



HAWAII STATE  
DEPARTMENT  
OF HEALTH

# Hawaii's Groundwater Protection Strategy

*4<sup>th</sup> Joint Government Water Conferences*

*July 26, 2018 (Oahu)*

*August 2, 2018 (Kauai)*

*August 7, 2018 (Maui)*

*August 15, 2018 (Hilo)*

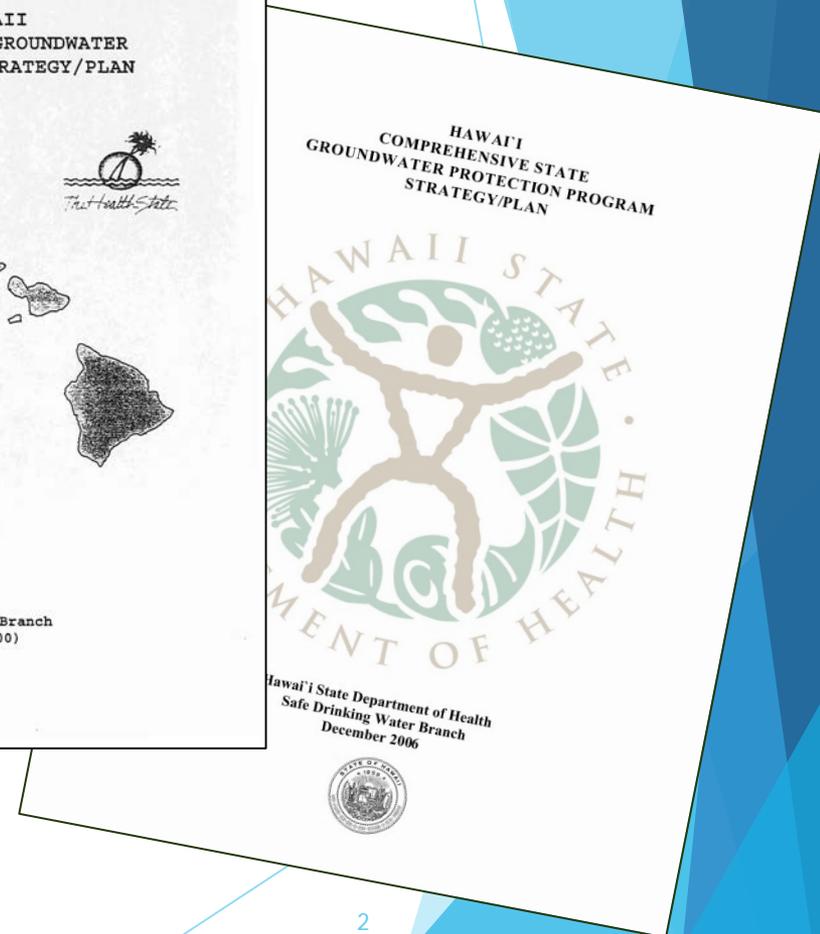
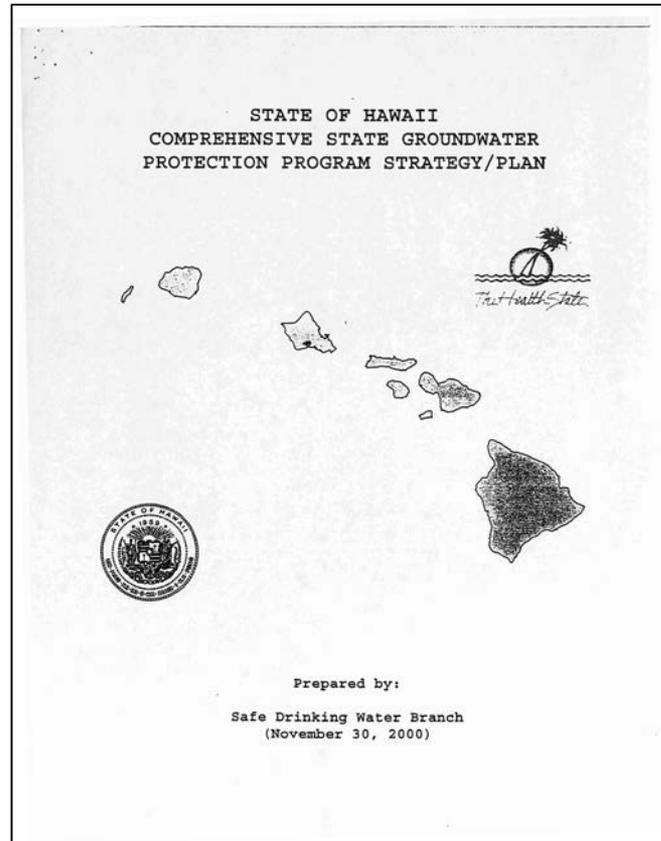
*August 21, 2018 (Kona)*

