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Environment Hawai'i
a monthly newsletter

The Threat Underfoot

Hundreds of chemically contaminated sites across the state now sit in areas that may, in the near future, be inundated by flooding from either above or below ground, or both: Parks sitting atop incinerator ash fill. A shooting range. Harbors with a decades-long history of underground fuel leaks …

Historically, so long as the contamination remained relatively protected from surface waters that might carry it elsewhere, the state Department of Health has generally let these sites be.

But as the seas rise and high tides and severe storms become more frequent, the threat these sites pose could be vast, according to the state Department of Health.

Teresa Dawson explains.

IN THIS ISSUE

Health Department Warns that Rising Seas, Extreme Floods May Unleash Contaminants

"It's pretty intense," says state toxicologist Dr. Diana Felton.

With rising seas and more frequent severe storms expected as a result of the climate crisis, she and Department of Health colleague Dr. Iris van der Zander warn of the increased potential for lead, arsenic and other contaminants at hundreds of polluted sites throughout the state to leach into coastal waters, into drinking water sources, and to spread throughout neighborhoods during floods.

And in areas such as Honolulu Harbor, where the ground has been saturated with petroleum after years of pipeline and fuel storage tank leaks, they say the infiltration of seawater, groundwater, or stormwater may spur the production of explosive and noxious gases.

A June 21 memorandum on climate changes and chemical contamination authored by Felton and van der Zander details these threats and makes several preliminary recommendations on what to do about them.

It notes that many of the 1,000 or so contaminated sites that HEER monitors and regulates are in low-lying areas and along shorelines. "Common chemical classes contaminating shoreline areas include petroleum constituents, heavy metals, solvents, pesticides, and persistent organic pollutants," the memo states.

These sites are not usually remediated and instead are simply capped and left alone. But that approach may be outdated, the authors suggest.

"These strategies have historically been viewed in the context of a static environment. The increasing impacts from climate change and sea level rise including more frequent flooding, accelerated erosion, and related disruption

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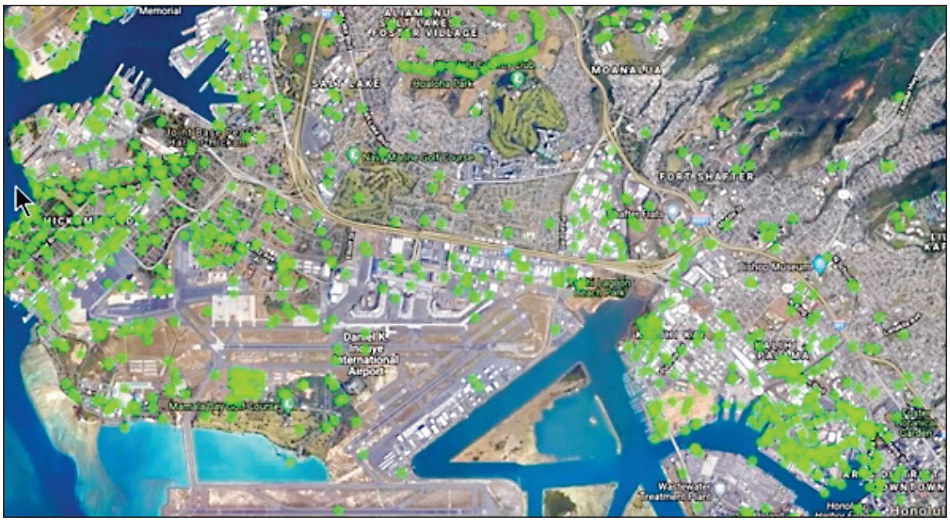

PHOTO: HAWAI'I DEPARTMENT OF HEALTH

The green dots indicate contaminated sites monitored and regulated by the Department of Health's Hazard Evaluation and Emergency Response office.

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NEW AND NOTEWORTHY

ADC Payout: Among the payments for settlements and judgments authorized by the state Legislature earlier this year was one for $131,849.52, identified as the settlement for a case brought in federal court in 2018.

Early that year, the Agribusiness Development Corporation was sued by three non-profit groups over discharges made from its lands in west Kaua'i into the ocean. The ADC had had no permit under the Clean Water Act to allow for the discharges since 2015.

In late 2019, the parties – plaintiffs Na Kia'i Kai, Surfrider Foundation, and Pesticide Action Network North America, represented by Earthjustice – and the ADC reached a settlement, which was recorded in court in February 2020.

Terms of the agreement call for the ADC to apply for a new NPDES permit and adopt a much more rigorous water sampling program, make improvements to roads to minimize runoff, and inspect improvements made by tenants to control offsite drainage, as outlined in a lengthy document specifying best management practices, among other things.

The 2018 lawsuit was actually the second one filed by the same plaintiffs over CWA violations. The first one, lodged in July 2016, was withdrawn in late 2017.

Following the filing of the settlement agreement, Judge Derrick K. Watson granted a motion for summary judgment in favor of the plaintiffs, allowing them to recoup their legal costs and attorney fees from the ADC. Funds for the payment come from general funds and not from the ADC budget.

ADC DEA: The state Agribusiness Development Corporation has released a draft environmental assessment to improve irrigation on about 800 acres of land it owns in Central O'ahu. The draft environmental assessment was first published in *The Environmental Notice* on June 23, and was republished again on July 23. The reason provided for the republication, according to a letter from James Nakatani, executive director of the agency, was to allow the public additional time to comment on the plan.

The plan outlined in the draft EA anticipates drawing surface water from Wahiawa Reservoir (Lake Wilson) and reclaimed R-1 water from the Wahiawa wastewater treatment plant and delivering it, by means of about 50,000 feet of new pipeline in addition to existing lines, to lands in the districts of Wahiawa and Waialua. The proposal also calls for construction of a new 14 million gallon reservoir, in addition to employing two existing reservoirs on ADC lands in the area.

The area of Wahiawa Reservoir where the ADC plans to place an intake pump.

The ADC anticipates drawing 5.1 mgd from the Wahiawa Reservoir, which, it says, "would allow the improved irrigation system to provide sufficient water service for uninterrupted commercial agricultural production in the project area."

Comments on the draft EA are due by August 23.

OEQC Now SERP: Act 152 of the 2021 Legislature moved the state Office of Environmental Quality Control out of the Department of Health and into the state Office of Planning. The old OEQC is now the State Environmental Review Program (SERP), and will continue to publish the bi-monthly *Environmental Notice.*

The old Office of Planning also got a new name and is now the Office of Planning and Sustainable Development (OPSD), thanks to Act 153.

And the OPSD's administrative responsibilities now extend not only to the former OEQC, but also to the Land Use Commission.

With the OPSD being a mandatory party to many of the redistricting petitions that come before the LUC, there was concern that this could present a conflict of interest. To address this, the new law states, "The land use commission shall maintain its independence on matters coming before it to which the office of planning and sustainable development is a party by establishing and adhering to the process required by" Chapter 225M-2, the law governing the OPSD.

