

Clyde Morita

Comment:

1. As evidenced by the COVID-19 pandemic and other public health epidemics and pollution-caused incidents, people need to be notified as much in advance of any potentially hazardous conditions, not after-the-fact. One more day in the DOH's advisories being posted can make the difference in people's health and lives.

Response:

The Hawaii Department of Health (HDOH) uses laboratory test methods approved by the U.S. Environmental Protection Agency (EPA) for the detection of enterococci, which is the fecal indicator recommended by EPA and adopted by HDOH. The test methods currently used by HDOH require 24 hours before a result can be reported.

The HDOH Clean Water Branch (CWB) currently uses the following monitoring procedure: On day 1, a beach sample is collected and delivered to the lab. The lab runs the tests and provides the results back to the CWB the next day or day 2 (within 24 hours). If the sample exceeds the Beach Action Value (BAV) of 130 cfu/100 mL, the CWB returns to the beach on day 2 and posts signs on the beach and issues an email advisory to all subscribers and posts the advisory in the CWB Advisories and Notifications website. The CWB also collects follow up, confirmatory samples and delivers it to the lab on day 2. The lab analyzes the samples and returns the results on day 3. In the majority of instances, the results from day 2 samples are below the BAV and the CWB removes the signs and cancels the advisories on day 3. At this point, the sign that was originally posted (on the day of the follow-up sample or day 2) advised the public to remain out of the water when in fact, on the day of the sign posting, there was no risk of gastrointestinal illness as determined by the lower enterococci levels from the day 2 sample analysis. The purpose of the follow-up sampling is to confirm the previous result and to confirm whether or not there may be a health threat. A posted sign would not be very helpful if the fecal indicator level exceedance is short lived because the signs, which are posted on the following day, may not represent the conditions at the time of posting. The most current *National Beach Guidance and Required Performance Criteria for Grants, 2014 Edition* (2014 Guidance) allows states to resample a location before issuing a notification if there is reason to doubt the accuracy of the first sample. This might be the case if sampling results at a beach have shown that, historically, water quality has consistently met acceptable beach water quality thresholds and no known or potential sources of fecal contamination affect beach water quality. Therefore, HDOH is revising its public notification process based on confirmatory test results. At any time, if the CWB believes that there is a credible threat to public health, signs will be posted on the beach.

Comment:

2. Ideally, the DOH should have a real-time monitoring and advisory system set up throughout the State. Technology is available; however, a will and the resources to establish such a system is lacking. Given the available resources of the DOH, we would

expect that its monitoring program will not be improved in timeliness until EPA develops and funds one.

Response:

Faster test methods are available such as quantitative Polymerase Chain Reaction (qPCR). However, these tests are currently not available in the HDOH labs that analyze water quality samples. The HDOH does not have adequate resources, capability, and capacity to routinely use such methods. Also, with any new system and test method, a lot of startup issues must be resolved (e.g., funds to purchase specialized analyzers, adequately trained lab technicians to run qPCR, duplicate testing capabilities on all islands, reliability of test results and interpretation). Additionally, the use of rapid methods such as qPCR will require modifications to the water quality standards because qPCR does not measure the same thing. The current method detects the number of viable enterococci cells in a sample, whereas the rapid method detects the amount of genetic material recovered in a sample, including genetic material from potentially non-viable organisms. Also, because the tests employ differing detection methods, the units of measure are not the same for both methods. These factors must be considered in the analytical and reporting methods to ensure comparability.

Given that the current indicator, enterococci, has been shown to grow naturally in Hawaii's environment, its detection does not always indicate a human health risk. Faster tests will not address the shortfalls of the indicator as a predictor of human health risk for Hawaii's waters.

HDOH is interested in finding better methods and technologies to improve monitoring to provide faster and accurate results to protect Hawaii's waters. However, laboratory technology is not yet at a point where alternative testing methods are simple, cheap, accurate, and rapid. Also, we must be able to replicate such sampling and laboratory capabilities and capacities for all our islands (including meeting the required sample preservation and holding times).

Comment:

3. A predictive model can be established with the help of the University of Hawaii and NOAA using the data that DOH has collected over the past 20-years, along with NOAA weather data. Correlations between rainfall and runoff at the beaches and monitoring data can be developed, allowing DOH to post advisories the day after runoff events. Subsequent monitoring will then confirm or remove the need for the advisory posting. Even if the predictive model is not 100% correct, its advance notification will more adequately protect the public than the present or proposed systems.

Response:

The HDOH uses a form of predictive model or preemptive public notification in the form of brown water advisories (BWAs). Data collected by the HDOH over the past thirty-plus years have shown that when heavy rains cause surface water runoff to enter coastal waters, enterococci levels often exceed the BAV. This is believed to be caused, at least in part, by the enterococci growing in the environment, but may also come from runoff from

non-point sources containing domestic and feral animal feces and leaking cesspools, sewer, and septic systems. The current indicator cannot distinguish between human and non-human sources. However, BWAs are issued to preemptively inform the public of elevated enterococci levels, which may or may not be attributable to human sewage. In addition, other pollutants that are not currently detected by our routine monitoring tests are expected to be in storm runoff, including pesticides, oil and solvents, fertilizers, other toxic chemicals, dead and decaying animals, and animal waste, all of which pose human health concerns.

