Hawaii Beach Monitoring Program

State of Hawaii
Department of Health
Environmental Management Division
Clean Water Branch

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1. INTRODUCTION

The Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), also known as the Clean Water Act (CWA), was amended by the Beaches Environmental Assessment and Coastal Health Act of 2000 (BEACH Act) to require: 1) states, territories, and tribes with coastal recreational waters to adopt new or revised water quality standards for pathogens and pathogen indicators for which the US Environmental Protection Agency (EPA) has published criteria under CWA section 304(a); 2) EPA to conduct studies associated with pathogens and pathogen indicators and publish new or revised criteria for pathogens and pathogen indicators; 3) states, territories, and tribes with coastal recreational waters to adopt new or revised water quality standards for all pathogens and pathogen indicators for which EPA published new or revised CWA section 304(a) criteria; and 4) authorizes EPA to award grants to states, territories, tribes or local governments to develop and implement beach monitoring and assessment programs.

In 2002 EPA published performance criteria for recipients of the BEACH Act grant which were revised in the "*2014 National Beach Guidance and Required Performance Criteria for Grants.*"[1] The Hawaii Department of Health (HDOH) Clean Water Branch (CWB) is a recipient of EPA BEACH Grants and this document presents the procedures and practices used by the HDOH CWB to meet the EPA-specified performance criteria.

The foundations of Hawaii's Beach Program are based on the state's recreational water quality standards as specified in the Hawaii Administrative Rules, Title 11, Chapter 54, Water Quality Standards (HAR 11-54)[2] which was last amended in October 2021. HAR 11-54 was amended in November 2014 (and approved by EPA on May 20, 2015) to adopt the 2012 EPA recommended Recreational Water Quality Criteria (RWQC) for bacterial indicators of fecal contamination. In its 2012 RWQC, the EPA recommended that state water quality standards specify the magnitude of the indicator density, expressed as a geometric mean and a statistical threshold value; the duration over which the magnitude is calculated; and the frequency of exceedances or the maximum number of times that the indicator may be present above the magnitude over the specified duration.

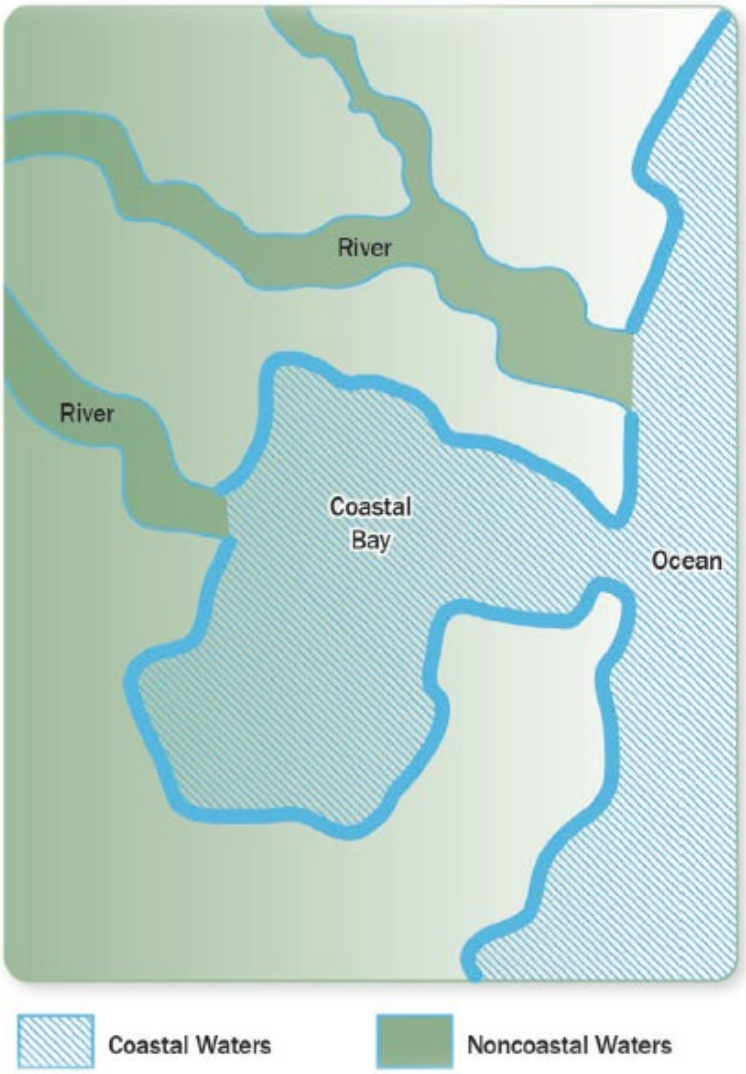
Hawaii's recreational water quality standards specify the use of enterococci as the fecal indicator bacteria (FIB, also identified by EPA as a fecal indicator or pathogen indicator). Enterococci, one of the FIBs recommended by EPA, is used to identify the possible presence of pathogenic microorganisms that may cause illness in users of recreational waters. The specific criteria for enterococci are expressed as colony forming units (CFU) or most probable number (MPN) per 100 milliliters (mL), depending on the analytical method used. Hawaii's water quality standards specify the geometric mean threshold value of enterococci concentrations in recreational waters to be 35 CFU or MPN per 100 mL. To further clarify, the magnitude of enterococci content is calculated as a geometric mean over the duration of any 30-day interval, and it shall not exceed

[1] National Beach Guidance and Required Performance Criteria for Grants, 2014 Edition, EPA-823-B-14-001, July 31, 2014.
[2] http://health.hawaii.gov/cwb/files/2013/04/Clean_Water_Branch_HAR_11-54_20141115.pdf

35 CFU or MPN per 100 mL. Hawaii's water quality standards also specify the Statistical Threshold Value (STV) of enterococci concentrations in recreational waters as 130 CFU or MPN per 100 mL. The frequency of enterococci concentrations exceeding the STV shall not be more than ten percent of the samples taken within the same 30-day interval in which the geometric mean is calculated.

The CWB has developed a beach program decision rule, shown in Section 2, to help guide actions necessary to appropriately advise the public when monitoring shows that beach waters do not meet recreational water quality standards. The decision specifies a "Beach Action Value" (BAV), the FIB level at which the CWB will take appropriate beach management actions. The CWB uses FIB levels above 130 CFU or MPN/100 mL as the BAV.

The Hawaii Beach Monitoring program specifically applies to coastal beaches and explicitly excludes inland waters upstream of the mouth of a river or stream, as specified in the 2014 National Beach Guidance, and shown on Figure 1 below.



Source: National Beach Guidance and Required Performance Criteria for Grants, 2014 edition

Figure 1. Coastal and Non-coastal waters

2. OVERVIEW OF THE BEACH MONITORING PROGRAM IN HAWAII

The State is required to identify measures to notify EPA and the public when a beach Advisory threshold (i.e., the BAV) is exceeded and to identify measures to inform the public of the potential risks associated with water contact activities in coastal recreational areas (beaches) when the BAV is exceeded. The State is also required to report to EPA, at least annually, on the occurrence, nature, location, pollutants involved, and the extent of any exceedances of the BAV.

The State must also identify any local governments to which they have delegated responsibility for implementing an advisory program and describe the process by which the delegation is made.

The Monitoring and Analysis Section of the CWB is responsible for the administration of Hawaii's BEACH Act monitoring program and all BEACH Act advisory requirements and does not delegate any of these responsibilities. As part of the BEACH monitoring program, CWB performs routine monitoring of Hawaii's beaches which encompass sample collection, field measurements, and field observations. Water quality samples are currently analyzed for the FIB enterococci by laboratories that are situated on the islands of Oahu, Maui, Kauai, and Hawaii.

Consistent with the 2014 EPA guidance, the CWB must promptly issue a beach Advisory or resample if there is reason to doubt the accuracy, certainty, or representativeness of the first sample. If there is reason to doubt the results of the first sample, the CWB will collect confirmatory samples before issuing an Advisory. The following sections detail the justifications used to develop the current CWB procedures for this situation.

Several studies and scientific reports[3] have concluded that enterococci, the FIB recommended by EPA, is not an ideal pathogen indicator in Hawaii in that it does not necessarily indicate the presence of fecal pollution. Enterococci has been shown to multiply in soil and decaying vegetation in Hawaii and other tropical regions, especially along inland streams that are heavily canopied by vegetation. Studies have identified major sources and sinks of enterococci in the environment, which include soil, aquatic and terrestrial vegetation, beach sand and sediment, and feral animals. The 2014 EPA Guidance states that it is important to note that the recommended FIB is not exclusively of fecal origin and that they can be part of the natural microflora in the environment and that FIB from these non-fecal sources have not been demonstrated to be related to the potential for human illness. The 2014 EPA Guidance further recommends that beach managers understand the potential fecal sources in the watershed affecting their beaches to most effectively protect the health of beachgoers. One recommendation towards this goal made by EPA is the performance of a sanitary survey.

The CWB conducted a site-specific sanitary survey on the island of Kauai after receiving complaints that the BAV was consistently being exceeded in the area. The sanitary survey could not definitively identify a source of enterococci that would indicate risk to human health. The CWB then commissioned a study to identify the potential sources of the FIB in the area. The study concluded "high concentrations of FIB in both Waiopili Ditch and Waikomo Stream were not caused by human or animal fecal contamination"[4]. As a result of this, and of previous studies[5], the CWB has determined that enterococci do not reliably indicate human health risk due

[3] https://www.ncbi.nlm.nih.gov/pubmed/23204362; https://www.ncbi.nlm.nih.gov/pubmed/26184253; https://www.ncbi.nlm.nih.gov/books/NBK190421/

[4] Mahaulepu and Waikomo Watersheds PhyloChip Source Tracking Study, Hawaii, Final Report May 22, 2019

