East Honolulu Watershed Management Plan (EHWMP)

A holistic ahupua`a and community-based water management plan

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HWWA Conference, October 16, 2025

Honolulu Board of Water Supply

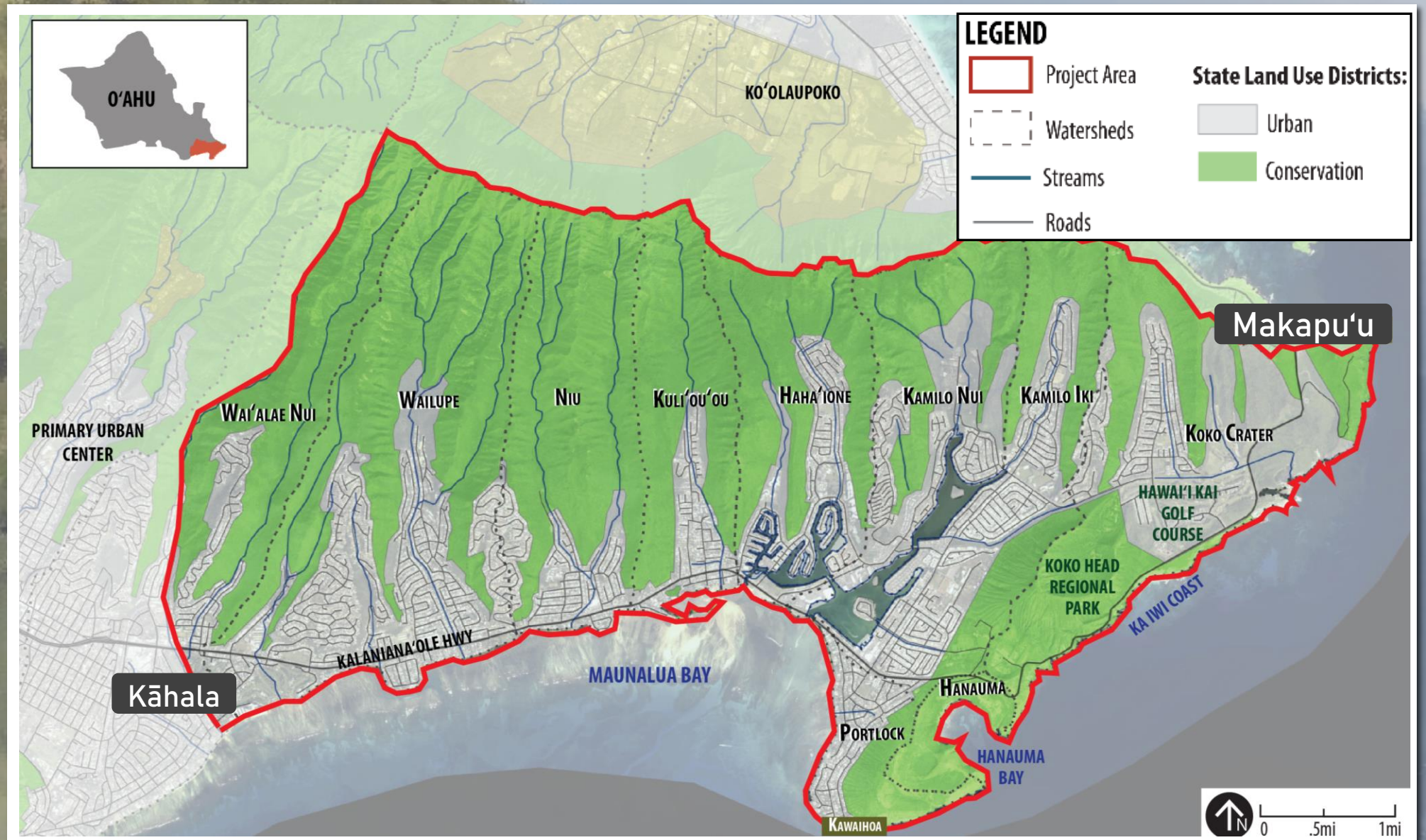
SSFM International

Presentation Agenda

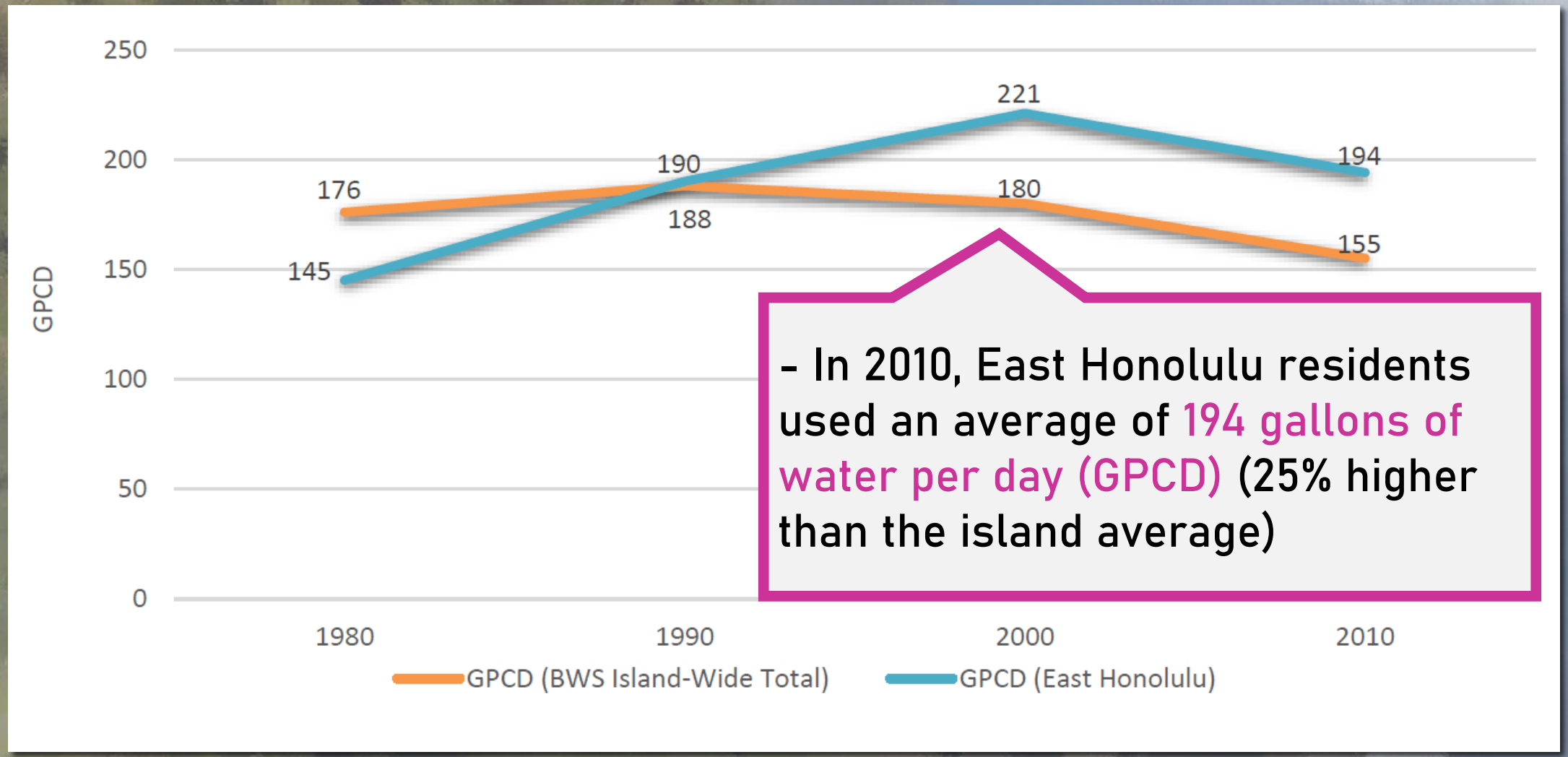
1. EHWMP Overview
2. Planning Process
3. Plan Framework
4. Takeaways and Best Practices
5. Q&A