Surfrider

Comment:

4. The stated goal of the Beach Monitoring Program should not be revised and should remain as described in the 2017 Beach Monitoring Program document.

Response:

The goal of the Beach Monitoring Program was modified to more precisely articulate the scope of the program with respect to the Clean Water Act. There are many sources of illness that beach users may be exposed to that are beyond the detection capabilities of our current indicator and are beyond the scope of the CWA, including exposure to naturally occurring pathogens such as *Vibrio* sp. and nuisance cyanobacteria such as *Lyngbya* sp., and pathogens that are mainly associated with bather density, such as *Staphylococcus* sp.

Comment:

5. Surfrider disagrees with the proposed change to no longer post an advisory sign on the beach when a single high bacteria result that exceeds the RWQC [Recreational Water Quality Criteria] is obtained. HDOH should definitely retest, but online-only notifications of the retest are not sufficient warning to the public of the elevated bacteria levels.

Response:

See response to Comment 1.

Comment:

6. Surfrider disagrees with the proposed change that allows CWB staff to take down permanent advisory signs at chronically polluted sites if “scientific investigations” do not identify human or animal sources of pollution. The failure to identify a source of pollution does not mean human health risk is diminished. Permanent signs should only be taken down if water quality conditions improve or if a full Qualitative [*sic*] Microbial Risk Assessment is performed that measures exposure to pathogens.

Response:

Only one permanent sign was removed at one location (Mahaulepu at the mouth of Waiopili Ditch on Kauai) after a credible scientific investigation has shown that there are

no human or animal fecal sources of contamination. No other permanent sign has been removed. A permanent sign is still posted on the beach fronting Gillin's House.

The genus *Enterococcus* is a large group of bacteria comprised of approximately 36 species divided into six groups and includes bacteria found in the guts of humans and animals as well as natural environments, like moist soils and sediments, beach sand, aquatic and terrestrial vegetation, and in the gut of some insects. Enterococci is the generic term used when referring to the organisms that are identified only by their phenotypic (non-genetic) characteristic such as when simple water quality tests are performed. The use of enterococci as a fecal indicator has been criticized by several researchers because the epidemiological studies which led to their selection mainly focused on beaches where point sources of sewage discharge were present and very little consideration was made for environmental (non-fecal) sources¹. Therefore, the use of enterococci as a surrogate for pathogens is problematic. Enterococci from the human gut is shed and passed in human feces. Therefore, greater numbers of human enterococci found in ambient waters indicate the presence of human feces which may also mean greater numbers of human pathogens and increased risk to humans. However, if there are no human or animal sources then the health risk is negligible in the area^{2,3}.

Comment:

7. The CWB should no longer suspend all testing during Brown Water Advisories and advisory signs should be posted at highly-used beaches.

Response:

Brown Water Advisories (BWA) are preemptive advisories that are issued in response to surface water runoff caused by heavy rain or other events (e.g., broken water main leading to runoff into the ocean). The CWB has more than thirty years of monitoring data which included fecal indicator tests conducted during brown water events and historical data has shown that in the majority of these events, the fecal indicator levels always exceeded the threshold level. Historical data and institutional knowledge were used to formulate the concept of BWAs which are intended to notify the public of potential hazards that may occur in surface runoff, including pesticides, solvents, toxic chemicals, dead animals, flood debris, as well as fecal contamination. The current test method can only detect enterococci, the fecal indicator recommended by EPA.

It is impractical to monitor beaches during BWAs since they may happen at any time and anywhere. CWB resource limitations and laboratory capacity limits testing of all brown water events. The CWB believes that mass communication through email advisories, which are also communicated by local news and social media is the most efficient means of public notification. The CWB has worked with local hotels and the visitor industry to

¹ 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.

² Soller, J.A., et al., Estimated human health risks from exposure to recreational waters impacted by human and non-human sources of faecal contamination, *Water Research* (2010), doi:10.1016/j.watres.2010.06.049

³ 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

help inform visitors and have provided translations of the various advisories in several foreign languages that are most commonly spoken by our visitors. Also in the near future, the CWB intends to work with city and county agencies that manage public beaches to get their cooperation in posting permanent BWA informational notices at their beaches to provide ongoing information and notification to the public about the greater potential health risk from water contact during and following storm events.

Comment:

8. HDOH should protect against human illness where the risk is the greatest – stream mouths and estuarine waters on the beach.

