



**CAUTION**

HIGH BACTERIA LEVELS FOUND  
in ocean and stream  
especially after heavy rainfall

Contact with water  
may cause illness

For information  
health.hawaii.gov/wh  
(808) 686-6236

Hawaii State Department of Health

2020

# ANNUAL REPORT



**WAI** WASTEWATER  
ALTERNATIVES &  
INNOVATIONS



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## MISSION

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To reduce sewage pollution and restore healthy watershed by providing innovative, affordable and eco-friendly solutions to waste and wastewater management.

## VISION

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Help Hawai'i homeowners and communities manage the difficult process of upgrading cesspools and failing septic systems across the state to new systems that are affordable, efficient and better for the environment.



# LETTER FROM THE EXECUTIVE DIRECTOR

A successful organization usually begins with a compelling purpose that brings people together for a common cause. WAI is not only the name of our organization but also the Hawaiian word for water, and that's the key element that unites us. Wastewater Alternatives & Innovations (WAI Org Inc.) is dedicated to protecting water quality by reducing sewage pollution and restoring healthy watersheds across the state.

With 88,000 cesspools across the state, Hawai'i has the highest number of cesspools per capita in the country, and these substandard systems discharge 53 million gallons of untreated sewage into the ground and groundwater every day. Hawai'i was also the last state to ban cesspools, and we have a long way to go before converting them all by 2050. It's both daunting and motivating to realize that our small organization is searching for solutions to one of the biggest environmental and public health issues in Hawai'i.

Thanks to the early support of funders like the Harold K. L. Castle Foundation, the Omidyar Network, the Ulupono Initiative and many others, we launched WAI in late 2019. We held our first Innovations in Sanitation Convening with the Bill & Melinda Gates Foundation that year. Along with Co-Founder John Anner, we brought on several talented staff members in 2020 with expertise in wastewater engineering, community outreach and water quality. Our current staff includes: Joachim 'Joko' Schneider, Christina Comfort and Jackie Orsa, all of whom are incredibly bright in their own rights, but together they make an even more impressive team.

2020 was a challenging year: pivoting during the COVID pandemic, raising funds during hard economic times and working remotely during quarantine. But as you will read in this report, we still made a lot of progress in each of our five programs: Innovative Technology; Creative Financing; Advocacy & Policy; Education & Outreach; and Pilot Projects. We partnered with six cutting-edge sanitation companies and have successful pilot projects across the state.

As a young and growing organization, we at WAI will continue to work on reducing sewage pollution, converting cesspools and restoring watersheds. We will also continue offering more innovative, affordable and eco-friendly solutions to waste and wastewater management to communities across the state. But our compelling purpose is protecting water quality for all people in Hawai'i. We are deeply grateful to our staff, Board of Directors, Advisory Board Members, tech partners, funders, individual donors, volunteers, interns and all those who have supported WAI. We look forward to continued growth and success in the future. Mahalo for your support.



*Stuart Coleman*  
WAI Executive Director & Co-Founder

## INNOVATIVE TECHNOLOGY

WAI is committed to introducing new sanitation technology to the state and finding the most efficient, affordable and eco-friendly solutions. In 2019, WAI successfully hosted its first Annual Innovations in Sanitation Convening with the Bill and Melinda Gates Foundation to bring together key stakeholders in the state to introduce innovation solutions, new research and best practices for wastewater systems and we look forward to growing our reach through similar Convenings in the future.

## FINANCIAL RESOURCES

WAI is seeking funding sources to help homeowners with the expensive process of converting their cesspools and failing septic systems. We are working with the Environmental Protection Agency (EPA), Hawai'i Dept. of Health (DOH), USDA's Rural Development Office and private foundations to bring together federal, state, and philanthropic funding to help homeowners. We will focus on low- and moderate-income households in high-priority areas where sewage pollution from cesspools threatens ground & drinking water, streams or coastal waters.

## POLICY & ADVOCACY

WAI is working with a coalition of groups to pass legislation and update policies that will help convert the state's worst cesspools and reduce the 53 million gallons of untreated sewage that are discharged into the state's waters each day. We are working on a number of bills this legislative session that will create pilot projects to test out new sanitation technology and provide funding for low- & moderate-income homeowners in high priority areas; require inspections of Individual Wastewater Systems (IWS) and conversions of cesspools and failing septic systems during the property point of sale; and create an online database for all IWS's.

## COMMUNITY OUTREACH

WAI is committed to working with homeowners and community groups to learn more about their needs and share the environmental and health threats associated with cesspools and sewage pollution. We will continue holding community talks, public presentations, workshops and convenings to educate the public about wastewater pollution & regulations and get their buy-in on the benefits of converting their cesspools and failing septic systems.

