Frequently Asked Questions:

Alaska Beach Program Virtual Beach Model

What is Virtual Beach?

Virtual Beach is a predictive decision support tool developed by the EPA. This tool is used by several BEACH monitoring programs across the United States. Virtual Beach uses local environmental data to predict bacteria levels at recreation beaches. This allows for beach managers to make informed and timely decisions when issuing bacteria-related swimming and recreation public advisories.

Why use the Virtual Beach Model?

Using the Virtual Beach model provides near real-time predictions of possible elevated bacteria levels instead of waiting several days for water sample laboratory results to be completed. This is more protective of human health by providing information on safe beach recreation practices in a timely manner, as opposed to a more rigid water sampling schedule and laboratory analysis process. The model is also cheaper because it uses data like air temperature and wind speed that is available for free online. In contrast, bacteria water sampling is relatively costly and time consuming to collect and analyze.

How does the Virtual Beach model work?

Predictions of bacteria conditions are comparable to the way the weather service makes a weather prediction. Meteorologists use easily measurable data (e.g., wind speed, air temp) to make a prediction of what the weather tomorrow might be. The Virtual Beach model does the same thing, but for bacteria. For example, if a warm day caused an increase in bacteria levels, the model might predict higher bacteria levels on future warm days.

Here's the steps DEC uses to develop and build the Virtual Beach model.

Collect Data	Input data to generate model	Use model to predict bacteria levels

1. First, bacteria samples are collected in the field. The model uses a minimum of 30 bacteria datapoints spread out over time for each beach being examined. Weather and tide data is downloaded from publicly available online databases (e.g., NOAA, USGS).
2. Next, this data is used to build the model. Virtual Beach provides three possible statistical regression techniques to look for relationships between the environmental data and the bacteria data. The resulting model that best describes the relationship between the environmental conditions and the bacteria data is selected. Each beach has unique environmental conditions, so each beach will have its own unique model.

3. To make a prediction, the environmental conditions of the beach on a given day are entered in the model. The model then calculates the likelihood that bacteria conditions will meet or exceed water quality standards.
4. Model predictions on whether the beach meets or exceeds water quality standards will be posted on the Alaska Beach Program webpage. This is a pilot year and DEC will evaluate the accuracy of the model after the 2022 recreation season to determine its usefulness in future years.

How accurate is Virtual Beach?

DEC is pilot testing the model during the summer of 2022 to determine how accurate it is at predicting bacteria exceedances. Traditional bacteria monitoring techniques require up to 38 hours for samples to be analyzed, so conditions at the beach can be vastly different by the time monitoring results are received from the laboratory. The benefit of predictive modeling is that it uses current environmental conditions to reveal probable bacteria levels in real time. However, like the weather prediction on your local news station, the bacteria predictions are not always accurate. After the pilot year, bacteria data would periodically need to be collected to compare results to the model predictions, and adjust the model as needed to ensure accuracy.

For 2022, predicted bacteria levels will be labeled accordingly alongside actual bacteria water sampling results on the Alaska Beach Program webpage.

Where is Virtual Beach used in Alaska?

Virtual Beach is currently being pilot tested for use at the two recreational beaches at the mouth of the Kenai River (North and South Kenai beaches) and at several Ketchikan area beaches.
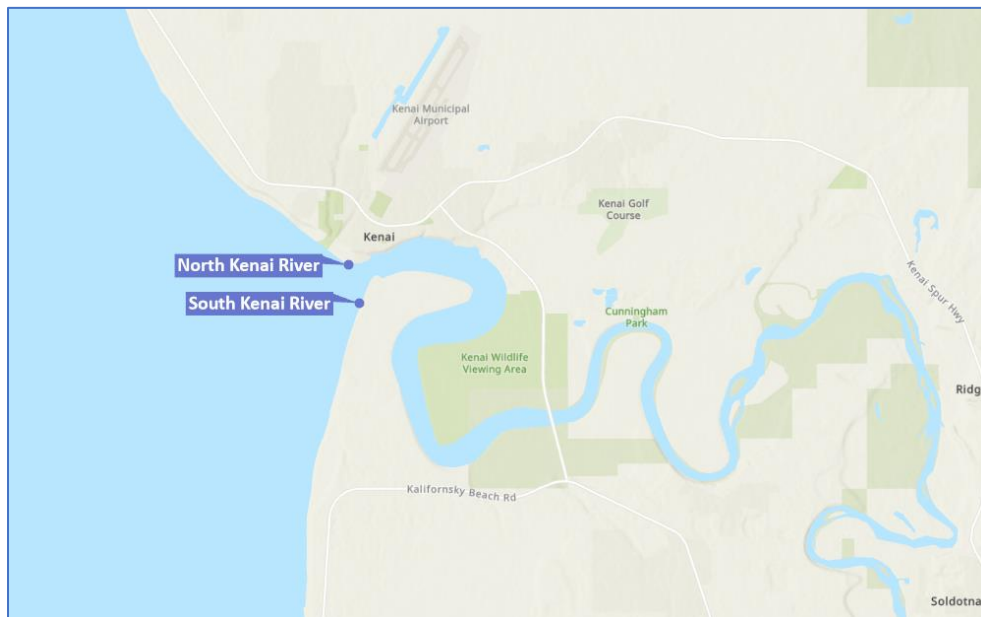

Figure 1. Kenai River Alaska Beach Program beaches

Figure 2. Ketchikan Alaska Beach Program beaches

Is DEC still collecting water samples at Alaska Beach Program beaches?

Yes, DEC will continue collecting water samples at Alaska Beach Program beaches. We are currently only pilot testing the model at a subset of beaches that are part of the Alaska Beach Program. For the beaches being used in the Virtual Beach pilot testing, water samples will be collected to compare the results to the model predictions. This will allow us to check that the model is working.

Where can I learn more about beach monitoring in Alaska?

You can visit the Alaska Beach Monitoring Webpage to learn more about the Alaska Beach monitoring program. You can also visit the EPA Virtual Beach Model webpage (https://www.epa.gov/ceam/virtual-beach-vb) to learn more about the model.

Who can I contact if I have questions about Virtual Beach?

The Kenai Region contact for the Alaska Beach Program is Sarah Apsens (907)741-1026; sarah.apsens@alaska.gov. For information on Ketchikan Beaches contact Gretchen Augat (907) 465-5023; gretchen.augat@alaska.gov.