Response:

The HDOH monitors areas that represent the entire beach or beach segment. If the BAV is exceeded, then the appropriate action is taken. Consistent with the 2014 Guidance, the HDOH monitors coastal waters. Figure 1 of the Hawaii Beach Monitoring Program provides examples of coastal and non-coastal waters. Stream mouths technically are not covered by the BEACH Act so are excluded as part of the regular Hawaii Beach Monitoring Program, to be sure to strictly adhere to CWA section 406(b) grant requirements. However, during sanitary surveys and more site-specific investigations, the HDOH does monitor sites throughout the watershed as necessary. The Hawaii Beach Monitoring Program document covers mainly the required elements of the BEACH Act since there are restrictions and limitations on the use of the grant funds.

Comment:

9. The tiered beach ranking system disproportionately favors testing of clean, economically important beaches over more polluted beaches where the health risk is likely higher.

Response:

The CWB has limited resources and must use them to serve as wide a population as possible. Highest priority is placed on Tier 1 beaches, which are monitored weekly. Tier 1 beaches include those that have lifeguard stations, which are placed in areas of highest use and public accessibility. These beaches may appear to be selected based primarily on being economically important tourist beaches, but they are also the most highly used beaches; where there is greater potential for higher incidences of illness should there be any fecal contamination of the water.

Each year, the CWB reviews the list of beaches to be monitored and makes minor adjustments (e.g., eliminated all beaches on Hawaii island that no longer exist due to volcanic activity). As part of the beach grant requirement, the CWB is expected to regularly monitor all the Tier 1 beaches. However, the CWB has more flexibility and discretion on the monitoring of Tier 2 and Tier 3 beaches. The CWB appreciates the Surfrider providing a list of beaches to be considered for monitoring and will review the list. It will take additional time to consider the suggested list and may require additional public review. Also, if resources allow, the CWB is interested in working with community groups and interested parties to consider the possibility of monitoring lower tiered or other BEACH Act beaches.

Comment:

10. Community concerns and citizen science should inform the CWB's list of monitored beaches and posting of permanent signs.

Response:

The CWB currently works with several citizen science groups, including some Hawaii Surfrider Chapters. The groups that provide the most valuable information are those that can demonstrate that the data they provide are credible, adequate training is received by monitoring staff, adequate documentation is maintained for all sampling and analytical procedures, there is willingness to openly share monitoring locations and methods, and there is willingness to work cooperatively with the CWB on beach site evaluation.

The CWB is interested in working with citizen monitoring groups to be sure that the data collected is scientifically defensible. The CWB has a Data Acceptance Criteria document which should be followed in order for the CWB to be able to reliably use and accept the data for water quality assessments. The CWB encourages Surfrider and other volunteer groups to develop and adhere to quality assurance plans and standard operating procedures for sample collection, sample analysis, data analysis and reporting. CWB would be interested in reviewing any group's formal monitoring procedures and providing technical guidance and assistance.

Comment:

11. Language describing when Sewage Spill Advisories are issued and rescinded needs clarification.

The following revisions were offered:

*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 **and can include cesspool and septic system overages and seepage.***

And:

*"The CWB will determine when the advisory is no longer in effect based on the indicator levels and current environmental conditions." with **Sewage spill advisories will remain in effect until bacteria levels fall below the STV as mandated by HAR 11-62 Appendix B.***

Response:

Sewage spill advisories are intended to apply to discrete and acute events involving line breakages, overflows, and discharges or releases from public wastewater treatment systems, and are most often reported directly by the wastewater managing authorities (e.g., City and County of Honolulu, Department of Environmental Services) to the HDOH. As to cesspools and septic seepages, the CWB acknowledges that they are chronic problems, not one-time spills, that occur throughout the State. Cesspools and septic seepages are being addressed by the HDOH Wastewater Branch and are not specifically addressed by the Beach Monitoring Program. However, cesspool and septic system overages and seepage events may specifically be added to an advisory if they can

be demonstrated to contribute to the spill event. If cesspool and septic system overages are shown to contribute to beach water pollution on a chronic level, a site-specific sign would be more appropriate and are issued. For example, special investigative studies conducted in Kahaluu, Oahu led to the posting of permanent wastewater warning signs (i.e., non-beach advisory signs) along the beach due to cesspool seepage. See also response to Comment 18.

HAR 11-62 does not specify the bacteria levels required for a sewage spill advisory to remain in effect. However, HDOH's practice is to keep sewage spill advisories posted until sample analysis results indicate that the affected beaches are not exceeding the BAV. HDOH will make appropriate revisions to the Hawaii Beach Monitoring Program document to clarify sewage spill advisories.

Comment:

12. We also recommend that the Hawaii Administrative Rules be amended to more accurately reflect HDOH's mission and the current goal of the HI Beach Monitoring Program.

Response:

Revisions to the Hawaii Administrative Rules (HAR) are beyond the scope of this current process to revise the Hawaii Beach Monitoring Program. No changes related to the beach program are being considered to the HAR at this time.

