What are Harmful Algal Blooms

Cyanobacteria are small microbes or bacteria that live in nearly every habitat on land and in the water. They have existed for billions of years as essential components of freshwater ecosystems and form the foundation of most aquatic food chains. When these organisms produce dangerous toxins, they are commonly referred to as harmful algal blooms or HABs. When environmental conditions favor the growth of HABs and algae, such as warm temperatures and low or stagnant water flows, and excessive nutrient inputs, they can multiply rapidly creating nuisance blooms. Some HABs can produce toxins that can harm pets, wildlife, or people. Not all HABs produce toxins, but those that do can cause a multitude of health issues and even death. There are two types of HABs known as planktonic (HABs suspended in the water column) or benthic (HAB that grow attached to the bottom). In California, harmful algal blooms are most common during the warm weather months between late May through October, but they can occur all year.

Advisory Signs: English and Spanish Signs

The Water Board relies on three tiers of signage for planktonic blooms to inform the public about HABs. The HAB advisory signage, also referred to as advisories, also serve to recommend actions to keep you, your family, and your pets safe when recreating near waterbodies that are experiencing a HAB. The three advisory tiers are Caution, Warning, and Danger. Caution is associated with the lowest advisory level where Danger is associated with the highest level. The advisory recommendations were developed by the California Cyanobacteria and HAB (CCHAB) Network, with members from the scientific community, counties, researchers, and agencies to be the most protective for human health. Each advisory sign indicates different precautions that should be followed when recreating near and within a waterbody. You can read these signs below and look at photos of areas within Tahoe and the Tahoe Keys experiencing each tier of a planktonic HAB. Advisory levels do not typically apply to an entire waterbody. Instead, they are focused on the specific area(s) that are experiencing the algal bloom.

- Planktonic HAB advisory signs (Caution, Warning, or Danger) are used to inform you of current conditions and recommended actions to keep you, your family, and your pets safe from HABs. More details are included with each sign below.
- Planktonic HAB advisory signs may be voluntarily posted when:
    - cyanobacteria or cyanotoxins are detected in the water column above the voluntary guidelines for cyanobacteria in California recreational waters, or
    - a potential HAB-related human or animal illness is reported.
- A Caution advisory sign can be put in place with visual identification and/or laboratory data of a HAB. Laboratory data, that confirms the presence of toxins is required to advise posting of Warning and Danger level advisories based on trigger levels.

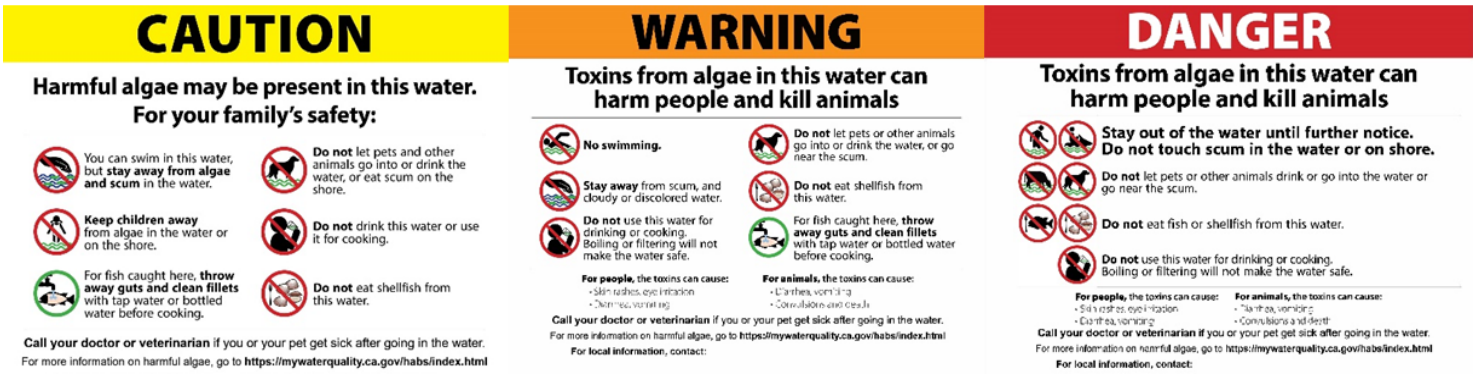

Figure 1: Image of all three HAB advisory signs.

