



# Safe for Swimming 2020 Edition

**Pollution at Our Beaches and How to Prevent It**



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and How to Prevent It**



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Written by:

Gideon Weissman, Frontier Group

John Rumpler, Environment America Research & Policy Center

July 2020

# Acknowledgments

Environment California Research & Policy Center sincerely thanks Madeline Magee of the Wisconsin Department of Natural Resources, Abhilasha Shrestha of the University of Illinois at Chicago School of Public Health, and Mara Dias of Surfrider Foundation for their review of drafts of this document, as well as their insights and suggestions. Thanks to Elizabeth Berg for her invaluable data assistance and to Frontier Group intern Christiane Paulhus for her research support. Thanks also to Tony Dutzik, Susan Rakov and Elizabeth Ridlington of Frontier Group for their editorial support.

Environment California Research & Policy Center thanks the Park Foundation for helping to make this report possible. The authors bear responsibility for any factual errors. The recommendations are those of Environment California Research & Policy Center. The views expressed in this report are those of the authors and do not necessarily reflect the views of our funders or those who provided review.

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# Executive summary

**T**he Clean Water Act, adopted in 1972, set the goal of making all of our waterways safe for swimming. Nearly a half-century later, Americans visiting their favorite beach are still met all too often by advisories warning that the water is unsafe for swimming. And each year, millions of Americans are sickened by swimming in contaminated water.

An analysis of fecal indicator bacteria sampling data from beaches in 29 coastal and Great Lakes states and Puerto Rico reveals that **386 beaches – nearly one of every eight surveyed – were potentially unsafe on at least 25 percent of the days that sampling took place last year.**<sup>1</sup> More than half of all the 3,172 beaches reviewed were potentially unsafe for swimming on at least one day. Beaches were considered potentially unsafe if fecal indicator bacteria levels exceeded the U.S. Environmental Protection Agency’s “Beach Action Value” associated with an estimated illness rate of 32 out of every 1,000 swimmers.<sup>2</sup>

**To protect our health at the beach, policymakers should undertake efforts to prevent fecal pollution, including deploying natural and green infrastructure to absorb stormwater.**

**Fecal contamination makes beaches unsafe for swimming. Human contact with contaminated water can result in gastrointestinal illness as well as respiratory disease, ear and eye infection and skin rash.**<sup>3</sup> Each year in the U.S., swimmers in oceans, lakes, rivers and ponds suffer from an estimated 57 million cases of recreational waterborne illness.<sup>4</sup>

**Our beaches are at risk.** Runoff from paved surfaces, overflows from aging sewage systems, and manure from industrial livestock operations all threaten the waters where Americans swim. These pollution threats are getting worse with climate change, as more extreme precipitation events bring heavy flows of stormwater.

- Sprawling development has created more impervious surfaces that cause runoff pollution and has destroyed natural areas like wetlands that protect beaches from contamination. From 1996 to 2010, U.S. coastal regions added 3.6 million acres of development, while losing 982,000 acres of wetland and millions of acres of forest.<sup>5</sup>
- America’s sewage infrastructure is deteriorating and outdated. Many communities, particularly around the Great Lakes, still use “combined sewers” that were designed to discharge sewage directly to waterways during heavy rainfall. Sanitary sewers, which are designed to carry sewage alone, can also spill dangerous sewage if they are not properly maintained, and overflow as many as 75,000 times each year in the U.S.<sup>6</sup>
- The rise of factory farms has resulted in large concentrations of livestock manure that cannot be stored safely and is often overapplied to crops. All too often, rainfall washes excess manure from cropland into our waterways where it can put swimmers’ health at risk. Animal manure also can contain pathogens that are resistant to antibiotics, creating added risk to public health.<sup>7</sup>

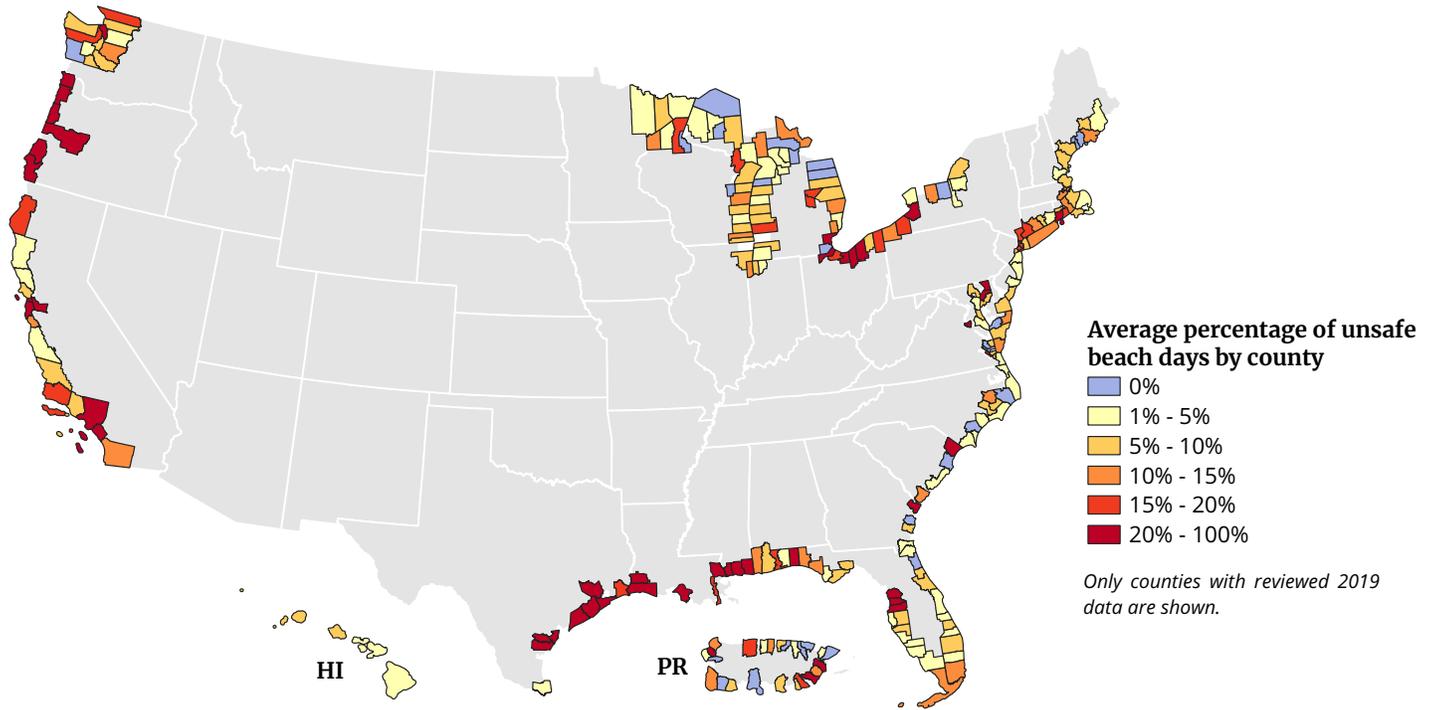


Figure ES-1. Average percentage of potentially unsafe beach days in 2019 by county  
*“Average percentage” represents the average of the percentage of potentially unsafe days at each beach within a county.*

**Of more than 3,000 beaches sampled for bacteria across the country in 2019, 386 were potentially unsafe for swimming on at least 25% of days that testing took place.**

- As of May 2020, sampling data for 2019 from 3,172 beaches in 29 coastal and Great Lakes states and Puerto Rico was available through the National Water Quality Monitoring Council’s Water Quality Portal.\*
- Of those beaches, 1,793 had bacteria levels indicating potentially unsafe levels of fecal contamination for swimming on at least one day, and 386 were potentially unsafe on at least 25 percent of the days that sampling took place.

- Swimmers could also be at risk at additional beaches where no bacterial testing was conducted or available through the Water Quality Portal.

**Bacteria testing of ocean and Great Lakes beaches in every region of the country revealed days of potentially unsafe fecal contamination in 2019.**

- Among East Coast beaches, 928 beaches, or 51% of the 1,820 beaches tested, were potentially unsafe for at least one day in 2019. 172 beaches, 9% of those tested, were potentially unsafe on at least 25% of the days that testing took place.
- Among Great Lakes beaches, 284 beaches, or 59% of the 484 beaches tested, were potentially unsafe

\* In the context of our findings, “beaches” in this report refer to recreational waters listed by the U.S. EPA under the Beaches Environmental Assessment and Coastal Health (BEACH) Act of 2000. Some “beaches” consist of multiple sampling sites. This represents a change from the previous edition of this report, which assessed individual sampling sites. For this and other reasons, meaningful comparisons cannot be made between findings in this and last year’s report. Data for two states, Florida and Illinois, is from state and local sources. See Methodology for details.

for at least one day in 2019. 55 beaches, 11% of those tested, were potentially unsafe on at least 25% of the days that testing took place.

- Among Gulf Coast beaches, 223 beaches, or 84% of the 266 beaches tested, were potentially unsafe for at least one day in 2019. 65 beaches, 24% of those tested, were potentially unsafe on at least 25% of the days that testing took place.
- Among West Coast beaches, 258 beaches, or 75% of the 346 beaches tested, were potentially unsafe for at least one day in 2019. 79 beaches, 23% of those tested, were potentially unsafe on at least 25% of the days that testing took place.

**In every coastal and Great Lakes state and Puerto Rico, sampling revealed potentially unsafe levels of contamination in 2019. (The figures below are based on U.S. EPA's Beach Action Value. Many states use other thresholds for beach closure and advisory decisions. Therefore, results presented in this report may differ from state reports on beach water quality. See Methodology for details.)**

- **Alabama:** In 2019, 15 of 25 beaches tested were potentially unsafe for at least one day. Fairhope Public Beach in Baldwin County tested as potentially unsafe for 12 days, more days than any other beach in the state.
- **California:** In 2019, 202 of 253 beaches tested were potentially unsafe for at least one day. Inner Cabrillo Beach in Los Angeles County tested as potentially unsafe for 150 days, more days than any other beach in the state.
- **Connecticut:** In 2019, 44 of 70 beaches tested were potentially unsafe for at least one day. Shady Beach in Fairfield County tested as potentially unsafe for 10 days, more days than any other beach in the state.
- **Delaware:** In 2019, 14 of 23 beaches tested were potentially unsafe for at least one day. Slaughter Beach in Sussex County tested as potentially unsafe for 12 days, more days than any other beach in the state.

- **Florida:** In 2019, 187 of 261 beaches tested were potentially unsafe for at least one day. South Beach (Key West) in Monroe County tested as potentially unsafe for 22 days, more days than any other beach in the state.
- **Georgia:** In 2019, 19 of 26 beaches tested were potentially unsafe for at least one day. St. Simons Island Lighthouse Beach in Glynn County tested as potentially unsafe for 9 days, more days than any other beach in the state.
- **Hawaii:** In 2019, 76 of 221 beaches tested were potentially unsafe for at least one day. Kuliouou Beach in Honolulu County tested as potentially unsafe for 10 days, more days than any other beach in the state.
- **Illinois:** In 2019, 19 of 19 beaches tested were potentially unsafe for at least one day. 63rd Street Beach in Cook County tested as potentially unsafe for 19 days, more days than any other beach in the state.
- **Indiana:** In 2019, 19 of 23 beaches tested were potentially unsafe for at least one day. Jeorse Park Beach I in Lake County tested as potentially unsafe for 28 days, more days than any other beach in the state.
- **Louisiana:** In 2019, 23 of 23 beaches tested were potentially unsafe for at least one day. Lake Charles North Beach in Calcasieu Parish tested as potentially unsafe for 20 days, more days than any other beach in the state.
- **Maine:** In 2019, 31 of 63 beaches tested were potentially unsafe for at least one day. Goose Rocks Beach in York County tested as potentially unsafe for 12 days, more days than any other beach in the state.
- **Maryland:** In 2019, 41 of 67 beaches tested were potentially unsafe for at least one day. Ocean City Beach 3 in Worcester County tested as potentially unsafe for 8 days, more days than any other beach in the state.

- **Massachusetts:** In 2019, 257 of 559 beaches tested were potentially unsafe for at least one day. Tenean Beach in Suffolk County tested as potentially unsafe for 44 days, more days than any other beach in the state.
- **Michigan:** In 2019, 78 of 196 beaches tested were potentially unsafe for at least one day. South Linwood Beach Township Park in Bay County tested as potentially unsafe for 13 days, more days than any other beach in the state.
- **Minnesota:** In 2019, 13 of 35 beaches tested were potentially unsafe for at least one day. Park Point Sky Harbor Parking Lot Beach in St. Louis County tested as potentially unsafe for 9 days, more days than any other beach in the state.
- **Mississippi:** In 2019, 21 of 21 beaches tested were potentially unsafe for at least one day. Pass Christian West Beach in Harrison County tested as potentially unsafe for 44 days, more days than any other beach in the state.
- **New Hampshire:** In 2019, 6 of 16 beaches tested were potentially unsafe for at least one day. North Hampton State Beach in Rockingham County tested as potentially unsafe for 7 days, more days than any other beach in the state.
- **New Jersey:** In 2019, 73 of 222 beaches tested were potentially unsafe for at least one day. Two beaches – Beachwood Beach West in Ocean County and Barnegat Light Bay Beach in Ocean County – tested as potentially unsafe for 9 days, more than any other beaches in the state.
- **New York:** In 2019, 219 of 350 beaches tested were potentially unsafe for at least one day. Tanner Park in Suffolk County on Long Island tested as potentially unsafe for 56 days, more days than any other beach in the state.
- **North Carolina:** In 2019, 93 of 209 beaches tested were potentially unsafe for at least one day. Colington Harbour Beach in Dare County tested as potentially unsafe for 6 days, more days than any other beach in the state.
- **Ohio:** In 2019, 54 of 54 beaches tested were potentially unsafe for at least one day. Maumee Bay State Park (Inland) in Lucas County tested as potentially unsafe for 38 days, more days than any other beach in the state.
- **Oregon:** In 2019, 18 of 20 beaches tested were potentially unsafe for at least one day. Seal Rock State Recreation Site in Lincoln County tested as potentially unsafe for 13 days, more days than any other beach in the state.
- **Pennsylvania:** In 2019, 8 of 9 beaches tested were potentially unsafe for at least one day. Erie Beach 11 in Erie County tested as potentially unsafe for 9 days, more days than any other beach in the state.
- **Puerto Rico:** In 2019, 24 of 35 beaches tested were potentially unsafe for at least one day. Tropical Beach in Naguabo Municipio tested as potentially unsafe for 15 days, more days than any other beach in the state.
- **Rhode Island:** In 2019, 44 of 65 beaches tested were potentially unsafe for at least one day. Easton's Beach in Newport County tested as potentially unsafe for 14 days, more days than any other beach in the state.
- **South Carolina:** In 2019, 12 of 23 beaches tested were potentially unsafe for at least one day. Myrtle Beach in Horry County tested as potentially unsafe for 41 days, more days than any other beach in the state.
- **Texas:** In 2019, 55 of 61 beaches tested were potentially unsafe for at least one day. Sargent Beach in Matagorda County tested as potentially unsafe for 96 days, more days than any other beach in the state.
- **Virginia:** In 2019, 29 of 47 beaches tested were potentially unsafe for at least one day. Hilton Beach in the city of Newport News tested as potentially unsafe for 8 days, more days than any other beach in the state.

- **Washington:** In 2019, 38 of 73 beaches tested were potentially unsafe for at least one day. Dakwas Park Beach, Neah Bay in Clallam County tested as potentially unsafe for 10 days, more days than any other beach in the state.
- **Wisconsin:** In 2019, 61 of 103 beaches tested were potentially unsafe for at least one day. South Shore Beach in Milwaukee County tested as potentially unsafe for 19 days, more days than any other beach in the state.

To ensure that all of our beaches are safe for swimming, policymakers should work to protect beaches from runoff and sewage pollution – including by stopping pollution at its source, and by protecting natural areas. Solutions include:

- Dramatically increasing funding to fix sewage sys-

tems and prevent runoff pollution through natural and green infrastructure, including rain barrels, permeable pavement and green roofs.

- Protecting wetlands, which filter out pollutants like bacteria.
- Enacting moratoriums on new or expanded industrial-scale livestock operations, particularly in areas that threaten our beaches and other waterways.

Policymakers should also ensure that swimmers are presented with the best-possible information to make decisions regarding their health. Officials should expand funding for beach testing, to ensure adequate testing at all beaches. States should use EPA’s most protective “Beach Action Value” bacteria standard for making beach advisory decisions and should work to implement same-day bacteria testing and warning systems.

# Introduction

Americans love the beach. From the warm waters of the Gulf Coast to the cliffside beaches of the Pacific Northwest to the shores of the Great Lakes, America's beaches enrich our lives, providing us a place to escape everyday life, soak up the sun, and cool off in the hot summer months.

Americans should be able to expect that water at our beaches is clean and safe for swimming. In fact, that was a key goal when our nation adopted the Clean Water Act in 1972. But all too often, those looking for a summer getaway arrive at the beach only to be met by an advisory sign warning of unsafe water. Even worse, millions of Americans in recent years have been sickened by swimming in contaminated water, with many hospitalized.

As the following analysis shows, far too many beaches, in every coastal and Great Lakes state, can be unsafe for swimming.

The causes are often within our control. Reckless development destroys wetlands that filter out pollutants; outdated sewer systems send raw waste directly into waterways; and agricultural practices create an excess of manure, which now often contains pathogens resistant to antibiotics, that finds its way into our waterways.

In different regions of the country there are different culprits for beach pollution. But all regions can implement solutions to prevent pollution from being created in the first place, and to keep pollution from reaching the waters where our families go to swim.

Making those changes can protect public health and the environment, and help ensure that families across the country can continue to look to the beach as a summer haven, now and in the future.

