

# Hawaii Beach Monitoring Program

May 22, 2017

## Contents

1. Introduction.....	3
2. Overview of Beach Monitoring Program in Hawaii.....	5
3. Goal of the Beach Monitoring Program in Hawaii.....	6
4. Risk-based Beach Evaluation and Classification.....	6
5. Methods and Assessment Procedures .....	8
6. Monitoring Report Submissions .....	8
7. Risk Communication Plan and Public Notification Process.....	9
A. Risk Communication Plan .....	9
B. Public Notification Process .....	12
I. Response to Sewage Spills .....	14
II. Brown Water Advisories.....	15
III. Additional CWB Website Advisory Information .....	16
8. Notification Report Submission.....	17
9. Public Evaluation of the Beach Program .....	17
APPENDIX 1.....	19
APPENDIX 2.....	24
APPENDIX 3.....	25
APPENDIX 4.....	27

This document presents an overview of the procedures and practices used by the Hawaii Department of Health (HDOH) Clean Water Branch (CWB) to comply with the Federal BEACH Act.

## 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 states to monitor coastal recreational waters and to provide for prompt notification of the public, local government, and the EPA whenever there is an exceedance or likelihood of exceedance of applicable water quality standards for coastal recreational waters. The overall goal of the BEACH Act is to reduce the risk of disease to users of the Nation's coastal recreation waters by identifying coastal recreational waters that may be impacted by pathogen or pathogen indicators. As part of the BEACH Act amendment, the EPA has made available to states, funding in the form of federal grants to help implement coastal recreational water monitoring and public notification programs. EPA has published performance criteria for recipients of the BEACH Act grant in 2002 which was revised in 2014.

The “*2014 National Beach Guidance and Required Performance Criteria for Grants*”<sup>1</sup> specifies 11 performance criteria for monitoring, assessment, and notification. The Hawaii Department of Health (HDOH), Clean Water Branch (CWB) is a recipient of a federal BEACH Act grant and is required to fulfill the performance criteria specified in the EPA guidance document. Procedures and practices implemented by the HDOH CWB to fulfill the performance criteria are addressed in this document.

The foundations of Hawaii's Beach Program lie in the state's recreational water quality standards as specified in the Hawaii Administrative Rules, Title 11, Chapter 54 (HAR 11-54)<sup>2</sup> which was last amended in November 2014. This amendment is consistent with the 2012 EPA Recommended Water Quality Criteria (RWQC) for recreational waters and was approved by EPA on May 20, 2015. 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 indicator bacteria (also identified as a fecal indicator or pathogen indicator). Enterococci is used to identify the possible presence of pathogenic bacteria that may cause illness in users of recreational waters. The specific criteria for enterococci is expressed as colony forming units (CFU) or most probable number (MPN) per 100 milliliters (mL), depending on the analytical method used. Hawaii's recreational water quality standards specify that enterococci content

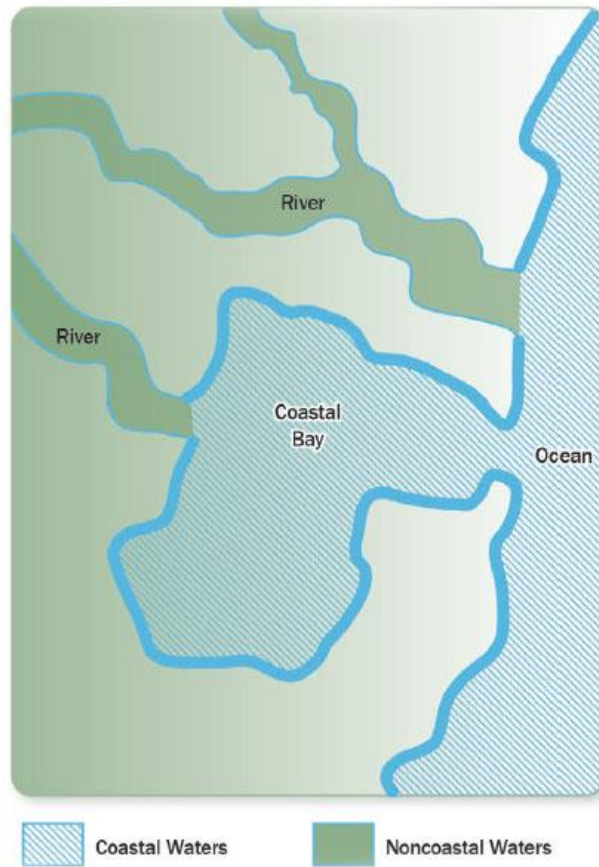
---

<sup>1</sup> [National Beach Guidance and Required Performance Criteria for Grants](#), 2014 Edition, EPA-823-B-14-001, July 31, 2014.

<sup>2</sup> [http://health.hawaii.gov/cwb/files/2013/04/Clean\\_Water\\_Branch\\_HAR\\_11-54\\_20141115.pdf](http://health.hawaii.gov/cwb/files/2013/04/Clean_Water_Branch_HAR_11-54_20141115.pdf)

(magnitude) in recreational waters may not exceed a geometric mean of 35 CFU or MPN per 100 mL over any 30-day period (duration). In addition, a Statistical Threshold Value (STV) of 130 CFU or MPN per 100 mL may not be exceeded by more than ten percent of samples taken within the same 30-day period (frequency). The CWB has developed a beach program decision rule, shown in Section 2, to help guide actions necessary to provide appropriate notification to the public when monitoring shows that beach waters do not meet recreational water quality standards. The decision specifies a “Beach Action Value” (BAV), the level of indicator bacteria at which the CWB will take appropriate beach management actions. The CWB uses enterococci levels above 130 cfu/100 mL as the BAV. Only a single exceedance of the BAV necessitates the CWB to take immediate actions and notify the public.

The Hawaii Beach Monitoring program specifically applies to 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.



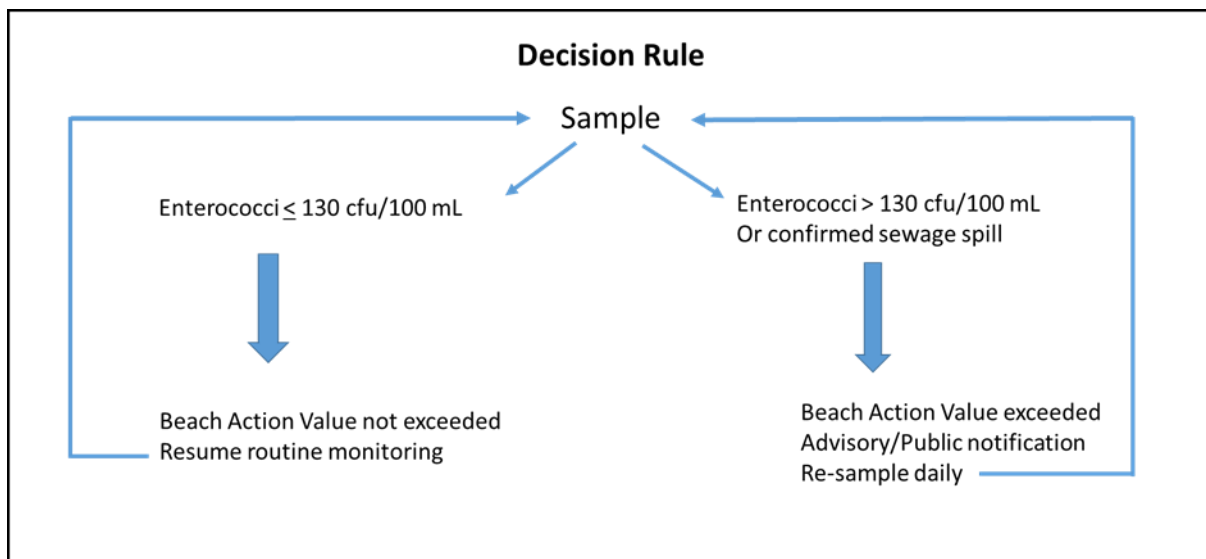
Source: National Beach Guidance and Required Performance Criteria for Grants, 2014 edition

