

CESSPOOL CONVERSION WORKING GROUP INFORMATIONAL BRIEFING

**Wednesday, January 4, 2023
Conference Room 423**

AGENDA

Background and Overview

Technology Study

Finance Study

Data and Prioritization

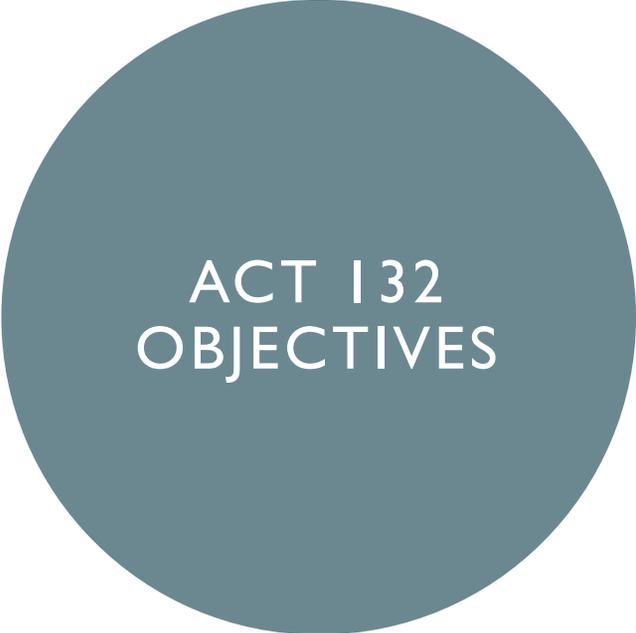
Final Report Recommendations

BACKGROUND AND OVERVIEW

- The Cesspool Conversion Working Group (CCWG) issued their Final Report to the Legislature recommending ways to facilitate the upgrading of 83,000+ cesspools in Hawaii.
- The Department of Health established the CCWG as authorized by the Legislature based on Act 132 of Session Law Hawaii 2018.
- Purpose of the CCWG was to develop a long-range comprehensive plan for cesspool conversion statewide for all cesspools by 2050.
- The CCWG spent four (4) years working to tackle this challenging issue with the first meeting held on September 3, 2018.

CCWG MEMBERS

1	Dr. Elizabeth Char, Chair	Director, Department of Health
2	Edward (Ted) Bohlen	Representative of the public
3	Stuart Coleman	Formerly Surfrider Foundation, WAI
5	Charlene Lani Fernandez	Bank of Hawai'i
6	Ken Hiraki	Hawai'i REALTORS
7	Troy Tanigawa	Wastewater Division, County of Kaua'i
8	Dr. Roger Babcock	Director, City and County of Honolulu, Department of Environmental Services
9	Ramzi Mansour	Director, County of Hawai'i, Department of Environmental Management
10	Dr. Darren T. Lerner	Director, University of Hawai'i Sea Grant College Program and the Pacific Islands Climate Science Center
11	Representative Nicole Lowen	State of Hawai'i House of Representatives
12	Kenneth Wysocki	USEPA Region 9
13	Eric Nakagawa	Director, County of Maui, Department of Environmental Management
14	Erica Perez	Coral Reef Alliance
15	Sina Pruder	Wastewater Branch, Department of Health
16	Dr. Kawika Winter	Manager, He'eia National Estuarine Research Reserve, Hawai'i Institute for Marine Biology
17	Michael Mezzacapo	University of Hawai'i Water Resources Research Center



ACT 132 OBJECTIVES

- Act 132 had 15 objectives that had to be evaluated by the CCWG.
- The CCWG reviewed the objectives and placed them in three categories: **Finance, Technology and Data Prioritization.**
- The CCWG contracted Carollo Engineers to study and provide reports on the Finance and Technology related to the objectives.
- The CCWG contracted the University of Hawaii to evaluate the 2017 data prioritization report and develop a new data prioritization method and tool to prioritize the risk of cesspools to human health and the environment.



Legislative Briefing for the

Cesspool Conversion Technologies Research

January 4, 2023

carollo
Engineers...Working Wonders With Water®

// Agenda

01

Introduction and Background

02

Onsite Wastewater Treatment System
Evaluation Overview

03

Decentralized Cluster Systems Overview

04

Lessons Learned from Other
States

05

Findings and Recommendations



Introduction and Background

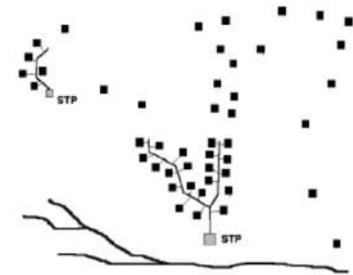
// Conversion options

- Connect to existing or new sewer



// Conversion options

- Connect to existing or new sewer
- Connect to existing or new decentralized system

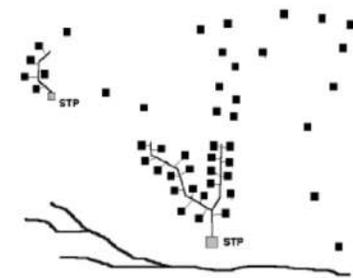


Decentralized approach



// Conversion options

- Connect to existing or new sewer
- Connect to existing or new decentralized system
- Convert/upgrade onsite system



Decentralized approach



Please note: Septic systems vary. Diagram is not to scale.





Onsite Wastewater Treatment and Disposal Technologies

// Treatment technologies evaluated

Treatment Technology	Approval Status
Septic Tank	Approved
Aerobic treatment unit w/ nitrification (ATU-N)	Approved
Aerobic treatment unit w/ nitrification and denitrification (ATU-N-DN)	Approved
Chlorine disinfection	Approved
UV disinfection	Approved
Recirculating sand filter	Approval required
Eliminite	Innovative
NITREX	Innovative
Recirculating gravel filter system (WA)	Emerging

// Disposal technologies evaluated

Disposal Technology	Approval Status
Absorption systems (bed/trench)	Approved
Seepage pit	Approved
Presby advanced enviro-septic	Approved
Evapotranspiration	Approval required
Constructed wetland	Approval required
Drip irrigation	Approval required
Passive treatment units (medium and high treatment, FL)	Innovative
Disposal by layered soil treatment (layer cake) systems (MA)	Emerging
Disposal by nitrification/denitrification biofilter (NY)	Emerging

// Evaluation criteria

- Type of technology and approval status
- Siting restrictions
- Treatment performance
- Replacement interval and costs
- Benefits and challenges to implementation

// Most likely conversion options for Hawaii

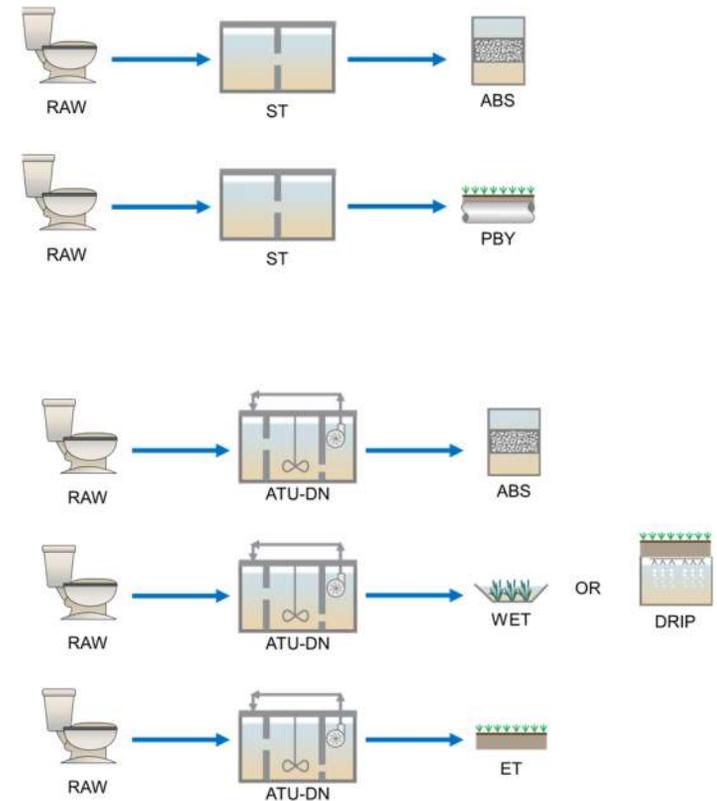
- Typical site conditions

- Septic + absorption
- Septic + Presby or ATU + absorption
- ATU N-DN + absorption or septic + layer-cake absorption*/wetlands*

- Constrained site

- Septic + seepage
- ATU + seepage
- ATU N-DN + UV disinfection + seepage (for coastal discharge areas)

* Innovative system that requires DOH approval





Decentralized Cluster Wastewater Collection, Treatment, and Disposal Technologies

// Key constraints and considerations of decentralized treatment

Constraints

- 10-100 homes (5,000-50,000 gpd)
- “Package plants”

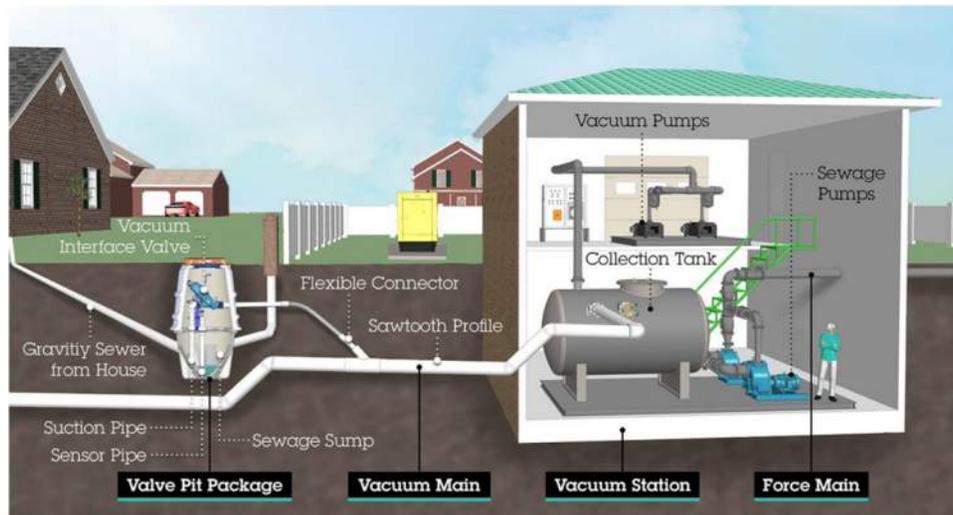
Considerations

- Number of cesspools in the cluster and the separation distance between them
- Terrain
- Availability of land
- Public support, including shared funding for construction and O&M



// Collection system options evaluated

- Gravity sewers
- Liquid-only pressure sewers
- Low-pressure sewers
- Vacuum sewers



Liquid-Only Pressure Sewers

COLLECTION SYSTEM TECHNOLOGY

A liquid-only sewer system is a network of pipes that convey pre-treated wastewater pumped under pressure to the treatment facility. A precondition for these sewers is that efficient preliminary treatment is available at the household level, typically achieved using a septic tank. This system is also known as a septic tank effluent pumping (STEP) sewer system and is practical in areas with a limited number of homes and relatively short distances to the neighborhood treatment facility.

IDEAL APPLICATION

- Where a septic tank already exists at each property.
- Where appropriate differences in elevation do not exist for gravity flow, or where shallow construction is preferred.

BENEFITS

- Independent from land topography restrictions.
- The septic tank retains most of the fats, oils, grease, and solids reducing clogging problems.
- Septic tanks have storage capacity to operate during power outages.
- Smaller pipes compared to conventional gravity sewers.
- Can be installed at a shallow depth.

CHALLENGES / RESTRICTIONS

- Requires power for the pumps located at each property.
- Requires a septic tank at each property.
- Grease and sludge must be periodically pumped from each individual septic tank.
- Pumps and filters must be maintained on each property.

