

**KO'OLAU POKO
WATERSHED MANAGEMENT PLAN
O'AHU WATER MANAGEMENT PLAN**

**Commission on Water Resource Management
Status Briefing
November 16, 2011**

City and County of Honolulu
Department of Planning and Permitting
Board of Water Supply

Consultant:

 Townscape, Inc.



Presentation Outline

- Background
- OWMP Overview
- Island-Wide Summary
- Highlights of the Ko'olau Poko Watershed Management Plan



Background

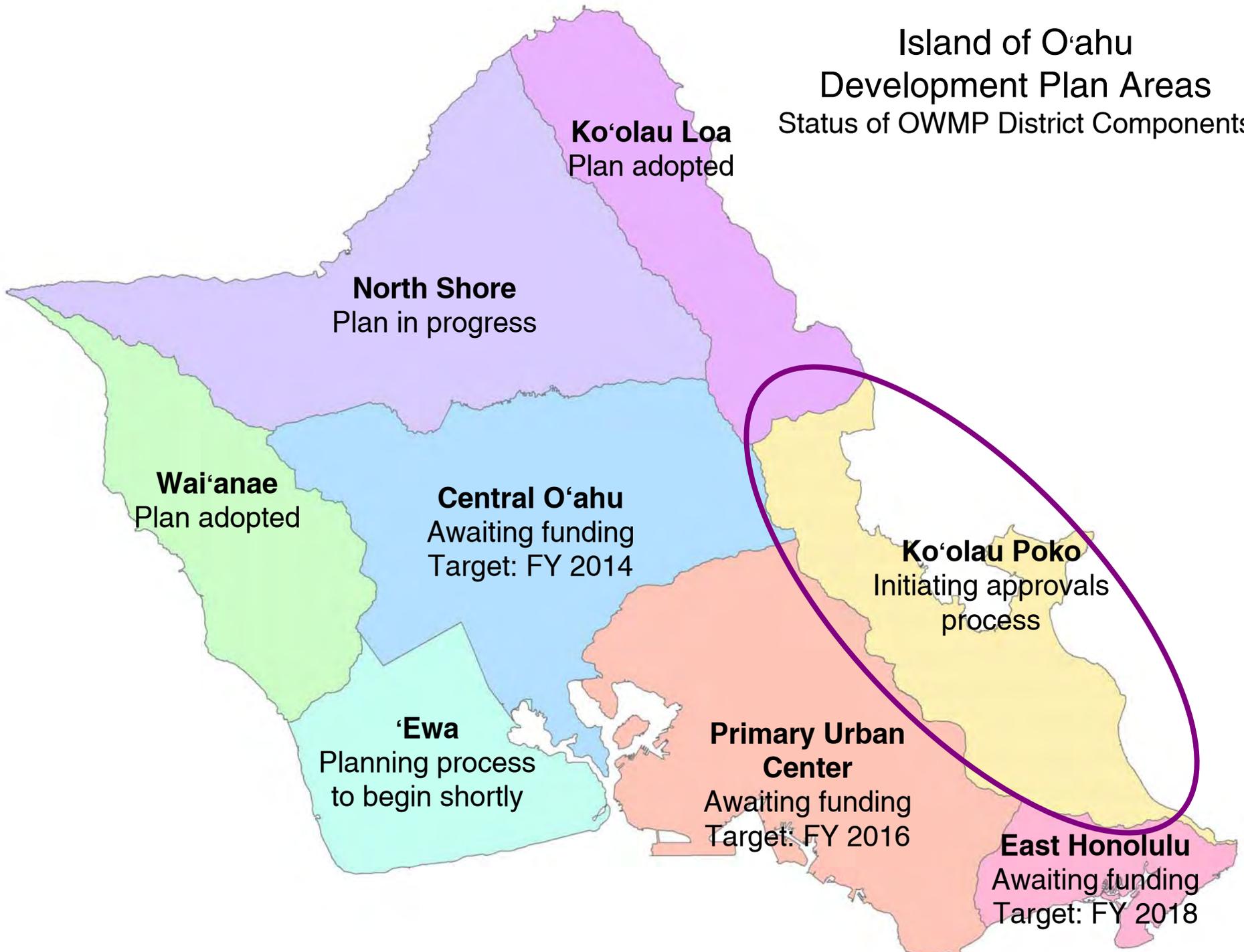
- On March 17, 2004, the Commission approved the Oahu Water Management Plan Framework of Regional Watershed Management Plans as “living documents” continually updated
- On August 28, 2008, the Commission approved the scope of work for the Koolaupoko and North Shore WMPs
- WMPs meet the statutory requirements of Sections 174C-5 and 31, HRS, State Water Code and Chapters 13-170-31 & 32, HAR, and addresses the recommended elements in the Statewide Framework pertaining to the update of the County WUDPs.
- WMP’s meet the requirements of Chapter 30, Articles 1, 2 and 3, ROH. The OWMP serves as the WUDP for the City and County of Honolulu. The OWMP consists of policies and strategies, which guide the activities of the City and County of Honolulu and advises the Commission in the areas of planning, management, water development and use and allocation of Oahu’s natural water resources.

OWMP Overview Section

Overview section provides context for the regional WMPs, including:

- Plan goals and objectives applying the ahupua‘a watershed-based approach to holistic resource management;
- Plans, policies, guidelines and controls covering federal laws, State Water Code, Hawaii Water Plan (WRPP, AWUDP, SWPP & DHHL), Framework, water rights, public trust doctrine, the precautionary principle, and State & City land use plans and ordinances;
- Urban and agricultural forecasts by land use district;
- Sustainable yield, permitted use and water uses by water management area updated to 2009;
- Mean perennial stream flows;
- Existing and potential ground water, surface water and alternative sources of water to meet demand;
- Summary of adequacy of supply;
- Uncertainties and contingencies for ground water and surface water supplies and demand forecasts; and
- Plan implementation.