**Figure 1. Coastal and Non-coastal waters**

## 2. Overview of Beach Monitoring Program in Hawaii

The Monitoring and Analysis Section of the CWB is responsible for the administration of Hawaii's BEACH Act monitoring program and all BEACH Act notification 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 analyzed for the pathogen indicator, enterococci, by five laboratories that are situated on the islands of Oahu, Maui, Kauai, and two on island of Hawaii. If there is an exceedance in the level of enterococci above the specified threshold, the CWB notifies the public of these exceedances and provides specific actions that they should take to protect their health.

The CWB has developed a beach program decision rule, shown in Figure 2 below, to help guide actions necessary to provide appropriate notification to the public when beach waters do not meet water quality standards. The decision rule specifies a "Beach Action Value" (BAV), the level of indicator bacteria at which the CWB will take appropriate beach management actions. The CWB selected enterococci at or above 130 cfu/100 mL as the BAV.



**Figure 2. Decision Rule**

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

If the BAV is exceeded, the CWB will issue an advisory for the affected beach to notify the public of the exceedance. Public notification and advisories are discussed in Section 7. Advisories in response to exceedances of the BAV remain in place until follow-up sampling results indicate that the BAV is no longer exceeded.

### 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. To achieve this goal, the CWB provides prompt public notification and risk communication to users of Hawaii's beaches. Public notification procedures are discussed in Section 7. The CWB believes that routine monitoring and prompt, accurate notifications 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 and annual reports to the EPA by compiling monitoring results, notification efforts and actions taken. Reporting activities are discussed in Sections 6 and 8.

### 4. Risk-based Beach Evaluation and Classification

Hawaii's beaches were evaluated and classified by HDOH 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, although included in the beach inventory, are not currently monitored due to logistical challenges. 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 Kahoolawe and Niihau 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 and identified the frequency of monitoring that the beaches that 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. Currently, there are approximately 490 BEACH Act beaches in the state, 125 of which have been monitored in 2016. The criteria for tiering beaches is shown on Table 1. The number of Tier 1 and Tier 2 beaches in the state is shown on Table 2. A 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 were ranked as such because of their economic and social importance to the state. Tier 1 beaches are heavily used and may be threatened by some type of pollution. These beaches were given the highest monitoring priority.
Tier 2	Tier 2 beaches are less heavily used than Tier 1 beaches. Tier 2 beaches are not currently monitored on a routine basis due to resource constraints. Infrequent monitoring may occur as resources permit.

Tier 3	Tier 3 beaches are even less heavily used, do not have a history of high indicator 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 physical hazard to the sampler.
<p>The tier based classification system for beaches is based on the following factors:</p> <ul style="list-style-type: none"> <li>• Year-round primary contact recreation</li> <li>• The presence of streams that flow through a residential, agricultural, urban, or industrial area and discharge nearby</li> <li>• Urban nonpoint sources</li> <li>• History of sewage spills in the area with accompanying monitoring data</li> <li>• Heavy beach usage</li> <li>• Importance of the area to the local economy and use by the community</li> <li>• Prior monitoring data showing elevated levels of pathogen indicators</li> </ul> <p>If a beach possessed five or more factors out of the seven listed above, the beach was given a Tier 1 ranking. If it possessed less than five factors, the beach was given a Tier 2 ranking. If the beach was determined not to be threatened using the above criteria, or if prior monitoring history revealed no evidence of excessive levels of indicators, additional monitoring was determined to not be required then the beach was classified as a Tier 3 beach.</p> <p>The beach tier levels will be evaluated by the CWB every five (5) years. The historical monitoring data as well as the above classification criteria will be used to evaluate whether the tier level assigned to a beach should be changed; however, priority consideration will be given to the economically important beaches</p>	

**Table 2: Number of Tier 1 and Tier 2 Beaches**

Island	Tier 1 Beaches	Tier 2 Beaches
Hawaii	11	38
Kauai	5	21
Maui	10	25
Oahu	23	51
<b>TOTAL</b>	<b>49</b>	<b>135</b>

Sampling frequency for Tier 1 beaches varies per island. On the islands of Kauai and Maui, beaches will be monitored once per week. All Oahu Tier 1 beaches will be monitored at least once every other week. Monitoring stations are divided into sampling runs, which are grouped by geographic proximity to each other. The Oahu Tier 1 sites are divided into five sampling runs; two runs will be monitored on one week and three will be monitored on the following week. All Big Island Tier 1 beaches will be monitored on an alternating basis every other week. The schedule must be flexible to ensure that both the Hilo and Kona regions are covered. Leeway must also be made to accommodate sign postings, which will require the sampler to remain in the region in which the signs will be posted. Due to the distances involved, samples from both

regions cannot be collected on any single day. In addition, the Oahu and Big Island sampling frequencies have been selected based upon analysis of historical data that has shown exceedances of less than 1% for most tier 1 beaches (see Appendix 4 below).

Specific sampling sites on each beach were 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 will target water near the geographic center of the beach or near an easily-recognizable landmark (e.g., 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 CWB website: <http://health.hawaii.gov/cwb/site-map/clean-water-branch-home-page/sample-sites/>. The CWB will notify 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 and discuss them with its EPA regional beach coordinators. 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 state-operated microbiological laboratories on the islands of Kauai, Oahu, Maui, and Hawaii Island. In addition, a contract microbiology laboratory is used on Hawaii Island due to the distance between the sampling sites and the state-operated laboratory.

Short-term increases in indicator 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*<sup>3</sup>.

## 6. Monitoring Report Submissions

Beach monitoring results are publicly available on the CWB website<sup>4</sup> after being verified and validated. Monitoring data are also uploaded to EPA's STORET database on a monthly basis.