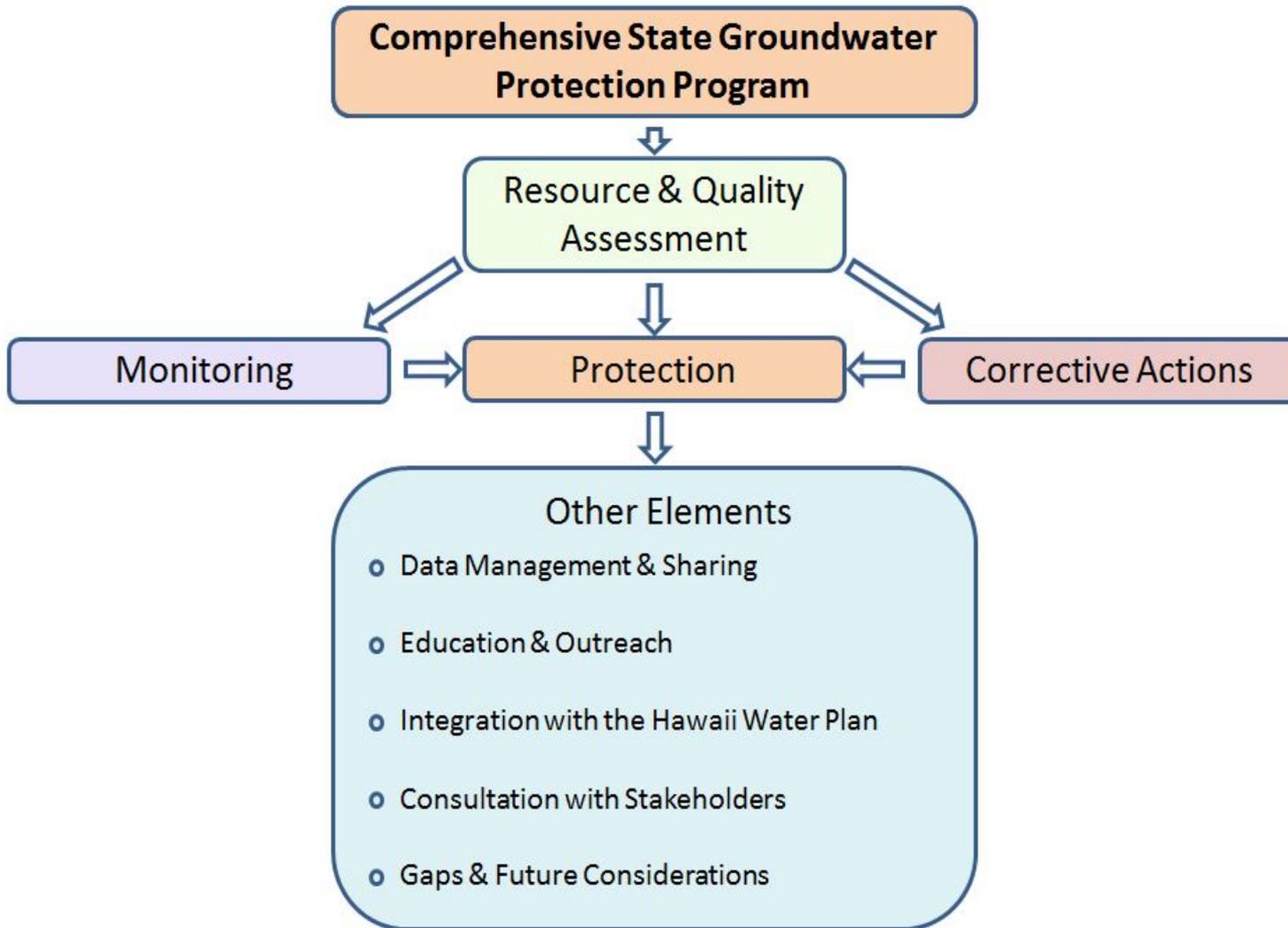
# Comprehensive State Groundwater Protection Program Strategy/Plan

Initial CSGWP Program Strategy/Plan prepared in November 2000.

2006 draft Strategy/Plan submitted to and considered to be inadequate by U.S. EPA.

SDWB to draft and submit new CSGWP Program Strategy/Plan to U.S. EPA consistent with WQP.





Source: State of Hawaii Department of Health,  
Environmental Planning Office

## Hawaii Groundwater Protection Strategy

Hawaii Department of Health Coordinating Branches/Offices:

Safe Drinking Water Branch (GW106/DWSRF 15%), Wastewater Branch (CWSRF), Clean Water Branch (SW106),  
Solid & Hazardous Waste Branch (SHWB), Hazard Evaluation and Emergency Response Office (HEER)

June 2017

**Mission:** To safeguard groundwater quality and public health by protecting Hawaii's groundwater from contamination.  
(potential funding source listed within parentheses)

**Goal 1: Monitor and assess groundwater quality.** (GW106)

**Objective 1:** Collect and analyze groundwater monitoring data with focus on priority threats to groundwater quality.

**Objective 2:** Work with other agencies that collect groundwater data to understand what data they collect and how it is collected.

**Objective 3:** Every four years, generate a Groundwater Status Report which provides a review, analysis, and summary of groundwater monitoring data to understand contaminant trends and sources of contamination. The Report shall include a list of proposed future monitoring of contaminants of concern with rationales and priorities based on severity of public health impacts.

**Goal 2: Identify and prioritize groundwater contamination threats.**

**Objective 1:** Recognize that groundwater quality monitoring since the 1990s has shown that the priority threats to groundwater quality as determined by DOH and review of data are as follows (GW106):

Priority Threats to Groundwater Quality - 2017
Onsite sewage disposal systems/cesspools/injection wells (WWB/CWB/SDWB)
Large scale use of recycled water (WWB/SDWB)
Large fuel storage facilities (SHWB/SDWB)
Increasing nitrate concentrations (WWB/CWB/SDWB)
Agricultural chemicals (HEER/SDWB)

**Objective 2:** Identify future threats to groundwater quality and prioritize for Goal 1 or Goal 3 follow-up (GW106/CWSRF/SW106/319/HEER/SHWB).

**Goal 3: Mitigate priority contamination threats and prevent contamination.**

**Objective 1:** Coordinate protection efforts with other branches/offices/agencies:

- Safe Drinking Water Branch Underground Injection Control Program - issuing permits for discharges to wells
- Wastewater Branch - protection from onsite sewage disposal systems and cesspools
- Clean Water Branch - surface water protection that also protect groundwater
- Solid & Hazardous Waste Branch - leaking underground storage tanks, landfills, and other wastes that may contribute to groundwater contamination
- Hazard Evaluation and Emergency Response Office - toxicology and health impacts of groundwater contamination and use of hazardous chemicals and pesticides
- Environmental Planning Office - review of new development projects and their impacts to groundwater
- Department of Land and Natural Resources, Commission on Water Resource Management – water quality planning via the Hawaii Water Plan, Water Resources Protection Plan – Section 10, Water Use Permits, Well-drilling applications, salt-water intrusion data
- Department of Agriculture – pesticide use and application

**Objective 2:** Coordinate use of funding sources to support the HIGWPS: Safe Drinking Water Branch (GW106/DWSRF 15%/DWSRF Fees), Wastewater Branch (CWSRF), Clean Water Branch (SW106, 319), Solid & Hazardous Waste Branch (SHWB), Hazard Evaluation and Emergency Response Office (HEER)

**Objective 3:** Coordinate the regulatory framework used by each branch/office/agency to protect groundwater from the prioritized contamination threats (e.g., Code of Federal Regulations, Hawaii Revised Statutes, Hawaii Administrative Rules, EPA Guidelines and online tools).

# Hawaii Groundwater Protection Strategy

June 29, 2017

**Strategy Mission:** To safeguard groundwater quality and public health by protecting Hawaii's groundwater from contamination.