Comment:

13. CWB should resume their regular beach monitoring schedule to protect coastal recreation during COVID-19 pandemic.

Response:

The CWB suspended routine monitoring at the early phase of Governor Ige's shelter-in-place order and through the height of the pandemic response in the State. This decision was made with an abundance of caution to protect workers as well as the general Hawaii residents from the spread of the coronavirus. There was a greater concern of potential spread because the State Lab facility that conducts the beach bacteria analysis is housed in the same location as the facility that is conducting the coronavirus testing for first responders and medical personnel. The CWB acted to minimize the potential exposure to the first responders and others that may have the greatest risk of being affected by the coronavirus. As the curve of COVID-19 cases in the State flattened, the CWB resumed routine beach monitoring.

Oahu Waterkeeper

Comment:

14. Posting signs at beaches is the most effective way to warn beach goers of potential health risk. Delayed posting denies the public timely information regarding the safety of the

water and prevents them from making an informed decision about whether to enter the water.

Response:

The CWB will continue to post signs on the beaches. If there is reason to doubt the accuracy or representativeness of the first sample, CWB will re-test the beach, as specified in the 2014 Guidance. In many instances, signs posted by the CWB have been false positives as indicated by the follow-up sampling results. Signs are currently posted on the next working day; the same day that follow up samples are collected. In most instances, the follow up sample did not exceed the BAV, so there was no health risk on the days that the signs were posted. Given the 24-hour delay in getting the water quality test results, it is not currently possible to post signs on the same day of sampling and the actual day on which the initial BAV is exceeded. Unfortunately, the current recommended testing methodology is such that today's sample results reflect yesterday's water quality. What is even more unfortunate is that enterococci, the EPA-recommended fecal indicator bacteria, has also been shown to grow in Hawaii's environment in the absence of human or animal fecal material and the current test method cannot differentiate fecal from non-fecal sources. CWB has many years of historical data and most areas have consistently met acceptable beach water quality thresholds and have no known or potential sources of fecal contamination that affect beach water quality. See also response to Comment 1.

Comments:

15. The HBMP is inconsistent in its protection of public health.
16. We are not aware that DOH has ever sampled brown water for fecal indicators or sampled to determine how long after the rain event the indicators remain elevated. Yet, when fair weather beach sampling does exceed the BAV, beaches are not posted until about four days afterwards, when a follow up sample confirms that the exceedance persists.
17. The HBMP states that CWB has been analyzing all water quality samples for *Clostridium perfringens*, but that no action is taken using *C. perfringens* results. These data appear to be useful in evaluating health risk and deciding whether or not to post beaches.

Responses:

The CWB assesses health risks at beaches in accordance with the 2014 Guidance. Specifically, CWB identified and prioritized BEACH Act beaches and developed a tiered monitoring plan. We are using EPA-approved test methods, using EPA allowable and approved threshold values for beach notification, implementing public notification and risk communication, and implementing predictive rainfall-based beach notifications in the form of Brown Water Advisories.

Please see the response to Comment 7 regarding BWAs. Several scientific studies and institutional knowledge hold that enterococci levels return to ambient levels 3 to 4 sunny days following a rain event⁴.

The EPA has discouraged CWB from using *C. perfringens* for BEACH Act action and stated that the CWB may not adopt the use of *C. perfringens* as a water quality standard for recreational waters protection without additional studies providing better associations with human health risk. The CWB has continued to sample and analyze for *C. perfringens* to supplement water quality data and information for ongoing research. Data are being collected, but no action is taken based on *C. perfringens* levels. However, HDOH would prefer to use multiple lines of evidence to take appropriate action (i.e., use the *C. perfringens* data along with enterococci data) and will continue to explore such approaches and work with EPA for such consideration.

Comment:

18. The abundance of cesspools in Hawai'i presents a diffuse but real health threat for recreational waters. The HBMP appears to ignore the real potential for this source to harm public health.

Response:

HDOH is not ignoring the public health problems associated with cesspools. In fact, HDOH has been authorized by Act 132 of SLH 2018 to establish the cesspool conversion working group, which has been convening to fulfill its intended purpose to develop a long-range, comprehensive plan for cesspool conversion statewide by 2050. The CWB has been working closely and in collaboration with the Wastewater Branch which has a lead role in addressing this statewide problem. The CWB provides monitoring or technical assistance required or requested by the Wastewater Branch. Those efforts are not routine and are not captured in the scope of the beach monitoring program, which is intended to be the core and routine beach monitoring program. See the Kahaluu example mentioned in response to Comment 11. The signage action at Kahaluu was taken based on the monitoring done by the CWB to assist the Wastewater Branch. The CWB will continue to work collaboratively with the Wastewater Branch and provide assistance as needed to eliminate the cesspool problems statewide. See also response to Comment 11.

Comment:

19. The HBMP lacks information that is critical to assessing the adequacy of beach monitoring and the risk to public health.

Response:

The CWB follows the EPA-approved Quality Assurance Project Plan for Beach Monitoring, September 2018, and the Standard Operating Procedure for Beach

⁴ 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.