Island of O'ahu
Development Plan Areas
Status of OWMP District Components





COMMISSION ON
WATER RESOURCE MANAGEMENT

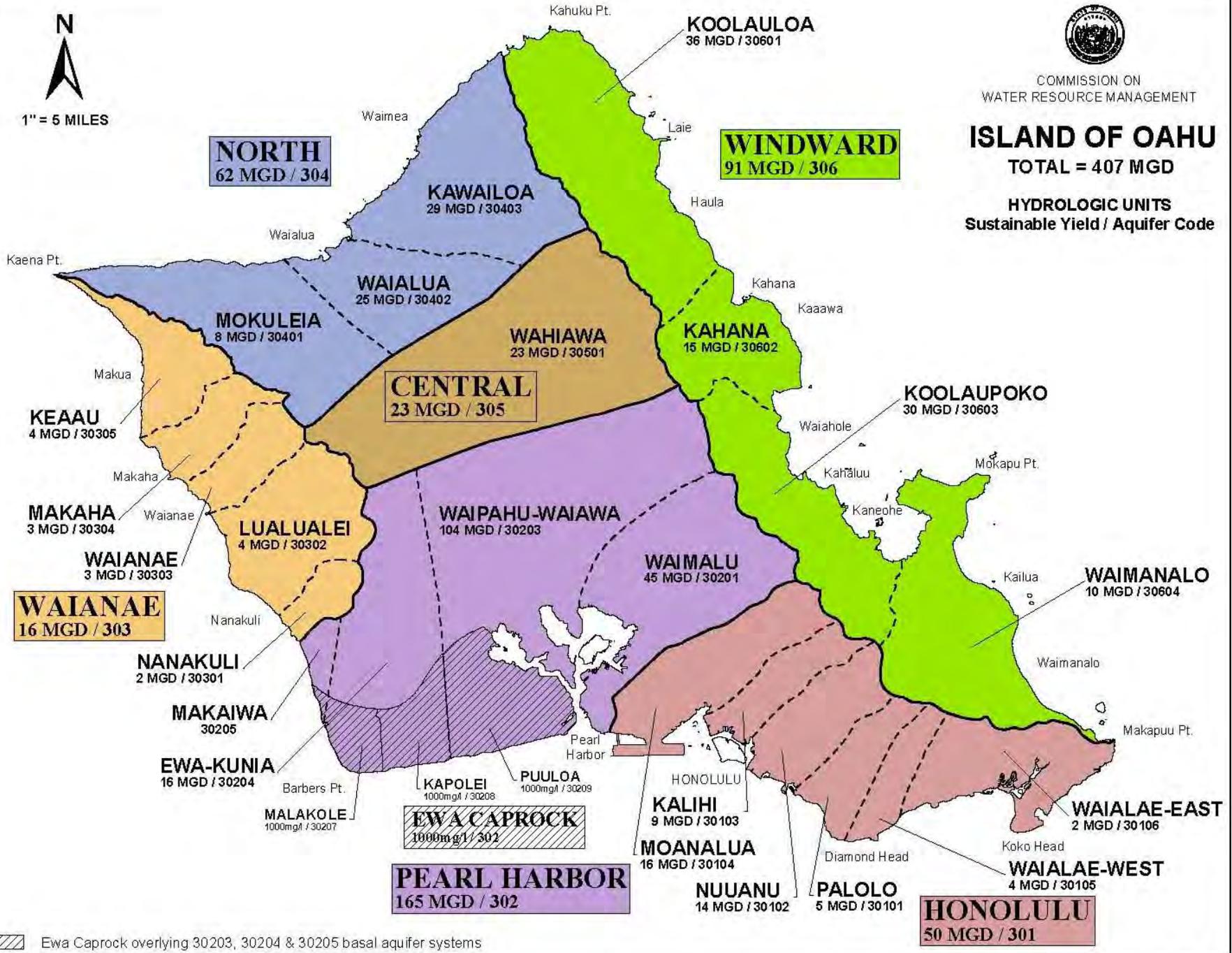
ISLAND OF OAHU

TOTAL = 407 MGD

HYDROLOGIC UNITS
Sustainable Yield / Aquifer Code



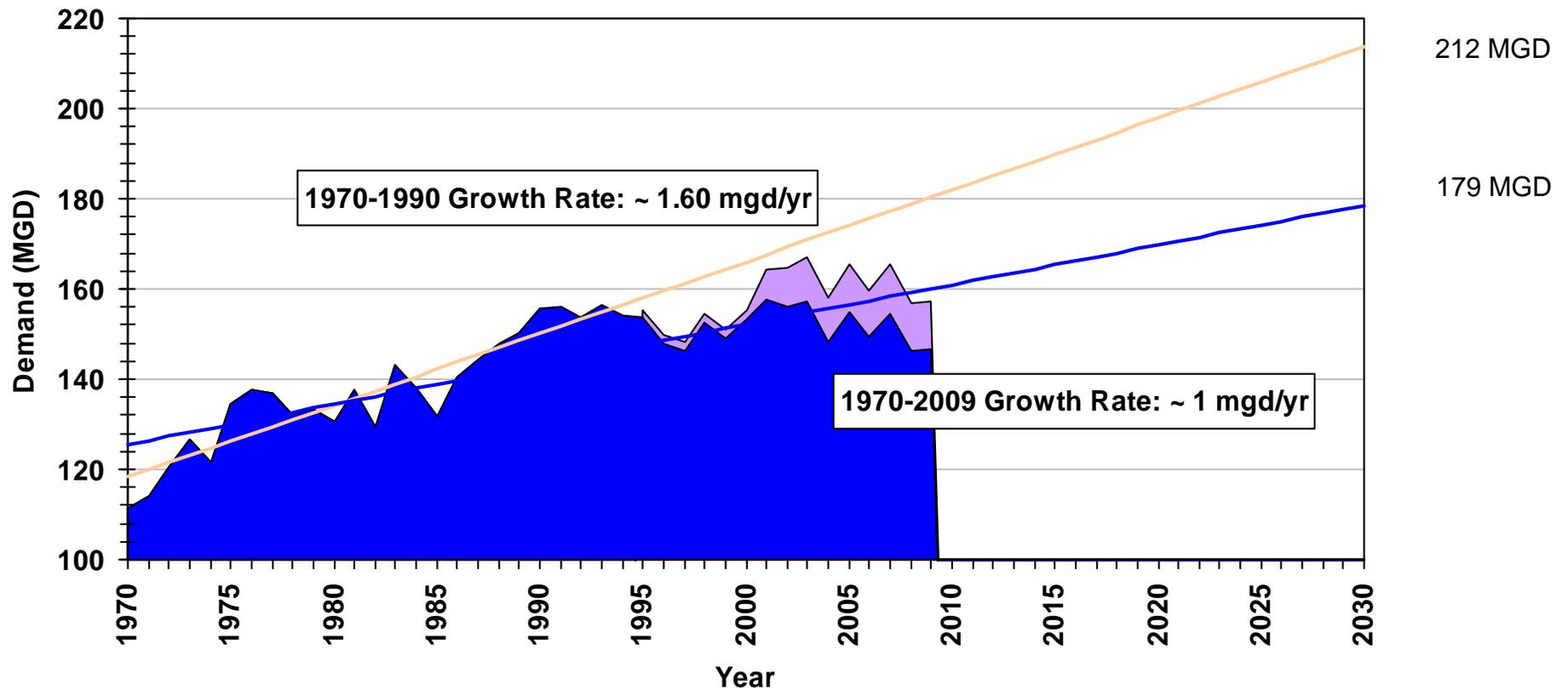
1" = 5 MILES



Sustainable Yield and Ground Water Use

Aquifer Sector	Sustain-able Yield (SY)	Water Use Permits Issued (2009)	Un-allocated SY	Existing Water Use (12 MAV), Sep 2009	SY minus Water Use
Honolulu	50	53.119	-3.119	41.169	8.831
Pearl Harbor	165	147.264	17.736	103.987	61.013
Central	23	21.928	1.072	7.047	15.953
Wai‘anae	16	0.000	16.000	4.795	11.205
North	62	39.590	22.050	3.533	58.467
Windward	91	31.633	59.367	20.580	70.420
TOTAL AQUIFER SECTOR	407	293.894	113.106	181.111	225.889
‘Ewa Caprock		15.897		6.448	
Waiāhole Ditch	15	12.440	2.560	8.524	6.476
GRAND TOTAL FRESH AND BRACKISH	442	322.231	115.666	196.083	232.365

BWS Potable Water System Demand Projections Historical Potable & Nonpotable Water Use



Potable & Nonpotable Sources

RESOURCE	ESTIMATED YEILD (mgd)	ADD. PERMITTED USE REQ. (mgd)	POTENTIAL DP AREA(S) SERVED
Ground Water (Potable)	47.4	19.85	'Ewa, Central, East Honolulu, Ko'olau Loa, Ko'olau Poko
ALTERNATIVE RESOURCE	MINIMUM ESTIMATE (mgd)	MAXIMUM ESTIMATE (mgd)	DEVELOPMENT PLAN AREA(S)
Desalination (potable)	5.2	15.5	'Ewa, Wai'anae
Recycled Water	16.8	29.6	'Ewa, Central, Ko'olau Loa, Ko'olau Poko, Wai'anae