EHWMP Overview

East Honolulu Planning District Kāhala to Makapu‘u

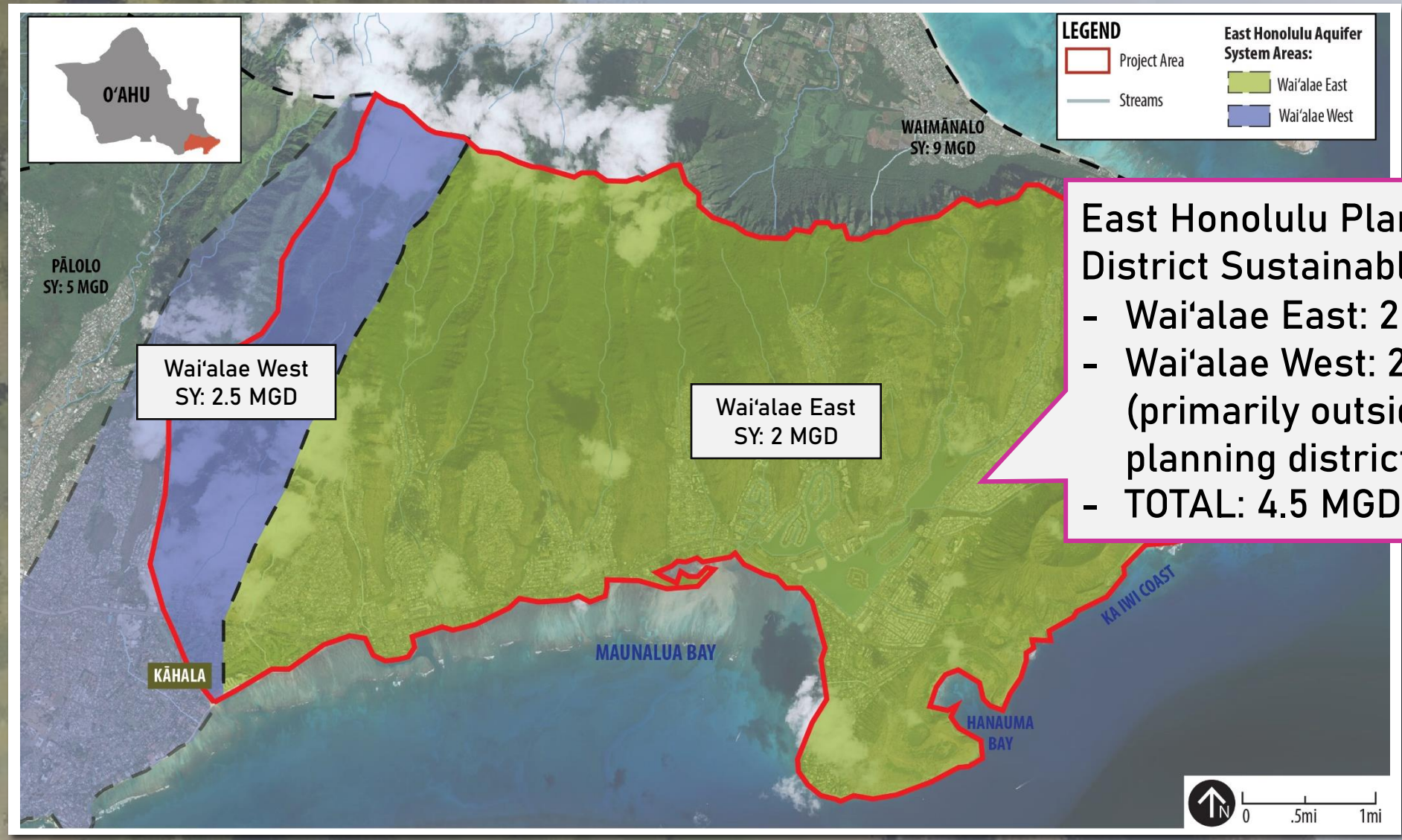


Historical Per Capita Water Demand



- In 2010, East Honolulu residents used an average of 194 gallons of water per day (GPCD) (25% higher than the island average)

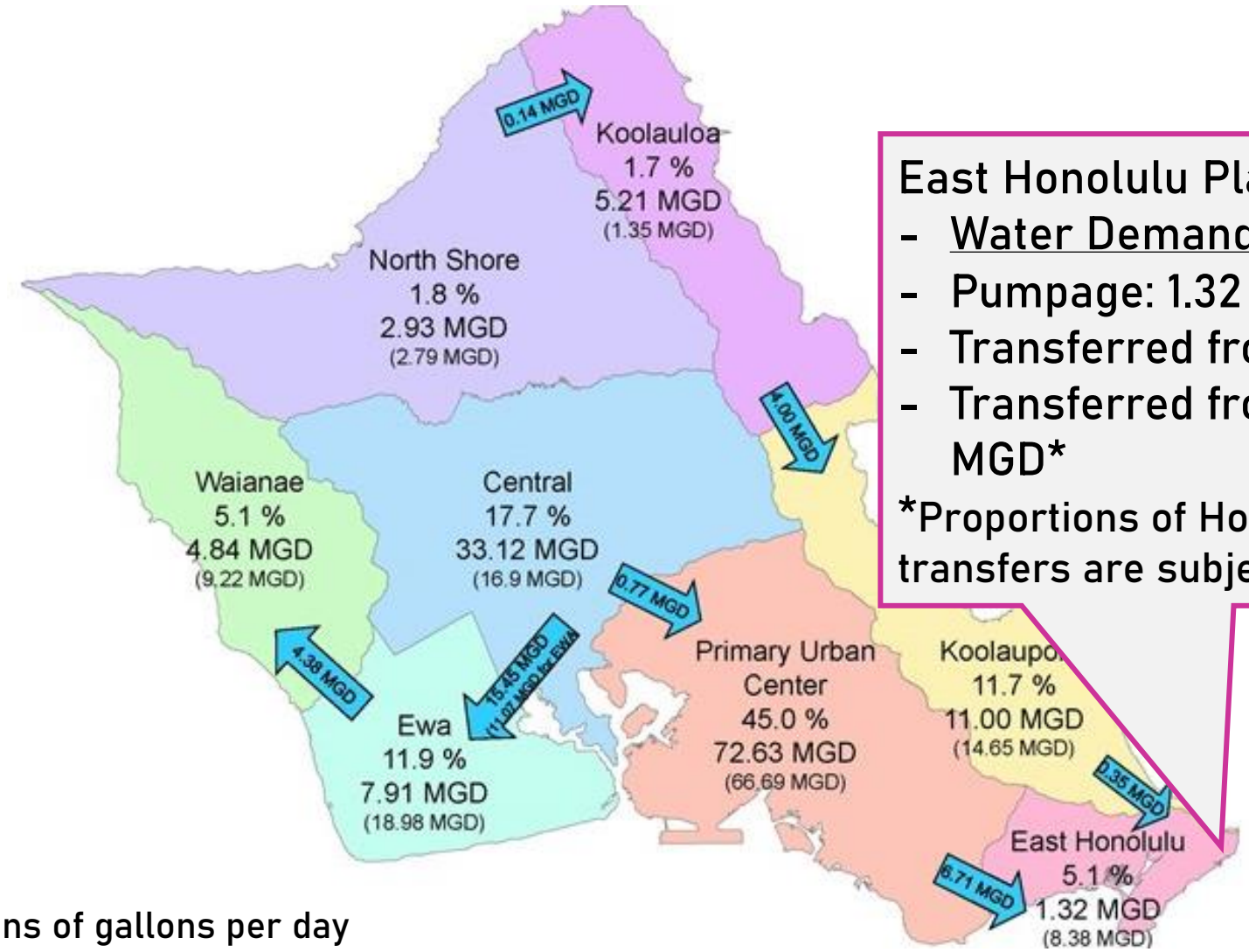
East Honolulu Groundwater System Areas



East Honolulu Planning District Sustainable Yield:

- Wai'alae East: 2 MGD
- Wai'alae West: 2.5 MGD (primarily outside of the planning district)
- TOTAL: 4.5 MGD

BWS Water Transfer Map
(2013-2017 average)