# Fecal contamination of swimming areas poses a public health threat

**P**eople who swim in water polluted with sewage or other fecal contamination risk falling seriously ill.

Human contact with fecal contamination can result in gastrointestinal illness as well as respiratory disease, ear and eye infection and skin rash.<sup>8</sup> The presence of fecal contamination in water is typically indicated by the existence of bacteria (including the *E. coli* and enterococcus bacteria samples reviewed in the following analysis). While bacterial indicators like *E. coli* can themselves pose health risks, most illnesses contracted from swimming in contaminated water are actually caused by other pathogens contained in fecal matter, including viruses.<sup>9</sup> Norovirus is likely the most common cause of viral recreational water outbreaks and can cause diarrhea, vomiting, nausea and stomach pain.<sup>10</sup>

Each year in the U.S., swimmers in oceans, lakes, rivers and ponds suffer from an estimated 57 million cases of recreational waterborne illness.<sup>11</sup> The vast majority

of those illnesses are unreported. Data on the most significant reported outbreaks is tracked by the Centers for Disease Control and Prevention (CDC). From 2000 to 2014, the CDC received 140 reports of outbreaks caused by recreational water contamination, including 45 outbreaks at beaches.<sup>12</sup> Those outbreaks caused 4,958 illnesses and two deaths.<sup>13</sup> In a single 2013 incident listed on the CDC's website, 141 people fell ill and 19 people were hospitalized from a contaminated Rhode Island pond (the pond was not named by the CDC).<sup>14</sup>

Water contamination can also ruin a day at the beach when it results in beach closures or swimming advisories. Of coastal beaches where water quality was tested in 2018, 38 percent had at least one advisory or closure.<sup>15</sup> While beach advisories are a critical tool to protect swimmers, many testing programs rely on a testing process that requires nearly 24 hours to show results, meaning that swimmers may have already been exposed to unsafe water by the time advisories are posted.<sup>16</sup>

# Overdevelopment of our coasts, aging sewage systems and factory farms threaten America's beaches

**T**he water at America's beaches frequently poses risks to human health (see "American beaches are often unsafe for swimming," page 16).

Although some beach contamination results from natural sources such as wildlife, many of the most dangerous risks posed to swimmers are the result of human activity.

In recent decades, three trends – the developing and paving of natural areas in coastal regions, the deterioration of sewer systems, and the rise of factory farms – have done particular harm to our beaches. Climate change, bringing more wet weather and flooding, is exacerbating these impacts. Without action to reverse these trends, more beach closures and water pollution are likely in years to come.

## **Overdevelopment in coastal regions is creating runoff pollution and destroying natural areas**

Rainfall that flows over yards, parks and other urban and suburban areas can pick up fecal waste from pets and wildlife, or sewage from failing septic or other sewage systems. This runoff can contaminate beach waters, either directly or indirectly after passing through a storm sewer system. Stormwater runoff is responsible for hundreds of miles of shoreline being

too polluted for swimming or other intended uses, according to the U.S. EPA's most recent Water Quality Assessment data.<sup>17</sup>

Heavy development of coastal zones, and the resulting loss of natural areas, is exacerbating the problem of runoff pollution. From 1996 to 2010, U.S. coastal areas added 3.6 million acres of development, while losing 982,000 acres of wetland and millions of acres of forest.<sup>18</sup>

This development both creates new sources of runoff fecal pollution and also makes it easier for that pollution to reach the water by replacing natural vegetated areas with impervious surfaces.

Natural features like wetlands – often known as marshes, bogs and swamps – play an important function in protecting water quality. Wetlands can absorb runoff and remove harmful pollutants, including fecal contamination, preventing the contamination of coastal waters and other waterways.<sup>19</sup>

When natural areas are replaced by human development, these protective features are lost at the same time that new sources of pollution – such as roads and parking lots – are created. These impervious surfaces

increase the quantity of runoff pollution that reaches waterways and beaches, because water flows over them instead of being absorbed into the ground. In many urban areas, this runoff is diverted into stormwater systems that then discharge directly into waterways.

Research links an increase in impervious surfaces with negative water quality impacts, including higher levels of fecal indicator bacteria. A 2014 study from the journal *Hydrological Processes* noted that the “increase in impervious surfaces will intensify current undesired impacts of development by converting even more rainfall to stormwater runoff” and that “[c]oncentrations of indicators of water quality degradation (e.g. chemicals, nutrients, bacteria, viruses) increase in waterways as development increases.”<sup>20</sup>

Climate change is further exacerbating the problem of runoff pollution, as flooding and heavy rainfall events become more frequent. The aforementioned study noted that “[i]ncreased rainfall from heavy storm events will amplify the negative impacts of runoff that are already intensified by increasing development.”<sup>21</sup> A separate study modeled climate and development impacts in one county in South Carolina and found that runoff quantity could triple under severe climate change scenarios.<sup>22</sup>

## **America’s sewage infrastructure is deteriorating and outdated**

Sewage systems leak or overflow tens of thousands of times each year in the U.S., spilling human fecal waste into the environment and often contaminating rivers, lakes and coastal waters.<sup>23</sup> Compared to some other sources of fecal contamination, sewage is thought to be particularly dangerous because human waste contains bacteria, viruses and parasites more likely to cause disease in humans.<sup>24</sup> Sewage pollution, both from urban sewage systems and onsite septic tanks, is responsible for more miles of shoreline being too polluted for swimming or other intended uses than any other source of pollution.<sup>25</sup>

As with runoff, the threat of sewage spills is exacerbated by the loss of green space and the development of natural areas, as the same stormwater that can directly impact waterways can also overwhelm sewer systems. As a *New York Times* analysis described:<sup>26</sup>

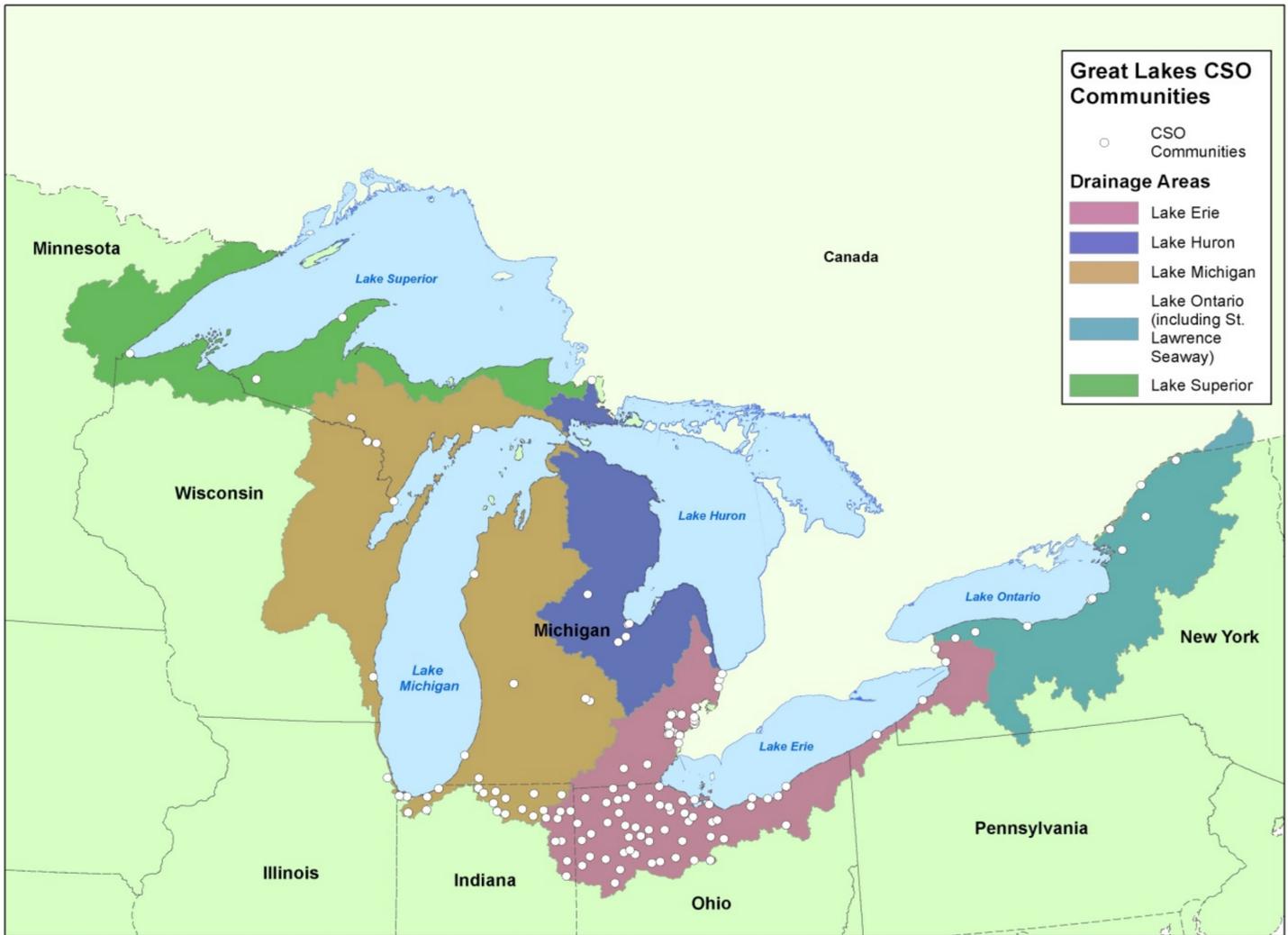
*As cities have grown rapidly across the nation, many have neglected infrastructure projects and paved over green spaces that once absorbed rainwater. That has contributed to sewage backups into more than 400,000 basements and spills into thousands of streets, according to data collected by state and federal officials. Sometimes, waste has overflowed just upstream from drinking water intake points or near public beaches.*

Meanwhile, sewage is often handled by deteriorating, poorly maintained, or outdated sewer systems. The EPA writes that much of our network of sewage infrastructure was built right after World War II and that “investment has not been enough to meet the ongoing need to maintain and renew these systems.”<sup>27</sup>

Some of the worst spills come from “combined sewer” systems, outdated systems that combine stormwater and sewage into a single pipe. These systems were designed to discharge excess waste directly to nearby waterways during heavy rain events.<sup>28</sup> Combined sewers are particularly common near the Great Lakes. In 2014, combined sewer overflows in the U.S. discharged 22 billion gallons of untreated sewage and stormwater to the Great Lakes.<sup>29</sup>

Combined sewer spills can pollute and shut down recreational beaches. In 2019, for example, the L Street Beach in Belmar, New Jersey, shut down for a month because of discharges from a nearby combined sewer system.<sup>30</sup> Belmar was able to reopen the beach after making investments in nearby sewage pipes and pumps.<sup>31</sup> Yet experts note that the problem goes beyond old sewage infrastructure and has root causes in state-wide development trends and rapidly diminishing green space, which have increased stormwater runoff and overwhelmed sewage systems across the state.<sup>32</sup>

Sanitary sewers, which are designed to carry sewage alone, are less prone to overflows than combined sewers, yet can also spill dangerous sewage if they are overwhelmed or poorly maintained.<sup>33</sup> Sanitary sewers overflow as many as 75,000 times each year in the U.S.<sup>34</sup> Deteriorating sewers can experience exfiltration (sewage leaking from pipes) or infiltration (groundwater or stormwater entering pipes, which can cause overflows).<sup>35</sup> Storm events and high water levels can also



Dozens of communities with polluting combined sewer systems are near the Great Lakes. Combined sewer overflows discharge millions of gallons of untreated sewage to the Great Lakes each year. Credit: EPA

overwhelm sewage treatment plants themselves, which can be located near coasts and waterways.<sup>36</sup>

Private septic systems, which are used by approximately one in four Americans, are also a serious source of sewage pollution.<sup>37</sup> Septic systems have a failure rate of between 5 and 35 percent.<sup>38</sup> Septic system maintenance typically depends on homeowners, and research has found that many septic system owners may not understand how often maintenance is required, or the importance of maintenance for the environment and public health.<sup>39</sup> Septic systems are often used in areas with sprawling development, where building centralized sewer and water treatment systems is difficult or prohibitively expensive.<sup>40</sup>

## Industrial livestock operations threaten manure pollution

According to the National Association of Local Boards of Health, fecal pollution from agriculture is “responsible for many beach closures and shellfish restrictions.”<sup>41</sup> This pollution risk is markedly worse at factory farms (also known as “concentrated animal feeding operations” or CAFOs), because of the sheer volume of manure generated.

In recent decades, meat and dairy production in America has radically shifted from small farms to industrial-scale operations.<sup>42</sup> In 1992, for example, less than a third of all hogs were raised on farms with more than 2,000 animals; in 2012, 97 percent of hogs were.<sup>43</sup>

As of the end of 2017, there were 19,961 “large” CAFOs in the United States, defined as operations with at least 1,000 cattle, 10,000 swine or 125,000 chickens.<sup>44</sup>

On traditional smaller farms, animal droppings could often be naturally dispersed and absorbed by crops or pasture. At today’s densely packed facilities, however, the volume of manure generated is far greater than surrounding cropland can absorb. This inevitably leads to the overapplication of manure. Rains can then sweep the excess into nearby creeks, rivers and streams.

Some types of CAFOs – typically hog and dairy farms – store large volumes of manure in lagoons.<sup>45</sup> These lagoons can be inundated during heavy storms, causing manure to flow into nearby waterways.<sup>46</sup>

Nationally, industrial-scale livestock operations generate hundreds of millions of tons of manure each year.<sup>47</sup> This contamination can reach beaches, either washing directly from manure lagoons or livestock facilities, or as runoff after it is applied to crops as fertilizer.<sup>48</sup>

Many livestock operations are in proximity to America’s coastal and Great Lakes beaches. Cattle farming is common in coastal areas of California, Texas and Florida; and hogs and pigs are raised intensively in North Carolina.<sup>49</sup> In all three coastal states, livestock waste has been implicated in water quality problems at or near the coast, including high levels of fecal indicator bacteria.<sup>50</sup> Livestock waste also contributes to bacteria levels in the Great Lakes.<sup>51</sup>

## Other factors affecting bacteria levels and health risk

Runoff from development, sewage overflows and manure from factory farms pose major threats to the safety of beaches across the country. At individual beaches, however, the causes of day-to-day bacteria levels are varied, and can include other sources.

**Certain beaches are more susceptible to contamination.** Factors including rainfall and physical beach layout have an impact on bacteria levels and susceptibility to contamination. EPA notes that, in recent years, “several studies have highlighted the importance of significant rainfall in determining the degree of water contamination.”<sup>56</sup> A study in Southern California found that storms with more than 6 millimeters of rainfall “consistently led to beach water quality degradation.”<sup>57</sup> The physical layout of beaches also has a significant impact on pollution levels. A state of California study found that enclosed beaches – for example beaches in enclosed bays or harbors – were five times more likely than open coastal beaches to exceed state standards for fecal bacteria.<sup>58</sup>

**Some sources of contamination are outside of human control.** Not all contamination results from

human activity or pollution. Wildlife, including birds and aquatic animals, generates waste and bacteria.<sup>59</sup> This means that even pristine areas may occasionally have days where bacteria readings are high. Contamination can also result from humans using a beach for recreational purposes.

**Bacteria from natural sources can be less indicative of risk.** Because there are a variety of sources for fecal indicator bacteria, not all bacteria signify the same level of risk. Bacteria from wildlife may not always signify the same risk to humans as bacteria in human waste or the waste of certain livestock. One study from *Epidemiology* noted that some animals can shed “bacterial indicators without certain accompanying human pathogens.”<sup>60</sup> Indeed, fecal indicator bacteria may not always indicate the presence of fecal matter at all, as the bacteria can exist in other sources including sand, soil and marine vegetation.<sup>61</sup> In setting its water quality criteria and Beach Action Values, EPA considered the differences in risk posed by various bacteria sources.<sup>62</sup>

Recreational contact with water contaminated by livestock waste is dangerous. Animal manure can contain a variety of bacterial and viral pathogens that cause disease in humans.<sup>52</sup> Cattle feces likely pose particular risk, and may pose risks similar to human waste.<sup>53</sup>

Agricultural waste likely poses additional health risk because of the heavy use of antibiotics on livestock, which has contributed to the rise of antibiotic-resistant bacteria that cause illnesses that can be difficult or impossible to treat. In EPA's 2018 review of its recre-

ational water criteria, the agency devoted an entire section to the health threat posed by resistant bacteria in recreational water, writing that "Drug-resistant bacteria and associated genes have become an emerging concern regarding the protection of human health during recreational activities in surface waters."<sup>54</sup> EPA cited one study showing that water downstream from concentrated swine operations can contain high levels of enterococci and *E. coli* exhibiting resistance to antibiotics including erythromycin and tetracycline.<sup>55</sup>

# American beaches are often unsafe for swimming

Testing data collected from around the country reveal that, all too often, beach water may be unsafe for swimming.