Field and laboratory data are entered into the CWB Water Quality Data Viewing and Advisory Resource system. This system maintains and manages all monitoring data and alert notifications that have been issued. Prior to becoming publicly available, the monitoring data are verified and validated by both CWB and laboratory staff for quality assurance purposes. When a laboratory enters a value that exceeds the BAV, the system immediately alerts the CWB Monitoring staff of the possible exceedance through emails so they may prepare for possible follow-up action,

---

<sup>3</sup> <https://www.gpo.gov/fdsys/pkg/FR-2012-05-18/pdf/2012-10210.pdf>

<sup>4</sup> <http://emdweb.doh.hawaii.gov/CleanWaterBranch/WaterQualityData/default.aspx>



including sign posting and sample collection. The system also prepares an automated public alert notification message showing a mapped image of the impacted area on the CWB website. After review, the CWB staff releases the alert message which becomes publicly available on the CWB website. CWB staff also prepares an email message bearing the notification message with a link to the CWB website for more information. Public notification activities are discussed in Section 7.

## **7. Risk Communication Plan and Public Notification Process**

A central component of the current beach monitoring program is the decision rule, which the CWB uses to identify actions to be taken in response to exceedances of recreational water quality standards at beaches during routine monitoring. Any exceedance of the BAV during routine monitoring of Hawaii's beaches will trigger public notification in the form of advisories and follow-up sampling. The CWB does not close beaches, but does provide different levels of advisories to inform the public about water quality conditions so that personal decisions may be made based on individual risk tolerances.

### **A. Risk Communication Plan**

Public notification and risk communication are primarily information sharing processes among three key groups of people: stakeholders, agency technical experts and risk communicators. Stakeholders are the target audiences that receive and respond to beach advisories. Agency technical experts are responsible for beach monitoring, setting policy and procedures to address exceedances of the water quality standards, and generating, interpreting, and assessing water quality data. Risk communicators are responsible for designing and implementing the notification and risk communication program.

The CWB has worked with its stakeholders, also referred to as community partners, and the EPA to develop a risk communication plan to notify the public whenever routine monitoring at a beach reveals levels of indicator bacteria that exceed the preset threshold level (BAV). The objective of the CWB risk communication plan is to provide prompt public notification of an exceedance of the BAV and to inform the public of potential risks associated with water contact activities while recreating in beach waters that exceed the BAV. The risk of illness has been shown to be positively correlated to the level of enterococci detected in beach waters.

The CWB has identified risk communication partners who has assisted, and continue to assist, the CWB in developing ways to communicate risk to the public. Risk communication partners include stakeholders, represented by the Oahu chapter of the Surfrider Foundation; representatives of the University of Hawaii Sea Grant College, members of the visitor industry, and county lifeguards, collectively referred to as community partners. The community partners represent local and visiting recreational beach users as well as professional beach managers and advisors. Agency technical experts are represented by the EPA and CWB staff. Since the CWB lacks personnel whose positions specifically include risk communications, the CWB agency technical experts and community partners also serve as the risk communicators.

The primary means of public notification was determined to be through the posting of advisory signs on the beach in locations where they would be most visible (e.g., parking lots, entrances, points of access, etc.). The CWB has worked with its community partners to develop the messaging content for the beach advisory signs that would best notify the beach users and inform them of the potential risks.

Four types of beach advisory notification signs were identified: temporary water quality exceedance advisories, permanent water quality exceedance advisories, sewage spill warning advisories, and brown water advisories. Of these, only temporary and permanent signs in response to BAV exceedances have been developed (shown in Appendix 2). The CWB has an inventory of sewage spill warning signs that has been in use for several years therefore a new sign was not needed. Sign posting during a Brown Water Advisory (BWA) would not be logistically feasible for the CWB since these advisories often encompass entire regions of an island, an entire island, or even the entire state and the CWB lacks the resources to post signs at all beaches that could be affected by BWAs. Communication of BWAs is performed via other means discussed below.

Temporary caution signs are posted on beaches where routine monitoring shows that the BAV has been exceeded. These signs alert beach users that high bacteria levels were found and that contact with the water may cause illness. CWB posts signs when the laboratory confirms a BAV exceedance and are removed when follow-up samples confirm that the BAV is no longer exceeded. Follow-up samples are collected on each subsequent work day after the initial posting.

If routine monitoring results consistently exceed the BAV more than 50% of the time over a period of one year, a permanent sign will be placed at the site. The permanent sign contains similar information as the temporary sign, but emphasizes that high bacteria levels may be attributed to heavy rainfall. Routine monitoring ends when the permanent signs are posted; however, the site will still be subject to occasional monitoring. The frequency of the site visits to these locations will depend on the availability of resources; however, they will be visited at least once per year.

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. An example of a warning sign is shown in Appendix 2.

The risk communication objective is to provide prompt notification to the public of the potential risk associated with swimming in waters that exceed the BAV so that people can make their own judgments and risk management decisions. This is accomplished using temporary and permanent signs when routine monitoring shows indicator levels exceeding the BAV. A second communication objective is to influence the public by presenting a convincing argument why they should follow the recommendations that safeguard health. This is accomplished by using sewage spill warning signs where the public is explicitly notified to keep out of the water and that the water is contaminated by sewage. These objectives are the reasons for the distinction

between the temporary and permanent caution signs and the sewage warning signs. Examples of beach advisory signs are shown in Appendix 2.

Another type of risk communication is through informational brochures. CWB and its community partners developed an informational brochure that will be used to inform beach users of the notification program and the purpose of the signs that they may encounter on the beach. The brochure also provides helpful information on which areas of the beach to avoid, how to minimize their risk of illness, some basic tips, and where to find more information. These brochures are intended to be handed out to beach users by lifeguards, hotel personnel, volunteers, and CWB field staff. Plans are underway to have the brochure translated, with the help of community partners, to the languages spoken by the majority of the visitors to the state. The brochure, shown in Appendix 3, will also be made available on the CWB website. The CWB is also discussing the development of other informational brochures with its community partners.

Other means of notifying the public is through email advisories sent out by the CWB. When a site exceeds the BAV, the CWB issues an email advisory indicating the location, enterococci level, and the BAV. Other helpful information is included on the email advisory based on many telephone inquiries that CWB has received from the public when past advisories have been posted. CWB also issues email notifications (advisory cancellations) when the BAV is no longer exceeded.

Email advisories link back to the CWB website which shows a map of the affected area and the original text of the email advisory message. Examples of the advisory messages are shown in Section 7B, below. Email advisories are issued to CWB staff members, officials from each county; various state and federal offices, including the military and the EPA; local news media outlets; county lifeguards; visitor industry representatives; community partners and other organizations; and interested parties. Currently, there are approximately 220 email recipients (subscribers). The public may subscribe to email notifications on the CWB website<sup>5</sup> under the “contact us” link and sending a request to be added to the email advisory list. This is currently a manual process; however, plans to upgrade to an automated opt-in/opt-out subscriber system are in the works that will not require an email request to the CWB.

The CWB website shows all current advisories as well as a map showing the locations of all active incidents. The beach advisory information that was submitted to email subscribers is also duplicated on the website. Examples of the different types of CWB website advisories are shown in section 7B.