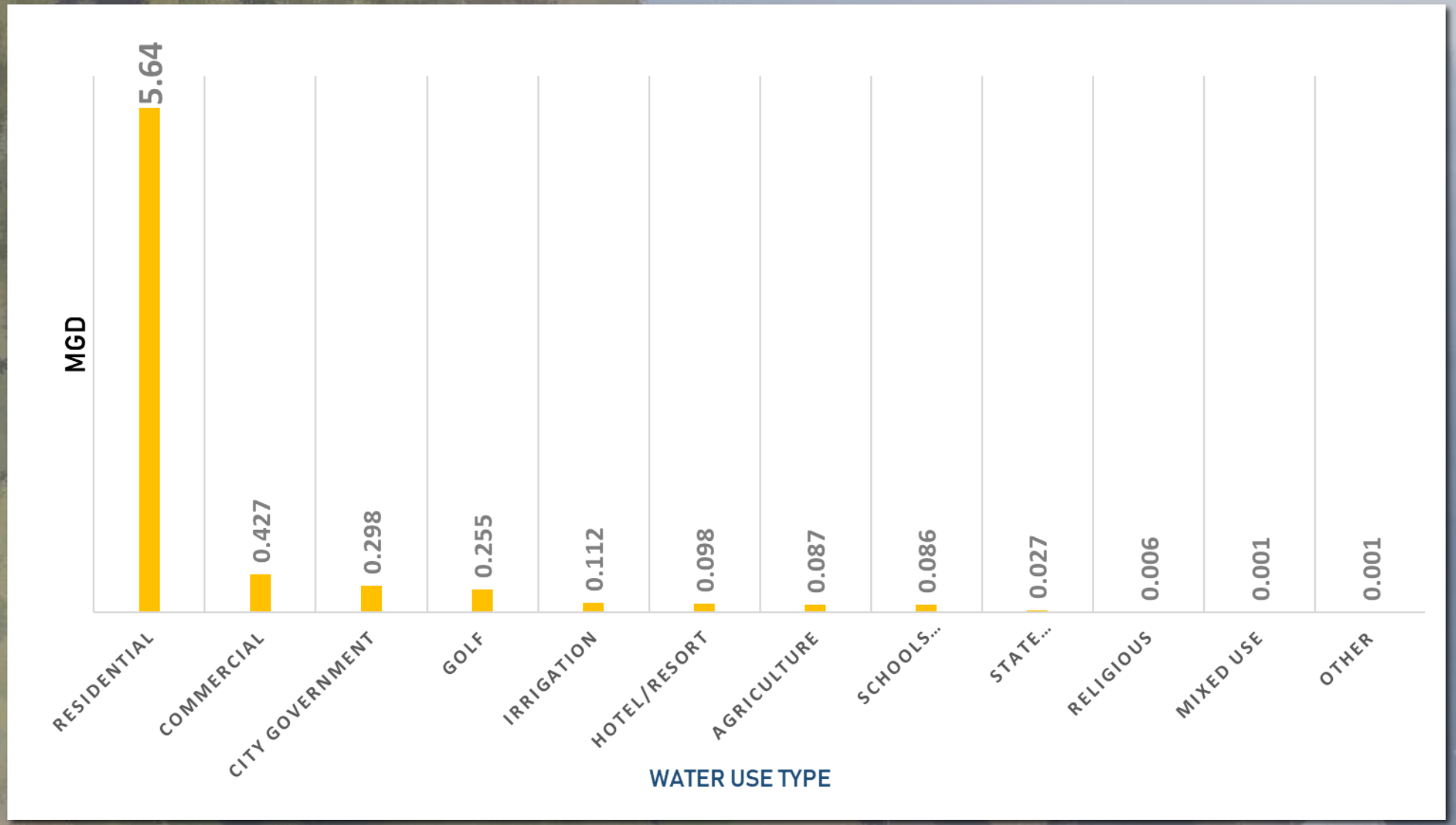
East Honolulu Planning District:

- <u>Water Demand: 8.38 MGD</u>
- Pumpage: 1.32 MGD
- Transferred from PUC: 6.71 MGD*
- Transferred from Windward: 0.35 MGD*

*Proportions of Honolulu and Windward transfers are subject to change

mgd= millions of gallons per day

BWS Potable Water Demand by Use Type (2013-2017 Average in MGD)



East Honolulu's Shared Water Kuleana

Issues

East Honolulu relies on Honolulu and Windward water sources

Water transfers can be impacted by drought and contamination, etc.

Ko'olau Poko has dike aquifers which are more vulnerable to drought

Transfers can be detrimental to Windward's streams and cultural uses

Kuleana

Responsibly to use transferred water efficiently

EHWMP Goal & Objectives

GOAL

Develop a holistic WMP that will provide a balance between: 1) the preservation, restoration, and management of O'ahu's watersheds; and 2) sustainable ground water and surface water use and development to serve present users and future generations.

OBJECTIVES

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

OWMP Framework

STATE WATER CODE

O‘AHU GENERAL PLAN

Legal/ Regulatory/Policy Guidance

HAWAI‘I WATER PLAN

- Statewide Framework to Update HWP
- Water Resource Protection Plan
- Water Quality Plan
- State Water Projects Plan
- Agricultural Water Use and Development Plan
- County Water Use and Development Plans

8 Development Plan (DP)/ Sustainable Communities Plan (SCP)

- Act 152: Watershed Protection
- Waiāhole Ditch Decision
- Ch 30, ROH Water Management
- BWS Mission Ka Wai Ola
- Mayor’s Climate Change & Sea Level Rise Directive 2018
- Ola O’ahu Resilience Strategy

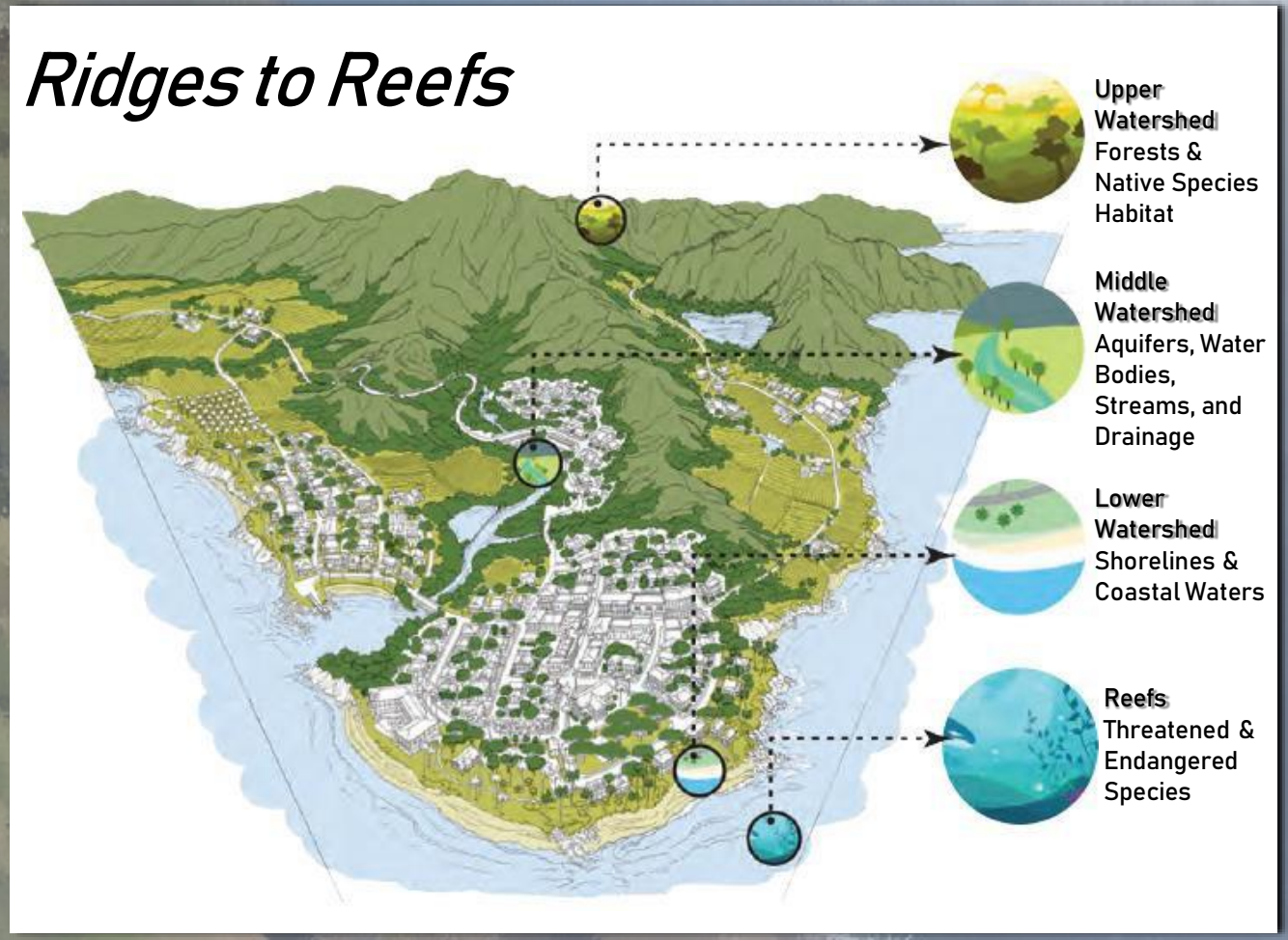
O‘AHU WATER MANAGEMENT PLAN (BY DP/SCP DISTRICT)

- Wai‘anae
- Ko‘olau Loa
- Ko‘olau Poko
- North Shore
- ‘Ewa
- Central O‘ahu
- PUC
- EAST HONOLULU

Ahupua‘a Model

Planning concept based on Native Hawaiian ahupua‘a model (systems-thinking), emphasizing:

- Watershed health
- Holistic resource management
- Self-sufficient and sustainable communities
- Inter-relationship of mauka and makai resources
- Stewardship and kuleana of land, water, people & culture



Emphasis on Cultural Resources and Traditional and Customary Practices

- Mauka to makai watershed management
- Preliminary Ka Pa‘akai Analysis

Planning Process

EHWMP Planning Process

Research & Identify Key Water Resource Issues

↓

Preliminary Watershed Analysis &
Water Demand Forecasting

↓

Water Supply Options & Watershed
Management Policies, Projects & Strategies

↓

Agency Review & Public Review Draft EHWMP

↓

Final Draft EHWMP & Adoption Process

Community Meeting #1

Community Meeting #2

Community Meeting #3

Community Meeting #4

CWRM Public Hearing

Stakeholder Consultations

EHWMP Schedule

Community Meeting

	2019				2020				2021				2022				2023				2024		
Year Quarter	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3
Stakeholder Consultation																							
Watershed Profile																							
Water Demand Analysis																							
Projects & Strategies																							
Implementation Plan																							
Agency Review & Public Review Drafts																							
Final EHWMP & Approvals Process																							

East Honolulu Stakeholder Outreach

26 Stakeholder Consultations + **12** Neighborhood Board Presentations + **5** Community Meetings + **4** City Council Hearings

<u>Community Organizations:</u>

- Kaiwi Maunalua Watershed Hui
- Livable Hawai'i Kai Hui
- Aloha ' Āina O Kamilo Nui
- Mālama Maunalua Bay
- Hui o Ko`olaupoko
- UH Sea Grant
- Ka Iwi Coast Coalition
- Maunalua Fishpond Heritage Center
- Roth Ecological
- Sierra Club
- WAI
- Kamehameha Schools
- Kamilo Nui Farmers

<u>Agencies:</u>

- CCH Office of Climate Change, Sustainability & Resiliency
- CCH Dept. of Facilities Maintenace
- DLNR Division of Forestry & Wildlife
- DLNR Nā Ala Hele Program
- Koʻolau Mountains Watershed Partnership
- DLNR Commission on Water Resource Management

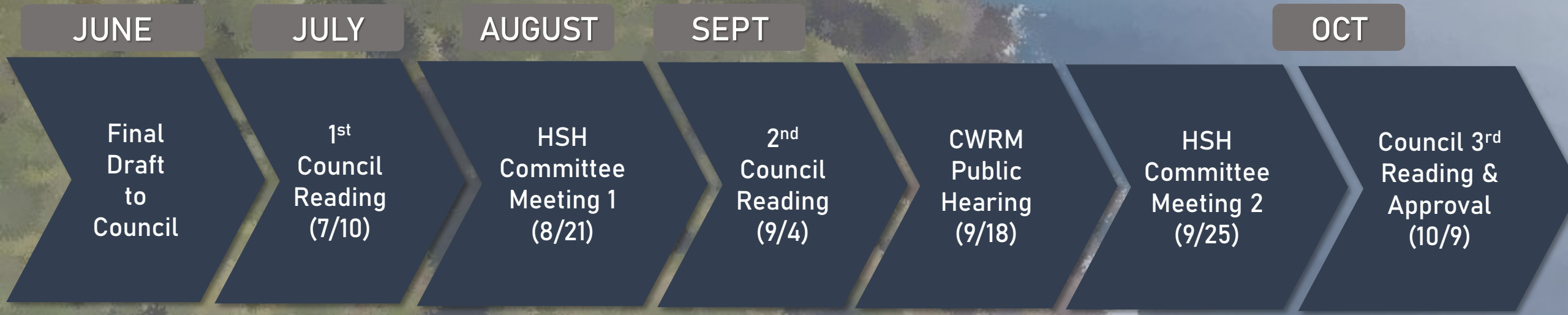
<u>Neighborhood Boards / Elected Officials:</u>

- Hawai'i Kai (NB Distict #1)
- Kuliʻouʻou-Kalani Iki (NB District 2)
- Waiʻalae-Kāhala (NB District #3)
- Stanley Chang (Senate District #9)
- Gene Ward (Senate District #17)
- Mark Hashem (Rep. District #18)
- City Councilmember Tommy Waters

Neighborhood Board Presentations & Endorsement of Final Draft (Feb–May 2024)

- **Hawai‘i Kai Neighborhood Board No. 1:**
  - February 2024: Unanimous endorsement
- **Kuli‘ou‘ou-Kalani Iki Neighborhood Board No. 2:**
  - May 2024: 7 votes in favor, 2 against
- **Wai‘alae-Kāhala Neighborhood Board No. 3:**
  - May 2024: 4 votes in favor, 4 abstained

Adoption Timeline (2024)



Transparency & Responsiveness to Community Input

PUBLIC REVIEW DRAFT – JANUARY 2024
(43 comments tabulated):

- Updated data, project information, and references where appropriate
  - Preliminary census data incorporated into water demand analysis
- Referenced additional community watershed projects provided by the Maunalua Ka Iwi Watershed Hui
- Updated place name references where appropriate
- Emphasized that Ka Paʻakai Analysis for projects was preliminary and may require further study

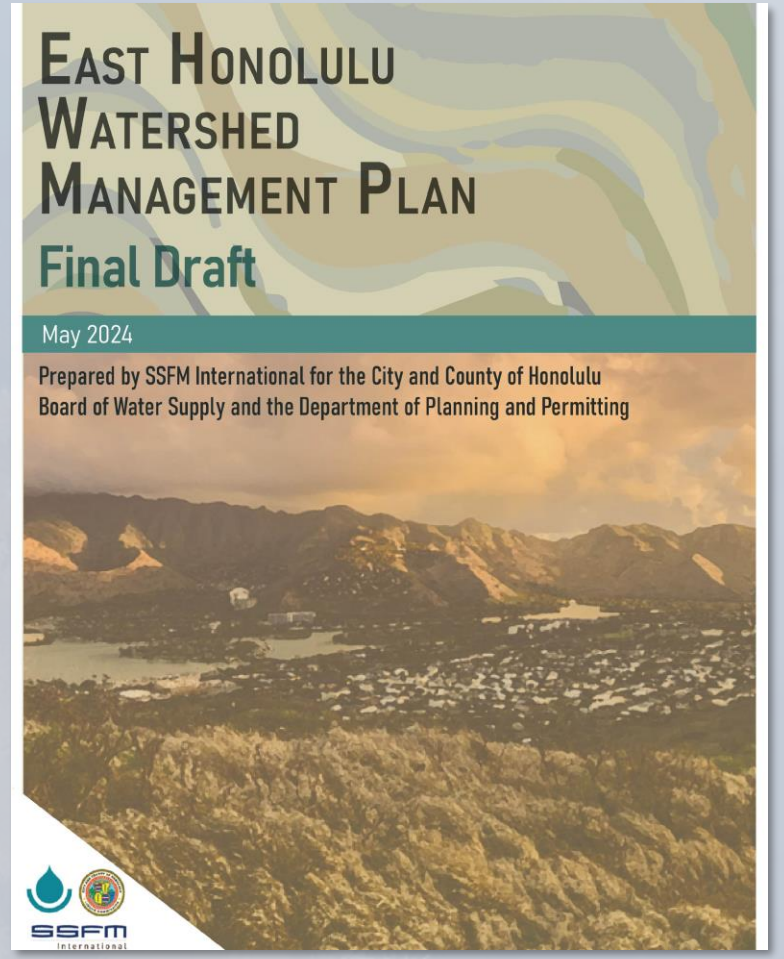
FINAL DRAFT TO COUNCIL – MAY 2024
(28 comments tabulated):

- Revisions to ahupuaʻa maps and boundaries to match updated State GIS ahupuaʻa layer
- Incorporated updates to Mālama Maunalua priority project
- Added references to Kamilo Nui Firewise
- Added project champions to project list
- Updated place name and organization names throughout
- Corrected tables/figures as applicable
- Added Paiko Ridge Preservation as Project #31