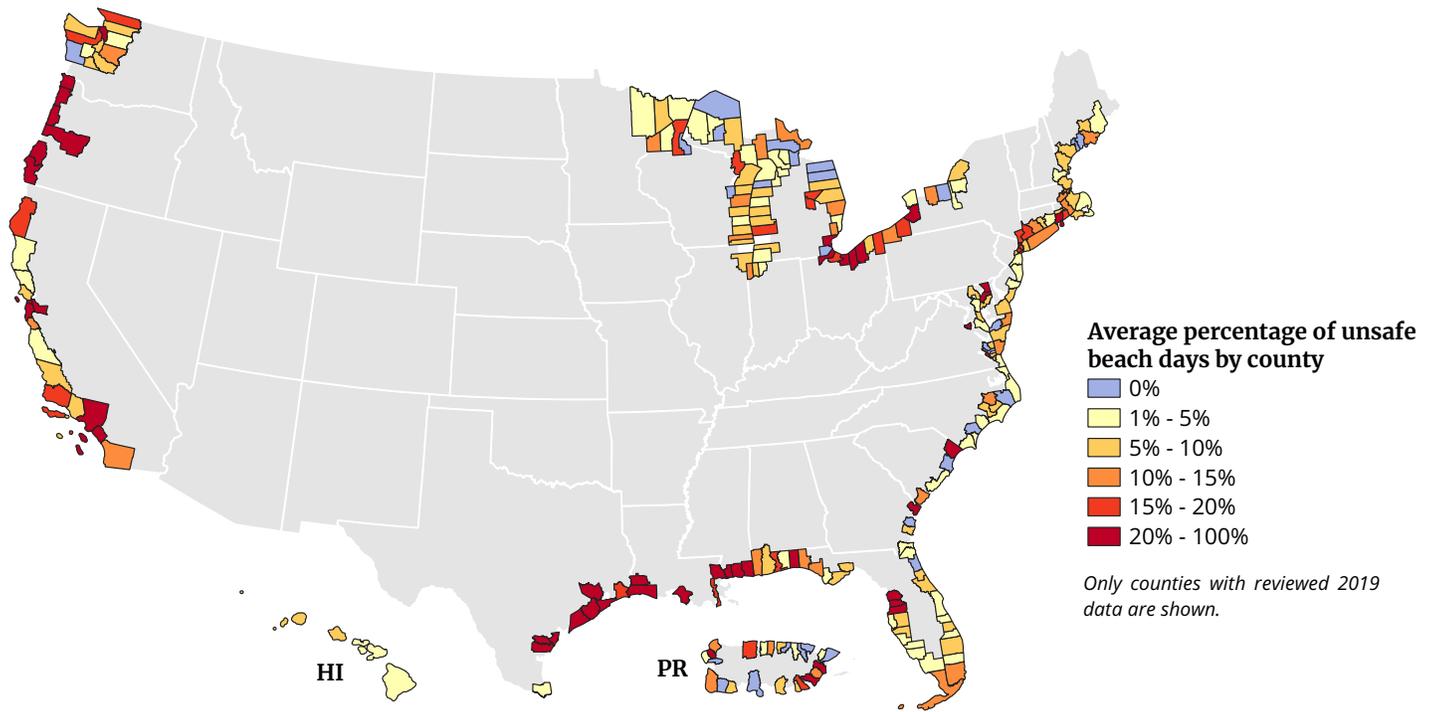
As of June 2020, water quality data for 2019 from 3,172 beaches in 29 coastal and Great Lakes states and Puerto Rico was available through the National Water Quality Monitoring Council's Water Quality Portal.<sup>63</sup> "Beaches" refers to recreation waters listed under the Beaches Environmental Assessment and Coastal Health Act (BEACH Act).

Of those beaches, 1,793 (57 percent) were potentially unsafe for swimming on at least one day during 2019, and 386 were potentially unsafe at least 25 percent of the days that sampling took place.

Beaches were considered potentially unsafe if fecal indicator bacteria levels exceeded the U.S. Environmental Protection Agency's most protective "Beach Action Value," which EPA suggests states use as a "conservative, precautionary tool for making beach notification decisions."<sup>64</sup> As many states use other criteria for beach closure and notification decisions, results presented in this report may differ from those in state reports on beach water quality. (See Methodology for details.)

Data for 2019 indicates potentially unsafe levels of fecal contamination in every region of the country.

- Among East Coast beaches, 928 beaches, or 51% of the 1,820 beaches tested, were potentially unsafe for at least one day in 2019. 172 beaches, 9% of those tested, were potentially unsafe on at least 25% of the days that testing took place.
- Among Great Lakes beaches, 284 beaches, or 59% of the 484 beaches tested, were potentially unsafe for at least one day in 2019. 55 beaches, 11% of those tested, were potentially unsafe on at least 25% of the days that testing took place.
- Among Gulf Coast beaches, 223 beaches, or 84% of the 266 beaches tested, were potentially unsafe for at least one day in 2019. 65 beaches, 24% of those tested, were potentially unsafe on at least 25% of the days that testing took place.
- Among West Coast beaches, 258 beaches, or 75% of the 346 beaches tested, were potentially unsafe for at least one day in 2019. 79 beaches, 23% of those tested, were potentially unsafe on at least 25% of the days that testing took place.

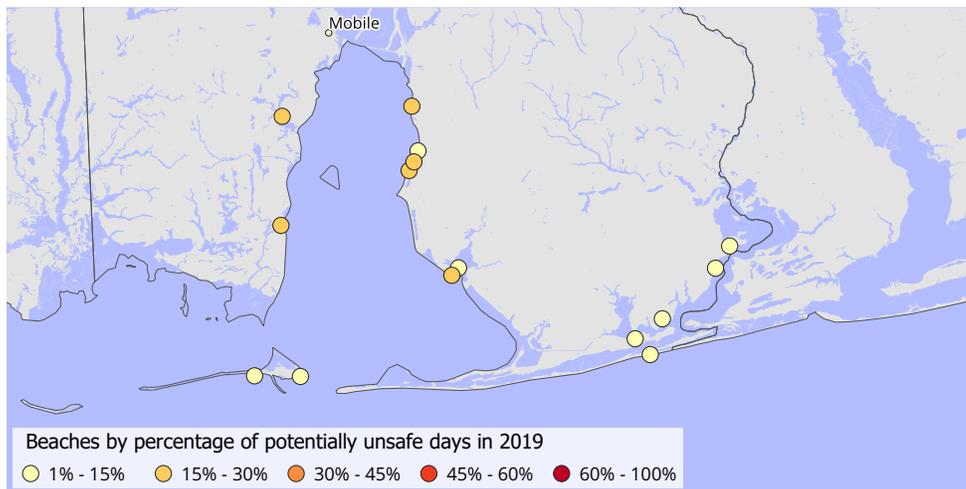


**Figure 1. Average percentage of potentially unsafe beach days in 2019 by county**  
 “Average percentage” represents the average of the percentage of potentially unsafe days at each beach within a county. Only counties with reviewed 2019 testing are visible on map.

Water quality data presented in this report is not necessarily comparable between beaches or states, as sampling techniques, reporting practices, frequency of testing and other factors vary by agency and by site. For some beaches, results are reported as a daily summary of multiple individual samples, with the potential to mask certain high bacteria readings. Some beaches are subject to additional testing following rainfall, pollution events like sewage spills, or as follow-up to other tests

showing high bacteria counts, creating the potential for those beaches to show a higher percentage of contaminated days than if sampling had occurred at regular intervals.<sup>65</sup> Some beaches are tested more often than others, including multiple times per day, or at multiple testing sites (beaches with multiple testing sites are marked with an asterisk in state tables below). Many beaches are not monitored at all and may present risks that are unaddressed in this report.<sup>66</sup>

## Beach pollution by state



### Alabama

◀ In Alabama, 15 tested beaches were potentially unsafe for swimming on at least one day in 2019.

In 2019, 25 beaches were tested for fecal indicator bacteria in Alabama. Tests at 15 of those beaches found potentially unsafe water on at least one day. Fairhope Public Beach in Baldwin County tested as potentially unsafe for 12 days, more days than any other beach in the state, and 21% of the days that sampling took place. In Mobile County, the average beach was potentially unsafe for swimming on 12% of the days that sampling took place, a higher percentage than any other county in the state.

### Top beach sites by most potentially unsafe swimming days in Alabama in 2019

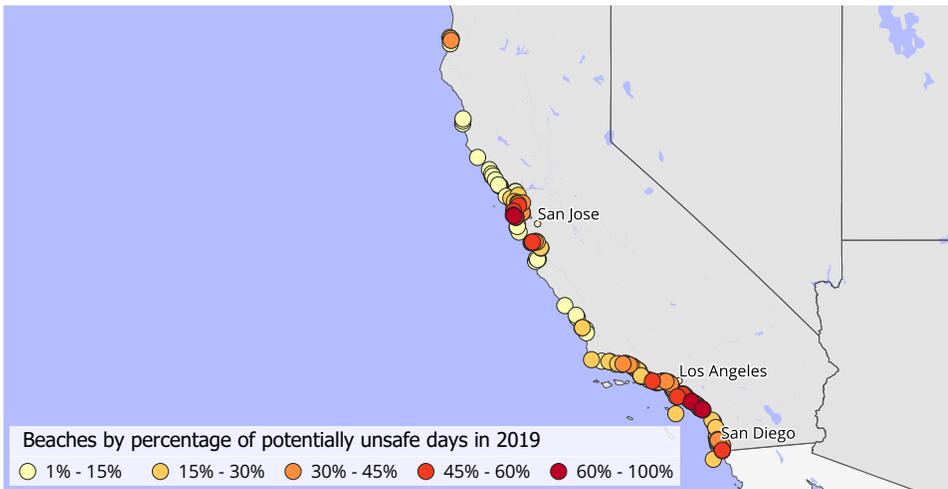
Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Fairhope Public Beach	Baldwin	12	56	21%
May Day Park	Baldwin	7	31	23%
Dog River, Alba Club	Mobile	7	33	21%
Orange Street Pier/Beach	Baldwin	5	31	16%
Fowl River at Highway 193	Mobile	5	32	16%
Camp Beckwith	Baldwin	4	52	8%
Mary Ann Nelson Beach	Baldwin	3	18	17%
Kee Avenue	Baldwin	3	30	10%
Orange Beach Waterfront Park	Baldwin	3	31	10%
Volanta Avenue	Baldwin	2	29	7%

### Average percentage of potentially unsafe days in Alabama by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Mobile	12%	4
Baldwin	6%	21

## California

◀ In California, 202 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in California in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Inner Cabrillo Beach*†	Los Angeles	150	258	58%
Marina Del Rey Beach/ Mothers Beach*†	Los Angeles	111	299	37%
Topanga State Beach†	Los Angeles	101	257	39%
Santa Monica State Beach*†	Los Angeles	93	305	30%
Will Rogers State Beach*†	Los Angeles	83	306	27%
Tijuana Slough National Wildlife Refuge*	San Diego	76	146	52%
Long Beach*	Los Angeles	74	146	51%
Malibu Lagoon State Beach*†	Los Angeles	71	303	23%
Imperial Beach*	San Diego	56	176	32%
Border Field State Park*	San Diego	55	131	42%

### Average percentage of potentially unsafe days in California by county in 2019

Table limited to counties with highest average percentage of potentially unsafe days.

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Alameda	32%	2
San Mateo‡	26%	20
San Francisco‡	25%	8
Orange	25%	22
Los Angeles‡	22%	32
Humboldt‡	20%	5
Santa Barbara	19%	15
Santa Cruz‡	14%	22
San Diego‡	12%	47
San Luis Obispo‡	8%	10

In 2019, 253 beaches were tested for fecal indicator bacteria in California. Tests at 202 of those beaches found potentially unsafe water on at least one day. Inner Cabrillo Beach in Los Angeles County tested as potentially unsafe for 150 days, more days than any other beach in the state, and 58% of the days that sampling took place. In Alameda County, the average beach was potentially unsafe for swimming on 32% of the days that sampling took place, a higher percentage than any other county in the state.

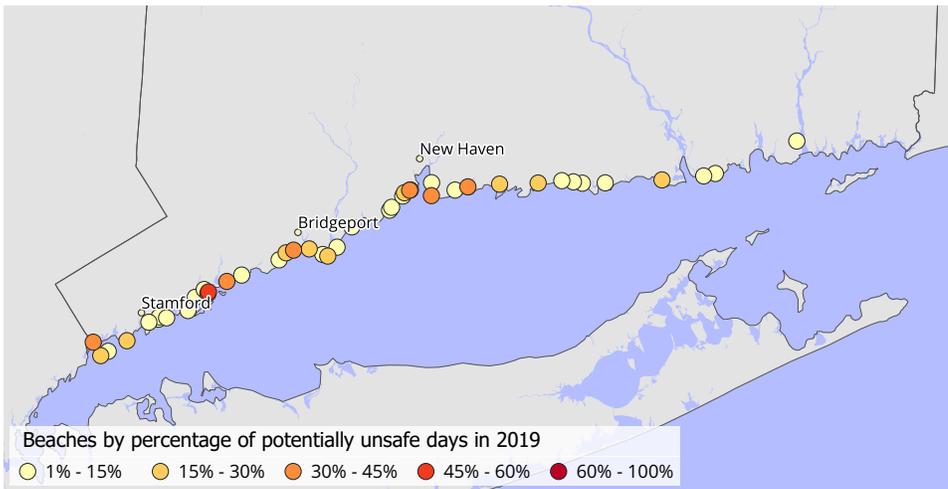
\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

† Some beach water quality tests assessed *E. coli* for marine water, for which no Beach Action Value is available. Those tests were not considered in calculating potentially unsafe days.

‡ Some county water quality tests assessed *E. coli* for marine water, for which no Beach Action Value is available. Those tests were not considered in calculating county averages.

## Connecticut

◀ In Connecticut, 44 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Connecticut in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Shady Beach*	Fairfield	10	22	45%
Byram Beach*	Fairfield	8	19	42%
Calf Pasture Beach*	Fairfield	8	21	38%
Seaside Park Beach*	Fairfield	6	14	43%
Branford Point Beach	New Haven	6	18	33%
Compo Beach*	Fairfield	5	13	38%
Lighthouse Point Beach*	New Haven	5	15	33%
Great Captain's Island Beach*	Fairfield	4	18	22%
Oak Street B Beach	New Haven	3	9	33%
Harvey's Beach	Middlesex	3	14	21%
Long Beach (Marnick's)	Fairfield	3	14	21%
Seabright Beach	Fairfield	3	14	21%

### Average percentage of potentially unsafe days in Connecticut by county in 2019

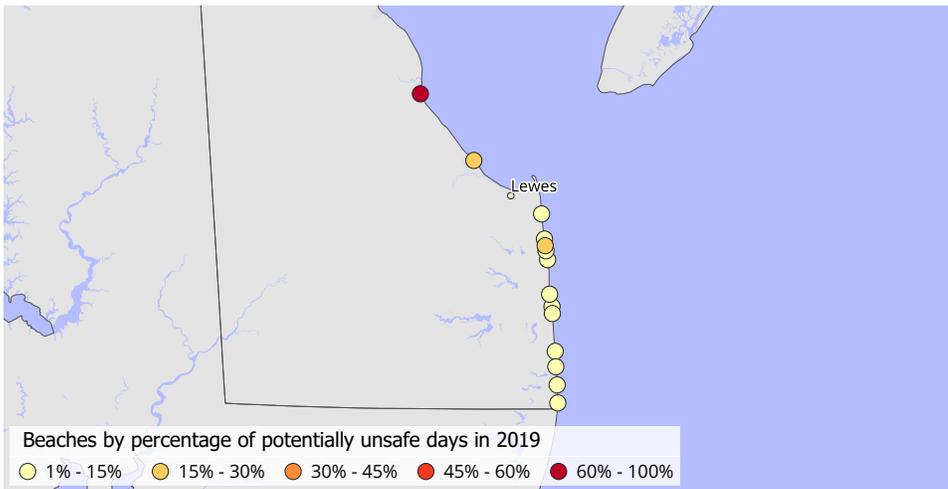
County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Fairfield	16%	29
New Haven	10%	25
Middlesex	7%	4
New London	2%	12

In 2019, 70 beaches were tested for fecal indicator bacteria in Connecticut. Tests at 44 of those beaches found potentially unsafe water on at least one day. Shady Beach in Fairfield County tested as potentially unsafe for 10 days, more days than any other beach in the state, and 45% of the days that sampling took place. In Fairfield County, the average beach was potentially unsafe for swimming on 16% of the days that sampling took place, a higher percentage than any other county in the state.

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Delaware

◀ In Delaware, 14 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Delaware in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Slaughter Beach	Sussex	12	19	63%
Broadkill Beach	Sussex	5	18	28%
Dewey Beach-Swedens	Sussex	4	17	24%
Dewey Beach-Dagsworthy	Sussex	4	40	10%
Rehoboth-Queen St Beach	Sussex	2	16	12%
North Indian River Inlet Beach	Sussex	2	17	12%
3 R's Road Beach	Sussex	1	16	6%
Atlantic Beach Near Gordons Pond	Sussex	1	16	6%
Fenwick Island State Park Beach	Sussex	1	16	6%
South Bethany Beach	Sussex	1	16	6%
South Indian River Inlet Beach	Sussex	1	16	6%
Tower Road-Ocean Beach	Sussex	1	16	6%

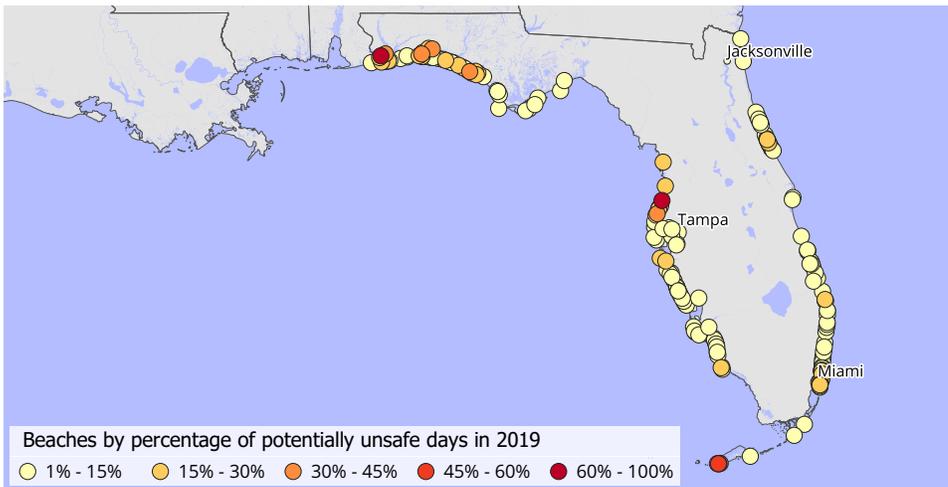
### Average percentage of potentially unsafe days in Delaware by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Sussex	8%	23

In 2019, 23 beaches were tested for fecal indicator bacteria in Delaware. Tests at 14 of those beaches found potentially unsafe water on at least one day. Slaughter Beach in Sussex County tested as potentially unsafe for 12 days, more days than any other beach in the state, and 63% of the days that sampling took place. In Sussex County, the average beach was potentially unsafe for swimming on 8% of the days that sampling took place.