In addition to email notifications, plans are underway to share information via social media through community partners (The Surfrider Foundation). The CWB does not have available resources to effectively maintain a social media presence and this partnership with the Surfrider Foundation will provide a valuable additional means of public notification.

---

<sup>5</sup> <http://emdweb.doh.hawaii.gov/cwb/wqd/viewer/>

Direct person-to-person communication will be provided by the county lifeguards, members of the visitor industry (specifically beach front hotels), and CWB field staff, if available, who can interact directly with beach users who encounter the CWB advisory signs while on the beach or inform beach users of any posted advisories on the beach. These community partners can also assist in answering questions from beach users or refer them to the CWB, and can assist in handing out beach program brochures as needed.

## **B. Public Notification Process**

If the BAV is exceeded during routine beach monitoring, an “Advisory Level I” is issued and the public is notified of the exceedance in several ways. CWB staff posts caution signs at the beach in areas that are most likely to be seen by beach users. Examples of signs are provided in Appendix 2. When the caution signs are posted, the CWB staff also collect follow-up samples on each subsequent work day until the BAV is no longer exceeded. During follow-up sampling, the CWB also checks to ensure that the signs have not been removed or defaced.

In addition to sign posting, the CWB posts advisory information on its website showing the location and a description of the event. Other public notification activities are described in Section 7A.

Two types of caution signs may be posted on a beach in response to an Advisory Level I; a temporary sign is posted whenever there is an exceedance of the BAV during routine monitoring, and a permanent sign is posted on beaches that demonstrate chronic exceedance of the BAV. Temporary signs indicate the date on which the signs were posted. The temporary signs are removed and email notifications are issued when water quality sampling data indicates that the BAV is no longer exceeded. Permanent signs will be posted whenever a site exceeds the BAV more than 50% of the time over a period of one year. Examples of these signs are shown in Appendix 1.

The purpose of permanent signs at sites that chronically exceed the BAV is to prevent CWB field staff from entering into an endless follow-up monitoring loop at the site thereby reducing the resources available to monitor higher priority sites that may only occasionally exceed the BAV. Follow-up studies to determine the source of the indicator will be dependent on CWB priorities and resource availability.

In addition to the posting of advisory signs on beaches, the CWB posts advisory notifications on its “Current Advisories, Warnings and Postings” page of its website<sup>6</sup>. The webpage is updated to identify the sites at which advisories have been posted and the reason for the posting. Below is an example of a beach alert (Advisory Level I) posted on the CWB website:

---

<sup>6</sup> <http://emdweb.doh.hawaii.gov/cwb/wqd/viewer/>

[Min. All](#) | [Max. All](#) | [Show all postings...](#)

## Hawaii

### Beach Advisory - Reported High Enterococci Count at Kailua Pier Sta. D [001208]

**Start Date:** 2017-04-01

**Cause:** Elevated Bacteria.

**Detail:** The public is advised of a water quality exceedance of enterococci at Kailua Pier, Station D, Kona. Levels of 406 per 100 mL have been detected during routine beach monitoring. The Department of Health Clean Water Branch provides beach monitoring and notification through its beach program. The advisory for this beach is posted because testing for enterococci indicate that potentially harmful microorganisms such as bacteria, viruses, protozoa, or parasites may be present in the water. Swimming at beaches with pollution in the water may make you ill. Children, the elderly, and people with weakened immune systems are the most likely populations to develop illnesses or infections after coming into contact with polluted water, usually while swimming. Fortunately, while swimming-related illnesses can be unpleasant, they are usually not very serious - they require little or no treatment or get better quickly upon treatment, and they have no long-term health effects. The most common illness associated with swimming in water polluted by sewage is gastroenteritis. It occurs in a variety of forms that can have one or more of the following symptoms: nausea, vomiting, stomachache, diarrhea, headache or fever. Other minor illnesses associated with swimming include ear, eye, nose and throat infections. In highly polluted water, swimmers may occasionally be exposed to more serious diseases. Not all illnesses from a day at the beach are from swimming. Food poisoning from improperly refrigerated picnic lunches may also have some of the same symptoms as swimming-related illnesses, including stomachache, nausea, vomiting and diarrhea. At any given time and place, we are constantly exposed to a variety of microorganisms that have the potential of making us ill. The beach remains open; however, this advisory will remain in effect until water sample results no longer exceed the threshold level of 130 enterococci per 100 mL. For more information, see:

<http://emdweb.doh.hawaii.gov/cwb/wqd/viewer/> and <https://www.epa.gov/beaches/learn-human-health-beach>

**Location/More Information:**

 [Kailua Pier Sta. D \[001208\]](#)

The overall advisory/notification process for BAV exceedances are as follows:

1. CWB receives preliminary exceedance notification from the laboratory (often prior to the official results), typically within 24 hours after samples are received by the laboratory.
2. The sampler is notified of the possible need to post signs and collect follow-up samples.
3. CWB calls the laboratory to confirm the results, or waits for the laboratory to call with the confirmation, typically 24 hours after the samples have been processed by the laboratory.
4. Once confirmation is received, the sampler returns to the site to post the signs and to collect follow-up samples.

5. CWB prepares the website advisory message and maps while the signs are being posted, or shortly thereafter.
6. Email advisories are sent out after the website advisory has been posted. Email advisories are based on the website advisory message. The email advisory includes the site name, enterococci levels, and a description of the event.
7. The exceedance results are posted to the data viewer manually and are available on the same day (except on weekends or holidays). Results from other samples (non-exceedances) are automatically posted on the data viewer at the end of the day, or the following day, depending on when the final analytical results of all samples have been entered into the system.
8. A cancellation email is sent out when follow-up samples show that the BAV is no longer exceeded.

The posting of signs, collection of follow-up samples, preparation of the website and email advisories occur shortly after laboratory confirmation of the sampling results.

### **I. Response to Sewage Spills**

If the CWB receives notification of a confirmed sewage spill, an “Advisory Level II” is issued. A confirmed sewage spill is defined as a spill reported by a permitted wastewater system or a spill that has been verified by a CWB staff member. Under HAR 11-62<sup>7</sup>, Wastewater Systems, Appendix C, a wastewater owner/agent (responsible party) is required to report to the HDOH, all spills of a thousand gallons or more, and for lesser spills if they present a substantial threat to public health. In addition, the responsible party is required to issue a press release notifying the public of the event and to post warning signs in the affected area. The responsible party is also required to perform bacterial monitoring for any spill greater than 100 gallons or when public health may be threatened. Complete requirements and response procedures for spills are specified in HAR 11-62. The counties of the state, the largest operators of wastewater systems, use warning signage that are consistent with those used by CWB. The CWB may post additional signs and collect additional samples, if needed, or if the responsible party is unable to. An example of a sewage spill warning sign is shown in Appendix 2.

When the CWB confirms a sewage spill that impacts a beach, the CWB website is updated with advisory information (location, description, cause, etc.). Email notifications are also transmitted to all email subscribers as described in Section 7A. The responsible party must provide the CWB with all monitoring results and the CWB will determine whether the advisory is rescinded when the BAV is no longer exceeded in beach waters. The CWB website will also be updated to include the advisory information.

