Beach Monitoring Handbook
Kenai River Beaches

2021 Monitoring Season

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Beach-Monitoring Handbook

This handbook introduces the DEC Beach Monitoring Program. The goal of the program is to reduce or eliminate illness and disease due to contact with water at recreational-use beaches that are contaminated by human and animal waste (fecal pollution).

This handbook was designed to provide you with simple instructions for beach assessments, water- quality sampling, and public notification in the event recreational water becomes contaminated with fecal pollution. The book is divided into four main sections.

Section 1 provides background information about the Alaska Beach Program, disease-causing organisms (Pathogens) and their indicators, and state and federal water-quality standards.

Section 2 gives you information about how to assess the risk of exposure to fecal contamination at beaches in your area. This section includes detailed information about how to collect, handle, and ship water samples for laboratory bacterial analysis, as well as how to conduct a beach survey.

Section 3 tells you whom you should notify when your beach assessment indicates marine water quality is unsafe for water-contact activities. It also provides information about how best to notify the public about the water quality at your beach(es).

Section 4 provides water sampling protocols and example field forms, press releases and signage.

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Section 1 - Background

Nationwide the greatest cause of coastal water quality impairment is bacteria.[1]

Beaches are a valuable recreational resource here in Alaska. Beaches provide access to coastal recreation waters for swimming, surfing, fishing, playing, and many other water-contact activities. Alaskans do not limit their recreational activities to sandy beaches; gravelly, rocky, or mud-covered beaches are commonly used for recreation. What Alaskans may not know is that recreational activities involving water contact could make them sick if the water is contaminated with human or animal waste (e.g., sewage or other sources of fecal pollution).

A wide variety of sources can contribute to the presence of pathogens associated with fecal pollution in coastal areas. While some of the sources may directly result from "point" sources (e.g., discharge from a wastewater treatment plant), others may be from "nonpoint" sources which are much harder to identify (e.g., failing septic systems, wildlife, domestic animals).

As rain washes over a watershed, it can gather pathogens from several different sources. Numerous potential sources make the process of ruling out whether bacteria are of anthropogenic or of natural source difficult. Other potential sources of bacteria include birds, wildlife, and algae. All have been linked to being the sources of high levels of fecal bacteria at recreational beaches across the United States.

People may get sick from recreating in water near possible fecal pollution sources, such as:

- sewage lagoons
- honey-bucket dumps
- sewage treatment plants
- septic tanks and leach fields
- small boats
- storm-water runoff
- landfills
- wildlife

Water contaminated with fecal pollution may contain disease-causing microbes (pathogenic bacteria, viruses, and protozoa). If people are directly exposed to or ingest this pollution, it can cause stomach aches, diarrhea, or ear, eye, and skin infections.

Water-quality monitoring at beaches near fecal-pollution sources can reveal conditions that indicate an elevated risk of becoming ill from water contact.

[1] US EPA. 2002. National Water Quality Inventory 2000 Report. EPA-18-R-01-001. Washington DC, Environmental Protection Agency.

National BEACH Monitoring Program

The U.S. Environmental Protection Agency (EPA) developed the concept of a Beach Sanitary Survey as a means for providing State and local beach managers with a technologically sound and consistent approach to identify pollution sources and share information[2]. The survey tool provides a method for documenting historic as well as current records of beach and watershed water quality. It provides baseline information including land use, water quality, and pollutant source data.

The survey document is meant to serve as a living record that is regularly updated and evaluated. The survey can be broken into two formats; routine and annual sanitary surveys, for temporal data to be evaluated in a more organized manner.

The survey information is used by the Alaska Department of Environmental Conservation (DEC) to prioritize beaches for monitoring and assist in development of models to predict daily bathing beach water quality, if appropriate. The survey also provides support for enforcement actions as it establishes a record of conditions and changes over time. The Beach Sanitary Survey assists beach managers meet the requirements of the BEACH Act Grant Program, as described in the National Beach Guidance and Required Performance Criteria for Grants (USEPA 2002b).

Alaska BEACH Program

In response to the increasing incidence of water-borne illness at public beaches, the U.S. congress passed the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000. The Act provides support for state programs to reduce the risk to beach users from contact with fecal contaminated water.

The Act authorized the EPA to award grants to states, and the DEC Division of Water (DOW) has used these grants to create an Alaska BEACH Program.

To date, the Alaska BEACH Program has:

- Defined many of the unique aspects of Alaskan recreational beach use;
- Sent surveys to Alaskan coastal communities to assess the likelihood of fecal pollution at their beaches;
- Used the survey data to rank beaches according to their potential exposure risk;
- Developed a generic beach-monitoring plan;
- Developed a generic risk-communication plan; and
- Conducted water-quality sampling at multiple Alaskan beaches that had been identified through community surveys as having risks of fecal pollution.

[2] US EPA. 2008. Great Lakes Beach Sanitary Survey User Manual. EPA-823-B-06-001 Washington DC. Environmental Protection Agency.

The DEC encourages communities to create local beach-monitoring programs and work with the beach steward(s)[3] in notifying the public if there is an elevated risk of becoming ill from the water. Local management of water-sampling and public notification programs should provide the most effective means of protecting the community from exposure to disease-causing organisms in human and animal waste.

Disease-causing organisms come from a variety of sources and can be complicated to track and monitor. As a result of this, the DEC has developed a BEACH Sanitary Survey, based on EPA's survey tool, to assign levels of risk in coastal areas where recreational activity takes place, to aid in the identification and remediation of pollution sources, and to protect marine water quality on Alaska's beaches. Use of surveys is just one part of a larger effort to protect water quality through appropriate and relevant management activities. The BEACH Monitoring process includes, and is not necessarily limited to:

- An initial risk assessment of the coastal area of concern;
- Development or improvement of a water quality monitoring plan specific to a particular area;
- A notification plan to communicate levels of risk to the public;
- Conducting a sanitary survey on a routine basis;
- Means for measuring and monitoring results;
- Cooperation amongst landowners and resource managers to resolve or mitigate issues;
- Metrics to measure improvements over time; and
- Increases public awareness and cooperation in controlling water pollution.

The Alaska Beach Program follows requirements set out in the 2014 National Beach Guidance and Required Performance Criteria for Grants.

Grant Specific BEACH Information

Every BEACH grant program requires the development of a formal relationship with the landowner of the beach proposed for monitoring. The landowner for Kenai River beaches is the City of Kenai.

Starting in 2010, DEC worked with The City of Kenai (COK) worked to develop a local beach monitoring program, with the goal of protecting beach users from exposure to water contaminated by fecal pollution.

[3] Stewards may include local landowners, resource managers, non-governmental organizations, etc.

Water samples were collected as part of the Kenai BEACH Monitoring program during the recreation season (approximately May through September) from 2010 to 2014, and then in 2018 through 2020. Water collection was conducted by the Kenai Watershed Forum, an organization sub-contracted by COK. DEC provided administrative support that included providing training for sample collectors, funding for water-quality sampling, development of Standard Operating Procedures, development of a Quality Assurance Project Plan (QAPP), and a development of a database template for data storage and sharing.

Starting in 2021, sampling will be conducted by DEC staff. The beach sampler(s) will work with the DEC project manager to collect samples and fill out sanitation surveys for the two Kenai River Beaches.

The roles and responsibilities of the beach monitors and the DEC project manager are described in this section. Details about conducting sanitary surveys, collecting, and shipping samples and notifying the public about sample results are given in **Section 2** (Community Beach Assessments) and **Section 3** (Notifying the Public) of this handbook. Figure 1 shows a flow chart describing roles in project organizational structure. In many cases, it is likely that one person may fill more than one role.

Kenai Beach Program Monitoring Staff Responsibilities

The main roles and responsibilities of Kenai Beach Program Monitoring staff[4] are to:

- Conduct beach assessments;
- Collect water-quality samples;
- Ship samples to a laboratory for bacterial analysis; and
- Notify the DEC Project Manager if water samples exceed acceptable bacteria limits.
- The DEC Project Manager will notify the land manager (COK) if water samples exceed acceptable bacteria limits.

The Kenai Beach Program Monitoring data analysis responsibilities include:

- Sending beach-sampling and sample identification information to the DEC project manager;
- Reviewing laboratory data results to ensure required Quality Assurance/Quality Control (QA/QC) criteria have been met;
- If QA/QC criteria have not been met, monitoring staff will notify the DEC project manager and DEC QA Officer as soon as possible, develop a corrective action plan to resolve the problem(s);

[4] Starting in the 2021 monitoring season, monitoring staff for the Kenai BEACH Monitoring Program refers to a DEC technician or assigned office staff.