Monitoring, September 2018. These documents include all the details of the sampling and analytical procedures for the beach monitoring conducted by the CWB.

CWB monitors beaches during weekday morning hours at tiered beaches on a rotational basis. Samples are collected by wading to knee depth, and sample bottles are submerged to 0.3 m depth for the beach water collection. Monitoring staff try to sample as early in the day as possible to be able to return samples to the laboratory for testing within the 6-hour recommended maximum holding time. Sampling based on tidal stages and at the same time staying within the holding time constraint is logistically impractical. Considerations must also be made for travel time to return samples to the lab and adequate time for necessary and required processing (e.g., complete chain of custody, sample preservation, labeling, etc.). Also, due to normal lab business hours not extending into the weekend, routine sampling does not occur on Fridays or on days preceding holidays. See also response to Comment 1 for the current beach monitoring time sequence from sample collection, analytical results, notification posting, and signage.

The holding time for FIB samples is six hours. All samples that are not analyzed within the holding time are invalidated.

The average number of days between initial samples and follow-up samples is one working day. CWB collects follow-up samples as soon as they are notified by the lab of the BAV exceedance. Sometimes, the notification occurs late in the afternoon after the field staff have left for the day. When the CWB is notified of a BAV exceedance late in the day, the follow-up sample is collected on the following workday. If the CWB is notified late on a Friday for an exceedance from a sample collected on Thursday, then the follow-up sample will be collected on the following Monday.

If a beach sample exceeds the BAV, a follow up sample is collected on the following workday. This will not change. If the original sample exceeds the BAV, a public notification will be issued informing the public of the exceedance and that follow up, confirmatory samples are being collected. If the follow up sample exceeds the BAV, then signs will be posted on the beach and the notification will become an advisory. If the follow up sample does not exceed the BAV, the notification will be canceled. If a follow up sample cannot be collected prior to a weekend or holiday, an advisory rather than a notification will be issued. This is a change made in response to public comment.

Since the CWB chose a BAV threshold of 130 cfu/100 mL, whenever there is an exceedance of the BAV, the CWB must take appropriate “action” to manage monitored beach sites. The action taken is usually a notification or advisory to the public about the exceedance. EPA guidance does not recommend or require differing actions for states to take based on varying thresholds of exceedances.

For a toxic chemical, EPA typically uses a dose-response curve to establish recommended protective levels that should not be exceeded; and higher numbers indicate more toxic effects to individuals. Unlike toxic chemicals, the acceptable risk level and enumerated value that should not be exceeded that are recommended by EPA for fecal

indicator bacteria are statistically derived. Higher values for enterococci and other fecal indicator bacteria mean that there may be greater potential incidences of gastrointestinal illness in the population in contact with the water based on epidemiological studies. Therefore, unlike toxic chemicals, for enterococci, the recommended values not to be exceeded are not values that indicate more harmful effects to humans as the numbers increase. EPA's recommended enterococci criteria was derived based on an acceptable risk level of 36 people out of 1000 water users getting gastrointestinal illness and that risk level best correlated to the enterococci data at a geometric mean not exceeding 35 cfu/100 mL of enterococci. In addition, EPA recommended using a statistical threshold value (STV) not exceeding 130 cfu/100 mL of enterococci 10% of the time to make sure higher magnitudes of enterococci are infrequent. As beach managers, the HDOH and other states are taking a more conservative approach and using the STV as if it were a "not to exceed" value and adopted the STV as the beach action value or BAV. HDOH is taking "action" when the STV or BAV is exceeded. CWB's actions are to notify the public when the BAV is exceeded and resample/retest the water. The 2014 Guidance allows for retesting if there is reason to doubt the accuracy or representativeness of the first sample. If the retest confirms the BAV exceedance, then the CWB will return to the beach site and post signs at the beach. If a follow up sample cannot be collected prior to a weekend or holiday, then signs will be posted at the affected beach.

Roger Fujioka

Comment:

20. The document states that CWB may use either the 35 CFU/100 ml of enterococci over any 30 day period or use Statistical Threshold [*sic*]Value of 130 CFU of enterococci per 100 ml by more than 10% of samples over a 30 day period. DOH did not provide a rationale for selecting the 130 CFU of enterococci per 100 ml as the Beach Action Value (BAV) rather than the geometric mean of 35 CFU/ 100 ml of enterococci. The document provides additional information which suggests that when the geometric of 35 CFU/100 ml is used as BAV, there are fewer exceedance than when the 130 CFU/100 ml BAV is used. If that is the case, the use of geometric mean of 35 CFU per 100 ml should be used by CWB.