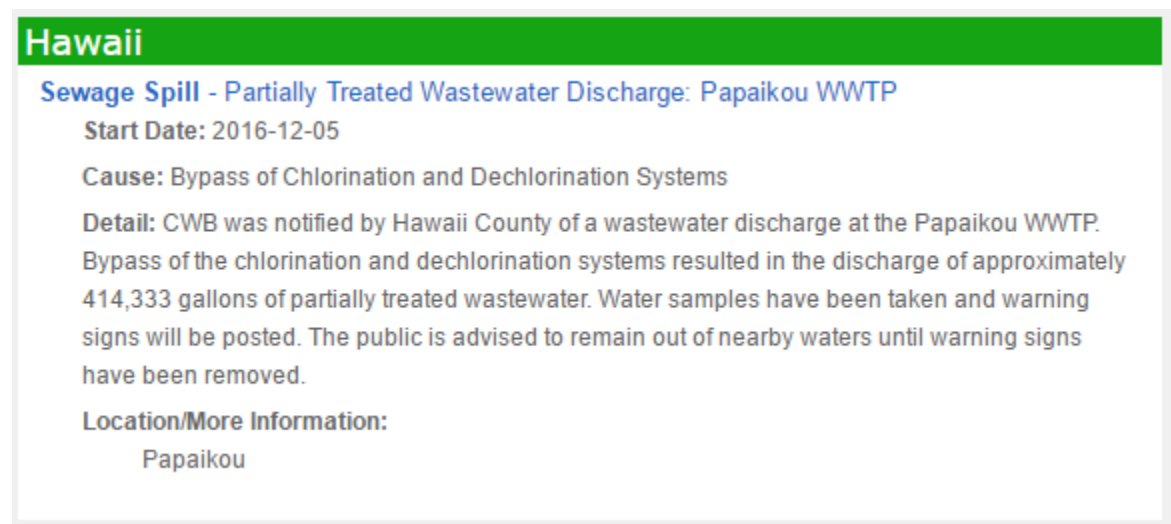
A warning sign will be posted for all verified sewage spill affecting beaches. Samples are not collected prior to the posting of warning signs. The sign warns against fishing, wading and swimming. Although affected beaches are not technically closed by the HDOH, the intent of the signs is to produce an influencing tone that is designed to convince the public to stay out of the affected area. Here, a “warning” is posted, as opposed to a “caution” used in Alert Level I

---

<sup>7</sup> <http://health.hawaii.gov/wastewater/>

notifications. The color of the background also helps to distinguish sewage spill events (warning) from BAV exceedance (caution) events. Warning signs are temporary and are removed when sampling results indicate that the BAV is no longer exceeded, or at the discretion of the CWB. Alert notifications are also removed from the CWB website and hotline when the BAV is no longer exceeded. An example of a warning sign is shown in Appendix 2. Email notifications of the alert cancellation will also be transmitted to all email recipients.

In addition to the posting of advisory signs on beaches, the CWB posts advisory notifications on its “Current Advisories, Warnings and Postings” page of its website. The webpage is updated to identify the sites at which advisories have been posted and the reason for the posting. An example of a sewage spill alert (Advisory Level II) posted on the CWB website is shown below:



**Hawaii**

**Sewage Spill - Partially Treated Wastewater Discharge: Papaikou WWTP**

**Start Date:** 2016-12-05

**Cause:** Bypass of Chlorination and Dechlorination Systems

**Detail:** CWB was notified by Hawaii County of a wastewater discharge at the Papaikou WWTP. Bypass of the chlorination and dechlorination systems resulted in the discharge of approximately 414,333 gallons of partially treated wastewater. Water samples have been taken and warning signs will be posted. The public is advised to remain out of nearby waters until warning signs have been removed.

**Location/More Information:**  
Papaikou

## II. Brown Water Advisories

In the event of heavy rain or if a Flash Flood Warning is issued by the National Weather Service, the CWB may issue a “Brown Water Advisory” (BWA). Beach water need not be brown for a BWA to be issued. BWAs are so named because surface water runoff often carries soil and sediment and other pollutants that can cause the beach water to appear brown or have a turbid appearance. A BWA is issued when there is a strong likelihood of land-based runoff entering beach waters thereby causing the BAV to be exceeded. Land-based runoff from streams and drainage systems into beach waters may pose a health risk to swimmers from elevated bacteria levels. 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. Heavy wave action may also stir up sediment and microorganisms in the sand and suspend them in the water column. 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 will need to be verified by the CWB before a BWA is issued. Samples are not collected under a BWA, and if samples have already been collected, CWB may not wait for laboratory results prior to its issuance. The BEACH Act addresses illness that may be caused by microorganisms and does not address chemicals such as pesticides, heavy metals, and other toxic material which may enter Hawaii’s

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

In the event of a BWA, the public will be notified as described in Section 7A; however, it is impractical to post physical signs on, and collect samples from all impacted beaches due to resource constraints. Currently, news organizations voluntarily include BWAs in their weather broadcasts when time permits. The HDOH Communications Office may issue a press release at their discretion. The CWB hotline will also be updated with the advisory information. BWAs are generally rescinded no sooner than three days after the event and when the water is no longer brown or turbid, as reported by CWB staff or community partners.

Below is an example of a Brown Water Advisory message posted on the CWB website:

## Maui

### Brown Water Advisory - BWA Napili Bay, Maui


**Start Date:** 2017-01-11

**Cause:** Unknown

**Detail:** A Brown Water Advisory is being issued for Napili Bay, Maui. The public is advised to stay out of flood waters and storm water runoff due to possible overflowing cesspools, sewer manholes, pesticides, animal fecal matter, dead animals, pathogens, chemicals, and associated flood debris. Not all coastal areas may be impacted by runoff, however, if the water is brown stay out and continue to practice good personal hygiene and follow up with your primary care physician if you have any health concerns.