- Comparing the laboratory results to Alaska and EPA water-quality standards;
- Conferring with the DEC program manager regarding water-quality standard exceedances and the possible need for re-sampling; and
- Submitting laboratory data to an appropriate database (e.g., AWQMS, BEACON), after completing QA/QC protocols, using a provided template.

DEC Project Manager Responsibilities

The roles and responsibilities of the DEC BEACH Project Manager are to:

- Provide assistance and recommendations to survey activities;
- Provide assistance to the monitoring staff for water-quality monitoring;
- Assist with water-quality data assessment;
- Work with the landowner to notify the general public of an exceedance following re-sampling and data assessment, and;
- Report beach-assessment and sampling data to the EPA.

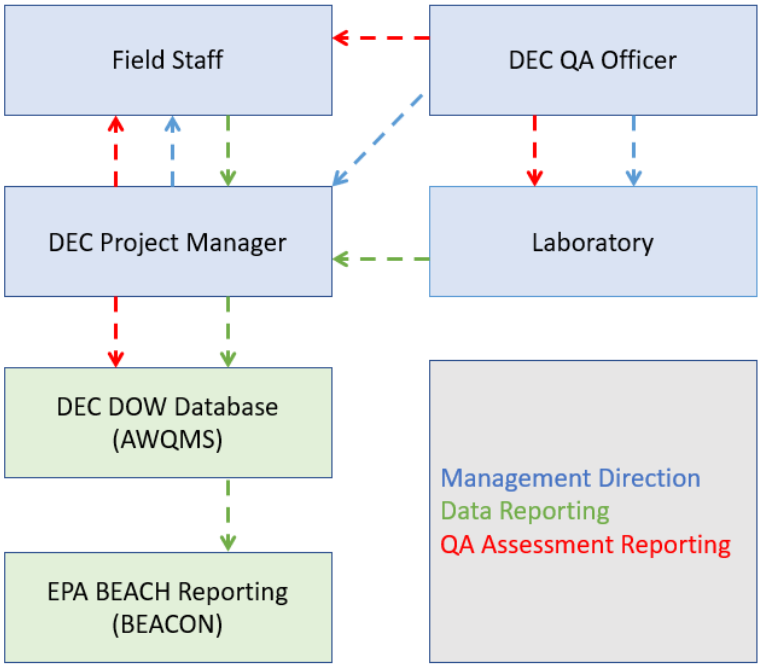


Figure 1. Project Organizational Structure

The DEC Project manager is also responsible for keeping a record of activities associated with sampling events. This record will include information on the dates, locations, samplers, and results of the monitoring, and will be used to compile an annual report to the EPA on recreational beach water quality for Alaska.

Most important, the DEC BEACH Project manager is responsible for developing a public notice and other press-related information advising the public of the risks from marine water when beach sampling results exceed State or federal Water Quality Standards. The municipality, landowner, and/or beach stewards will consult on additional outreach activities.

Water Quality Standards (WQS)

The BEACH programs objective is to monitor for fecal contamination. Bacteria can indicate the presence of fecal contamination, which itself may harbor disease-causing (pathogenic) microbes. The indicator bacteria most used are fecal coliform and enterococci. Federal and State Water Quality Standards (WQS) set limits for these parameters. Laboratory testing for the presence and abundance of these bacteria is required as part of the BEACH program.

EPA's Water Quality Standards

The EPA recommends the use of enterococcus bacteria, or enterococci (pronounced ĕn'tə-rō-kŏk'sī') as indicators of fecal pollution in marine water. Enterococcus bacteria are found in the human intestine and warm-blooded animals.

They are subgroup of the fecal streptococci. Studies indicate that the enterococci portion of the streptococcus group is the most efficient bacterial indicator of fresh and marine water quality.

As allowed under Criterion 10 of the EPA, July 2014, National Beach Guidance and Required Performance Criteria for Grants, Alaska has proposed and received an alternative Beach Action Value (BAV). Alaska's proposed BAV is equal to the EPA's 2012 Recommended Recreational Water Quality Criteria's Statistical Threshold Value (at the 36 per 1000 recreators' illness rate) of 130 CFU/100 ml (EPA-832-B-14-001). The 130 CFU/100 ml value corresponds to the 90th percentile of the water quality distribution associated with the same level of public health protection (in this case, 36 per 1000 recreators').

Alaska's Water Quality Standards

The State of Alaska's water quality standard uses enterococcus and fecal coliform bacteria as indicators of fecal pollution in marine water for recreational use.

This standard for enterococci and fecal coliform bacteria is provided in the Alaska Administrative Code 18 AAC 70 (section 14, part B) for marine water contact recreation. The Kenai Beach Monitoring program will also report the standard for the harvest for consumption of raw mollusks or other raw aquatic life (section 14, part D). See Table 1 for specific criteria.

Enterococci bacteria must be determined by the membrane filter technique or Most Probable Number procedure as detailed in Standard Methods for the Examination of Water and

Wastewater (American Public Health Association), or by other methods approved by the DEC and EPA.

Designated Use	**Description of Criteria**
(14) Bacteria, For Marine Water Uses	
(B) Water Recreation	
(i) Contact Recreation	In a 30-day period, the geometric mean of samples may not exceed 35 enterococci CFU / 100ml, and not more than 10% of the samples may exceed a statistical threshold value (STV) of 130 enterococci CFU / 100 ml.
(ii) Secondary Contact Recreation	In a 30-day period, the geometric mean of samples may not exceed 200 fecal coliform/100 ml, and not more than 10% of the samples may exceed 400 fecal coliform / 100 ml.
(D) Harvesting for Consumption of Raw Mollusks or Other Raw Aquatic Life	The geometric mean of samples may not exceed 14 fecal coliform / 100 ml; and not more than 10% of the samples may exceed; - 42 MPN per 100 ml for a five-tube decimal dilution test; - 49 MPN per 100 ml for a three-tube decimal dilution test; - 28 MPN per 100 ml for a twelve-tube single dilution test; - 31 CFU per 100 ml for a membrane filtration test (see note 14)

Table 1. Alaska Marine Water-Quality Indicator Standards (18 AAC 70[5]).

[5] Amended as of March 5, 2020.

Kenai BEACH Monitoring Program

The Kenai BEACH Monitoring Program will monitor both types of bacteria against WQS set for Marine Water Recreation contact recreation[6]. In May 2016, DEC adopted the 2012 RWQC statistical threshold value (STV) of 130 cfu/100mL for enterococcus for primary contact recreation in Alaska's Water Quality Standards and as the BAV for Alaska's BEACH monitoring program. In addition, the geometric mean of five samples collected within a 30-day period may not exceed 35 enterococci per 100 ml.

Section 2 – Community Beach Assessments

Overview

A Sanitary Survey is a type of beach assessment used to identify sources of pollution. It can be an effective tool for protecting human health at recreational-use beaches by providing information that can be used to design future or modify existing monitoring programs.

For beaches without established monitoring programs - Community samplers and/or field staff should conduct surveys in suspected high-risk areas to confirm the presence or absence of fecal pollution. An Annual Survey should be conducted on all newly nominated beaches as well as the beginning of each season of on-going monitoring projects to document seasonal changes or new sources.

Annual Surveys collect information from area maps and land use plans, annual and seasonal trends, coastal geomorphic information, and additional potential sources of pollution at a watershed or sub- watershed level. In some cases, Annual BEACH Surveys may be conducted at the end of a sampling season to determine whether changes to the monitoring program should take place in the following year.
Information that should be considered during the survey process include:

- Freshwater inputs (river mouth, stream, storm drains);
- Properties with subsurface wastewater disposal systems;
- Significant wildlife habitat/wetlands;
- Agricultural operations;
- Impervious surfaces;
- Marinas/moorages/anchorages;

[6] Pg. 27 of 18 AAC 70. Alaska Water Quality Standards. Amended as of March 5, 2020.

Recreational areas and the availability of facilities (restrooms, trash cans, doggie bag disposal stations).

For beaches with established monitoring programs - Routine Surveys will be completed when a sample is collected for water-quality testing. For Kenai Beaches routine surveys will be completed using the:

- BEACH Survey Field Form[7],
- the EPA Sanitary Survey App for Marine and Fresh Waters[8],
- and/or the site-specific sanitary survey developed to gather all field parameters needed for the EPA's Virtual Beach Model

Since fecal coliform bacteria may originate from sources other than humans, the assessment will note the number of birds, dogs, or other animals on the beach. Debris, vegetation, tide stage and murky water are also noteworthy. If animal waste sources are identified, field monitoring staff should discuss their observations with the Project manager as soon as possible.