Plan Framework

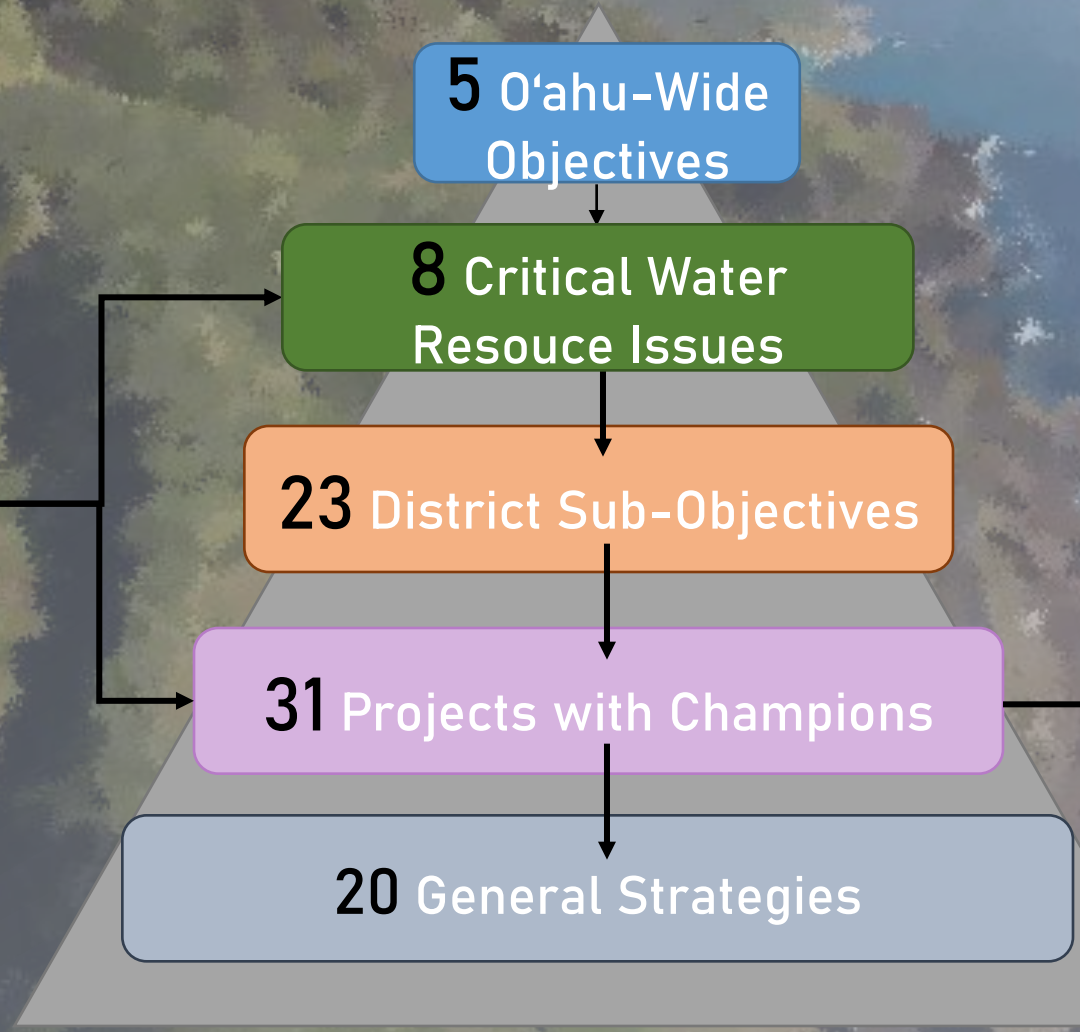
EHWMP Structure

- **Ch. 1:** O‘ahu-Wide Overview
- **Ch. 2:** East Honolulu Watershed Profile
- **Ch. 3:** East Honolulu Water Demand/Supply
- **Ch. 4:** Policies, Projects & Strategies
- **Ch. 5:** Implementation



EHWMP Framework

- Literature review
- Stakeholder consultations
- Community input
- Water demand analysis

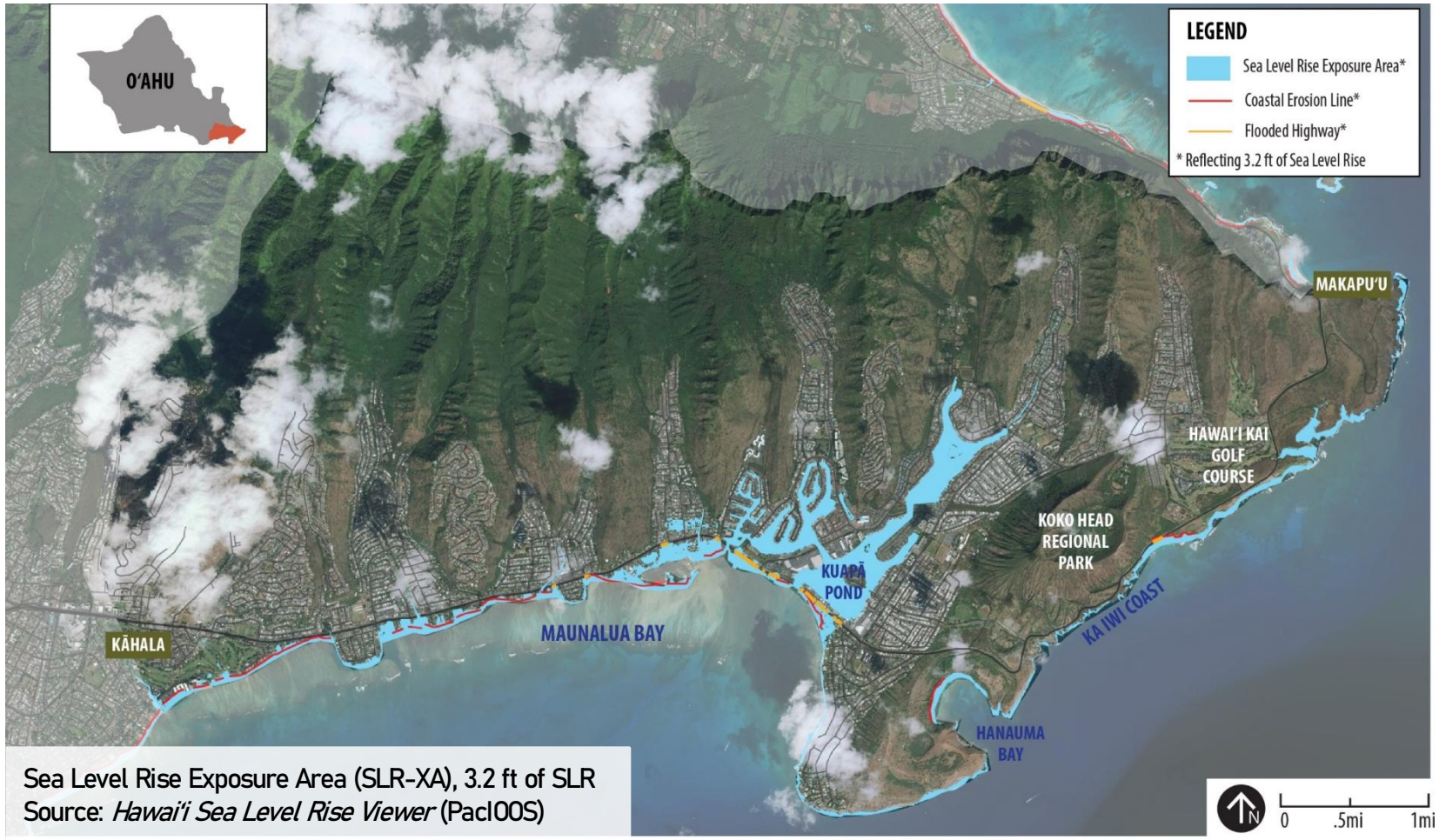


2 Catalyst Projects

East Honolulu Water Resource Issues & Concerns

- Climate Change
- Sea Level Rise
- Nearshore Water Quality
- Water Conservation Efforts
- Maintaining Traditional & Customary Practices
- Flooding & Drainage
- Access to Mauka & Makai Areas
- Wildfires