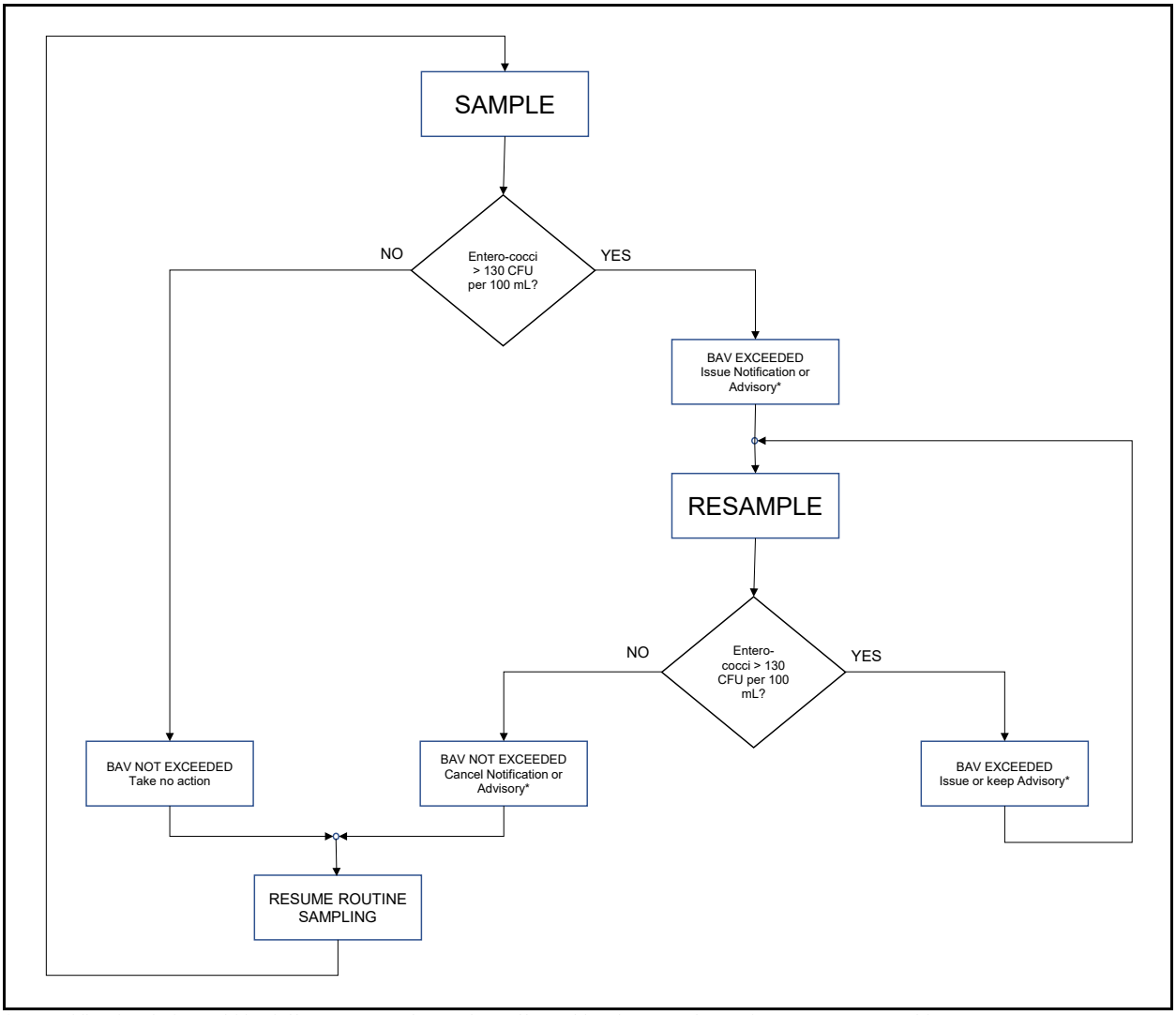
[5] Viau, E.J.; Lee, D.; Boehm, A.B. Swimmer Risk of Gastrointestinal Illness from Exposure to Tropical Coastal Waters Impacted by Terrestrial Dry-Weather Runoff. Environ. Sci. Technol. 2011, 45 (17), 7158-7165.

to fecal pollution in Hawaii and confirmatory testing must be performed before beach advisories are issued.

The previous beach decision rule specified the issuance of Advisories immediately after receiving laboratory results showing that the BAV has been exceeded. Signs were posted on the affected beach and follow-up samples were collected. From the initiation of Hawaii's beach advisory program in October 2017 to December 2021, more than 15,300 samples were collected statewide- out of which, 156 Advisories were issued for 82 beaches. Of the 82 beaches at which Advisories were issued, 76 beaches did not exceed the state's monthly geometric mean standard of 35/100 mL, over the two-year period. And, of the 156 Advisories issued, 146 Advisories were canceled based on the laboratory results of the follow-up sample, which was usually shortly after the 24-hour analytical period. CWB data shows that during the period between the posting of the Advisory and the receipt of the follow-up sample results, the FIB levels for these samples were below the BAV and there was no significant risk to the public, despite the posting of the Advisory signs. Data shows that for the vast majority of Advisories that were issued, immediate follow-up resamples indicated that there were no significant risks during the period that the Advisory signs were posted. If there were a public health risk as a result of fecal pollution, the BAV would remain elevated for several consecutive days[6]. Advisory posting of single-day exceedances of the BAV, unless warranted (e.g., evidence or report of sewage leaks or spills), causes unnecessary apprehension and inconvenience to the public when no significant health risk can be demonstrated. The CWB has concluded that, in most cases, there is a valid reason to doubt the certainty and representativeness of the first sample, and confirmatory resampling of the area prior to issuing an Advisory is warranted[7].

The CWB's beach program decision rule, shown in Figure 2 below is used to help guide actions necessary to communicate to the public when there is a potential risk to beach users. The decision rule specifies a "Beach Action Value" (BAV), the level of FIB at which the CWB will take appropriate beach management actions. The CWB selected enterococci above 130 CFU or MPN/100 mL as the BAV, which is equivalent to the EPA recommended statistical threshold value not to be exceeded 10% of the time.

[6] Thoe, W., Gold, M., Griesbach, A., Grimmer, M., Taggart, M.L., Boehm, A.B., 2014. Predicting water quality at Santa Monica Beach: evaluation of five different models for public notification of unsafe swimming conditions. Water Res. 67,105e117.
[7] Review and analysis of DOH data from October 2017 through December 2021.



*A Notification is issued if a follow-up sample can be collected by the next day. Signs are not posted in response to a Notification. An Advisory is issued if follow-up samples cannot be collected prior to a weekend or holiday

Figure 2. Decision Rule

If the BAV is not exceeded, i.e., is less than or equal to 130 CFU or MPN enterococci/100 mL during routine monitoring, then no action is required and routine monitoring resumes.

If the BAV is exceeded, the CWB collects a confirmatory follow-up sample on the next workday and issues a Notification on the CWB Water Quality Notification and Advisories website and sends email Notification to subscribers informing them that confirmatory testing is being conducted. If a follow-up sample cannot be collected prior to a weekend or a holiday, an Advisory rather than a Notification is issued.

If the confirmatory follow-up sample shows that the BAV is not exceeded, the CWB will update the Notification stating that no Advisory is issued, and routine monitoring is resumed.

If the confirmatory follow-up sample shows that the BAV is exceeded, the CWB issues an Advisory for the affected beach and communicates the exceedance to the public. Advisories in response to exceedances of the BAV remain in place until further follow-up sampling results indicate that the BAV is no longer exceeded.

When the BAV is no longer exceeded after an Advisory has been issued, an Advisory cancellation is communicated to the public.

Public Notifications and Advisories are discussed in Section 7.

Responses to wastewater or sewage spills, overflows, and discharges are carried out pursuant to HAR 11-62, Wastewater Systems, Appendix B[8] and are discussed in Section 7, Response to Sewage Spills.

3. GOAL OF THE BEACH MONITORING PROGRAM IN HAWAII

The goal of Hawaii's Beach Monitoring Program is to reduce the risk of illness to users of Hawaii's beaches due to sewage pollution by issuing public advisories when warranted (e.g., due to evidence of sewage leaks or spills, heavy rains, etc.) and in response to exceedances of the BAV when there is no reason to doubt the accuracy or representativeness of the monitoring results. To achieve this goal, the CWB takes prompt action in response to any exceedance to the BAV by collecting confirmatory follow-up samples. The CWB provides timely public advisories and risk communication to users of Hawaii's beaches in response to BAV exceedances that may pose a health risk. Risk communication is provided to the public so that personal decisions may be made based on individual risk tolerances. The CWB believes that routine monitoring and prompt, accurate advisories will satisfy the goal of reducing risk to beach users by keeping beach users informed.

In addition to informing the public, the CWB is also required to prepare quarterly reports to EPA to satisfy a grant requirement and annual reports to the EPA to satisfy a federal BEACH Act requirement. These reports compile monitoring results, Advisory and Notification efforts, and actions taken. Reporting activities are discussed in Sections 6 and 8.

4. RISK-BASED BEACH EVALUATION AND CLASSIFICATION AND TIERED MONITORING PLAN

Hawaii's beaches were evaluated and classified by the CWB when the BEACH Act was first enacted in 2000. In 2003, Hawaii submitted to the EPA an inventory of beaches that were subject to the provisions of the BEACH Act (i.e., "BEACH Act beaches"). There are six major islands with public access to beaches. The four largest islands of Kauai, Oahu, Maui, and Hawaii Island are staffed by CWB personnel. The beaches on the islands of Lanai and Molokai

[8] https://health.hawaii.gov/opppd/files/2015/06/11-62-Wastewater-Systems.pdf

are included in the beach inventory but are currently not monitored due to logistical challenges imposed by holding time restrictions for the samples. These islands are the least populated and industrialized of the major Hawaiian Islands and their beaches are least likely to be threatened by pollution. There are no BEACH Act beaches on the islands of Kaho'olawe and Ni'ihau due to access restrictions. With current resources, it is impossible and impractical for the CWB to monitor all beaches in the state; therefore, the CWB has ranked all beaches into different priority levels or tiers.

Hawaii's BEACH Act inventory of beaches, submitted to the EPA in 2003, was ranked by tiers which identified the frequency of monitoring that the beaches would receive. During the evaluation process, CWB staff used a checklist to evaluate each beach using the factors listed below. The CWB also considered factors such as accessibility, available facilities such as showers and restrooms, local knowledge of the area, and consulted external sources such as lifeguards to determine daily beach user counts and reference books for current and historic information on usage. A major determining factor when considering beach usage is the presence of lifeguard stations on a beach.

Currently, there are approximately 407 BEACH Act beaches in the state; of which, approximately 230 were monitored in 2021. Some of the larger beaches have multiple monitoring stations/sampling sites, all of which may not be monitored at the same frequency. However, if a beach is designated a Tier 1 beach, then, at least, one of the monitoring stations situated on that beach is monitored at a Tier 1 frequency. The criteria for determining beach tier levels are shown on Table 1. The number of Tier 1 and Tier 2 beaches in the state has been updated in August 2022 and is shown on Table 2. A current list of Tier 1 and Tier 2 beaches is provided in Appendix 1.

Table 1. Beach Tiering Criteria

Tier 1	Tier 1 beaches are considered "core" beaches and are ranked as such because of their economic and social importance to the state. Tier 1 beaches are heavily used and most are stationed by lifeguards. Tier 1 beaches may be threatened by some type of pollution. These beaches are given the highest monitoring priority
Tier 2	Tier 2 beaches also include beaches which may be economically or socially important to the state but are less heavily used than Tier 1 beaches. Tier 2 beaches are currently monitored on a less frequent basis compared to Tier 1s due to resource constraints; however, the frequency may be increased as resources become available.
Tier 3	Tier 3 beaches are even less heavily used, do not have a history of high FIB concentrations, are less threatened than Tier 1 or Tier 2 beaches, and currently receive no *routine* monitoring due to the lower threat and usage level. Tier 3 beaches also include those beaches that may pose a safety hazard to the sampler.