## Florida

◀ In Florida, 187 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Florida in 2019

*State beach data is from alternate data source. See Methodology for details.*

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
South Beach (Key West)	Monroe	22	43	51%
Robert J. Strickland Beach	Pasco	19	26	73%
Crandon Park - South	Miami-Dade	19	67	28%
Higgs Beach	Monroe	18	40	45%
Bayou Chico	Escambia	16	25	64%
Bayou Texar	Escambia	16	51	31%
Crandon Park - North	Miami-Dade	14	62	23%
Blue Mountain Beach Access	Walton	12	42	29%
Palma Sola South	Manatee	12	44	27%
North Shore Ocean Terrace	Miami-Dade	12	62	19%

### Average percentage of potentially unsafe days in Florida by county in 2019

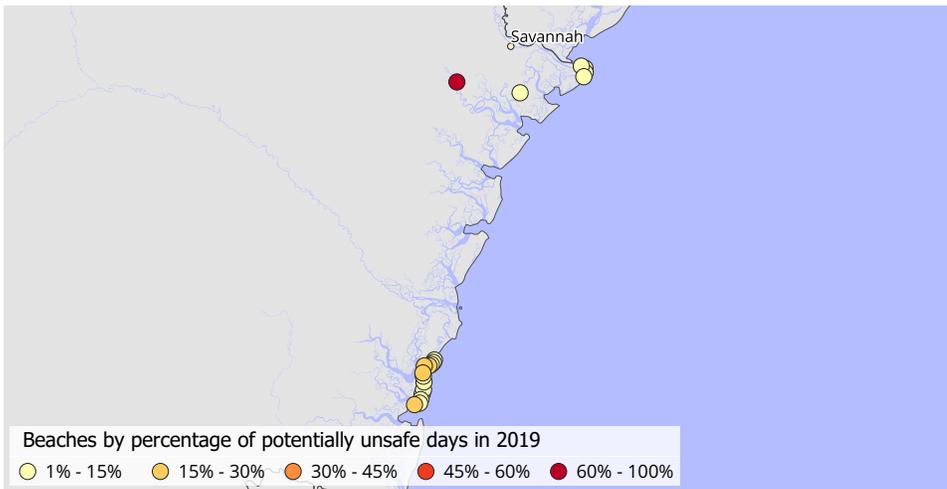
*Table limited to counties with highest average percentage of potentially unsafe days. Note that some counties only had monitoring data for one beach in 2019.*

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Pasco	33%	5
Hernando	29%	1
Citrus	22%	1
Okaloosa	22%	10
Escambia	17%	13
Miami-Dade	14%	16
Walton	14%	7
Bay	13%	10
Monroe	11%	11
Volusia	9%	13

In 2019, 261 beaches were tested for fecal indicator bacteria in Florida. Tests at 187 of those beaches found potentially unsafe water on at least one day. South Beach (Key West) in Monroe County tested as potentially unsafe for 22 days, more days than any other beach in the state, and 51% of the days that sampling took place. In Pasco County, the average beach was potentially unsafe for swimming on 33% of the days that sampling took place, a higher percentage than any other county in the state.

## Georgia

◀ In Georgia, 19 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Georgia in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
St. Simons Island Lighthouse Beach	Glynn	9	47	19%
5th St. Crossover (St. Simons Island)	Glynn	8	46	17%
Tybee Island Strand	Chatham	6	45	13%
Tybee Island Polk St.	Chatham	5	44	11%
East Beach Old Coast Guard (St. Simons Island)	Glynn	5	45	11%
Massengale (St. Simons Island)	Glynn	5	45	11%
Kings Ferry	Chatham	4	4	100%
4H Camp (Jekyll)	Glynn	4	44	9%
Jekyll Driftwood Beach	Glynn	4	45	9%
Jekyll North at Dexter Lane	Glynn	3	43	7%
Tybee Island Middle	Chatham	3	43	7%

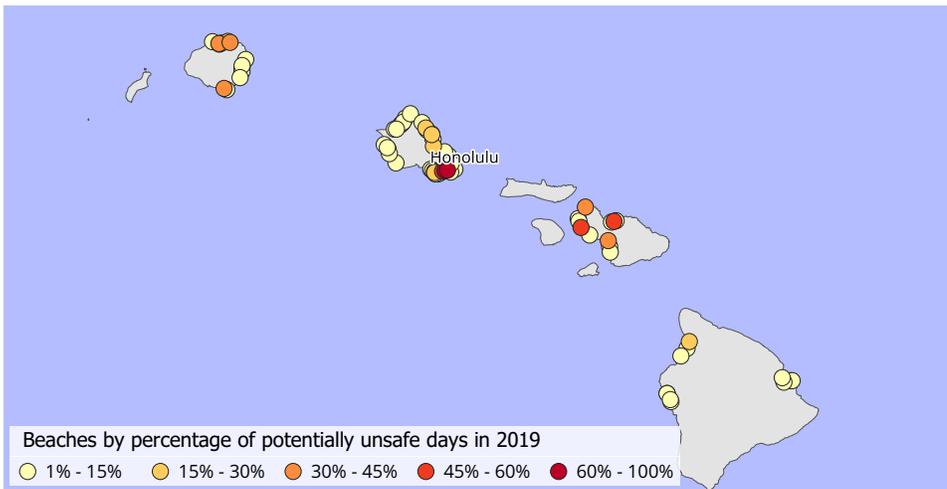
### Average percentage of potentially unsafe days in Georgia by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Chatham	22%	7
Glynn	9%	17
McIntosh	0%	2

In 2019, 26 beaches were tested for fecal indicator bacteria in Georgia. Tests at 19 of those beaches found potentially unsafe water on at least one day. St. Simons Island Lighthouse Beach in Glynn County tested as potentially unsafe for 9 days, more days than any other beach in the state, and 19% of the days that sampling took place. In Chatham County, the average beach was potentially unsafe for swimming on 22% of the days that sampling took place, a higher percentage than any other county in the state.

## Hawaii

◀ In Hawaii, 76 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Hawaii in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Kuliouou Beach	Honolulu	10	11	91%
Hanalei Beach Co. Park*	Kauai	9	59	15%
Niu Beach	Honolulu	8	10	80%
Kalapaki Beach	Kauai	7	48	15%
Beach House Beach	Kauai	4	10	40%
Queen's Surf Beach Park	Honolulu	4	24	17%
Honoli'i Beach Co. Park	Hawaii	4	27	15%
Hanauma Bay	Honolulu	4	43	9%
Kualoa Co. Regional Park	Honolulu	4	48	8%
Kuhio Beach Park	Honolulu	4	56	7%

### Average percentage of potentially unsafe days in Hawaii by county in 2019

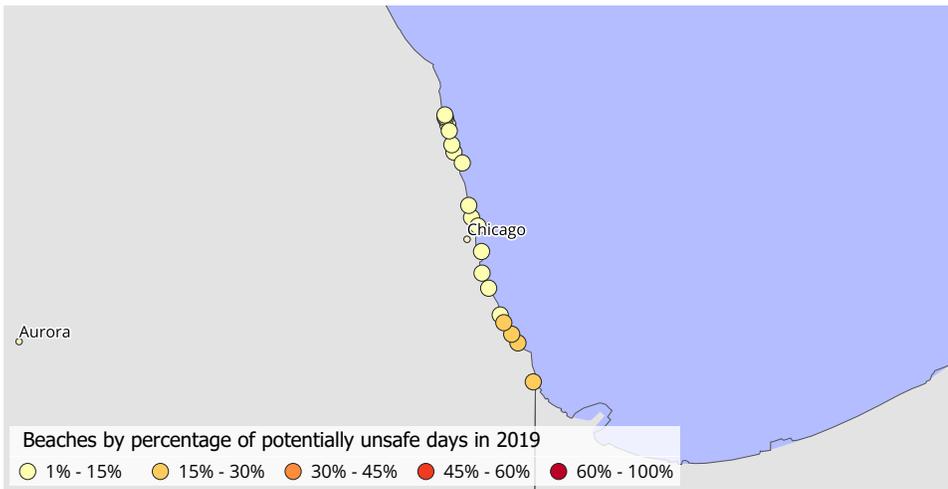
County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Kauai	6%	34
Honolulu	5%	110
Maui	4%	51
Hawaii	3%	26

In 2019, 221 beaches were tested for fecal indicator bacteria in Hawaii. Tests at 76 of those beaches found potentially unsafe water on at least one day. Kuliouou Beach in Honolulu County tested as potentially unsafe for 10 days, more days than any other beach in the state, and 91% of the days that sampling took place. In Kauai County, the average beach was potentially unsafe for swimming on 6% of the days that sampling took place, a higher percentage than any other county in the state.

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Illinois

◀ In Illinois, 19 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Illinois in 2019

State beach data is from alternate data source. See Methodology for details.

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
63rd Street Beach	Cook	19	101	19%
Calumet South Beach	Cook	18	102	18%
South Shore Beach	Cook	17	101	17%
Rainbow Beach	Cook	16	102	16%
Margaret T Burroughs (31st St. Beach)	Cook	15	101	15%
Rogers Avenue Park Beach	Cook	12	86	14%
Ohio Street Beach	Cook	10	100	10%
Hartigan Beach	Cook	10	102	10%
Montrose Beach	Cook	9	99	9%
Kathy Osterman Beach	Cook	8	101	8%

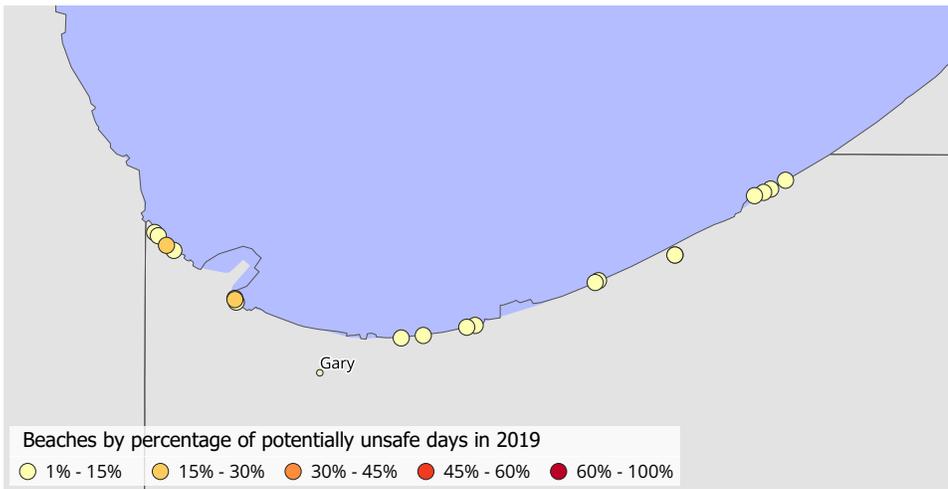
### Average percentage of potentially unsafe days in Illinois by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Cook	9%	19

In 2019, 19 beaches were tested for fecal indicator bacteria in Illinois. Tests at all 19 of those beaches found potentially unsafe water on at least one day. 63rd Street Beach in Cook County tested as potentially unsafe for 19 days, more days than any other beach in the state, and 19% of the days that sampling took place. In Cook County, the average beach was potentially unsafe for swimming on 9% of the days that sampling took place.

## Indiana

◀ In Indiana, 19 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Indiana in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Jeorse Park Beach I	Lake	28	94	30%
Jeorse Park Beach II	Lake	20	94	21%
Whihala Beach West	Lake	17	93	18%
Indiana Dunes State Park West Beach	Porter	14	101	14%
Washington Park Beach	LaPorte	14	113	12%
Buffington Harbor Beach	Lake	13	93	14%
Broadway Beach	Porter	10	101	10%
Hammond Marina East Beach	Lake	9	101	9%
Whihala Beach East	Lake	8	93	9%
Ogden Dunes West Beach	Porter	8	101	8%

### Average percentage of potentially unsafe days in Indiana by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Lake	12%	10
Porter	8%	6
LaPorte	4%	7

In 2019, 23 beaches were tested for fecal indicator bacteria in Indiana. Tests at 19 of those beaches found potentially unsafe water on at least one day. Jeorse Park Beach I in Lake County tested as potentially unsafe for 28 days, more days than any other beach in the state, and 30% of the days that sampling took place. In Lake County, the average beach was potentially unsafe for swimming on 12% of the days that sampling took place, a higher percentage than any other county in the state.

## Louisiana

◀ In Louisiana, 23 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Louisiana in 2019

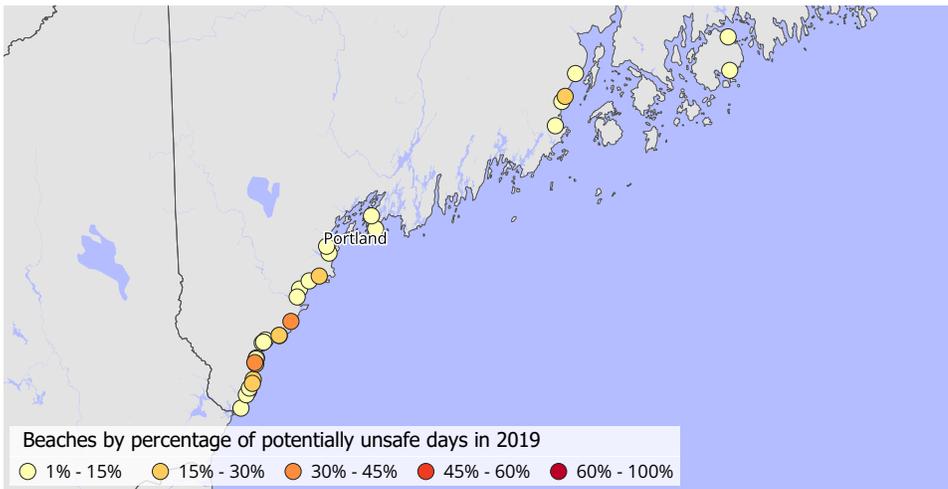
Beach name	Parish	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Lake Charles North Beach	Calcasieu	20	30	67%
Fontainebleau State Park	St. Tammany	19	29	66%
Rutherford Beach	Cameron	13	30	43%
Cypremort Point State Park	St. Mary	10	30	33%
Holly Beach - 6	Cameron	10	30	33%
Holly Beach - 1	Cameron	8	30	27%
Constance Beach	Cameron	7	30	23%
Grand Isle State Park - 1	Jefferson	7	30	23%
Little Florida	Cameron	7	30	23%
Long Beach	Cameron	7	30	23%

### Average percentage of potentially unsafe days in Louisiana by parish in 2019

*Note that some parishes only had monitoring data for one beach in 2019.*

Parish	Average percentage of days with potentially unsafe water for beaches in parish	Number of tested beaches
Calcasieu	67%	1
St. Tammany	66%	1
St. Mary	33%	1
Cameron	22%	12
Jefferson	16%	8

In 2019, 23 beaches were tested for fecal indicator bacteria in Louisiana. Tests at all 23 of those beaches found potentially unsafe water on at least one day. Lake Charles North Beach in Calcasieu Parish tested as potentially unsafe for 20 days, more days than any other beach in the state, and 67% of the days that sampling took place. In Calcasieu Parish (with just one monitored beach in 2019), the average beach was potentially unsafe for swimming on 67% of the days that sampling took place, a higher percentage than any other parish in the state.



## Maine

◀ In Maine, 31 tested beaches were potentially unsafe for swimming on at least one day in 2019.

In 2019, 63 beaches were tested for fecal indicator bacteria in Maine. Tests at 31 of those beaches found potentially unsafe water on at least one day. Goose Rocks Beach in York County tested as potentially unsafe for 12 days, more days than any other beach in the state, and 44% of the days that sampling took place. In Knox County, the average beach was potentially unsafe for swimming on 12% of the days that sampling took place, a higher percentage than any other county in the state.