**Location/More Information:**

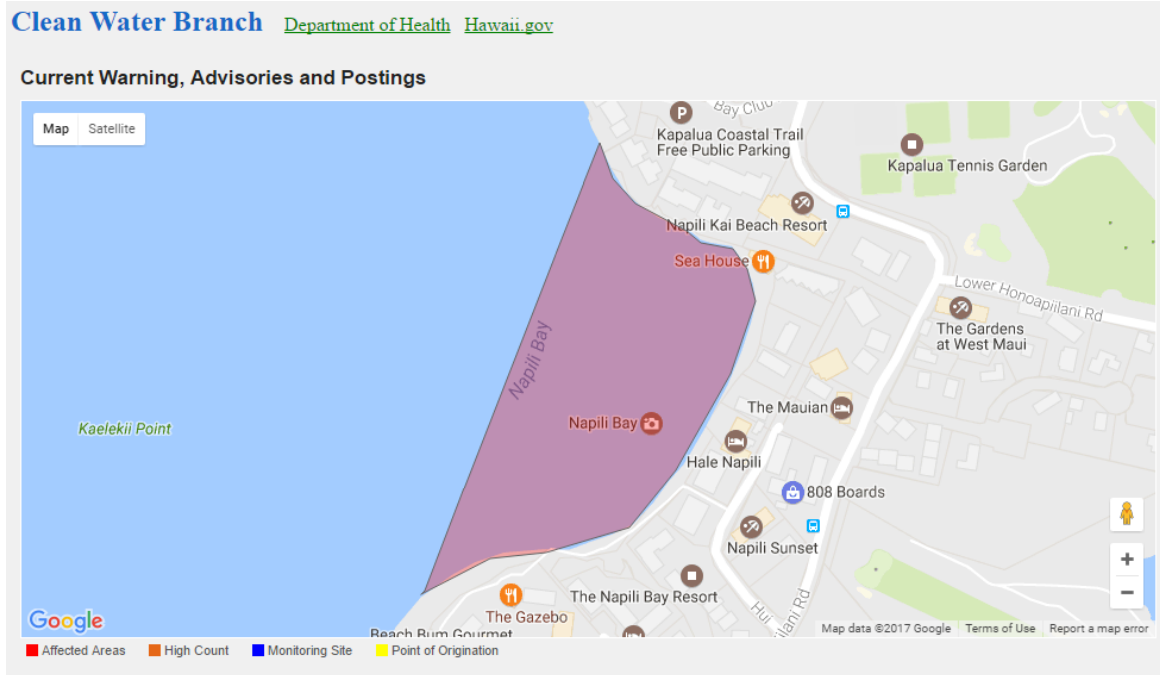
Napili Bay BWA

 Napili Bay 1.12.17.JPG

### III. Additional CWB Website Advisory Information

In addition to the advisory information stated above, the CWB website contains a map showing the affected area of each advisory on the same page, as shown below:





Email notifications transmitted to subscribers include a link to the CWB webpage containing this information.

## 8. Notification Report Submission

The CWB reports its public notification and advisory activities electronically to the EPA through the Program Tracking, Beach Advisories, Water Quality Standards, and Nutrients (PRAWN) database on an annual basis. The data elements that are uploaded include beach monitoring notifications (advisories) and beach locational data. As part of its BEACH Grant conditions, the CWB also provides the EPA with quarterly and 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 Beach Advisory and Closing On-line Notification (BEACON) system at: <https://watersgeo.epa.gov/beacon2/reports.html>

In addition to reporting its beach notification activities, the CWB also reports (uploads) the actual monitoring results (enterococci levels) to the national EPA STORET/WQX database system on a monthly basis. Monitoring results are also posted on the CWB website after they have been verified and validated. The information uploaded to STORET is available to the public at: <https://www.epa.gov/waterdata/storage-and-retrieval-and-water-quality-exchange>

## 9. Public Evaluation of the Beach Program

This document describes the Hawaii Beach Monitoring Program and will be made publicly available on the CWB website. The public will be provided an opportunity to evaluate and

provide comment on all aspects of the Beach Monitoring Program over a period of not less than 30 days. All subsequent changes to the program, including, but not limited to, beaches to be monitored, and beach ranking will be subject to public comment.

The CWB schedules regular meetings with its community partners (Oahu Chapter of the Surfrider Foundation, representatives of the University of Hawaii Sea Grant College, the visitor industry, and county lifeguards) to discuss and develop the beach monitoring program and public outreach activities. Once completed, the CWB plans to hold state-wide public informational meetings to present the Beach Monitoring Program.

**Points of Contact**

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

Phone: (808) 586-4309

Fax: (808) 586-4352

Email address: [cleanwaterbranch@doh.hawaii.gov](mailto:cleanwaterbranch@doh.hawaii.gov)

Mailing address:

Clean Water Branch  
Environmental Management Division  
State Department of Health  
P.O. Box 3378  
Honolulu, HI 96801-3378

## APPENDIX 1.

### Tier 1 Beaches

<b>ISLAND</b>	<b>BEACH ID</b>	<b>BEACH NAME</b>
Hawaii	HI013290	Kahalu'u Beach Co. Pk.
Hawaii	HI261474	Kamakaokahonu
Hawaii	HI315019	Hilo Bayfront
Hawaii	HI326172	Anaeho'omalua Bay
Hawaii	HI540868	Lelewi Beach Co. Pk.
Hawaii	HI668132	Puako
Hawaii	HI670254	James Kealoha Park
Hawaii	HI707059	Analani Pond (Puala'a)
Hawaii	HI753566	Kailua Bay
Hawaii	HI857411	Honoli'i Beach Co. Park
Hawaii	HI862286	Onekahakaha Beach Co. Pk.
Kauai	HI385259	Hanalei Beach Co. Park
Kauai	HI396850	Po'ipu Beach Co. Park
Kauai	HI701008	Salt Pond Beach Co. Park
Kauai	HI758685	Kalapaki Beach
Kauai	HI798758	Lydgate State Park
Maui	HI058731	Ma'alaea Beach
Maui	HI278988	Wailea Beach Park
Maui	HI280920	Kahalui Harbor
Maui	HI496115	Kama'ole Beach 3
Maui	HI558359	Launiupoko St. Wayside
Maui	HI761092	Kama'ole Beach 1
Maui	HI765340	St. Theresa's
Maui	HI789952	Spreckelsville
Maui	HI797225	Kanaha Beach Co. Park
Maui	HI797917	Hanaka'o'o Beach Co. Pk.
Oahu	HI267023	White Plains Beach
Oahu	HI306071	Ala Moana Beach Co. Park, D.H.
Oahu	HI366432	Kahanamoku Beach
Oahu	HI451176	Hale'iwa Ali'i Beach Co. Pk.
Oahu	HI451471	Hanauma Bay
Oahu	HI467413	Nanakuli Beach Co. Pk.
Oahu	HI471097	Waimanalo Beach Co Park
Oahu	HI473893	Ala Moana Beach Co. Park
Oahu	HI482719	Kailua Beach Co. Pk.

