


Community Meeting #1 Recap

Community Interests & Issues Discussed :

- Climate change
- Importance of traditional & cultural practices
- Protecting ground water quality
- Nearshore water quality
- Flooding
- Watershed protection
- Developing new water sources (e.g. water recycling)
- BWS water system

PUC Water Resources: Ground Water



PUC Water Resources: Ground Water

	SUSTAINABLE YIELD (MGD)
PEARL HARBOR SECTOR AREA	
Waipahu-Waiawa (only partially in PUC)	104
Waimalu	45
TOTAL	**149**
HONOLULU SECTOR AREA	
Moanalua	16
Kalihi	9
Nu‘uanu	14
Palolo	5
Wai‘alae-West (only partially in PUC)	4
TOTAL	**48**
GRAND TOTAL	**197**

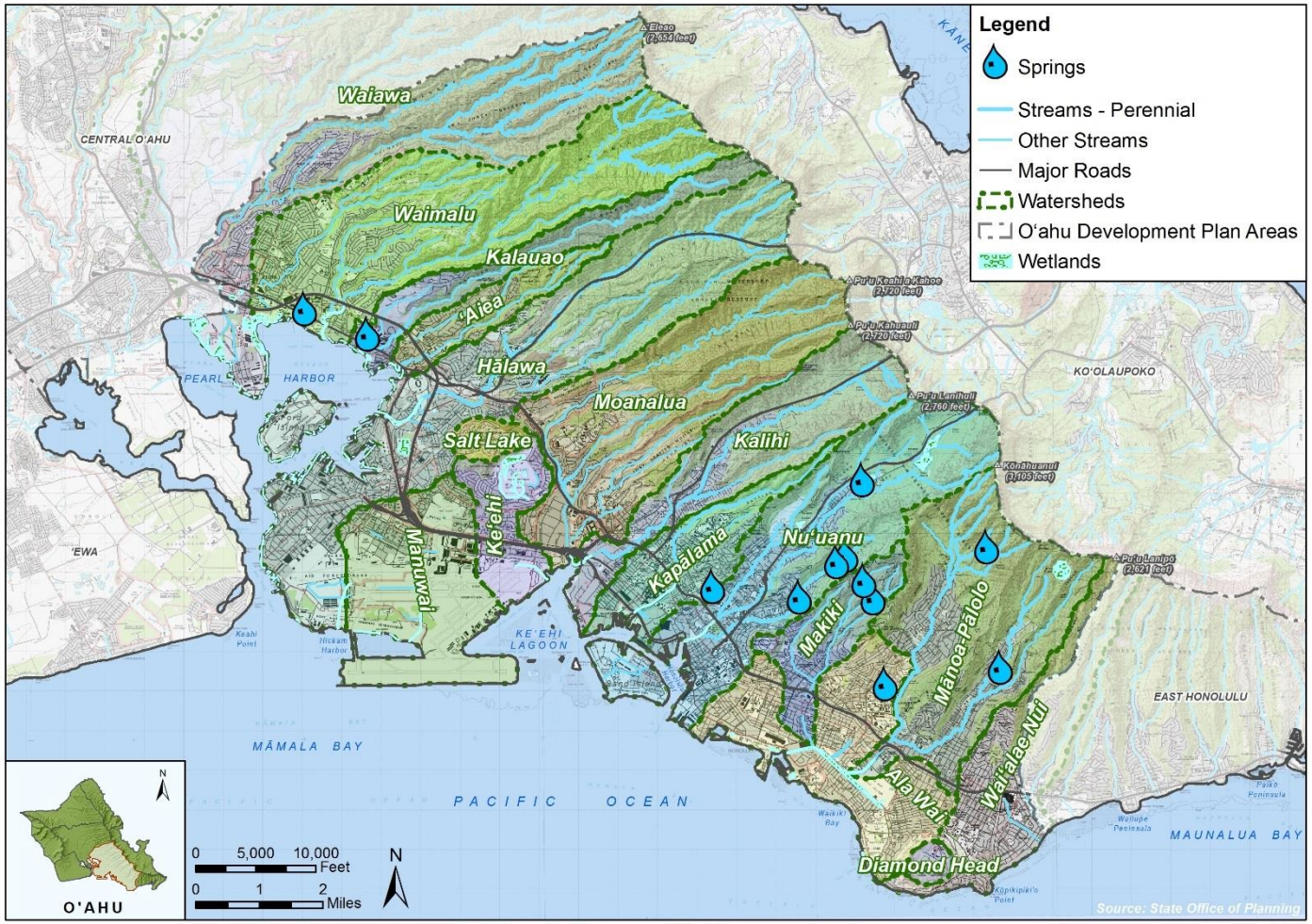
Total Sustainable Yield for aquifers underlying PUC:

197 MGD (potable water)

Note:

- Waipahu-Waiawa aquifer is largely outside of PUC
- Wai‘alae-West aquifer is partially outside of PUC

PUC Water Resources: Surface Water



456 acres of wetland area

12 existing springs

11 perennial streams

- Aiea
- Ala Wai Canal
- Hālawa
- Kalauao
- Kalihi
- Kapālama
- Moanalua
- Nuʻuanu
- Waiʻalae nui
- Waiawa
- Waimalu

PUC Water Systems: Overview

Honolulu Board of Water Supply	City & County of Honolulu	State of Hawai'i	Federal	Private
• Ground water – Potable – Caprock • Surface water	• Ground water – Potable – Caprock	• Ground water – Potable – Caprock	• Ground water – Potable	• Ground water: – Potable – Caprock • Surface water
2010 Total Water Use (reported ground water pumpage* + reported surface water use):				
74.4 MGD	**1.1 MGD**	**0.04 MGD**	**18.5 MGD**	**14.3 MGD**