### Top beach sites by most potentially unsafe swimming days in Maine in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Goose Rocks Beach*	York	12	27	44%
Riverside (Ogunquit)	York	7	18	39%
Little Beach	York	4	15	27%
Short Sands Beach	York	4	15	27%
Cape Neddick Beach	York	4	16	25%
Higgins Beach*	Cumberland	3	15	20%
East End Beach	Cumberland	3	27	11%
Gooch's Beach*	York	2	13	15%
Laite Beach	Knox	2	13	15%
Drakes Island Beach*	York	2	14	14%
Ferry Beach (Scarborough)	Cumberland	2	14	14%
Long Sands Beach - North*	York	2	14	14%
Mitchell Field Beach	Cumberland	2	14	14%
York Harbor Beach	York	2	14	14%

### Average percentage of potentially unsafe days in Maine by county in 2019

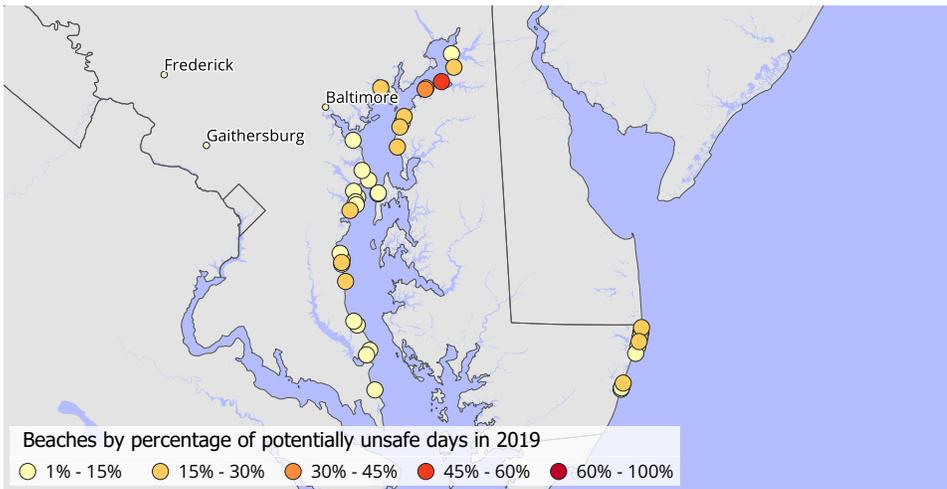
*Note that some counties only had monitoring data for one beach in 2019.*

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Knox	12%	3
York	9%	35
Waldo	8%	1
Cumberland	6%	12
Hancock	3%	5
Sagadahoc	0%	6
Lincoln	0%	1

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Maryland

◀ In Maryland, 41 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Maryland in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Ocean City Beach 3*	Worcester	8	28	29%
Ocean City Beach 6	Worcester	6	28	21%
Ocean City Beach 4	Worcester	5	28	18%
Grove Point Camp	Cecil	3	5	60%
YMCA Camp Tockwogh*	Kent	3	7	43%
Assateague State Park*	Worcester	3	16	19%
Breezy Point	Calvert	3	17	18%
Mayo Beach Park	Anne Arundel	3	17	18%
Ocean City Beach 1	Worcester	3	28	11%
Echo Hill Camp (Youth Camp)*	Kent	2	7	29%
Ferry Park	Kent	2	7	29%
Gunpowder Falls - Hammerman Area	Baltimore	2	7	29%
Tolchester Marina and Beach	Kent	2	7	29%

### Average percentage of potentially unsafe days in Maryland by county in 2019

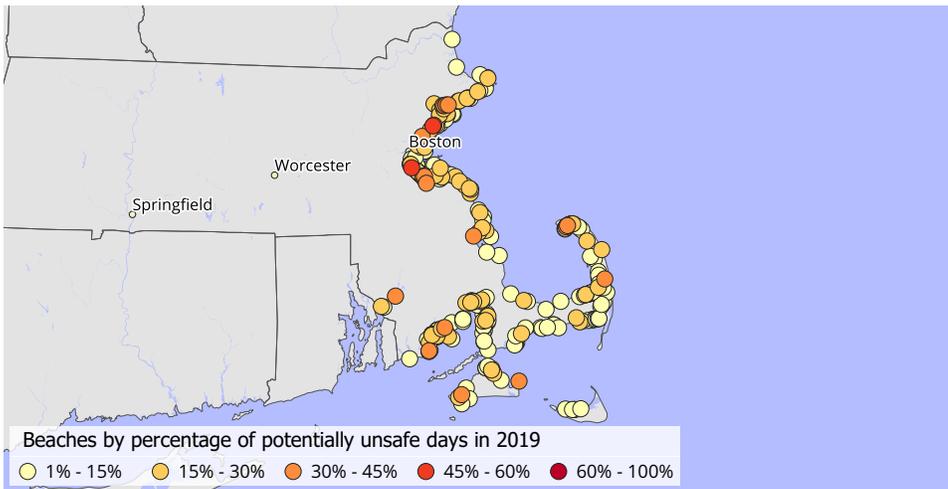
County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Cecil	30%	3
Kent	28%	6
Worcester	14%	10
Calvert	10%	10
Queen Anne's	6%	2
Baltimore	6%	5
St. Mary's	4%	3
Anne Arundel	4%	26
Somerset	0%	2

In 2019, 67 beaches were tested for fecal indicator bacteria in Maryland. Tests at 41 of those beaches found potentially unsafe water on at least one day. Ocean City Beach 3 in Worcester County tested as potentially unsafe for 8 days, more days than any other beach in the state, and 29% of the days that sampling took place. In Cecil County, the average beach was potentially unsafe for swimming on 30% of the days that sampling took place, a higher percentage than any other county in the state.

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Massachusetts

◀ In Massachusetts, 257 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Massachusetts in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Tenean Beach	Suffolk	44	90	49%
Kings Beach*	Essex	43	88	49%
Malibu Beach	Suffolk	20	87	23%
Wollaston at Channing Street	Norfolk	20	87	23%
Constitution Beach*	Suffolk	19	87	22%
Wollaston at Sachem Street	Norfolk	15	87	17%
Wollaston at Milton Street	Norfolk	14	87	16%
Wollaston at Rice Road	Norfolk	13	87	15%
Landing Road	Plymouth	8	21	38%
Salt Pond	Barnstable	8	23	35%

In 2019, 559 beaches were tested for fecal indicator bacteria in Massachusetts. Tests at 257 of those beaches found potentially unsafe water on at least one day. Tenean Beach in Suffolk County tested as potentially unsafe for 44 days, more days than any other beach in the state, and 49% of the days that sampling took place. In Suffolk County, the average beach was potentially unsafe for swimming on 14% of the days that sampling took place, a higher percentage than any other county in the state.

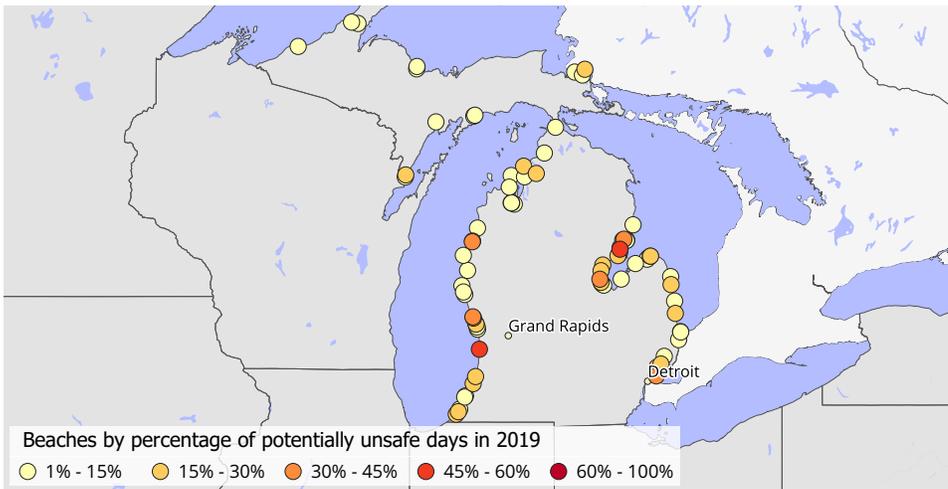
### Average percentage of potentially unsafe days in Massachusetts by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Suffolk	14%	18
Norfolk	14%	22
Bristol	11%	44
Essex	10%	80
Plymouth	8%	83
Dukes	5%	44
Barnstable	4%	252
Nantucket	2%	16

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Michigan

◀ In Michigan, 78 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Michigan in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
South Linwood Beach Township Park	Bay	13	41	32%
Lake St. Clair Metropark Beach	Macomb	10	53	19%
Pier Park	Wayne	8	18	44%
St. Clair Shores Memorial Park Beach	Macomb	8	50	16%
Singing Bridge Beach	Arenac	7	12	58%
Brissette Beach Township Park	Bay	6	39	15%
Pere Marquette Park	Muskegon	5	12	42%
New Baltimore Park Beach	Macomb	5	50	10%
Holland State Park	Ottawa	4	8	50%
First Street Beach	Manistee	4	11	36%

In 2019, 196 beaches were tested for fecal indicator bacteria in Michigan. Tests at 78 of those beaches found potentially unsafe water on at least one day. South Linwood Beach Township Park in Bay County tested as potentially unsafe for 13 days, more days than any other beach in the state, and 32% of the days that sampling took place. In Wayne County (with just one monitored beach in 2019), the average beach was potentially unsafe for swimming on 44% of the days that sampling took place, a higher percentage than any other county in the state.

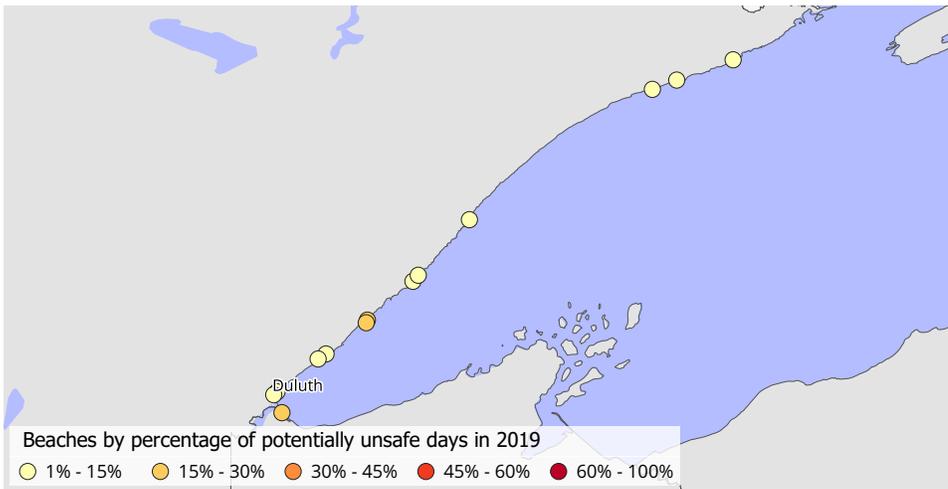
### Average percentage of potentially unsafe days in Michigan by county in 2019

*Table limited to counties with highest average percentage of potentially unsafe days. Note that some counties only had monitoring data for one beach in 2019.*

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches	County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Wayne	44%	1	Macomb	15%	3
Ottawa	20%	4	Schoolcraft	13%	2
Bay	19%	5	Chippewa	11%	4
Menominee	18%	2	Sanilac	11%	5
Arenac	17%	8	Muskegon	10%	13

## Minnesota

◀ In Minnesota, 13 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Minnesota in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Park Point Sky Harbor Parking Lot Beach	St. Louis	9	31	29%
Agate Bay Beach	Lake	5	18	28%
Burlington Bay Beach	Lake	3	15	20%
Durfee Creek Area Beach	Cook	2	14	14%
Grand Marais Campground Beach	Cook	2	14	14%
French River Beach	St. Louis	1	12	8%
Bluebird Landing Beach	St. Louis	1	13	8%
Chicago Bay Boat Launch Beach	Cook	1	13	8%
Gooseberry Falls State Park Beach	Lake	1	14	7%
Tettegouche State Park Beach	Lake	1	14	7%
Twin Points Public Access Beach	Lake	1	14	7%

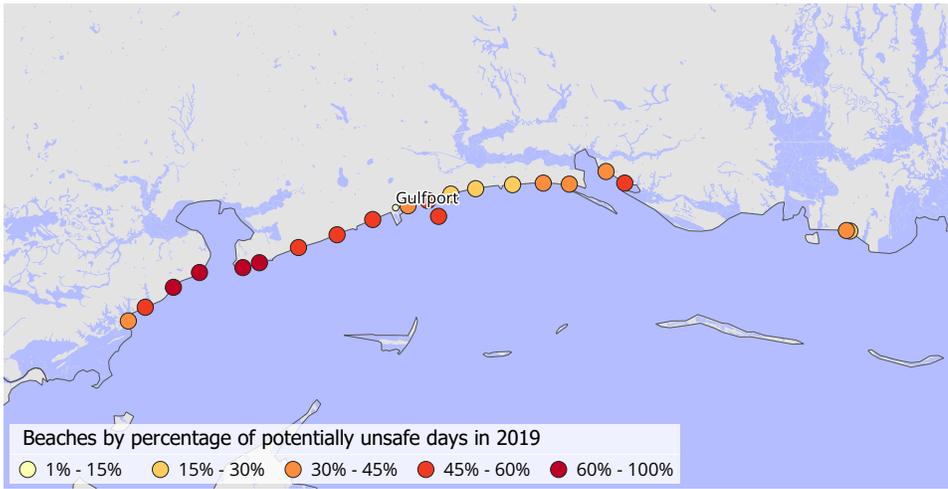
In 2019, 35 beaches were tested for fecal indicator bacteria in Minnesota. Tests at 13 of those beaches found potentially unsafe water on at least one day. Park Point Sky Harbor Parking Lot Beach in St. Louis County tested as potentially unsafe for 9 days, more days than any other beach in the state, and 29% of the days that sampling took place. In Lake County, the average beach was potentially unsafe for swimming on 8% of the days that sampling took place, a higher percentage than any other county in the state.

### Average percentage of potentially unsafe days in Minnesota by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Lake	8%	9
St. Louis	4%	15
Cook	3%	11

## Mississippi

◀ In Mississippi, 21 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Mississippi in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Pass Christian West Beach	Harrison	44	62	71%
Waveland Beach	Hancock	43	62	69%
Bay St. Louis Beach	Hancock	38	51	75%
Pass Christian Central Beach	Harrison	31	51	61%
Gulfport Central Beach	Harrison	30	50	60%
Shearwater Beach	Jackson	27	50	54%
Pass Christian East Beach	Harrison	25	49	51%
Gulfport West Beach	Harrison	24	45	53%
Long Beach	Harrison	24	46	52%
East Courthouse Road	Harrison	21	46	46%

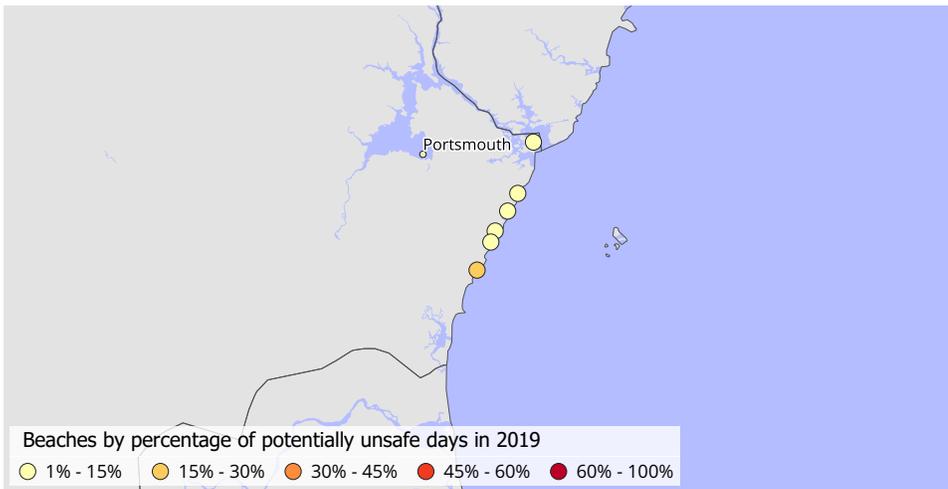
### Average percentage of potentially unsafe days in Mississippi by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Hancock	58%	4
Harrison	43%	13
Jackson	38%	4

In 2019, 21 beaches were tested for fecal indicator bacteria in Mississippi. Tests at all 21 of those beaches found potentially unsafe water on at least one day. Pass Christian West Beach in Harrison County tested as potentially unsafe for 44 days, more days than any other beach in the state, and 71% of the days that sampling took place. In Hancock County, the average beach was potentially unsafe for swimming on 58% of the days that sampling took place, a higher percentage than any other county in the state.

## New Hampshire

◀ In New Hampshire, 6 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in New Hampshire in 2019

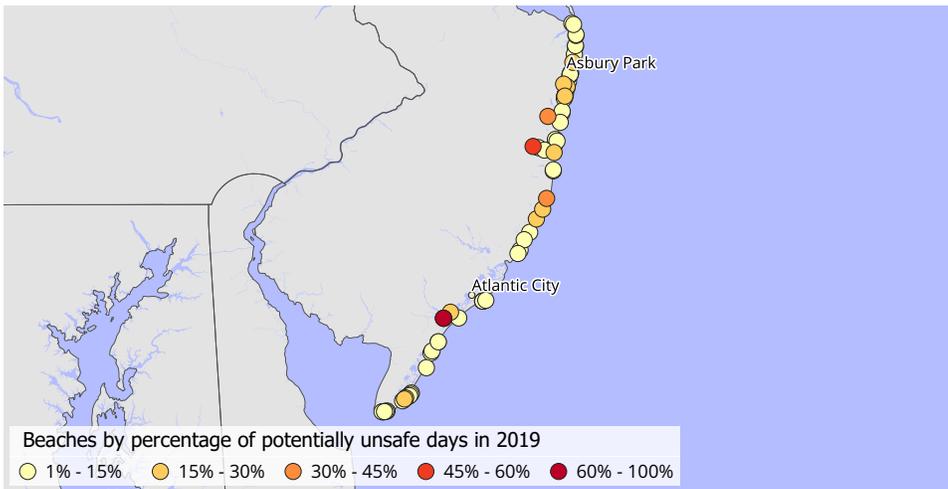
Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
North Hampton State Beach*	Rockingham	7	34	21%
New Castle Town Beach*	Rockingham	3	25	12%
Wallis Sands Beach at Wallis Road*	Rockingham	2	25	8%
Foss Beach*	Rockingham	1	9	11%
Sawyer Beach*	Rockingham	1	13	8%
Jenness Beach at Cable Road*	Rockingham	1	14	7%

### Average percentage of potentially unsafe days in New Hampshire by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Rockingham	4%	16

In 2019, 16 beaches were tested for fecal indicator bacteria in New Hampshire. Tests at 6 of those beaches found potentially unsafe water on at least one day. North Hampton State Beach in Rockingham County tested as potentially unsafe for 7 days, more days than any other beach in the state, and 21% of the days that sampling took place. In Rockingham County, the average beach was potentially unsafe for swimming on 4% of the days that sampling took place.

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.



## New Jersey

◀ In New Jersey, 73 tested beaches were potentially unsafe for swimming on at least one day in 2019.

In 2019, 222 beaches were tested for fecal indicator bacteria in New Jersey. Tests at 73 of those beaches found potentially unsafe water on at least one day. Two beaches – Beachwood Beach West in Ocean County, and Barnegat Light Bay Beach in Ocean County – tested as potentially unsafe for 9 days, more than any other beaches in the state. In Cape May County, the average beach was potentially unsafe for swimming on 5% of the days that sampling took place, a higher percentage than any other county in the state.