Oahu	HI515191	Ihilani Kohola
Oahu	HI529142	Magic Island Beach
Oahu	HI617815	Sans Souci St. Rec. Area
Oahu	HI627464	Ma'ili Beach Co. Park
Oahu	HI632106	Makaha Beach Co. Park
Oahu	HI659533	Poka'i Bay Beach Co. Pk.
Oahu	HI681782	Kuhio Beach Park
Oahu	HI696599	Waimea Bay Beach Co. Pk.
Oahu	HI723399	Makapu'u Beach Co. Park
Oahu	HI776760	Sandy Beach Co. Park
Oahu	HI848207	Kualoa Co. Regional Park
Oahu	HI860544	Sunset Beach
Oahu	HI882094	Ala Moana Beach Co. Park, Center
Oahu	HI898947	Royal-Moana Beach
Oahu	HI950962	Chun's Reef

**Tier 2 Beaches**

<b>ISLAND</b>	<b>BEACH ID</b>	<b>BEACH NAME</b>
Hawaii	HI107517	Ka Lae (South Point)
Hawaii	HI122881	Kapoho Tidepools (Vacationland)
Hawaii	HI124561	Ninole
Hawaii	HI138086	Hakalau Co. Pk.
Hawaii	HI143737	Ohai'ula Beach
Hawaii	HI152572	Ho'okena
Hawaii	HI224651	Punalu'u
Hawaii	HI246645	Honaunau Bay
Hawaii	HI261869	Kauna'oa Beach
Hawaii	HI316864	Pohoiki Beach
Hawaii	HI320616	Pine Trees
Hawaii	HI380623	Laupahoehoe Beach Co. Park
Hawaii	HI391407	Kapoho Bay
Hawaii	HI425303	Radio Bay
Hawaii	HI436267	White Sands Beach Co. Pk. (Magic Sands)
Hawaii	HI459942	Kehena
Hawaii	HI470112	Miloli'i Beach
Hawaii	HI478461	Pu'u honua Pt. (Pu'u o Honaunau)
Hawaii	HI534434	Waipi'o Bay
Hawaii	HI542822	Kalapana Beach (new) (Harry K. Brown Beach Co. Pk.)
Hawaii	HI582331	Holoholokai Beach
Hawaii	HI616452	2nd Beach (Next to Mahaiula)
Hawaii	HI621002	Hapuna Beach St. Rec. Area
Hawaii	HI643938	Wawaloli Beach

Hawaii	HI659453	Ice Pond (single point)
Hawaii	HI691720	Lehia Beach Co. Pk.
Hawaii	HI693485	Kolekole Beach Co. Park
Hawaii	HI713293	Keahou Bay (Kona)
Hawaii	HI713314	Banyan's Surfing Area
Hawaii	HI720408	Manini'owali
Hawaii	HI720900	Whittington Beach Co. Pk.
Hawaii	HI738158	Pelekane Bay
Hawaii	HI849313	Keaukaha Beach Park
Hawaii	HI890924	Mauna Lani (Kalahuipua'a)
Hawaii	HI934020	Waiulaula
Hawaii	HI936372	Spencer Beach Co. Pk.
Hawaii	HI977673	Coconut Island Park
Hawaii	HI978783	Kawaihae Harbor
Kauai	HI124511	Ke'e Beach
Kauai	HI156238	Beach House Beach
Kauai	HI166521	Brennecke Beach
Kauai	HI245235	Waimea Rec. Pier St. Pk.
Kauai	HI247403	Polihale State Park
Kauai	HI264001	Kalihiwai Bay
Kauai	HI270737	Anahola Beach
Kauai	HI277808	Haula Beach
Kauai	HI338804	Anini Beach
Kauai	HI352580	Hanama'ulu Beach Co. Park
Kauai	HI358435	Shipwreck Beach
Kauai	HI392082	Wai'ohai Beach
Kauai	HI402035	Kealia
Kauai	HI418744	Anini Beach Park
Kauai	HI468251	Pakala (Makaweli)
Kauai	HI502794	Nukoli'i Beach Park
Kauai	HI530569	Kekaha Beach Co. Pk.
Kauai	HI542569	Sheraton Beach
Kauai	HI554189	Ha'ena Beach Co. Park
Kauai	HI606168	Wailua Beach
Kauai	HI619039	Kukui'ula Bay
Kauai	HI682678	Waipouli
Kauai	HI698776	Kawailoa Beach
Kauai	HI742228	Prince Kuhio Park
Kauai	HI836118	Wai'oli Beach Park
Kauai	HI889639	Lumaha'i Beach
Kauai	HI951651	Spouting Horn Beach Co. Park

Kauai	HI955435	Koloa Landing
Kauai	HI972832	Kapa'a Beach Co. Park
Kauai	HI976083	Gillin's Beach
Maui	HI058731	Ma'alaea Beach
Maui	HI097179	Kama'ole Beach 2 (Ili'iliholo Beach)
Maui	HI118874	Wai'anapanapa State Park
Maui	HI157533	Pu'u ola'i (Small Beach)
Maui	HI160433	Kahana
Maui	HI167153	Puamana Beach Co. Park
Maui	HI169380	Wahikuli State Wayside Park
Maui	HI245556	Makena Landing Beach
Maui	HI253548	Fleming Beach North
Maui	HI276573	Ku'au Bay
Maui	HI279887	Oneloa Beach (Big Beach)
Maui	HI280286	Honolua Bay
Maui	HI284036	Waipulani
Maui	HI339656	Polo Beach Park
Maui	HI343702	Waihe'e Beach Co. Park
Maui	HI373055	Pu'unoa Beach
Maui	HI385800	Huakini Bay
Maui	HI391006	Kapalua (Fleming's) Beach
Maui	HI407363	Lahaina Beach
Maui	HI412391	Honokowai Beach Co. Pk.
Maui	HI423064	Maliko Bay
Maui	HI462219	Papalaua
Maui	HI491359	Olowalu
Maui	HI553820	Hata's
Maui	HI588333	Ulua Beach Park
Maui	HI607763	Keawakapu Beach
Maui	HI643627	Ka'anapali
Maui	HI647373	Kalepolepo Beach
Maui	HI684864	Po'olenalena Beach
Maui	HI705118	Kalama Beach Co. Park
Maui	HI715975	Mai Poina Oe Iau Beach Co. Pk.
Maui	HI740710	Oneloa Bay Beach
Maui	HI756040	Oneuli Beach
Maui	HI764060	Napili Bay
Maui	HI789952	Spreckelsville
Maui	HI814309	Ukumehame Beach Co. Pk.
Maui	HI846900	H.P. Baldwin Beach Co. Pk.
Maui	HI847607	Malu'aka Beach

Maui	HI861961	Mokapu Beach Park
Maui	HI864937	Lower Pa'ia
Maui	HI916183	Waiehu Beach Co. Park
Maui	HI977299	Mokule'ia Beach
Maui	HI985873	Ho'okipa Beach Co. Pk.
Maui	HI996835	Hana Bay
Maui	HI997014	Palaeua Beach Park
Oahu	HI071892	Kalama Beach
Oahu	HI137325	Malaekahana Bay
Oahu	HI148836	Punalu'u Beach Co. Park
Oahu	HI173325	Kahala Hilton Beach
Oahu	HI183312	Laniakea Beach
Oahu	HI188157	Pipeline, The
Oahu	HI244505	Waikiki Beach Center
Oahu	HI248913	Tongg's Beach
Oahu	HI279194	Waimanalo Bay St. Rec. Area
Oahu	HI410842	Kaluanui Beach
Oahu	HI430267	Maunalua Bay Beach Park
Oahu	HI548986	Kahe Pt. Beach Co. Pk.
Oahu	HI555850	Fort DeRussy Beach Park
Oahu	HI596989	Lanikai
Oahu	HI733929	Kapi'olani Park
Oahu	HI757588	Ke'ehi Lagoon
Oahu	HI767708	Kokololio Beach
Oahu	HI798011	Bellows Field Beach Co. Pk.
Oahu	HI851298	Queen's Surf Beach Park
Oahu	HI904851	Kapaeloa Beach
Oahu	HI952205	Oneawa Beach