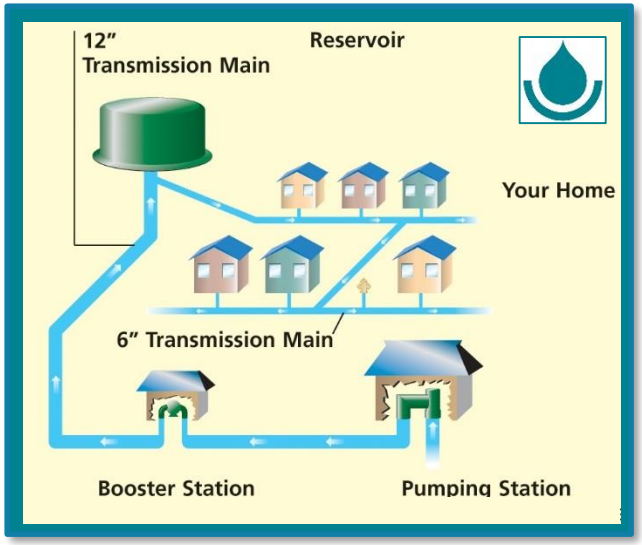
** Ground water includes caprock and non-caprock (potable) sources*
Note: Slight discrepancies in totals are due to differences in rounding and/or data source

PUC Water Systems:

Honolulu Board of Water Supply

Potable Ground Water

- The 2010 BWS-served population of the PUC was ~461,000 people (~46% of O‘ahu)
  - Excludes those served by other water supply systems & includes visitors present
  - BWS provides water to ~97% of all O‘ahu residents



PUC Water Systems:

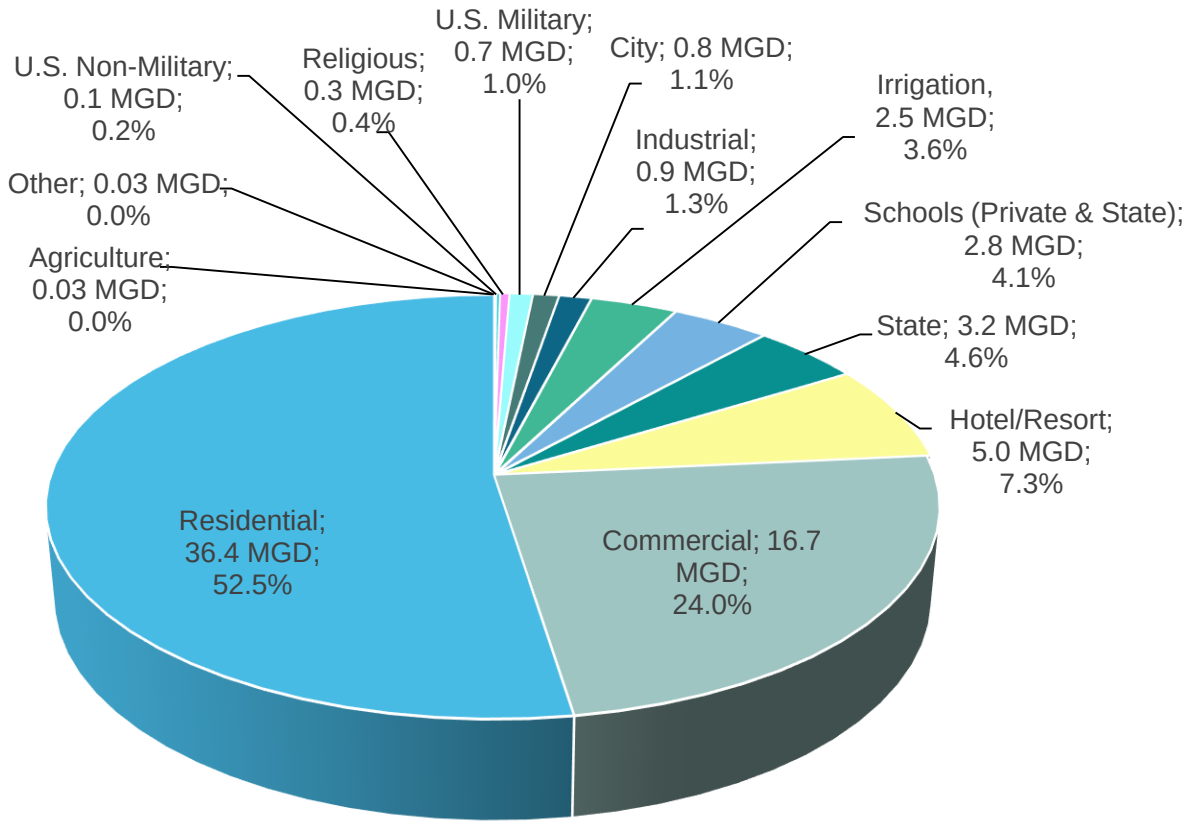
Honolulu Board of Water Supply

Potable Ground Water:

69.5 MGD

2010 BWS Water Demand in PUC

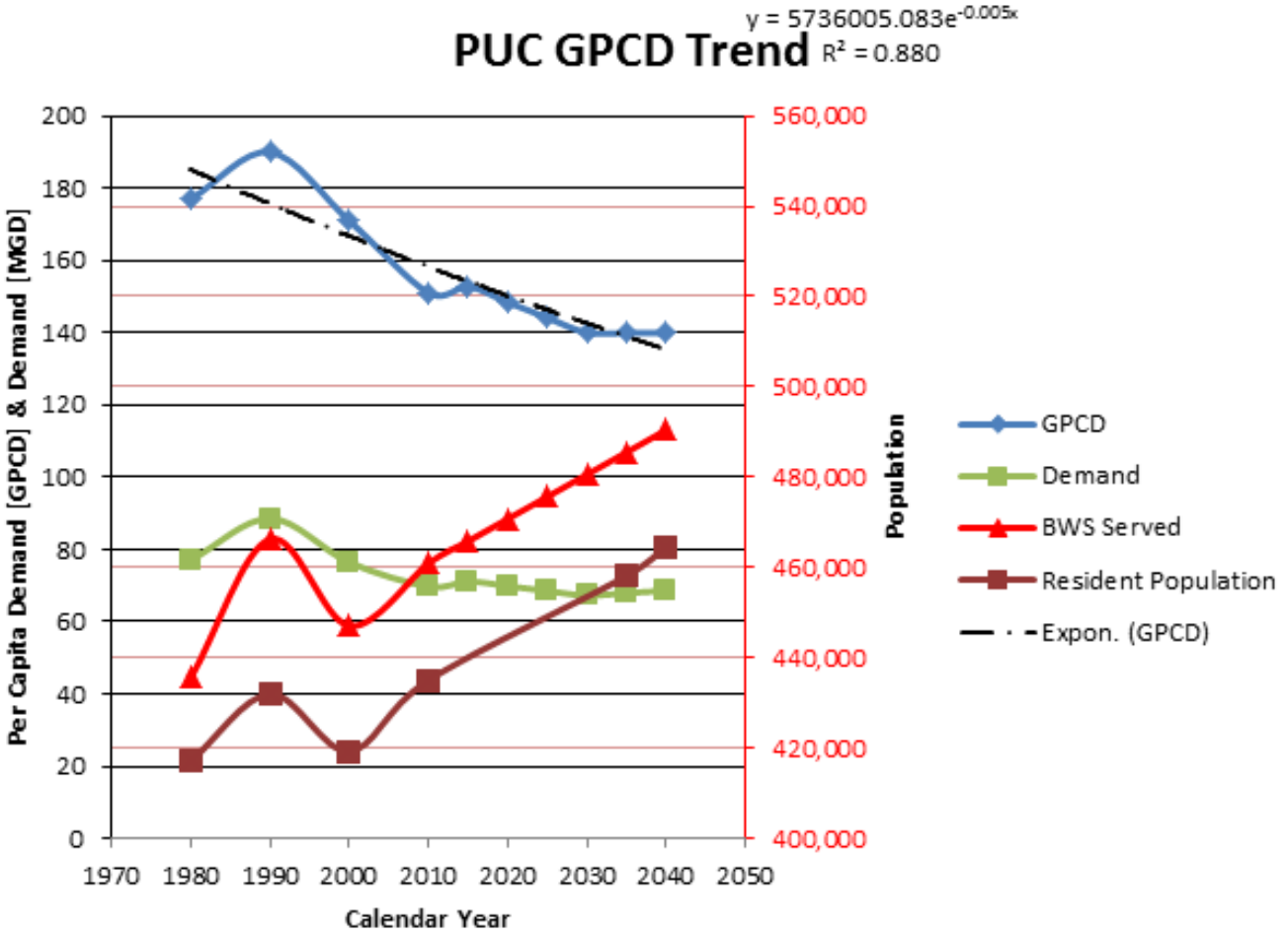
(5 year average – drinking/potable water only)



PUC Water Systems:

Honolulu Board of Water Supply

Water Use Per Capita Has Been Declining



2010 Caprock Water Pumpage & Surface Water Use in PUC – BWS

PUC Water Systems:

Honolulu Board of Water Supply

Caprock Water:
4.3 MGD

Surface Water:
0.8 MGD

Caprock Water (Industrial use)

- 4.3 MGD (salt water for cooling)

Irrigation

- 0.80 MGD (Kalauao Springs)

PUC Water Systems:

City & County of Honolulu

Total Ground Water:
1.1 MGD

2010 Reported Groundwater Pumpage in PUC – City

Irrigation

- 0.1 MGD (Golf course; potable)
- 1.0 MGD (Landscaping; caprock)

Other

- 0.01 MGD (Honolulu Zoo; caprock)

PUC Water Systems:

State of Hawai'i

Total Ground Water:
0.04 MGD

2010 Reported Groundwater Pumpage in PUC – State

- 0.04 MGD (Dept. of Transportation; potable)
- 0.001 MGD (Waikīkī Aquarium; caprock salt water)

PUC Water Systems:

Federal

Potable Ground Water:

18.5 MGD

2010 Reported Groundwater Pumpage in PUC – Federal

Domestic Residential

- 17.5 MGD (Navy)
- 0.5 MGD (Army)

Domestic Non-Residential

- 0.4 MGD (Army)

Irrigation

- 0.2 MGD (U.S. Fish & Wildlife Services - Pearl Harbor National Wildlife Refuge)

PUC Water Systems:

Private

Total Ground Water:
14.1 MGD

Surface Water:
0.2 MGD

2010 Reported Groundwater Pumpage & Surface Water Use in PUC – Private

Domestic Non-Residential

- 1.0 MGD (potable)

Agriculture

- 0.004 MGD (potable)
- 0.04 (surface water)

Industrial

- 4.0 MGD (0.81 MGD potable, 3.14 MGD caprock)

Irrigation

- 8.8 MGD (0.8 MGD potable, 8.0 MGD caprock)
- 0.001 MGD (surface water)