The tier-based classification system for beaches is based on the following seven factors:

- Year-round primary contact recreation
- Presence of streams flowing through a residential, agricultural, urban, or industrial area and discharging nearby (urban nonpoint sources)
- History of sewage spills in the area with accompanying monitoring data
- Heavy beach usage
- Importance of the area to the local economy and use by the community
- Prior monitoring data showing elevated levels of FIB
- Ease of access to the beach, including whether access is restricted or must be gained through crossing private property

If a beach possesses five or more factors out of the seven listed above, the beach is given a Tier 1 ranking. If it possesses less than five factors, the beach may be given a Tier 2 ranking. If the beach is determined not to be threatened using the above criteria, if prior monitoring history revealed no evidence of excessive levels of FIB, or if regular monitoring is deemed unnecessary, the beach is classified as a Tier 3 beach.

The beach tier levels are evaluated annually by the CWB. The above classification criteria and, more importantly, the aggregated historical monitoring data are used to evaluate whether the tier level assigned to a beach should be changed. Heavily used beaches on each island are given priority consideration as there could be greater potential exposure when contamination levels are high. However, efforts are made to diversify the regularly monitored beaches, with the mentioned guidelines in mind as much as possible, as well as to monitor as many different regions of each island as resources allow.

Table 2: Number of Tier 1 and Tier 2 Beaches (as of August 2022)

Island	Tier 1 Beaches	Tier 2 Beaches
Hawaii	10	28
Hilo	5	9
Kona	5	19
Kauai	12	26
Maui	14	37
Oahu	25	25
TOTAL	**61**	**116**

Tier 1 beaches are given the highest priority in the Beach Monitoring program and are monitored weekly on all islands. Monitoring stations are divided into sampling runs, which are grouped by geographic proximity to each other. Tier 2 beaches are routinely monitored at a lower priority and frequency dictated by the individual island's resources. Tier 3 beaches are not regularly monitored but may be included in sampling *after* Tier 2 beach responsibilities have been met, at the discretion of CWB.

Scheduled Tier 2 and Tier 3 beaches may be adjusted to accommodate activities such as follow-up sampling and sign posting on beaches where Advisories are warranted and to accommodate other duties of the field staff.

Specific sampling sites on each beach are chosen to be readily identifiable to the sampler and to be representative of how the particular beach is typically used. For example, most of the sampling sites target near the geographic center of the beach or near an easily recognizable landmark (e.g., lifeguard station, pavilion, public restroom) to help ensure that the sampling sites remain consistent. The CWB has established beach sampling sites near where people are most likely to enter the water and recreate. An inventory of beach monitoring sampling sites (including maps, latitude and longitude coordinates, and a general description) is available on the HDOH CWB website: http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/sample-sites/. The CWB notifies the EPA and the public at least annually whenever there is a significant change to the list of beaches or beach rankings. As specified in the 2014 National Beach Guidance, a state or tribe must review its program and associated list of beaches annually to determine whether there are significant changes and, if so, must provide the public with an opportunity to review these significant program changes. All significant changes to the Hawaii Beach Monitoring Program, including changes to the criteria and beach classifications will be subject to public review.

5. METHODS AND ASSESSMENT PROCEDURES

Hawaii's beach monitoring program is based on the collection of discrete samples by CWB staff that are analyzed by microbiological laboratories on the islands of Kauai, Oahu, Maui, and Hawaii Island. Detailed sample collection methods, protocols, and rationales are outlined in the

Quality Assurance Project Plan for Beach Monitoring and in the Standard Operating Procedures for Beach Monitoring documents which have both been approved by EPA.

Short-term increases in FIB levels are identified using EPA-approved laboratory methods for the detection and enumeration of enterococci, as specified in 40 CFR 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act*[9]. The CWB may utilize site-specific water quality assessment indicators and methods that are consistent with the 2012 EPA Recreational Water Quality Criteria in areas where the levels of enterococci cannot be accurately attributed to human or animal sources.

In addition to enterococci, the CWB has been analyzing all water quality samples for the presence of *Clostridium perfringens* for nearly 30 years to provide supplemental information and to collect data which may be used to demonstrate its feasibility for use as a potential future fecal indicator. Studies conducted at the University of Hawaii[10] and Washington State University[11] suggest *C. perfringens* may be a more appropriate indicator of fecal contamination in Hawaii's coastal marine waters. Currently, no action is taken using *C. perfringens* results.

6. MONITORING REPORT SUBMISSIONS

As part of the BEACH Act grant requirements, the CWB submits quarterly and annual reports that summarize Beach program activities. All Notifications and advisories including sewage spills, Brown Water Advisories (BWAs), BEACH program Advisories, and beach locational data are provided annually in the BEACH program Advisory and Notification submission to EPA. This information is available on EPA's **Pr**ogram tracking, beach **A**dvisories, **W**ater quality standards and **N**utrients (PRAWN) database and is available to the public via EPA's **Be**ach **A**dvisory and **C**losing **O**n-line **N**otification (BEACON) system. Monitoring data, including the number of samples collected, the number of beaches monitored under the BEACH program, and all BEACH Act funding activities (purchases, payments, etc.) are submitted quarterly to EPA. Advisory and Notification report submissions are discussed in Section 8.

The public can view all BEACH program monitoring data after they have been verified and validated, on the CWB Water Quality Data website[12]. This data is also uploaded to the Water Quality Portal[13] (WQP) through EPA's Water Quality Exchange (WQX) monthly. The public may also view all BEACH Advisories and Notifications issued by the CWB on the CWB Water Quality Notification and Advisories website[14]. Advisories and Notifications may be sorted by

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[9] https://www.gpo.gov/fdsys/pkg/FR-2012-05-18/pdf/2012-10210.pdf
[10] Fujioka, R.S. (2001). Monitoring coastal marine waters for spore-forming bacteria of faecal and soil origin to determine point from non-point source pollution. Water Science and Technology 44, 181-188.
[11] Miller-Pierce, M.R. (2019). Clostridium perfringens Testing Improves the Reliability of Detecting Non-point Source Sewage Contamination in Hawaiian Coastal Waters Compared to Using Enterococci alone. Marine Pollution Bulletin 114, 36-47.
[12] http://cwb.doh.hawaii.gov/CleanWaterBranch/WaterQualityData/default.aspx
[13] https://www.waterqualitydata.us/
[14] https://eha-cloud.doh.hawaii.gov/cwb/#!/landing

type (Beach Advisory, Beach Notification, Brown Water Advisory, Sewage Spills and Permanent postings), island, and status (Issued or Canceled). Advisories and Notifications can also be downloaded as Excel files from the Water Quality Notification and Advisories website.

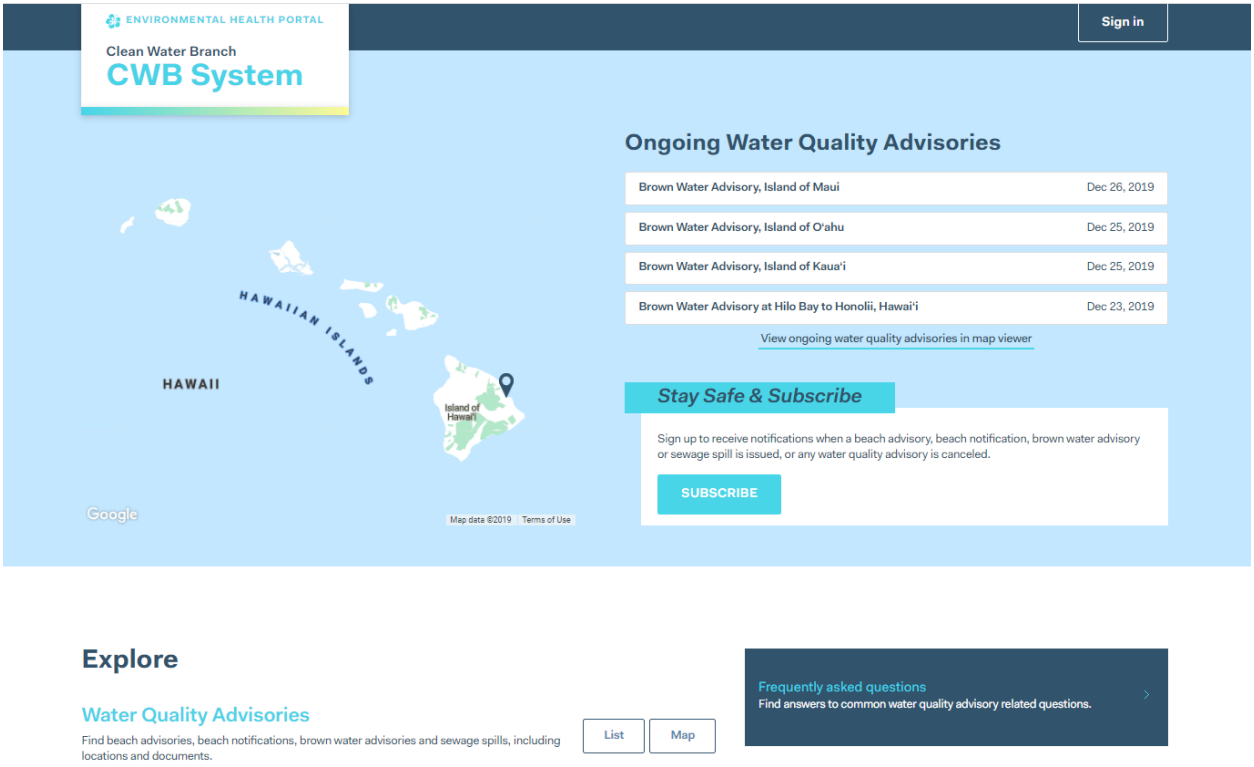
7. PUBLIC NOTIFICATION, ADVISORY, AND RISK COMMUNICATION PLAN

A central component of the current beach monitoring program is the decision rule, shown in Figure 2, which the CWB uses to identify actions to be taken in response to exceedances of the BAV during its routine monitoring. Any exceedance of the BAV during routine monitoring of Hawaii's Beach Program beaches triggers confirmatory follow-up sampling, a *Notification* on the CWB Water Quality Notification and Advisories website and a Notification email to all subscribers. The Notification serves to inform the public that the beach is being resampled. No Advisory signs are posted on the beach until confirmatory follow-up sampling test results indicate BAV exceedance. The Notification is canceled on the CWB Water Quality Notification and Advisories website if the follow-up resample results show that the BAV has not been exceeded and email Notifications are transmitted to all subscribers to inform them of the cancellation.

To avoid a prolonged Notification period, an Advisory, rather than a Notification, is issued if follow-up samples cannot be collected before a weekend or a holiday. Signs are also posted on the affected beach(es). Follow-up samples are collected on the next workday.