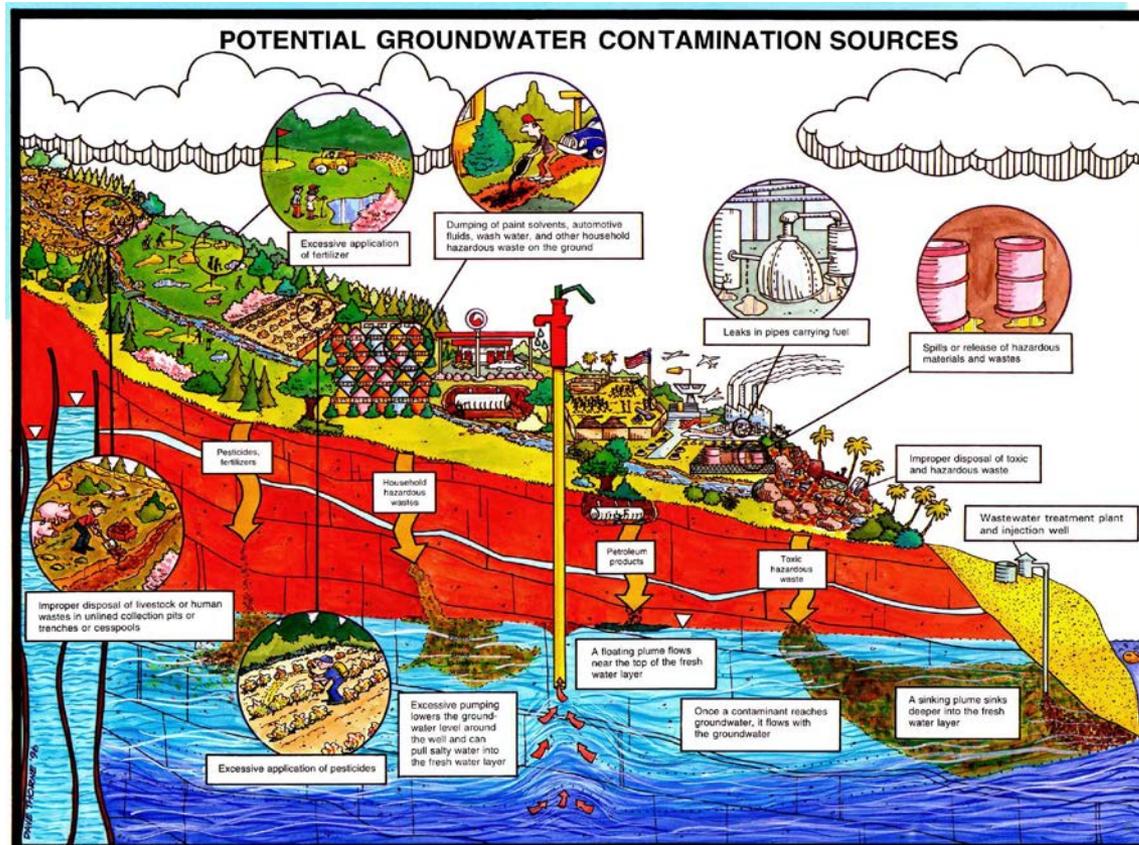
- ▶ **GOAL 1: Monitor and assess groundwater quality**
- ▶ GOAL 2: Identify and prioritize groundwater contamination threats
- ▶ GOAL 3: Mitigate priority contamination threats and prevent contamination



BWS Kahuku Well

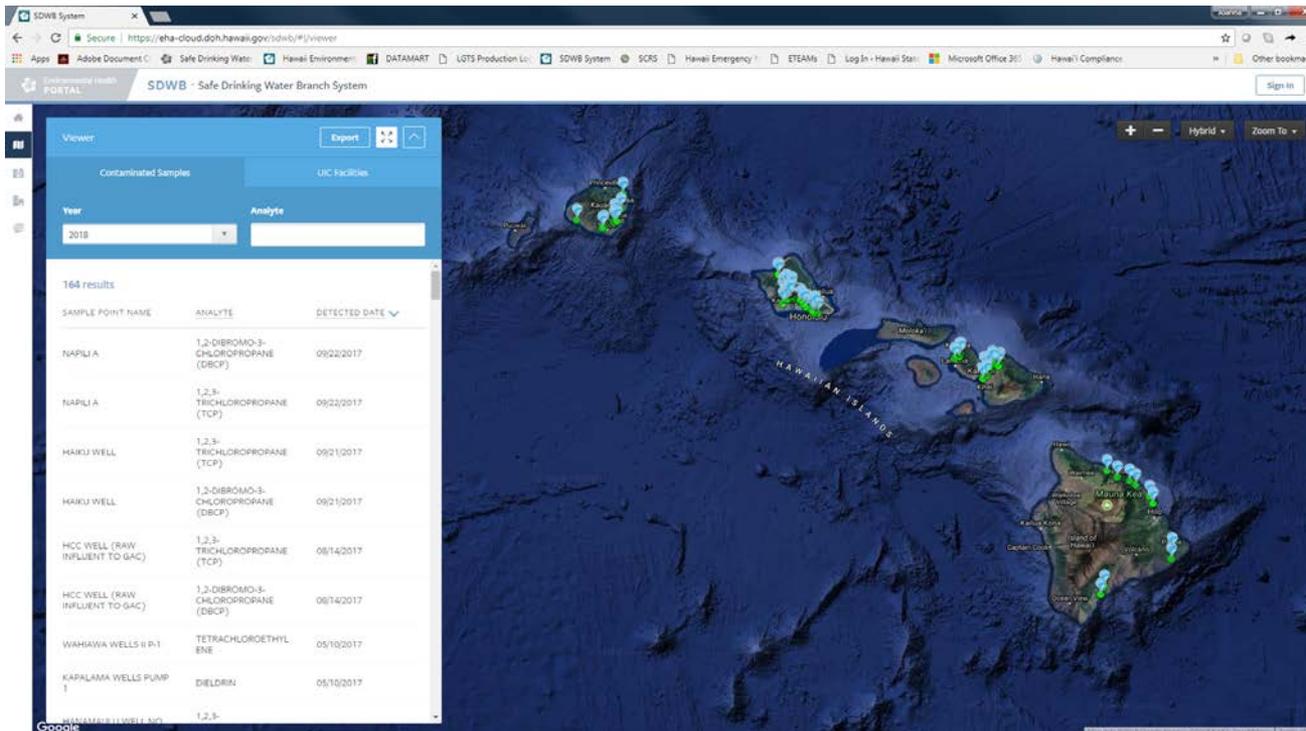
# GOAL 1: Monitor and assess groundwater quality

- ▶ Objective 1: Collect and analyze groundwater monitoring data with focus on priority threats to groundwater quality.