What should I do if I see a **Caution** sign at the waterbody I am visiting?

- Follow the recommended actions shown on the Caution sign:
  - You can swim in this water, but stay away from algae and scum in the water.
  - Do not let pets and other animals go into or drink the water, or eat scum on the shore.
  - Keep children away from algae in the water and on the shore.
  - Do not drink the water or use it for cooking.
  - For fish caught here, throw away guts and clean fillets with tap water or bottled water before cooking.
  - Do not eat shellfish from this water.

Figure 2: Image of the caution advisory sign.

What should I do if I see a **Warning** sign at the waterbody I am visiting?

- Follow the recommended actions shown on the Warning sign:
  - No swimming.
  - Do not let pets and other animals go into or drink the water, or eat scum on the shore.
  - Stay away from scum, and cloudy or discolored water.
  - Do not eat shellfish from this water.
  - Do not use this water for drinking or cooking. Boiling or filtering will not make the water safe.
  - For fish caught here, throw away guts and clean fillets with tap water or bottled water before cooking.

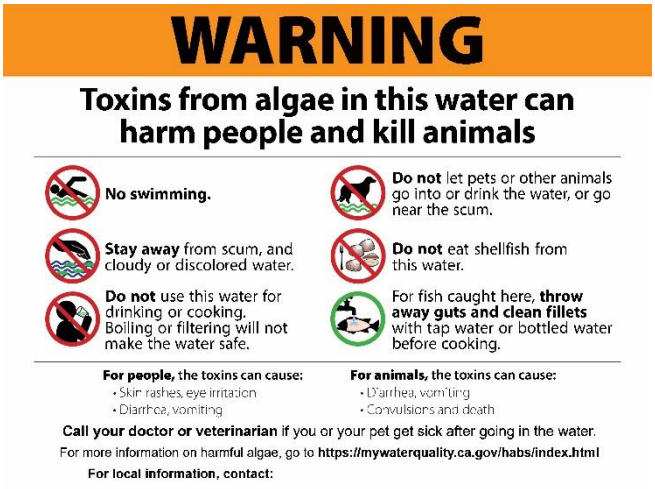

Figure 3: Image of the warning advisory sign.

What should I do if I see a **Danger** sign at the waterbody I am visiting?

- Follow the recommended actions shown on the Danger sign:
  - Stay out of the water until further notice.
  - Do not let pets and other animals drink or go into the water, or go near the scum.
  - Stay away from scum, and cloudy or discolored water.
  - Do not eat fish or shellfish from this water.
  - Do not use this water for drinking or cooking. Boiling or filtering will not make the water safe.

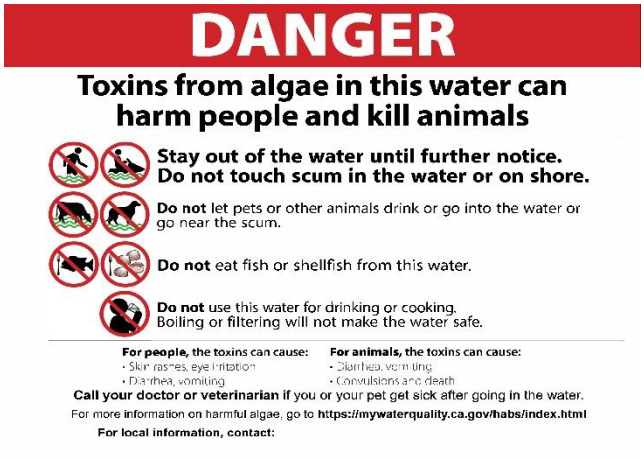

Figure 4: Image of the danger advisory sign.

When are HAB advisory signs removed?

- All HAB advisory signs are removed after a bloom is no longer visible and cyanotoxins are consistently below the thresholds in the voluntary guidelines for cyanobacteria in California recreational waters.

What are HAB general awareness signs, and when are they posted?