Exceedance of the BAV in a follow-up confirmatory sample immediately triggers a public *Advisory* and follow-up sampling. An Advisory consists of sign posting on the beach, Advisory posting on the CWB Water Quality Notification and Advisories website, and emails to all subscribers informing them of the Advisory. The CWB does not close beaches in response to any Advisory but does issue Advisories to inform the public about water quality conditions so that personal decisions may be made based on individual risk tolerances. Public awareness and enhancing the capacity for informed personal choice are important factors in ensuring public health protections are provided to recreational water users. Notifications differ from Advisories in that Notifications inform the public that the site is being resampled or that the site is no longer exceeding BAV levels. Signs are not posted on the beach in response to Notifications.

Three distinct activities have been identified to inform the public of confirmed BAV exceedances: 1) posting of Advisory signs on the beach at locations where they would be most visible (e.g., parking lots, entrances, points of beach access, etc.); 2) transmission of email Notifications/Advisories issued by the CWB to all subscribers, which include media outlets, other government agencies, non-governmental organizations, and private citizens; and 3) Advisory posting on the CWB Water Quality Notification and Advisories website: https://eha-cloud.doh.hawaii.gov/cwb/#!/landing (shown below):



The public is encouraged to subscribe to receive email Notifications and Advisories at the CWB Water Quality Notification and Advisories website. The CWB Water Quality Notification and Advisories website also provides a link to frequently asked questions relating to the beach monitoring program.

The CWB has worked with its stakeholders, also referred to as community partners, to develop the messaging content for the beach advisory information that would best inform the beach users of the potential risks. Four types of beach advisories were identified: temporary water quality exceedance advisories, permanent water quality exceedance advisories, sewage spill warning advisories, and brown water advisories. The CWB posts signs for temporary and permanent exceedances of the BAV on the affected beaches. Sewage spill signs are posted according to the requirements specified in HAR 11-62, Appendix B. Signs are not posted during a Brown Water Advisory (BWA) as it is not logistically feasible for the CWB since these advisories often encompass entire regions of an island, an entire island, or even the entire state. The CWB lacks the resources to post signs at all beaches that could be affected by BWAs. However, posting of permanent BWA informational notices at public beaches are being considered. Exceedances of the BAV, sewage spills, and BWAs are also communicated via email advisories and are issued on the CWB Water Quality Notification and Advisories website.

If sample test results indicate an exceedance of the BAV, resampling of the beach site is scheduled for the next workday or as soon as possible to confirm the high counts of the fecal indicator bacteria. If the result of the resample confirms continued high count above the BAV (a

second BAV exceedance), temporary Advisory signs are posted at the beach to alert beach users that high fecal indicator bacteria levels were found and that contact with the water may cause illness. Follow-up samples are collected on each subsequent workday until laboratory results confirm that the BAV is no longer exceeded. Likewise, posted signs will not be removed until the same circumstances are met. Laboratory analyses take 24 hours to complete and are available to CWB shortly thereafter.

If routine monitoring results consistently exceed the BAV, a permanent sign may be placed at the site. Routine monitoring is discontinued at the site where permanent signs are posted; however, the site may be subject to occasional monitoring. The frequency of the site visits to these locations depends on the availability of resources; however, they are visited at least once per year to ensure that the signs remain standing and legible. Permanent signs may be posted when the decision rule indicates that the BAV is exceeded more than 50% of the time over a period of one calendar year or when deemed necessary by the CWB. If the CWB determines that the source of the BAV exceedance does not pose a significant health risk to users, as evidenced by scientific investigations, the permanent signs are removed. Significant health risk is determined when human, and to a lesser extent, animal sources of enterococci are detected and indicate potential risks at or higher than EPA's recommended protection level in the 2012 Recreational Water Quality Criteria.

Warning signs are used to alert beach users of known sewage contamination due to reported sewage spills. The warning sign explicitly states that the water is contaminated by sewage and that people should keep out of the water. Warning signs are differentiated visually from routine monitoring exceedance signs to distinguish the level of potential risks.

Examples of the Advisory signs used for the Beach Monitoring program are shown in Appendix 2. The temporary beach Advisory signs have been updated to include a Quick Response (QR) code which may be scanned and read by most smart phones and provides a direct link to the CWB Water Quality Notification and Advisories webpage. The posting procedures and messages displayed on other HDOH signs are beyond the scope of this document.

Examples of advisories on the CWB Water Quality Notification and Advisories website are shown in Appendix 3.

Another type of risk communication is through direct person-to-person interaction with beach users through the use of laminated informational sheets or placards. These placards provide direct interaction with beach users to inform them of any advisories issued on the beach, especially visitors who do not speak English. The placards have been translated into several of the most common languages spoken by Hawaii's visitors and provide helpful information on what the signs mean, how to minimize their risk of illness, and where to find more information. These placards are intended to be shown to beach users by county lifeguards, visitor industry personnel (specifically beach front hotels and beach activity vendors), and CWB field staff to help provide information.

Response to BAV exceedances

The overall Advisory/Notification process for BAV exceedances is as follows (see also Figure 2, Decision Rule):

1. CWB receives an automated exceedance notification from the Water Quality Data system after the laboratory has entered and confirmed a result that exceeds the BAV (i.e., >130 CFU or MPN enterococci/100 mL), typically 24 hours after the samples have been processed.
2. The sampler collects follow-up confirmatory samples from the affected site usually on the next workday.
    a. A *Beach Notification* is issued on the CWB Water Quality Notification and Advisories website and includes the affected area, sampling date, enterococci count, and advisement that the area is to be retested
    b. Email Notifications with the above information and a link to the website posting are transmitted to all email subscribers
3. If laboratory results for the follow-up confirmatory sample show that the BAV is not exceeded, routine sampling resumes.
    a. The Notification on the Water Quality Notification and Advisories website is updated with a statement of the follow-up sample's BAV non-exceedance resulting in no Advisory being issued and the Cancellation date
    b. Emails with the Notification cancellation update are transmitted to all subscribers
4. If laboratory results for the follow-up confirmatory sample show that the BAV is exceeded OR if follow up samples cannot be collected prior to a weekend or holiday:
    a. A *Beach Advisory* is issued on the CWB Water Quality Notification and Advisories website and includes the affected area, sampling date, enterococci count, cause (if known), Advisory creation date, and an advisement informing the public of how they can reduce their risk of illness. Active Advisories are regularly verified and updated with the date of the most current information by CWB Monitoring staff
    b. Email Advisories with the above information and a link to the website posting are transmitted to all subscribers
    c. Advisory signs are posted on the affected beach
    d. A follow-up sample is collected on the next workday
5. When follow-up Advisory samples show that the BAV is no longer exceeded:
    a. The Advisory issued on the CWB Water Quality Notification and Advisories website is cancelled and updated with the Cancellation date
    b. An Advisory cancellation email is transmitted to all subscribers stating that the BAV is no longer being exceeded
    c. Advisory signs that were posted on the affected beach are removed
    d. Routine sampling resumes

Follow-up samples cannot be collected on Fridays or on days preceding holidays because laboratory analyses take 24 hours to complete. On these days, an Advisory, instead of a Notification, is to be issued and follow-up samples are collected on the next workday.

Response to Sewage Spills

If the CWB receives a report of a confirmed sewage spill into State waters, a *Sewage Spill* advisory is issued. A confirmed sewage spill is defined as a spill reported by a permitted wastewater facility or a spill that has been verified by a CWB staff member. Cesspool and septic system overages and seepage events (non-chronic events) may be added to an advisory if they can be demonstrated to contribute to the spill event. The procedures specified in HAR 11-62[15], Wastewater Systems, Appendix B, Responses for Wastewater Spills, Overflows, and Discharges ("Spills") will be followed. If the owner/agent is unable to post warning signs, the CWB posts signs in area(s) likely to be affected by the spill and where public access is possible.

A Sewage Spill advisory provides information (location, description, cause, etc.) and warns the public to stay out of the affected waters. The advisory is transmitted via email to all subscribers as described above. Sewage advisories affecting beaches remain active until water samples indicate that the enterococci BAV is no longer exceeded. When the advisory is no longer in effect, the signs are removed, the advisory on the CWB Water Quality Notification and Advisories website is removed, and emails are transmitted to all subscribers informing them that the advisory is no longer in effect. An example of a Sewage Spill advisory message issued on the CWB Water Quality Notification and Advisories website is shown in Appendix 3.

Response to Brown Water Advisories

In the event of heavy rain, or if a Flash Flood Warning is issued by the National Weather Service, or if conditions occur that may result in surface runoff into the ocean, the CWB may issue a "Brown Water Advisory" (BWA). The coastal beach water need not be brown for a BWA to be issued. BWAs are preemptive advisories and are so named because surface water runoff often carries soil, sediment, and other pollutants that can cause water at the beach to appear brown/discolored or have a turbid appearance. A BWA is issued when there is a strong likelihood of land-based pollutants entering coastal beach waters thereby increasing the possibility of exceeding the BAV. Land-based runoff from streams and drainage systems into coastal beach waters may pose a health risk to swimmers from elevated pathogen levels due to fecal contamination from sewage. It should be noted that heavy rainfall need not occur on the beaches for a BWA to be issued; rainfall in the mountains may carry polluted runoff into beach waters through streams and drainage systems. Additional information leading to a BWA may come from CWB staff, county lifeguards, or other CWB partners such as community organizations who observe water conditions directly. Information from other sources may need to be verified by the CWB before a BWA is issued. Sampling is suspended under a BWA, and, if samples are already collected when a BWA is issued, CWB may not wait for laboratory results before issuing a BWA. The BEACH Act addresses illness that may be caused by sewage related pathogens and does not address chemicals such as pesticides, heavy metals, and other toxic

