



Swimming in Natural Environments

By the PHTA Recreational Water Quality Committee

MANY PEOPLE HAVE a general understanding of what makes up a swimming pool. At the very least, it is a man-made contained body of water that is circulated, filtered and treated with a sanitizer to help prevent swimmer exposure to potentially harmful microorganisms. A natural environment (river, lake, ocean) is none of these things, and people should be aware of the risks that can be encountered when using them for swimming and recreation.

Swimming in a natural environment, such as a lake or pond, is a riskier endeavor when compared to a treated swimming pool. There are physical, biological and chemical factors that can affect the swimmer and can potentially create unsafe conditions. The U.S. Centers for Disease Control and Prevention (CDC) reports in their Unintentional Drowning Fact Sheet that “more than half of fatal and nonfatal drownings among those 15 years and older (57% and 57%, respectively) occurred in natural water settings.” Whenever possible, swimming in designated swimming areas is strongly recommended.

Water clarity in natural environments may not be as high as in swimming pools, so swimmers encountering trouble may not always be seen

underwater. Physically, there can be obstructions in the water, such as sunken trees, limbs and other large debris, that may not be visible from the surface. Small debris, such as old fishing line, discarded fish hooks or broken glass, may create additional hazards for the swimmer. Additionally, there sometimes can be strong currents that can affect the ability of the swimmer to maintain control.

The American Red Cross Swimming Safely in Lakes, Rivers and Streams website recommends swimmers be aware of these physical hazards:

- Sudden changes in air or water temperature
- Sudden change in weather
- Thunder and lightning — leave the water immediately and do not re-enter until after 30 minutes following the last thunder clap
- Fast moving currents, waves and rapids
- Hazards such as dams, underwater obstacles and rocks/debris
- Vegetation, animals and fish
- Sudden drop-offs in depth
- The activities of others, including boating

Diving is never recommended in natural waters, as it is associated with increased risk of injury due to the previously described physical hazards.

Additionally, spinal cord injuries sustained by diving may be the result of horseplay or other behavior. Entry into natural waters, such as rivers, lakes, streams, reservoirs and oceans, should be done feet first and never from an elevated position such as a bridge, cliff or boat.

Often, the overall water chemistry in natural environments may not be ideal for swimming. A primary concern in natural environments is pollution that may occur around industrial areas from effluent that is released into the environment either intentionally or through a spill or water runoff. Another chemical hazard may be caused by cyanobacteria, which can form algal blooms and create toxins in the water that can affect the health of the swimmer. The U.S. CDC (2020b) Healthy Swimming website recommends:

- Do not swim following a heavy rain. More pollutants could be in the water from runoff, and currents in rivers or lakes could be stronger than usual.
- Do not enter the water if pipes draining into the area are seen.

Another type of hazard found in natural swimming environments is a biological hazard. There are several predators in North America that can present hazards for swimmers in

natural environments, whether they are sharks at ocean-front beaches, alligators in southern states or poisonous water snakes throughout. Care must be taken to be familiar with your surroundings and these potential hazards; however, the greatest biological threat could be due to the potential presence of microbiological pathogens. In its June 26, 2020 Morbidity and Mortality Weekly Report (MMWR), the CDC reported that between 2009 and 2019 there were 119 untreated recreational water illness outbreaks resulting in 5,240 cases, with the majority of these occurring during the summer months of June through August. The leading causes were enteric pathogens: norovirus (19 [22%] outbreaks; 1,858 cases); Shiga toxin-producing *Escherichia coli* (STEC) (19 [22%]; 240), *Cryptosporidium* (17 [19%]; 237), and *Shigella* (14 [16%]; 713). The CDC found in its June 29, 2018 MMWR that between 2000 and 2014, 84% of the outbreaks occurred from exposure in lakes, ponds and reservoirs. A 2013 study by Wade, et al. of beachgoers at marine and freshwater beaches were associated with increased risk of ear infections.

There are several pathogens of concern in natural aquatic environments including *Cryptosporidium*, *Giardia*, *Naegleria*, *Vibrio*, *E. coli*, etc. These organisms can thrive in natural waters, particularly in warm temperature water. They can be introduced into the water by animals, humans or from runoff from multiple sources. According to an article entitled "Recreational Water-Associated Disease Outbreaks — United States, 2009–2010" published in the CDC's MMWR, four recreational water-associated outbreaks of gastroenteritis were attributed to disease-causing bacteria, and of these, three were linked to freshwater (e.g., lakes and streams). In these outbreaks, 12% of those who became ill required hospitalization. *Naegleria fowleri* is a particularly dangerous organism found in freshwater and soil, mainly in the warmer climates of southern states. While the risk of infection from *Naegleria fowleri* is low, the CDC reports that between 1962 and 2019, there have been 148 Primary Amebic Meningoencephalitis (PAM) infections in which the organism enters the

body through the nose, with only four survivors. PAM infections, while rare, cause inflammation in the brain and destruction of brain tissue. People do not get infected from drinking contaminated water. For this reason, if swimming in natural waters, particularly waters susceptible to this organism, focus should be on limiting the amount of water going into the nose when swimming.

Not all of the biological dangers are in the water, as others may be found in the sand at beaches. A 2009 study by Heaney, et al. showed that sand-contact activities, such as being buried in the sand, often exhibited increased risk of gastrointestinal illness. The U.S. Environmental Protection Agency (EPA) website on Learn: Human Health at the Beach recommends always washing your hands after any sand-contact activity.

There will always be a higher risk when swimming in untreated waters. However, there are several things that can help mitigate the risk. The following general precautions recommended by the U.S. CDC (2020b) Healthy Swimming website should always be taken:

- Before you go swimming, see if there are any closures or advisories about the area (particularly after a heavy rain).
- If your immune system is compromised, check with your healthcare provider before you go swimming.
- Do not enter the water if the swim area is closed. This applies to physical hazards such as rip currents, sharks at the beach or biological hazards that have been discovered.
- Do not swim if the water is cloudier than normal or smells bad. This can indicate that there has been some sort of contamination.
- Do not enter the water if you are sick with diarrhea.
- Do not enter the water if you have an open cut or wound. This also applies to anyone healing from such a wound or a surgical procedure. This is an entry point for some pathogens into the body.
- Do not swallow the water.
- Keep sand away from your mouth.
- Don't poop or pee in the water. Take regular breaks so that kids won't do it in the water either.

- Wash your hands for 20 seconds before eating food or letting your hands near your mouth.

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To Summarize...

Natural environments, unlike swimming pools, are typically not treated for potentially harmful microorganisms.

Natural environments contain physical hazards that swimming pools typically do not, such as fishing line and hooks, broken glass on bottom, rocks, logs and other obstructions, etc.

There may be chemical and biological hazards present in a particular natural swimming environment, and extra precautions may be necessary to mitigate any risk.

There may be designated areas for swimming in a natural environment.

Special safety signs and flags may be posted for additional directions. ~