Sea Level Rise Impacts



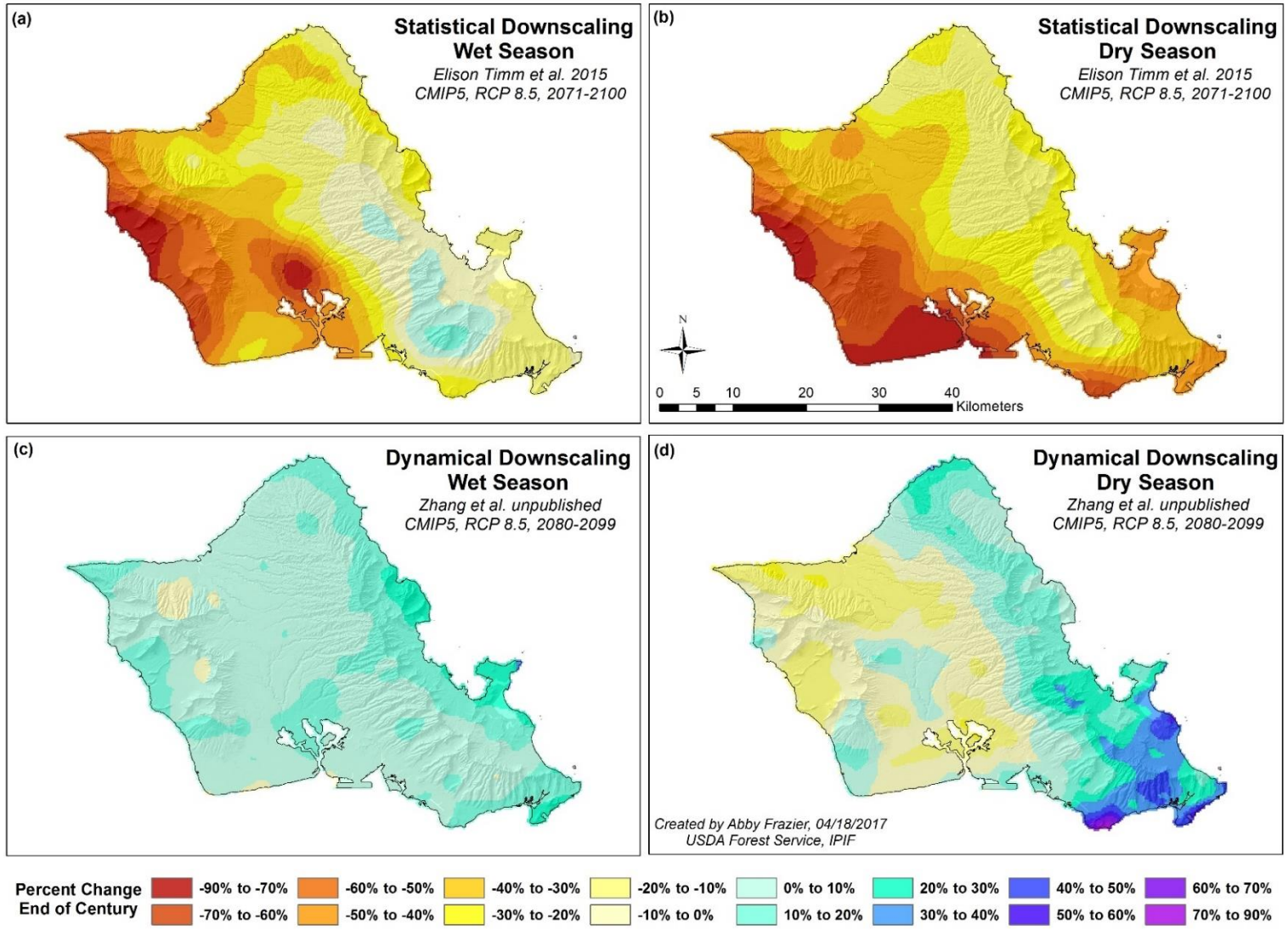
Sea Level Rise Exposure Area (SLR-XA), 3.2 ft of SLR
Source: *Hawai'i Sea Level Rise Viewer* (PacIOOS)

Ultimate Demand Scenarios accounts for 3.2 ft or more of sea level rise

Ultimate Rainfall Scenarios

Drier = "Worst Case"

Wetter = "Best Case"



The Ultimate Scenario accounts for differences in the "Dry" and "Wet" rainfall scenarios– the dry scenario incorporates increased irrigation demand

East Honolulu Future Water Demand Projections

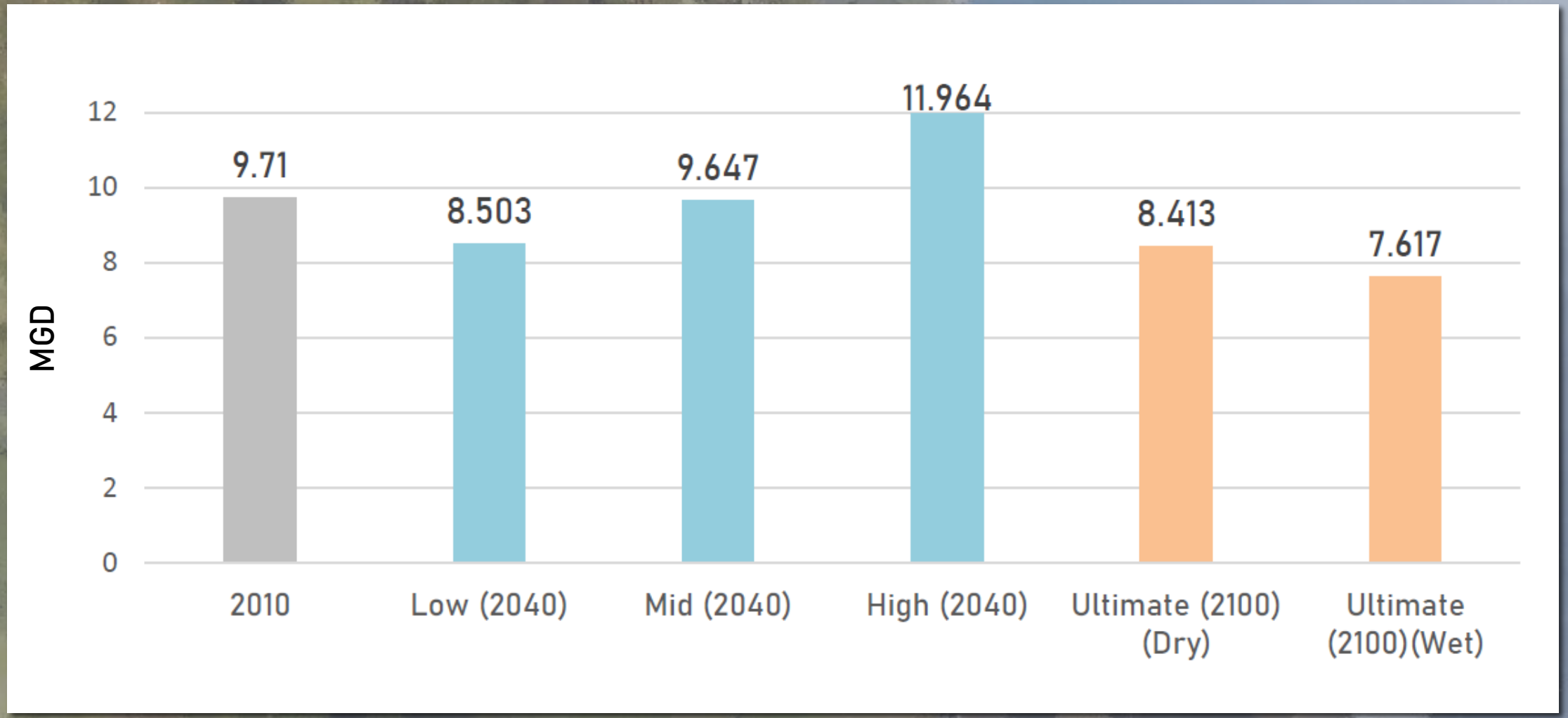
Three Scenarios for the Year 2040

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

One Scenario for the Year 2100

- "Ultimate" Demand
  - "Dry" Rainfall Scenario
  - "Wet" Rainfall Scenario

Total Future Water Demand by Scenario (MGD)



Water Source Adequacy

2040

- Low ("Most Probable") Demand Scenario – existing water supply is adequate
- Mid- and High-Demand Scenarios – would require additional water resources / improved water efficiency

2100 Ultimate

- Wet Scenario - adequate water supply (anticipated)
- Dry Scenario - would require improved water efficiency

Example of District Sub-Objectives

1: Promote Sustainable Watersheds

1.1: Increase native reforestation and implement measures to slow the spread of invasive species and ungulates…

1.2: Implement preventative measures that reduce wildfire risks

1.5 Conserve natural shorelines to protect beaches and coastal ecosystems….

2: Protect and Enhance Water Quality and Quantity

2.1: Encourage the use of xeriscaping and other low impact development…

2.2: Improve the water quality of Maunalua Bay by capturing stormwater runoff…

2.5: Reduce ground water contamination through cesspool conversion…

3: Protect Native Hawaiian Rights and Traditional and Customary Practices

3.1: Restore fishponds and springs for cultural and educational use

3.3: Improve public shoreline access…

4: Facilitate Public Participation, Education and Project Implementation

4.2: Provide educational opportunities to learn about protecting and preserving water resources

4.3: Collaborate among government agencies, landowners, and other stakeholders to implement mutually beneficial projects….