## PILOT PROJECTS

WAI is working with key stakeholders to create successful demonstration projects that can serve as models for the rest of the state. We are collaborating with community groups, wastewater companies, government agencies, researchers, wastewater engineers and contractors to design and implement cutting-edge pilot projects. In this way, we will build on these five pillars to create a strong foundation for the most efficient, affordable and practical sanitation solutions.







# WAI'S 1ST YEAR BY THE NUMBERS!



INSTALLED **1ST**  
CINDERELLA  
INCINERATION  
TOILET IN HAWAI'I



DEVELOPED **6** NEW  
INNOVATIVE TECHNOLOGY  
PARTNERS

RECEIVED **6** GRANTS  
TO FUND OUR  
PROGRAMS



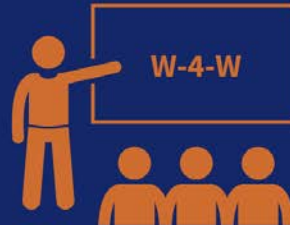
BROUGHT ON **7** DISPLACED  
CARES ACT WORKERS TO  
EXPAND OUR OUTREACH



CONDUCTED OVER  
**40**  
WORK-4-WATER  
PRESENTATIONS



CONSULTED WITH **24**  
HOMEOWNERS ABOUT THEIR  
CESSPOOL REPLACEMENT  
OPTIONS



WITHIN OUR FIRST YEAR AS A NON-PROFIT,  
WAI HAS MET NUMEROUS MEASURABLE GOALS:

- Developed 6 innovative technology partnerships, with national and international companies
- Received 6 grants to fund our expanding programs, including state and federal grants
- Brought on 7 displaced workers with CARES act funding to expand outreach capacity
- Consulted with 24 homeowners about their cesspool replacement options;
- Gave over 40 presentations, most of which focused on our scale-up "Work-4-Water"



**STUART COLEMAN**  
**EXECUTIVE DIRECTOR & CO-FOUNDER**

Stuart, MFA, worked for ten years as the Hawaiian Islands Regional Manager of the Surfrider Foundation, overseeing five Chapters and hundreds of volunteers across the state. He has led coalitions to help shape policy and pass landmark legislation to reduce pollution of Hawai'i's coastal areas, including the nation's first and only bill to create smoke-free beaches & parks and the first bill to ban oxybenzone in sunscreens. Stuart also helped pass legislation to reduce wastewater pollution and mandate the upgrade of cesspools across Hawai'i. He currently serves on the state's Cesspool Conversion Working Group and on the Advisory Board of UH Manoa's Sea Grant Program. Stuart is also the award-winning author of three books about modern Hawaiian history, surfing and culture, including Eddie Would Go, Fierce Heart and Eddie Aikau: Hawaiian Hero.

**JOHN ANNER**  
**MANAGING DIRECTOR & CO-FOUNDER**

John, PhD, has worked in the non-profit sector for over 30 years, with 20 of those years in the CEO position. He was the CEO of Thrive Networks for 13 years, where he led a major sanitation program in Southeast Asia. He has specialized in nonprofit infrastructure to de-risk and de-cost launching innovative social enterprise ventures. John's PhD dissertation and original research focused on the use of impact measurement as a critical success factor for social enterprises. He is also currently the Chief Operating Officer at the Coleridge Initiative.



**CHRISTINA COMFORT**  
**PROGRAM MANAGER**

Christina holds an M.Sc in Biological Oceanography from the University of Hawai'i and worked for 8 years as a coastal oceanographer in the Center for Physical Oceanography and Marine Ecology. Christina's research interests center on the health and conservation of Pacific Island coastal marine ecosystems. She has managed many research projects involving long-term water quality and oceanography measurements in the context of human impacts to coastal systems. Christina also managed the Surfrider Foundation Oahu Chapter's Blue Water Task Force from 2018-2020, a citizen science initiative wastewater input to Oahu's beaches via fecal indicator bacteria testing.

**JOACHIM SCHNEIDER**  
**PROJECT COORDINATOR**

Joachim, MS, has been working in the wastewater field in Hawai'i in different capacities since 2017. He started as an intern for two wastewater consulting firms before completing his graduate studies at UH Manoa. His thesis research investigated an innovated wastewater treatment method that will be employed at the second-largest treatment plant in Hawai'i. Prior to WAI, he worked as a project manager and design engineer for a private wastewater consulting company, where he oversaw the entire life cycle of various civil and environmental engineering projects.