Nonpotable Water	28.87	53.9	'Ewa, Central, Ko'olau Loa, North Shore, PUC
Total Alternative Resources	51.6	98.88	

Watershed Management Plan Goal

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

- (1) the protection, preservation and management of O‘ahu’s watersheds
- (2) sustainable ground and surface water use and development to serve present users and future generations

Watershed Management Plan Objectives

1. Promote Sustainable Watersheds
2. Protect and Enhance Water Quality & Quantity
3. Protect Native Hawaiian Rights and Traditional & Cultural Practices
4. Facilitate Public Participation, Education & Project Implementation
5. Meet Future Water Demands at Reasonable Costs

KPWMP CONTENTS

CHAPTERS

ES Executive Summary

- 1 O'ahu Water Management Plan Overview
- 2 Ko'olau Poko Watershed Profile
- 3 Water Use and Projected Demand
- 4 Plan Objectives, Water Supply, and Watershed Management Projects and Strategies
- 5 Implementation

APPENDICES

- A O'ahu Watershed Management Plan Framework
- B Plans, Policies, Guidelines, and Controls
- C O'ahu Water Use Permit Index
- D Overview of O'ahu Hydrogeology
- E Water Use and Demand – Methodology
- F BWS Ko'olau Poko Stream Diversion Survey
- G Neighborhood Board Endorsements

Ko'olau Poko Moku

Population (2000): 117, 999
(13.5% of O'ahu)

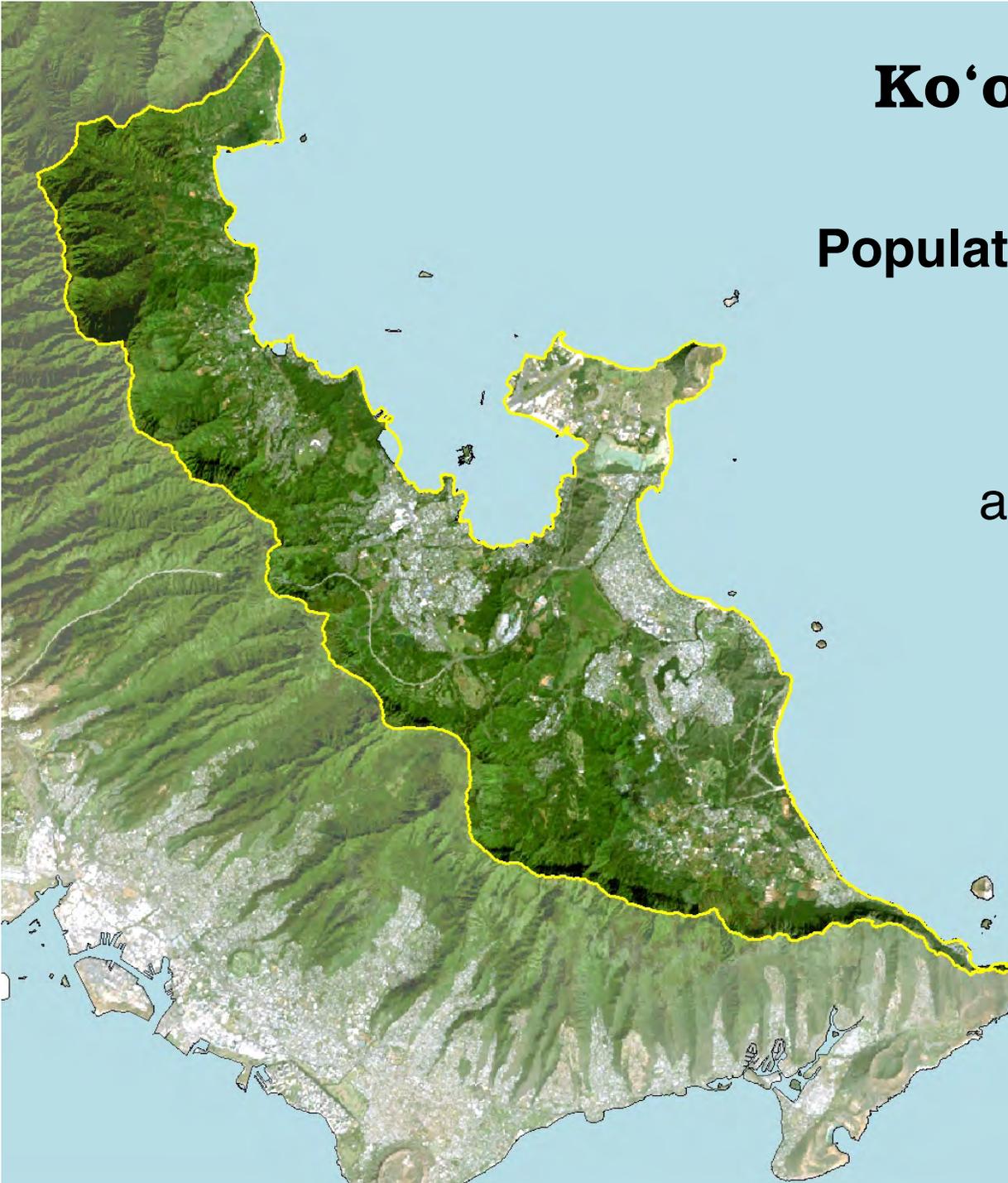
Size: 43,598 acres
approx. 11% of O'ahu

State Land Use

Conservation
19,880 ac. (48%)