5: Meet Public Water Demands at a Reasonable Cost

5.2: Adapt and plan for drought…

5.3: Implement conservation measures to improve water efficiency…

EHWMP Projects with Champions

#1 Kalauhaʻihaʻi Fishpond Restoration
#2 Wailupe Stream Restoration
#3 Kuliʻouʻou Watershed Retrofit
#4 Kamilo Nui Watershed Kipuka Reforestation
#5 Kamilo Nui Watershed Sustainable Agriculture Pilot Project
#6 Kamilo Nui Watershed Kuapā Pond Restoration
#7 Keawāwa Wetland & Hawea Heiau Restoration
#8 Ka Iwi Coast Mauka Lands Preservation
#9 Restoration of Upper Niu and Wailupe Watersheds
#10 Maunalua Kaiwi Watershed Hui
#11 Maunalua Watershed Talk Stories
#12 Mālama Maunalua Programs
#13 Coral Assisted Evolution Project
#14 Community Cleanups and Water Quality App
#15 Work-4-Water Initiative
#16 DFM Community Programs
#17 Low Impact Design and Green Infrastructure Standards and Guidelines
#18 Stormwater Utility Oʻahu
#19 Watershed Boulder Basins and Detention Basins
#20 Drainage System Upgrades
#21 Implement Mayor's Directive on Climate Change and Sea Level Rise
#22 Climate Change Sustainable Yield Scenarios
#23 Infrastructure Planning in the Sea Level Rise Exposure Area
#24 Oʻahu Climate Adaptation Strategy
#25 Wastewater Long Range Master Plans
#26 Drainage and Stormwater Master Plans
#27 BWS Long Range Water Master Plan and Infrastructure Renewal and Replacement Program
#28 BWS Water Conservation Incentives Program
#29 One Water Collaboration for Climate Resilience
#30 R-1 Recycled Water for Irrigation in Hawaiʻi Kai
#31 Ka Lapa O Maua (Paikō Ridge) Preservation

EHWMP General Strategies & Programs

A: Southern Koʻolau Mountains Native Species Reforestation Program
B: Stream Restoration, Dechannelization & Maintenance
C: Stream Debris Educational Program
D: Coordinated Pig Hunting Program
E: Trail Educational Program
F: Trail Erosion Mitigation
G: Kuliʻouʻou Ridge Trail Entrance Improvements
H: Firebreak Program
I: Golf Course Xeriscaping and Water Efficiency Plan
J: Lateral Shoreline Access Plan
K: Awāwāmalu Access Improvements
L: Agricultural Water Use Plans
M: Grey Water Reuse Plan
N: Climate Adaptation Neighborhood Plans
O: Climate Change and Resilience Education
P: Restoration of Freshwater Spring Flows to Nearshore Coastal Waters
Q: Strengthen Building Codes and Standards for Building Resilience
R: Build Back Better and Smarter
S: Restrictions on Shoreline Armoring
T: Redevelopment District

Example of Issues – Policies – Projects Relationship

District Issues & Values	District Sub-Objective	Projects with Champions	General Strategies
OBJECTIVE #2: PROTECT AND ENHANCE WATER QUALITY AND QUANTITY		(O'ahu-Wide Objective)	
Issue: Irrigation is a large contributor to water demand for single-family home development, particularly in East Honolulu, which has a relatively dry climate.	**2.1:** Encourage the use of xeriscaping and other low impact development strategies to reduce irrigation water demand from current aquifer sources and mitigate flooding impacts, with a focus on large landscaped areas such as parks, schools, golf courses, roadway landscaping, farms and large residential lots.	**#17:** Low Impact Design and Green Infrastructure Standards and Guidelines **#30:** Develop R-1 Recycled Water for Irrigation Users in Hawai'i Kai	**L:** Agricultural Water Use Plans **I:** Golf Course Xeriscaping and Water Efficiency Plan **M:** Grey Water Reuse Plan
Value: Water quality of Maunalua Bay was one of the most discussed water resource issues among residents. **Issue:** Maunalua Bay is considered an impaired water body; stormwater contributes to the degraded quality of the Bay.	**2.2:** Improve the water quality of Maunalua Bay by capturing and infiltrating stormwater runoff and reducing the transfer of sediment and other pollutants from mauka areas to the Bay.	**#2:** Wailupe Stream Restoration **#3:** Kuli'ou'ou Watershed Retention and Infiltration Retrofit **#4:** Kamilo Nui Watershed Kipuka Reforestation **#5:** Kamilo Nui Watershed Sustainable Agriculture Pilot Project **#6:** Kamilo Nui Watershed Kuapā Pond Restoration **#11:** Restoration of Upper Niu and Wailupe Watersheds **#12:** Mālama Maunalua Programs **#16:** DFM Community Programs **#17:** Low Impact Design and Green Infrastructure Standards and Guidelines **#18:** Stormwater Utility O'ahu **#19:** Watershed Boulder Basins and Detention Basins **#20:** Drainage System Upgrades **#26:** Drainage and Stormwater Master Plans **#29:** One Water Collaboration for Climate Resilience **#31:** Ka Lapa O Maua (Paikō Ridge) Preservation	**A:** Southern Ko'olau Mountains Native Species Reforestation **D:** Coordinated Pig Hunting Program **C:** Stream Debris Educational Program **E:** Trail Education Program **F:** Trail Erosion Mitigation **G:** Kuli'ou'ou Ridge Trail Entrance Improvements

EHWMP Catalyst Projects

- **Catalyst Project #1:** Improve water quality in Maunalua Bay
  - Priority watersheds for implementation: 1) Wailupe 2) Niu 3) Kuli‘ou‘ou 4) Haha‘ione 5) Kamilo Nui and 6) Kamilo Iki

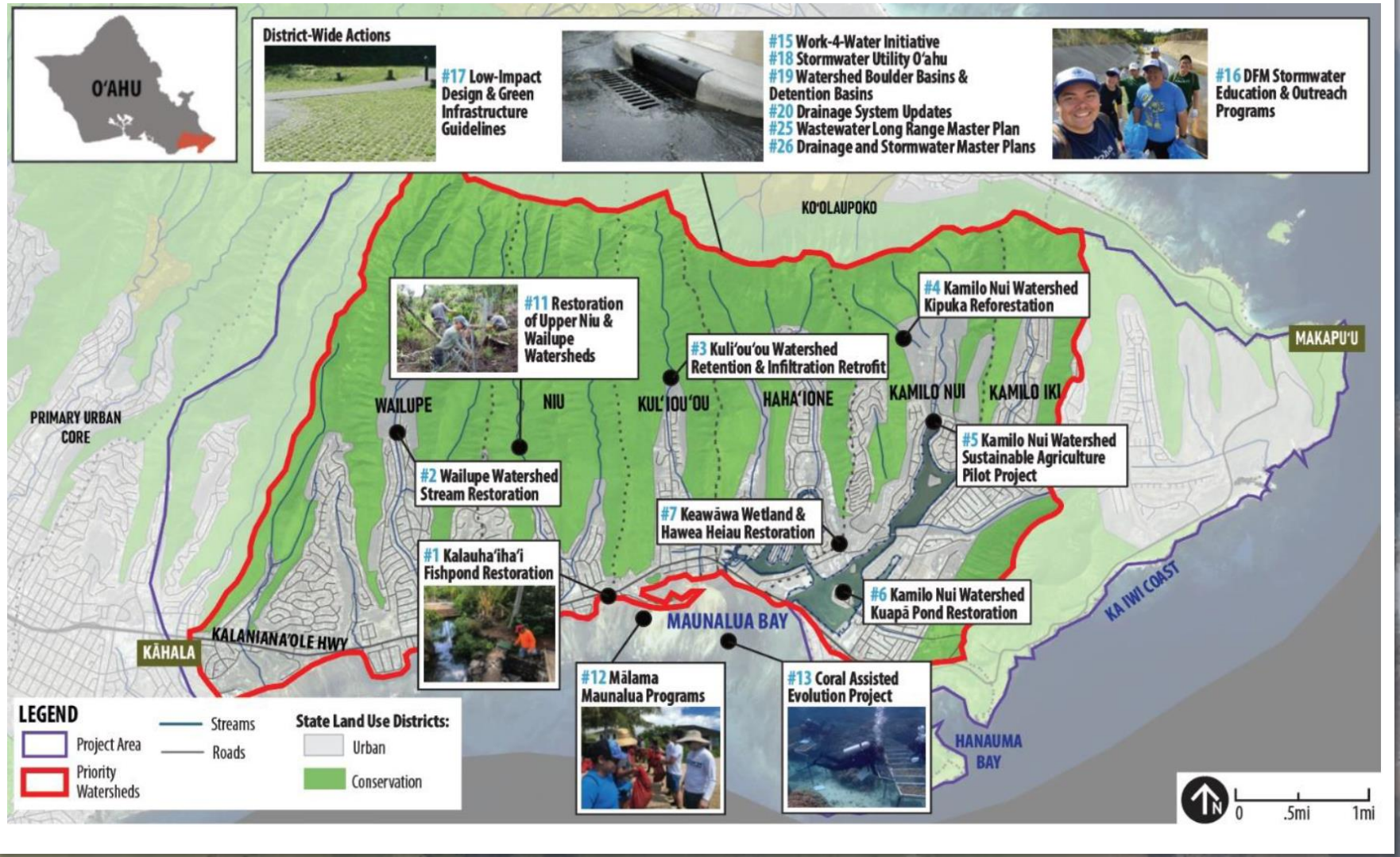
- **Catalyst Project #2:** Increase water efficiency in East Honolulu
  - District-wide implementation

Catalyst Project #1: Improve water quality in Maunalua Bay

Goals:

- #1: Reduce the amount of invasive algae found in the Bay.
- #2: Increase the amount of healthy, living coral reef in the Bay.
- #3: Decrease the amount of impervious surfaces within the priority watersheds.
- #4: Decrease the number of cesspools located within the priority watersheds.
- #5: Increase the amount of fresh water that enters the Bay through stormwater retention and water conservation.
- #6: Decrease the amount of stormwater runoff, erosion, and debris that enter the Bay.