**RAQUEL GILLILAND**  
**OPERATIONS COORDINATOR (FORMER)**

Raquel received her B.S in Aquatic and Marine Biology with a double minor in Geography and Environmental Science and Community Engagement from Stetson University. Prior to joining the WAI team she interned at the Coral Restoration Foundation, becoming involved in volunteer management and also worked for Kupu as a coral technician at the DAR Hawai'i Coral Restoration Nursery. Raquel left the WAI team at the end of August 2021 to move to Oregon and pursue her masters degree in Marine Resource Management.

**JACKIE ORSA**  
**OPERATIONS COORDINATOR (CURRENT)**

Jackie brings eight years of experience in real estate sales, management, and marketing to the WAI team. She received her Bachelor of Science from Virginia Polytechnic Institute and State University in Housing & Resource Management with a minor in Real Estate. Jackie lives in Kona on Hawai'i Island and it is through her experience in Hawai'i Real Estate that she comes to WAI after recognizing the gap that exists between homeowners and the accessibility to crucial home wastewater systems that contribute to both environmental and homeowner health. Jackie volunteered with WAI in 2020 and now joins us as the new Operations Coordinator.





**ROGER BABCOCK**



**MAHINA PAISHON-DUARTE**

**CARES WORKERS**

**VOLUNTEERS**

Raquel Gilliland

Shelly Masuda

Brandon Hansen

Jackie Orsa

Dominique Pena

Jon Champlin

Richard Rodarte

Phil Schlieder

Karissa Fitzgerald

**CARES WORKER TO  
OPERATIONS COORDINATOR**

Raquel Gilliland joined the WAI team as a CARES worker in 2020. In four months, we were able to bring Raquel on board as our Operations Coordinator to assist in the critical day to day operations of our organization. In August 2021, Raquel transitioned from WAI to attend graduate school and pursue her Master's Degree in Marine Resource Management.





## RESEARCH AND PARTNERSHIPS

WAI hosted the Bill and Melinda Gates Foundation Innovations in Sanitation Convening in 2019 which led to the development of many innovative technology partnerships in 2020. WAI is working to introduce these technologies to Hawai'i:

- **Fuji Clean** manufactures top of the line Aerobic Treatment Units, which treat wastewater to a high standard and remove pathogens and nutrients that would otherwise pollute the environment.
- **Cinderella Eco Group's Cinderella Incineration Toilet** is a waterless alternative toilet powered by electricity or propane. It produces only a small amount of odorless, pathogen-free ash and avoids water pollution.
- **Ridge to Reefs has designed a Bioreactor Garden** which is a constructed wetland and uses a layer-cake model and plant microbial activity to denitrify wastewater. This is an example of a nature-based solution that reduces water pollution.
- **Eljen produces the Geotextile Sand Filter (GSF)** that can be used in an enhanced leach field. These GSFs remove nutrients and pollutants from wastewater after it exits a septic tank.
- **Cambrian is a company that provides decentralized membrane bioreactor wastewater treatment.** Their equipment can either be used with industrial strength or residential wastewater, and they can produce clean, reusable water at the end of processing. A typical decentralized Cambrian facility could process 20-200 homes worth of wastewater and produce usable water for agricultural purposes.
- **Biomass Controls has an exciting solution for wastewater sludge** (the solids that are left over after wastewater treatment). By combining 51% wastewater sludge solids with 49% green waste such as invasive plant cuttings, Biomass can produce biochar in a carbon-negative process. The resulting biochar could be used for stormwater filtration or as a soil amendment, and will reduce the overall carbon footprint of wastewater treatment.





## PILOT PROJECTS

WAI has developed ongoing partnerships with multiple innovative technology companies. We work with technologies that function better than septic systems, including nitrate-removing biofilters or constructed wetlands, incineration toilets, aerobic treatment technologies, and community-scale decentralized wastewater systems. During 2020, three pilot projects were initiated.

- A demonstration unit of the **Cinderella Incineration Toilet** was installed at the Hawai'i Institute of Marine Biology on Moku o Lo'e, Oahu.
- Working with **Eljen**, we were able to donate a **biofilter system** to a veteran residing on Hawai'i Island.
- Finally, the **Ridge-to-Reef Bioreactor Garden** was set up to undergo testing to achieve NSF-245 certification (removes >50% of nitrogen) at the East Honolulu Wastewater Treatment plant. The testing itself is planned for February-August 2021.