Other

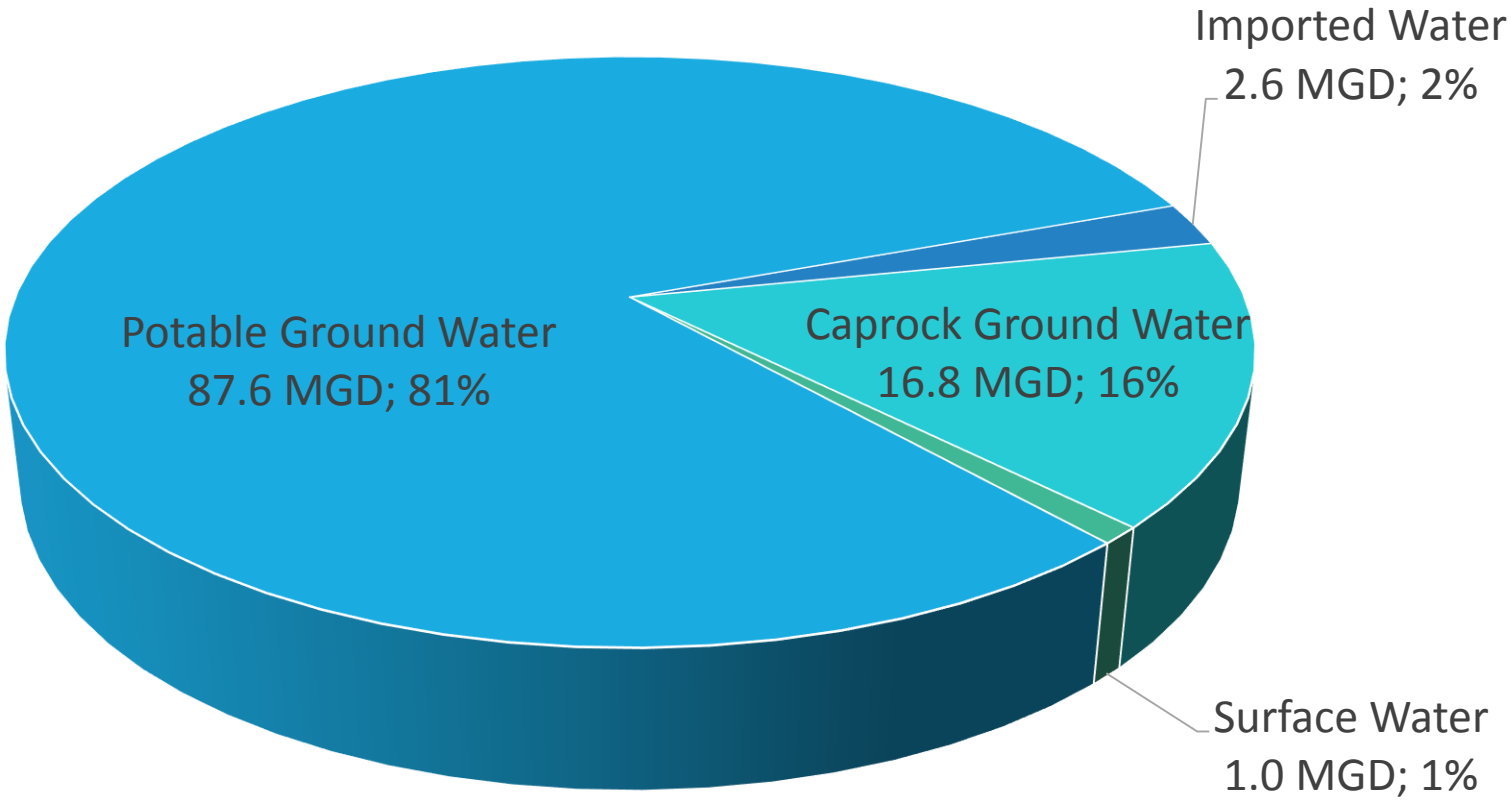
- 0.3 MGD (caprock)
- 0.2 MGD (surface water)

2010 PUC Water Demand by Use Category

Water Use Category	2010 Water Demand (MGD)	Percentage
Domestic Residential	54.4	50%
Domestic Non-Residential	34.4	32%
Agriculture	0.04	0%
Industrial	8.2	8%
Irrigation	10.9	10%
Other	0.5	0%
TOTAL	**108.5**	**100%**

Note: Slight discrepancies in totals are due to differences in rounding and/or data source

2010 PUC Water Sources



Note: Slight discrepancies in totals are due to differences in rounding and/or data source

PUC Water Demand Projections

Why project future water demand?

- To determine how much and when water may be needed in the future
- To indicate when increased demands might require infrastructure upgrades
- To provide guidance for responsible land and water use decisions

PUC Water Demand Projections

Three Scenarios for the Year 2040

- Low demand (most probable)
- Mid demand
- High demand

One Scenario for the Year 2100

- "Ultimate" demand

PUC Water Demand Draft Scenario: Low/Most Probable Demand (2040)

Scenario	Description	BWS-Served Pop. Change from 2010
Low Demand (2040)	• City population projection based on General Plan and PUC Development Plan. • BWS implements significant water conservation measures, resulting in a lower per capita water demand for existing and future users.	+ 28,500

PUC Water Demand Draft Scenario: Mid Demand (2040)

Scenario	Description	BWS-Served Pop. Change from 2010
Mid Demand (2040)	• City population projection based on General Plan and PUC Development Plan. • Only the incremental increase in the BWS-served population reduces per capita water demand; existing population's per capita demand remains at 2010 levels.	+ 28,500