Quote of the Month

"I'm just flailing about here like everybody else, but trying to do it in a good way."

— Sam Lemmo, Office of Conservation and Coastal Lands

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Agencies Seek Funding, Explore Options For Mitigating Effects of Sea Level Rise

As *Environment Hawai'i* reported in April, sea level rise threatens to draw sewage from cesspools and other on-site disposal systems into coastal waters. And as we report in this month's cover story, rising seas may also leach hazardous chemical contaminants into the ocean and foster the underground proliferation of petroleum-derived explosive and noxious gases.

Heading off these and other harmful effects of sea level rise will likely cost billions of dollars, whatever types of mitigation are ultimately employed. And as a recent proposal regarding small-scale beach restoration projects showed (see our Board Talk column in this issue), gaining consensus on the best path forward won't be easy.

Still, government agencies, the Legislature, non-profit organizations, and others are forging ahead with adaptation efforts. We highlight just a few of them below:

Water Control

"If we took a traditional approach … we'd be looking at an estimated $30 billion to relocate or elevate state roads and bridges, address impacts to airports, and protect the state's commercial harbor facilities," Edward Sniffen, Department of Transportation (DOT) deputy director for highways, testified before Congress in May.

The state cannot afford to do that, even if it had places to move all of its vulnerable facilities and infrastructure to. Still, DOT officials have recently suggested that shoring up or otherwise protecting just the harbors and airports may cost at least $17 billion.

Sniffen estimated a few years ago that mitigating sea level rise effects on the state's highway system might cost some $15 billion. However, the Highways Division's Climate Resilience Action Plan, released in May, does not include any cost estimates.

At last month's meeting of the Hawai'i Climate Commission, DOT deputy director Lynn Araki-Regan said modifications to Honolulu Harbor to manage the effects of sea level rise are estimated to cost between $1 billion and $3 billion.

She said the department is seeking funding for the U.S. Army Corps of Engineers to conduct a feasibility study to determine if locks and dams installed at the harbor's two entrance channels would be effective in controlling water levels while still allowing ships to traverse between the harbor and the ocean.

That study alone is expected to cost $3 million, with the state paying for half of it. She also said it would take three years to complete.

"A water control system at Honolulu Harbor would not only protect the port where the majority of commercial goods from toilet paper to Spam enter the state, it could potentially protect surrounding neighborhoods and provide insight into the use of such systems to protect seaside populations and assets. Honolulu Harbor also serves as a distribution point for goods transported to Guam, the Commonwealth of the Northern Mariana Islands, American Samoa, and the Compact of Free Association nations," Sniffen stated in his congressional testimony.

For the smaller outer-island harbors, which can't accommodate dam structures, the DOT is looking at replacing pile-supported piers with bulkhead piers, which would involve the installation of sheet piles along pier faces. The estimated cost for those modifications is $8 billion, Araki-Regan said.

As for the 15 airports managed by the DOT, the agency has determined that 10 of them, including Honolulu's Daniel K. Inouye airport, would be vulnerable to flooding as a result of sea level rise. Relocation and elevation are both being considered as options, as is seawall or revetment construction.

Based on construction costs of current projects, the DOT estimates it will need $8 billion to address anticipated sea level rise at the state's airports, Sniffen said.

Federal Funding

One potentially significant source of funding for the kinds of flood mitigation projects the DOT is considering is the Federal Emergency Management Agency's Building Resilient Infrastructure and Communities program, or BRIC for short.

In fiscal year 2020, up to $33.6 million ($600,000 per applicant) was made available to states, the District of Columbia, and U.S. territories. According to Luke Meyers, administrator for the Hawai'i Emergency Management Agency, all three of Hawai'i's applications for this funding were granted.

Two of the applications were made by the City and County of Honolulu's Office of Climate Change, Sustainability, and Resilience: $375,000 for a grid and resilient power system at Kaimuki Middle School and $150,000 for project scoping options for sea level rise. The third grant of $75,000 was to the Honolulu Board of Water Supply for an emergency power master plan.

FEMA also offered $450 million ($50 million per applicant) in BRIC grants for mitigation and management costs through a national competition. None of the 13 projects Hawai'i applicants proposed for consideration was funded.

Among the applicants from Hawai'i were Honolulu's Office of Climate Change, Sustainability, and Resilience, which sought $20 million for a Ko'olauloa

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PHOTO: DEPARTMENT OF LAND AND NATURAL RESOURCES

The Hawai'i Department of Transportation is seeking to study the feasibility of installing locks and dams at both entrance channels into Honolulu Harbor to mitigate the anticipated impacts of sea level rise on the land-based facilities and structures

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resilience hub and community safe room; the Department of Defense, which sought $50 million to modernize its emergency operations center (EOC); and the state Energy Office, which sought $6 million for microgrids.

Meyers said that in the national grant competition, which received more than 900 submissions, all of Hawai'i's applications automatically lost 15 technical points out of 100 because neither the state nor the counties participate in a federally accredited Building Code Effectiveness Grading Schedule.

None of Hawai'i's projects even made the top 100. Meyers noted that the program's requirement that projects have a 25 percent cost-share match is a major obstacle for smaller groups, communities, and states.

Only ten states received funding and all of it went to large-scale, traditional flood-control infrastructure projects.

"Flood infrastructure is driving a lot of these conversations," Meyers told the Hawai'i Climate Commission last month, adding that his office is planning to hire a mitigation strategist.

Despite losing out on BRIC funding, Meyers' presentation to the commission suggested that some of the projects may still get federal funding through other channels.

He noted that Rep. Ed Case's office submitted a request for community project funding for three microgrids for the Hawai'i State Energy Office, to the tune of $7.9 million, in addition to $1 million for hardening and modernization of the state EOC, and $330,000 for a Hawai'i Safe Home Hurricane Retrofit Program.

Sen. Brian Schatz's office has also submitted direct funding requests for six projects, including $1 million for the same EOC project, $3 million for a home hurricane retrofit program, and $300,000 for a master drainage plan for the areas of Mapunapuna and Kalihi.

Finally, Meyers noted that the nearly $10 million in disaster related funding received for volcanic and severe weather incidents in 2016 and 2018 have helped pay for a number of climate change mitigation-related measures, including an energy and critical infrastructure vulnerability and resiliency assessment and an analysis of shoreline and riparian setbacks in Hawai'i County.

Nature-Based Solutions

While traditional flood-control projects won all of FEMA's competitive BRIC funding this year, the agency is open to considering nature-based solutions to flooding. Since 2010, it's had an Engineering with Nature program that collaborates with other FEMA teams on various projects.

At the Honolulu Climate Commission's June meeting, Todd Bridges, the Engineering with Nature program's national lead, highlighted the need for more nature-based solutions. He noted the findings published last December in the journal *Nature*, that human-made mass now exceeds all living biomass on earth.