Catalyst Project #1: Priority Watersheds & Key Actions



- Key actions within these watersheds are being prioritized as they represent the **highest pollution reduction benefits**
- Most site-specific actions have been previously identified by the **Maunalua Watershed Hui**

Catalyst Project #2: Increase water efficiency in East Honolulu

Goals:

- #1: Maintain East Honolulu's per capita water demand at 170 gallons per person per day (GPCD) through 2040.
- #2: Reduce per capita water demand to 130 GPCD by 2100.

Catalyst Project #2: Increase water efficiency in East Honolulu

District-Wide Key Actions:

Water Distributor

- BWS Infrastructure Renewal and Replacement Program (Project #27)

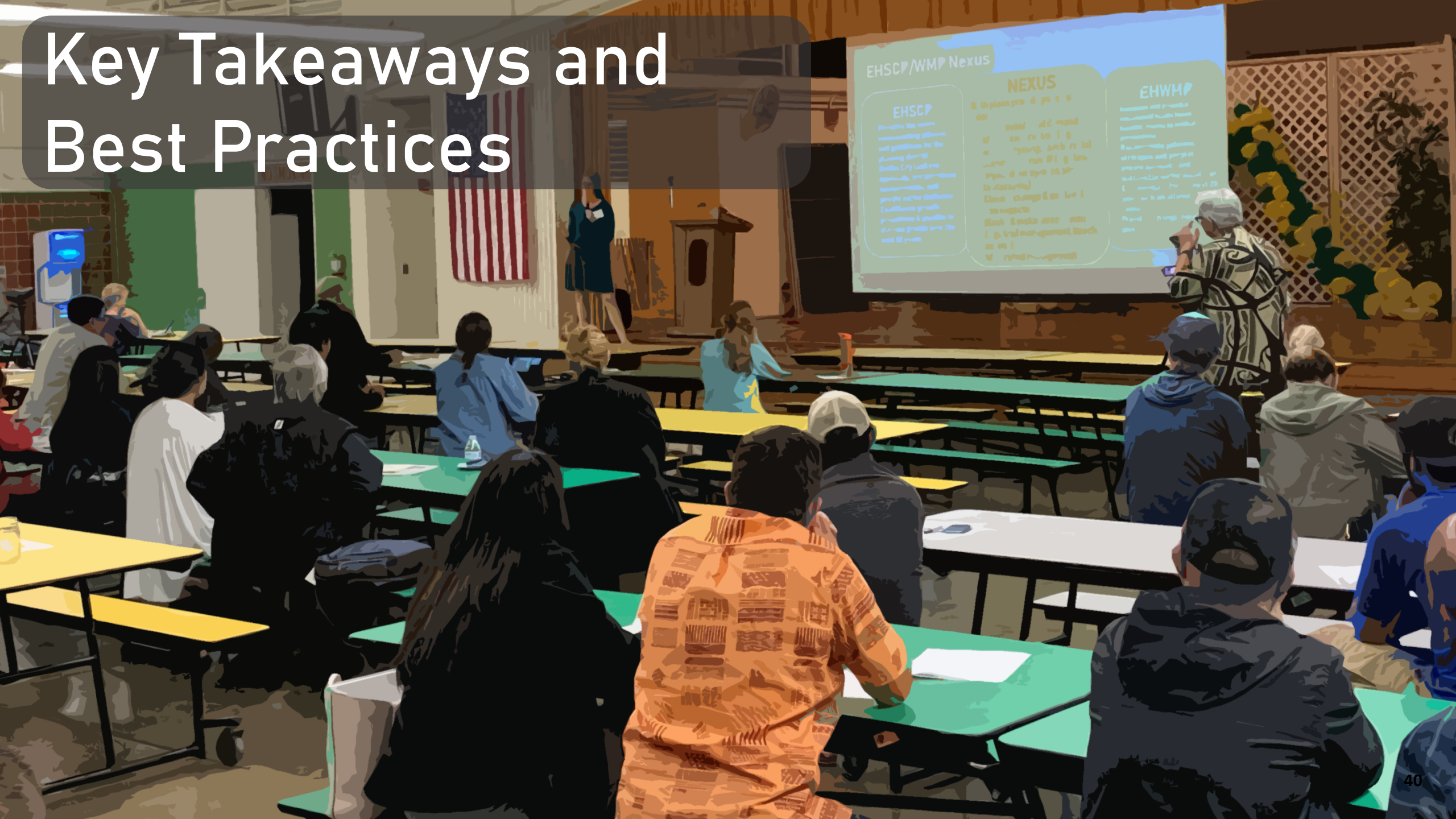
Water Users

- BWS Water Conservation Incentives Program (Project #28)
- Developing R-1 Recycled Water for Irrigation Users in Hawai‘i Kai (Project #30)

Example Implementation Framework for Catalyst Projects

Project with Champion or Strategy	Goals & Alignment with Improving Water Quality in Maunalua Bay	Existing or Potential Champions & Partners	Status	Estimated Project Costs	Target Implementation
Project #26: Drainage and Stormwater Master Plans	*Project Goal:* Implement DFM's *Stormwater Management Program Plan*, which increases resilience of the drainage system in accordance with the Mayor's Climate Change and sea level rise Directive 18-02. *Catalyst Project Alignment:* Drainage system improvements are needed to slow, capture, and filter stormwater runoff that enters Maunalua Bay.	CCH Department of Design and Construction (DDC) and DFM	*To Date:* The Storm Water Management Program Plan was finalized by DFM in September 2021. *Next Steps:* DFM to work with DCC and other partner agencies to implement the *Stormwater Management Program Plan.*	Unknown.	Ongoing Effort
SHORT-TERM (2-5 YEARS TARGET IMPLEMENTATION)					
Project #4: Kamilo Nui Watershed Kipuka Reforestation	*Project Goal:* Reforest the area near Kamilo Nui Farm with kipuka, to reseed and repopulate native plants in Kamilo Nui Valley. *Catalyst Project Alignment:* Enhanced vegetation cover and diversity surrounding Kuli'ou'ou Stream and Paikō lagoon will help prevent erosion and reduce stormwater entering Maunalua Bay.	Maunalua Watershed Hui	*To Date:* Field observations have been completed and stakeholders / potential contractors have identified by the Hui. *Next Steps:* The Hui to determine the number and size of kipuka areas, establish an agreement with the affected landowner(s), identify and obtain any required permits, and acquire funding for implementation.	Cost will be dependent upon the number and size of kipuka areas, as well as the agreement reached with the landowner(s).	2025

Key Takeaways and Best Practices



Key Takeaways

- Community involvement early and often is key
- Use data to support conversations about water use and management
- Leverage and support the work of existing community organizations
- Engage in two-way knowledge exchange with stakeholders
- Maximize transparency and access to the process (in person and online engagement, etc)

Best Practices for Watershed Planning

- Whole watershed approach informed by ahupua‘a concept of land and resource management
- Ongoing collaboration with key agencies: CWRM, DPP
- Alignment with key state/city plans
- Emphasis on preserving and restoring cultural resources, traditional and customary practices in projects and strategies
- Integration of climate change considerations and uncertainties around future rainfall/water supply into future scenarios
- Science-driven projects and strategies that support water quality/quantity as well as public access, restoration of cultural/natural resources, etc.

Mahalo!

Honolulu Board of Water Supply

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For more information, please visit:
http://www.boardofwatersupply.com/water-resources/watershedmanagement-plan/east-honolulu