# GOAL 1: Monitor and assess groundwater quality

- ▶ Objective 2: Work with other agencies that collect groundwater data to understand what data they collect and how it is collected.



Groundwater Contamination Viewer

# GOAL 1: Monitor and assess groundwater quality

- ▶ Objective 3: Every four years, generate a Groundwater Status Report which provides a review, analysis, and summary of groundwater monitoring data to understand contamination trends and sources of contamination. The Report shall include a list of proposed future monitoring of contaminants of concern with rationale and priorities based on severity of public health impacts.

See this afternoon's Concurrent Session B - Water Quality Workshop, 1 pm presentation by Dan Chang for more details on this report.

# Groundwater Quality Monitoring

Potential impacts to groundwater quality from various current priority contaminating activities, such as:

- ▶ **Agricultural activities**
  - sediments
  - nutrients (fertilizers)
  - toxic chemicals (pesticides)
- ▶ **Wastewater disposal systems (cesspools, septic systems, other OSDS)**
  - nutrients
  - toxic chemicals (PPCPs)
  - pathogens
- ▶ **Use of Alternative Water Sources (Reuse Wastewater)**
  - toxic chemicals (PPCPs/Emerging Contaminants)

**Strategy Mission:** To safeguard groundwater quality and public health by protecting Hawaii's groundwater from contamination.

- ▶ GOAL 1: Monitor and assess groundwater quality
- ▶ **GOAL 2: Identify and prioritize groundwater contamination threats**
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Cesspools, Septic Tanks



Agriculture

# GOAL 2: Identify and prioritize groundwater contamination threats

- ▶ Objective 1: Recognize that groundwater quality monitoring since the 1990's has shown that the priority threats to groundwater quality as determined by DOH and review of data are as follows:

## Priority Threats to Groundwater Quality - 2017

Onsite sewage disposal systems/cesspools/injection wells

Large scale use of recycled water

Large fuel storage facilities

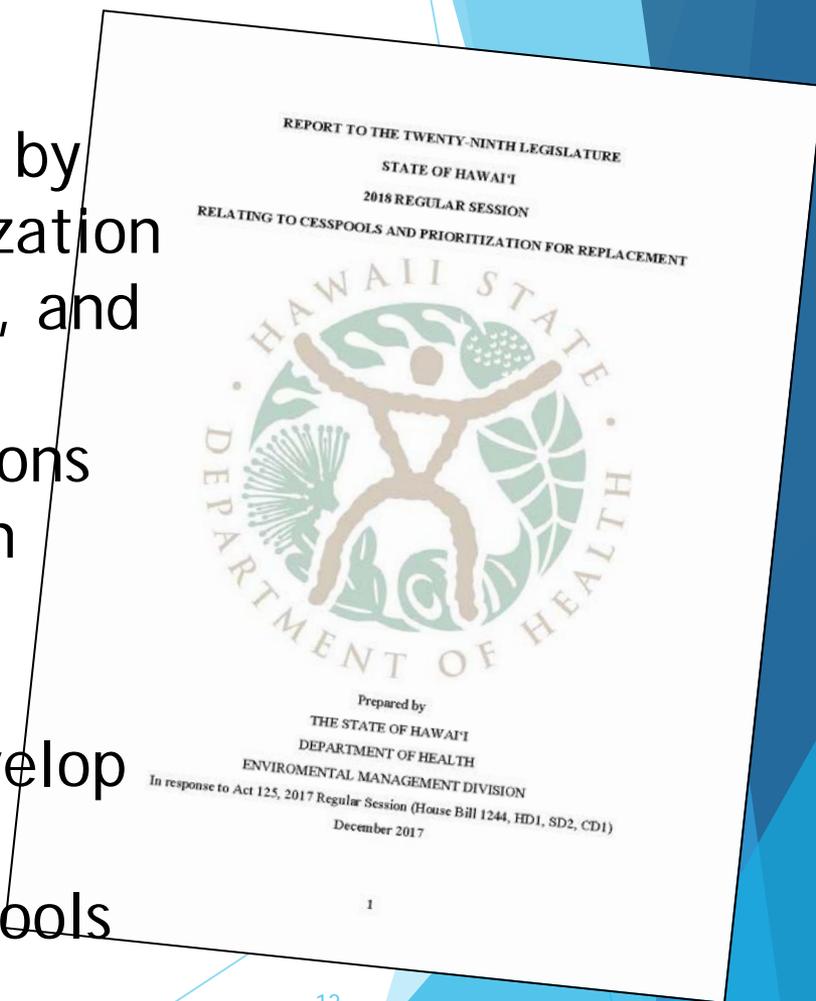
Increasing nitrate concentrations

Agricultural chemicals

- ▶ Objective 2: Identify future threats to groundwater quality and prioritize for Goal 1 or Goal 3 follow-up.

# The Hawaii Department of Health is now faced with many issues related to water protection including:

- The replacement of all cesspools by 2050, the evaluation and prioritization of cesspools in the state (report), and working with the Department of Taxation on possible funding options to reduce the financial burden on homeowners (Act 125, 2017).
- The establishment of a Cesspool Conversion Working Group to develop a comprehensive plan for the conversion of all statewide cesspools by 2050 (Act 132, 2018).