"We've used a lot of concrete, rock aggregate, sand, brick, and asphalt to construct this infrastructure," he said. Referring to the *Nature* article, he noted that the doubling time for human-made mass was 20 years, which "really challenges the whole notion of sustainability."

When it comes to addressing the flooding threats posed by sea level rise and coastal storm surges, he said there are basically three options: shoreline hardening, retreat, or advancement. That third option is where "natural" solutions might be employed — be they wetlands, mangroves, man-made sand islands, or reefs — to mitigate hazards and "buy time for adaptation," he said.

PHOTO: FEMA

Rather than install a solid breakwater to protect the Fort Pierce City Marina in Florida from future hurricane damage, a sand archipelago was built. In addition to providing protection from storm surges, it also restored an ecosystem, according to FEMA's Todd Bridges.

Bridges extolled the value of coral reefs in flood mitigation, citing a *Nature Sustainability* article published this year on research by the USGS and University of California at Santa Cruz. It showed that for the island of O'ahu alone, coral reefs annually provide hundreds of millions of dollars' worth of flood protection, roughly $10 million in benefits per kilometer of reef.

Department of Hawaiian Home Lands planner Nancy McPherson asked Bridges and the Hawai'i-based Army Corps staff at the meeting for advice on what nature-based solutions could help with the flood risks some homestead areas are facing.

"Coastal erosion and inundation is meeting the flash flooding and our homesteaders are in the middle of that," she said.

Brian Kamisato, director of regional business for the Army Corps at Fort Shafter, said his office is "a good place to start with this dialogue."

"From where I sit, there's opportunity here. We have some authorities. We perform work under civil works, whether flood risk management [or] ecosystem restoration. … If we can find partners — with cities or states or others — we can enter feasibility studies. … We can bring potentially some federal dollars to bear."

At the Hawaiian Homes Commission's July 20 meeting, McPherson reported that to address coastal erosion and inundation of homestead lands in south Moloka'i, her office is investigating the benefits wetlands or other natural living shorelines might provide.

She noted that under current state and county policies, any kind of shoreline armoring would be "really, really difficult to achieve."

"We're looking at restoration of makaloa (a native sedge) … a lot of dune species like 'aki'aki grass and pohuehue (beach morning glory)," she said.

She noted that the shoreline along the homestead at Kapa'akea is an artificial one created by the department, "so there's going to be a lot of challenges employing nature-based solutions along that stretch. … Kamiloloa has a much better chance.

The department is planning to hold workshops across the state to develop resiliency plans to deal with the impacts of climate change, particularly with regard

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to the many cesspools on coastal homestead lands.

Reef Insurance

To help pave the way for more nature-based solutions, the state Legislature this year passed a resolution encouraging the Department of Land and Natural Resources to purchase reef insurance to help pay for enhancement projects that may help protect shorelines and coastal infrastructure.

DLNR director Suzanne Case supported the measure. In written testimony, she stated that the department's Division of Aquatic Resources is partnering with communities, non-profit groups, researchers, and businesses to develop coral restoration techniques and hybrid reef structures to protect vulnerable coastlines and increase fish habitat.

"Reef insurance is a new concept that has been tested in Mexico where the government of Quintana Roo recently received an $850,000 insurance payout after hurricane Delta impacted the Cancun region in 2020. The Nature Conservancy recently completed a two-year feasibility assessment for reef insurance in Hawai'i, and it appears there is interest and applicability in the islands. Further, the cost of insurance appears to be significantly less in Hawai'i, potentially making it more attractive for coastal property owners and others who have a vested interest in keeping our reefs healthy and resilient," she wrote.

She added, "[E]rosion and chronic flooding are predicted to increase as a result of sea-level rise. Beach erosion is already a significant and growing issue in Hawai'i, with 70 percent of beaches experiencing erosion. Ongoing sand replenishment and proposed structural erosion controls are not only costly, they often have detrimental effects on marine life and coastal systems."

The Nature Conservancy, Hawai'i program also testified in support. The organization, which helped develop the reef insurance program in Mexico, noted that severe hurricanes can destroy 50 percent or more of live coral cover, "and the loss of just one meter of reef could result in a doubling of the cost of damage."

"In 2018, Hawai'i was threatened by two Category 3+ hurricanes and last July, Category 1 Hurricane Douglas came within 30 miles of the state. As the risks to our reefs and coastal resources increase, so too does our need to develop new funding sources to protect and restore them. Reef insurance is a proven source of funding to repair reefs after a natural disaster," the organization stated.

There are insurance companies interested in offering reef insurance for hurricanes and bleaching in Hawai'i, it continued.

TNC has already mapped areas around the state where reefs are protecting important coastal infrastructure and local communities, as well as those reefs that are most vulnerable to severe bleaching.

"These are the regions where we should be investing in building reef resilience – increasing the reef's ability to resist or recover from natural disasters. … Our study suggests that an investment of just $20,000 a year could lead to a payout of up to $1 million to repair a reef impacted by the storms we know are coming. It is a small price to pay for the peace of mind that comes from knowing we can repair the reefs that provide our food and livelihoods while protecting homes and businesses across the state," it stated. ***— T.D.***

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of contaminated lands due to sea level rise, ground water inundation, and an increase in storms and heavy rain events require an equal progression in the manner in which risk is evaluated and mitigated for these types of sites. Of particular concern are large, current or former industrial sites in coastal areas that are known to be heavily contaminated and are at high risk of climate change-related impacts. This includes many harbors, airports, bulk fuel terminals and former landfills in the islands," the memo states.

Explosive Gases

At these contaminated sites, "[a]s long as the subsurface is sufficiently aerated and enough oxygen is present, methane oxidizing bacteria can degrade petroleum to CO_2. Unfortunately, as these areas become inundated from sea level rise, groundwater inundation or flooding, the oxygen supply decreases, leading to enhanced production of methane," the memo states.

Monitoring data from wells at Honolulu Harbor have shown that subsurface methane levels often spike during high tides and heavy rains.

The memo notes that the concrete surfaces in the area and the installation of plastic liners at active fuel terminals have hampered oxygen circulation to the underground pollutants.

"Methane can build up in areas under pavement and move along utilities or utility corridors, into confined spaces and accumulate in other subterranean pockets, creating a significant explosive hazard for utility workers and construction crews," it states, adding that methane vapors appear to be "enhanced during low atmospheric (barometric) pressures. This indicates a heightened risk of high methane concentrations during storm events."

Felton says that the actual risk increased methane production poses is still being determined, since the gas would have to be concentrated and exposed to a spark to cause an explosion.

In addition to methane, the memo also notes that sea water inundation of petroleum contaminated soil will likely increase production of toxic, and flammable, hydrogen sulfide gas.

"Hydrogen sulfide gas and methane vapors can migrate laterally and vertically and potentially intrude into buildings, creating indoor air quality concerns and flammability/explosive hazards," it states.

The memo, the content of which was shared at the Hawai'i Climate Commission meeting last month, showed that there are about 100 HEER-regulated sites in and around Honolulu Harbor.