Response:

When the Beaches Environmental Assessment and Coastal Health Act of 2000 (BEACH Act) was enacted into law, it amended the Clean Water Act to authorize the award of federal grant funds to states to support its monitoring and notification program for coastal recreation waters. In order to receive such grant funds, states must meet certain performance criteria which are specified by the EPA in the 2014 Guidance. The Hawaii Beach Monitoring Program document was prepared to address all the required program elements for the grant program. One of the requirements is for the State to specify a beach notification threshold, or a Beach Action Value (BAV) that triggers the state to take appropriate actions to notify the public of potential health risks. It is intended to be used by beach water quality management agencies, like the HDOH, to provide more immediate notification to the public of any potential health risk based on the most recent

water quality test results. If test results of water samples are above the state chosen BAV and/or the state is aware of conditions that warrant immediate public notification (e.g., spills, heavy storm runoff), the state provides appropriate notifications or actions (e.g., email and website postings, signage, etc.).

In contrast to BAVs (which are not part of the WQS), the WQS are expressed as a geometric mean or average value of all sample results that should not be exceeded over some period of time to provide a more robust assessment of the overall water quality of beach sites and not used for daily public notifications. Hawaii's WQS are based on EPA's acceptable risk rate of 36 gastrointestinal illnesses out of 1000 water recreators and EPA's corresponding recommended criteria of the geometric mean not to exceed 35 cfu/100 mL and statistical threshold value (STV) not to exceed 10% of the time of 130 cfu/100 mL. Hawaii chose the STV to be used as the BAV, since it is extremely conservative to use the 10% not to exceed rate as if it were a never to exceed rate. It should be noted that none of the beaches for which public advisories were issued in 2018-2019 (based on a BAV exceedance) had exceedances of the geometric mean.

The 2014 Guidance requires states to monitor their beaches and promptly notify the public of exceedances or likely exceedances of WQS for pathogens and pathogen indicators. In the 2014 Guidance, EPA recommends that states use the culturable fecal indicator bacteria, *Enterococcus* sp., to monitor ambient marine waters. The Guidance further states that other fecal indicators such as coliphage, *Bacteroidales*, and *Clostridium perfringens* may be considered; however, they must be reliable predictors of health risk and correlate with the applicable WQS. For many years, the CWB has used *C. perfringens* as a co-indicator and has, in the past, used both indicators as a basis for public notification. In 2016, EPA provided a letter to the HDOH stating that it cannot use *C. perfringens* levels as a basis of issuing public notification because *C. perfringens* was not officially adopted into Hawaii's WQS. Despite several attempts at incorporating *C. perfringens* into Hawaii's WQS, EPA has never approved its use as a fecal indicator in Hawaii because Hawaii lacked risk association data.

Comment:

21. Communicating the risk to the public is important. How does DOH interpret and inform the risk to the public when the STV exceedance is reported. For example, how does DOH interpret the risk with the STV value increases to 200 CFU/100 ml or to 300 CFU/100 ml.

Response:

Hawaii's beach program does not use different STV (BAV) levels to indicate greater risk. Enterococci levels exceeding 130 cfu/100 mL during routine monitoring automatically triggers public notification.

For the purposes of beach notification and advisory, HDOH only uses the STV (BAV) values since the intent is to provide timely notice to the public soon after test results indicate that there may be potential higher risk to beach users. The geometric mean and STV exceedance levels are mostly used to assess overall beach water quality conditions

for specific sites over a specific time period. This information is compiled every two years and the assessments are provided to the public in the State of Hawaii Water Quality Monitoring and Assessment Report (Integrated Report), which is required by the Clean Water Act Sections 305(b) and 303(d). In the most recent compilation and evaluation for the preparation of the 2020 cycle of the Integrated Report, the geometric mean has not been exceeded in any of the beaches for which advisories were issued during the 2018-19 assessment period.

Comment:

22. The document states that DOH as well as USEPA have accepted the fact that enterococci are naturally found in the soil and vegetation of Hawaii and these non-fecal sources of enterococci have not been demonstrated to be related to the potential for human illness. Since the method to measure for enterococci does not differentiate between sewage and environmental sources, how does DOH communicate the risk to the public based only on monitoring data and the fact that previous epidemiological studies have shown that when non-point sources of enterococci exceed recreational water quality standards, the risk to swimmers do not apply.

Response:

HDOH is not able to differentiate between sewage and non-sewage sources of enterococci during routine monitoring, therefore the public must be informed of all exceedances.

Most of the beach sites with exceedances for which advisories were issued returned to below threshold levels with the follow-up samples on the next working day. This indicates that for most of the exceedances that were issued, there was no ongoing sewage-related discharge, and there was little risk of sewage-related gastrointestinal illness to the public. These one-day events are believed to have been due to non-point or environmental sources. This is one reason that HDOH is proposing the use of *notifications* (as opposed to *advisories*) where signs are not posted on the beaches, but the public is still being informed through email notification and news/social media. If the exceedance is observed in the follow-up samples, an *advisory* will be issued, and signs will be posted on the beaches.

Meanwhile, HDOH is very much interested in supporting continuing research to find and establish better recreational waters protection indicators appropriate for Hawaii's more tropical waters and environmental conditions. Although funds are limited, we are in the process of conducting more microbial source tracking and quantitative microbial risk assessment studies in conjunction with the University of Hawaii to get more site-specific risk assessment data and to test a combination of additional indicators which may be better predictors of public health risks.