[15] https://health.hawaii.gov/opppd/files/2015/06/11-62-Wastewater-Systems.pdf

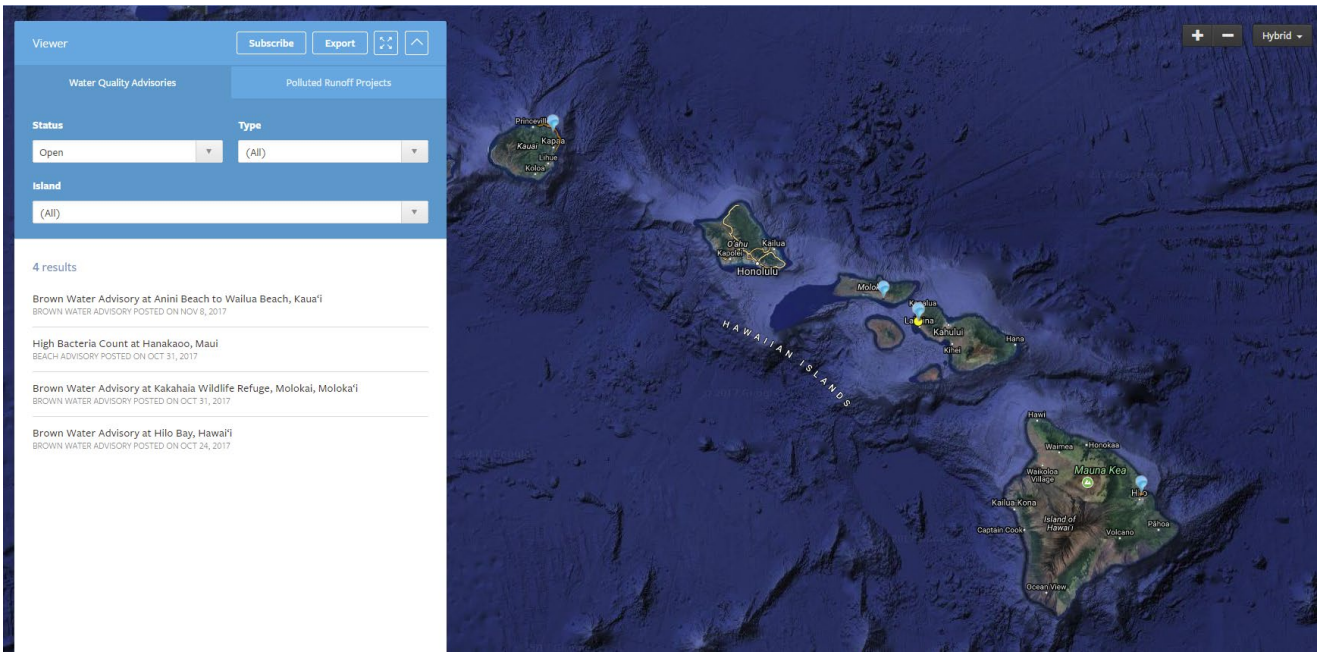
material which may enter Hawaii's beaches through surface water runoff. BWAs are issued to provide additional protection to Hawaii's beach users above those required by the BEACH Act.

The public is informed of a BWA as described above; however, signs are not posted on the beach and confirmatory samples are not collected. It is impractical to post physical signs on, and collect samples from, all impacted beaches due to resource constraints. Currently, news organizations may include BWAs in their weather broadcasts when time permits. The HDOH Communications Office may issue a press release at their discretion. BWAs are generally rescinded within four days after the rain event has subsided and the surface water runoff no longer poses a potential risk to users of the beach. CWB staff determines if the BWA needs an extension or if an earlier cancellation is warranted.

An example of a Brown Water Advisory message issued on the CWB Water Quality Notification and Advisories website is shown in Appendix 3.

Additional Information on the CWB Water Quality Notification and Advisories Website

In addition to the Notification and Advisory information stated above, the CWB Water Quality Notification and Advisories website contains a viewer which lists, at a glance, all ongoing (active) Notifications and Advisories statewide, as well as a map which identifies the locations of the active Notification and Advisories. The viewer is accessed through the link labeled "View ongoing water quality Notifications and Advisories in map viewer." The viewer is shown below. Clicking on any of the text Advisories or a pin location on the map in the viewer takes the user to the specific Advisory information.



Visitors to the Viewer can sort the water quality Notifications and Advisories by status (Issued or Canceled); by type (Beach Advisory, Beach Notification, Brown Water Advisory, Sewage Spill, and Permanent); and by island. Users may also export information on the Notifications and Advisories as comma-separated values or .csv files, which are viewable in Microsoft Excel.

8. NOTIFICATION REPORT SUBMISSION

As part of its BEACH grant conditions, the CWB reports its public Notification and Advisory activities electronically to the EPA through the PRAWN database on an annual basis. The data elements that are uploaded include beach monitoring Notifications, Advisories, and beach locational data. The CWB also provides the EPA with quarterly or annual written reports summarizing all BEACH Act program specific water quality data, including beach locational data, the number of samples taken, the number of stations monitored, and all Notifications and Advisories that were issued during that time span. The information in the PRAWN database is available to the public through the BEACON system at: https://watersgeo.epa.gov/beacon2/reports.html.

In addition to reporting its beach Notification and Advisory activities, the CWB issues routine beach monitoring results on the CWB Water Quality Data website (http://cwb.doh.hawaii.gov/CleanWaterBranch/WaterQualityData/default.aspx) after they have been verified and validated. This data are then also transmitted (uploaded) to the national EPA Water Quality Exchange (WQX) database system (formerly, compiled in the **Sto**rage and **Ret**rieval Data Warehouse – STORET) on at least a monthly basis. The information uploaded through WQX is available to the public at the multi-agency Water Quality Portal (WQP): https://www.waterqualitydata.us/.

9. PUBLIC EVALUATION OF THE BEACH PROGRAM

This document describes the Hawaii Beach Monitoring Program and is made publicly available on the CWB website. The public is provided an opportunity to evaluate and provide comment on all aspects of the Beach Monitoring Program when significant changes are made.

Points of Contact
All questions on the Beach Program may be directed to the CWB at:

Clean Water Branch
State of Hawaii Department of Health
2827 Waimano Home Rd. #225
Pearl City, HI 96782

Phone: (808) 586-4309
Email: cleanwaterbranch@doh.hawaii.gov

APPENDIX 1.

Tier 1 Beaches

ISLAND	BEACH ID	BEACH NAME
Hawaii (Hilo)	HI315019	Hilo Bayfront
Hawaii (Hilo)	HI857411	Honoli'i Beach Co. Park
Hawaii (Hilo)	HI540868	Leleiwi Beach Co. Pk.
Hawaii (Hilo)	HI670254	James Kealoha Park
Hawaii (Hilo)	HI862286	Onekahakaha Beach Co. Pk.
Hawaii (Kona)	HI326172	Anaeho'omalu Bay
Hawaii (Kona)	HI013290	Kahalu’u Beach Co. Pk.
Hawaii (Kona)	HI753566	Kailua Bay
Hawaii (Kona)	HI261474	Kamakaokahonu
Hawaii (Kona)	HI668132	Puako
Kauai	HI270737	Anahola Beach
Kauai	HI554189	Ha'ena Beach Co. Park
Kauai	HI385259	Hanalei Beach Co. Park (Hanalei Bay Pavilion)
Kauai	HI758685	Kalapaki Beach
Kauai	HI402035	Kealia
Kauai	HI124511	Ke'e Beach
Kauai	HI530569	Kekaha Beach Co. Pk.
Kauai	HI798758	Lydgate State Park
Kauai	HI396850	Po'ipu Beach Co. Park
Kauai	HI701008	Salt Pond Beach Co. Park
Kauai	HI392082	Wai'ohai Beach
Kauai	HI836118	Wai'oli Beach Park
Maui	HI253548	Fleming Beach North
Maui	HI846900	H.P. Baldwin Beach Co. Pk.
Maui	HI797917	Hanaka'o'o Beach Co. Pk.
Maui	HI985873	Ho'okipa Beach Co. Pk.
Maui	HIXXXXXX	Ka'anapali Beach (1)
Maui	HI280920	Kahului Harbor
Maui	HIXXXXXX	Kalama Beach (South)
Maui	HI761092	Kama'ole Beach 1
Maui	HI097179	Kama'ole Beach 2 (Ili'iliholo Beach)
Maui	HI496115	Kama'ole Beach 3
Maui	HI797225	Kanaha Beach (2)
Maui	HI558359	Launiupoko St. Wayside

Maui	HIXXXXXX	North Ka'anapali Beach
Maui	HI278988	Wailea Beach Park
Oahu	HI882094	Ala Moana Beach Co. Park, Center
Oahu	HI306071	Ala Moana Beach Co. Park, Diamond Head (DH)
Oahu	HI950962	Chun's Reef
Oahu	HI451176	Hale'iwa Ali'i Beach Co. Pk.
Oahu	HI451471	Hanauma Bay
Oahu	HI515191	Kohola Lagoon 1
Oahu	HI366432	Kahanamoku Beach
Oahu	HI548986	Kahe Pt. Beach Co. Pk.
Oahu	HI482719	Kailua Beach Co. Pk.
Oahu	HI681782	Kuhio Beach Park
Oahu	HI183312	Laniakea Beach
Oahu	HI596989	Lanikai
Oahu	HI529142	Magic Island Beach
Oahu	HI627464	Ma'ili Beach Co. Park
Oahu	HI632106	Makaha Beach Co. Park
Oahu	HI723399	Makapu'u Beach Co. Park
Oahu	HI467413	Nanakuli Beach Co. Pk.
Oahu	HI659533	Poka'i Bay Beach Co. Pk.
Oahu	HI193495	Pupukea Beach Co. Pk.
Oahu	HI898947	Royal-Moana Beach
Oahu	HI776760	Sandy Beach Co. Park
Oahu	HI617815	Sans Souci St. Rec. Area
Oahu	HI860544	Sunset Beach
Oahu	HI471097	Waimanalo Beach Co. Park
Oahu	HI696599	Waimea Bay Beach Co. Pk.

Tier 2 Beaches

ISLAND	BEACH ID	BEACH NAME
Hawaii (Hilo)	HI977673	Coconut Island Park
Hawaii (Hilo)	HI138086	Hakalau Co. Pk.
Hawaii (Hilo)	HI659453	Ice Pond (single point)
Hawaii (Hilo)	HI542822	Kalapana Beach
Hawaii (Hilo)	HI849313	Keaukaha Beach Park
Hawaii (Hilo)	HI459942	Kehena
Hawaii (Hilo)	HI693485	Kolekole Beach Co. Park
Hawaii (Hilo)	HI380623	Laupahoehoe Beach Co. Park
Hawaii (Hilo)	HI691720	Lehia Beach Co. Pk.