- Either type of general awareness sign can be voluntarily posted year-round at waterbodies where HABs may occur.
- The general awareness sign for toxic algal mats advises visitors to assess the location to determine if mats are present. If you see algal mats, then follow the advisories and make sure no children, dogs, or adults touch or ingest any mat material.
- The **planktonic** HAB general awareness sign provides you with general information about HABs, potential symptoms, and general precautions. Either the condensed version shown here or a more detailed version may be posted.

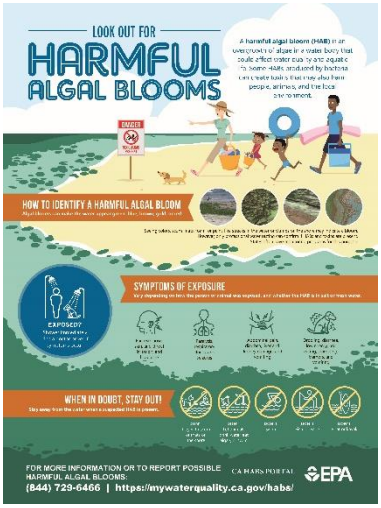

Figure 5: Image of the planktonic general awareness sign.

Monitoring and Advisories in Lake Tahoe and the Tahoe Keys

Typically, a waterbody is initially investigated for a HAB when a new bloom report is filed on a public reporting platform managed by the State Water Resources Control Board at this web address: My Water Quality: California Harmful Algal Blooms (HABs). Any agency or member of the public can report a suspected HAB or share data through this on-line reporting form. After a HAB is confirmed, the CCHAB Network recommends the waterbody manager and/or county following the 8-step voluntary guidance for response to HABs in recreational waters which includes sampling every two weeks to give the public the most up to date information on the HAB toxin levels by having the most appropriate signage in place.

Since waterbody owners, land managers, and the Water Board may not have the resources to investigate and/or sample every waterbody or shoreline location within the Lake Tahoe Basin or respond to every incident reported, it is vital for the public to always follow Healthy Water Habits.

Lake Tahoe

Due to the high level of recreational use that Lake Tahoe supports, reports of algal blooms are taken seriously. Though resources may not allow water quality sampling for each report/complaint, staff

make every effort to investigate bloom reports through a site visit, , follow-up discussions with the waterbody operator, public, and complainant, and provide recommendations on advisory postings. Water samples have been collected and tested for the presence of HABs and their associated toxins around the California side of Lake Tahoe at various locations in response to new bloom reports and during pre-holiday assessment monitoring. HAB monitoring associated with pre-holiday assessments is intended to collect information to inform the public about the safety of waterbodies during high-recreational use holiday weekends including Memorial Day, Fourth of July, and Labor Day.

Tahoe Keys Lagoons

HAB samples have been collected in several locations throughout the Tahoe Keys lagoons since 2017. Visual inspections of the waterways and water sampling have been conducted to inform homeowners of potential health risks associated with HABs, and to evaluate the effectiveness of aeration systems (air bubblers) that are operating within specific areas of the Tahoe Keys. In 2022 monitoring throughout the lagoons had increased due to the Control Methods Test (CMT). Monitoring is conducted inside and outside of the CMT perimeter. The CMT is a three-year project to evaluate treatment methods to control target aquatic invasive weeds. Sampling of CMT area is being conducted through contracted field crews and Regional and State Water Board staff. Although there is routine monitoring, blooms are highly mobile, especially in smaller lagoons with wind action, so it is always recommended to follow Healthy Water Habits.

Advisory Examples

To help guide you on what different advisory levels might look like below contains a few examples of each within Lake Tahoe and the Tahoe Keys Lagoons. Note that warning and danger HAB advisories have only been reached within the Tahoe Keys and has not ever occurred in Lake Tahoe proper.