Agriculture
5,760 ac. (14%)

Urban
15,990 ac. (38%)



Ko'olau Poko Watersheds

12 Ahupua'a

19 Watersheds

12 Perennial Streams



BWS Ko'olau Poko Stream Diversion Inventory

(2009 - 2011)

- Total stream flow recorded: 73.77 mgd
- Number of diversions: 117
 - Active 66
 - Inactive 44
 - Unknown 7
- Total diverted flow recorded: 21.24 mgd
- Uses: diversified agriculture, *kalo*, aquaculture, potable supply, other

Ko'olau Poko Aquifers (Ground Water)



Sustainable Yields

- Ko'olau Poko 30 MGD
- Waimānalo 10 MGD

Permitted Use

- Ko'olau Poko 15.3 MGD
- Waimānalo 1.6 MGD

Withdrawal* (2005)

- Ko'olau Poko 12.7 MGD
- Waimānalo 0.5 MGD

*Only reflects reported withdrawals.

Ko'olau Poko

Values

- Promote the cultivation of more locally grown food and the concept of food security
- Kāne'ōhe Bay has potential for abundance
- Ko'olau Poko's water resources are treasured
- Place names and cultural knowledge are valued
- Place-based natural resource management and cultural education programs are valued

Issues

- Invasive plants and animals
- Lack of access to resources
- Coordination of resource management needs improvement
- Impact of population growth on resources
- Drier climate is reducing water supply
- Water needs to be returned to streams for ag and in-stream uses
- Surface and near-shore water quality is degraded
- Storm water management needs improvement
- Illegal dumping

Ko'olau Poko Watershed Management Plan Water Supply Findings

- **Urban water use projected to decrease** as population decreases and conservation advances.
- As pumpage decreases, **streamflows are restored** for those surface waters affected by ground water.
- **Continue water conservation efforts**
- **Develop non-potable water for agricultural and landscape irrigation**
- **Surface water can continue to supply agricultural demands**, but improvements are needed to increase efficiency
- **Recycled water can offset some of the irrigation needs**
- **Continue to import water from Ko'olau Loa**, but use this water efficiently

Ko'olau Poko District Water Supply Options

GROUND WATER



- 1) Reduce BWS import of water from Ko'olau Loa wells
- 2) Additional Private Agriculture Wells

RECYCLED WATER



- 4) Waimānalo WWTP
- 5) Marine Corps Base Hawai'i WWTP

OTHER

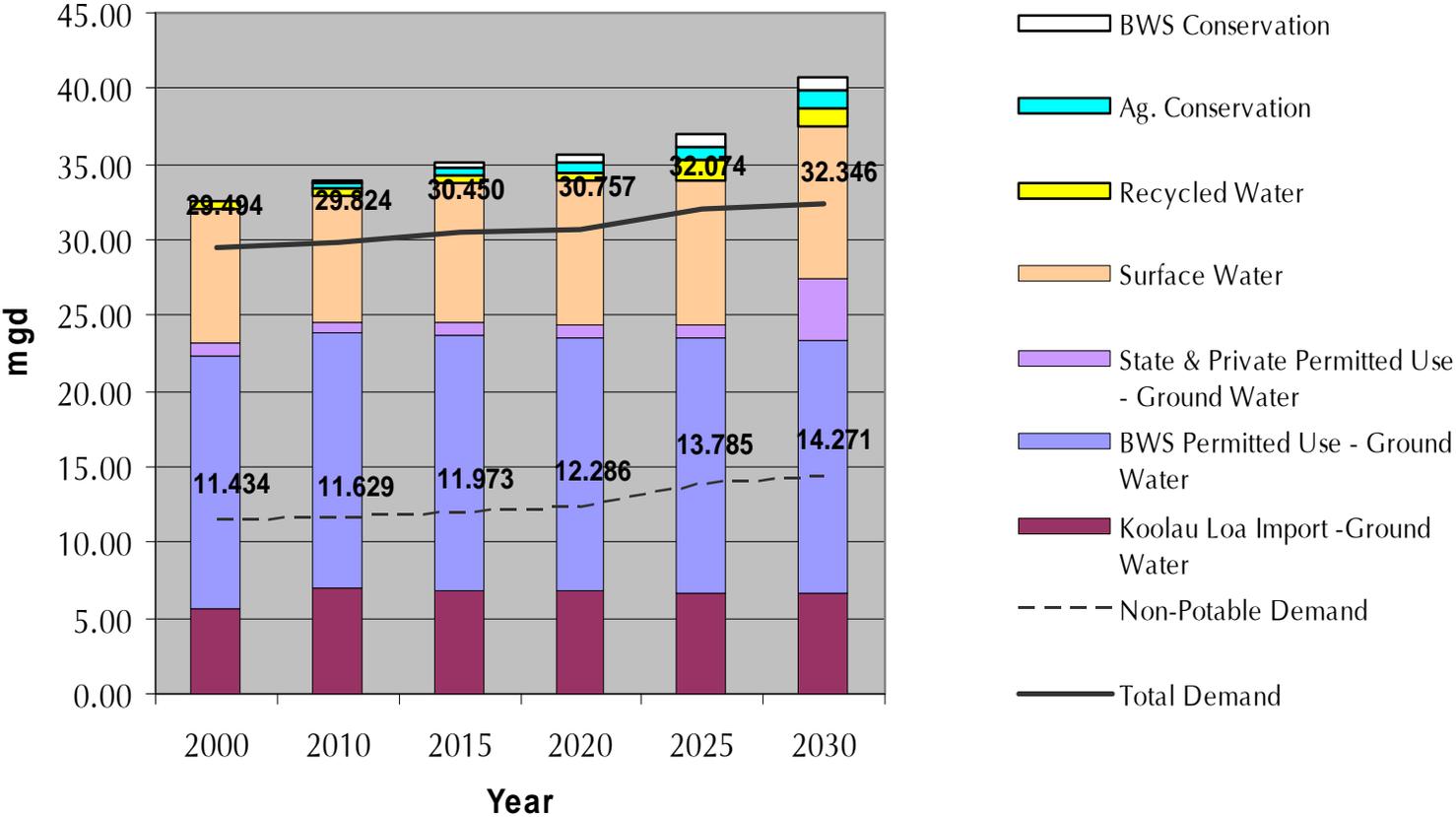


- 5) Municipal Conservation and Agricultural Water Loss Minimization



- 6) Surface water use for agricultural irrigation: increase efficiency before proposing new diversions