Only about a dozen of them would fall directly within inundation areas if sea level were to rise 3.2 feet. But add a 100-year flood-type event on top of that, and all of the sites would be vulnerable.

Chemical Catastrophe

As *Hakai* magazine reported in an article published last November, the chemical contamination in certain parts of downtown Honolulu, combined with tidally induced flooding, already put the public drinking water supply at risk. If a corroded water main in Mapunapuna should break while submerged in polluted water during a high tide, hazardous chemicals

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could contaminate the pipeline and the drinking water it carries.

With sea level rise, that type of scenario will be an even greater, if not constant, threat.

The office found that more than 448 contaminated sites would be subject to inundation under a 3.2-foot rise in sea level: 307 sites on O'ahu, 54 on Maui, 42 on Hawai'i island, 23 on Moloka'i, 21 on Kaua'i, and one on Lana'i.

"When 1 percent annual-chance coastal flood zone and risk from rising groundwater or additional sea level rise up to six-feet is considered, the count of at-risk chemically contaminated sites rises dramatically," the memo states.

Before they started mapping which sites would be inundated under various scenarios, Felton says they had a fairly good idea that many of them would be impacted by sea level rise.

They were, however, surprised and concerned at the scope of sites vulnerable to extreme floods on top of a 3.2-foot rise in sea level.

"We know that the intensity and frequency of extreme floods is going to go up," she says.

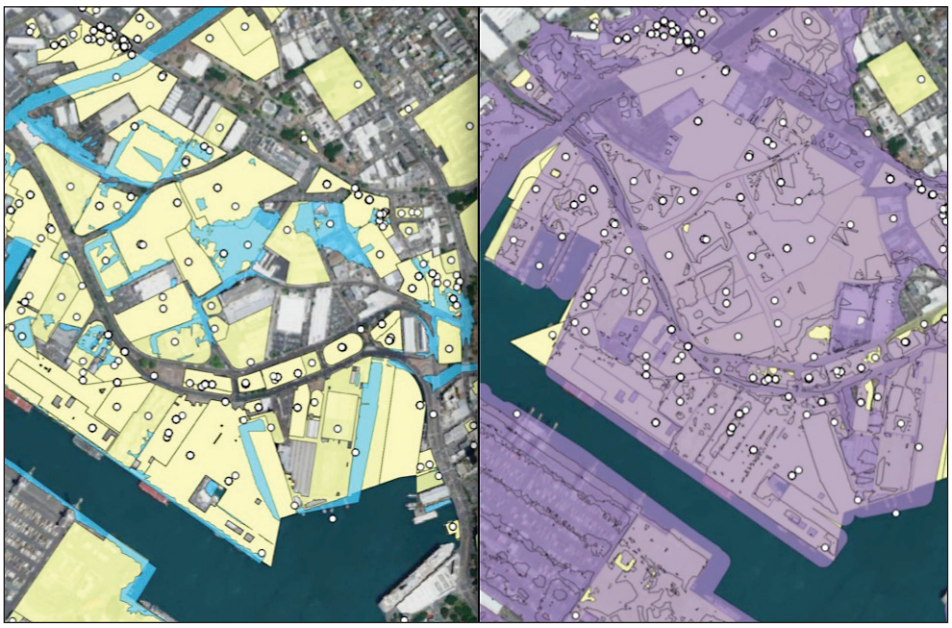
The memo offers some examples of the kinds of public and environmental health threats these sites pose as sea level rises and extreme storm events become more frequent:

• Large sections of Honolulu's shoreline are underlain with fill composed, in part, of lead-laden incinerator ash. This includes Kaka'ako Park and the land extending several hundred yards inland. Thick caps of clean soil and pavement cover the contaminated fill, but sea level rise or storm surges "could disrupt the caps and spread contaminated fill material along the shoreline and onto adjacent coral reefs," it states.

• Hilo's Wailoa River State Park was the site of a Canec plant that produced arsenic-infused wallboard from bagasse in the first half of the last century. Sediment in the park's Waikea Pond and the soil around it are heavily contaminated with arsenic. Tsunamis in 1946 and 1960 further spread the arsenic into the broader park area.

• The Wai'anae High School Outdoor Air Rifle Range is located less than one meter above sea level and the soil there is highly contaminated with lead.

• Decades ago, the Ke'ehi Lagoon Canoe Facility Increment II site in Honolulu Harbor was supposed to become a public park, with areas for race spectators and restored salt ponds for birds. Those plans were dropped after a 1994 site investigation discovered lead and polyaromatic hydrocarbons, which cause cancer, in the soil and groundwater. The department suspects the contamination came from a former asphalt plant in the area, as well as dumping of unclassified fill material into the lagoon to create 10 acres of land. The low-elevation site is directly adjacent to the lagoon and receives stormwater run-off.



The map on the left shows HEER sites in the Honolulu Harbor area in relationship to the sea level rise (SLR) exposure area at 3.2 feet of sea level rise. The exposure area is shown in blue and a combination of three modeled effects: sea-level-rise induced passive flooding expressed at the surface; coastal erosion, and annual high wave flooding. The map on the right shows in purple the area affected by a 100-year flood event in addition to 3.2 feet of SLR.

The Big Question

So what, exactly can be done to prevent the contamination at these sites from migrating or creating explosive hazards?

"That's sort of the big question. Are we going to have to figure out a way to remove all of this stuff? That's the tricky part," Felton says, adding that determining which sites pose a high risk to human health and the environment is key.

"We're really in the phase of raising awareness of this issue [that's] relatively unrecognized," Felton says.

The memo recommends that studies be done to "examine and measure changing contaminant conditions in high-risk areas and explore mitigation approaches to reduce methane risks and potential build-up of methane vapors."

It also recommends that criteria be developed to identify high-risk sites, with particular attention paid to "former dump sites and landfills, areas with extensive cover of contaminated fill materials, current and former bulk fuel terminals and related pipeline networks with extensive petroleum contamination and other areas of contamination associated with past industrial activity."

In addition, it calls for developing guidance, policies, and regulations to address and mitigate adverse impacts and for identifying high risk sites for focused attention and resources to mitigate in a timely manner.

Once the high-risk sites are identified, mitigation options can be considered. "Is it barriers to prevent the sea from coming in? Is it removal of that soil? Is it evacuation of the surrounding area? … There's not a ton of options," Felton says.

The removal of contaminated soil, which may have to be shipped to the mainland, is so expensive, it's a non-starter in a lot of cases, she says, adding that methods to clean soils in place are being developed.

"We're a long way from having the answer," she says.

— Teresa Dawson

BOARD TALK

Objections Follow Land Board Approval Of Small-Scale Beach Restoration Program

On July 9, Maui's Kai Nishiki and Kaua'i's Caren Diamond — both well-known advocates for public beach access — requested a contested case hearing on the state Board of Land and Natural Resources' approval of an amended version of the Department of Land and Natural Resources' small-scale beach restoration program.