PUC Water Demand Draft Scenario: High Demand (2040)

Scenario	Description	BWS-Served Pop. Change from 2010
High Demand (2040)	• The Honolulu Rail has spurred Transit-Oriented Development, creating jobs and attractive neighborhoods to live/work/play for residents and visitors. The population has grown faster than projected. • Decreased rainfall due to climate change has caused a 24% increase in irrigation. • Only the incremental increase in the BWS-served population reduces per capita water demand; existing population's per capita demand remains at 2010 levels.	+ 82,800

PUC Water Demand Draft Scenario: Ultimate Demand (2100)

Scenario	Description	BWS-Served Pop. Change from 2010
Ultimate Demand (2100)	• Follows assumptions for 2040 "High Demand" scenario, however, the impacts of climate change become more severe after 2040. While the City has implemented some adaptation strategies, these impacts have slowed population growth and tourism by the end of the century. • Decreased rainfall due to climate change has caused a 32% increase in irrigation. • Only the incremental increase in the BWS-served population reduces per capita water demand; existing population's per capita demand remains at 2010 levels.	+ 114,400

Water Demand Projections by Use:

Honolulu Board of Water Supply

(Domestic Residential + Non-Residential)

Scenario	2040 BWS-Served Population (MGD)	Per Capita Demand (GPCD)	Projected Water Demand (MGD)
Existing (2010)	461,000	151 (actual)	69.5 (actual)
Low (2040)	489,500	140 (all pop.)	68.7
Mid (2040)	489,500	151/140 (existing/new pop.)	74.4
High (2040)	543,800	151/140 (existing/new pop.)	84.0*
Ultimate (2100)	575,400	151/140 (existing/new pop.)	88.4*

** Assumes increased irrigation due to climate change*

- DRAFT PROJECTIONS -

Water Demand Projections by Use:

Domestic Residential – Other
(Navy + Army)

Scenario	Basis	Projected Water Demand (MGD)
Existing (2010)	Reported water use	18.0
Low (2040)	No known changes	18.0
Mid (2040)	No known changes	18.0
High (2040)	No known changes; however, assumes increased irrigation due to climate change	18.6
Ultimate (2100)	No known changes; however, assumes increased irrigation due to climate change	18.8

- DRAFT PROJECTIONS -

Water Demand Projections by Use:

Domestic
Non-residential – Other
(e.g. schools, hospitals, etc.)

Scenario	Basis	Projected Water Demand (MGD)
Existing (2010)	Reported water use	1.4
Low (2040)	No known changes	1.4
Mid (2040)	No known changes	1.4
High (2040)	No known changes	1.4
Ultimate (2100)	No known changes	1.4

- DRAFT PROJECTIONS -

Water Demand Projections by Use:

Irrigation

(Landscaping + 4 Golf Courses*)

** Irrigation for other golf courses in the PUC is covered by other categories (BWS or Military systems)*

Scenario	Basis	Projected Water Demand (MGD)
Existing (2010)	Reported water use	10.9
Low (2040)	No known changes	10.9
Mid (2040)	No known changes	10.9
High (2040)	No known changes; however, assumes increased irrigation due to climate change	13.5
Ultimate (2100)	No known changes; however, assumes increased irrigation due to climate change	14.4

- DRAFT PROJECTIONS -

Water Demand Projections by Use:

Agriculture

Scenario	Basis	Projected Water Demand (MGD)
Existing (2010)	Reported water use	0.04
Low (2040)	No known changes	0.04
Mid (2040)	No known changes	0.04
High (2040)	No known changes; however, assumes increased irrigation due to climate change	0.05
Ultimate (2100)	No known changes; however, assumes increased irrigation due to climate change	0.06

- DRAFT PROJECTIONS -

Water Demand Projections by Use:

Industrial

Scenario	Basis	Projected Water Demand (MGD)
Existing (2010)	Reported water use	8.2
Low (2040)	No known changes	8.2
Mid (2040)	No known changes	8.2
High (2040)	No known changes	8.2
Ultimate (2100)	No known changes	8.2

- DRAFT PROJECTIONS -

Water Demand Projections by Use:

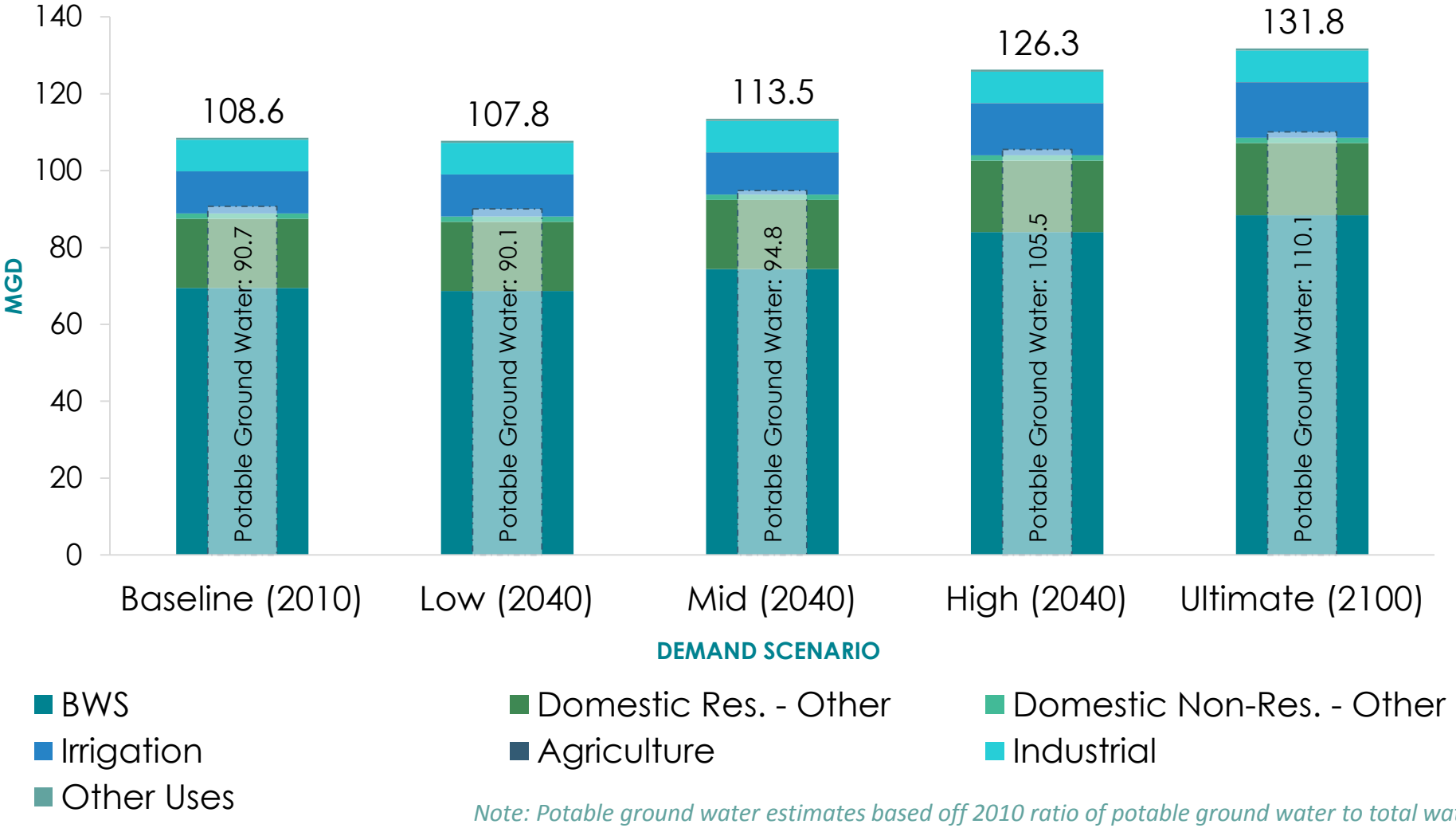
Other Uses

(Private uses, Honolulu Zoo, Waikīkī Aquarium, State DOT)

Scenario	Basis	Projected Water Demand (MGD)
Existing (2010)	Reported water use	0.5
Low (2040)	No known changes	0.5
Mid (2040)	No known changes	0.5
High (2040)	No known changes	0.5
Ultimate (2100)	No known changes	0.5

- DRAFT PROJECTIONS -

PUC Draft Total Water Demand Projections: Summary



Note: Potable ground water estimates based off 2010 ratio of potable ground water to total water

Potable Ground Water Supply

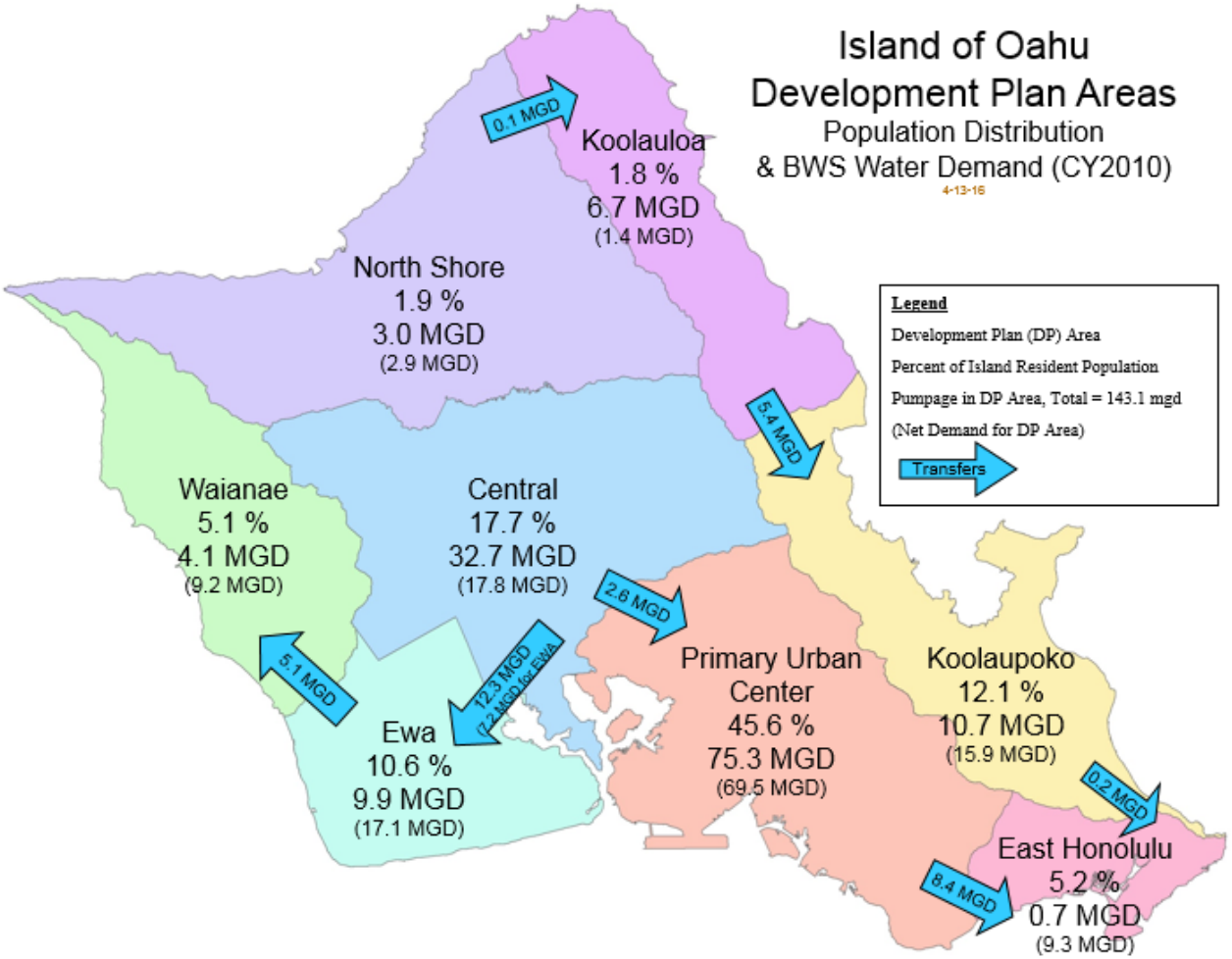
	SUSTAINABLE YIELD (MGD)
PEARL HARBOR SECTOR AREA	
Waipahu-Waiawa (only partially in PUC)	104
Waimalu	45
TOTAL	**149**
HONOLULU SECTOR AREA	
Moanalua	16
Kalihi	9
Nu‘uanu	14
Palolo	5
Wai‘alae-West (only partially in PUC)	4
TOTAL	**48**
GRAND TOTAL	**197**