Ko'olau Poko District Projected Demand & Supply



Ko'olau Poko Watershed Management Projects



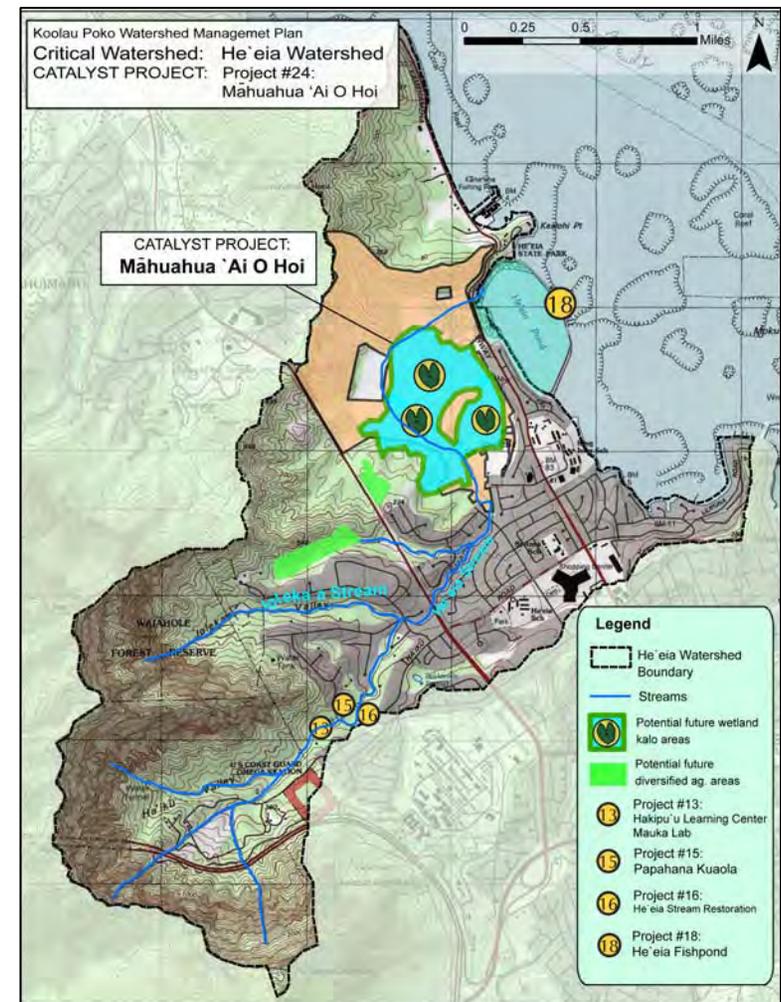
Critical Watersheds

KĀNE‘OHE NB AREA: He‘eia Watershed

- Important source of potable water
- Several ongoing projects that support sustainable watersheds, Native Hawaiian rights, and cultural practices
- Water quality and quantity are critical in the protection of ecosystem values, agricultural uses, and potable water needs

CATALYST PROJECT: Māhuahua ‘Ai o Hoi – “Regrowing the Fruit of Hoi”

- Restore the ecological function and food-producing landscape of the He‘eia wetlands.



Implementation of Water Supply And Watershed Projects

- Proposed strategies and projects guide agencies and organizations in implementing the most important initiatives.
- Implementation and funding is not the sole responsibility of the BWS, the City & County of Honolulu, or the State of Hawai'i.
- Plan implementation and timing will depend on budgetary priorities, grant availability, and partnering efforts over the long term.
- Funding limitations should not preclude the City from planning.
- The Plan guides public and private investment and provides opportunities for agency and community collaboration.

KPWMP Status

- **CWRM approval** of Ko‘olau Poko WMP scope of work: 2008
- **Public Participation:** Over 70 individual, community, neighborhood board, and agency meetings conducted.

- **Public Review Draft**

- Released November 2010

- **Neighborhood Board Endorsement**

- Kahalu‘u (NB 29) October 2011
 - Kāne‘ohe (NB 30) November 2011 (expected)
 - Kailua (NB 31) November 2011
 - Waimānalo (NB 32) October 2011

Approval Process



BRIEFINGS:

- BWS Manager & Board
- City and County
- CWRM

CITY COUNCIL Adoption by Ordinance

- 3 Council Readings
- Public Hearing
- Committee Meetings

CWRM 90 Day Notice



Public Hearing

CWRM Meeting & Approval



- ▶ Koolau Loa Plan
- ▶ Waianae Plan
- ▶ Koolau Poko Plan

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Koolau Poko Watershed Management Plan

Watershed Management Plans

Koolau Poko Watershed Management Plan

- ▶ Koolau Poko Sub-District Meetings
- ▶ Koolau Poko Watershed Management Plan Public Review Draft Meetings
- ▶ Koolau Poko Watershed Management Plan Public Review Draft - November 2010
- ▶ Koolau Poko Watershed Management Plan Pre-Final Draft - September 2011

The Honolulu Board of Water Supply (BWS) has begun the development of the district-wide "Koolau Poko Watershed Management Plan (KPWMP)." The KPWMP will be used to meet the requirements of preparing a county water use and development plan under the State of Hawaii Water Code and City and County of Honolulu ordinance. BWS is expanding the KPWMP to include a management plan for watershed protection that identifies critical watersheds and develops a list of watershed protection strategies and projects for those watersheds because fresh water is not an infinite resource; its high quality, quantity, and sustainability are essentially linked to the existence of healthy watersheds.



The overall goal of the KPWMP is to formulate an environmentally holistic, community-



Mahalo

Department of Planning & Permitting

David Tanoue, Director

(808) 768-8000

Honolulu Board of Water Supply

Barry Usagawa, Water Resources Program Administrator

(808) 748-5900 busagawa@hbws.org

Consultant: Townscape Inc.