Comment:

23. The document makes two statements that appear to lack validity. The first statement states that "the CWB believes that if there was a public health risk as a result of fecal pollution, the BAV would remain elevated for several consecutive days." My comment is

that a belief does not pass the scientific rationale requirement and should not be used to develop important monitoring decision. In this regard, there are many known environmental and geographical conditions which can actively transport away or dilute that pollution event from a given site. These environmental and geographical conditions can also maintain that pollution event at a given site. The second statement which also lacks scientific rationale states that “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.” Based on the predominant non-point sources of enterococci in Hawaii’s environment, the second sample should be equally compromised as the first sample because in Hawaii, there are significant non-sewage sources of enterococci. As a result, enterococci is an unreliable fecal indicator. I foresee another complication when two samples taken in consecutive days are used to determine Beach Action Value. Currently, today’s sampling data characterizes yesterday’s water quality conditions. Therefore, the data is not meaningful for the swimmer who comes to the beach today. If you require data from two consecutive sampling days, the swimmer who comes to the beach today learns about the quality of the water at the beach two days ago. These kinds of complicated risk communication will not be appreciated by the public.

Response:

The HDOH will revise the language to better clarify the rationale for the intended changes in the notification procedure. The CWB’s explanation for the statement: “...the CWB believes that if there was a public health risk as a result of fecal pollution, the BAV would remain elevated for several consecutive days” is because in situations where there actually is a sewage source, such as leaking sewer pipes or cesspools, enterococci as a fecal indicator has been shown to be effective at detecting such fecal contamination sources. However, guidance is lacking for its use as an indicator in areas without a known sewage source. The 2014 Guidance acknowledges the presence of pathogens in waters contaminated by fecal material from humans and animals, but no mention is made, or guidance provided regarding the course of action to be taken when enterococci is detected in recreational waters that have no human or other warm-blooded animal source. The 2014 Guidance briefly acknowledges naturally occurring human pathogens in recreational waters such as *Vibrio vulnificus* and *Naegleria fowleri* but provides no further guidance there as well. Since there is no other or better recommended indicator at this time for Hawaii’s use, the CWB is limited in using the enterococci indicator. See also response to Comment 22 and further below for our continuing research efforts.

There are no sewage outfalls on any beach in Hawaii. All permitted treatment facilities are required to report all instances of sewage spills to the HDOH and in most instances, the facility is required to monitor fecal indicator levels, post warning signs, issue press releases, and to clean, disinfect, and deodorize the area. The HDOH has responded to many instances of sewage spills and in most instances, the level of enterococci reported at the point of discharge on the first day of monitoring usually ran about an order of magnitude greater than the level observed during typical beach monitoring. Therefore, if there is an ongoing sewage release through a leaking infrastructure or deliberate discharge during routine monitoring, the HDOH expects the level of enterococci to be

much higher than the values typically seen during routine monitoring. If conditions transport away or dilute the pollution event in such a way that the BAV is not exceeded, then there is no public health risk and an advisory or notification is not warranted. If the pollution event continues at a given site, then follow-up testing will most likely detect it, and an advisory is posted (including sign postings).

The rationale for issuing an advisory after receiving results of the follow-up samples is based in part due to the weakness of enterococci as an indicator of human health risk in Hawaii and based on beach data collected since the program was initiated in 2016. For the majority of exceedances, the HDOH has issued advisories on the day following the sample collection. The HDOH also posted advisory signs on the beach and collected follow-up samples on the next working day, which in most instances, did not exceed the threshold. This means that the signs that were posted on the day of the follow-up samples were essentially false positives and there was no risk of gastrointestinal illness as a result of sewage discharge. Therefore, the commenter is absolutely correct in pointing out that “today’s sampling data characterizes yesterday’s water quality conditions.”

The HDOH is following the 2014 Guidance, which states that if a state has a reason to doubt the representativeness of the first sample collected, additional samples may be collected as soon as possible if sampling has shown that based on historical data the beach has consistently met acceptable beach threshold values and there are no known or potential sources of fecal contamination. Although studies have shown that there are significant non-fecal sources of enterococci in Hawaii’s waters, the HDOH will continue to collect follow-up samples for all instances where the BAV has been exceeded. The HDOH acknowledges that the nature of the test precludes immediate, same day advisories/notifications and that today’s beach sampling results reflect yesterday’s water quality condition. However, based on years of experience in collecting water quality data, the HDOH believes that these single-day events may be primarily due to environmental (non-fecal) sources of enterococci, and single-day exceedance events are impossible to investigate. HDOH is currently limited to using an indicator that is probably not the best indicator for Hawaii’s tropical environment in that it does not differentiate between human and certain animal fecal sources which may pose a health risk and environmental (non-fecal) sources which do not. If at any time, the HDOH foresees an immediate health threat, an advisory will be issued (as opposed to a notification) and signs will be posted on the beach.