The department's Office of Conservation and Coastal Lands, which administers the program, had proposed an updated version that would have, among other things, streamlined the permitting process. Earlier this year, the state Legislature passed what became Act 162, which waived the requirement for a water quality certification for certain small-scale beach restoration (SSBR) projects.

"[S]ome standard best management practices (such as complete dewatering of sand sourced from directly offshore) require double or triple handling of material (this practice would not be necessary where the sand source is clean Hawaiian beach sand), which drives up project costs to a point that is prohibitively expensive. Thus, not requiring a Section 401 Water Quality Certification for SSBR projects would result in a considerable reduction in project costs, would allow more efficient project delivery, and more effective/efficient administration of water pollution controls; but most importantly, it would keep beach sand where it belongs, which is on our beaches," wrote DLNR director and Land Board chair Suzanne Case in her testimony supporting the bill.

When the OCCL brought its new program to the Land Board for approval last month, several community groups and members of the public testified in opposition.

Malama Kua'aina, on behalf of which Diamond — its executive director — requested a contested case hearing, complained that the OCCL's outreach during the environmental review process on the program was practically non-existent and failed to meet the public participation objectives of the Coastal Zone Management Act.

The organization also complained about a temporary emergency sandbag revetment installed along five private properties in Ha'ena nearly 25 years ago, that it says impedes lateral public access.

"Under the proposed SSBN, sandbag revetments like the ones that have plagued the Ha'ena coastline will be allowed to remain in place through a streamlined and simplified permitting process. While this approach may be appropriate for some communities, it is certainly not appropriate for the North Shore of Kaua'i," it stated.

Its testimony continued that while the prior program, which expired in 2010, also provided for streamlined permitting, the proposal now before the board would also allow construction of sand stabilization structures, including "sand filled geotextile bags or tubes, stone filled marine mattresses, geotextile filter fabric, core stone, armor stone, steel or vinyl sheet pile, timber piles, and concrete, among others. … [T]the SSBN program that this board is being asked to approve on public trust lands is anything but small.

"Moreover, the SSBN allows the use of invasive mechanical systems and heavy equipment – such as excavators, cranes, bulldozers, front-end loaders, and other earth moving equipment – in performing beach nourishment activities. Streamlining mechanical manipulation of public beach resources by private landowners is misguided at best."

The group lamented that the OCCL's proposal failed to consider managed retreat in its environmental assessment, arguing that the activities proposed under the program "merely provide a temporary band-aid fix to the larger systemic problem with our state's coastal management."

It also argued that "taking a statewide approach to shoreline management, rather than evaluating shoreline management proposals on a case-by-case basis, prevents the board from exercising its due diligence to ensure the actions it takes do not impact Native Hawaiian traditional and customary rights."

Finally, with regard to an issue Diamond has successfully pursued all the way to the Hawai'i Supreme Court, the group argued that the proposed new program, which allows the planting of vegetation on the beach, directly contradicts state laws that require the maintenance of beach transit corridors, free of human-induced vegetation.

During his defense of his office's proposed program, OCCL administrator Sam Lemmo agreed with at least one argument made by Malama Kua'aina, that small-scale beach nourishment is just a temporary fix.

He acknowledged that there are people who want to force shoreline retreat now. They want people to not simply plan for sea level rise adaptation, they want them to implement, he said.

"We all want that," he continued, "but we don't know how to do it. And simply playing hardball with people is not going to give us what we want. It's going to backfire on us, in fact. We need to find a way forward that is manageable and economical and socially reasonable. …

"It's like we're simply trying to buy some time so we can reduce the pressure valve on everybody and maybe at the end of the day get a nice beach or save some of the beach sand that we have."

"You can't just force that on people without giving them solutions," he continued. Using as an example a Maui condominium where the sea is dangerously close to making it unlivable and has

Continued on next page

PHOTO: DLNR

Sand nourishment project at Kuhio Beach in Waikiki.

Keahole Kampachi Cages Attract Aggressive Bottlenose Dolphins

Bottlenose bullies.

That pretty much describes the behavior of some of the bottlenose dolphins that frequent the waters near Makako Bay, just north of the Kona airport.

Up until about 2006, most of the dolphins in the area were the much smaller spinner dolphins. Makako Bay had been used by the spinners as a daytime resting area, with up to 90 percent of the Kona spinner dolphins using it, according to Robin Baird of the Cascadia Research Collective. Baird has been studying false killer whales and other marine mammals in the area for the last couple of decades. He described his work on the bottlenose dolphins at this year's conference on Hawai'i ecosystem research organized by Stanford University's Peter Vitousek, held virtually in early July.

Starting around 2006, shortly after an open-ocean fish farm had been installed in the area, one or two bottlenose dolphins began hanging around the farm's giant net cages off of Keahole Point, Baird said. The farm raises amberjack fish, also known as kahala and sold as kampachi, with each of the cages holding thousands of the fish. At times, Baird said, there might be seven or eight bottlenose dolphins in the area.

Research cruises led by Baird have encountered bottlenose dolphins 31 times in close proximity to the fish farm and have logged 18 more encounters of bottlenose dolphins within five kilometers of it. Altogether, 35 individuals have been documented at the fish farm, both males and females, by Baird and his team. This, he said, suggests that the fish farm is attracting ever more bottlenose dolphins.

The bottlenose dolphins belong to one of four stocks around the Main Hawaiian Islands. The population for the Hawai'i Island stock is thought to number about 136.

Early on in the fish-farm operation, workers would feed the dolphins, Baird said, citing a report from Neil Sims, one of the farm's executive officers at the time. While that practice has ended, the bottlenose dolphins continue to hang around the aquaculture facility.

Over time, the behavior of these farm-associated bottlenose dolphins has become more aggressive, Baird said, not only toward the spinners, but also toward false killer whales. "They try to get food from false killer whales," he said, and, in one observed instance, attempted to separate a false killer whale calf from its mother.

The fish farm, Baird suggested, represents a fixed food source for the bottlenose dolphins, reducing the amount of time they spend foraging. At the same time, their aggression toward spinners seems to have caused the spinners to abandon their resting area at Makoko Bay.

In a 2013 paper, Sims speculated that the bottlenose dolphins "are probably attracted to the fish farm by a combination of: (i) the presence of the midwater structures acting as a fish aggregating device and the associated fish community that is present around the net pens; (ii) the occasional provisioning from 'leakage' escapes when divers enter or exit a net pen and from the rare larger escape incidents when predators have breached the Dyneema nylon webbing; and (iii) interaction with divers outside of the net pen, as the divers move about the farm from boat to net pen and back."

But more recently, divers have discov-

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had trouble with its efforts to halt further erosion, Lemmo argued, "What the hell's the county going to do at Kahana Sunset? The building's cracked. You know, are they going to condemn the building? Well guess what, they gotta pay them $30 million now. Or is everybody going to step aside and say let nature take its course and then we have a big mess?