### Top beach sites by most potentially unsafe swimming days in New Jersey in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Beachwood Beach West*	Ocean	9	18	50%
Barnegat Light Bay Beach*	Ocean	9	21	43%
Windward Beach*	Ocean	8	21	38%
Harvey Cedars Borough at 75th Bay Front*	Ocean	4	16	25%
Sea Girt Borough at New York Blvd*	Monmouth	4	18	22%
Wildwood City at Bennett*	Cape May	4	20	20%
Surf City Borough at 16th St. Bay Front	Ocean	3	13	23%
Belmar Borough at L Street Beach*	Monmouth	3	15	20%
Belmar Borough at 20th*	Monmouth	3	17	18%
Long Branch City at Elberon Beach Club	Monmouth	3	17	18%
Somers Point City at New Jersey Ave*	Atlantic	3	17	18%

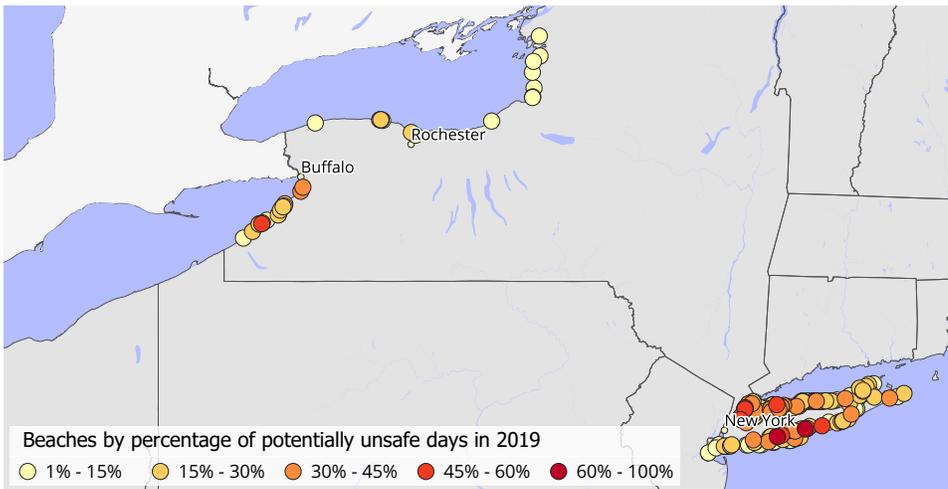
### Average percentage of potentially unsafe days in New Jersey by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Cape May	5%	69
Ocean	5%	60
Monmouth	5%	45
Atlantic	1%	48

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## New York

◀ In New York, 219 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in New York in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Tanner Park	Suffolk	56	79	71%
Woodlawn Beach State Park*	Erie	43	103	42%
Sayville Marina Park	Suffolk	34	56	61%
Hamburg Bathing Beach	Erie	32	95	34%
Valley Grove Beach	Suffolk	27	51	53%
Venetian Shores	Suffolk	25	51	49%
Benjamins Beach	Suffolk	25	57	44%
East Islip Beach	Suffolk	21	47	45%
Hewlett Beach	Nassau	21	57	37%
Huntington Beach Community Association	Suffolk	19	45	42%

In 2019, 350 beaches were tested for fecal indicator bacteria in New York. Tests at 219 of those beaches found potentially unsafe water on at least one day. Tanner Park in Suffolk County on Long Island tested as potentially unsafe for 56 days, more days than any other beach in the state, and 71% of the days that sampling took place. In Erie County, the average beach was potentially unsafe for swimming on 24% of the days that sampling took place, a higher percentage than any other county in the state.

### Average percentage of potentially unsafe days in New York by county in 2019

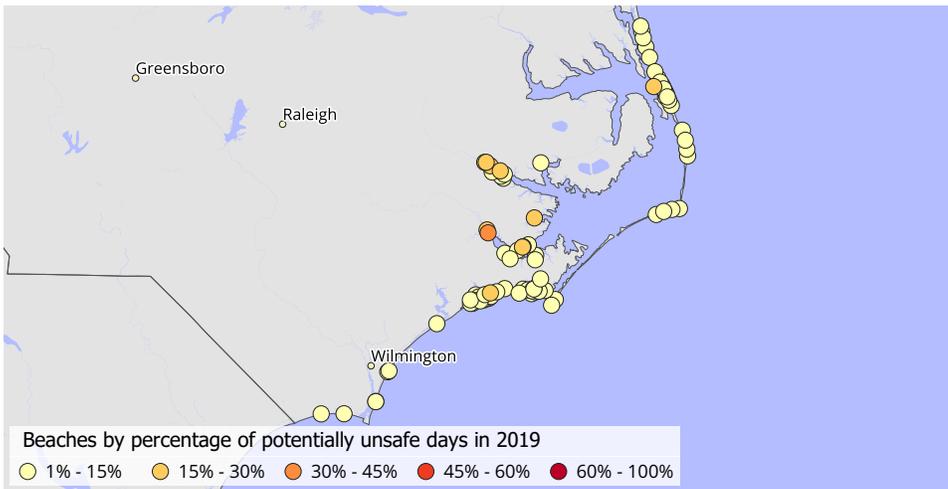
*Table limited to counties with highest average percentage of potentially unsafe days.*

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Erie	24%	7
Bronx	21%	10
Queens	18%	5
Kings	17%	6
Chautauqua	16%	10
Westchester	16%	23
Suffolk	14%	187
Monroe	12%	7
Richmond	8%	4
Nassau	6%	70

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## North Carolina

◀ In North Carolina, 93 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in North Carolina in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Colington Harbour Beach	Dare	6	33	18%
Pamlico River - City Park in Washington	Beaufort	5	19	26%
Public Beach Southside of Dawson Creek Bridge	Pamlico	5	20	25%
Ragged Point	Beaufort	5	34	15%
Pamlico River Railroad Trestle	Beaufort	4	18	22%
New Bern	Craven	4	19	21%
Dawson Creek	Pamlico	4	20	20%
Pantego Creek	Beaufort	4	32	12%
Bogue Sound - Goose Creek	Carteret	3	19	16%
Dinah's Landing	Beaufort	3	19	16%
Vandemere Creek	Pamlico	3	19	16%
Washington - Southeast of Washington Pt.	Beaufort	3	19	16%

In 2019, 209 beaches were tested for fecal indicator bacteria in North Carolina. Tests at 93 of those beaches found potentially unsafe water on at least one day. Colington Harbour Beach in Dare County tested as potentially unsafe for 6 days, more days than any other beach in the state, and 18% of the days that sampling took place. In Beaufort County, the average beach was potentially unsafe for swimming on 12% of the days that sampling took place, a higher percentage than any other county in the state.

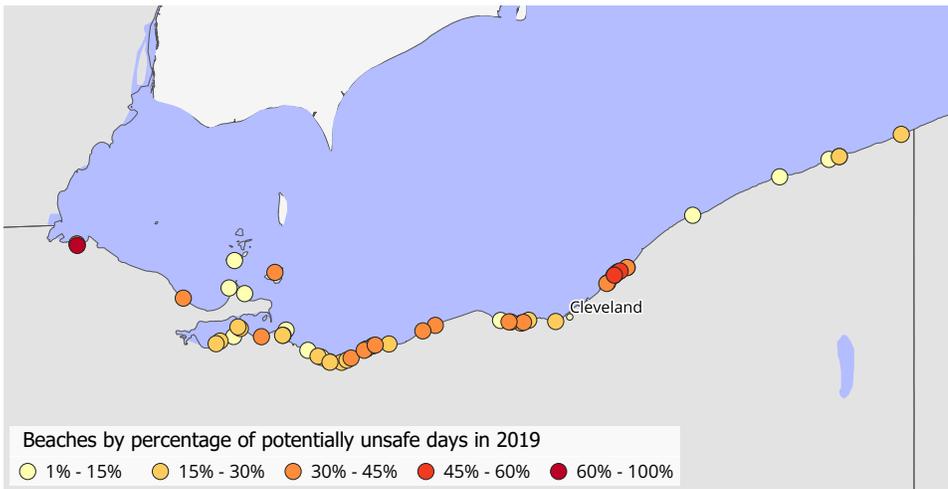
### Average percentage of potentially unsafe days in North Carolina by county in 2019

Table limited to counties with highest average percentage of potentially unsafe days.

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches	County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Beaufort	12%	10	Carteret	4%	54
Craven	9%	8	Onslow	2%	14
Pamlico	8%	9	New Hanover	1%	22
Dare	4%	38	Richmond	8%	4
Currituck	4%	5	Nassau	6%	70

## Ohio

◀ In Ohio, 54 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Ohio in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Maumee Bay State Park (Inland)	Lucas	38	58	66%
Villa Angela State Park	Cuyahoga	36	85	42%
Euclid State Park	Cuyahoga	31	71	44%
Lakeview Beach	Lorain	25	59	42%
Lagoons Beach	Erie	24	72	33%
Century Beach	Lorain	23	59	39%
Beulah Beach	Erie	23	72	32%
Sherod Park Beach	Erie	22	72	31%
Main Street Beach	Erie	21	71	30%
Bay View West	Erie	20	72	28%

In 2019, 54 beaches were tested for fecal indicator bacteria in Ohio. Tests at all 54 of those beaches found potentially unsafe water on at least one day. Maumee Bay State Park (Inland) in Lucas County tested as potentially unsafe for 38 days, more days than any other beach in the state, and 66% of the days that sampling took place. In Lucas County, the average beach was potentially unsafe for swimming on 48% of the days that sampling took place, a higher percentage than any other county in the state.

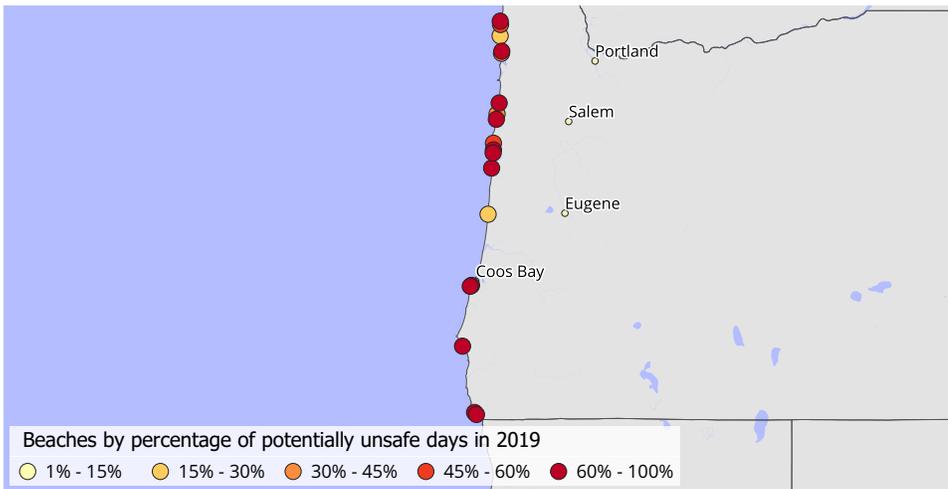
### Average percentage of potentially unsafe days in Ohio by county in 2019

*Note that some counties only had monitoring data for one beach in 2019.*

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Lucas	48%	2
Lorain	41%	2
Cuyahoga	37%	17
Erie	22%	22
Ottawa	17%	6
Ashtabula	15%	4
Lake	8%	1

## Oregon

◀ In Oregon, 18 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Oregon in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Seal Rock State Recreation Site*	Lincoln	13	17	76%
Nye Beach*	Lincoln	12	14	86%
Rockaway Beach*	Tillamook	9	10	90%
Sunset Bay State Park*	Coos	9	10	90%
Cannon Beach*	Clatsop	9	11	82%
D River State Wayside*	Lincoln	9	13	69%
Neskowin Beach State Wayside*	Tillamook	8	10	80%
Agate Beach State Wayside*	Lincoln	8	12	67%
Bastendorf Beach*	Coos	6	7	86%
Hubbard Creek Beach at Humbug Mountain State Park*	Curry	6	9	67%

### Average percentage of potentially unsafe days in Oregon by county in 2019

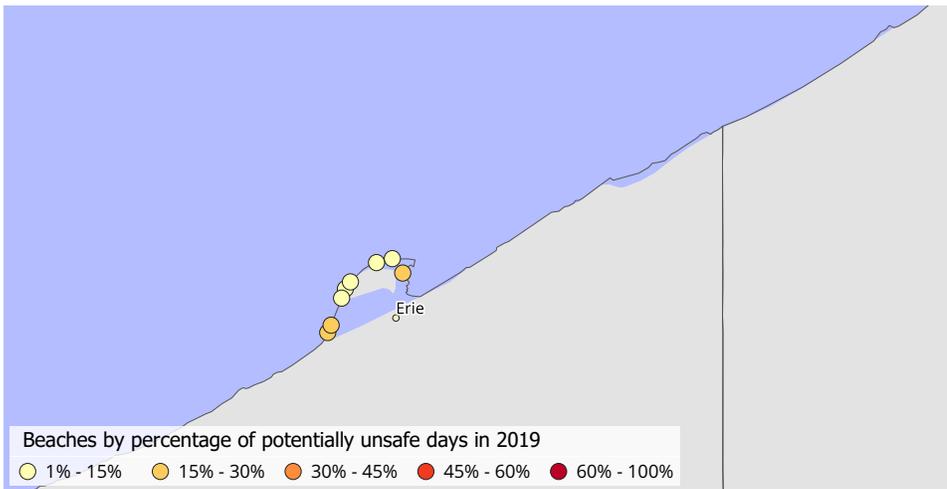
*Note that some counties only had monitoring data for one beach in 2019.*

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Coos	88%	2
Lincoln	65%	6
Tillamook	58%	4
Curry	52%	4
Clatsop	44%	3
Lane	29%	1

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Pennsylvania

◀ In Pennsylvania, 8 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Pennsylvania in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Erie Beach 11*	Erie	9	32	28%
Barracks Beach*	Erie	6	29	21%
Beach 1 East*	Erie	5	32	16%
Beach 6*	Erie	3	31	10%
Beach 9 (Pine Tree Beach)*	Erie	2	30	7%
Beach 8 (Pettinato Beach)*	Erie	2	31	6%
Beach 7 (Water Works Beach)*	Erie	1	28	4%
Beach 10 (Budny Beach)*	Erie	1	29	3%

### Average percentage of potentially unsafe days in Pennsylvania by county in 2019

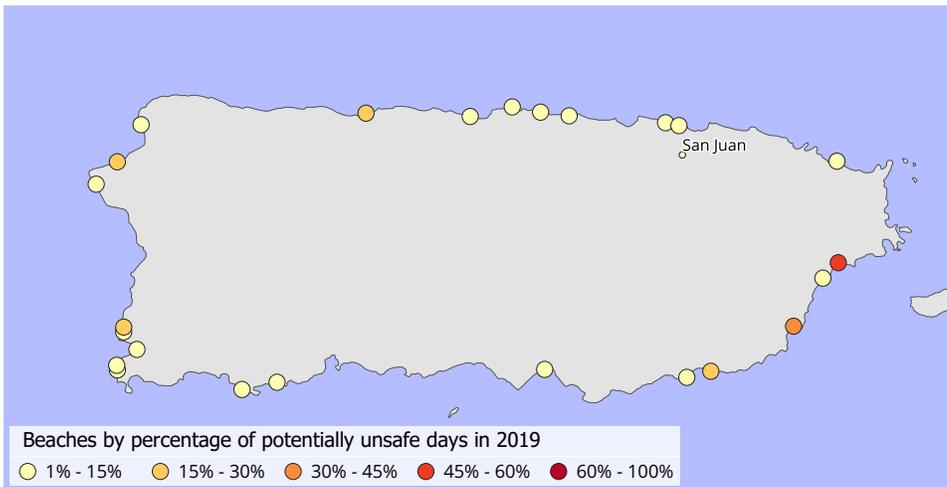
County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Erie	10%	9

In 2019, 9 beaches were tested for fecal indicator bacteria in Pennsylvania. Tests at 8 of those beaches found potentially unsafe water on at least one day. Erie Beach 11 in Erie County tested as potentially unsafe for 9 days, more days than any other beach in the state, and 28% of the days that sampling took place. In Erie County, the average beach was potentially unsafe for swimming on 10% of the days that sampling took place.

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Puerto Rico

◀ In Puerto Rico, 24 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Puerto Rico in 2019

Beach name	Municipio	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Tropical Beach	Naguabo	15	32	47%
Playa Guayanes	Yabucoa	11	29	38%
Playa Villa Lamela	Cabo Rojo	8	30	27%
Balneario Pico De Piedra	Aguada	6	27	22%
Muelle De Arecibo	Arecibo	5	28	18%
Balneario Patillas	Patillas	4	25	16%
Playa Mojacasabe	Cabo Rojo	4	27	15%
Balneario Crash Boat	Aguadilla	3	25	12%
Balneario De Humacao	Humacao	3	26	12%
Balneario Puerto Nuevo	Vega Baja	3	27	11%
Balneario Sardinera	Dorado	3	27	11%
Playa Ocean Park	San Juan	3	27	11%

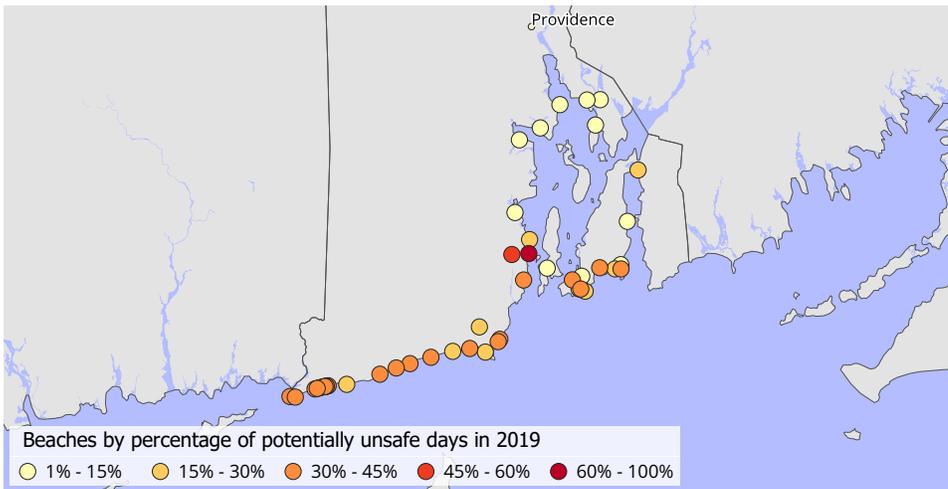
### Average percentage of potentially unsafe days in Puerto Rico by municipio in 2019

Table limited to municipios with highest average percentage of potentially unsafe days. Note that some municipios only had monitoring data for one beach in 2019.