Bruce Tsuchida, President

(808) 536-6999 bruce@townscapeinc.com

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OWMP Framework

- Statewide Framework
- State Water Projects Plan
- State Agricultural WUDP
- Water Resources Protection Plan
 - Sustainable Yield and Instream Flow Standards
- Water Quality Plan
- Oahu Water Use and Development
- Waiāhole Ditch Decision
- DHHL
- Conservation
- Watershed partnerships
- ROH Chapter 30, Water Management
- O‘ahu General Plan and District-Level Land Use Plans
- BWS Sustainability Mission

Hawai‘i Water Plan

Sustainable Yield and Ground Water Use

Aquifer Sector	Aquifer System	Sustainable Yield (SY)	Water Use Permits Issued (2008)	Un-allocated SY	Existing Water Use (12 MAV), Sep 2008	SY minus Water Use
Honolulu	Wai'alaie-East	2	0.790	1.210	0.492	1.508
	Wai'alaie-West	4	2.797	1.203	0.755	3.245
	Pālolo	5	5.646	-0.646	5.816	-0.816
	Nu'uaniu 1	14	15.165	-1.165	13.123	0.877
	Kalihi	9	8.761	0.239	7.941	1.059
	Moanalua 1	16	19.960	-3.960	13.042	2.958
	TOTAL		50	53.119	-3.119	41.169
Pearl Harbor	Waimalu	45	46.951	-1.951	32.265	12.735
	Waipahu-Waiawa	104	84.856	19.144	55.389	48.611
	'Ewa-Kunia	16	15.457	0.543	16.333	-0.333
	Makaīwa	0	0.000	0.000	0.000	0.000
	TOTAL		165	147.264	17.736	103.987

Sustainable Yield and Ground Water Use

Aquifer Sector	Aquifer System		Sustainable Yield (SY)	Water Use Permits Issued (2008)	Un-allocated SY	Existing Water Use (12 MAV), Sep 2008	SY minus Water Use
Central	Wahiawā		23	21.928	1.072	7.047	15.953
TOTAL			23	21.928	1.072	7.047	15.953
Wai'anae	Nānākuli	1,2,4	2	0.000	2.000	0.000	2.000
	Lualualei	1,2,4	4	0.000	4.000	0.099	3.901
	Wai'anae	2	3	0.000	3.000	2.418	0.582
	Mākaha	1,2	3	0.000	3.000	2.278	0.722
	Kea'au	2,4	4	0.000	4.000	0.000	4.000
TOTAL			16	0.000	16.000	4.795	11.205
North	Mokulē'ia	1	8	8.025	-0.025	0.174	7.826
	Waialua	1	25	30.311	-5.311	2.974	22.026
	Kawailoa	1	29	1.614	27.386	0.385	28.615
TOTAL			62	39.590	22.050	3.533	58.467

Sustainable Yield and Ground Water Use

Aquifer Sector	Aquifer System		Sustainable Yield (SY)	Water Use Permits Issued (2008)	Un-allocated SY	Existing Water Use (12 MAV), Sep 2008	SY minus Water Use
Windward	Ko'olau Loa	1	36	18.589	17.411	10.373	25.627
	Kahana	1,4	15	1.101	13.899	0.000	15.000
	Ko'olau Poko	1,3,4	30	10.312	19.688	9.904	20.096
	Waimānalo	1,4	10	1.631	8.369	0.303	9.697
TOTAL			91	31.633	59.367	20.580	70.420
TOTAL AQUIFER SECTOR			407	293.894	113.106	181.111	225.889
'Ewa Caprock	Malakole	5	1,000 mg/l	0.603		4.414	
	Kapolei	5	1,000 mg/l	2.033		0.608	
	Pu'uloa	5	1,000 mg/l	12.261		1.426	
TOTAL				15.897		6.448	
Waiāhole Ditch			15	12.440	2.560	8.524	6.476
TOTAL			15	12.440	2.560	8.524	6.476
GRAND TOTAL FRESH AND BRACKISH			442	322.231	115.666	196.083	232.365