Cinderella Incineration Toilet at  
Hawai'i Institute Marine Biology, Moku o Lo'e, Oahu



Ridge-to-Reef Bioreactor Garden

Converting almost 90,000 cesspools presents multiple challenges, the greatest being the lack of financial resources to pay for the upgrades and enough wastewater workers to complete the jobs. Currently, cesspools are being converted at a rate of about 150 per year; in order to comply with the 2050 mandate, the rate of conversions needs to increase to about 3,000 cesspools per year. In order to do this, we will need to increase the number of workers in the individual and decentralized wastewater sector, including engineers, installers, designers, maintainers/operators, and inspectors. Ideally, cesspools will be converted to more advanced treatment systems that reduce nutrient pollution to our water resources. These solutions may be on-site systems or decentralized wastewater treatment systems.

To address this workforce development challenge, the Work-4-Water hui was formed as a partnership between WAI, University of Hawai'i (UH) Sea Grant, UH Water Resources Research Center, UH Community Colleges, and the Hawai'i Department of Health. Work-4-Water (W4W) aims to train and develop a workforce in the green wastewater sector. W4W envisions training workers on innovative technologies that leapfrog past the traditional, minimally effective solution of septic systems (which are having to be replaced at great expense in New York, Florida and other coastal states).

If fully funded, the initiative will also replace 400 cesspools across the state with innovative technology and subsidize or partially subsidize 30% of these conversions for low-income families. The project can also be scaled back according to the availability of funding (ie., 50% of funding would convert 50 cesspools in each county). By expanding the workforce for this progressive and environmentally-focused sector of decentralized wastewater solutions, Hawai'i can both meet the 2050 mandate and become a leader in the nation in wastewater solutions.

Outside of the W4W Initiative, WAI is independently exploring grant and loan programs that could help homeowners access the needed funds to convert their cesspools. WAI began working with the USDA and the national Environmental Finance Centers to learn how to access existing grant and loan programs or potentially build a new program.



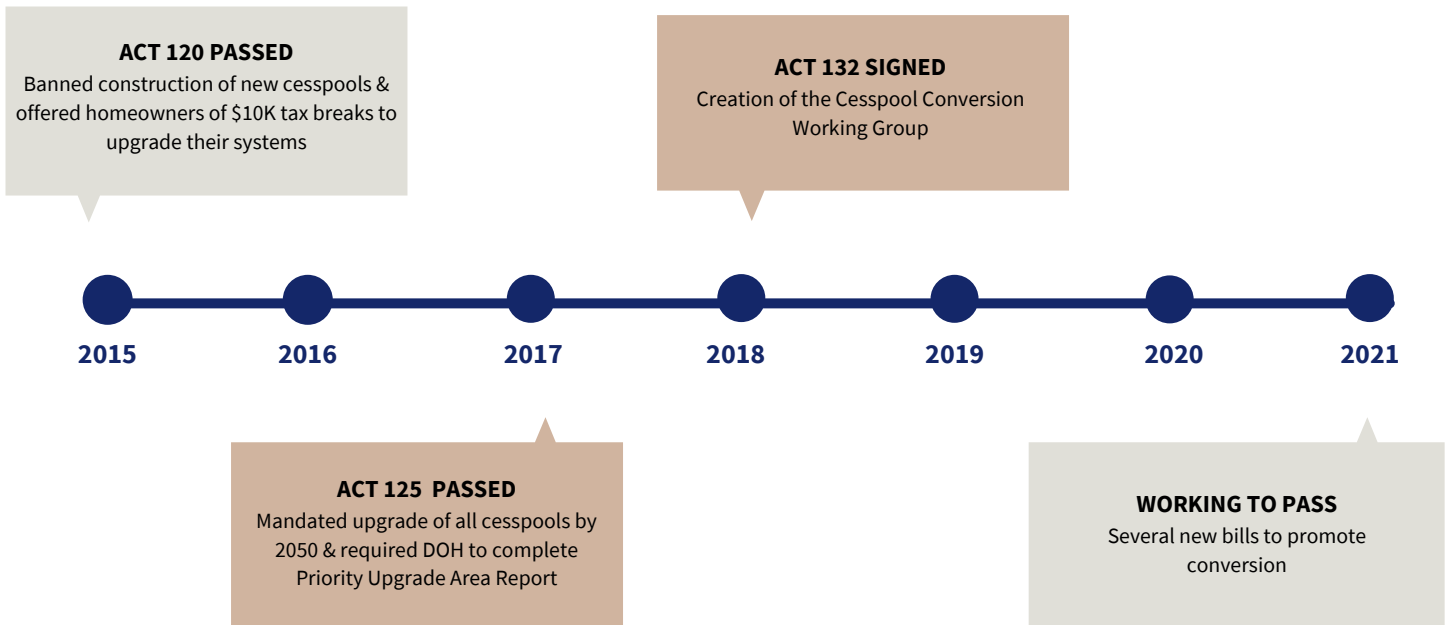
## Work-4-Water

Workforce Development • Infrastructure Investment  
Cesspool Replacement • Water Protection