OPERATIONS AND MAINTENANCE

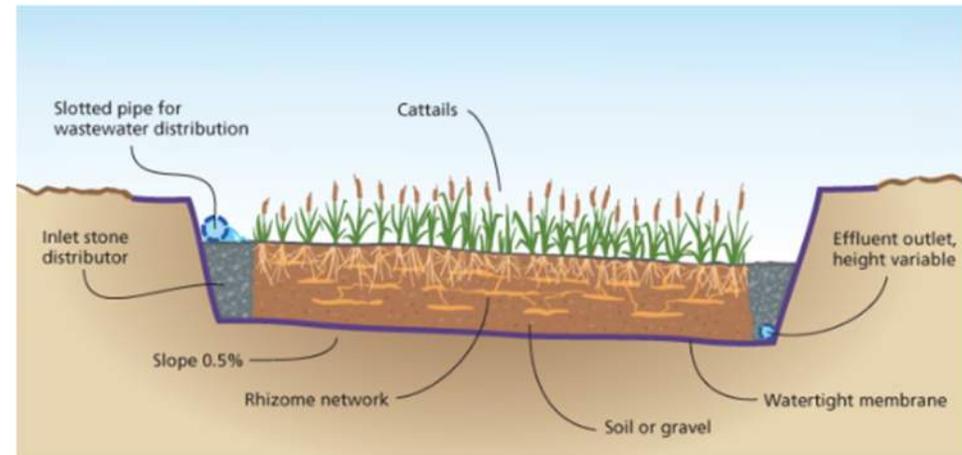
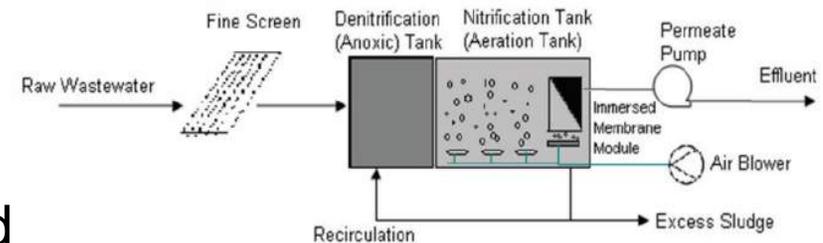
- Provide/maintain power to the pump at each property.
- Inspect and clean filter on pump monthly.
- Periodically remove accumulated sludge and scum from septic tank.
- Remove any blockages in pressure pipe network.



Liquid-Only Pressure Sewer System (Granco Systems, Inc.)

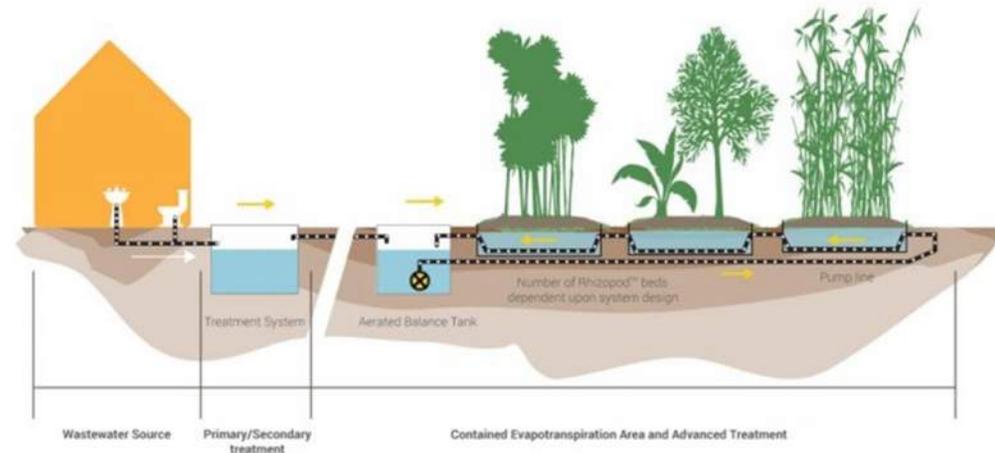
// Treatment system options evaluated

- Conventional activated sludge
- Extended aeration activated sludge
- Membrane bioreactor (MBR) activated
- Textile filter (attached growth systems)
- Moving bed biofilm reactor
- Constructed wetland



// Effluent disposal options evaluated

- Absorption trench/bed
- High-pressure drip
- Low pressure pipe
- Seepage pit
- Water reuse
- Evapotranspiration
- *Injection well*
- *Surface water discharge*



// Benefits and challenges of decentralized systems

Benefits

- Potential for rapid conversions
- Reducing administrative oversight and enforcement burden
- Reducing burden on homeowners to hire engineers and contractors independently
- Ensure proper operations and ongoing maintenance by licensed operators
- Broaden range of funding opportunities

Challenges

- Need for neighborhood-level coordination
- Higher cost
- Need for skilled operators
- Land/space requirements



Findings and Recommendations

// Summary of findings and recommendations

- **Further evaluation of septic tank systems**

- Allowable “density” of septic tank systems or numeric limits for total nitrogen

- **Develop a coordinated strategy for methods of conversions**

- Countywide or statewide study focused on recommended conversion options for different areas
- What cesspools can be easily connected to existing sewers?
- What cesspools can be connected to extended or new sewer systems?
- Feasibility of decentralized treatment for high-density, high-priority cesspool areas.



// Summary of findings and recommendations (cont'd)

• **Best practices for application and approval of alternative and innovative technologies**

- Develop a staffing plan
- Determine fees and program funding
- Develop standardized application forms and templates
- Consider water quality standards
- Use certified laboratories
- Establish testing period, sampling intervals, and number of systems tested
- Data management plan
- Develop simplified approval process
- Provide certification and training programs



// Summary of findings and recommendations (cont'd)

• Staffing/training/workforce development

- Professional staff
- Contractors
- Operators

• Public outreach, education, and homeowner tools

- Develop educational resources
- Educate on conversion options
- Facilitate access to engineers, contractors, and operators with applicable experience
- Provide guidance on financial support or funding options

RULES ARE CHANGING FOR YOUR HOME CESSPOOL

CESSPOOLS NEED TO GO!

Cesspools are underground wells used to dispose of household wastewater into the groundwater table. In 2017, the Hawaii State Legislature passed Act 125 requiring the replacement of all cesspools by 2050 to prevent environmental contamination. Cesspools pose a high risk to drinking water sources and coastal ecosystems. Even if you don't plan on being in your house in 2050, having a cesspool will negatively effect the resale value of your home.

HOW DO I KNOW IF I HAVE A CESSPOOL?

You probably **don't** have a cesspool if:

- ✓ You pay a sewer bill or sewer charge on your water bill.
- ✓ Your home was built recently.
- ✓ An alternative wastewater system other than a cesspool is shown at your residence on the "GSDS" map found here: geportal.hawaii.gov

Inquire with the Department of Health if you're unsure of whether or not you have a cesspool

OK, SO HOW DO I FIX IT?

- 1 Hire a licensed civil engineer to help you make a plan
- 2 Submit your plan to the Department of Health for approval
- 3 Hire a licensed contractor to build new system
- 4 Engineer submits inspection report for approval

CAN I AFFORD THIS?

Check out our local financing options. Typical replacement costs range from \$9,000 to more than \$60,000. For current financing opportunities, contact the Department of Health or visit their website listed below.

- State or County Support (if available)
- Home Refinancing
- Federal Grants and Loans (if available)

For additional information contact the Department of Health at 808-586-4294 or visit their website at health.hawaii.gov/wastewater



Mahalo!



Cesspool Conversion Working Group Informational Briefing for the

Cesspool Conversions Finance Research

January 4, 2023
Conference Room 423

 **carollo**
Engineers...Working Wonders With Water®

// Agenda

01 Affordability Analysis

02 Funding Options

03 Factors That Affect Cesspool Conversion Programs

04 Findings and Recommendations

// Technologies and Finance Team



Gary Deis
Principal in Charge



Cari Ishida
Project Manager



Seema Chavan
Funding Lead



Jen Ivey
Affordability Lead



Mark Panny
Lead Analyst



Ann Hajnosz
Local Finance
Harris & Associates



Roger Babcock
Technologies
UH/CCH



John Katahira
Education
TLCG

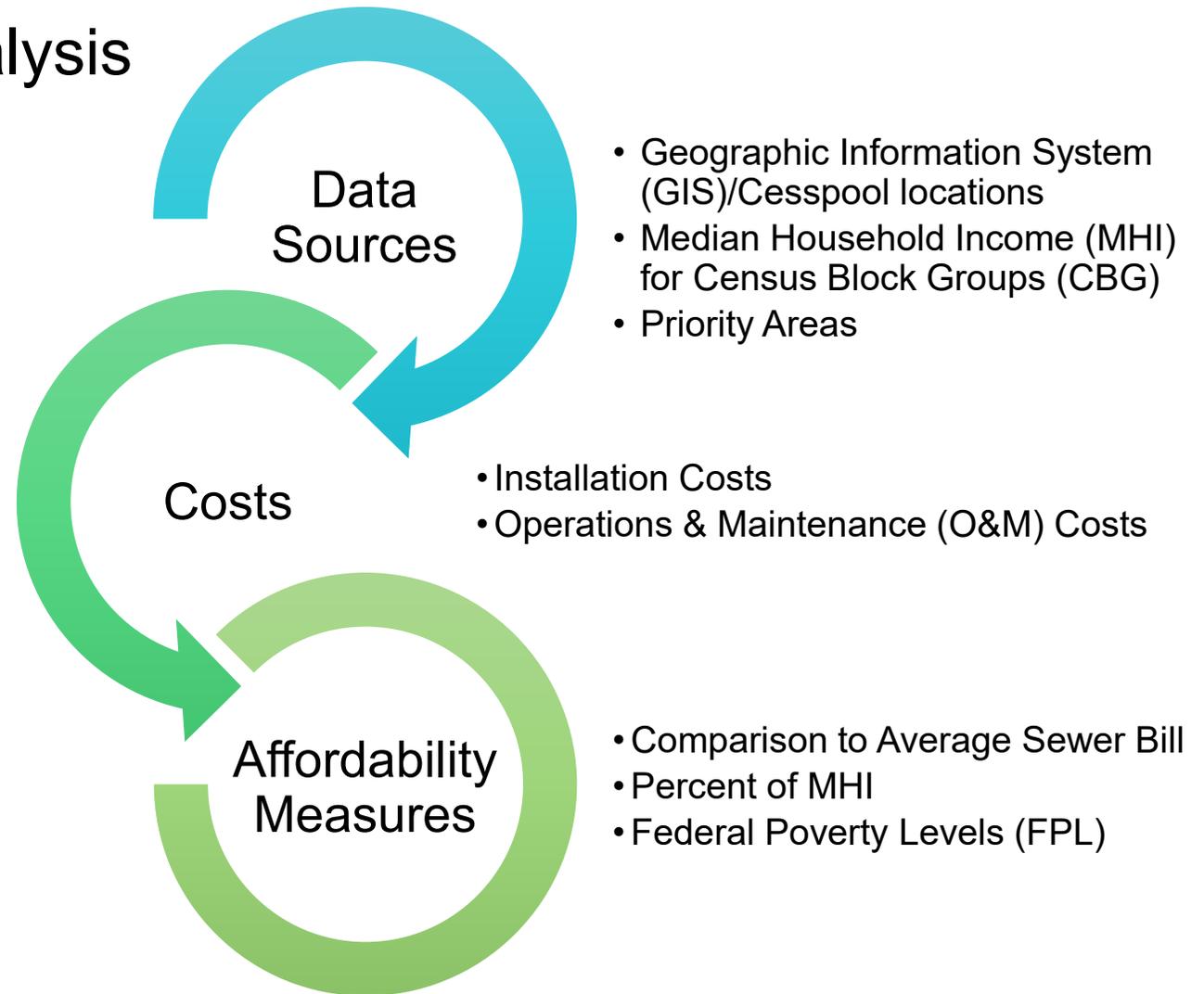


James Roberts
Education
TLCG



Affordability Analysis

// Affordability Analysis Methodology



// Financial Impact of Cesspool Conversions

Cost Description	Low	Average	High
Cesspool Conversion Construction Cost (total) ⁽¹⁾	\$10,000	\$23,000	\$38,000
Interest rate (percent) ⁽²⁾	4.0		
Loan Term (years) ⁽²⁾	20		
Cesspool Conversion Construction Cost (monthly) ⁽²⁾	\$61	\$139	\$230
Estimated O&M Cost (monthly) ⁽³⁾	\$33	\$71	\$108
Estimated Monthly Cost	\$94	\$210	\$339