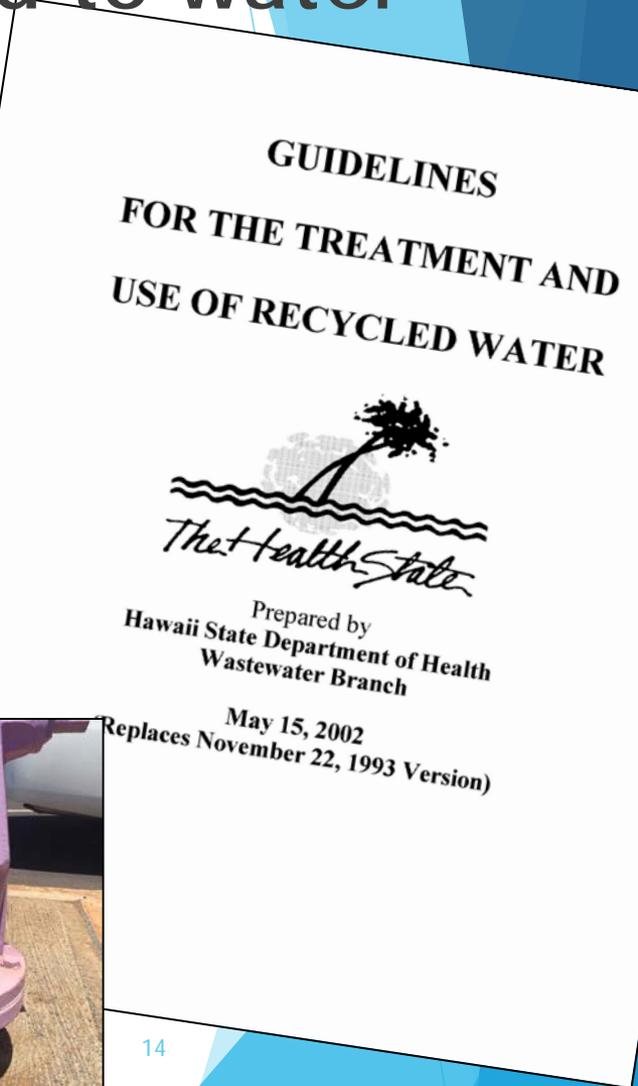


Large diameter injection well used for drainage wells, seepage pits, cesspools



# The Hawaii Department of Health is now faced with many issues related to water protection including (con't.):

- Due to the increasing need for water and declining high quality groundwater resources available, the State is now looking at alternative sources of water, including the reuse of treated wastewater. The DOH supports and advocates the use of treated wastewater providing that public health and water resources are not compromised.



# Example of Reuse Water

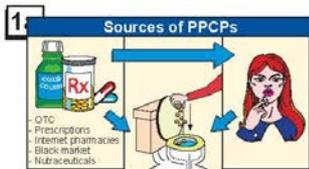


“The Experience at Koele Golf Course, on the Island of Lanai, has used recycled water for irrigation since 1994. The pond shown is recycled water, as is all the water used to irrigate this world-class golf course in the state of Hawaii.”

# The Hawaii Department of Health is now faced with many issues related to water protection including (con't.):

- As technology changes and evolves, new and emerging chemical compounds are being developed and used. We must be aware of these potential emerging contaminants of concern and their potential impact to our water resources and public health.



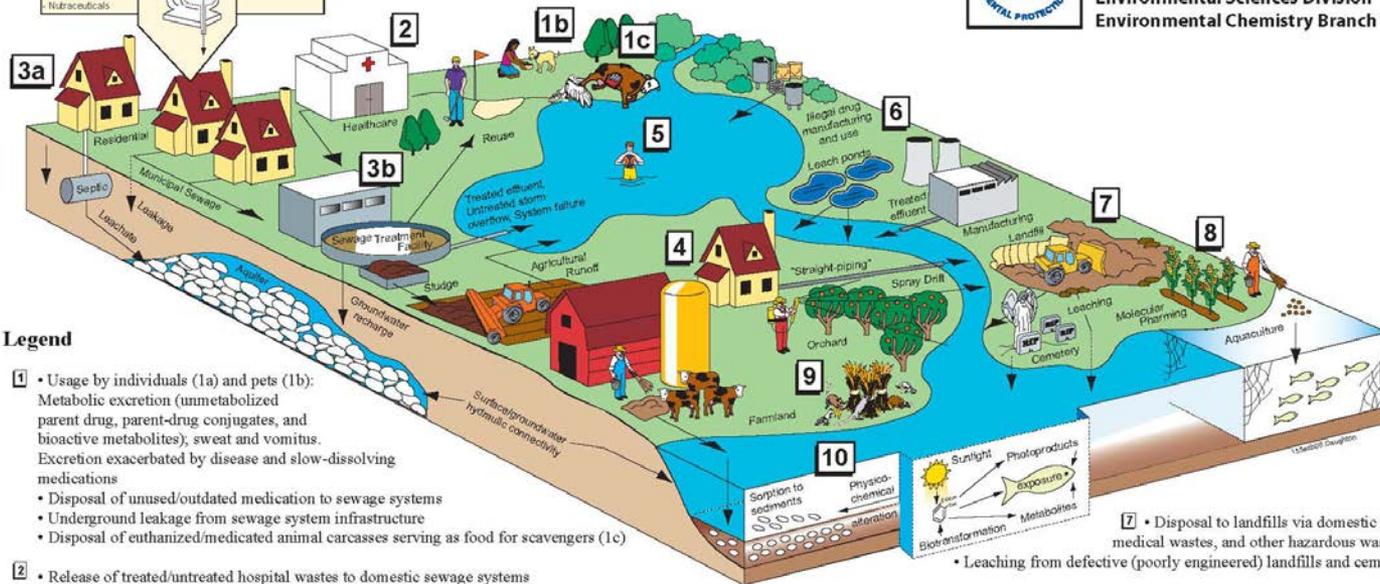


# Origins and Fate of PPCPs<sup>†</sup> in the Environment

<sup>†</sup>Pharmaceuticals and Personal Care Products



U.S. Environmental Protection Agency  
Office of Research and Development  
National Exposure Research Laboratory  
Environmental Sciences Division  
Environmental Chemistry Branch