Act 125 was passed in 2017 and mandates that all cesspools in Hawai'i be upgraded to better alternatives by 2050. WAI is working to pass supportive legislation and policy changes that will allow the process of cesspool conversion to be more streamlined. Some of these goals include:

- Legislation to mandate wastewater system inspection and cesspool upgrade at point of home sale.
- Legislation to allow public-private partnerships that support innovative companies to provide wastewater treatment on a community scale in Hawai'i.
- Legislation to update Act 125 to include newer and more efficient systems beyond septic systems and aerobic treatment units.



**NATIONAL & INTERNATIONAL NETWORKS**

WAI was selected for the national Decentralized Wastewater Innovation Cohort, hosted by the nonprofit organization DigDeep. This cohort includes five organizations across the country whose communities struggle with water and wastewater challenges, including the Navajo Nation, the “black belt” of Alabama, rural Alaska, and Long Island, NY. We were also invited to be a partner in the Nature Conservancy’s Ocean Sewage Alliance, which serves as an international knowledge and educational hub for sewage pollution issues in the marine environment.



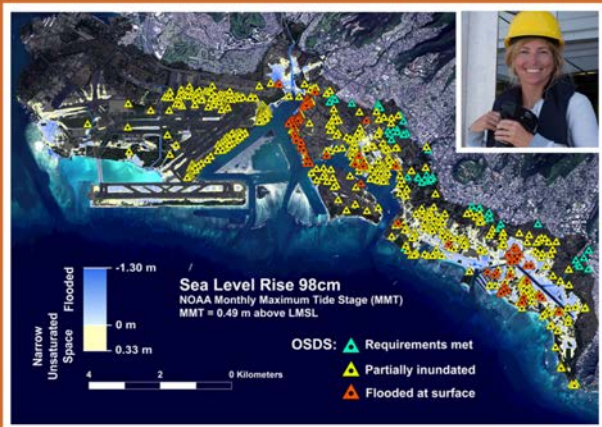
Community outreach and education are some of the most important parts of our work as we are bridging the gaps between homeowners and the possibilities of how to use innovative technologies to convert their cesspools. Some are still unaware of the mandate to convert all cesspools by 2050 and many people are unaware of the massive environmental issues that their cesspools may be causing. To better spread awareness of our vision and mission we have developed a variety of new community outreach tools and materials. We are on social media platforms Facebook, LinkedIn and Instagram. Through these platforms we connect with 800 people over Facebook, 300 people through instagram, and 62 people through LinkedIn.

In order to reach a more specific group of expert collaborators, we created a monthly meeting called the "CRAP (Cesspool Researchers, Advisors, and Planners) Pau Hana." This monthly meeting centers on presentations from various experts both locally and off-island, including topics like new technologies that are being introduced to Hawai'i, innovative methods to measure water quality, and the intersection of wastewater issues and climate science. The average attendance of these meetings is about 20 people and provides a space for experts from different fields to connect and discuss these innovative ideas. Some of our keynote speakers have included expert researchers such as Dr. Shellie Habel from UH Sea Grant discussing Sea Level Rise & Inundation of Coastal Cesspools & Wastewater Systems, and Dr. Trista Mckenzie discussing Geochemical Evidence For Tidally-Driven Groundwater Inundation Of Coastal Wastewater Infrastructure.

## November CRAP Pau Hana

WEDNESDAY NOV. 18TH 5:30PM-6:30PM

### Sea Level Rise & Inundation of Coastal Cesspools & Wastewater Systems



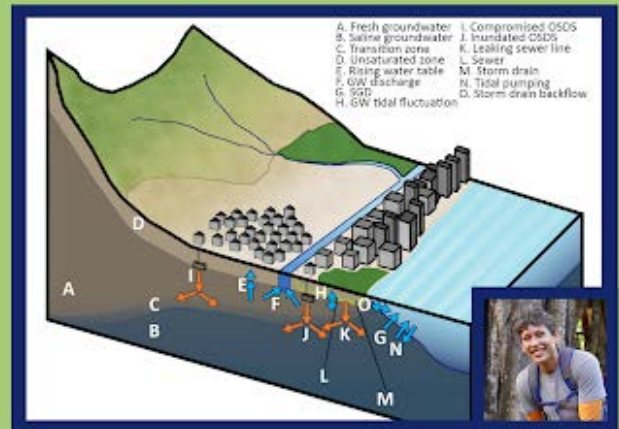
Guest Speaker: Shellie Habel, Coastal Lands Program Coordinator, UH Sea Grant