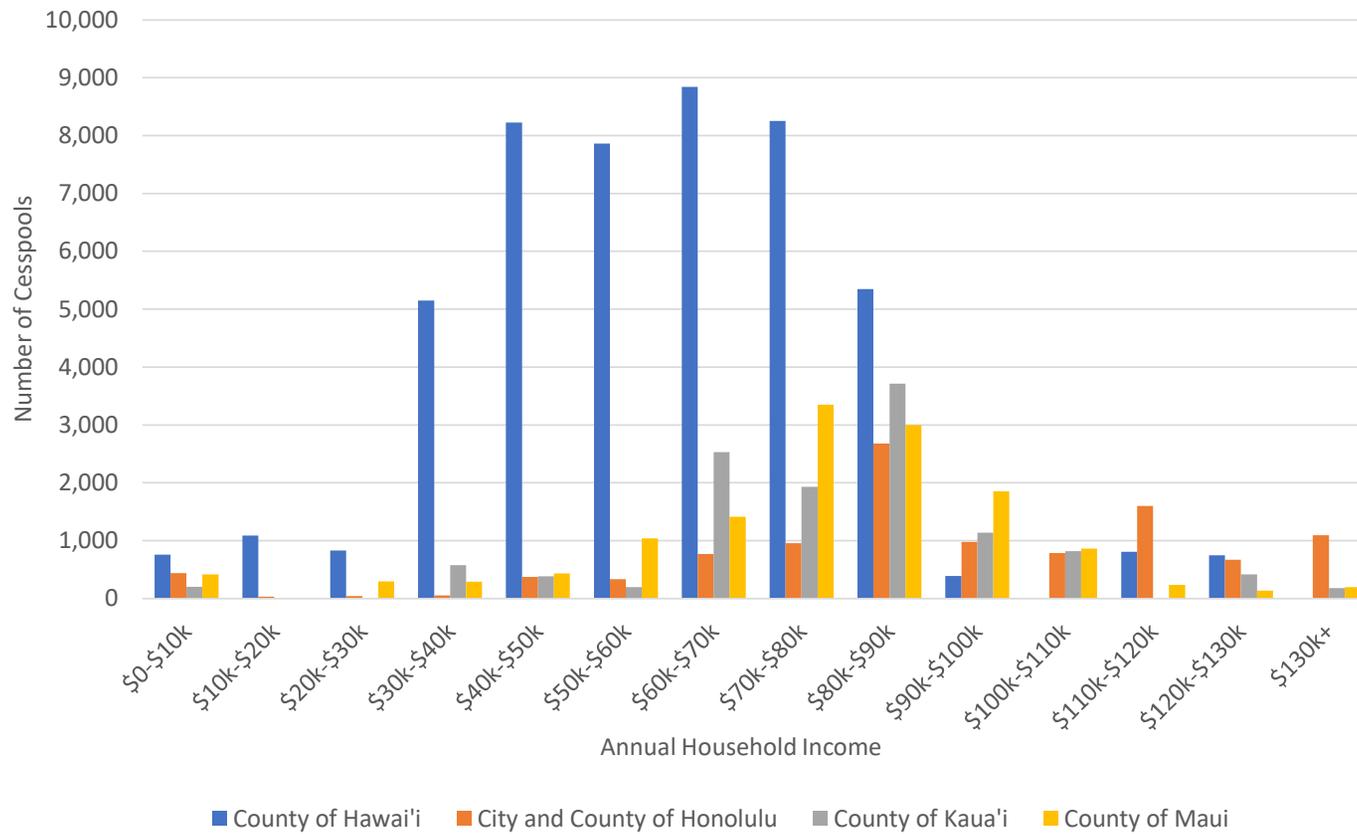
Notes:

1. Installation costs are based on historical installation costs for septic tank and ATU treatment and disposal systems from DOH. The low-end cost represents the 10th percentile, and the high-end cost represents the 90th percentile. All conversion costs are site specific and these installation costs may not be representative for more complex sites/installations.
2. Installation costs are assumed to be financed over 20 years at 4 percent based on market rates for home equity loans as of July 2020.
3. Monthly operating costs are estimated with the low end representing septic tank operations costs. The high end represents a higher level of treatment with ATU + UV disinfection + seepage pit. The median operations cost is the median of the low- and high-end operations costs.

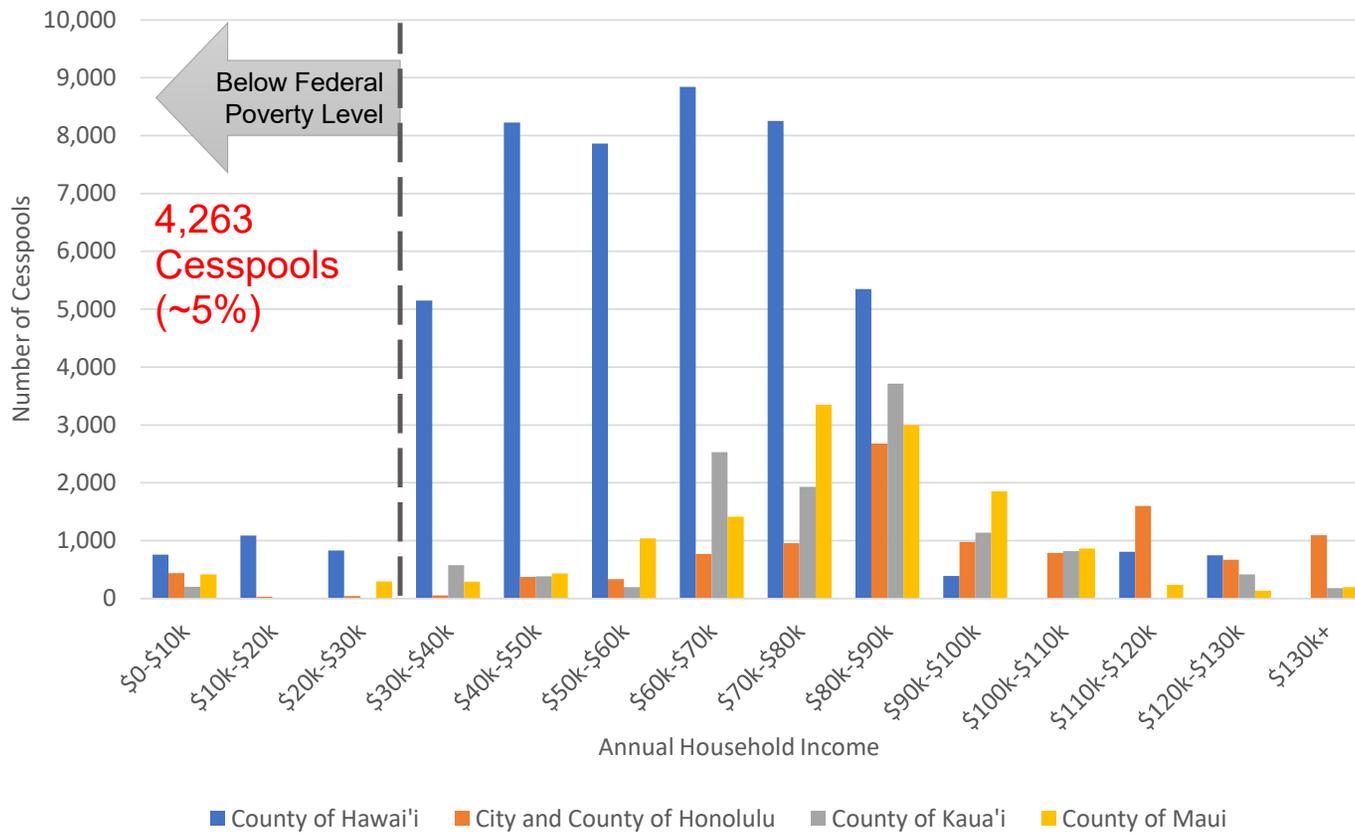
// Affordability Measures

- Federal Poverty Level
 - Annual income < \$30,718
- Percent of Median Household Income
 - Financially burdened if conversion cost is greater than 2% of MHI
 - Annual income < \$126,125

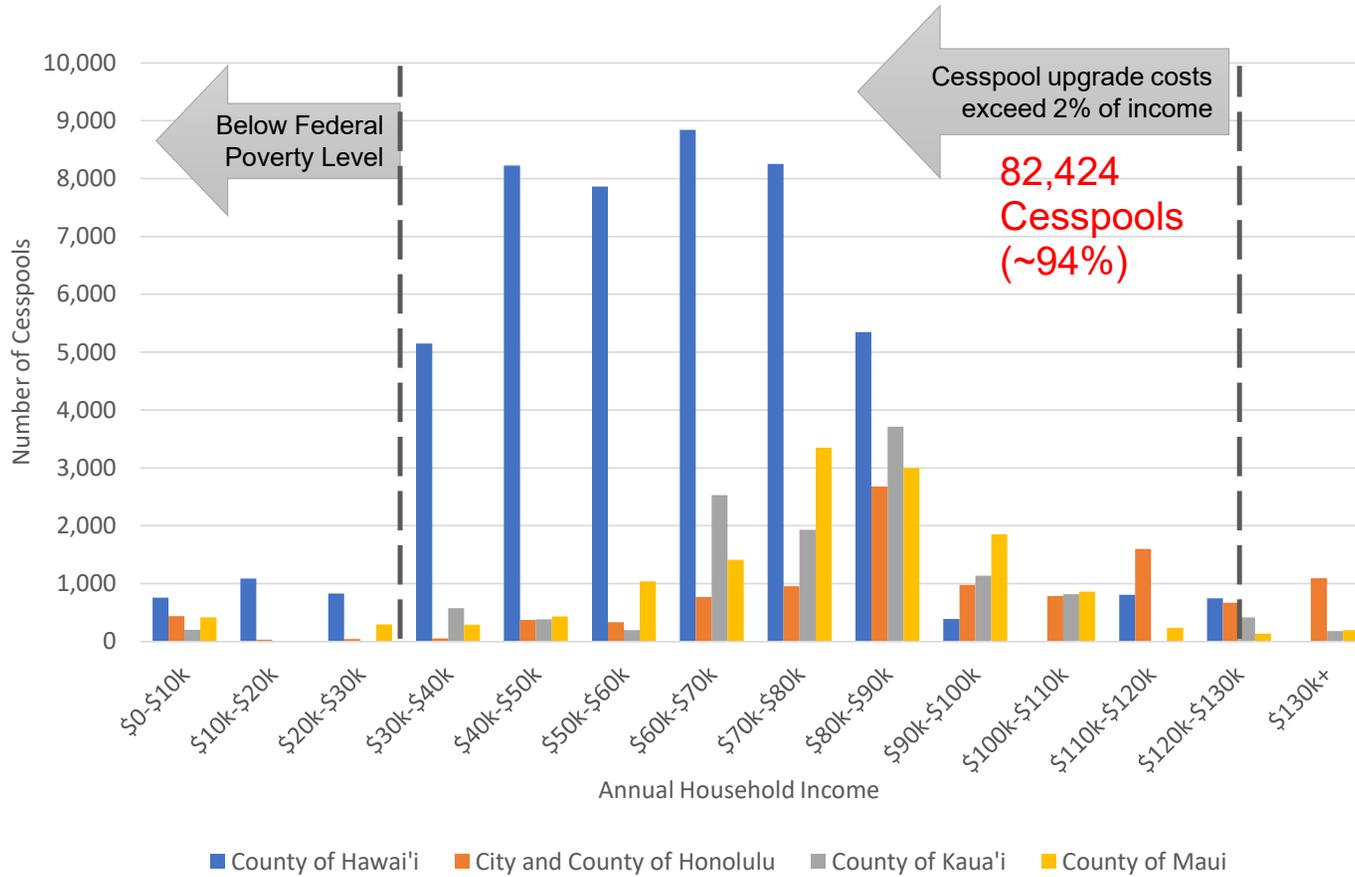
// Statewide Cesspool Conversion Affordability Results