Municipio	Average percentage of days with potentially unsafe water for beaches in municipio	Number of tested beaches	Municipio	Average percentage of days with potentially unsafe water for beaches in municipio	Number of tested beaches
Naguabo	47%	1	Aguadilla	12%	1
Yabucoa	38%	1	Humacao	12%	1
Aguada	22%	1	Cabo Rojo	11%	5
Arecibo	18%	1	Vega Baja	11%	1
Patillas	16%	1	Dorado	9%	2

In 2019, 35 beaches were tested for fecal indicator bacteria in Puerto Rico. Tests at 24 of those beaches found potentially unsafe water on at least one day. Tropical Beach in Naguabo Municipio tested as potentially unsafe for 15 days, more days than any other beach in the territory, and 47% of the days that sampling took place. In Naguabo Municipio (with just one monitored beach in 2019), the average beach was potentially unsafe for swimming on 47% of the days that sampling took place, a higher percentage than any other municipio in the territory.

*Note: At the time of analysis, Puerto Rico was still submitting 2019 beach data, and results may change following that process. See Methodology for details.*



## Rhode Island

◀ In Rhode Island, 44 tested beaches were potentially unsafe for swimming on at least one day in 2019.

In 2019, 65 beaches were tested for fecal indicator bacteria in Rhode Island. Tests at 44 of those beaches found potentially unsafe water on at least one day. Easton’s Beach in Newport County tested as potentially unsafe for 14 days, more days than any other beach in the state, and 41% of the days that sampling took place. In Washington County, the average beach was potentially unsafe for swimming on 20% of the days that sampling took place, a higher percentage than any other county in the state.

### Top beach sites by most potentially unsafe swimming days in Rhode Island in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Easton’s Beach*	Newport	14	34	41%
Scarborough State Beach - South*	Washington	13	40	32%
Third Beach*	Newport	9	25	36%
Scarborough State Beach - North*	Washington	8	26	31%
Saunderstown Yacht Club*	Washington	6	8	75%
Gooseberry Beach*	Newport	5	14	36%
Bonnet Shores Beach Club*	Washington	4	13	31%
Conimicut Point Beach*	Kent	4	27	15%
Sandy Point Beach*	Newport	4	27	15%
Oakland Beach*	Kent	4	28	14%

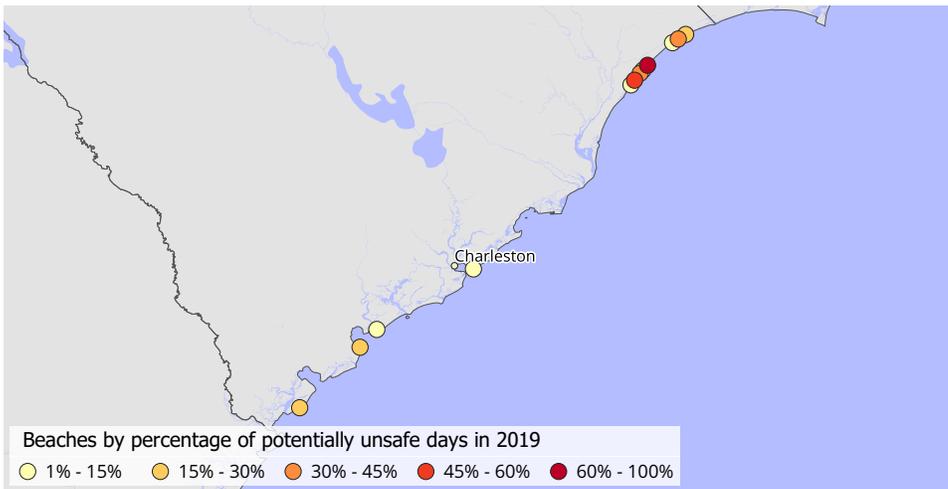
### Average percentage of potentially unsafe days in Rhode Island by county in 2019

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Washington	20%	41
Newport	16%	17
Kent	9%	4
Bristol	9%	3

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## South Carolina

◀ In South Carolina, 12 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in South Carolina in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Myrtle Beach*	Horry	41	50	82%
Briarcliffe Acres*	Horry	18	49	37%
Surfside Beach*	Horry	16	27	59%
North Myrtle Beach*	Horry	9	52	17%
Horry County Beaches South Carolina Campgrounds*	Horry	8	20	40%
Hilton Head Island*	Beaufort	3	10	30%
Harbor Island*	Beaufort	3	12	25%
Horry County Beach Arcadia Beach*	Horry	3	23	13%
Horry County Beaches South Carolina State Park	Horry	2	21	10%
Sullivan's Island*	Charleston	1	10	10%

### Average percentage of potentially unsafe days in South Carolina by county in 2019

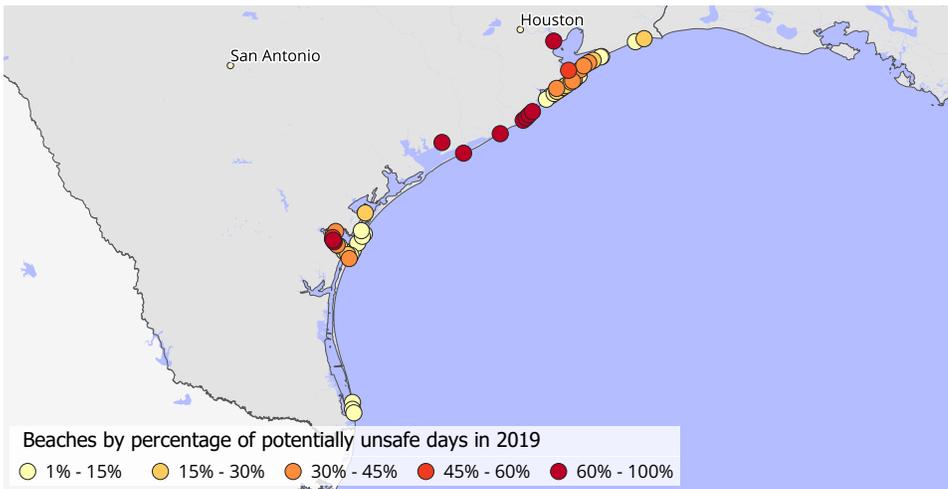
County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Horry	29%	9
Beaufort	14%	4
Charleston	3%	6
Georgetown	0%	4

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

In 2019, 23 beaches were tested for fecal indicator bacteria in South Carolina. Tests at 12 of those beaches found potentially unsafe water on at least one day. Myrtle Beach in Horry County tested as potentially unsafe for 41 days, more days than any other beach in the state, and 82% of the days that sampling took place. In Horry County, the average beach was potentially unsafe for swimming on 29% of the days that sampling took place, a higher percentage than any other county in the state.

## Texas

◀ In Texas, 55 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Texas in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Sargent Beach*	Matagorda	96	102	94%
Sylvan Beach Park*	Harris	88	89	99%
Palacios Pavilion*	Matagorda	80	95	84%
Jetty Park*	Matagorda	78	96	81%
Surfside*	Brazoria	75	93	81%
Follets Island*	Brazoria	71	87	82%
Quintana*	Brazoria	69	89	78%
Cole Park*	Nueces	67	80	84%
Bryan Beach	Brazoria	52	79	66%
Ropes Park	Nueces	48	64	75%

In 2019, 61 beaches were tested for fecal indicator bacteria in Texas. Tests at 55 of those beaches found potentially unsafe water on at least one day. Sargent Beach in Matagorda County tested as potentially unsafe for 96 days, more days than any other beach in the state, and 94% of the days that sampling took place. In Harris County (with just one monitored beach in 2019), the average beach was potentially unsafe for swimming on 99% of the days that sampling took place, a higher percentage than any other county in the state.

### Average percentage of potentially unsafe days in Texas by county in 2019

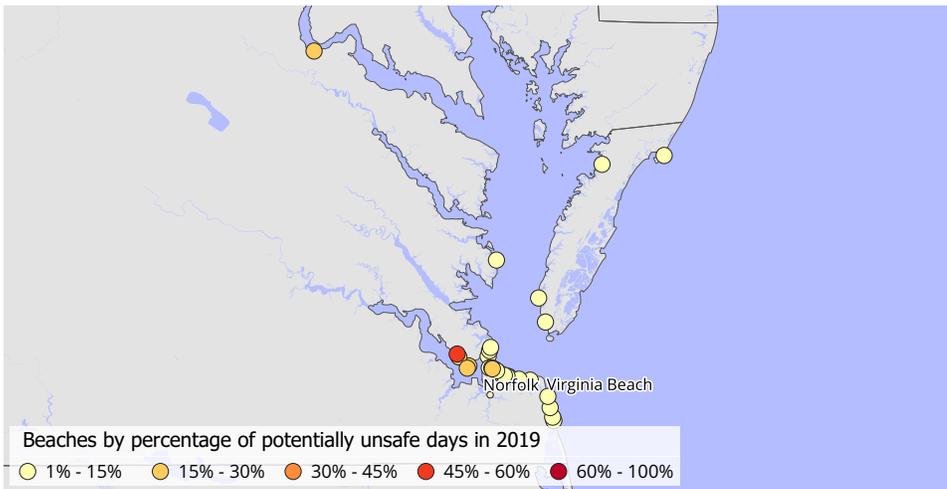
*Note that some counties only had monitoring data for one beach in 2019.*

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Harris	99%	1
Matagorda	87%	3
Brazoria	76%	4
San Patricio	30%	1
Nueces	27%	17
Galveston	23%	23
Aransas	22%	1
Jefferson	16%	2
Cameron	1%	9

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

## Virginia

◀ In Virginia, 29 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Virginia in 2019

Beach name	County or independent city	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Hilton Beach	Newport News	8	15	53%
King/Lincoln Park	Newport News	5	17	29%
Fairview Beach	King George	4	15	27%
Anderson's Beach	Newport News	4	17	24%
Huntington Beach	Newport News	4	17	24%
Captains Quarters	Norfolk	4	20	20%
Ocean View Park, East Side of Parking Lot	Norfolk	3	20	15%
Kiptopeke State Park	Northampton	2	16	12%
Town of Cape Charles Public Beach	Northampton	2	16	12%
Salt Ponds	Hampton	2	18	11%

### Average percentage of potentially unsafe days in Virginia by county or independent city in 2019

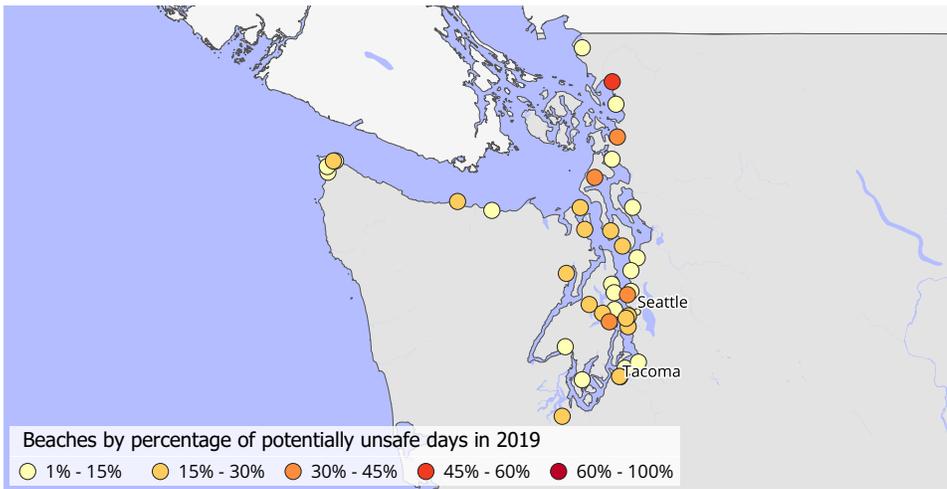
Table limited to counties/independent cities with highest average percentage of potentially unsafe days. Note that some areas only had monitoring data for one beach in 2019.

County or independent city	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Newport News	32%	4
King George	27%	1
Northampton	12%	2
Norfolk	10%	10
Hampton	7%	3
Accomack	7%	2
Mathews	7%	1
Virginia Beach	2%	22

In 2019, 47 beaches were tested for fecal indicator bacteria in Virginia. Tests at 29 of those beaches found potentially unsafe water on at least one day. Hilton Beach in Newport News tested as potentially unsafe for 8 days, more days than any other beach in the state, and 53% of the days that sampling took place. In Newport News, the average beach was potentially unsafe for swimming on 32% of the days that sampling took place, a higher percentage than any other county or independent city in the state.

## Washington

◀ In Washington, 38 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Washington in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
Dakwas Park Beach, Neah Bay*†	Clallam	10	51	20%
Little Squalicum Park*	Whatcom	8	14	57%
Pomeroy Park - Manchester Beach*	Kitsap	6	17	35%
Bayview State Park*	Skagit	5	14	36%
Golden Gardens*	King	5	14	36%
Windjammer Lagoon*	Island	5	16	31%
Fort Worden State Park*	Jefferson	5	17	29%
Front Street Beach, East*†	Clallam	5	50	10%
Priest Point Park*	Thurston	4	14	29%
Illahee State Park*	Kitsap	4	16	25%
Waterfront Dock / Ruston Way*	Pierce	4	16	25%

### Average percentage of potentially unsafe days in Washington by county in 2019

Table limited to counties with highest average percentage of potentially unsafe days.

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Island	24%	3
Whatcom	19%	4
Jefferson	18%	4
King	11%	10
Thurston	10%	3
Kitsap	9%	12
Clallam	9%	8
Skagit	6%	7
Pierce	6%	9
Mason	5%	3

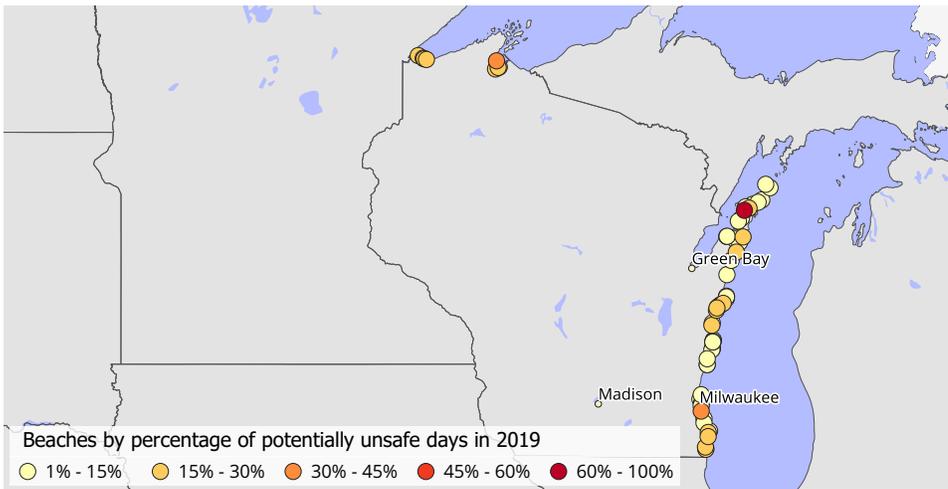
In 2019, 73 beaches were tested for fecal indicator bacteria in Washington. Tests at 38 of those beaches found potentially unsafe water on at least one day. Dakwas Park Beach, Neah Bay in Clallam County tested as potentially unsafe for 10 days, more days than any other beach in the state, and 20% of the days that sampling took place. In Island County, the average beach was potentially unsafe for swimming on 24% of the days that sampling took place, a higher percentage than any other county in the state.

\* Beach has more than one associated testing site, which may affect number of potentially unsafe days.

† Beach is located on tribal territory.

## Wisconsin

◀ In Wisconsin, 61 tested beaches were potentially unsafe for swimming on at least one day in 2019.



### Top beach sites by most potentially unsafe swimming days in Wisconsin in 2019

Beach name	County	Potentially unsafe days in 2019	Days with testing	Percentage of testing days with potentially unsafe water
South Shore Beach	Milwaukee	19	58	33%
Fish Creek Beach	Door	17	21	81%
Thompson West End Park Beach	Bayfield	12	31	39%
Blue Rail Marina Beach	Manitowoc	12	43	28%
Ephraim Beach	Door	12	56	21%
Red Arrow Park Beach Manitowoc	Manitowoc	8	42	19%
Pennoyer Park Beach	Kenosha	7	31	23%
Eichelman Beach	Kenosha	7	43	16%
Murphy Park Beach	Door	7	55	13%
Kreher Park Beach	Ashland	6	28	21%
Maslowski Beach	Ashland	6	28	21%

### Average percentage of potentially unsafe days in Wisconsin by county in 2019

Table limited to counties with highest average percentage of potentially unsafe days.

County	Average percentage of days with potentially unsafe water for beaches in county	Number of tested beaches
Ashland	15%	4
Douglas	14%	6
Manitowoc	11%	11
Racine*	10%	5
Kenosha	8%	6
Milwaukee	8%	10
Door	6%	32
Kewaunee	6%	2
Sheboygan	6%	7
Bayfield	4%	11

In 2019, 103 beaches were tested for fecal indicator bacteria in Wisconsin. Tests at 61 of those beaches found potentially unsafe water on at least one day. South Shore Beach in Milwaukee County tested as potentially unsafe for 19 days, more days than any other beach in the state, and 33% of the days that sampling took place. In Ashland County, the average beach was potentially unsafe for swimming on 15% of the days that sampling took place, a higher percentage than any other county in the state.

\* For two of its beaches, Racine County uses *E. coli* qPCR testing, for which no Beach Action Value is available. Those beaches were not considered in calculating the Racine County average.

# With resources, communities can make beaches safe

**C**ontaminated beach water can make swimmers sick. That is why communities across the country have undertaken efforts to tackle pollution.