## Legend

- 1 • Usage by individuals (1a) and pets (1b):  
Metabolic excretion (unmetabolized parent drug, parent-drug conjugates, and bioactive metabolites); sweat and vomitus. Excretion exacerbated by disease and slow-dissolving medications  
• Disposal of unused/outdated medication to sewage systems  
• Underground leakage from sewage system infrastructure  
• Disposal of euthanized/medicated animal carcasses serving as food for scavengers (1c)
- 2 • Release of treated/untreated hospital wastes to domestic sewage systems (weighted toward acutely toxic drugs and diagnostic agents, as opposed to long-term medications); also disposal by pharmacies, physicians, humanitarian drug surplus
- 3 • Release to private septic/leach fields (3a)  
• Treated effluent from domestic sewage treatment plants discharged to surface waters, re-injected into aquifers (recharge), recycled/reused (irrigation or domestic uses) (3b)  
• Overflow of untreated sewage from storm events and system failures directly to surface waters (3c)
- 4 • Transfer of sewage solids ("biosolids") to land (e.g., soil amendment/fertilization)  
• "Straight-piping" from homes (untreated sewage discharged directly to surface waters)  
• Release from agriculture: spray drift from tree crops (e.g., antibiotics)  
• Dung from medicated domestic animals (e.g., feed) - CAFOs (confined animal feeding operations)
- 5 • Direct release to open waters via washing/bathing/swimming
- 6 • Discharge of regulated/controlled industrial manufacturing waste streams  
• Disposal/release from clandestine drug labs and illicit drug usage
- 7 • Disposal to landfills via domestic refuse, medical wastes, and other hazardous wastes  
• Leaching from defective (poorly engineered) landfills and cemeteries
- 8 • Release to open waters from aquaculture (medicated feed and resulting excreta)  
• Future potential for release from molecular pharming (production of therapeutics in crops)
- 9 • Release of drugs that serve double duty as pest control agents:  
examples: 4-aminopyridine, experimental multiple sclerosis drug → used as avicide; warfarin, anticoagulant → rat poison; azacholesterol, antilipidemics → avian/rodent reproductive inhibitors; certain antibiotics → used for orchard pathogens; acetaminophen, analgesic → brown tree snake control; caffeine, stimulant → coqui frog control
- 10 Ultimate environmental transport/fate:  
• most PPCPs eventually transported from terrestrial domain to aqueous domain  
• phototransformation (both direct and indirect reactions via UV light)  
• physicochemical alteration, degradation, and ultimate mineralization  
• volatilization (mainly certain anesthetics, fragrances)  
• some uptake by plants  
• respirable particulates containing sorbed drugs (e.g., medicated-feed dusts)

Christian G. Daughton, U.S. EPA-Las Vegas

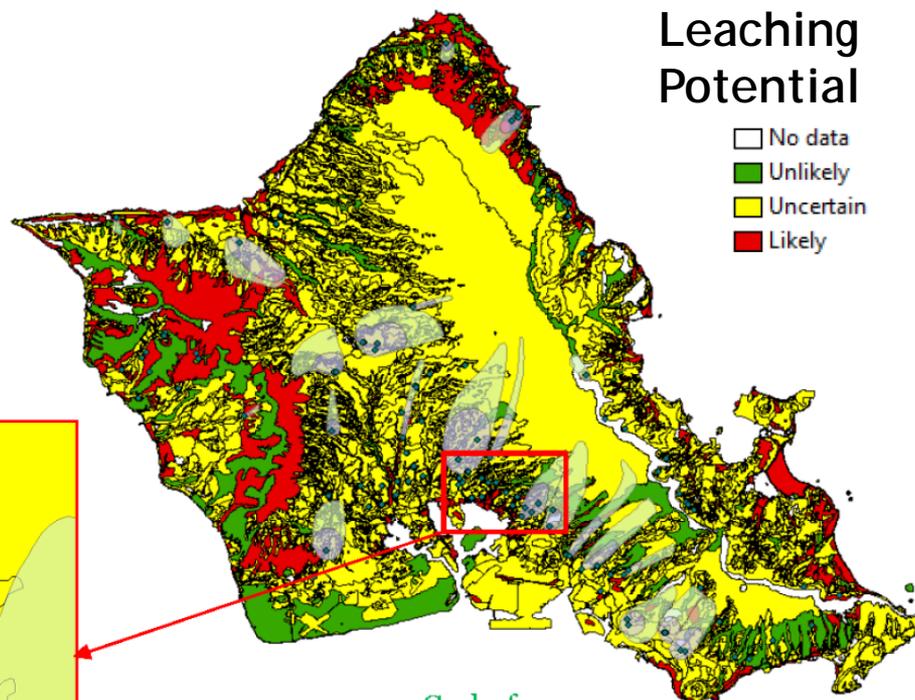
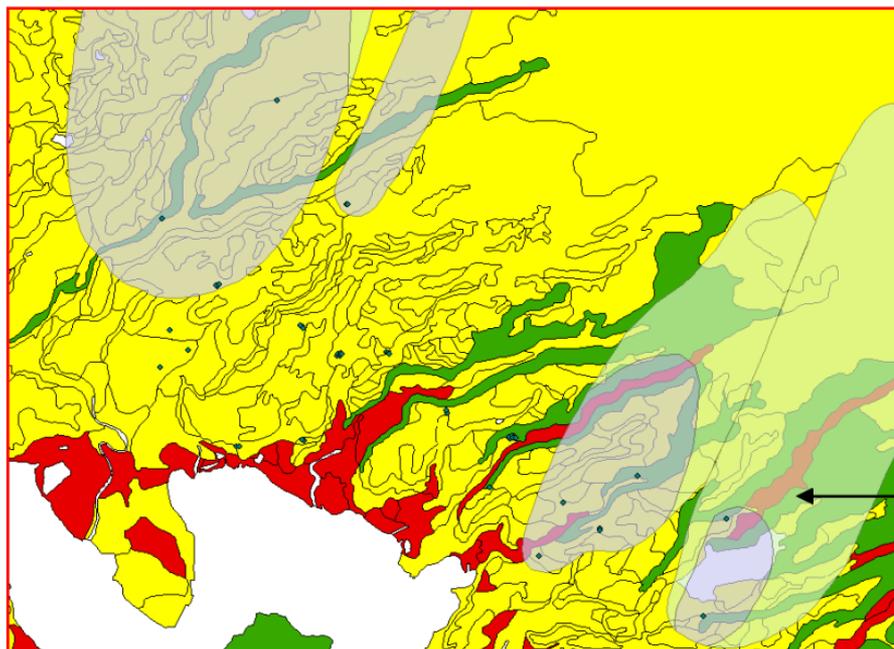
March 2006  
original February 2001

<http://epa.gov/oes/ed1/chemistry/pharma/images/drawing.pdf>  
from: <http://epa.gov/oes/ed1/chemistry/pharma/>

Comprehensive Leaching Risk Assessment System (CLERS) evaluates the potential for a contaminant to leach to the groundwater.