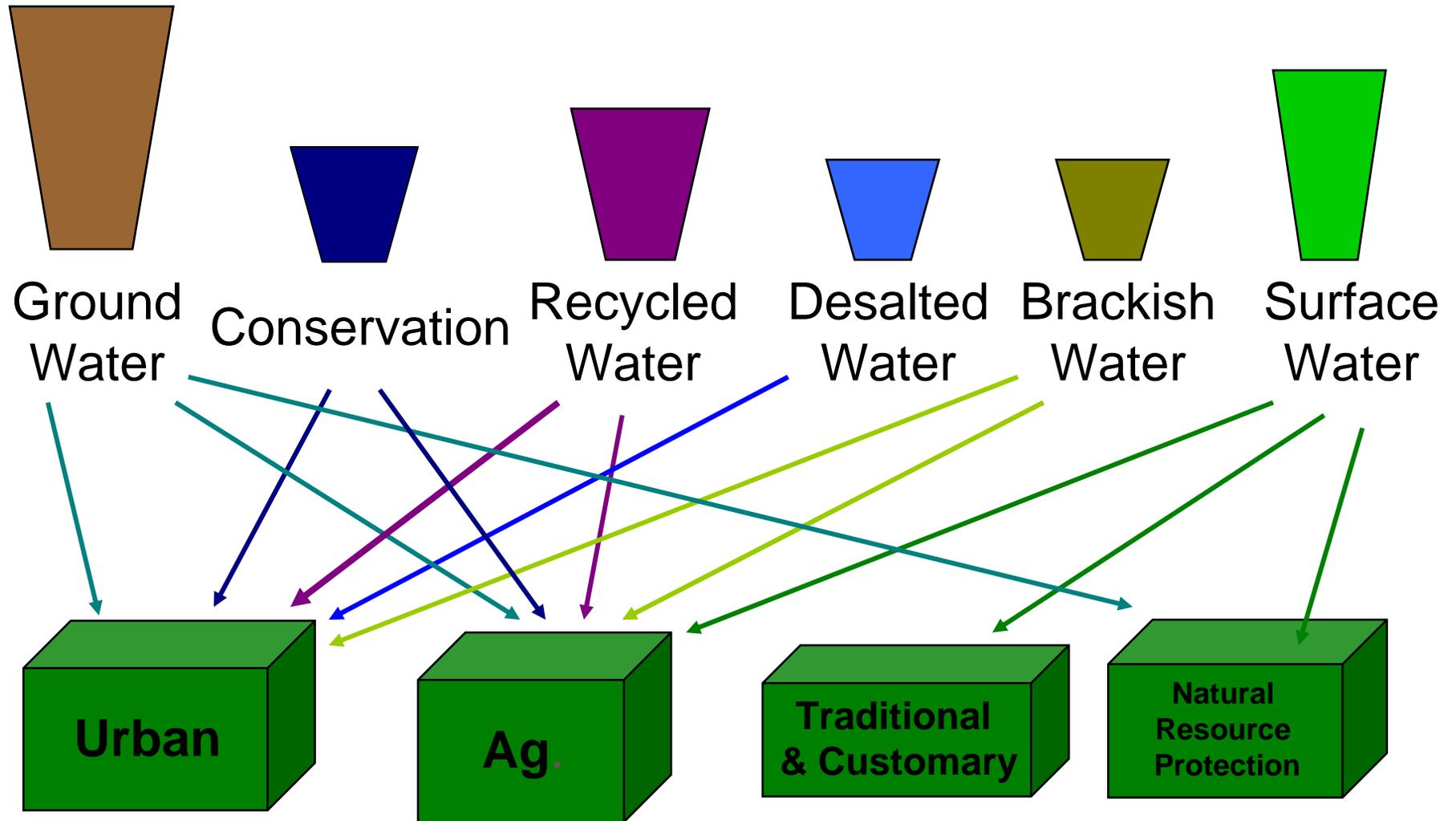
Planned Potable Ground Water Sources

Table 1.9

New Ground Water Sources		Estimated Yield (mgd)	Additional Permitted Use Required (mgd)	CWRM WMA	Potential Development Plan Area(s) Served
1	Kahuku Wells Pump 3	1.0	1.0	Koolauloa	Koolauloa
2	Ōpana Wells	1.0	1.0	Koolauloa	Koolauloa
3	Kaipapau Well	1.0		Koolauloa	Koolaupoko
4	Kaluanui Wells	1.5		Koolauloa	Koolaupoko
5	Maakua Wells	1.0		Koolauloa	Koolaupoko
6	Kuou Well III	0.5		Koolaupoko	Koolaupoko
7	Waimanalo Well III	0.5	0.3	Waimānalo	Koolaupoko
8	Āina Koa Well II	0.7		Waialae-West	East Honolulu
9	Waialae Nui Well	0.7		Waialae-West	East Honolulu
10	Wahiawā Well III	3.0	3.0	Wahiawa	Central
11	Waipio Hts Wells II& III	2.5	0.7	Waipahu-Waiawa	Central/PUC
12	Mililani Wells IV	3.0	1.0	Waipahu-Waiawa	Central
13	Waiawa Wells I-IV	6.0	6.0	Waipahu-Waiawa	Central
14	Manana Well	1.0	0.9	Waipahu-Waiawa	PUC
15	Kunia Wells III	3.0		Waipahu-Waiawa	Ewa, Waianae
16	Waipahu Wells II	3.0	1.0	Waipahu-Waiawa	Central
17	Waipahu Wells III	3.0		Waipahu-Waiawa	PUC
18	Waipahu Wells IV	3.0		Waipahu-Waiawa	Ewa, Waianae
19	Ewa Shaft	10.0	3.0	Waipahu-Waiawa	Ewa
20	Koa Ridge Makai Wells	2.0	2.0	Waipahu-Waiawa	Central
Total Potable Resources		47.4	19.85 **		



Holistic Approach to Water Use & Supply



Alternative Potable & Nonpotable Sources

RESOURCE		MINIMUM ESTIMATE	MAXIMUM ESTIMATE	DEVELOPMENT PLAN AREA(S)
Desalination (potable)				
1	Kapolei Brackish Desalination Plant	0.2	0.5	Ewa, Waianae
2	Kalaeloā Seawater Desalination Plant	5	15	Ewa, Waianae
Recycled Water				
4	Wahiawā Recycled Water	2	4	Central
5	Honouliuli Recycled Water	12	20	Ewa
6	Waianae Recycled Water	2	3	Waianae
7	Kahuku, Turtle Bay, Lāie Recycled Water	0.8	2.6	Koolauloa
Nonpotable Water				
8	Waiāhole Ditch	12.57	15	Ewa, Central
9	Wahiawa Reservoir	8.5	22	North Shore, Central
10	Kalauao Spring	0.5	3.3	PUC
11	Kapolei West Brackish Well	1	1	Ewa
12	Koolau Loa Agricultural Wells	6.3	12.6	Koolau Loa
Total Alternative Resources		51.6	98.88	