Hawaii (Kona)	HI616452	2nd Beach (Next to Mahaiula)
Hawaii (Kona)	HI713314	Banyan’s Surfing Area
Hawaii (Kona)	HI621002	Hapuna Beach St. Rec. Area
Hawaii (Kona)	HI582331	Holoholokai Beach
Hawaii (Kona)	HI246645	Honaunau Bay
Hawaii (Kona)	HI152572	Ho'okena
Hawaii (Kona)	HI809832	Kealakekua Bay (Curio Stand)
Hawaii (Kona)	HI261869	Kauna'oa Beach
Hawaii (Kona)	HI978783	Kawaihae Harbor
Hawaii (Kona)	HI713293	Keauhou Bay (Kona)
Hawaii (Kona)	HI720408	Manini'owali
Hawaii (Kona)	HI890924	Mauna Lani (Kalahuipua'a)
Hawaii (Kona)	HI470112	Miloli'i Beach
Hawaii (Kona)	HI256093	Old Kona Airport St. Rec. Area
Hawaii (Kona)	HI320616	Pine Trees
Hawaii (Kona)	HI478461	Pu'uhonua Pt. (Pu'u o Honaunau)
Hawaii (Kona)	HI936372	Spencer Beach Co. Pk.
Hawaii (Kona)	HI643938	Wawaloli Beach
Hawaii (Kona)	HI436267	White Sands Beach Co. Pk. (Magic Sands)
Kauai	HI338804	Anini Beach
Kauai	HI418744	Anini Beach Park
Kauai	HI156238	Beach House Beach
Kauai	HI166521	Brennecke Beach
Kauai	HI976083	Gillin’s Beach
Kauai	HI352580	Hanama'ulu Beach Co. Park
Kauai	HI264001	Kalihiwai Bay
Kauai	HI972832	Kapa'a Beach Co. Park
Kauai	HI698776	Kawailoa Beach
Kauai	HI955435	Koloa Landing
Kauai	HI619039	Kukui'ula Bay
Kauai	HI889639	Lumaha'i Beach
Kauai	HI547745	Moloa'a Bay
Kauai	HI953916	Niumalu Beach Park
Kauai	HI502794	Nukoli'i Beach Park
Kauai	HI176480	Pacific Missile Range Facility
Kauai	HI468251	Pakala (Makaweli)
Kauai	HI247403	Polihale State Park
Kauai	HI742228	Prince Kuhio Park
Kauai	HI542569	Sheraton Beach
Kauai	HI358435	Shipwreck Beach

Kauai	HI936087	Tunnels Beach
Kauai	HI330114	Waikoko Bay
Kauai	HI606168	Wailua Beach
Kauai	HI245235	Waimea Rec. Pier St. Pk.
Kauai	HI682678	Waipouli
Maui	HI879646	Ahihi-kina'u Natural Area Reserve
Maui	HI996835	Hana Bay
Maui	HI412391	Honokowai Beach Co. Pk.
Maui	HI280286	Honolua Bay
Maui	HI984456	Honomanu Bay
Maui	HIXXXXXX	Ka'anapali Beach (2)
Maui	HI160433	Kahana
Maui	HIXXXXXX	Kalama Beach (North)
Maui	HI647373	Kalepolepo Beach
Maui	HIXXXXXX	Kanaha Beach (3) (Kite Beach)
Maui	HI391006	Kapalua (Fleming's) Beach
Maui	HI607763	Keawakapu Beach
Maui	HI276573	Ku'au Bay
Maui	HI407363	Lahaina Beach
Maui	HI864937	Lower Pa'ia
Maui	HI058731	Ma'alaea Beach
Maui	HI715975	Mai Poina 'Oe la'u Beach Co. Pk.
Maui	HI245556	Makena Landing Beach
Maui	HI847607	Malu'aka Beach
Maui	HI861961	Mokapu Beach Park
Maui	HI977299	Mokule'ia Beach
Maui	HI764060	Napili Bay
Maui	HI491359	Olowalu
Maui	HI740710	Oneloa Bay Beach
Maui	HI279887	Oneloa Beach (Big Beach)
Maui	HI462219	Papalaua
Maui	HI339656	Polo Beach Park
Maui	HI684864	Po'olenalena Beach
Maui	HI373055	Pu'unoa Beach
Maui	HI789952	Spreckelsville
Maui	HI814309	Ukumehame Beach Co. Pk.
Maui	HI588333	Ulua Beach Park
Maui	HI169380	Wahikuli State Wayside Park
Maui	HI118874	Wai'anapanapa State Park
Maui	HI916183	Waiehu Beach Co. Park

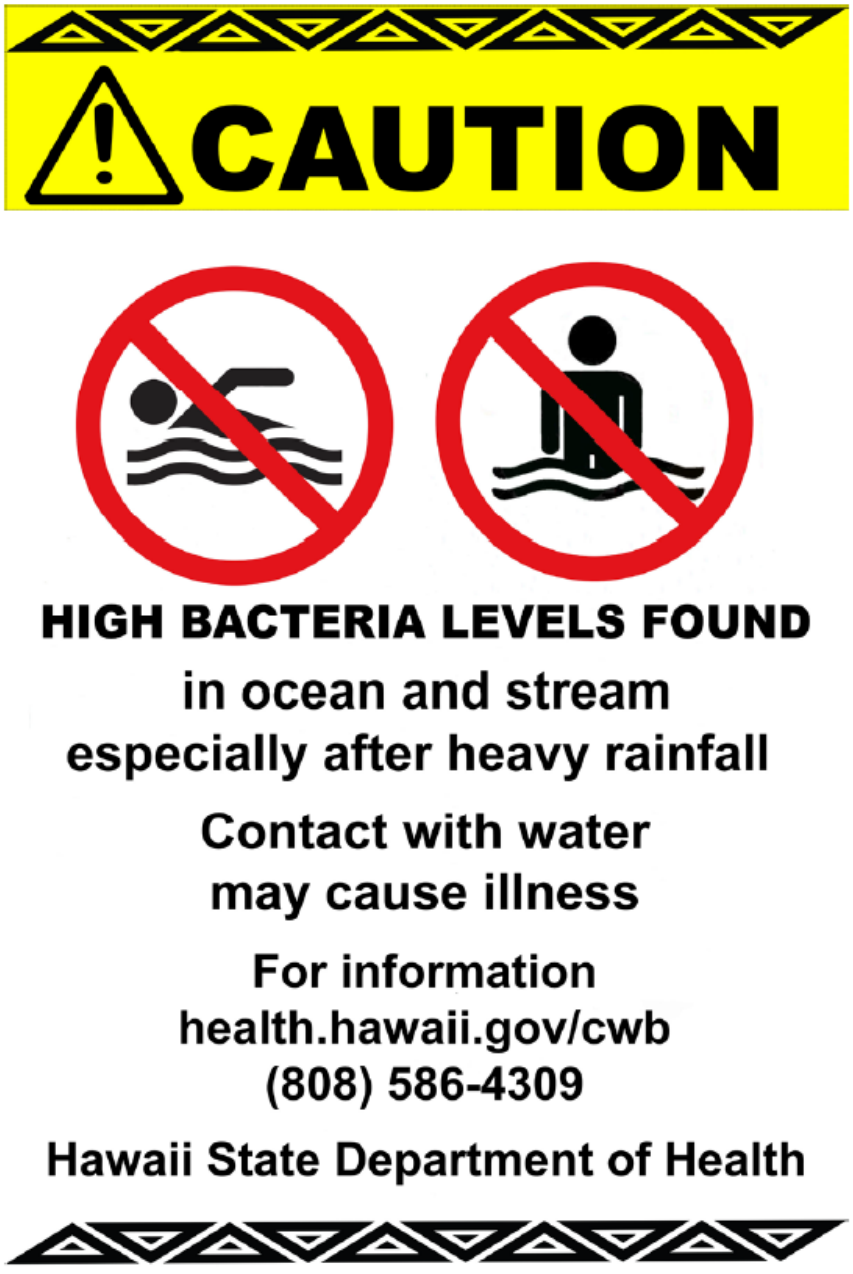
Maui	HI343702	Waihe'e Beach Co. Park
Maui	HI284036	Waipulani
Oahu	HI702973	Ala Moana Beach Co. Park, Ewa
Oahu	HI531535	Ehukai Beach Co. Pk.
Oahu	HI767464	Ewa Beach
Oahu	HI580360	Ka'a'awa Beach Park
Oahu	HI173325	Kahala Hilton Beach
Oahu	HI071892	Kalama Beach
Oahu	HI904851	Kapaeloa Beach
Oahu	HI733929	Kapi'olani Park
Oahu	HI304424	Kawaiku'i Beach Park
Oahu	HI550240	Ulua Lagoon 4
Oahu	HI767708	Kokololio Beach
Oahu	HI848207	Kualoa Co. Regional Park
Oahu	HI431723	Kuilei Cliffs
Oahu	HI412224	Kuilima Cove
Oahu	HI915061	Makua Beach
Oahu	HI137325	Malaekahana Bay
Oahu	HI717740	Manner’s Beach
Oahu	HI908786	Mokule'ia Beach
Oahu	HI952205	Oneawa Beach
Oahu	HI825419	One'ula Beach Co. Park
Oahu	HI587568	Pounders Beach
Oahu	HIXXXXXX	Pua'ena Pt. Beach
Oahu	HI244505	Waikiki Beach Center
Oahu	HI279194	Waimanalo Bay St. Rec. Area
Oahu	HI267023	White Plains Beach

APPENDIX 2.

Advisory Signs

The Advisory signs used in the Beach Monitoring program are shown below.

Temporary sign: High Bacteria Levels



Permanent sign: High Bacteria Levels

Temporary sign: Sewage Contamination

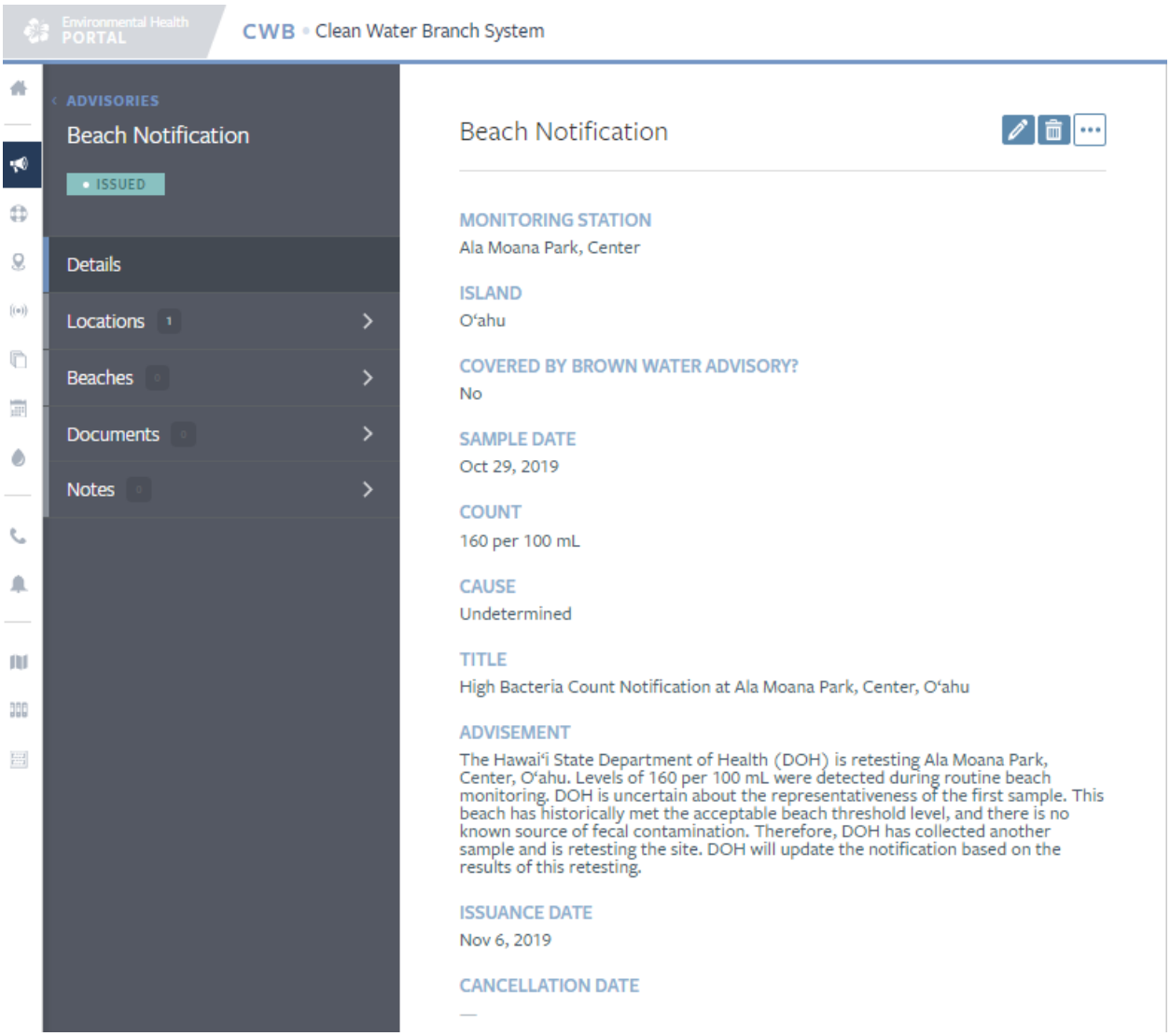
APPENDIX 3.