### Legend

- ◆ Public Drinking Water Well
- Two-year Time of Travel Delineation
- Ten-year Time of Travel Delineation



### Leaching Potential

- No data
- Unlikely
- Uncertain
- Likely

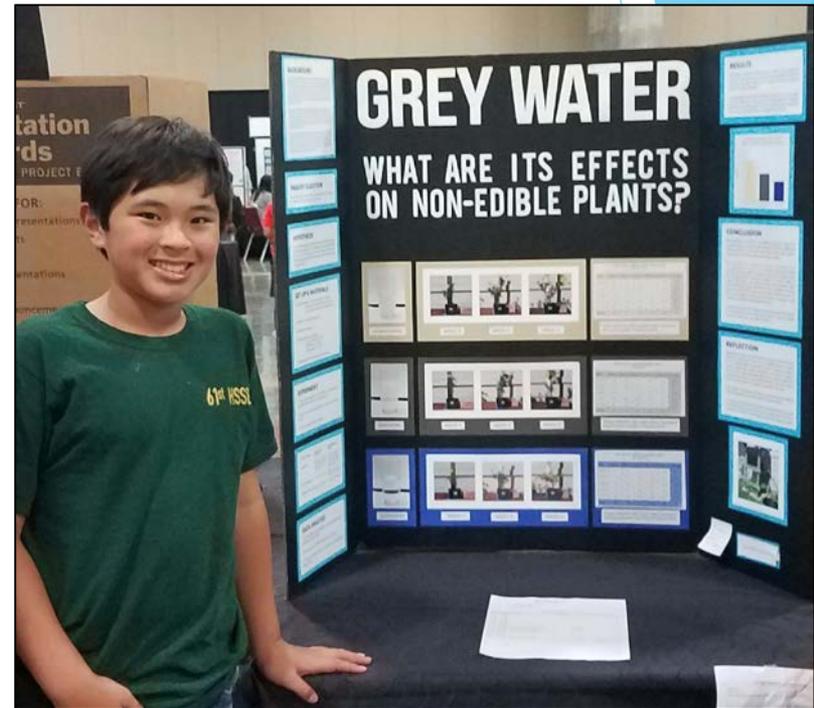
Carbofuran

Drinking Water Well  
Time of Travel Delineation

CLERS Modeled Leaching *Potential* for the Pesticide Carbofuran

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Oliver Upton, Aikahi Elementary School Grade 6  
SDWB 2018 HSSEF Jr. Research First Prize

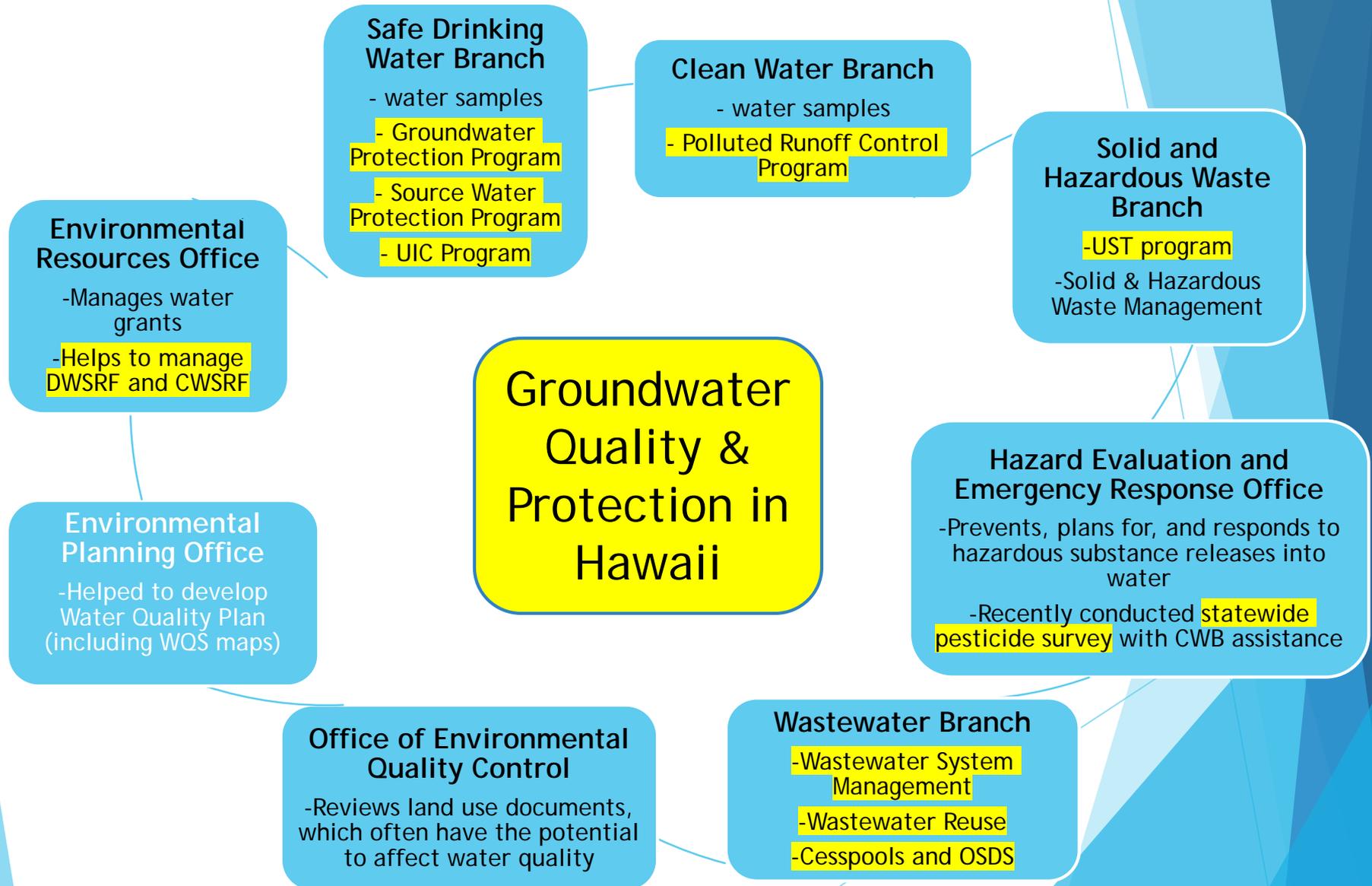
# GOAL 3: Mitigate priority contamination threats and prevent contamination