## December CRAP Pau Hana

WEDNESDAY DEC. 16TH 5:30PM-6:30PM

### Geochemical Evidence For Tidally-Driven Groundwater Inundation Of Coastal Wastewater Infrastructure



Guest Speaker: Dr. Trista McKenzie, Department of Earth and Sciences, University of Hawai'i at Manoa





Our CARES worker team created individual Island Outreach Presentations. This project generated county-focused presentations for the WAI team to give at small community events such as neighborhood board meetings. The slides include maps of main areas of concern on each island utilizing cesspool data; the Hawai'i DOH Priority Areas Report and USDA RD qualifying areas data; the number of cesspool in that area and amount of sewage generated, list of the federal, state & county legislators who represent that area; observations about average rainfall, soil type, water quality, and wastewater-related environmental issues in that area; potential options for cesspool replacement in the area; and a discussion of potential financial resources for homeowners. The final outcome is four presentations, one for each of the four most populous islands, that we are using to present to key stakeholders and homeowners.

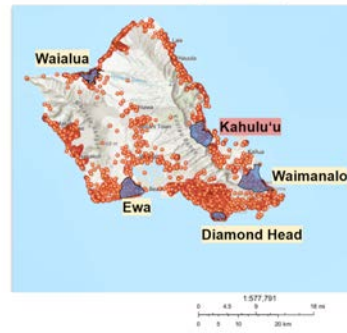
## Cesspool Conversion Priority Areas

As defined by Hawai'i Department of Health

- Priority 1: Significant Risk**  
Documented impacts to drinking water, health, sensitive streams and/or coastal waters
- Priority 2: Potential impacts to drinking water**  
Cesspools are within drinking water resource areas
- Priority 3: Potential impacts to ecologically sensitive waters**  
Including coral reefs, impaired waterways, and waters with endangered species
- Priority 4: Impacts not identified**  
Risk to water resources appears low based on current knowledge



## O'ahu Priority Areas



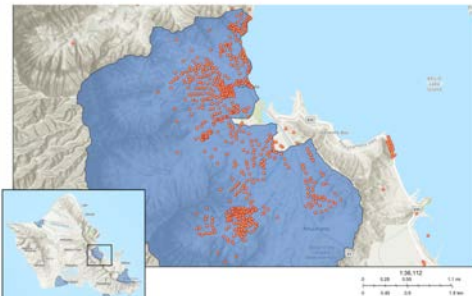
11,300 cesspools

7,500,000 gallons per day of effluent discharge

- Priority 1: Significant risk, known impacts to water resources
- Priority 2: Potential impacts to drinking water
- Priority 3: Potential impacts to ecologically sensitive waters



## Priority level 1: Kahalu'u Area of O'ahu



740 cesspools

440,000 gallons per day of effluent discharge

US Representative: Kai Kahele  
State Representative: Lisa Katagawa  
State Senator: Gil Riviere  
City Council Member: Heidi Tsuneyoshi