Total Sustainable Yield:
197 MGD

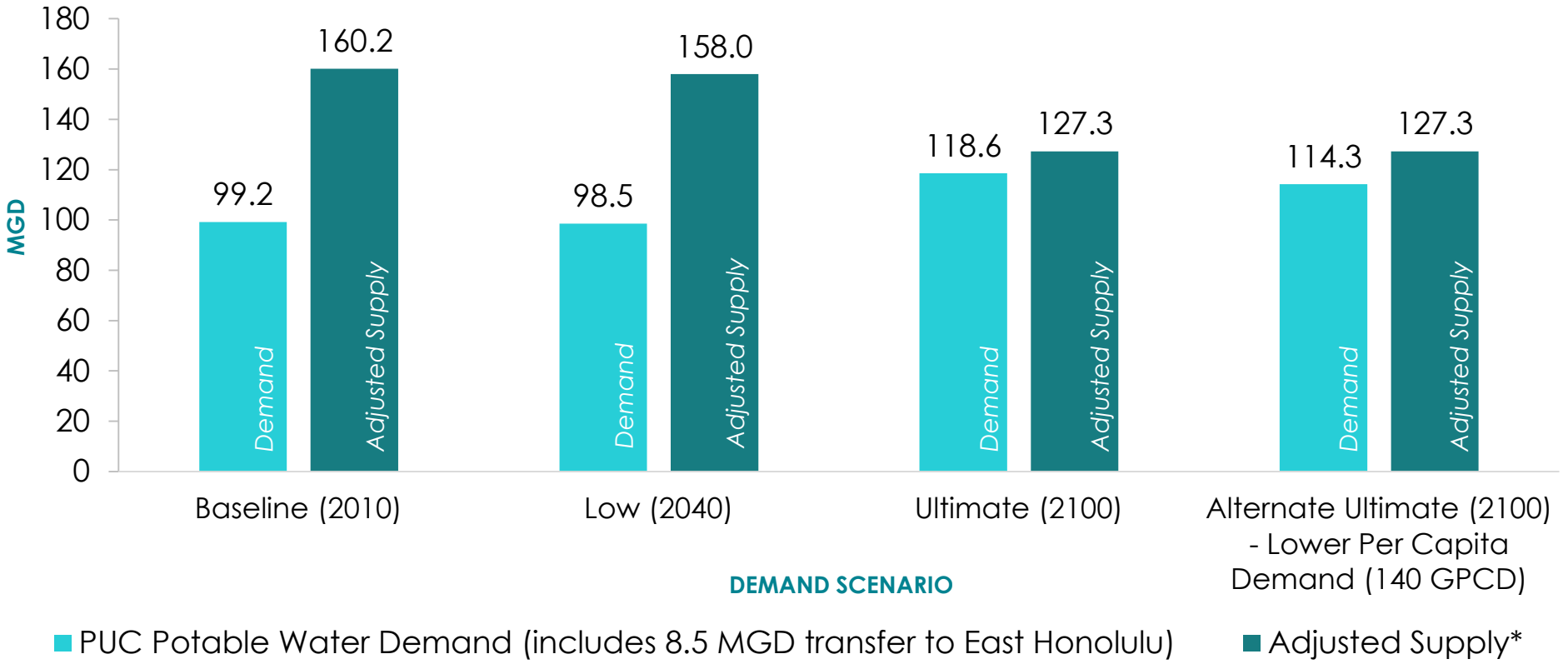
Important Considerations:

- The Waipahu-Waiawa and Wai‘alae-West aquifers are only partially in the PUC
- An “adjusted supply” for the PUC can be estimated by accounting for the projected water demands for adjacent areas