Beach Survey Field Form

The BEACH Survey Field Form is a data sheet used for collecting field information as part of the Routine and Annual BEACH survey process. It is designed to gather information that the project manager and field staff can use to make annual and routine comparisons of physical characteristics. It documents the physical conditions present during sampling events. These forms will be created and managed in a manner that will facilitate easy data entry into the Ambient Water Quality Monitoring System (AWQMS).

The BEACH Survey Field Form is made up of three parts:

1. The first part asks for a description of the beach including its location and the name of the person performing the assessment.
2. The second part asks for details about the water quality sample, if collected. These details include date, time sample number(s), and water temperature. The water temperature is determined by using a calibrated thermometer that reads to 0.1 degree centigrade (0.1°C). Record the temperature to 0.1°C. It is very important to allow time for the thermometer to stabilize before writing down the temperature reading.
3. The third part asks for information about the condition of the beach at the time of the assessment including the weather, levels of activity, and potential pollution sources.

[7] See example form in Section 4
[8] See the EPA Beach Tech website for up-to-date information on the Sanitary Survey App

The remainder of the form may ask for additional environmental parameters, including pH, conductivity, total dissolved solids, turbidity, and wave height. These parameters are collected with a handheld probe, turbidimeter, and wave height stick. See section 4 for more information on these devices.

Beach Survey Schedule and Locations

The field monitoring staff should conduct routine surveys using the BEACH Survey Field Form, or the EPA Sanitary Survey App, at designated locations at the beginning of the sampling season and each time a water sample is collected for water-quality testing. These observations can help the project manager assess changes from year to year and modify the existing monitoring program by identifying times during the season with the highest risk of people getting sick from water contact.

The field monitoring staff may also conduct BEACH surveys at other suspected high-risk beaches to identify any persistent problems that may warrant a need for water-quality testing. The information gathered can be used by the project manager to design future monitoring programs to protect human health during the recreation season. Additional sampling must be discussed and approved by the project manager before water samples are collected.

Sampling location data should be collected using a calibrated GPS unit to ensure accuracy. All latitude/longitude data should be collected and recorded in decimal form (12.3456) using the Horizontal Collection System datum NAD83. All sampling events should take place within 100 feet of an identified site unless the project manager and field monitoring staff determine that the site does not accurately represent background conditions of beach water quality.

For the 2021 recreation season field monitoring staff will collect samples on a bi-weekly basis starting in May and ending in August 2021. This sampling plan was designed to collect water samples during times of high recreational use of Kenai Beaches.

Samples must be sent to a laboratory that is approved by DEC for Fecal Coliform Bacteria (Method 9222D) and Enterococci by MPN (Method ASTMD-6503-99). This list is updated periodically by DEC staff and found by visiting the DEC website https://dec.alaska.gov/eh/lab/

The sample collection should follow the tide/sampling schedule provided by the project manager and be transported to the DEC-approved laboratory within the 6-hour sample holding time. The project manager and field monitoring staff will need to coordinate with

the laboratory to make sure someone is at the laboratory and able to process the samples as soon as they arrive.

Sample Chain of Custody

The sample chain of custody (COC) form documents actions taken to ensure that samples are traceable from the time they are collected at the beach to the time the analytical laboratory reports the results. The laboratory usually supplies these forms with their field sampling kit. Field monitoring staff must request and print out COC forms from the lab if not provided with supplies.

A completed COC form will identify the samples, request analysis from the laboratory, note any special instructions, and document who handled the samples from the time they were shipped from the field to the time they reach the laboratory. The project manager and field monitoring staff are responsible for filling out the chain-of-custody form and keeping a copy for reference. The form must include the following information:

- Name and contact information of the person collecting the samples;
- Sample identification, including the sample number, and date and time the sample was collected;
- The sample preservation method(s);
- The type of sample (e.g., water sample, sample replicates, field and temperature blanks) and the number of jars being submitted for analysis;
- The requested analysis (enterococcus and fecal coliform bacteria);
- The requested turn-around time, or TAT (Note: the laboratory is requested to analyze the samples and present the results within 36 hours of sampling);
- Name and contact information for delivery of results (Note: the results should be sent to the DEC Project manager; and
- A relinquishment signature including printed name, date, and time.

In addition to completing the COC form the field monitoring staff need to:

1. Place the completed COC form into a plastic bag taped to the inside lid of the cooler;
2. Attach two completed COC seals (provided stickers or tape) to cross over the cooler lid seams;
3. Attach a clearly marked label with laboratory contact information on the top of the sample cooler,;
4. Hand deliver the samples to the airline or shipping company;
5. Keep a copy of the airlines' transportation documentation or other means of delivery for reference;
6. Contact the courier service to ensure pick-up and delivery of sample;

7. Contact the laboratory, again, to verify that someone will be there when the samples arrive; and
8. Email a copy of the BEACH Survey Field Form to the DEC project manager.

Laboratory Responsibilities

The DEC project manager will work with the pre-determined laboratory to complete analysis of samples and data submission. Laboratories are responsible to comply with the data quality objectives specified in the QAPP and as specified in the laboratory QAP and method specific Standard Operating Procedures (SOPs). Validated sample laboratory data results are reported to the DEC project manager. Electronic project data will be stored on a secure computer or on a removable hard drive that can be secured. All records will be retained by the contract laboratory for five years.

Preliminary Quality Assurance/Quality Control (QA/QC) Review of Beach Sample Data

When the project manager receives sample results from the laboratory, the results will be compared to the marine Water Quality Standards that are referenced in Section 1 of this handbook. The field monitoring staff will check to make sure the sample was analyzed within the 6-hour holding time and that the temperature was within the allowed range when the samples were received at the laboratory.

The DEC QA officer is responsible for the secondary review, secondary verification and validation of field and laboratory data. The project manager reformats the data as needed for reporting to AWQMS. The secondary reviewer is also responsible for reporting validated data to the DEC DOW NPS division manager when potential exceedances of water quality criteria. Data management tasks will include keeping accurate records of field and laboratory QA/QC samples so that project managers and technical staff who use the data will have appropriate documentation to show that the required minimum data quality standards have been met.

The project manager will provide a sample data submission template to field monitoring staff. The project manager and DEC QA Officer will conduct final data reviews (tertiary review) and submits the validated data to AWQMS. See the flow chart in Figure 2 for detailed information on data management responsibilities.

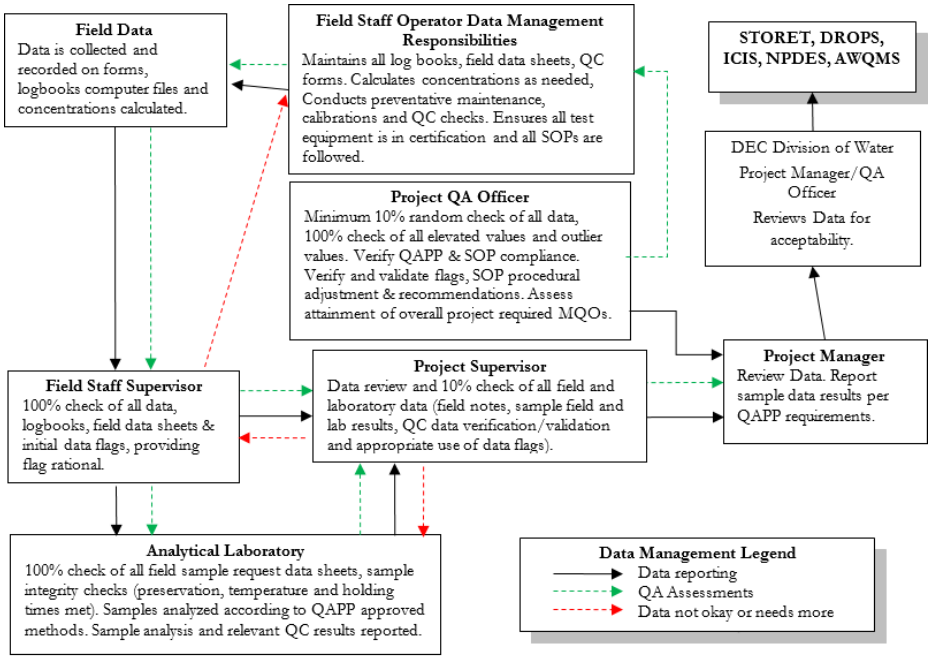


Figure 2. Data Management Flow Chart

Communicating with DEC

After collecting and shipping samples to the laboratory, the field monitoring staff will let the project manager know that the samples are on their way to the lab, and send a scanned copy (.pdf form) of the completed BEACH Survey Field Form to the program manager.

After reviewing the sampling results from the laboratory, field monitoring staff will discuss with the program manager if additional sampling or public notification procedures should be initiated.