"So I don't know. I'm just flailing about here like everybody else, but trying to do it in a good way," Lemmo said, adding, "I think this is a good program and I think we should go for it."

With regard to Malama Kua'aina's concerns about what structures could be installed, Lemmo said that the proposed program "has absolutely zero to do with sandbag revetments. You could maybe put in a sandbag groin, but the purpose of a groin is to create a beach, not prevent erosion."

On Lemmo's suggestion that condemnation is the only option in cases like Kahana Sunset — a statement he later retracted — board chair Case noted, "Just for the record, I'm not sure the government would have to condemn [parcels] at full market value for something that's seriously compromised, but it is a very thorny situation and lots to work through there."

In the end, Land Board member Vernon Char moved to approve the program as proposed, but said he welcomed any amendments to address concerns raised by the public.

Board member Chris Yuen seconded the motion, while offering several amendments.

He would require all the Category 3 projects, which are those where more than 25,000 cubic yards of material would be placed on the beach or would include the construction of stabilization structures, to come to the Land Board for final approval, after the OCCL held a public meeting on it and a full Ka Pa'akai and public trust analysis on its impacts was completed.

Also, the Office of Hawaiian Affairs would have to be consulted on all projects, private owners would be required to certify that they would not get a regulatory certified shoreline makai of their pre-construction shorelines, and OCCL staff would be given the authority to deny any projects if negative effects were found to outweigh the benefits.

"This is a really difficult issue and we need to make a decision of some sort. To not do anything at his point would be irresponsible I think," board member Sam Gon said before voting in support of the motion. The motion passed, with board members Kaiwi Yoon and Doreen Canto voting in opposition.

Nishiki and Diamond then requested a contested case hearing. They had 10 days to follow up with written petitions. Should the Land Board grant the trial-like hearing, the new beach restoration program's implementation would be on hold until the case is resolved. **— *T.D.***

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ered the animals managing to open the pens and allow the fish to swim out – into the welcoming jaws of the dolphins.

Divers who frequent the area have caught this on videos posted to the web. One of them, Dylan Currier, has explained the action this way: "This pod claims an offshore fish farm as their territory and has developed an ingenious method of harvesting their own percentage of the catch. The dolphins swim down below the rim of the cage where there are holes in the net and use blasts of air to scare the jacks out into the open."

Baird said until the observations of the bottlenose dolphins around the fish farm, he had never seen bottlenose and spinner dolphins together. "All aggressive behaviors," he said, "involved farm-associated dolphins."

A few kahala manage to escape both cages and the bottlenose dolphins. At the June meeting of the Western Pacific Fishery Management Council, council member Ed Watamura, a fisherman, said that the escaped kahala are "barraging everything." Fishers targeting bottomfish "have to pick up and move" when the kahala come along, he said. "After catching 10 or 12 kahalas, you give up."

"Many bottomfishermen are saying the same thing," he added. "The escapees are a problem. And we know it's the result of escapees. There are two types of kahalas. The one's we're catching more of are the aquaculture kind."

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Wespac Advisors Critical Of Measures to Protect False Killer Whales

At the June meeting of the Western Pacific Fishery Management Council, members heard Jim Lynch, chairman of the council's Scientific and Statistical Committee, lay out a proposal that certain members of the SSC had been developing. The informal working group – consisting of Lynch, retired social scientist and longtime SSC member Craig Severance, Australian environmental consultant Milani Chaloupka, and David Itano, a former fisheries biologist with the National Marine Fisheries Service and now a consultant in private practice – had come up with an outline of what Lynch and the others hoped would eventually be an article in a peer-reviewed scientific journal discrediting the several measures imposed on the Hawai'i-based longline tuna fishery to reduce its impact on false killer whales.

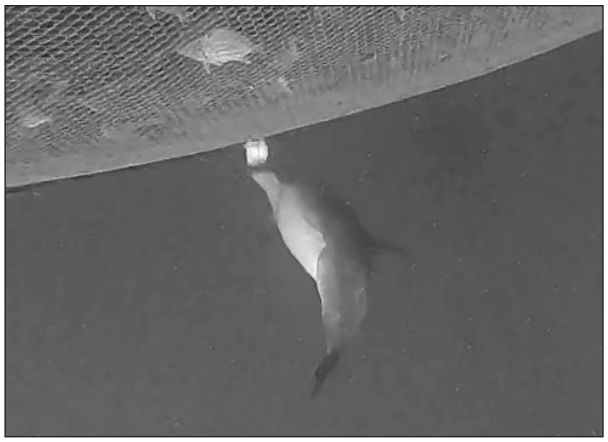

PHOTO: DYLAN CURRIER/VIMEO

A bottlenose dolphin capturing a kampachi that it has managed to free from an aquaculture cage off Keahole.

At the SSC meeting held the previous week, Lynch had unveiled the group's work to the rest of the committee. "Some of us have seen a lack of action," he said, when it came to reducing the impacts of fishing on false killer whale populations. "The SSC's recommendations have not been taken into account. The paper we developed attempts to synthesize years of data and recommendations" that could be forwarded to the council and the National Marine Fisheries Service.

"The goal and intent is to produce one or more scientific presentations that can be presented to journals," Lynch said. The paper or papers could then be used by the agencies "to address impacts to false killer whales in a lawful and pragmatic way."

Each member of the working group was assigned a section to work on. Although the draft paper was distributed to other members of the SSC who weren't included in the working group, it was not made public.

A summary of the group's preliminary conclusions was presented in outline form, however. Among other things, the group had:

• reviewed "a decade of interaction research and mitigation efforts;

• taken note of previous SSC and council recommendations ("both those followed and ignored!");

• reviewed gear modifications, seeing "promise in the industry-led switch" to monofilament leaders; and

• taken note of the fact that under the federal Marine Mammal Protection Act, the development of PBR – potential biological removal – "drives the process, but does not encourage creative solutions. (PBR is the maximum number of animals that can be removed from a defined population while still allowing that population to reach its optimum level.)

Several approaches to mitigation that have either been adopted or are now being studied were pooh-poohed. A proposed "move-on strategy," requiring vessels that encounter false killer whales to relocate to different fishing grounds, is "inappropriate for a fishery marketing fresh, iced product with limited storage time," the working group found.

"Catch-shielding gears," to protect caught fish from depredation by false killer whales, "have many logical issues," while "acoustic deterrents can become ineffective and contribute to the 'dinnerbell' effect," the group determined. Like the move-on strategy, these two approaches have merely been floated as possible deterrence measures.

Three additional mitigation measures that are either required or are being studied are the use of weak hooks (allowing the animals to free themselves when the line is held taut); cutting branch lines close to the hook, and thus minimizing trailing gear when the animal is set free; and "novel line-cutting devices."

The last of these is actually in development by the Hawai'i Longline Association, in connection with its switch to monofilament leaders on all deep-set longline (tuna-targeting) fishing vessels. This approach, the group concluded, "should be promoted."