2010 BWS Water Transfers



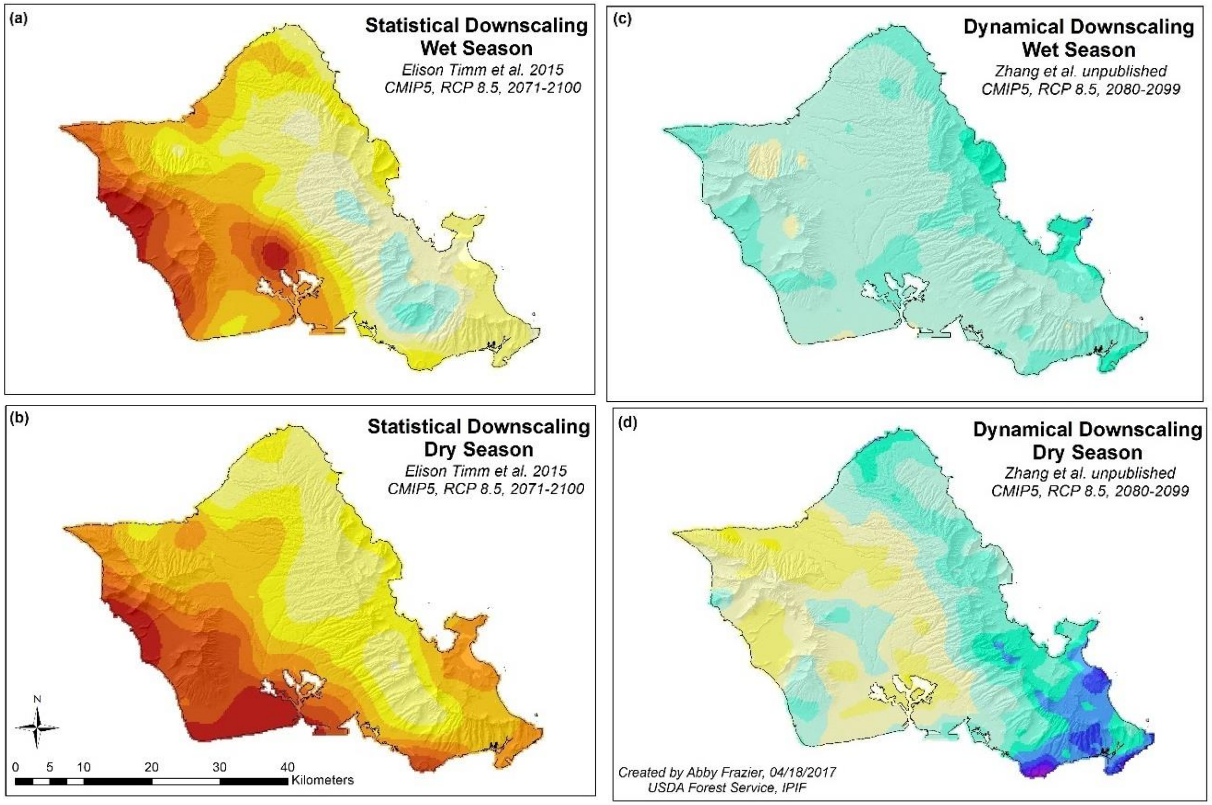
Potable Ground Water:
Comparison of Supply to Projected Demand



** Adjusted Supply = Total Sustainable Yield (197 MGD) MINUS draft Central O'ahu demand projections and exports to 'Ewa and Wai'anae (Waipahu-Waiawa Aquifer is shared by both areas)*

Climate Change Projections & Future Water Supply/Demand

Climate Change - Rainfall Projections



- "High" and "Ultimate" demand projections for the PUC included the **most severe** modeling projections
  - 24% and 32% decrease in rainfall in the dry season by 2040 and 2100, respectively

Implications for Water Demand and Supply Planning

Important Factors

- 61 MGD of ground water is available for future use (based on 2010 "adjusted supply")
- Increasing population
- Increasing tourism
- Increasing water demand due to climate change (reduced rainfall)
- Decreasing water supply due to climate change (reduced rainfall)

Water Planning Objectives

- Promote sustainable watersheds
- Protect & enhance water quality/quantity
- Protect native Hawaiian rights/traditional & customary practices
- Meet future demands at reasonable costs
- Facilitate public participation, education, & project implementation

Strategies

- Increased water efficiency
  - Reduce water use through demand-side conservation
  - Possible plumbing code updates
  - Leak detection and repair
- Storm water capture
- Recycled water
- Water transfers

Next Steps: PUC WMP Schedule

Year	2016		2017				2018				2019		
Quarter	3	4	1	2	3	4	1	2	3	4	1	2	3
Stakeholder Consultation													
Watershed Profile				★									
Water Demand Analysis							★						
Projects and Strategies									★				
Implementation Plan													
Public Review Draft										★			
Approvals Process													

★ = Community Meetings

PRIMARY URBAN CENTER DEVELOPMENT PLAN UPDATE (PUC DP)

The Primary Urban Center stretches from Kahala to Pearl City and is the State's most populated area. We want to hear from you to create a vision for our region's future! Visit the project website to stay informed, participate in a survey (Spring 2018), and sign up to be notified of public meetings and events.

O'AHU'S GATHERING PLACE

www.pucdp.com

CITY AND COUNTY OF HONOLULU · STATE OF HAWAII

QUESTIONS?

Board of Water Supply

Barry Usagawa

808-748-5900

busagawa@hbws.org

TOWNSCAPE INC

Bruce Tsuchida

808-550-3891

bruce@townscapeinc.com

For more information, please visit:
http://www.boardofwatersupply.com/water-resources/watershed-management-plan/primary-urban-center-plan