Re-Sampling

If a sample, after undergoing quality assurance review, is found to exceed BEACH program Water Quality Standards (WQS; Table 1), the DEC program manager may initiate an additional sampling event to confirm that the exceedance is an on-going issue[9] (See Figure 3). Re-sample protocols will be consistent with those of routine events. If the re-sample event determines that the exceedance is on- going, a Beach Advisory (see Section 3) will be issued by the landowner and DEC. Routine sampling events will continue according to schedule and the Beach Advisory will remain in place until samples are below WQS.

[9] This refers to beach sample sites without established monitoring programs. Kenai River beaches have an established weekly, or bi-weekly, sampling plan and exceedances do not necessarily necessitate the immediate resampling of a site.

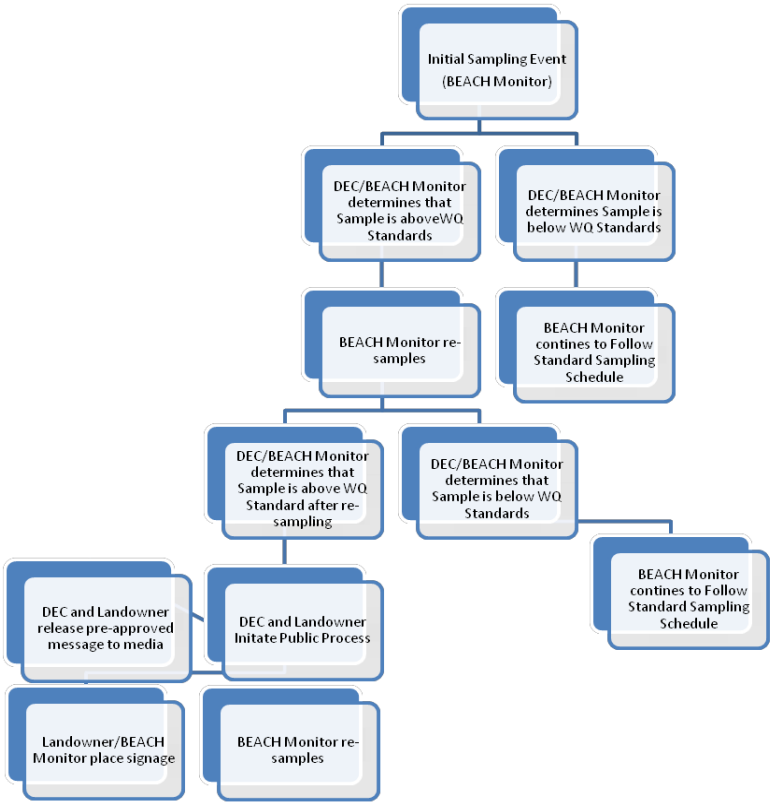


Figure 3. Sample Decision Tree

Section 3 – Notifying the Public

Communicating with the public regarding the nature of the BEACH program, sampling results, and potential responses to Water Quality Standards exceedances is a core component of the Alaska Beach Program. DEC will work with the respective landowner(s) to distribute public information about sampling results that may require actions such as a Beach Advisory. A communication plan for the Kenai Beach program can be found in the project QAPP. Specific actions taken beyond public advisories (i.e., sign postings, temporary beach closures) will be communicated and developed between DEC, the landowner(s), and stakeholders on a case by case basis.

See the 2021 Kenai Beach Communication Plan for the most up to date information.

Beach Advisory

DEC will issue an advisory to the public that warns of health risks from recreation in coastal water when beach-sampling results indicate potential fecal bacteria contamination. The advisory will be based on the bacterial counts and the information from the Beach Survey Field Form.

A beach advisory provides recommendations to the public to avoid contact with water that has exceeded the marine WQS referenced in Section 1 (Table 1) of this handbook. Sampling events are scheduled to take place throughout the recreational season. A beach advisory may be issued by the respective DEC upon receipt of water quality sampling results that demonstrate a continued exceedance of water quality standards for bacteria.

In 2020 DEC utilized the Alaska BEACH Program Listserv to distribute advisory notices to key stakeholders and the members of the public. Anyone can sign up to receive notifications by visiting the Alaska Beach Program webpage and clicking on the listserv link. Social media posts were also used during the 2020 monitoring season. DEC will continue to utilize social media in 2021.

In 2020 DEC issued a general pre-season press release for Kenai River beaches. This press release was distributed on the listserv, and on the Alaska BEACH Program webpage. An interactive map and social media post were updated when exceedances were observed during the recreation season (Figure 4).

In 2021 DEC will issue a general pre-season press release for Kenai River beaches. An online interactive map will be updated with bi-weekly monitoring results. Monitoring results will be distributed to stakeholders through the Beach Listserv. Lastly, 2021 will be the pilot year for incorporating EPA's Virtual Beach model for Kenai River beaches.

Figure 4. Example social media post.

Advisory notices should include.

- General heading ("ADVISORY" or "WARNING")
- Reason for the advisory
- Time of the advisory
- Duration of the advisory
- Location of the affected beach
- Number to contact local beach manager for further information

Advisories may be issued in the form of press releases, listserv notices, social media post, signs at the affected beach, and fact sheets (informative flyers). The DEC will act as the lead in developing advisory information. The project manager will work closely with the DEC Public Information Officer when developing public outreach.
The landowner is encouraged to develop and display signage on the impacted beach. Example contacts are listed below. See the most recent communication plan in QAPP for this project.

Community Entity	Contact	Phone Number	Email Address
KDLL Public Radio	Jenny Neyman	(907)283-8433	Jneyman@kdll.org
Peninsula Clarion	Newsroom	(907)283-7551	news@peninsulaclarion.com
City Manager	Paul Ostrander	(907)283-8223	postrander@kenai.city
ADFG Sportfish	Colton Lipka	(907)262-9368	colton.lipka@alaska.gov
ADNR Kenai Peninsula	Jack Blackwel	(907)262-5581	dnr.pkskenai@alaska.gov
Regional Nurse Manager	Jerry Trohynski	(907)334-2251	jerry.troshynski@alaska.gov
DEC, Food Safety	Kimberly Stryker	(907)269-7501	Kimberly.stryker@alaska.gov

Table 2. Contacts for Public Notification during a Beach Advisory.

Media outlets, local governments and emergency response entities can initiate their existing communication protocols to notify the public of potential health risks at the local beach(es). A standard- format press release public service announcement is included in Section 4. **This list is not comprehensive** – See the 2021 Communication Plan for a full list of contacts.

Beach Signs

If a re-sampling event has been triggered and water quality standards continue to show exceedances, a sign may be posted by the landowner at major beach access points to alert beach users of their risk of illness from water-contact recreation. Signs will be in place until re-sampling determines that water quality standards are being met. An example of a Beach advisory sign is in Section 4.

Fact Sheets or Flyers

Distributing informative flyers in public areas can also communicate potential health risks to local beach users. A flyer could be used as an advisory by passing out press release information to people in public places. It also could be used to educate the community about the BEACH Project. The Alaska BEACH Program produced a generic one-page fact sheet about the BEACH project that answers commonly asked questions. It can be found at the DEC Alaska BEACH Grant Program Website.

Press Release

A press release is likely the fastest way to spread the news about water quality at recreational use beaches in Alaskan communities. The DEC will act as the lead agent in providing public information.

Section 4: Protocols and Example Forms

Water Sample Collection

Water sampling involves wading into the water adjacent to a beach commonly used for water recreation to collect water from below the surface into sample jars. The sample should be collected in the general recreational beach area, or near locations expected to be influenced by fecal contamination (e.g., adjacent to sewage lagoons, near small boat harbors). The field monitoring staff will complete sampling after the following steps have been accomplished.

- Each sample jar is filled with water
- Each sample jar is labeled
- Each sample jar is placed in a cooler kept chilled with artificial ice (artificial ice reduces potential for cross contamination)
- The Beach Survey Field Form is filled out
- A chain-of-custody form is filled out
- The cooler is transported to the laboratory responsible for determining fecal coliform and enterococcus populations
- A copy of the Beach Survey Field Form and chain-of-custody form is sent to the project manager

Detailed directions for water sample collection, sample handling and delivery are given in the following subsections.

Water Samples

A good water sample is collected by avoiding cross-contamination, which can happen when the sampler inadvertently contaminates the sample. To reduce the potential for cross-contamination the sampler must follow a standard sample-collection method. Step-by-step sample-collection instructions are provided below.

1. Request a sample kit from the laboratory. The kit should include.
   - A cooler
   - The appropriate sample bottles for marine water-quality sampling (enterococci and fecal coliform bacteria)
   - Artificial ice to keep the cooler chilled to the appropriate temperature (<10°C)
   - Temperature blank
   - Chain-of custody form
   - Custody seal

- Sample jar labels
- An extra set of sample bottles
- An extra set of sample bottles for a replicate sample
- Shipping labels
- Packing material

2. Call the laboratory prior to sampling to make sure there will be someone at the laboratory to receive and process the samples within 6 hours of sampling.