- ▶ Objective 1: Coordinate protection efforts with other branches/offices/agencies:
  - Safe Drinking Water Branch UIC Program - issuing permits for discharge to wells
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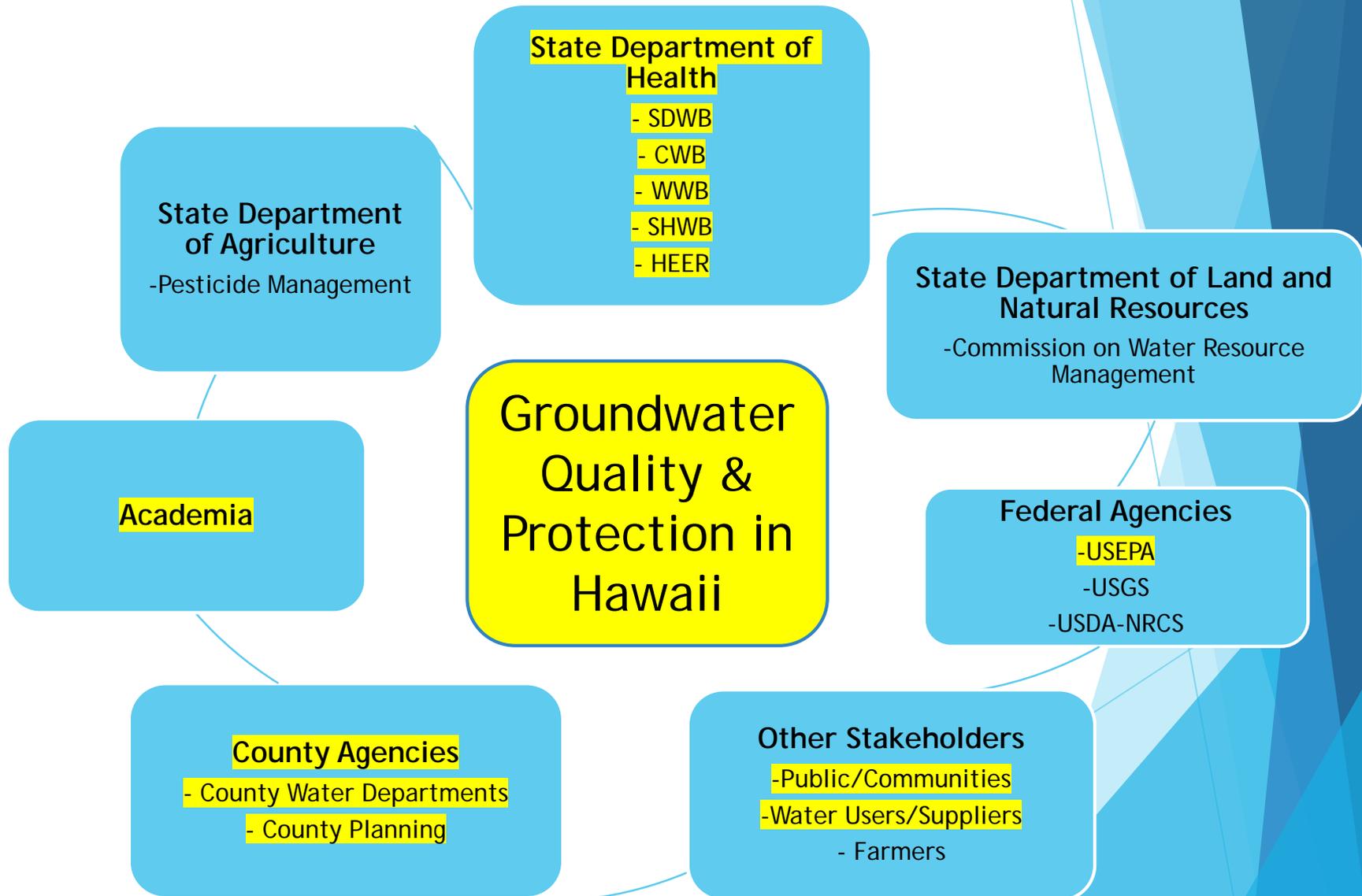
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  - Hazard Evaluation and Emergency Response Office - toxicology and health impacts of groundwater contamination and use of hazardous chemicals and pesticides
  - Environmental Planning Office - review of new development projects and their impacts to groundwater
  - Department of Land and Natural Resources, Commission on Water Resource Management - Hawaii Water Plan, Water Resources Protection Plan - Section 10 Water Use Permits, Well-drilling applications, salt water intrusion data
  - Department of Agriculture - pesticide use and application.

# DOH Groundwater Activities



# Statewide Groundwater Activities



# GOAL 3: Mitigate priority contamination threats and prevent contamination

- ▶ Objective 2: Coordinate use of funding sources to support the HIGWPS:
  - (1) Safe Drinking Water Branch  
(GW106/DWSRF 15%/DWSRF Fees)
  - (2) Wastewater Branch (CWSRF)
  - (3) Clean Water Branch (SW106/319)
  - (4) Solid & Hazardous Waste Branch (SHWB)
  - (5) Hazard Evaluation and Emergency Response Office (HEER)

# GOAL 3: Mitigate priority contamination threats and prevent contamination

- ▶ Objective 3: Coordinate the regulatory framework used by each branch/office/agency to protect groundwater from the prioritized contamination threats:
  - (1) Code of Federal Regulations
  - (2) Hawaii Revised Statutes
  - (3) Hawaii Administrative Rules
  - (4) EPA Guidance
  - (5) Other online tools

# Challenges

Intra-agency  
collaboration

Inter-agency  
collaboration

Funding  
Issues

Groundwater Protection requires Intra- & Inter- Agency Coordination/ Collaboration and Funding

# Hawaii Groundwater Protection Strategy Summary

**Strategy Mission:** To safeguard groundwater quality and public health by protecting Hawaii's groundwater from contamination.

- ▶ **GOAL 1: Monitor and assess groundwater quality**
- ▶ **GOAL 2: Identify and prioritize groundwater contamination threats**
- ▶ **GOAL 3: Mitigate priority contamination threats and prevent contamination**

**Priority on Cesspools**

**Accomplished through collaboration and funding**

# Mahalo!

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