As for weak hooks, their use is the subject of an ongoing study, whose results are expected to be released later this year.

The group was skeptical about the utility of cutting branch lines closer to the hook. This "should be better assessed

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in relation to post-release condition and serious injury determinations," the group found.

Chaloupka's presentation was the harshest.

The false killer whales are "abundant and widespread in the Pacific," he said, with both the insular populations of the animals as well as their pelagic counterparts exposed to anthropogenic hazards around Hawai'i. They are not at "high risk" of capture by the Hawai'i fleet, he added, and there's no evidence of a "high apparent rate of at-vessel mortality" for animals taken in the fishery.

He continued. There is no "reliable information" on captures and at-vessel mortality "readily available for monitoring status and trends;" no reliable estimate of post-release mortality and sublethal effects for animals caught by longliners; no "reliable demographic parameters … needed for stock assessment and diagnosing trends;" no "level-4 population consequences of distribution-based risk assessment;" and no evaluation of the effect of the Southern Exclusion Zone or weak-hook rules.

"So," he concluded, "is an evidence-informed bycatch mitigation policy in place? No." It is, he added, "a unicorn." To which council executive director Kitty Simonds replied, "Amen, brother."

Another SSC member then asked him, "What's a unicorn?"

"A figment of your imagination," Chaloupka responded.

The group came up with six recommendations, including several that seem at odds with each other.

Mike Tosatto, administrator of NMFS' Pacific Islands Regional Office, praised the group's work as well.

Recommendation three calls for additional studies of false killer whale population dynamics. The fourth recommendation suggests that a new metric, other than PBR (potential biological removal) be developed to assess trends in the false killer whale population.

The fifth recommendation calls for elevating the role of the Scientific and Statistical Committee in developing measures included in the Take Reduction Plan for false killer whales. The friction between the False Killer Whale Take Reduction Committee, charged with reducing the interactions between the protected animals and the longline fishery, and the SSC goes back years. It broke into the open in January 2014, when Robin Baird, who sits on the TRT and who, at the time, was on the council's Protected Species Advisory Committee, was disparaged by Chaloupka when Baird was making a presentation to the SSC.

Baird pioneered research into false killer whale populations in waters surrounding the islands in the Hawaiian archipelago, and it was largely his work that was responsible for listing the insular population, around the Main Hawaiian Islands, as an endangered distinct population segment under the federal Endangered Species Act. Baird also sits on the Take Reduction Team.

As reported in *Environment Hawai'i* in the March and May 2014 editions, Baird was so outraged by the conduct of Chaloupka that he resigned from the council advisory committee and walked out of the meeting.

The final recommendation is that the council adopt "conformance-based monitoring" of false killer whale captures. What exactly this means was not explained.

Lynch made the same presentation to the full council the following week. Council members praised the report.

Ed Watamura: "Just wanted to say hallelujah, Jim. … You guys, everything you're doing is what I've been thinking about."

McGrew Rice was also thrilled: "This is the most exciting part of the meeting for me. I've been on the trail of false killer whales for the last nine years. Good to see you guys are putting it on paper."

Mike Tosatto, administrator of NMFS' Pacific Islands Regional Office, praised the group's work as well.

"I say that with sincerity," Tosatto continued. "I can commit, we have a MMPA structure. … I wouldn't characterize it as a failed act, but it can be improved, catch up to the times. The MMPA has many benefits, but it also has many unfortunate statutory requirements. We have to follow them."

He noted that the council operates under the Magnuson-Stevens Act, "updated every ten to fifteen years. The MMPA is stuck in the past. The obligation of the Take Reduction Team is well defined as reducing PBR [potential biological removal] but we have to get to near zero. That's not necessarily the same objective as the council has."

Lynch replied that he, too, tried to educate SSC members about the constraints of the law. "But it doesn't stop there," he said. "We need to educate everyone. We owe it to ourselves to not just be complacent but challenge things that don't make sense."

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Toxoplasmosis, Rain, And Dying Monk Seals

The relation between toxoplasmosis, feral cat colonies, and monk seal deaths has been well established. In recent years, 13 monk seal deaths have been attributed to toxoplasmosis, a disease caused by a parasite shed in cat feces.

But scientists at the Pacific Islands Fishery Science Center have also been observing monk seal strandings (including deaths) that seemed to happen after rainy periods.

As explained in the science center's recent report to the council, "we set out to formally study the association between toxoplasmosis strandings and major freshwater runoff events that might flush oocysts [similar to eggs] into the monk seals' coastal habitat."

PIFSC researchers' initial findings "indicate that cases were up to 35 times more likely than controls to occur a few weeks after heavy runoff events. The greatest odds ratio was observed when rainfall occurred three weeks prior to stranding, potentially providing clues about the timeline of the disease process."

The heavy rainfall events, the researchers noted, deliver "sufficient numbers of oocysts to infect Hawaiian monk seals. With infectious doses as low as a single oocsyst, any contaminated runoff constitutes a serious risk to Hawaii's endangered monk seals."

The researchers conclude, "This analysis indicates, as has been documented in other marine species, that land-to-sea flow of oocysts locally is the main source of exposure for Hawaiian monk seals and suggests that local to regional scale efforts to mitigate oocyst deposition and runoff can reduce risk of exposure to this devastating disease."

— Patricia Tummons

Hawai'i Tuna Longliners Near Limit on False Killer Whales

As the working group convened by the Scientific and Statistical Committee of the Western Pacific Fishery Management Council developed its criticisms of measures intended to reduce the bycatch of false killer whales by the Hawai'i longline fleet, actual interactions between the longliners and false killer whales in waters around Hawai'i have been increasing.

As of mid-July, nine interactions had been observed. Of the three that occurred inside the U.S. Exclusive Economic Zone (EEZ), two were determined to have resulted in serious injury to the animals involved, while one resulted in its death. Of the six that occurred beyond the 200-mile boundary of the EEZ, preliminary determinations are that five resulted in serious injury; one has been preliminarily determined to have been non-serious.

Under the Take Reduction Plan approved by the National Marine Fisheries Service, the take – representing the mortality or serious injury of an animal (M&SI) – of false killer whales caught inside the EEZ can be no more than 16 per year before restrictions on fishing grounds are put into place. That number is the so-called Potential Biological Removal (PBR) set under the Marine Mammal Protection Act – the level of harm that can be sustained by a population of marine mammals without its chances for recovery being jeopardized.

The PBR is calculated not by the number of animals that are taken in the presence of on-board observers, but by multiplying the number of observed takes that are judged to be serious or deadly by the fraction of the fleet on which observers are placed.

Until COVID-19 hit, that percentage was 20, or one-fifth of the deep-set longline fleet that targets bigeye tuna. The M&SI of three observed animals within the EEZ would extrapolate to 15 animals killed or seriously injured fleetwide, just one below the actual number taken so far this year.