Community efforts to protect beaches can take multiple forms: Installing green and natural infrastructure to prevent runoff from reaching the ocean; investing in sewage infrastructure to prevent sewage overflows; and working to stop pollution at its source, including by improving agricultural practices.

The following case studies are examples of these approaches paying off.

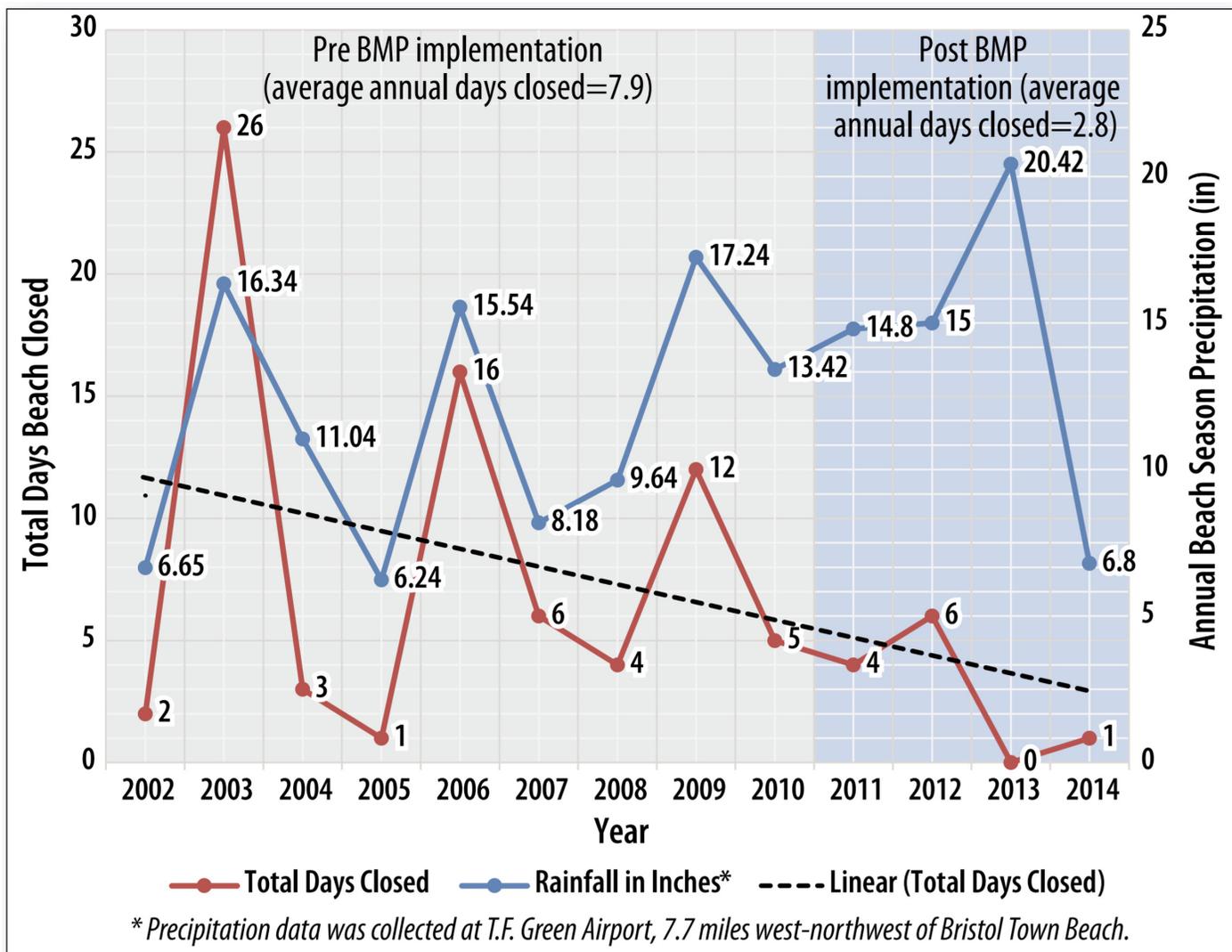
## **Green infrastructure leads to lower bacteria counts at Bristol Town Beach in Rhode Island**

Many existing roads, parking lots and other impervious surfaces that turn stormwater into runoff pollution are here to stay. But communities can take steps to prevent stormwater from flowing into waterways, including by installing “green infrastructure” that mimics some of the functions of lost natural areas, or by restoring or creating new natural areas.

Bristol Town Beach along Rhode Island’s Narragansett Bay was closed on average eight times per swimming season between 2002 and 2010 as a result of exceedances of the state’s single-sample bacteria standard.<sup>67</sup> At fault was runoff pollution, including runoff from a nearby suburban neighborhood which discharged through stormwater outfalls just north of the beach.



*Green infrastructure at Bristol Town Beach in Rhode Island has helped mitigate runoff pollution and improve water quality. Staff photo.*



This EPA chart shows how at Bristol Town Beach in Rhode Island, beach closures declined following the implementation of best management practices (BMP) including the installation of permeable pavement and planting of trees. Credit: EPA

A water quality improvement plan was developed through a collaborative effort between the town of Bristol and state and federal partners, including the Rhode Island Department of Environmental Management and the U.S. EPA. The plan primarily involved the installation of green infrastructure at the beach: drainage swales, permeable pavement, tree plantings, and a vegetative treatment system, which is an area of permanent vegetation designed to catch and treat runoff

pollution. Green infrastructure is a proven solution for reducing the impact of runoff pollution. In addition to being able to capture and filter runoff pollution, green infrastructure can bring aesthetic and recreational value to beaches and urban landscapes.<sup>68</sup>

Following implementation of the plan, exceedances of the state's water quality standard dropped sharply. In 2013, Bristol Town Beach had zero closures, despite a ten-year high in rainfall.<sup>69</sup>

## Improved sewer infrastructure takes Avalon Beach off the “Bummer List” in California

Aging, leaky sewage systems can create near-constant pollution problems, making water unsafe for days or weeks at a time. In its 2017-2018 *Beach Report Card*, Greater Los Angeles environmental group Heal the Bay shined its “Beach Improvement Spotlight” on one community that invested in sewer improvements and saw dramatically improved water quality: the city of Avalon, on Catalina Island 20 miles off the coast of Los Angeles.<sup>70</sup>

For years, water quality at Avalon Beach had suffered from sanitary sewer overflows, caused by both maintenance problems and operator error.<sup>71</sup> The overflows created health risks, including for the people who use the beach for swimming, fishing and diving.<sup>72</sup> Pollution problems landed Avalon Beach on Heal the Bay’s “Beach Bummer List,” for beaches with poor water quality, 12 separate times.

The city began turning its pollution problem around in 2012. That year, the Los Angeles Regional Water Quality Control Board established a Total Maximum Daily Load (TMDL) for the city of Avalon with numeric limits for bacteria concentrations, including for enterococcus and fecal coliform.<sup>73</sup>

To meet the new limits, the city of Avalon spent \$5.7 million on sewer main improvements and implemented a new sewer inspection and tracking system.<sup>74</sup> Sewer improvements included the rehabilitation and replacement of aging sewer lines, system-wide cleaning, and root control.<sup>75</sup> The city also took steps to reduce other sources of water pollution, including adopting a regulation to prohibit restaurants and businesses from discharging or dumping debris, and developing a pollution prevention public education program.

Following these steps, Heal the Bay reported steady improvements in water quality – and Avalon Beach has not appeared on the “Beach Bummer List” since 2013.<sup>76</sup>



Improved sewer infrastructure and other efforts to reduce pollution have dramatically improved water quality at Avalon Beach in California. Credit: Tom Gally via Wikimedia (public domain)

## Agricultural best practices lead to a cleaner Wilson River and Tillamook Bay in Oregon

The Wilson River in Oregon is used for swimming and boating. It is also the largest river feeding the Tillamook Bay, a picturesque bay popular for kayaking and crabbing.<sup>77</sup> Despite the beautiful setting, both the river and the bay have long experienced elevated levels of fecal indicator bacteria.<sup>78</sup>

To clean up the river, local environmental and academic organizations formed a plan that began with research to determine the source of the river's fecal contamination. Beginning in 2001, a three-year research collaboration between the Tillamook Estuaries Partnership (TEP) and Oregon State University used bacteria genetic markers to establish that cattle from dairy pastures were a primary contributor to bacteria in the lower Wilson River.<sup>79</sup> Improving water quality, therefore, would require reducing the impact of local agriculture.

Many of the farms in Tillamook County raise cattle on pasture.<sup>80</sup> Such farms generally cause far less pollution than densely-packed cattle feedlots, which generate excessive manure that cannot be properly handled.<sup>81</sup> Yet pasture-based farming can still threaten water quality if cattle and manure are not managed properly.

The TEP, along with the Tillamook Bay Watershed Council and Tillamook Soil and Water Conservation District, worked with local stakeholders to establish a set of measures to protect the river. These included fencing to keep livestock away from riverbanks, planting trees along the river, and acquiring a section of wetland to be maintained as a permanent natural area.

TEP also started the Backyard Planting Program, a voluntary program to help landowners plan and implement riparian vegetation projects. The program provided site-specific plans, a planting crew, and site maintenance, all for no cost.<sup>82</sup> In its 2015, TEP reported that 116 landowners had participated in the program, including 48 agricultural landowners. Tens of thousands of native trees and shrubs have now been planted through the program.

In addition, the Natural Resources Conservation Service (NRCS), an agency of the United States Department of Agriculture, worked with dozens of dairy farms throughout Tillamook County to improve manure management and reduce overapplication of manure on fields.<sup>83</sup>

These efforts have helped create a cleaner river and have contributed to improvements in the health of the bay.<sup>84</sup> In 2016, the state's Conservation Effectiveness Partnership reported that river bacteria levels "now consistently meet the recreational use water quality standard."<sup>85</sup>



The Wilson River in Oregon, which flows to Tillamook Bay, has seen water quality improvements thanks to efforts to reduce pollution from dairy pastures. Credit: Finetooth via Wikimedia (CC BY-SA 3.0)

# Conclusion and policy recommendations

Americans should be able to enjoy beaches that are clean and safe for swimming in every corner of the country. Too often, however, the water at our beaches presents risks to public health.

Policymakers and local communities have a variety of tools to ensure safe, swimmable beaches. Communities can often see dramatic improvements in water quality by adopting best practices at and around beach areas, including the installation of green and natural infrastructure. To ensure long-term improvements in beach health, policymakers must look to the broader causes of water quality problems, including urban development, aging sewage systems, and agriculture.

Policymakers at every level of government should take actions to protect America's beaches, including the following:

## **Prevent urban runoff pollution.**

- Dramatically increase public investment in natural and green infrastructure features – such as rain barrels, permeable pavement, urban greenspace and green roofs – that prevent bacteria-laden pollution from reaching waterways.
- Require the use of green infrastructure in new development/redevelopment and use additional policy tools to promote its use at existing developments.
- Protect and restore natural infrastructure, including riparian areas and wetlands that can filter bacteria, sediment and nutrients.

## **Prevent sewage pollution.**

- Dramatically increase public investment in fixing aging sewage systems.
- Use green infrastructure to prevent sewage overflows. The strategic use of green infrastructure can reduce the quantity or rate of water flowing into sewer systems.<sup>86</sup>
- Strengthen enforcement of standards for municipal wastewater treatment, and reject any “sewage blending” rule that would allow sewage treatment plants to release partially treated wastewater during heavy rainfalls.
- Upgrade wastewater facilities that are in danger of overflowing during storms and floods.
- Ensure more frequent inspections and proper maintenance of residential septic systems.

## **Prevent manure pollution.**

- Enact moratoriums on new or expanded industrial-scale livestock operations, especially in watersheds already overburdened by manure pollution.
- Ban livestock waste lagoons, especially in flood-prone areas.
- Restrict manure application to cropland to prevent runoff pollution.
- Encourage livestock operations to raise animals on rotational pasture.

Policymakers should also take actions to **provide beachgoers with the information they need to stay safe, including the following:**

- Use EPA's most protective "Beach Action Value" bacteria standard for posting beach advisories.
- Put in place systems for same-day water testing and warnings, particularly during times of heavy water recreation.<sup>87</sup>
- Increase funding for beach monitoring to ensure that state, tribal and local agencies have adequate

resources to conduct testing at beaches used for recreation.

Finally, federal policymakers should maintain a strong Clean Water Act that protects all streams and other waterways that flow to our beaches and wetlands that help filter out pollution before it reaches the places where we swim. This must start with EPA immediately repealing its rule which leaves more than half the nation's wetlands and thousands of streams without federal protection from pollution or development.<sup>88</sup>

# Methodology

National beach fecal indicator bacteria testing data was downloaded from the National Water Quality Monitoring Council's Water Quality Portal (WQP) on 30 June 2020.<sup>89</sup> This analysis includes water quality data at all beaches listed under the BEACH Act located in U.S. states (except for Alaska) and Puerto Rico for which 2019 testing data was available. Some beaches included in this report are now considered “historical” BEACH Act beaches, and are now monitored under separate programs. As of July 2020, EPA's BEACON data portal marked the status of 2019 data for Georgia, Hawaii, Texas, and Virginia as “verifying,” and data for Puerto Rico as “submitting.”<sup>90</sup> Water quality data may change as those states complete their data submission processes.

Due to limitations with Florida and Illinois water quality data in the WQP, data on BEACH Act beaches for both states was obtained from alternate sources. Florida data was obtained directly from the Florida Department of Health.<sup>91</sup> Illinois data was downloaded from the City of Chicago's data portal.<sup>92</sup> For Illinois, water quality data was taken from the column “DNA Reading Mean.” As of June 2020, the WQP only contained 2019 data for Illinois from Chicago, and no non-Chicago beaches were omitted by relying on Chicago's data portal.

Beach sites were considered “potentially unsafe” if sample results exceeded the EPA Beach Action Value (BAV) associated with an estimated illness rate of 32 per 1,000 swimmers.<sup>93</sup> The EPA suggests states use BAVs “as a conservative, precautionary tool for making beach notification decisions.”<sup>94</sup> The following BAVs were used for assessing beach safety:

- For enterococcus, the BAV is 60 colony-forming units per 100 milliliters (cfu/100mL), for both marine and fresh water.
- For *E. coli* the BAV is 190 cfu/100mL, for fresh water only.
- For enterococcus tests conducted using a quantitative polymerase chain reaction (qPCR) method, with results reported as calibrator cell equivalent (cce) per 100mL, the BAV is 640 cce/100mL, for both marine and fresh water.

Tests for which there is no applicable BAV were not considered for this analysis. Such tests include *E. coli* tests of marine waters (of which there were many in California) and *E. coli* qPCR tests (which are used for monitoring two beaches in Racine County, Wisconsin).<sup>95</sup> California beaches for which *E. coli* tests were not considered are marked in California's state information table.

Bacteria tests were grouped together by day to determine “potentially unsafe days.” If multiple tests occurred on a single day, and one of those tests exceeded the safe limit for bacteria, that day was considered a “potentially unsafe day.” State tables of beach sites generally include the 10 beaches with the most potentially unsafe days, ordered by most to fewest. Tables are secondarily ordered by fewest to most days with testing.

The average percentage of potentially unsafe days by county was calculated by averaging percentages of potentially unsafe sampling days for all beaches within each county (as opposed to dividing the total number of

unsafe beach days by total sampling days in the county). In states with data for more than 10 counties, county tables were limited to the top counties as ranked by average percentage of potentially unsafe days.

Some data cleanup and categorization were performed before conducting analysis and mapping:

- Water quality data was linked to beach attribute data, such as beach name and location, using each water sample's associated "Beach ID." In the WQP, Beach IDs are listed under the attribute ProjectIdentifier. Beach attribute data was obtained from the EPA's BEACON 2.0 database.<sup>96</sup> Beach names were occasionally edited for clarity.
  - Latitude and longitude data for displaying beach sites on maps come from three sources. Where available, beach locations were based on the midpoint of beach lines published in EPA's *Reach Access Database (RAD)*.<sup>97</sup> For locations not available through RAD, beach locations were based on the midpoint of start and end points contained in the beach attributes available through EPA's BEACON 2.0.<sup>98</sup> Finally, for a small number of beaches without location information available either through RAD or BEACON 2.0, beach location data was downloaded for each beach's affiliated sampling site from the National Water Quality Monitoring Council's *Water Quality Portal*.<sup>99</sup> In a very small number of cases in which beach location was visibly wrong, beaches were manually placed on the map.<sup>100</sup> Because of the nature of the geotagging process, sample sites displayed on maps may occasionally reflect imprecise locations.
  - For regional aggregations, most beaches were assigned to regions based on their state. New York and Florida both contain sample sites grouped to two different regions: New York has sample sites in the Great Lakes and the East Coast, and Florida has sample sites in the Gulf and the East Coast. Those beaches were assigned based on the EPA beach "Waterbody Name" attribute.
- In addition to each to each sample's recorded measurement, other information in the WQP had the potential to affect how samples were treated in this analysis:
- Samples with parameter ResultConditionText of "Not Detected," "Detected Not Quantified" and other similar entries were treated as safe samples. Samples with ResultConditionText of "Present Above Quantification Limit" were treated as potentially unsafe.
  - Measure values recorded as "less than" a specific number value (indicated with a "<" symbol) were treated as safe samples. Measure values indicated as "more than" a value (indicated with a ">" symbol) were treated as the value that followed the symbol.
  - Measurements for which the parameter "ResultMeasure/MeasureUnitCode" was not specified were assumed to be reported in concentrations per 100 milliliters (as opposed to calibrator cell equivalents reported for the still-rarely-used quantitative polymerase chain reaction tests).
  - Sample results were not considered if comment text indicated a problem with the test, including "lab accident" and "no sample collected."
  - Sample results not considered if parameter "StatisticalBaseCode" was recorded as a "30-day Geometric Mean" test, as multi-day tests cannot be used to determine beach safety for specific days.
  - Samples recorded as a "geometric mean" were assessed against the BAV single sample threshold, as exceedance of the geometric mean implies that at least one sample exceeded the single-sample threshold.

# Notes

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