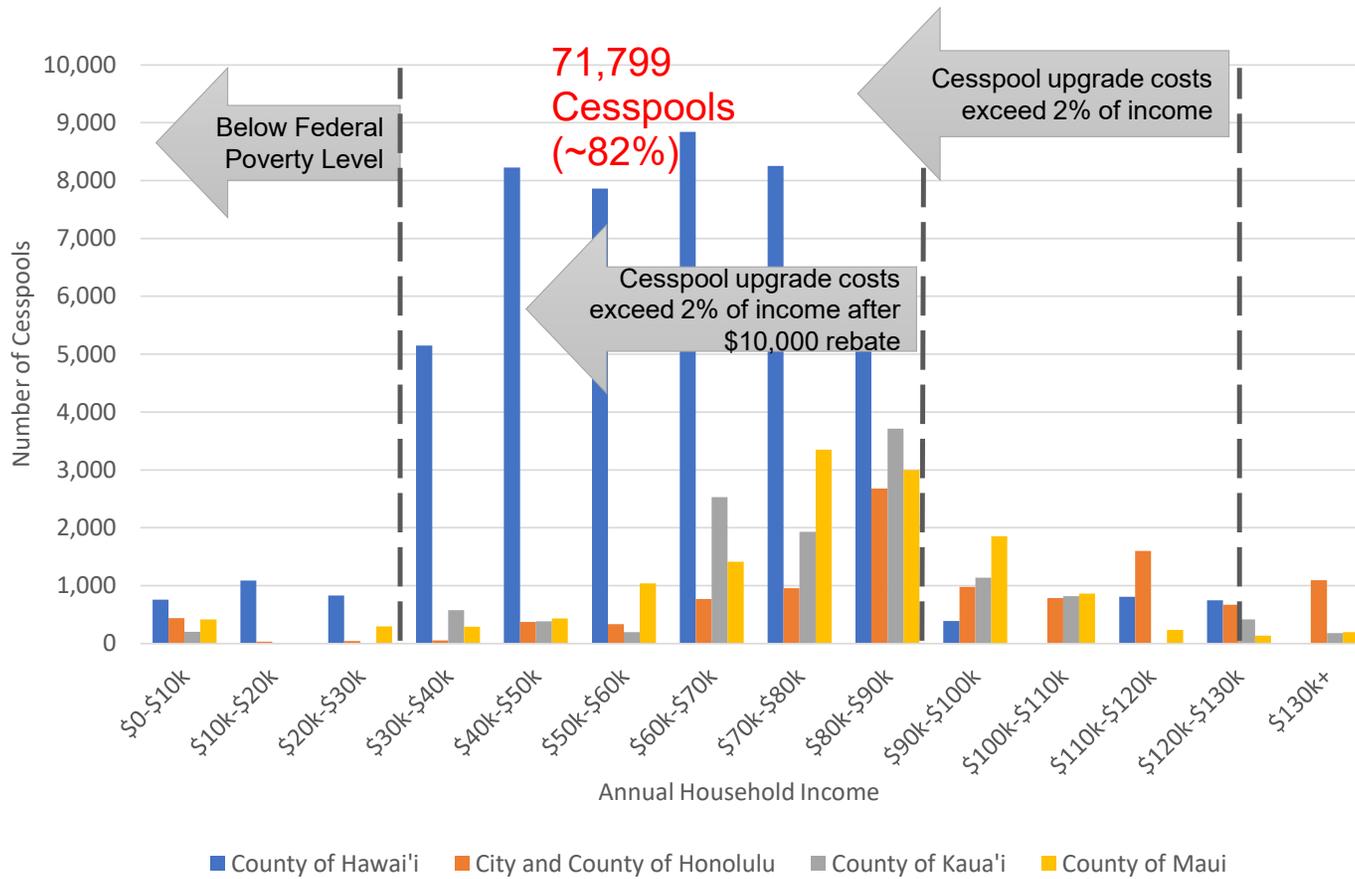
// Statewide Results: FPL



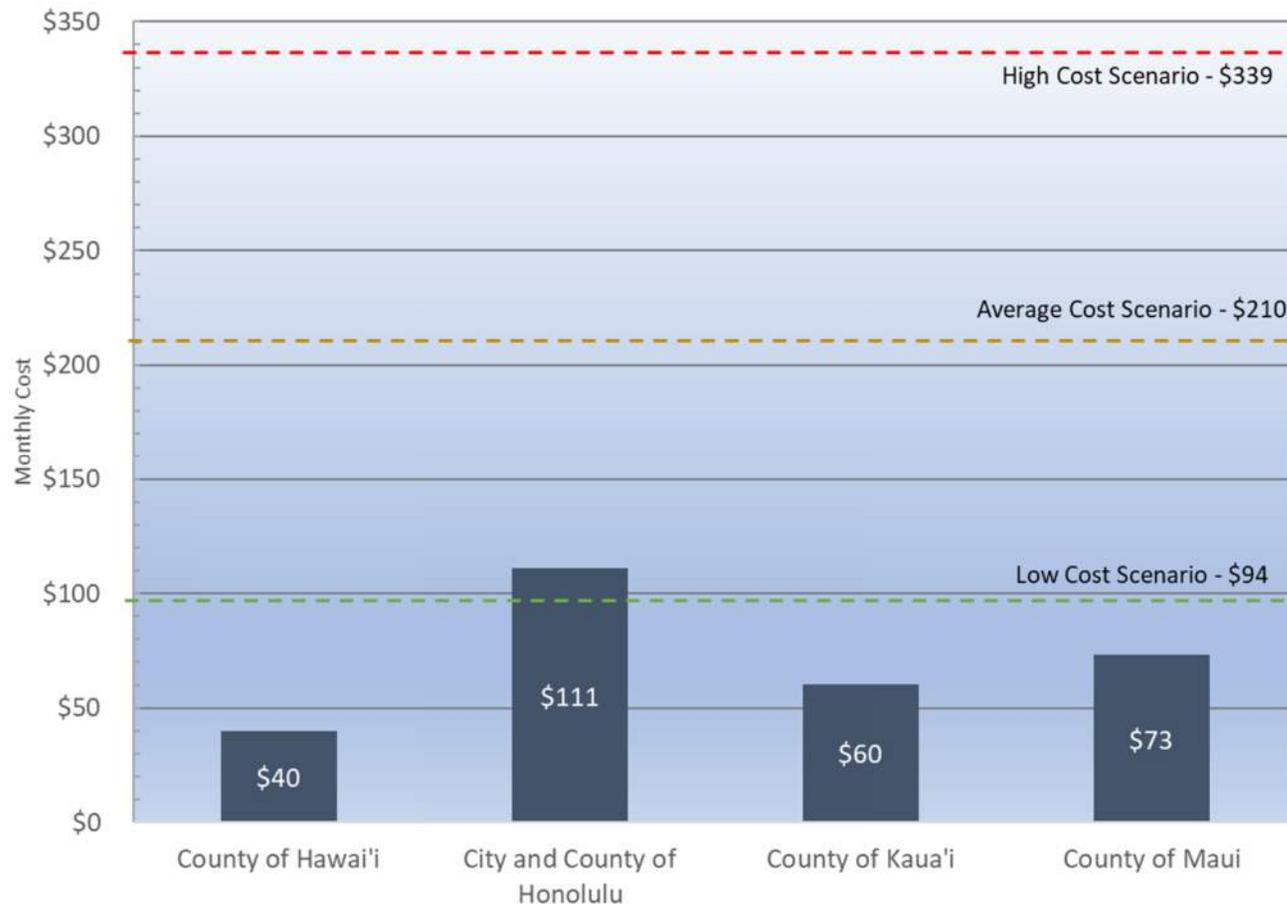
// Statewide Results: FPL, MHI



// Statewide Results: FPL, MHI, \$10K Rebate



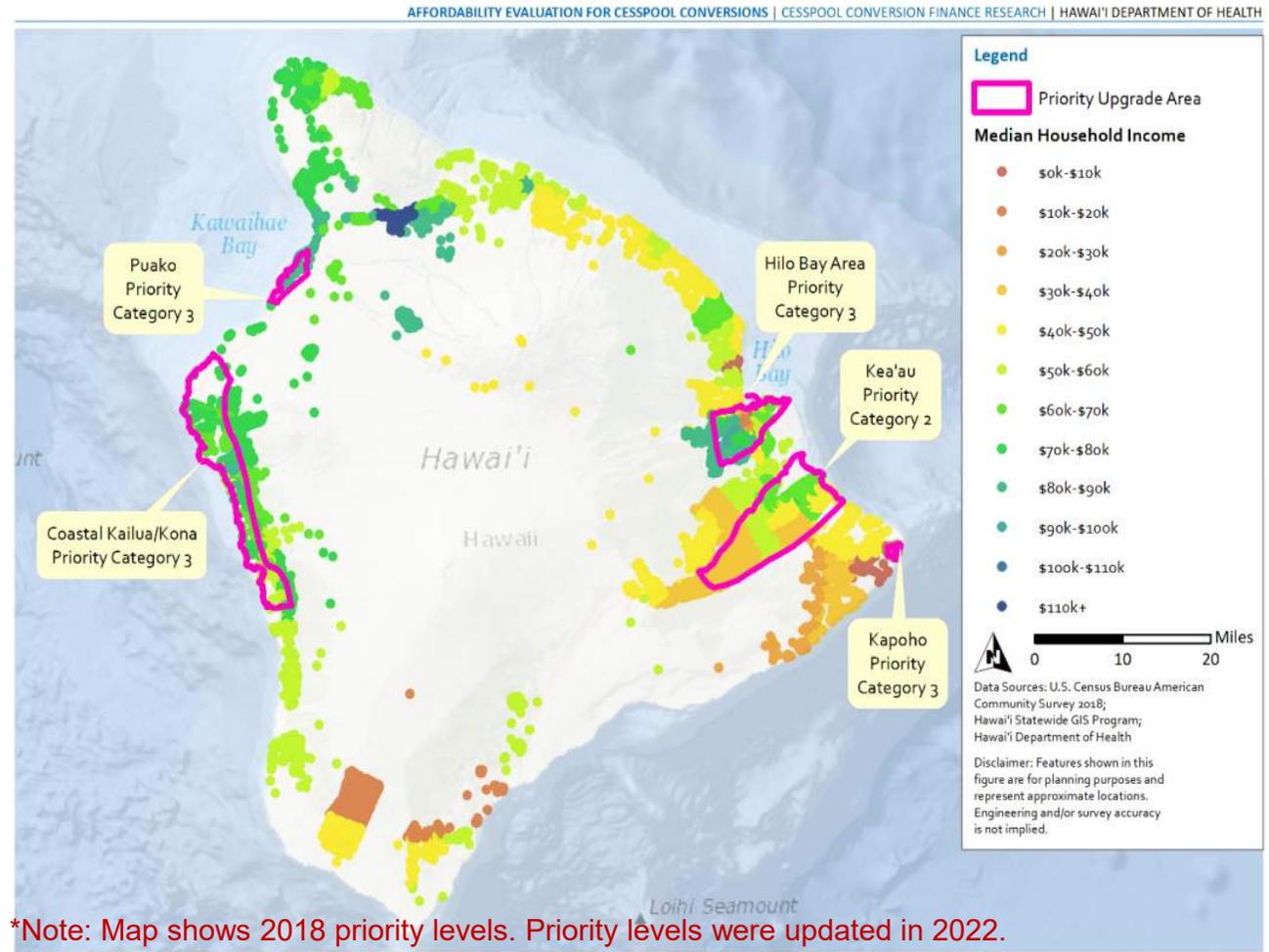
// Typical Monthly Sewer Bill Compared to Monthly Cesspool Conversion Costs for Average Scenario



Monthly sewer bills are not representative of total cost to Counties of sewer

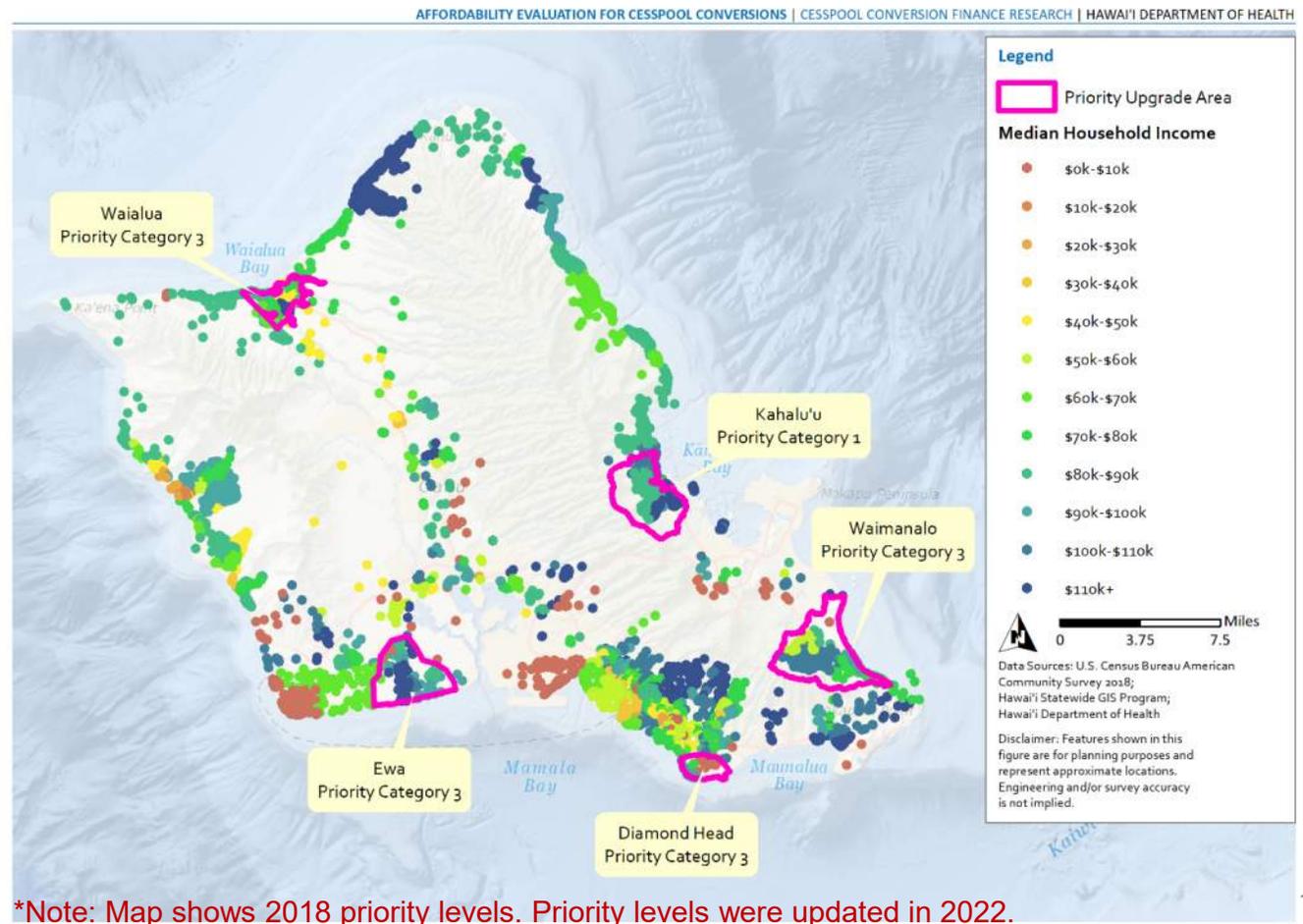
// Hawai'i County

- Greatest affordability challenges (98%)
- Most cesspools of all counties
- Least access to centralized sewers, 71% without sewers