3. **Consult flight schedules to make sure there will be a flight that can get the samples to the laboratory within 6 hours of sampling.**

4. Write the beach sampling location on the bottle label and Beach Survey Field Form.

5. Put on clean waders and gloves. Wade into the water to a depth of approximately 3 feet[10]. Try to avoid kicking up sediment or wait until any sediment that has been kicked up settles. Stand downstream of the water current and wait for sediment to clear.

6. Remove the bottle cap just before collecting the sample. Protect the cap from contamination. Do not touch the inside of the bottle, or the inside of the cap.

7. Open the sampling bottle and hold onto the base with one hand. Plunge the top of the bottle downward into the water. Avoid introducing surface scum. Point the mouth of the bottle into the current. Hold the bottle about one (1) foot below the water surface and tip it slightly upward to allow air to exit and the bottle to fill.

8. Remove the bottle from the water. Pour out a little water to leave airspace at the top of the jar.

9. Tightly close each bottle.

Collect one replicate for each analyte per sampling event. To collect a replicate sample, you must first have requested extra bottles from the laboratory. Repeat Steps 2 through 9 at the same location to complete collection of field replicates.

10. Complete bottle labels and attach them to each sample jar. Labels should be clean, waterproof, non- smearing, and large enough for all the information. Information on the label should include.
    - Sample location (e.g., beach name, KB-Rotary)

[10] Beware of soft sediment in the low intertidal. Always sample with a buddy, and if a situation ever feels unsafe **STOP** sampling and address the issue(s) before continuing sample collection. Sampling can always be rescheduled if current conditions are questionable.

- Sampling date and time
- Laboratory method for analysis
- Name of sampler

In-situ Environmental Parameters

Additional in-situ environmental parameters will be collected with DEC provided equipment.

A handheld probe (HANNA Instruments combo tester HI98129, or similar) will be used to collect pH, conductivity, total dissolved solids, and water temperature. A turbidimeter (HACH 2100Q Portable Turbidimeter, or similar) will be used to measure turbidity. These environmental parameters will be used in developing a predictive model based on the EPA Virtual Beach Model (https://www.epa.gov/ceam/virtual-beach-vb).

Calibrate the handheld probe before heading to the field (see calibration instructions in the Appendices). The turbidimeter will need to be checked for proper calibration in the field using a set of provided standards. Always make sure devices are fully charged and/or bring additional batteries. Wave height will be measured using a PVC rod with or meter stick.

11. Handheld Probe
    - If water sample collection increased suspended sediment, wait until water settles or move 1-2 steps to the side to take measurements. Stand downstream of the location where you will take the measurements.
    - Turn on device. Submerge measurement probe end of the handheld probe in water (do not submerge entire device), and swirl gently to remove air bubbles
    - Hold probe until reading has stabilized (indicated by a stability tag on the HANNA model)
    - Record measurement value, type, and time of collection on data sheet
    - Repeat process for remaining parameters. HANNA device measurements include: pH, conductivity, total dissolved solids, and water temperature.

An AquaTroll, or similar, may be available for use for the 2021 monitoring season. Calibrate the device following manufacturers guidelines before each sampling event. The AquaTroll collect turbidity in addition to water temperature, pH, dissolved oxygen, and conductivity. Verify device readings after each sampling event. Store device following manufactures directions. Field staff should discuss the use of the AquaTroll or alternative devices with the project manager before using these devices in the field. All device information (i.e., model name, number, serial number) must be recorded on field observation sheet.

12. Turbidimeter
    - Check calibration of device by checking on the provided standards. If devices reading differs from standard, go through the device calibration steps (see Appendices).
    - Use a provided vial and fill vial up to rim using methods outlined in the Water Sample section above
    - Wipe outside of vial with provided cloth and a drop of silicone (also provided). Ensure no moisture remains on the outside of the vial, as this may impact the instrument reading.
    - Place vial in turbidimeter, ensure that arrow on vial lines up with arrow on device. Close lid and run the turbidimeter. Wait until reading stabilizes. Record results on lab data sheet.
    - An AquaTroll may be used instead of a Turbidimeter if available. Record device(s) used on field data sheet. Discuss use of alternative tools with the project manager before using these devices in the field.
13. Wave Height
    - Orient the wave stick vertically at sample location. End of stick should be resting on the bottom sediment, but make sure not to allow stick to sink below sediment surface.
    - When wave stick is vertical (have a partner step back and confirm that stick is vertical), watch to see where the incoming waves crest on the stick (watch for ~30 seconds). Record the height at which the waves crested.
    - Note that wave height will only be collected at wadeable sites (i.e., North Kenai Beach and South Kenai Beach).
    - Rinse wave stick with fresh water before long term storage

When finished sampling, wash your hands and arms with soap and water or waterless antimicrobial cleanser, or disinfectant lotion to reduce exposure to potentially harmful bacteria or microorganisms. Rinse probe and turbidmeter with deionized water before storage. Use HANNA HI70300 Storage solution for pH probe. Follow manufactures suggested storage methods for all devices used.

Sample Handling

Sample handling involves packing the samples in a cooler and shipping them to the laboratory. After sample collection is complete. The samples must be handled with care so that they arrive to the laboratory in good condition. Step-by-step sample handling instructions are provided below.

1. Place the sample(s) in a pre-chilled cooler containing artificial ice to maintain a temperature from 1° to 10°C. Ask the laboratory ahead of time how much ice will be needed. **Do not allow the samples to freeze**. Samples must remain below 10°C until receipt by qualified staff at the laboratory, otherwise samples are determined invalid so ensure sufficient cold artificial ice is added.

2. Place enough packing material inside the cooler to protect the sample bottles from breaking during transport to the laboratory.

3. Complete the chain-of-custody form. Put the form in a plastic bag and tape it to the inside of the cooler lid.

4. Write a note in the "Special Instructions" box requesting that the laboratory results be sent without delay (within 36 hours of sampling) to:

    a. The Project manager

    b. The DEC QA Officer

5. If the cooler will be out of your immediate control (such as on an airplane or courier), fill out two custody seals and attach one to the front and one to the back of the cooler to span the lid seam. You want them to tear when the cooler is opened. If custody seals are not available, use packing tape to secure the cooler lid for transport.

6. Securely tape the cooler shut prior to shipment. Attach shipping labels that identify the shipping destination and say: "keep cool," "do not freeze," and "fragile."

7. Ship the samples to the designated lab. In 2021 this is SGS North America Inc.

SGS North America Inc.
200 West Potter Drive
Anchorage, AK 99518
(907) 562-2343

8. Contact the lab to arrange a courier to pick up the cooler from the airport and deliver it to the lab. Be prepared to provide the flight number and estimated arrival time for the cooler.

Remember that samples must be collected, shipped, and received by the laboratory in 6 hours. Consult flight schedules, and call the laboratory prior to sampling to make sure there will be a flight that can get the samples to the laboratory within 6 hours of sampling, and that there will be someone at the laboratory to receive the samples and begin the analyses**.**

Appendix A - Example Field Forms

Example EPA BEACH App Sanitary Survey

Visit the EPA Sanitary Surveys for Recreation Waters website for up to date information on the EPA Beach App. Note that the app must be downloaded, and credentials established before field sampling. This app will be tested for use during the 2021 monitoring season.