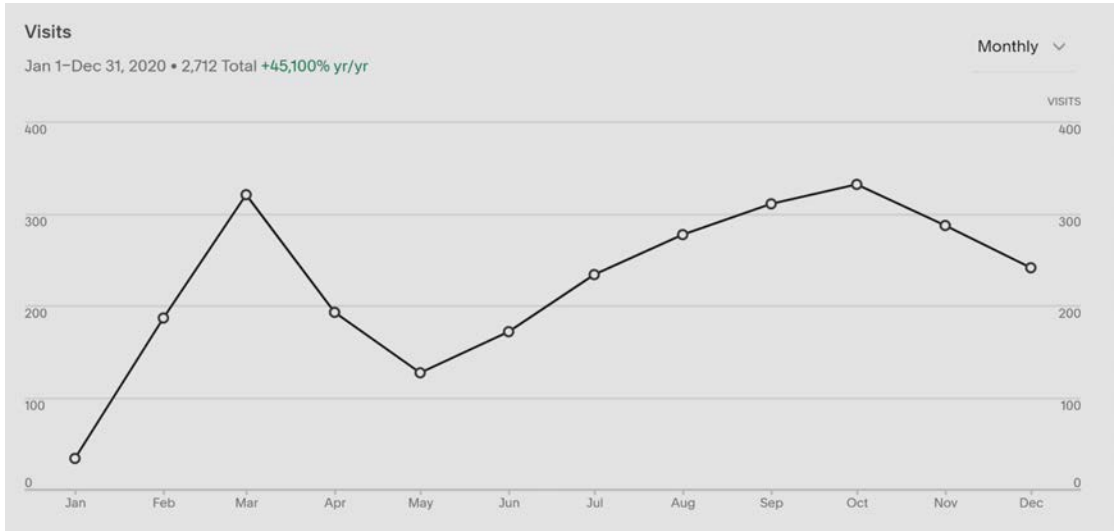


## O'ahu Representative Contact information

Priority Area	State Representative	State Senator	City Council Member
<b>Kahalu'u</b>	Lisa Katagawa 808-586-8540 repkatagawa@capitol.hawaii.gov	Gil Riviere 808-586-7330 senriviere@capitol.hawaii.gov	Heidi Tsuneyoshi 808-768-5002 htsuneyoshi@honolulu.gov
<b>Diamond Head</b>	R. Bertrand Kobayashi 808-586-6310 repkobayashi@capitol.hawaii.gov	S. Stanley Chang 808-586-8420 senchang@capitol.hawaii.gov	Tommy Waters 808-768-5004 tommy.waters@honolulu.gov
<b>Ewa</b>	R. Matthew LoPresti 808-586-6080 reptloprest@capitol.hawaii.gov	S. Kurt Favella 808-586-6360 senfavella@capitol.hawaii.gov	Kymerly Marcos Pine 808-768-5001 kmpine@honolulu.gov
<b>Waialua</b>	R. Lauren Matsumoto 808-586-9490 repmatsumoto@capitol.hawaii.gov	S. Gil Riviere 808-586-7330 senriviere@capitol.hawaii.gov	Heidi Tsuneyoshi 808-768-5002 htsuneyoshi@honolulu.gov
<b>Waimanalo</b>	R. Lisa Marten 808-586-9450 repmarten@capitol.hawaii.gov	S. Chris Lee 808-586-9450 senlee@capitol.hawaii.gov	Alan Kekoa Teixeira 808-768-5003 alan.teixeira@honolulu.gov



Our website has evolved into an informative and well-designed resource for homeowners, researchers, and stakeholders alike. In 2020 we had over 2,000 individuals visit our website and over 5,000 website views over the year!



Having an award-winning author as our Executive Director also allows us to be featured in numerous news outlets. From January -December we were featured in three major publications including Clean Technica, US News, and Civil Beat.

### How Hawaii Can Lead In Wastewater Management

Civil Beat, July 2020

*In the midst of this crisis, we have an opportunity to diversify our economy and an obligation to create a workforce that is not dependent on the ebb and flow of tourists on our beaches.*

### Advocates Launch Nonprofit Group to Rid Hawaii of Cesspools

US News, March 2020

*Wastewater Alternatives and Innovations plans to help the state address sewage pollution by finding ways to convert cesspools to effective treatment systems..*

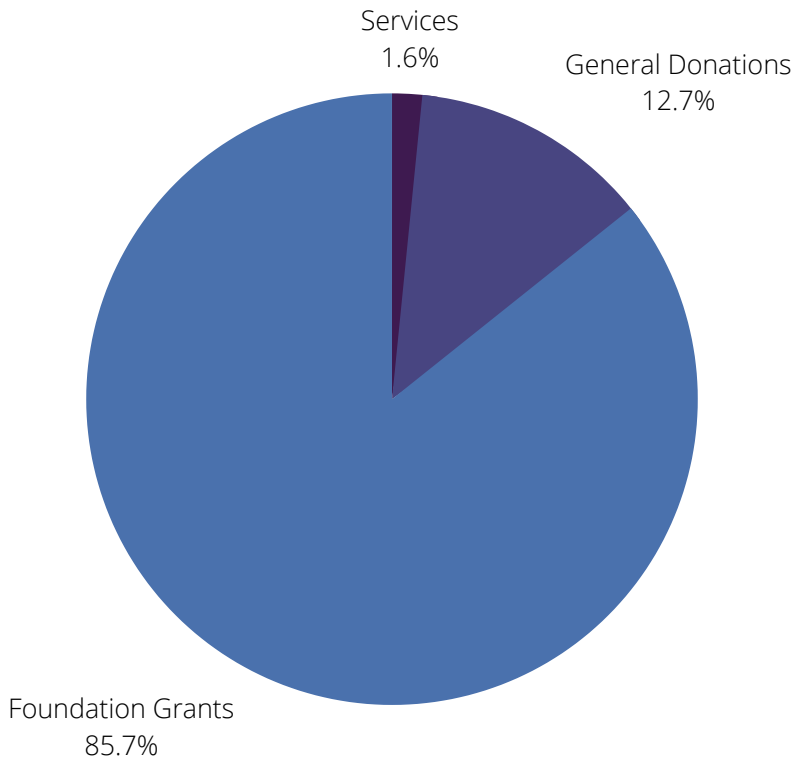
### 53 Million Gallons Of Wastewater Flushes Daily Into Hawaii's Waters — How One Local Non-Profit Is Working To Fix This