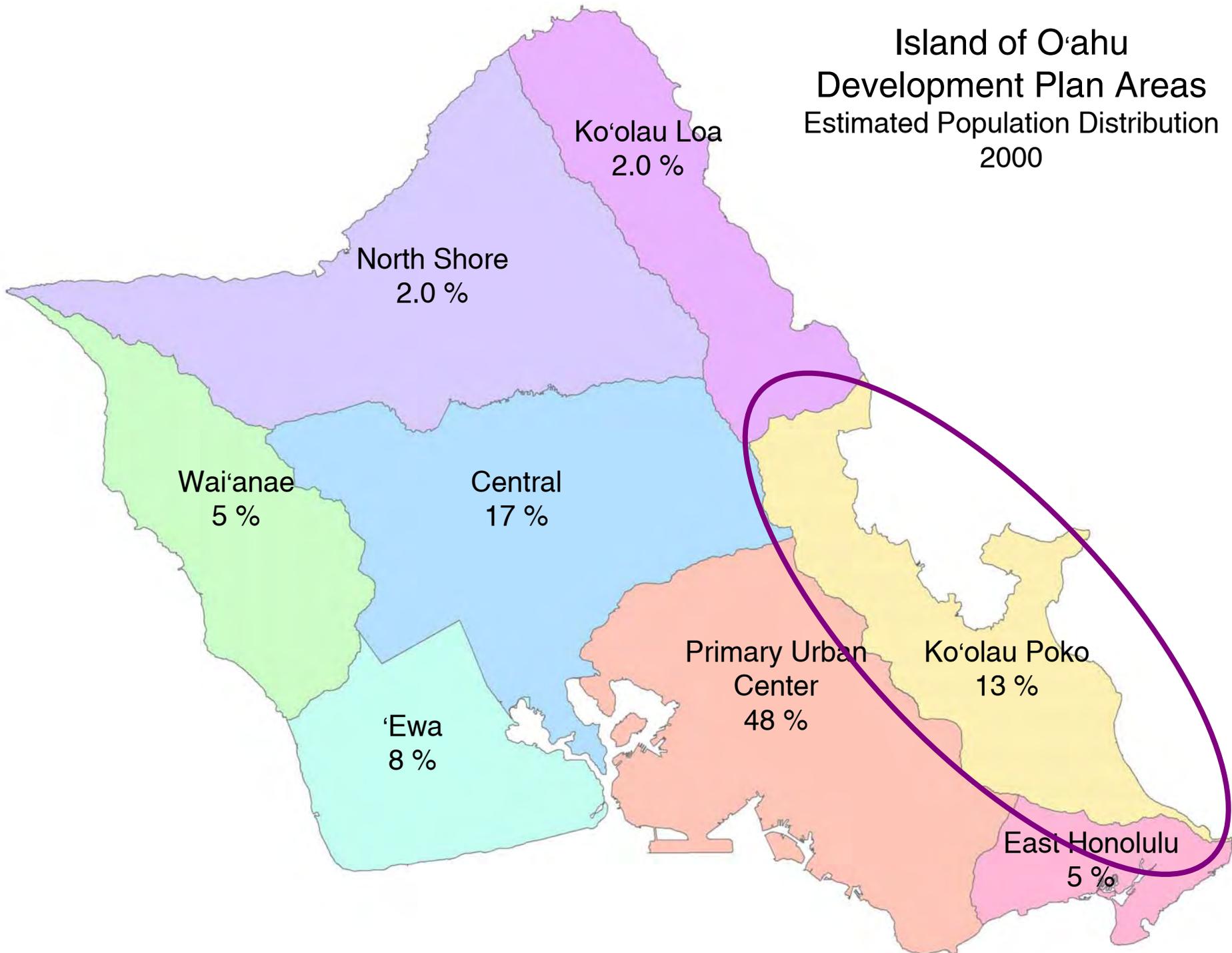
O'ahu Water Management Plan Summary

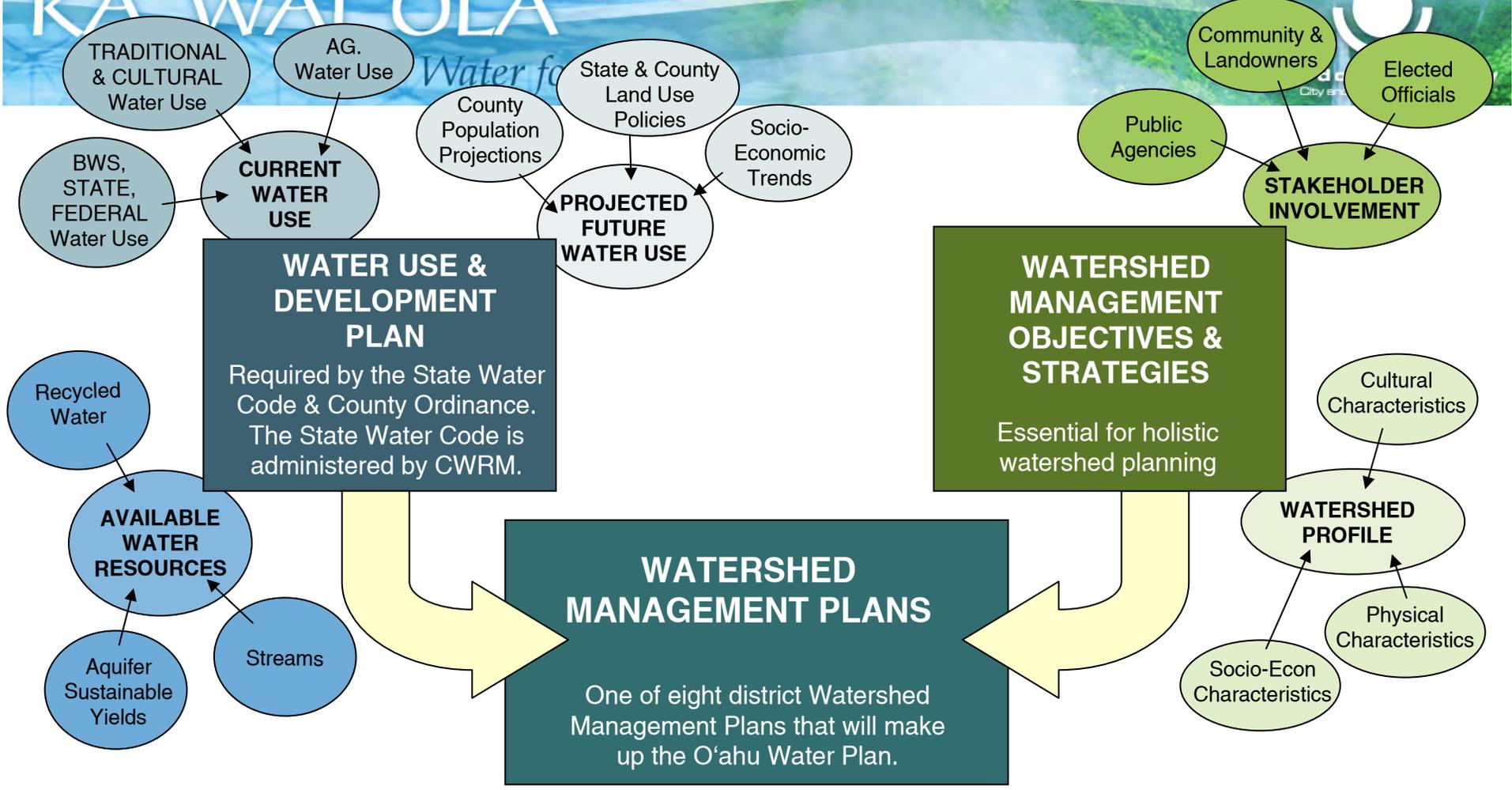
- Protect watersheds
- Promote water efficiency and conservation
- Diversify natural & alternative water supplies
- Inventory water supply and existing water use
- Forecast demand: low, mid and high growth
- Identify uncertainties & contingencies
- Describe the water allocation process

O'ahu Water Management Plan Summary

- Conclusion: There is enough water supply on O'ahu for urban and ag demands through the 2030 planning horizon
- Districts completed: Wai'anae and Ko'olau Loa
- Districts in-process: Ko'olau Poko and North Shore
- Districts to begin shortly: 'Ewa

Island of O'ahu
Development Plan Areas
Estimated Population Distribution
2000





-- OUTPUTS (examples) --



Critical Watersheds

KAILUA NB AREA: Kawainui Watershed

- Several existing partnerships
- Provides opportunities to protect Native Hawaiian rights and practices
- Promotes sustainable watersheds: native ecological communities and potential food-producing opportunities
- Significant source of water for agriculture and habitat
- Water quality and quantity are critical for watershed health

CATALYST PROJECT: Management and Stewardship of Kawainui March

- Coordinate existing projects and organizations to maximize resources and minimize duplication of efforts