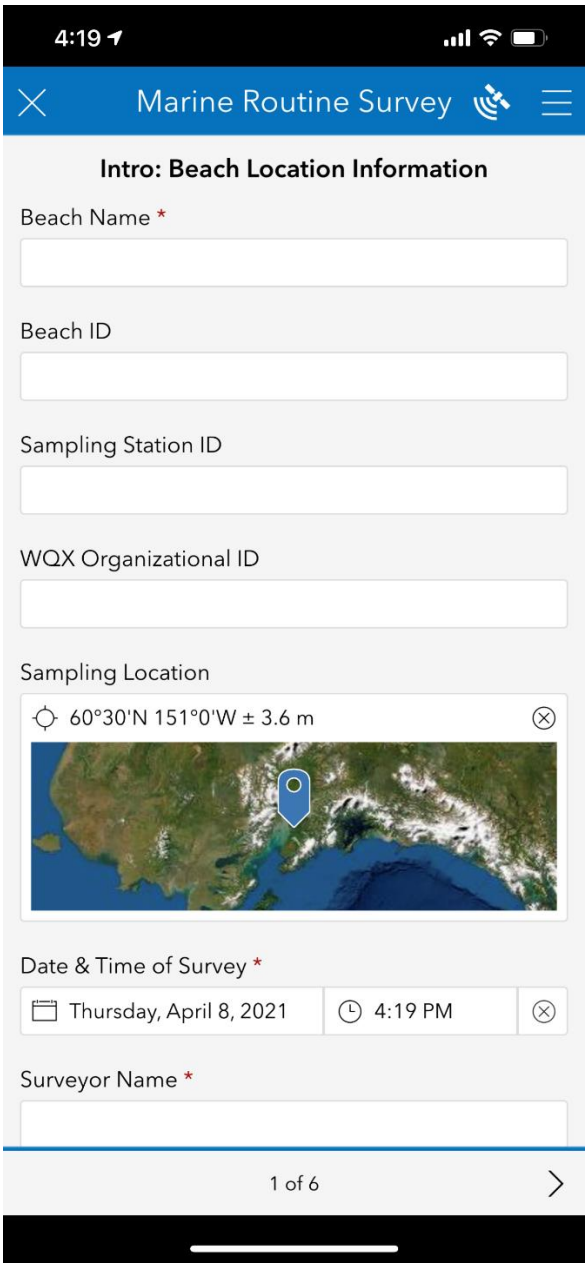


Figure 5. Screen clip from the EPA Sanitary Survey App.

Example Paper Field Form

BEACH Monitoring Field Sheet — Modified Spring 2020

Name of Beach: _____ Date: _____
Beach Code: _____
Latitude N: _____ Longitude: _____

Samples

Sample(s) ID: _____ Time: _____
Replicate ID: _____ Time: _____
Field Blank ID: _____ Time: _____

Weather Conditions (circle one)

Sunny & Clear — Rain
Cloudy/Overcast — Fog
Other (describe): _____

Air Temp: _____ °C / °F
Wind Direction: _____ MPH
Wind Speed: _____ MPH
Precipitation in last 24 hrs.: _____ in

Tidal Conditions (circle one)

Low — Ebbing
High — Flooding

Tide Height: _____ ft / m _____
Time: _____ am / pm

Handheld Probe Values

Water temp: _____ °C / °F
pH: _____
TDS: _____
Conductivity: _____
Turbidity _____ NTU

Activity on Beach

Adults: _____ Dogs: _____
Children: _____ Other: _____
*est. number present

Condition of Water (circle one or more)

Clear — Cloudy/Murky — Oily Film
Other: _____

Potential Pollution Sources

Waterfowl Type: _____
Est. Number: _____
Other Sources (describe and provide number est.): _____

Beach Condition

	Debris	Vegetation (% coverage)
On Shore		
In Water		

Odors: Y / N _____
Stormwater Pipes: Y / N _____
Fish Processing: Y / N _____

Additional Comments:

_____
_____
_____
_____
_____
_____

Sampler(s) Name and Signature:

Name: _____ _____
Name: _____ _____
Name: _____ _____

Additional comments, noteworthy unusual conditions:

_____

_____

_____ _____

Sampler Name (Printed) Signature

INSERT A MAP OF BEACH HERE
Sampling Notes: *(Put a mark on the map where you collected the sample)*

Date:		Sample Number:	
Additional Comments:			

Appendix B – Example Beach Advisory Sign

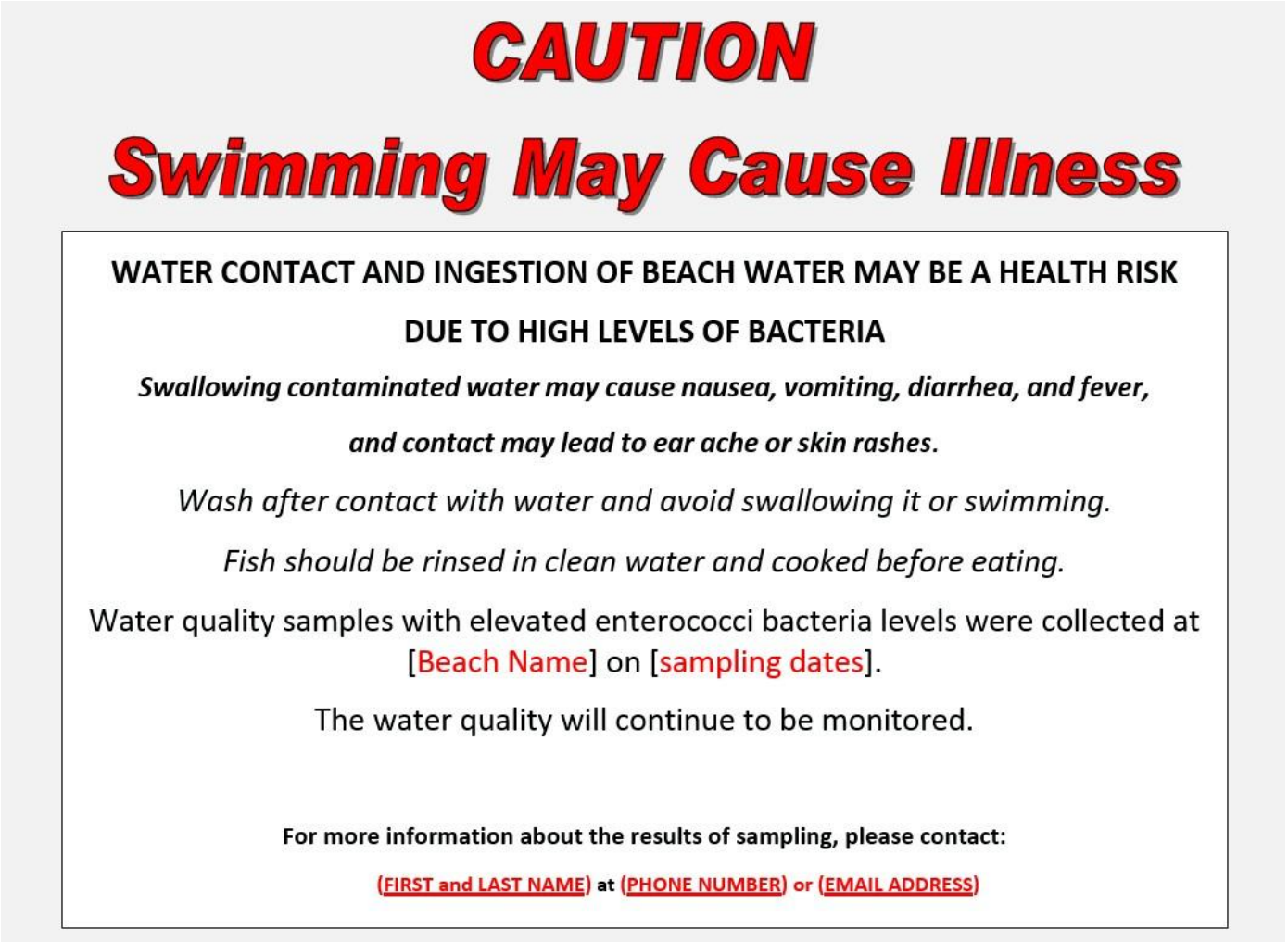


Figure 6. Example Beach Advisory Sign

Appendix C – Example DEC Press Release

For Immediate Release: [Date]

Contact: [Name, Title, Phone, email]
Elevated Levels of [Enterococci] Bacteria Found at [Beach Name]

Kenai, Alaska – (Month, Day, Year) – Recent water quality samples collected at [Beach Name] indicate elevated levels of [Enterococci] bacteria in the water. The Alaska Department of Environmental Conservation (DEC) is collecting the samples this summer to determine if the water is safe for recreation.

Contact with water that has high levels of [Enterococci] may cause people to have stomach aches, diarrhea, or ear, eye and skin infections.

DEC suggests that beach users take normal precautions to avoid exposure, such as avoiding drinking or swimming in the water; washing after contact with the water, and rinsing fish harvested from the area with clean water. As always, people should cook seafood to a minimum of 145 degrees Fahrenheit internal temperature to destroy pathogens.

[Beach Name] is located at the [location description]. Water quality samples were collected [Date(s)]. DEC continues to monitor water quality. If bacteria levels increase significantly, the [landowner] may post advisory signs at the beach until additional sampling indicates that bacteria numbers have dropped to safe levels.

[Enterococci] bacteria can come from any warm-blooded animal including birds, seals, and humans. [The reason for the currently elevated levels is unknown. List any information know about potential sources, e.g. monitoring from nearby wastewater treatment plants.]

The beach sampling program is being funded and implemented by DEC with cooperation of [City of Kenai and/or Landowner]. It is part of a nationwide effort to decrease the incidence of water-borne illness at public beaches under the federal BEACH Act.