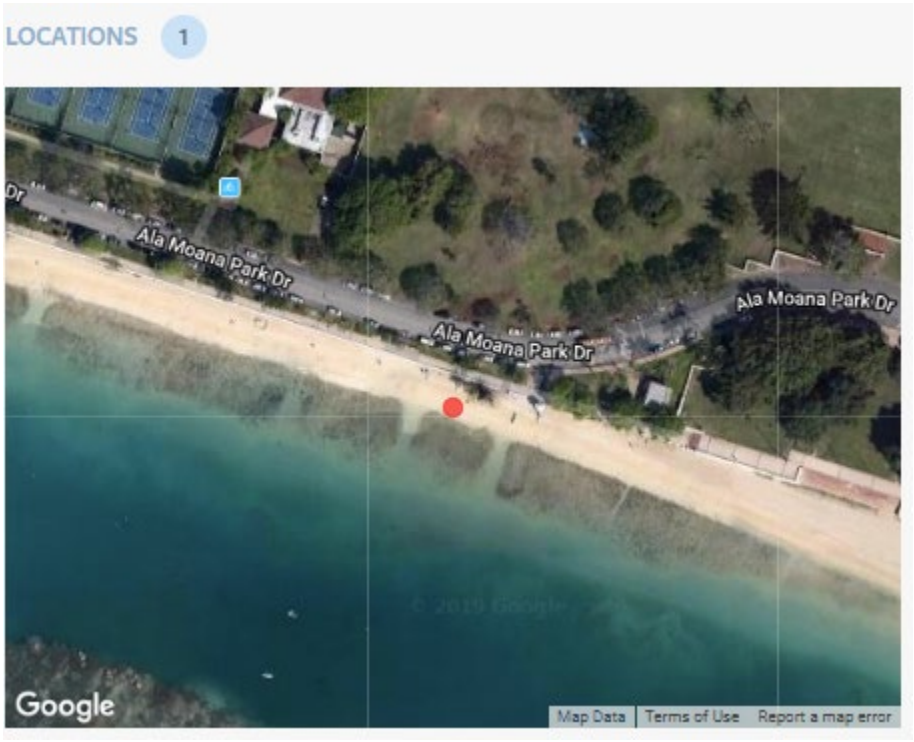
Examples of Notifications and Advisories on the CWB Water Quality Notification and Advisories Website

Note: "Issued" and "Canceled" refer to the status of the Notification or Advisory. "Issued" indicates that the Notification or Advisory is actively ongoing and "Canceled" indicates that the Notification or Advisory is no longer in effect.

Beach Notification

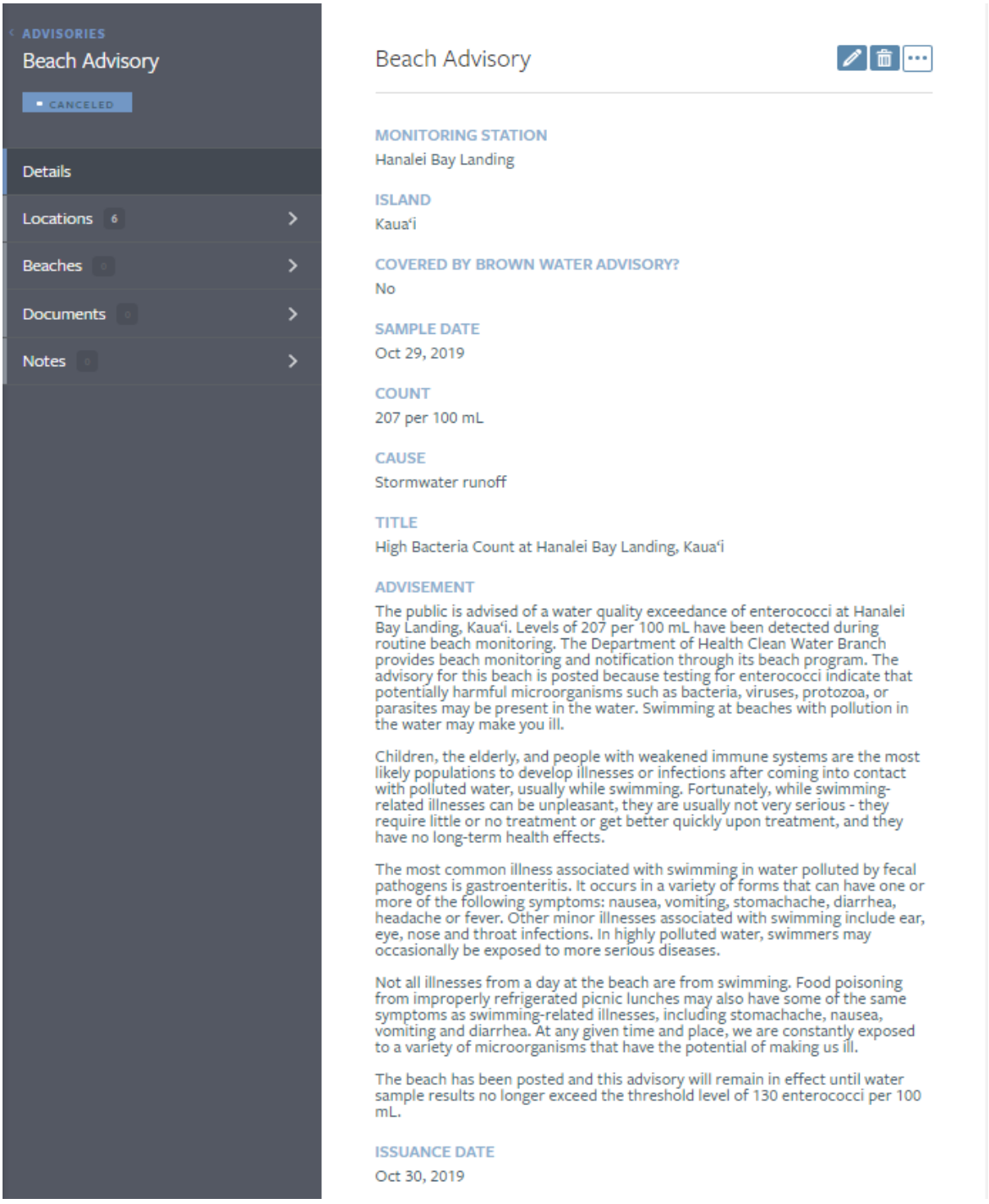
Beach Notifications are issued when enterococci levels exceed 130 MPN or CFU/100 mL during routine monitoring.




LOCATIONS
1
Ala Moana Park Dr
Ala Moana Park Dr
Ala Moana Park Dr
Google
Map Data
Terms of Use
Report a map error

Beach Advisory

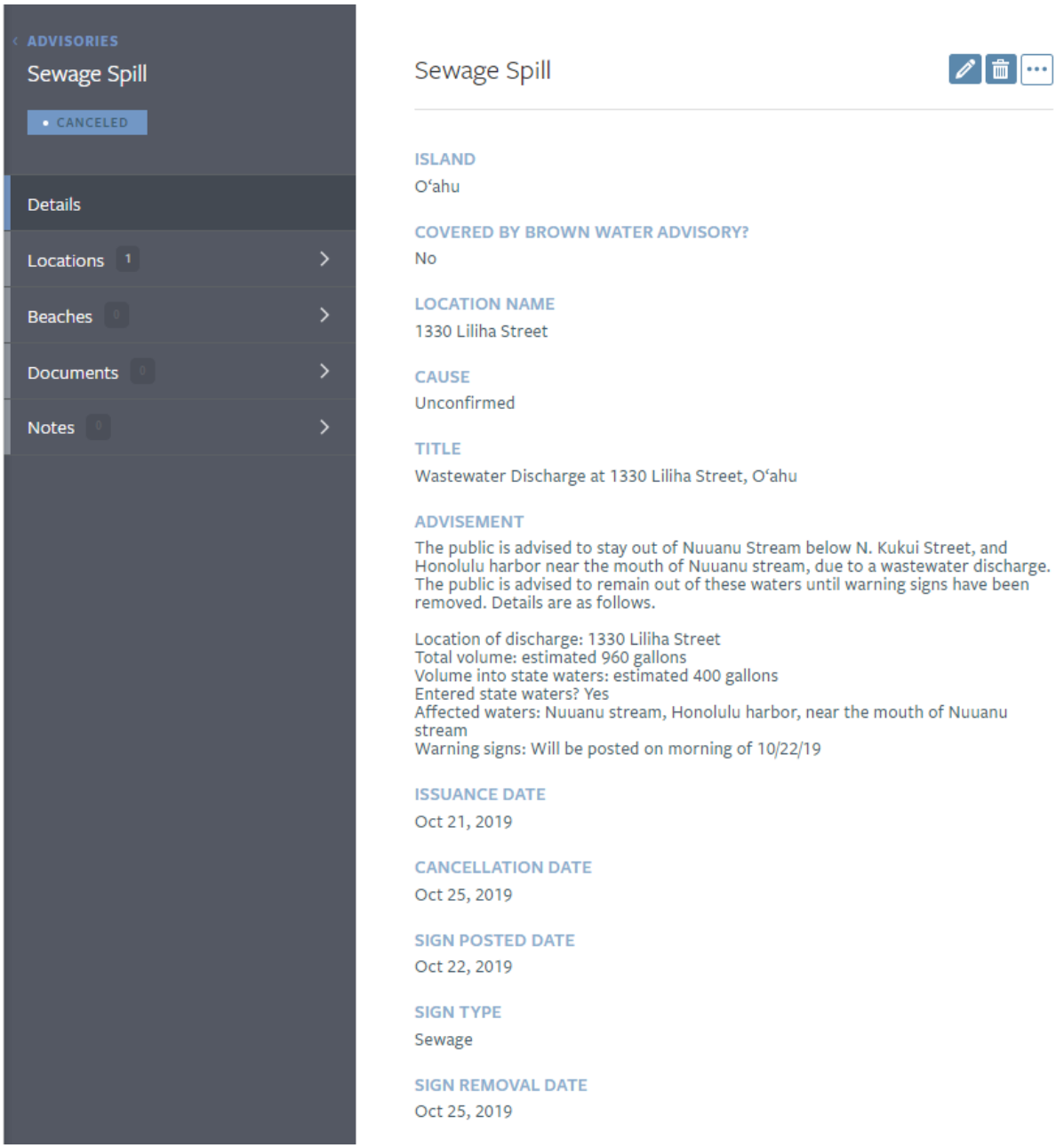
Beach Advisories are issued when enterococci levels exceed 130 MPN or CFU/100 mL in follow-up confirmatory sampling or if follow-up sampling cannot be taken immediately due to a holiday or weekend.