Clean Technica, February 2020

*Some cesspool-dense areas are lower-income areas while others are in some high-income areas — some of the nicest neighborhoods on Oahu and Maui, with homes valued at many millions of dollars, are still on cesspools.*



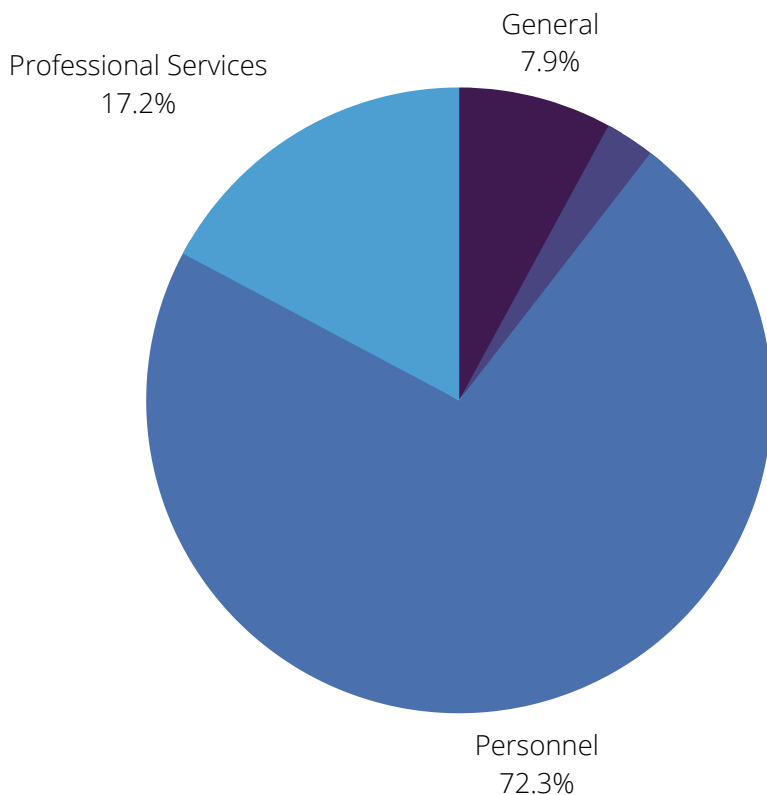
**2020 INCOME**



**2020 INCOME**

Foundation Grants	\$243,330
General Donations	\$36,020
Services	\$4,500
<b>Total Income</b>	<b>\$283,850</b>

**2020 EXPENSES**



**2020 EXPENSES**

General	\$16,642.98
Insurance	\$5,353.79
Auto	\$16.25
Personnel	\$151,743.77
Professional Services	\$36,150
<b>Total Expenses</b>	<b>\$209,906.79</b>

## DONORS

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Dana Montgomery  
John Anner  
Smallify Community  
Dee Fulton  
Ted Bohlen  
Beth Champlin  
Damon Haverly  
Randolph Pritchard  
Shanaugh Robbins  
Roger Babcock  
Dana & Allison Montgomery  
Elemental Excelerator

## FOUNDATIONS

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National Philanthropic Trust  
Castle Foundation  
Omidyar Network  
Ulupono Fund of the Hawai'i Community Foundation  
Kipuka Fund of the Hawai'i Community Foundation  
Healy Foundation  
Innovation Norway

## TECHNOLOGY PARTNERS

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Biomass  
Cinderella Eco Group  
Cambrian  
Eljen Corporation  
Fuji Clean  
Ridge to Reefs





**MAHALO NUI LOA FOR  
SUPPORTING WAI!**

**IF YOU HAVE ANY QUESTIONS OR  
WOULD LIKE TO GET MORE INVOLVED  
PLEASE CONTACT US!**

[www.waicleanwater.org](http://www.waicleanwater.org) | [info@waicleanwater.org](mailto:info@waicleanwater.org) | [@waicleanwater](https://www.instagram.com/waicleanwater)

2927 Hibiscus Place, Honolulu, HI 96815, c/o Stuart Coleman

501(c)3 Nonprofit Organization