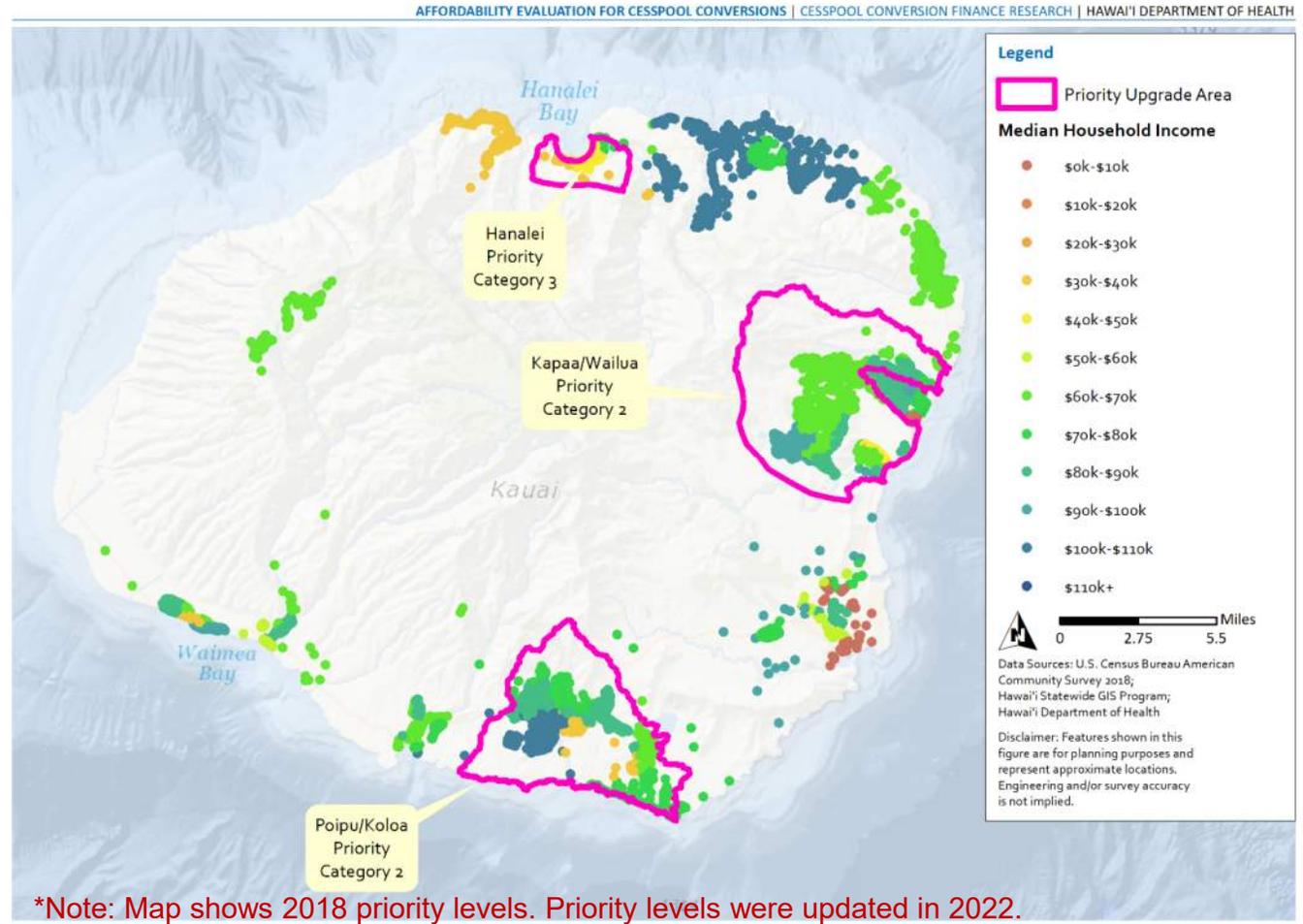
// City and County of Honolulu

- Most access to centralized sewers, lowest percentage of households with cesspools @ 3%
- Most affluent of all counties
- Significant poverty



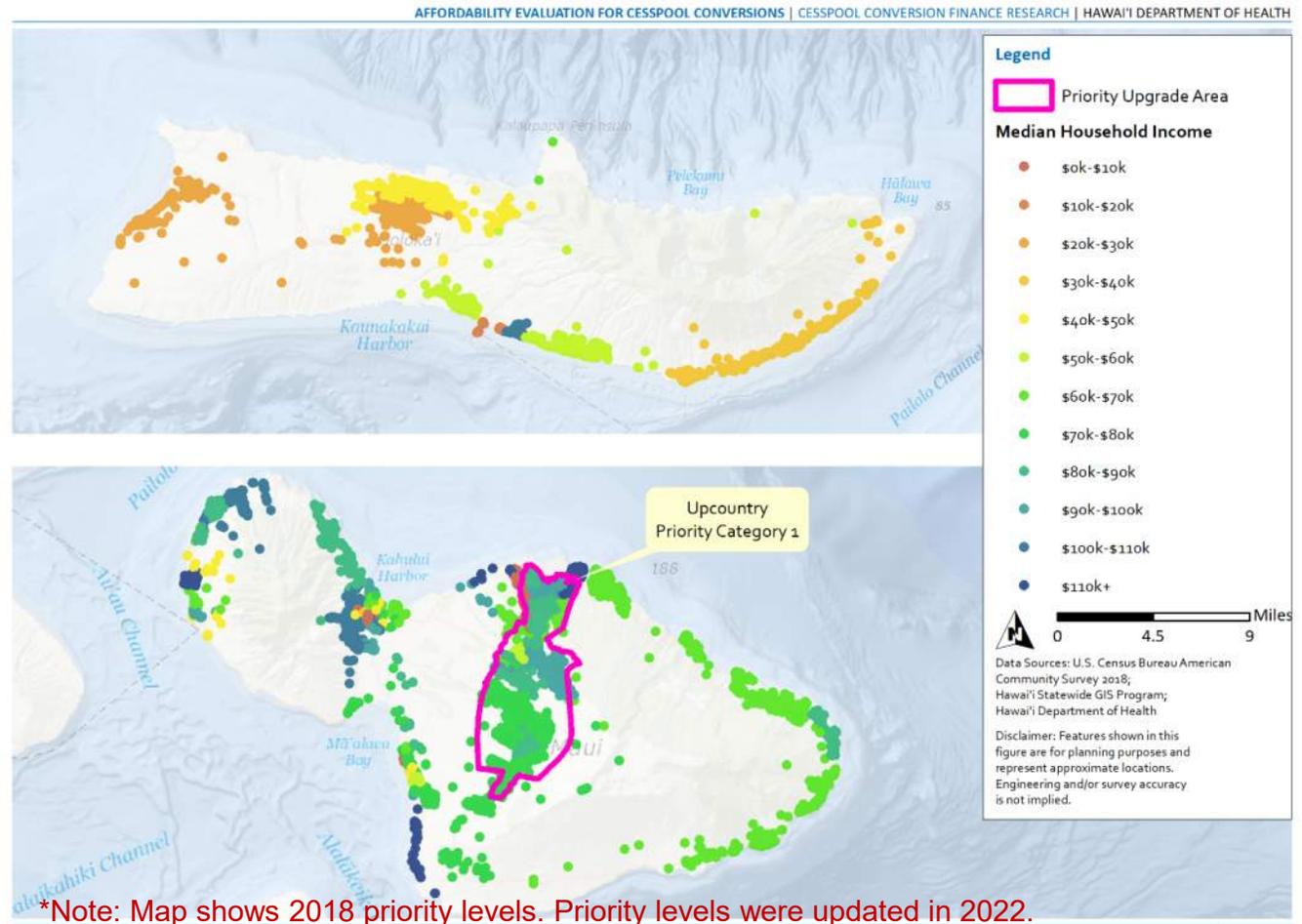
// Kaua'i County

- 95% cannot afford conversions
- 54% of all households have cesspools



// Maui County

- 22% of households have cesspools
- 98% of Maui and 100% of Molokai residents cannot afford conversions





Funding Options

// Cesspool conversion: Funding program challenges



Not a “one size fits all solution” for all counties



Magnitude of the affordability issue



Homeowners need incentives to convert cesspools

- Identification/quantification of benefits (e.g., environmental, water quality, etc.)
- Need for an extensive, sustainable public outreach program