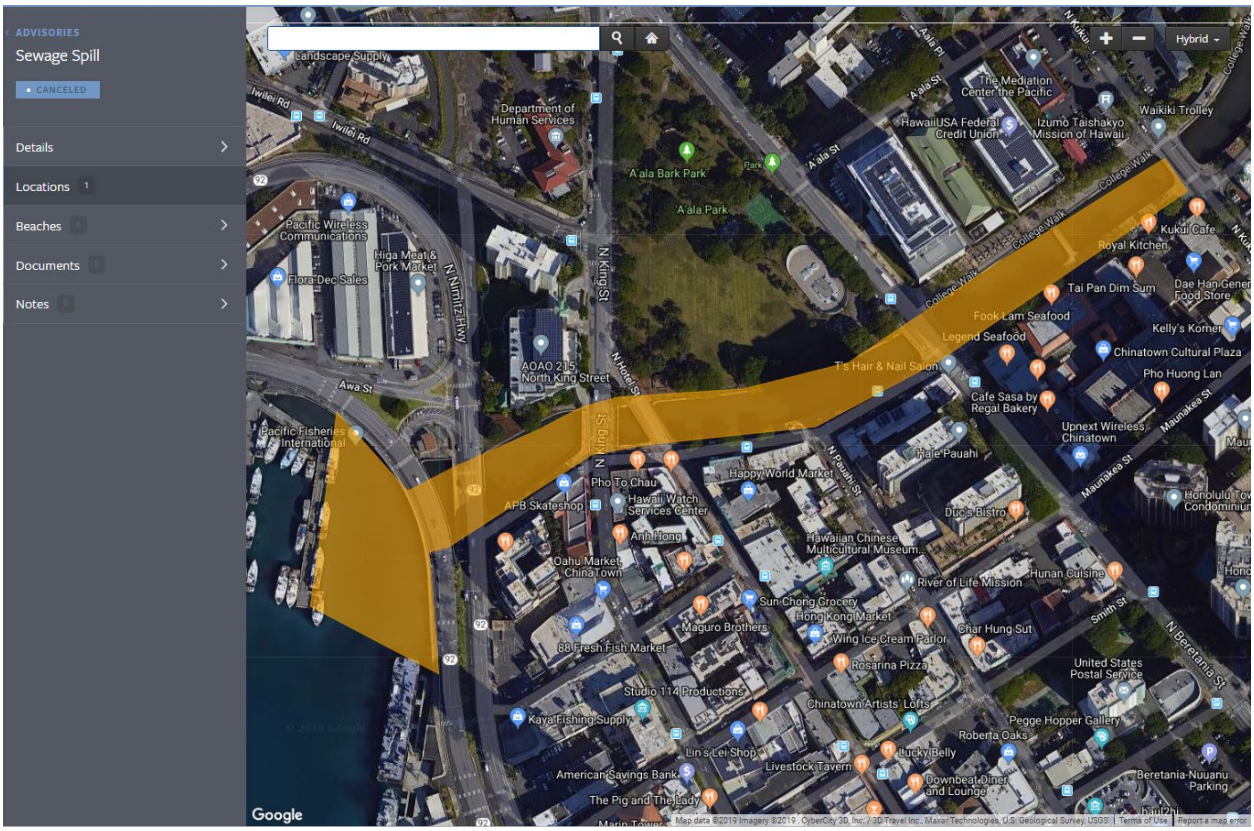



ADVISORIES
Beach Advisory
CANCELED
Details
Locations 6
Beaches
Documents
Notes
Hybrid
Hanalei River Boat Yard
Black Pot beach parking
Hanalei Pier
Weke Rd
Weke Rd
Weke Rd
Weke Rd
Google

Sewage Spill

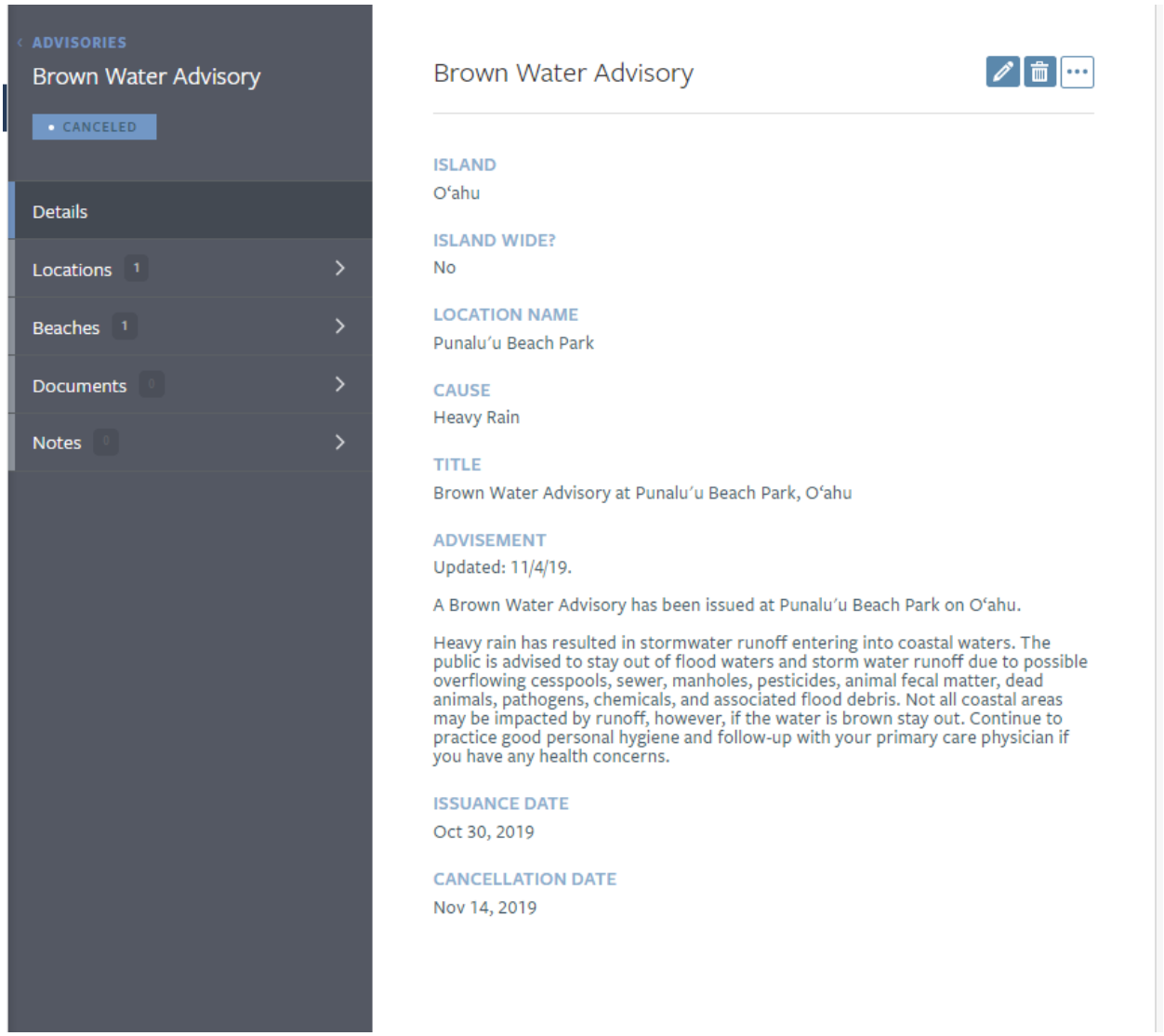
Sewage Spill advisories are issued following confirmed sewage spills.




ADVISORIES
Sewage Spill
CANCELED
Details
Locations 1
Beaches 2
Documents 3
Notes 0
Hybrid
Landscape Supply
Iwilei Rd
Department of Human Services
A'ala Park
The Mediation Center the Pacific
HawaiiUSA Federal Credit Union
Izumo Taishakyo Mission of Hawaii
Waikiki Trolley
College Walk
Kukui Cafe
Royal Kitchen
Tai Pan Dim Sum
Dae Han General Food Store
Fook Lam Seafood
Legend Seafood
Kelly's Korner
Chinatown Cultural Plaza
Pho Huong Lan
Cafe Sasa by Regal Bakery
Upnext Wireless Chinatown
Maunakea St
Hale Pauahi
Pacific Wireless Communications
Higa Meat & Pork Market
Flora-Dec Sales
N Nimitz Hwy
N King St
AOAO 215 North King Street
Awa St
Pacific Fisheries International
Pho To Chau
Happy World Market
N Pauahi St
APB Skateshop
Hawaii Watch Services Center
Duc's Bistro
Ann Hong
Hawaiian Chinese Multicultural Museum
Oahu Market Chinatown
River of Life Mission
Hunan Cuisine
Sun Chong Grocery
Hong Kong Market
Maguro Brothers
Char Hung Sut
Smith St
N Beretania St
88 Fresh Fish Market
Wing Ice Cream Parlor
Rosarina Pizza
United States Postal Service
Studio 114 Productions
Chinatown Artists' Lofts
Kaya Fishing Supply
Pegge Hopper Gallery
Roberta Oaks
Lin's Lei Shop
Tucky Belly
Livestock Tavern
American Savings Bank
Downbeat Diner and Lounge
Beretania-Nuuanu Parking
The Pig and The Lady
Google
Map data ©2019 Imagery ©2019 , CyberCity 3D, Inc., 3D Travel Inc., Maxar Technologies, U.S. Geological Survey, USGS | Terms of Use | Report a map error

Brown Water Advisory

Brown Water Advisories are issued if stormwater or surface water runoff is entering the ocean.




ADVISORIES
Brown Water Advisory
CANCELED
Details
Locations 1
Beaches 1
Documents 0
Notes 0
Hybrid
Maipuna Stream
Punalu'u Beach Park
Google