As stated in the 2014 Guidance, *EPA strongly encourages states to review the technical support materials because they provide guidance on how to implement tools that states and tribes can use... to develop WQS that differ from EPA’s recommended criteria (i.e., alternative criteria)*. As stated in the response to comment 22, HDOH is supporting research at the University of Hawaii, Water Resources Research Center on microbial source tracking and quantitative microbial risk assessment to develop alternative recreational water quality criteria that are based on the presence of fecal pathogens. Due to limited funding, this research is expected to be conducted in phases over several years and will look at the risk level associated with Hawaii-specific enterococci levels with the possibility of modifying the EPA-recommended criterion for enterococci of 130 cfu/100

mL currently used in Hawaii and/or developing Hawaii-specific alternative fecal indicators that may be better predictors of health risk.

Comment:

24. The document states that CWB has been monitoring for *C. perfringens* for the past 27 years. Moreover, the document states that studies conducted at the University of Hawaii and at Washington State University suggest that *C. perfringens* may be a more appropriate indicator of fecal contamination in Hawaii's coastal marine waters. However, the document states that currently, no action is taken using *C. perfringens* results." In this regard, CWB should explain why no action is taken using *C. perfringens* results. It should be noted that in Hawaii, there is a recognized need for another test to determine if the source of enterococci in a water sample is primarily from sewage (high risk) or primarily from environmental soil (low risk). To address this need, Hawaii for many years has monitored the same water samples for concentrations of *C. perfringens* as an independent marker of sewage contamination, In this regard, *C. perfringens* is consistently present in sewage at moderate concentrations and this spore forming bacteria survives longer in water samples than other microorganisms. Another important characteristic of *C. perfringens* is that it requires anaerobic conditions to grow. As a result it cannot multiply under ambient conditions and its concentrations in streams are relatively low. Of significance, several studies in Hawaii have shown an increase in concentrations of *C. perfringens* in stream waters, which were known to be contaminated with sewage. Since there is scientific rationale as well as monitoring data that *C. perfringens* can be used to determine when samples are contaminated with sewage, CWB should explain why monitoring for *C. perfringens* is not used in place of CWB belief that second day monitoring for enterococci can be used to determine when sewage contamination may have occurred.

Response:

Prior to 2016, HDOH used both enterococci and *C. perfringens* levels as a basis to issue risk advisories to the public. In 2016, the EPA insisted that HDOH not use *C. perfringens* levels for beach program activities because its use was not specified in Hawaii's WQS. EPA did not include *C. perfringens* in its national criteria recommendation for recreational waters protection because the national epidemiological studies did not demonstrate a strong correlation between levels recovered and illness rates. HDOH, however, has been collecting and continues to collect *C. perfringens* data from all routine beach monitoring as part of our ongoing research efforts to find alternative indicators that better determine health risk for Hawaii waters. Although HDOH is actively in search of an alternative indicator, it is also exploring the possibility of using multiple lines of evidence (multiple indicators) to more accurately determine health risk to beach users in Hawaii. See also response to comments 15/16/17, 22 and 23.

Marek Kirs

Comment:

25. Although there is an urgent need to evaluate alternative microbial beach water quality indicators due to the several limitations of enterococci as beach water quality indicator, I'm writing this letter to provide my strong support to the proposed modification of the Hawaii Beach Monitoring Program (as revised December 31, 2019).

Response:

Thank you for the support.

Comment:

26. [T]he use of alternative indicators such as *Clostridium perfringens*, and/or F+ coliphages should be considered. In this regard, earlier risk assessment study conducted in Hawaii, demonstrated that *C. perfringens* correlates better with the health risk when compared to the enterococci. I would like to urge DOH to consider and evaluate the use of alternative microbial water quality indicators for the use in the beach monitoring program.

Response:

Alternative indicators should be scientifically evaluated for use in Hawaii where non-fecal sources of enterococci have been recovered. The HDOH is currently supporting research at the University of Hawaii to develop alternative recreational water quality indicators that are more appropriate in Hawaii (see responses to comments 22 and 23).

Comment:

27. While making water quality management decisions solely based on the enterococci concentrations (currently or as proposed) is not ideal in Hawaii, I do strongly support the change as: 1) a single sample has extremely limited value when evaluating water quality, and 2) this would allow Hawaii, where water quality management is challenging due to the environmental sources of enterococci, utilize strategies which are already used by the other states.

Response:

Thank you for the support. Water quality management is challenging due to the environmental sources of enterococci. Therefore, the HDOH is continuing ongoing studies and research on alternative indicators and site-specific risk assessments.

Comment:

28. Considering the limitations of enterococci as water quality indicators, I do strongly believe that the current frequent posting of beach caution signs based on the enterococcus estimates from just a single sample is not justified nor presents accurate information of beach water quality to the public. Requirement for re-testing before posting is a good step forward.

Response:

Thank you for the support.