## APPENDIX 2.

### Beach Advisory Signs



**HIGH BACTERIA LEVELS**

found here on \_\_\_\_\_

Contact with water  
may cause illness

For information  
[health.hawaii.gov/cwb](http://health.hawaii.gov/cwb)  
(808) 586-5826

Hawaii State Department of Health



**HIGH BACTERIA LEVELS FOUND**

in ocean and stream  
especially after heavy rainfall

Contact with water  
may cause illness

For information  
[health.hawaii.gov/cwb](http://health.hawaii.gov/cwb)  
(808) 586-5826

Hawaii State Department of Health

Temporary Sign

Permanent Sign

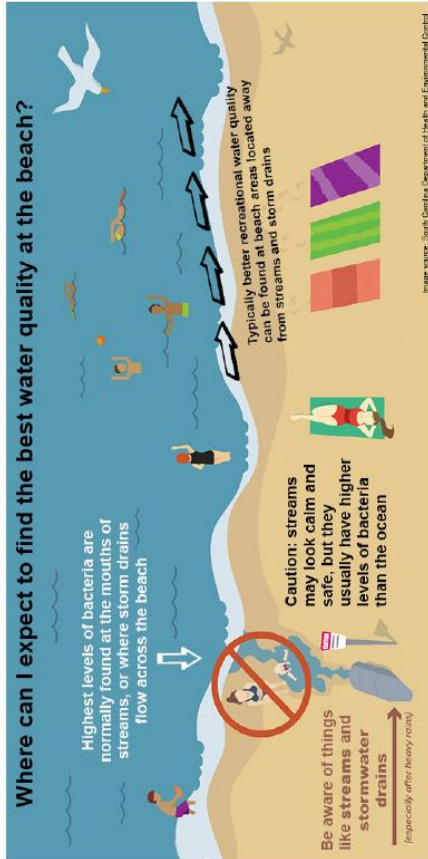


Warning Sign



## APPENDIX 3.

### Hawaii Beach Monitoring Program Informational Brochure



- Basic tips for enjoying your time at the beach:
- Keep informed – check out the websites noted on the other side of this brochure or ask a lifeguard – Know before you go!
  - Observe advisories and safety hazard signs
  - Avoid entering the water with cuts or open wounds
  - Practice good hygiene by thoroughly washing off using showers after swimming or recreating at the beach
  - Avoid wading and swimming in streams
  - For more information: [www.epa.gov/beaches](http://www.epa.gov/beaches)

## Hawaii's Beach Monitoring Program

Hawaii's beaches are well known for their beauty and clear blue waters. The State of Hawaii, Department of Health, Clean Water Branch routinely checks for contamination at popular beach sites throughout the state to help protect public health. However, especially after heavy rainfall or sewage spills, beaches can be affected by storm water flowing out of drainage pipes, channels, and streams. To help reduce the risk of illness, it is best to avoid these areas where bacteria levels may exceed recreational water quality standards.



When monitoring indicates a possible problem, the public is notified. Three (3) different types of signs are commonly used to advise everyone on beach water quality.



- Temporary sign
- Bacterial levels exceed standards at this beach sampling location
- Potential health risk associated with swimming or wading in these ocean waters
- Beach remains open and people can decide their own comfort level of risk
- Sign removed when sampling results indicate compliance with state standards



- Permanent sign
- Bacteria levels frequently exceed standards at this beach sampling location
- Potential health risk associated with swimming or wading in ocean waters often contaminated by storm water from urban areas and other contaminated sources such as streams
- The beach remains open and people can decide their own comfort level of risk



- Temporary sign
- Wastewater spill has contaminated waters
- Beach users should avoid any and all water contact
- Signs remain posted until sampling results indicate compliance with state standards

For more information, please visit the Department of Health, Clean Water Branch website at [health.hawaii.gov/cwb](http://health.hawaii.gov/cwb). The latest beach water quality warnings and advisories can also be heard on the Clean Water Branch Hotline at (808) 586-5826. Another useful website, [www.hawaiibeachsafty.com](http://www.hawaiibeachsafty.com), provides real-time wave and beach hazard information for popular beaches throughout the state.

**Know before you go.**

## APPENDIX 4.

### Exceedances of Oahu and Big Island Tier 1 Beaches

Oahu and Big Island Tier 1 exceedances (>130) from 1/1/2014 to 4/1/2017

Oahu Beaches	ID	Tier	# of Samples	# Exceed	% Exceed
Ala Moana Lagoon	222	1	162	3	1.85
Ala Moana Park, Center	153	1	167	2	1.20
Ala Moana Park, D.H.	154	1	168	1	0.60
Chun's Reef	218	1	121	0	0.00
Haleiwa Ali'i Beach Park	247	1	113	0	0.00
Hanauma Beach Park	201	1	147	3	2.04
Ihilani-Kohola Lagoon	252	1	110	2	1.82
Kahanamoku Beach, Waikiki	155	1	170	6	3.53
Kailua Beach Park	193	1	155	1	0.65
Kualoa Beach	208	1	121	8	6.61
Kuhio Beach, Waikiki	161	1	168	8	4.76
Maili Beach Park	186	1	108	0	0.00
Makaha Beach	185	1	116	0	0.00
Makapuu	216	1	155	1	0.65
Moana Beach, Waikiki	238	1	161	2	1.24
Nanakuli Beach Park	187	1	114	0	0.00
Pokai Bay	224	1	116	1	0.86
Sandy Beach Pt. No. 1	200	1	155	1	0.65
Sans Souci	228	1	168	2	1.19
Sunset Beach	225	1	119	3	2.52
Waimanalo Beach	197	1	155	1	0.65
Waimea Bay Shoreline	172	1	114	3	2.63
White Plains Beach	236	1	116	0	0.00

Big Island Beaches	ID	Tier	# Samples	# Exceed	% Exceed
Beach - Kona					
Kahalu'u Beach Co. Pk.	1203	1	181	12	6.63
Kamakaokahonu	1208, 1206	1	369	10	2.71
Anaeho'omalua Bay	1236	1	183	1	0.55
Puako	1211, 12220	1	202	2	0.99
Kailua Bay	1204	1	30	2	6.67

<b>Beach - Hilo</b>	<b>ID</b>	<b>Tier</b>	<b># Samples</b>	<b># Exceed</b>	<b>% Exceed</b>
Hilo Bayfront	1107, 1138	1	107	6	5.61
Leleiwi Beach Co. Pk.	1136	1	88	5	5.68
James Kealoha Park	1114	1	88	0	0.00
Analani Pond (Puala'a)	1143	1	87	2	2.30
Honoli'i Beach Co. Park	1110	1	84	8	9.52
Onekahakaha Beach Co. Pk.	1126, 1130	1	124	6	4.84