Provide funding for upfront costs

- Program funding
- Homeowner funding

// Cesspool conversion: Funding program challenges *(cont'd)*



Consider the funding recipient—Homeowner or other entity

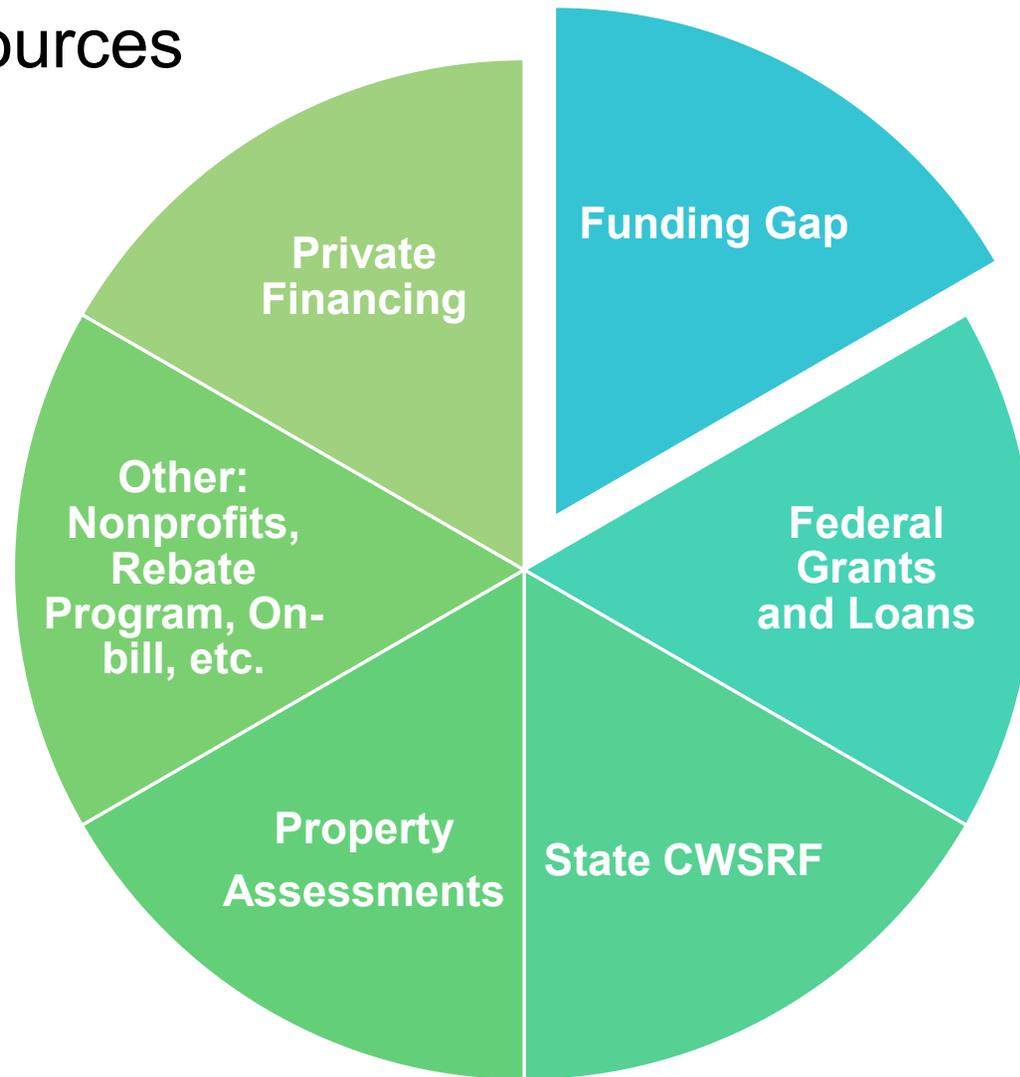


Potentially fund a variety of conversion options



Legislation/Governance Structure

// Funding sources

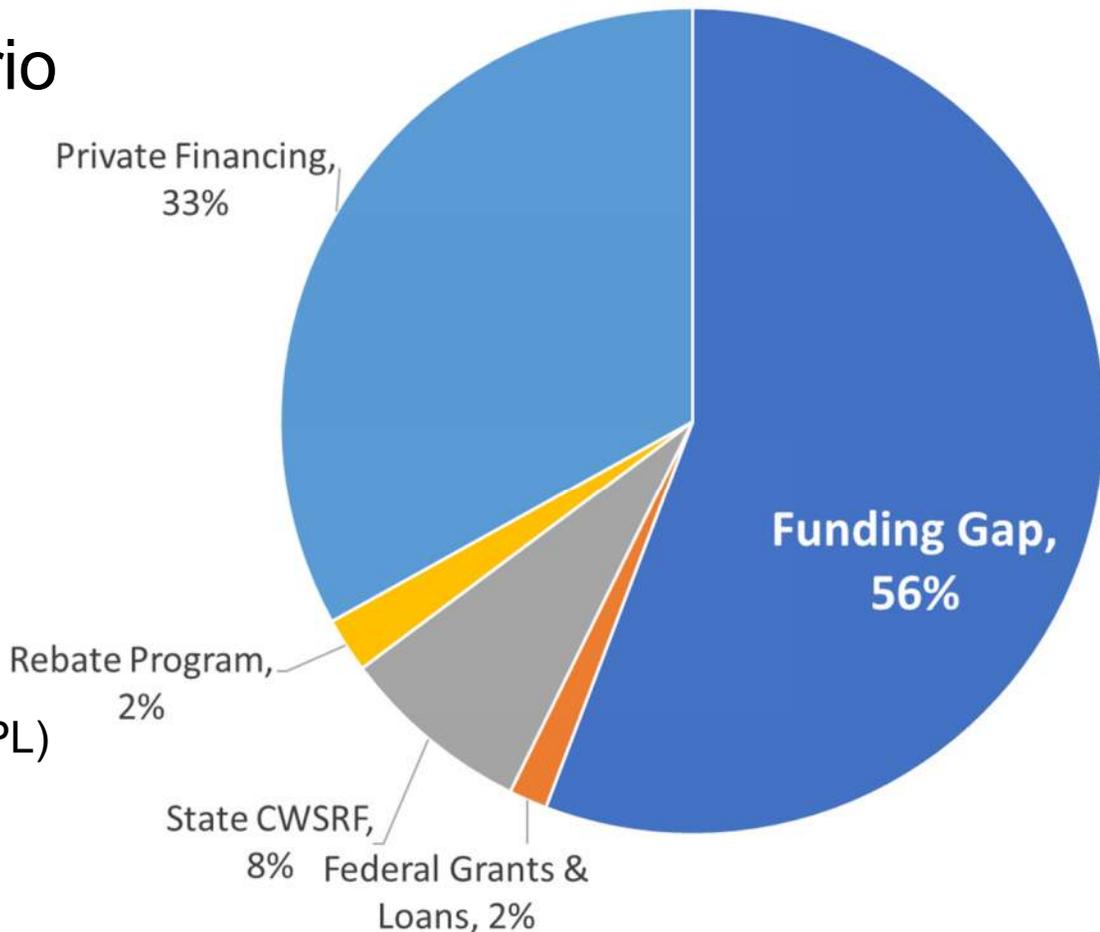


// Funding options: Hypothetical scenario

What are the pieces of the funding “pie”?

Assumptions:

- Total conversion cost: \$2B
- State CWSRF: \$150M (@\$5M/yr * 30 yrs)
- Federal grants/loans: \$30M (@\$1M/yr * 30 yrs)
- Rebate program: \$43M (\$10K rebate for those below FPL)
- Private financing: \$661M
- **Funding gap: \$1.1B**





Funding:

Key takeaways from other states

- Magnitude of the funding needed vs. available funds
- Need for sustainable financing mechanisms to cover program administration and other costs
- Other states with successful programs had:
 - Suite/portfolio of funding options
 - **Early** and **extensive public outreach** and education
 - State programs to help pay for conversions
 - Low interest loans
 - Conduit agencies/partnerships



Factors That Affect Cesspool Conversion Programs

// Factors that affect cesspool conversion programs



Public acceptance and education

- Environmental benefits
- Methods of conversions
- Technical & financial resources



Perception of inequity

- Site-specific costs
- Conversion costs compared to sewer fees



Near-term incentives to convert

- Aggressive pace of conversions to meet 2050 deadline
- Focus on priority areas



Available workforce and resources

- Professionals
- Contractors/materials
- O&M



Responsible management entity

- Single management entity
- Long-term



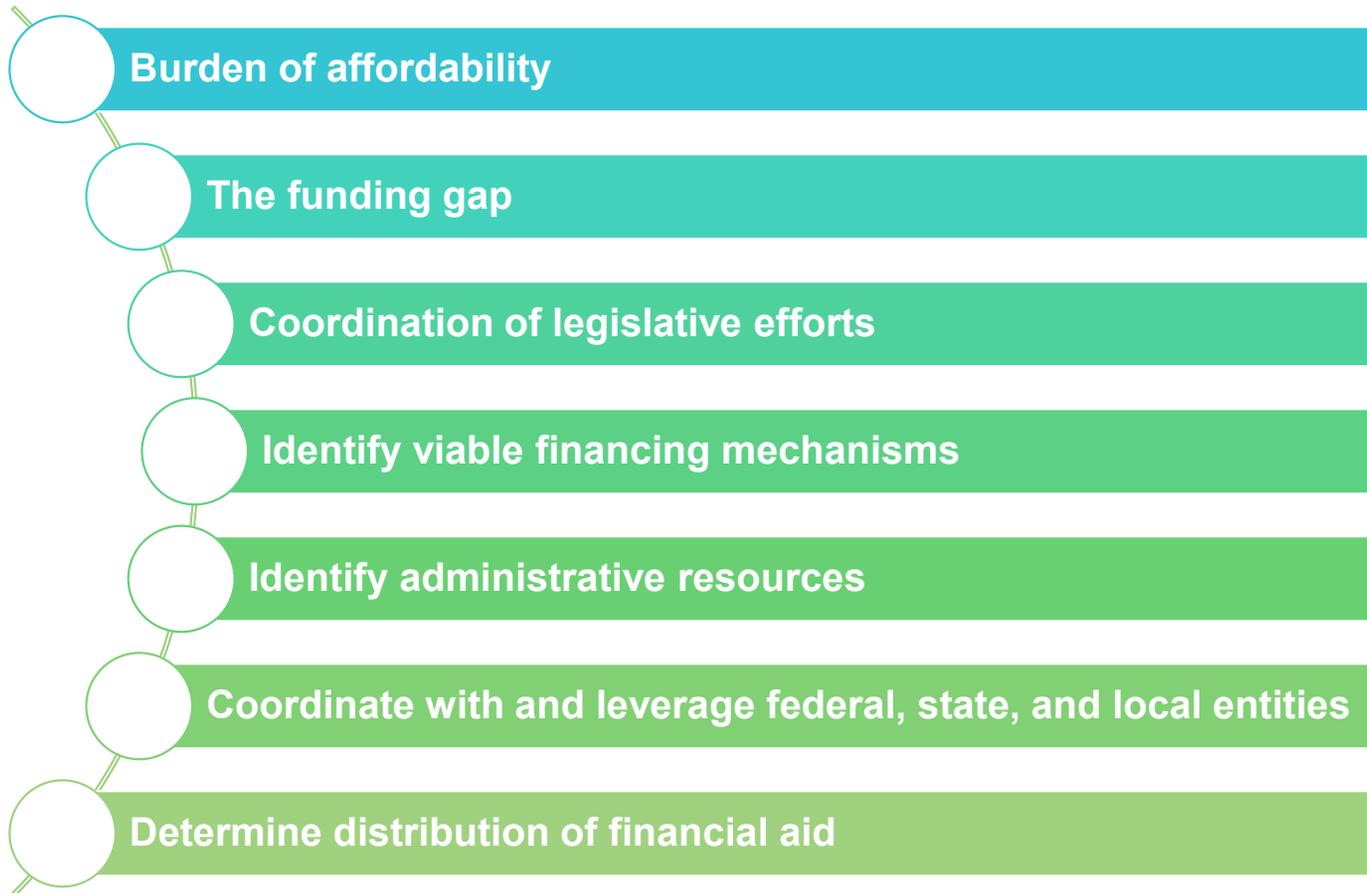
Stable source of revenue

- Support funding program
- Administrative costs



Findings and Recommendations

// Summary of Findings & Recommended Next Steps: Finance & Program Development

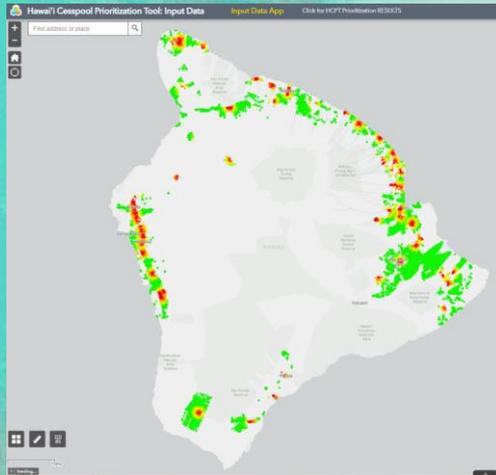




Mahalo!

The 2022 Hawai'i Cesspool Hazard Assessment & Prioritization Tool

Chris Shuler & Michael Mezzacapo
*University of Hawaii at Manoa SeaGrant College Program &
Water Resources Research center*



The Need for Prioritization

Motivation:

- Scale of the problem: 88,000 cesspools, 53 million gallons of untreated sewage / day, \approx 9.2 million lbs of Nitrogen \approx 2.5 million lbs of Phosphorus dumped on reefs per year
- Workforce, materials, and technology limitations demand a step-wise planning and management strategy
- Filling the DoH recognized need for updates to 2017 prioritization

HCPT Goal: To rank Hawaii's cesspools based on their individual and collective impact to human health and the environment

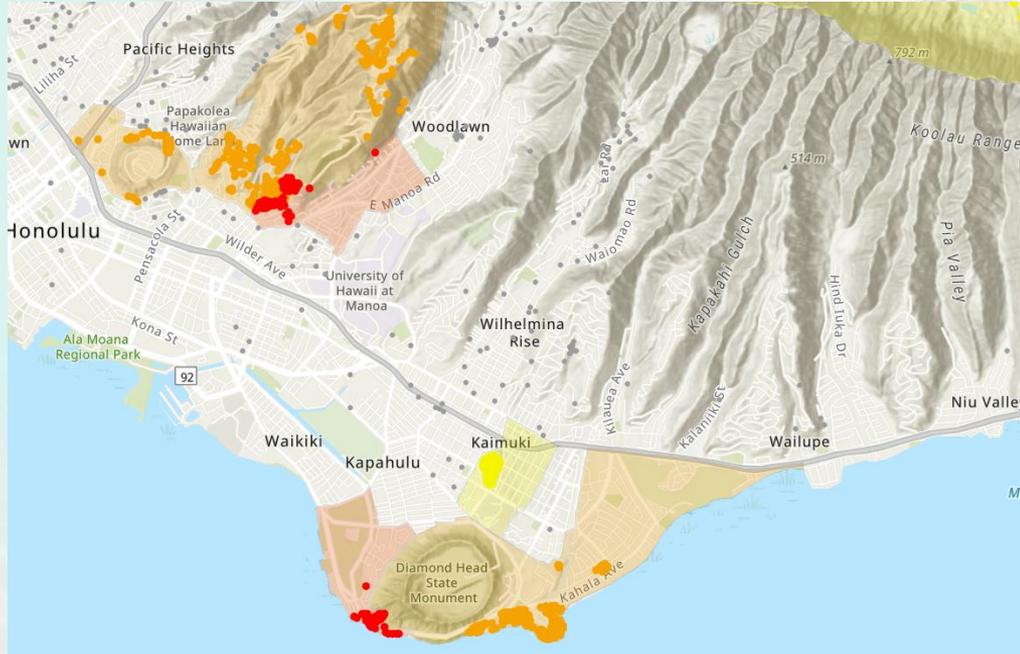
Objectives

1. Identify a comprehensive list of factors to inform the new prioritization assessment;
2. Categorize previously uncategorized (Priority Level 4) cesspools;
3. Provide DoH/CCWG recommendations based on new findings where appropriate;
4. Develop a scientifically unbiased and objective framework to rank all cesspools on the 4 main islands
5. Present results through a web-based tool to view prioritization levels and input data