For more information about the Alaska beach monitoring program contact the Alaska BEACH Project manager Gretchen Augat (907-465-5023) or visit the Alaska BEACH Grant Program Website (http://dec.alaska.gov/water/wqsar/wqs/beachprogram.htm

Appendix D – Sampling Equipment

HANNA Instruments Combo pH/EC/TDS Tester HI98129
Calibration Information

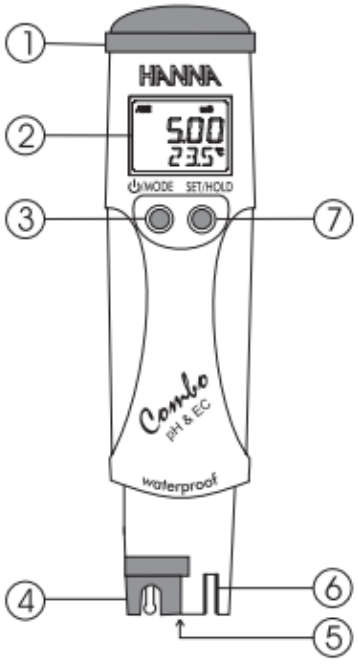
In 2020 the DEC will provide two HANNA handheld probes. Two backup probes will also be available. Each probe comes with its own calibration and storage solution.

Each device must be calibrated before the start of the monitoring season. Probes should be calibrated once per month, or more frequently if values are outside normal range.

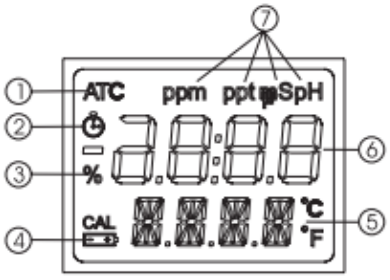
The instruction manual is available online:
https://cdn2.hubspot.net/hubfs/2134380/product-manuals/manhi_98129_98130.pdf.
Please carefully read through the device manual before operating. It is the responsibility of the person monitoring to make sure device has been calibrated and operating properly.

Use deionized water to clean device between monitoring events. Use provided storage solution for between monitoring events. Do not touch the pH probe membrane.

FUNCTIONAL DESCRIPTION



1. Battery compartment
2. Liquid Crystal Display (LCD)
3. ON/OFF/MODE button
4. **HI 73127** pH electrode
5. Temperature sensor (behind)
6. EC/TDS probe
7. SET/HOLD button



1. Automatic temperature compensation indicator
2. Stability indicator
3. Battery life percentage indicator
4. Low battery indicator
5. Secondary display
6. Primary display
7. Measuring units for primary display

SPECIFICATIONS

Range	0.0 to 60.0°C / 32.0 to 140.0°F 0.00 to 14.00 pH 0 to 3999 µS/cm (**HI 98129**) 0.00 to 20.00 mS/cm (**HI 98130**) 0 to 2000 ppm (**HI 98129**) 0.00 to 10.00 ppt (**HI 98130**)
Resolution	0.1°C / 0.1°F 0.01 pH 1 µS/cm ; 1 ppm (**HI 98129**) 0.01 mS/cm ; 0.01 ppt (**HI 98130**)
Accuracy (@20°C/68°F)	±0.5°C / ±1°F ±0.05 pH ±2% f.s. (EC/TDS)
Typical EMC Deviation	±0.5°C / ±1°F ±0.02 pH ±2% f.s. (EC/TDS)
Temperature Compensation	automatic, with β=0.0 to 2.4%/°C (EC/TDS)
Environment	0 to 50°C (32 to 122°F); RH 100%
TDS Factor	0.45 to 1.00 (CONV)
Calibration	automatic, 1 or 2 point with 2 sets of memorized buffers (pH 4.01/7.01/10.01 or 4.01/6.86/9.18) for pH; automatic, at 1 point for EC/TDS
EC/TDS Cal.solutions	
HI 98129:	**HI7031** (1413 µS/cm) **HI7032** (1382 ppm; CONV=0.5) **HI70442** (1500 ppm; CONV=0.7)
HI 98130:	**HI7030** (12.88 mS/cm) **HI70038** (6.44 ppt; CONV=0.5 or 9.02 ppt; CONV=0.7)
Electrode (included)	**HI 73127** pH electrode
Battery Type/Life	4 x 1.5V with BEPS/approx. 100 hours
Auto-off	after 8 minutes of non-use
Dimensions	163 x 40 x 26 mm (6.4 x 1.6 x 1.0")
Weight	100 g (3.5 oz.)

Recommendations for Users

Before using this product, make sure that it is entirely suitable for the environment in which it is used. Operation of this instrument in residential areas could cause unacceptable interferences to radio and TV equipment.

The glass bulb at the end of the electrode is sensitive to electrostatic discharges. Avoid touching this glass bulb at all times.

Any variation introduced by the user to the supplied equipment may degrade the instrument's EMC performance. To avoid electrical shock, do not use this instrument when voltages at the measurement surface exceed 24 Vac or 60 Vdc. To avoid damages or burns, do not perform any measurement in microwave ovens.

IST98129R4 07/05

Figure 7. Device description for HANNA Instruments Combo Probe

OPERATIONAL GUIDE

To turn the meter on and to check battery status

Press and hold the ⏻/MODE button for 2-3 seconds. All the used segments on the LCD will be visible for a few seconds, followed by a percent indication of the remaining battery life (Eg. % 100 BATT).

To change the temperature unit

To change the temperature unit (from °C to °F), from measurement mode, press and hold the ⏻/MODE button until TEMP and the current temperature unit are displayed on the lower LCD (E.g. TEMP °C).
Use the SET/HOLD button to change the temperature unit, and then press the ⏻/MODE button twice to return to normal measuring mode.

To freeze the display

Press the SET/HOLD button for 2-3 seconds until HOLD appears on the secondary display.
Press either button to return to normal mode.

To turn the meter off

Press the ⏻/MODE button while in normal measurement mode. OFF will appear on the lower part of the display. Release the button.

Notes:

- Before taking any measurement make sure the meter has been calibrated.
- To clear a previous calibration, press the ⏻/MODE button after entering the calibration mode. The lower LCD will display ESC for 1 second and the meter will return to normal measurement mode. The CAL symbol on the LCD will disappear. The meter will be reset to the default calibration.
- If measurements are taken in different samples successively, rinse the probe thoroughly to eliminate cross-contamination; and after cleaning, rinse the probe with some of the sample to be measured.

pH MEASUREMENTS & CALIBRATION

Taking measurements

Select the pH mode with the SET/HOLD button.
Submerge the electrode in the solution to be tested.
The measurements should be taken when the stability symbol ▯ on the top left of the LCD disappears.

The pH value automatically compensated for temperature is shown on the primary LCD while the secondary LCD shows the temperature of the sample.

Calibration buffer set

- From measurement mode, press and hold ⏻/MODE until TEMP and the current temperature unit are displayed on the lower LCD (E.g. TEMP °C).
- Press the ⏻/MODE button again to show the current buffer set: pH 7.01 BUFF (for pH 4.01/7.01/10.01) or pH 6.86 BUFF (for NIST set, pH 4.01/6.86/9.18).
- Press the SET/HOLD button to change the buffer value.
- Press the ⏻/MODE button to return to the normal measuring mode.

Calibration procedure

From measurement mode, press and hold the ⏻/MODE button until CAL is displayed on the lower LCD. Release the button. The LCD will display pH 7.01 USE or pH 6.86 USE (if you have selected the NIST buffer set). The CAL tag blinks on the LCD.

For a **single-point pH calibration**, place the electrode in any buffer from the selected buffer set (eg. pH 7.01 or pH 4.01 or pH 10.01). The meter will recognize the buffer value automatically.
If using pH 4.01 or pH 10.01, the meter will display OK for 1 second and then return to the normal measuring mode.
If using pH 7.01, after recognition of the buffer the meter will ask for pH 4.01 as second calibration point. Press the ⏻/MODE button to return to measurement mode or, if desired, proceed with the 2-point calibration as explained below.

Note: It is always recommended to carry out a two-point calibration for better accuracy.

For a **two-point pH calibration**, place the electrode in pH 7.01 (or 6.86 if you have selected the NIST buffer set). The meter will recognize the buffer value and then display pH 4.01 USE.
Rinse the electrode thoroughly to eliminate cross-contamination.
Place the electrode in the second buffer value (pH 4.01 or 10.01, or, if using NIST, pH 4.01 or 9.18). When the second buffer is recognized, the LCD will display OK for 1 second and the meter will return to the normal measuring mode.

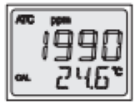
The CAL symbol on the LCD means that the meter is calibrated.