Since the pandemic hit, the percentage of coverage has been closer to 15 percent, or between a sixth and a seventh of the fleet. With that level of coverage, three animals killed or seriously injured extrapolates to between 18 and 21 for the total fleet.

However, Mike Tosatto, administrator of the NMFS' Pacific Islands Regional Office, said that in 2020, observer rates were increasing, so the extrapolation rate remains based on an observer rate of 20 percent.

In 2019, when the calculated rate of M&SI exceeded PBR, it led to the closure of the southern exclusion zone (SEZ), an area south of the Main Hawaiian Islands that represents about 17 percent of the total available fishing grounds for longliners within the EEZ.

The SEZ was reopened last August and has not been closed yet for 2021.

The Interactions

The SEZ had been opened just a few months when the first two false killer whale interactions of 2021 were observed on January 4, both outside the EEZ. The same vessel was involved in both interactions.

In the first case, at around 7:20 p.m., the animal surfaced and the crew grabbed the line, but, according to a NMFS summary, "the line broke while in the hands of the crew … before any action could be taken." "The hook, weight, leader, and 1.9 m[eter] of line remained on the whale," the observer noted.

The second interaction occurred about two hours later. "The crew took the line in hand and were struggling to pull in enough line to tie off," the NMFS report states. "At that point, the captain arrived on deck and instructed the crew to tie off the line to the cleat. Once the line was tied off, it broke. The whale was hooked in the mouth and the observer could see the leader but not the hook. The observer noted the whale's behavior as struggling and distressed throughout the interaction. After the line broke, the whale dove and was not seen again. The hook, weight, leader, and 1 m of line remained on the whale."

Both of these interactions have been given a preliminary determination as serious injury.

The third interaction of the year occurred two weeks later, on January 18, inside the EEZ. In that case, 12 meters of line remained on the whale. This was given a final determination by NMFS as a serious injury.

In March, another interaction inside the EEZ was classified as serious. In this case, "the line was leading towards the mouth, but it was not clear if the hook was in the mouth or ingested. The crew attempted to tie off the line, when the line suddenly snapped and broke. The hook, weight, leader, and 8.9 m of branchline remained on the animal."

The third interaction noted inside the EEZ occurred on April 17 and resulted in the animal's death. "A false killer whale came up tail first and unresponsive, with the mainline and multiple branchlines (observer estimated 7 branchlines) entangled around the fluke," the NMFS report states. "Several hooks were embedded in the animal."

From May 6 to June 17, four more interactions were recorded by observers, all occurring outside the EEZ. No final determinations had been made for these interactions as of mid-July. However, three of these four were preliminarily classified as serious. ***— P.T.***

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As Homeowners Seek to Replace Cesspools, DOH to Now Ask for Certified Shorelines

Late last year, Justin Prouty purchased an ocean-front home for $2.7 million on Ke Nui Road, on O'ahu's North Shore. The area, known as Sunset Beach, is famous for its surf – but also for the high winter waves that have eroded the coast, effectively moving houses on Ke Nui and nearby areas ever closer to the water.

A year earlier, in 2019, the property was one of nearly two dozen in Haleiwa and nearby Pupukea that had obtained permission from the state Department of Land and Natural Resources to install temporary emergency sandbag berms along the eroding scarp.

Now, as Prouty plans to add an additional bedroom and den to the house, he must replace the existing cesspool that serves the property with a more modern aerobic treatment unit that disperses partially treated waste into a leach field.

Under Department of Health rules, leach fields need to be set back from the shoreline a minimum of 50 feet. Complying with the setback requirement is not possible, given the small back yard of Prouty's house lot. And so Prouty's engineer, Michael McNulty, prepared an application for a variance from DOH setback requirements, which was submitted to the DOH Wastewater Branch in early July.

On July 7, the *Honolulu Star-Advertiser* carried a public notice of the variance application, and Environment Hawai'i obtained a copy of it a few days later.

Plans for Prouty's leach field show there's at most 18.5 feet between the outermost edge of the planned leach field and the shoreline.

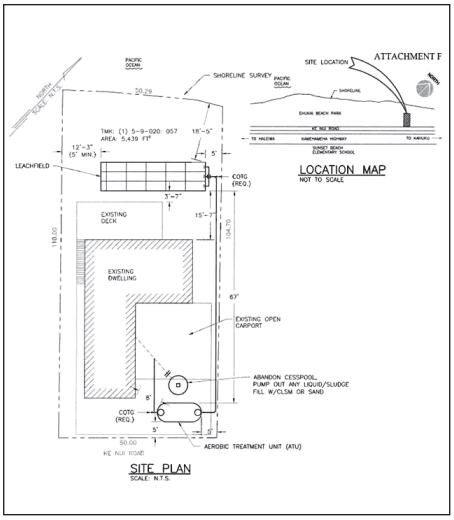
In addition to the 50-foot setback between the outermost reach of the leach field and the shore, DOH rules also require a minimum of 5 feet between the leach field and structures. As shown on the site plan accompanying the Prouty variance application, just 3.7 feet lie between the mauka wall of the most mauka trench of the leach field and the makai edge of a deck. The makai wall of the house is another 12 feet further inland from the outer boundary of the deck.

Sina Pruder, head of the Wastewater Branch, was asked if her staff was able to confirm the distances provided in the application. "DOH relies on the licensed engineer to provide the information about the shoreline certification when submitting a variance and/or individual wastewater system application," she replied.

At present, she noted, the house at 59-297 Ke Nui Road "is currently a 3 bedroom/2 bath home that is connected to a cesspool that is at least 10 feet deep. When designing individual wastewater systems, we use 200-gallons-per-day for a bedroom. Based on that information, the existing design flow of the cesspool is … 600 gpd. The owners plan on adding another bedroom and a den, which we consider a bedroom-like room, so the design will be 5 bedrooms x 200 gpd = 1,000 gpd."

Given this, Pruder was asked, should the Department of Health require current certified shorelines be included in applications for wastewater variances along the coast?

"As a condition of the variance," Pruder replied, "we'll request that a certified shoreline survey shall be submitted with the individual wastewater system application. We'll actually include this as a condition for future variances with similar situations."



Site map included with the variance application for 59-297 Ke Nui Road.

Although McNulty's application did not note a certified shoreline on the site plan, after he was asked about this, he provided *Environment Hawai'i* with a copy of the certified shoreline map as accepted by the Department of Land and Natural Resources in early July.

As determined by the most recent survey, the shoreline is well mauka of a certified shoreline surveyed in 1990, and even further mauka of a survey made in 2015.

Dr. Shellie Habel, coastal lands program coordinator with Sea Grant at the University of Hawai'i, noted that the shoreline in that area is known to experience seasonal erosional/accretion patterns. "Just because it's wide now doesn't mean it's always wide," she told *Environment Hawai'i*. The Department of Health should factor that in, "in addition to at least near-term projects of sea level rise."

— Patricia Tummons