Process

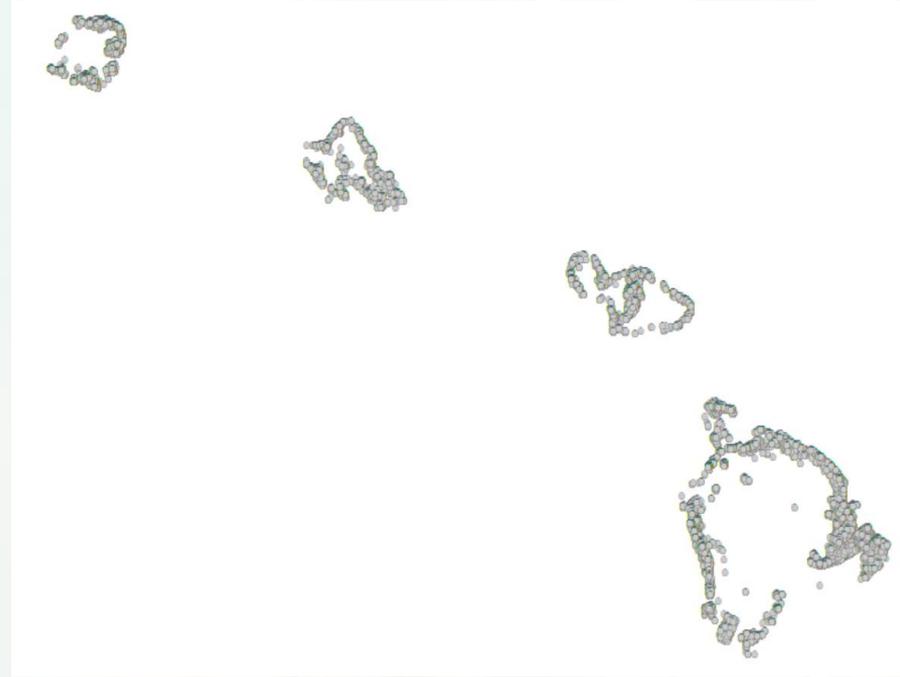
Started with research of related legal, academic, and gray literature

Chose a simplified geospatial hazard-based model. To visualize, assign, and rank multiple factors to a point on a map



Process

1) Updated statewide cesspool inventory



Process

- 1) Updated statewide cesspool inventory
- 2) Curated statewide risk-factor data

1. Distance to coastline;
2. Distance to streams and wetlands;
3. Distance to drinking water wells;
4. Well capture zones;
5. Sea level rise zones;
6. Precipitation;
7. Depth to groundwater;
8. Cesspool density;
9. Soil characteristics;
10. Groundwater flow paths;
11. Coral cover;
12. Fish biomass/recovery potential;
13. Beach user-days;
14. Proximity to lifeguarded beach;
15. Coastal ocean circulation

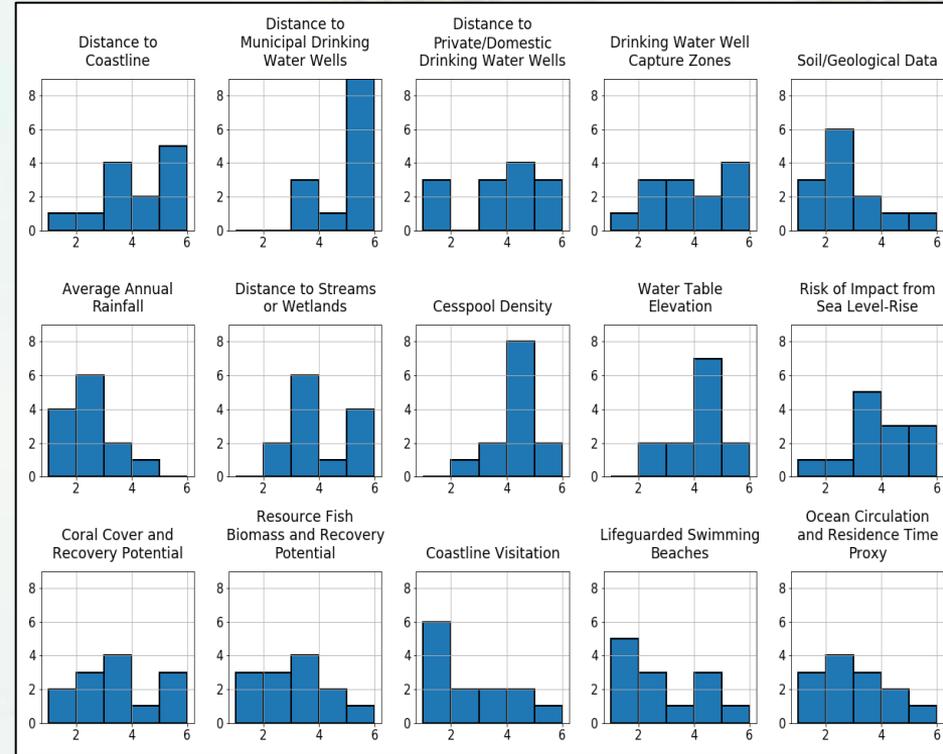
Process

- 1) Updated statewide cesspool inventory
- 2) Curated statewide risk-factor data
- 3) Developed reproducible, scientifically objective code-based calculation framework



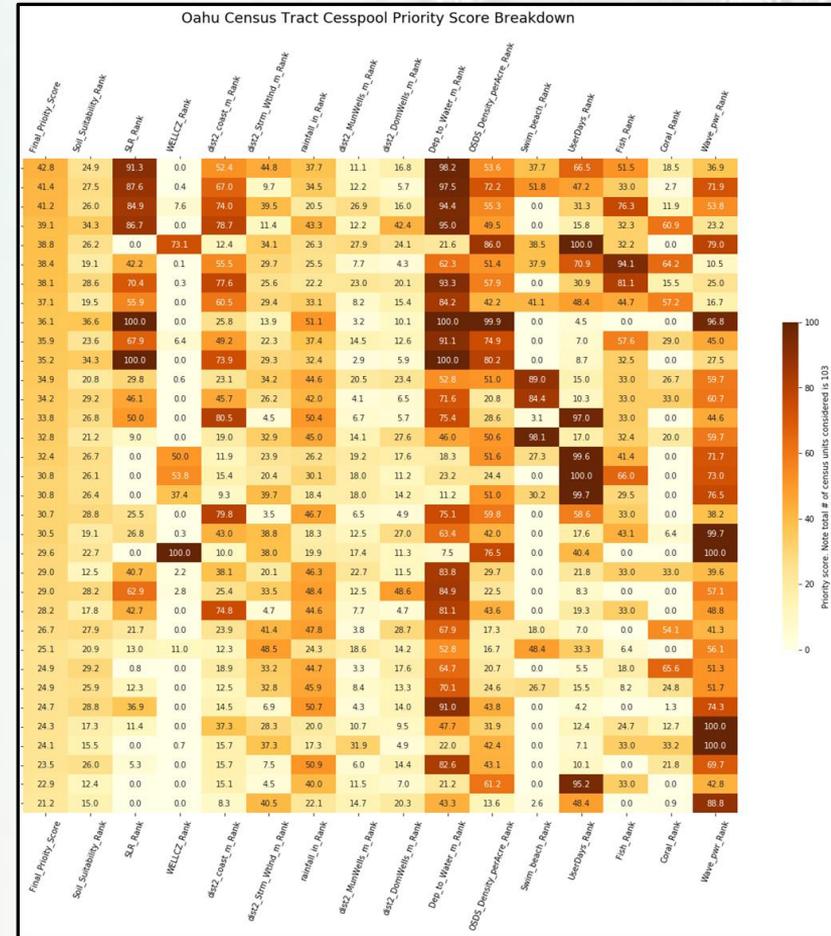
Process

- 1) Updated statewide cesspool inventory
- 2) Curated statewide risk-factor data
- 3) Developed reproducible, scientifically objective code-based calculation framework
- 4) Quantified 'risk' through geospatial association with each factor
- 5) Workshops with a panel of experts to help weight factors



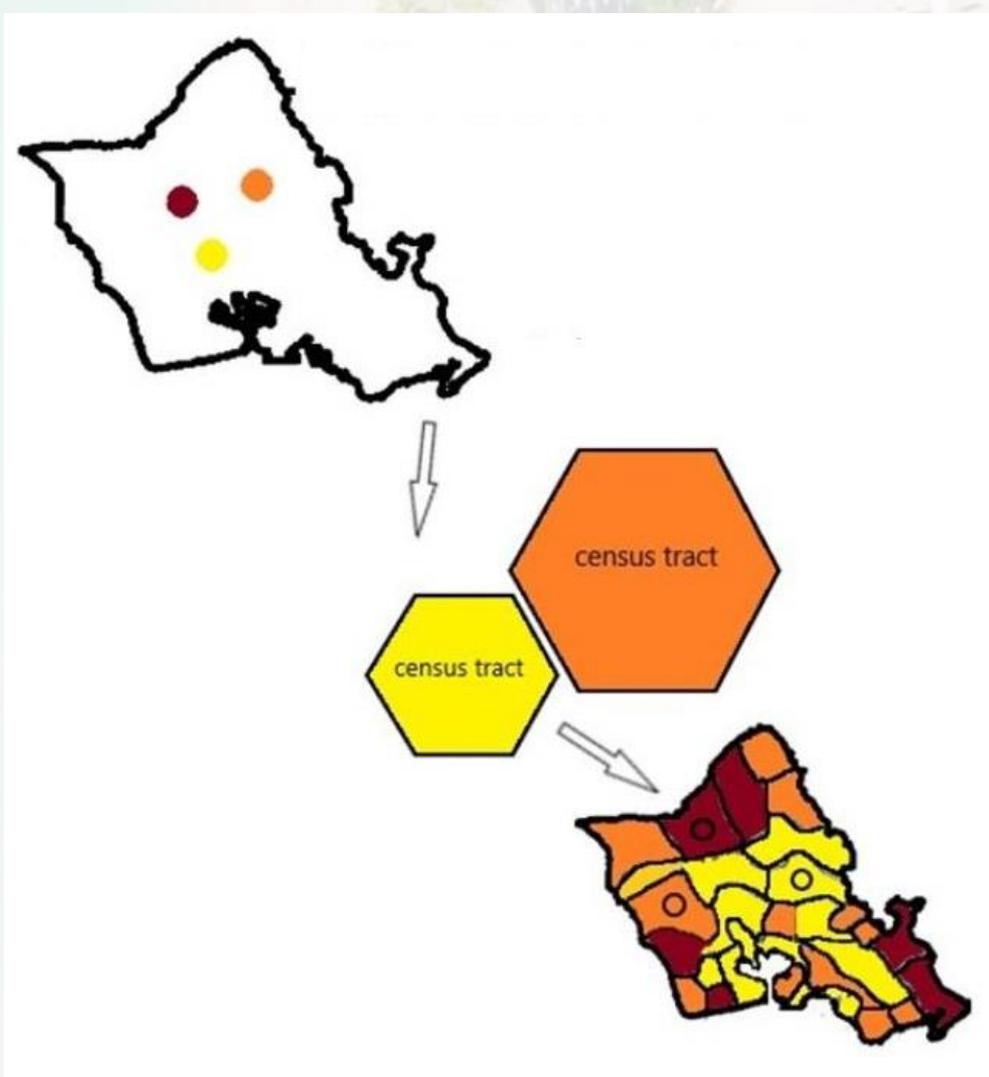
Process

- 1) Updated statewide cesspool inventory
- 2) Curated statewide risk-factor data
- 3) Developed reproducible, scientifically objective code-based calculation framework
- 4) Quantified 'risk' through geospatial association with each factor
- 5) Workshops with a panel of experts to help weight factors
- 6) Synthesized all data into single prioritization score for each cesspool