EC/TDS MEASUREMENTS & CALIBRATION

Taking measurements

Select either EC or TDS mode with the SET/HOLD button.
Submerge the probe in the solution to be tested. Use plastic beakers to minimize any electromagnetic interferences.
The measurements should be taken when the stability symbol ▯ on the top left of the LCD disappears.

The EC (or TDS) value automatically compensated for temperature is shown on the primary LCD while the secondary LCD shows the temperature of the sample.



To change the EC/TDS conversion factor (CONV) and the temperature compensation coefficient β (BETA)

- From measurement mode, press and hold the ⏻/MODE button until TEMP and the current temperature unit are displayed on the lower LCD. Eg. TEMP °C.
- Press the ⏻/MODE button again to show the current conversion factor. Eg. 0.50 CONV.
- Press the SET/HOLD button to change the conversion factor.
- Press the ⏻/MODE button to show the current temperature compensation coefficient β. Eg. 2.1 BETA.
- Press the SET/HOLD button to change the temperature compensation coefficient β.
- Press the ⏻/MODE button to return to the normal measuring mode.

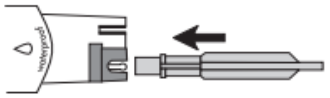
Calibration procedure

- From measurement mode, press and hold the ⏻/MODE button until CAL is displayed on the lower LCD.
- Release the button and immerse the probe in the proper calibration solution: **HI7031** (1413 µS/cm) for **HI98129** and **HI7030** (12.88 mS/cm) for **HI98130**.
- Once the calibration has been automatically performed, the LCD will display OK for 1 second and the meter will return to normal measurement mode.
- Since there is a known relathionship between EC and TDS readings, it is not necessary to calibrate the meter in TDS

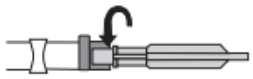
The CAL symbol on the LCD means that the meter is calibrated.

pH ELECTRODE MAINTENANCE

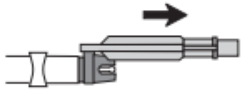
- When not in use, rinse the electrode with water to minimize contamination and store it with a few drops of storage (**HI 70300**) solution in the protective cap after use. DO NOT USE DISTILLED OR DEIONIZED WATER FOR STORAGE PURPOSES.
- If the electrode has been left dry, soak in storage solution for at least one hour to reactivate it.
- To prolong the life of the pH electrode, it is recommended to clean it monthly by immersing it in the **HI 7061** cleaning solution for half an hour. Afterwards, rinse it thoroughly with tap water and recalibrate the meter.
- The pH electrode can be easily replaced by using the supplied tool (**HI 73128**). Insert the tool into the electrode cavity as shown below.



- Rotate the electrode counterclockwise.



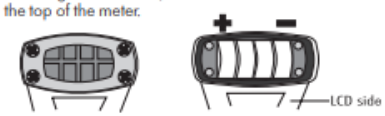
- Pull the electrode out by using the other side of the tool.



- Insert a new pH electrode following the above instructions in reverse order.

BATTERY REPLACEMENT

The meter displays the remaining battery percentage every time it is switched on. When the battery level is below 5%, the ▭ symbol on the bottom left of the LCD lights up to indicate a low battery condition. The batteries should be replaced soon. If the battery level is low enough to cause erroneous readings, the meter shows "0%" and the Battery Error Prevention System (BEPS) will automatically turn the meter off.
To change the batteries, remove the 4 screws located on the top of the meter.



Once the top has been removed, carefully replace the 4 batteries located in the compartment while paying attention to their polarity.
Replace the top, making sure that the gasket is properly seated in place, and tighten the screws to ensure a watertight seal.

ACCESSORIES

HI 73127	Replaceable pH electrode
HI 73128	Electrode removal tool
HI 70004P	pH 4.01 solution, 20 mL sachet (25 pcs)
HI 70006P	pH 6.86 solution, 20 mL sachet (25 pcs)
HI 70007P	pH 7.01 solution, 20 mL sachet (25 pcs)
HI 70009P	pH 9.18 solution, 20 mL sachet (25 pcs)
HI 70010P	pH 10.01 solution, 20 mL sachet (25 pcs)
HI 77400P	pH 4 & 7 solutions, 20 mL sachet (5 each)
HI 7004M	pH 4.01 solution, 230 mL bottle
HI 7006M	pH 6.86 solution, 230 mL bottle
HI 7007M	pH 7.01 solution, 230 mL bottle
HI 7009M	pH 9.18 solution, 230 mL bottle
HI 7010M	pH 10.01 solution, 230 mL bottle
HI 70030P	12.88 mS/cm solution, 20 mL (25 pcs)
HI 70031P	1413 µS/cm solution, 20 mL (25 pcs)
HI 70032P	1382 ppm solution, 20 mL (25 pcs)
HI 70038P	6.44 ppt solution, 20 mL (25 pcs)
HI 70442P	1500 ppm solution, 20 mL (25 pcs)
HI 7061M	Electrode cleaning solution, 230 mL bottle
HI 70300M	Electrode storage solution, 230 mL bottle

Figure 8. HANNA Probe Operational Guide

HACH Turbidmeter 2100Q

In 2020 the DEC will provide one HACH Tubidimeter 2100QIS. The turbidimeter comes with a carrying case and a set of standards in vials.

The turbidimeter should be calibrated before each sampling event. Periodically check the provided standards in the meter to see if it is reading accurately.

The device manual is located online: https://www.hach.com/2100q-is-portable-turbidimeter/product-downloads?id=7640450964

Always bring an extra set of batteries for the device. Take care to keep the turbidimeter dry and the vials clean between each use. Use deionized water to clean vials between uses.

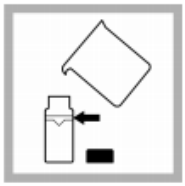
Below are basic instructions for operation. **NOTE** all persons operating the turbidimeter must review the full operation manual before operating deice in the field. The following is for quick reference only.

- Prior to field sampling event
    - Ensure device is fully charged and operating properly. Pack extra batteries in field kit,
    - Ensure all standards are in carrying case
    - Ensure cleaning cloth or similar microfiber towel is available
    - REVIEW FULL OPERATING MANUAL FOR DEVICE
- In field
    - Turn on device
    - Calibrate the device by following the instructions in the user manual
        - Push CALIBRATION key to enter calibration mode
        - Gently invert each standard before using with device
        - Insert the 20 NTU standard and close device lid
        - push READ, device will stabilize and then show result
        - Repeat step 2 and 3 with 100 NTU and 800 NTU standard
        - Push DONE to complete calibration
        - Push STORE to save results
    - Collect water sample in sample vial (aka Sample Cell in manual)
    - Make sure device is on level surface
    - Ensure cap is secure on sample vial. Gently invert sample vial once. Wipe the outside of the vial with microfiber towel and a small (pea size or less) drop of silicone.
    - Place the sample in device (align arrow on vial with arrow on device).
    - Push READ on device.
    - Wait until device stabilizes and record results on field data sheet.

- Measure samples immediately to prevent temperature changes and settling. Before a measurement is taken, always make sure that the sample is homogeneous throughout.
- Avoid sample dilution when possible.
- Avoid operation in direct sunlight.

Turbidity measurement procedure

Note: *Before a measurement is taken, always make sure that the sample is homogeneous throughout.*



1. Collect a representative sample in a clean container. Fill a sample cell to the line (about 15 mL). Take care to handle the sample cell by the top. Cap the cell.

2. Wipe the cell with a soft, lint-free cloth to remove water spots and fingerprints.

3. Apply a thin film of silicone oil. Wipe with a soft cloth to obtain an even film over the entire surface (Apply silicone oil to a sample cell on page 17).

4. Push the **Power** key to turn the meter on. Place the instrument on a flat, sturdy surface.

Note: *Do not hold the instrument while making measurements.*

5. Gently invert and then insert the sample cell in the instrument cell compartment so the diamond or orientation mark aligns with the raised orientation mark in front of the cell compartment. Close the lid.

6. Push **Read**. The display shows Stabilizing then the turbidity in NTU (FNU). The result is shown and stored automatically. Additional information is available on the manufacturer's website.

Data management

About stored data

The following types of data are stored in the data log:

- Reading Log: stores automatically each time a sample reading is taken (500 records).
- Calibration Log: stores only when **Store** is selected at the end of a calibration (25 records).
- Verify Cal Log: stores only after **Done** is selected at the end of a verification calibration (250 records).

When the data log becomes full, the oldest data point is deleted when more data is added to the log.

View data log

The data log contains Reading Log, Calibration Log and Verify Cal log. All logs can be sorted by date.

Figure 9. Turbidity Measurement Procedure - see user manual for more information