Process

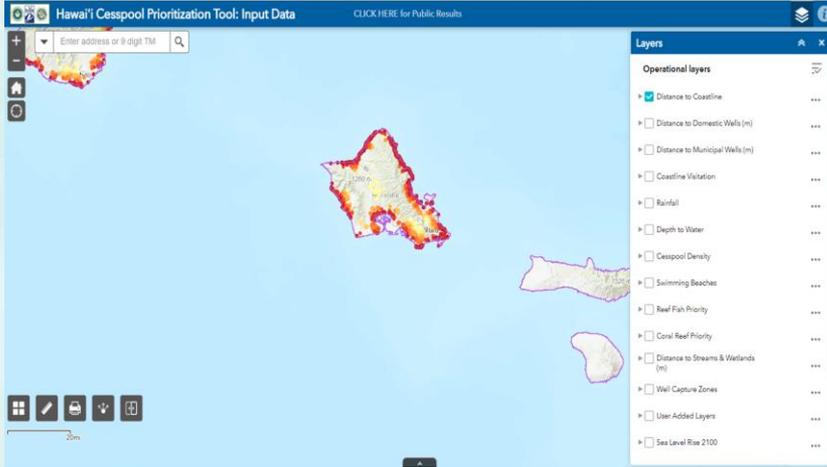
Aggregation: We chose to aggregate a cumulative hazard score to each census tract



HCPT Key Points:

1. The HCPT uses a site-based process to determine if a cesspool at any given location has higher or lower potential to cause social and environmental impacts.
2. The tool is merely a starting point for assessing the areas with the most significant hazards.
3. May support development of a thorough and thoughtful cesspool conversion plan.
4. The tool cannot make decisions regarding conversion prioritization timelines.
5. New results can coexist with previous data/research. This is a living framework and can incorporate new information for future updates.
6. Validated by comparing priority zones with observation data from Act 132 (algae $\delta^{15}\text{N}$) results.

Web Application Tools



[DOH Input Data Tool](#)



[Public Results Map](#)

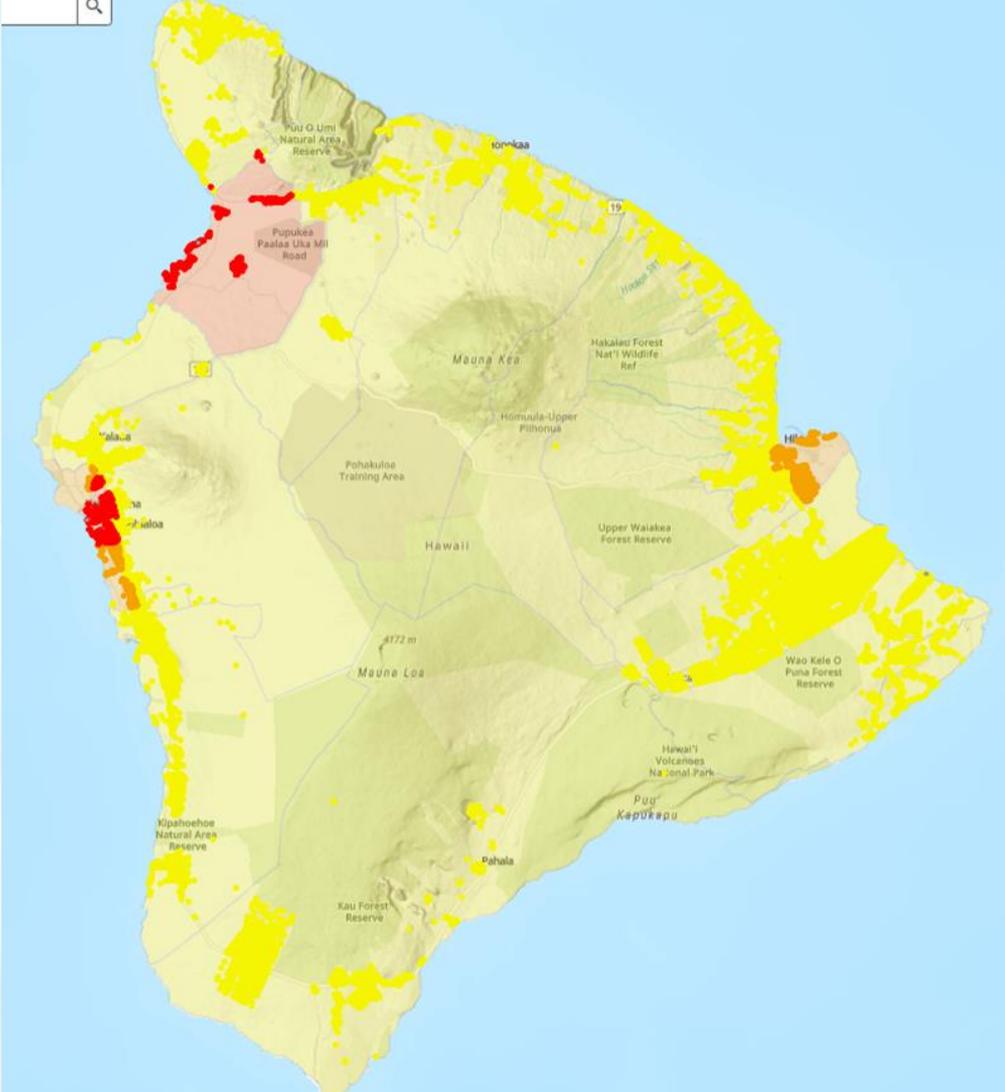
<http://hawaiicesspooltool.org/>

Hawaii Island Results

Priority 1:
5,119 (11%)

Priority 2:
2,619 (6%)

Priority 3:
40,858 (84%)

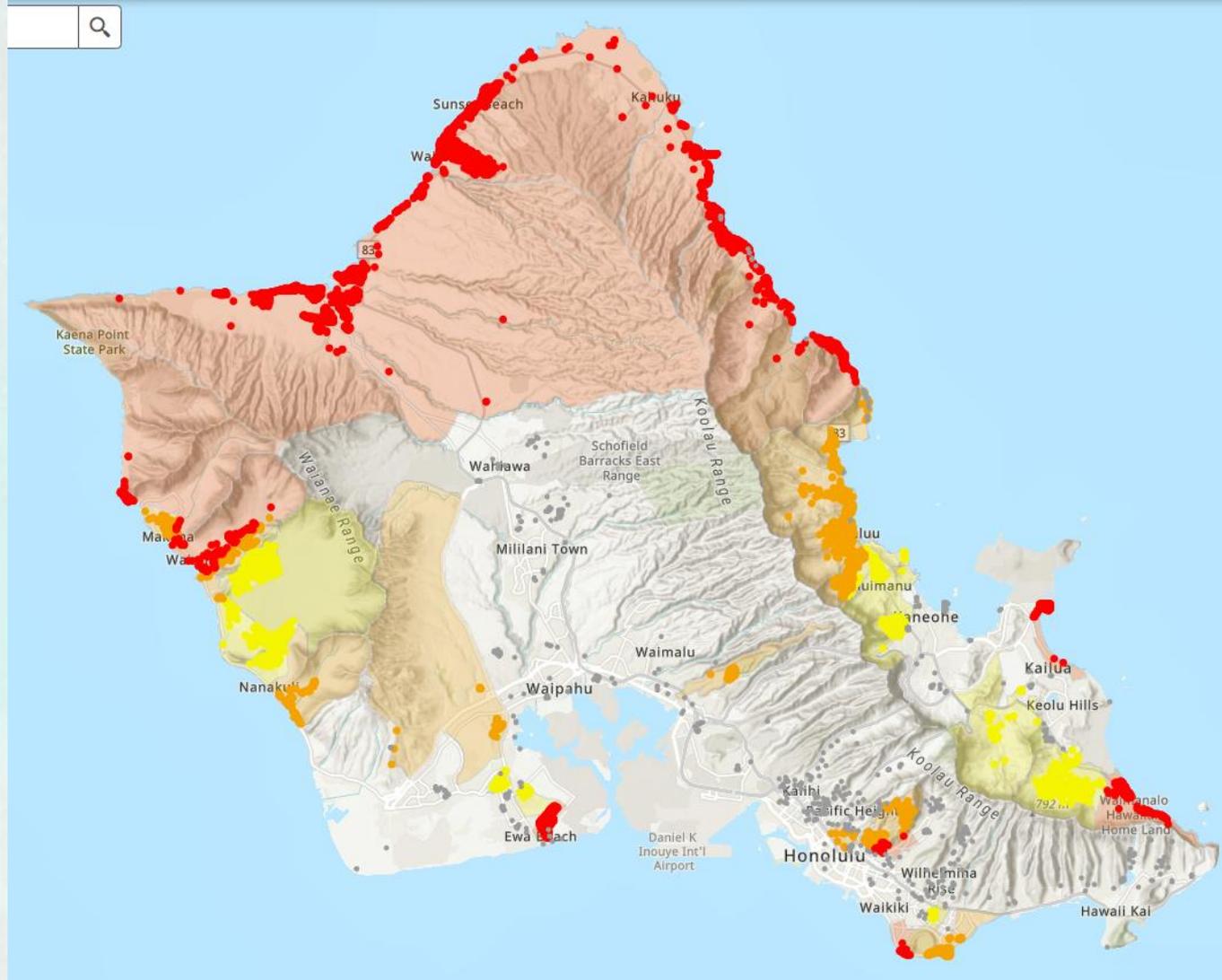


Oahu Results

Priority 1:
4,779 (64%)

Priority 2:
1,640 (22%)

Priority 3:
1,072 (14%)





**FINAL REPORT
RECOMMENDATIONS**

- **Prioritization and Timing**
- **Financial Support**
- **Technology Considerations**
- **Planning/Program Administration**
- **Workforce Development**
- **Outreach**

FINAL REPORT RECOMMENDATIONS

Prioritization and Timing

Replace the 2050 deadline, from Act 125 Session Laws of Hawaii (SLH) 2017, for cesspool conversion as follows:

- Priority 1 (13,821 cesspools) converted by 2030, and
- Priority 2 (12,367 cesspools) converted by 2035.
- Priority 3 (55,237 cesspools) would continue to be converted by 2050.

Require a seller's disclosure form for any property sold that has a cesspool.

FINAL REPORT RECOMMENDATIONS

Financial Support

Maximize federal funding options where available to offset the cost of conversion:

- Including grants, tax credits, and low interest loans, funds under the Infrastructure Investment and Jobs Act funds, Inflation Reduction Act, and American Rescue Plan Act.

Reallocate State and county resources or generate new revenue to supplement other financing programs and homeowners' dollars.

Facilitate financing options to assist low- and moderate-income homeowners in converting, as well as incentives for cesspool conversion for all homeowners.

Enable nonprofits and community development financial institutions to help cesspool owners access available funding through the Clean Water State Revolving Funds.

FINAL REPORT RECOMMENDATIONS

Technology Considerations

The Hawaii Department of Health should:

- Certify and adopt novel wastewater treatment and disposal technologies to address nutrient pollution reduction and public health protection.
- Develop and maintain an online comprehensive resource of approved technology options, including advantages and disadvantages of approved technology options for given locations and site conditions (including onsite systems, sewerage systems, and cluster systems).
- Update minimum treatment standards (i.e., reduction of nutrients) for onsite wastewater technology for ecologically sensitive areas (high water table, proximity to ocean/streams, prone to sea level rise).

FINAL REPORT RECOMMENDATIONS

Planning/Program Administration

- Require each County to develop a comprehensive integrated wastewater management plan to include where connections to centralized (public and private) treatment systems are planned, where individual treatment systems will continue to be needed, and where smaller-scale “cluster” treatment systems might be utilized. Include financial strategies.
- Establish a cesspool section within the Hawaii Department of Health’s Wastewater Branch to include at least three to four staff to work on cesspool conversions planning, implementation, permitting, and regulatory framework.
- Increase administrative capacity as needed for cesspool conversion on State lands.
- Prioritize environmental justice principles for disadvantaged community needs to promote equitable outcomes related to the entire cesspool conversion process.

FINAL REPORT RECOMMENDATIONS

Workforce Development

- Assess and identify the workforce needs for upgrading all cesspools.
- Allocate funding to support existing (i.e. the Workforce-4-Water program) and/or the creation of new workforce training program(s) such as education, certification, on the job training, partnerships with other agencies, the University of Hawaii system, labor unions, non- profits, or other entities as appropriate.

FINAL REPORT RECOMMENDATIONS

Outreach

- Fund the development of a comprehensive outreach strategy for cesspool conversions that educates homeowners on conversion options and resources.

QUESTIONS?