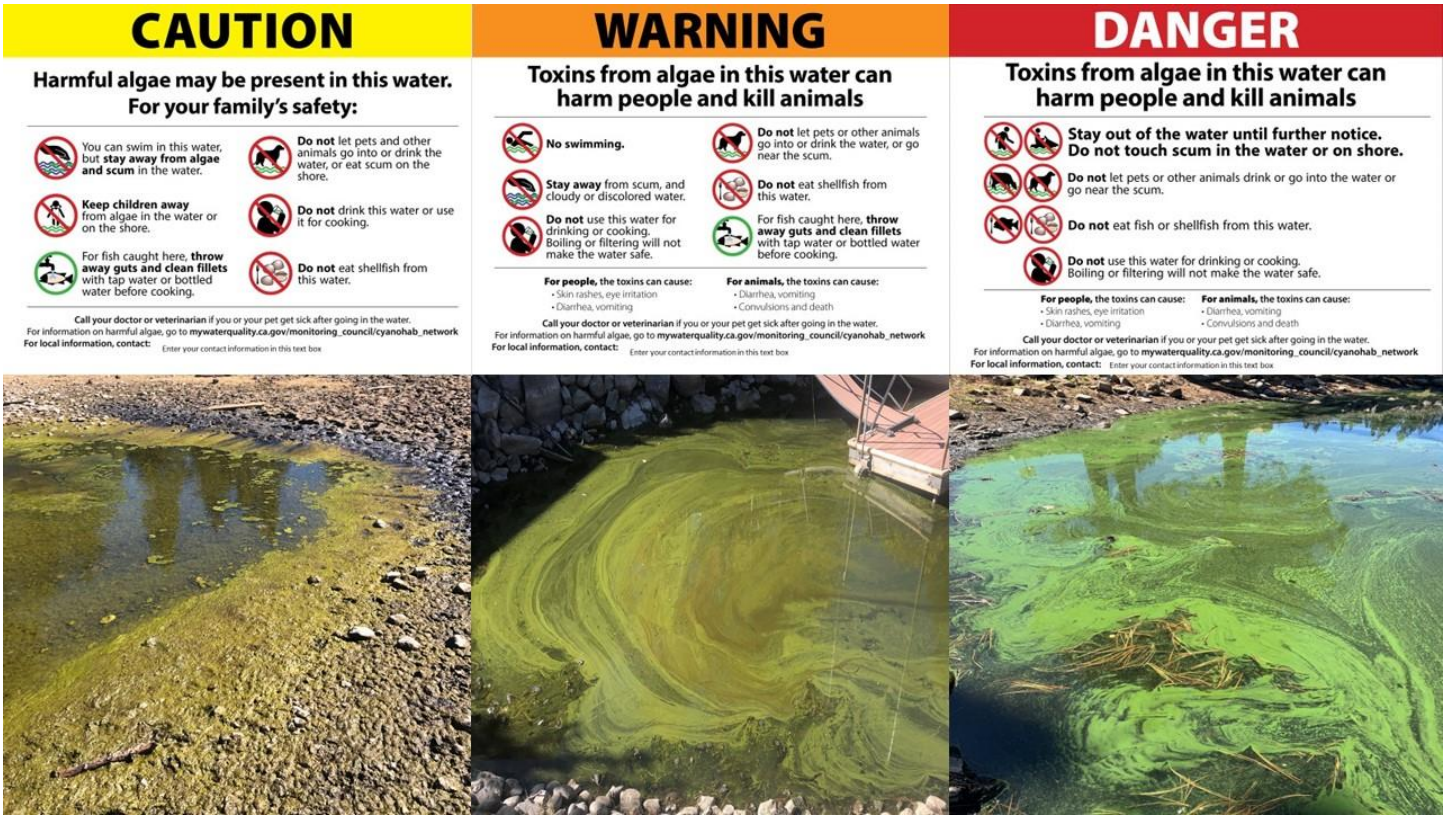

Figure 6: Side by side image of all three advisory signs with HAB conditions below them that warranted each advisory.

What is periphyton and metaphyton and why should we care?

Periphyton and metaphyton are typically non-toxic algae that grow within Lake Tahoe, although they can be associated with nuisance taste and odor compounds. Periphyton is a benthic filamentous alga that grow nearshore on submerged surfaces such as rocks and gravel. They have been observed around Lake Tahoe for about 30 years growing in early spring. Metaphyton is filamentous alga that grow in shallow areas detached from surfaces at the bottom of the water column. It is believed that metaphyton growth is directly linked to the presence of invasive Asian clams which first appeared in Lake Tahoe 15 years ago. It is common for wind and wave action to cause dense accumulations of periphyton and metaphyton to wash up on shore. When the material washes up along the shores of Lake Tahoe and begin to decay and odors are released. It is important to note that HABs can attach to this material, so always take caution and avoid it when feasible.

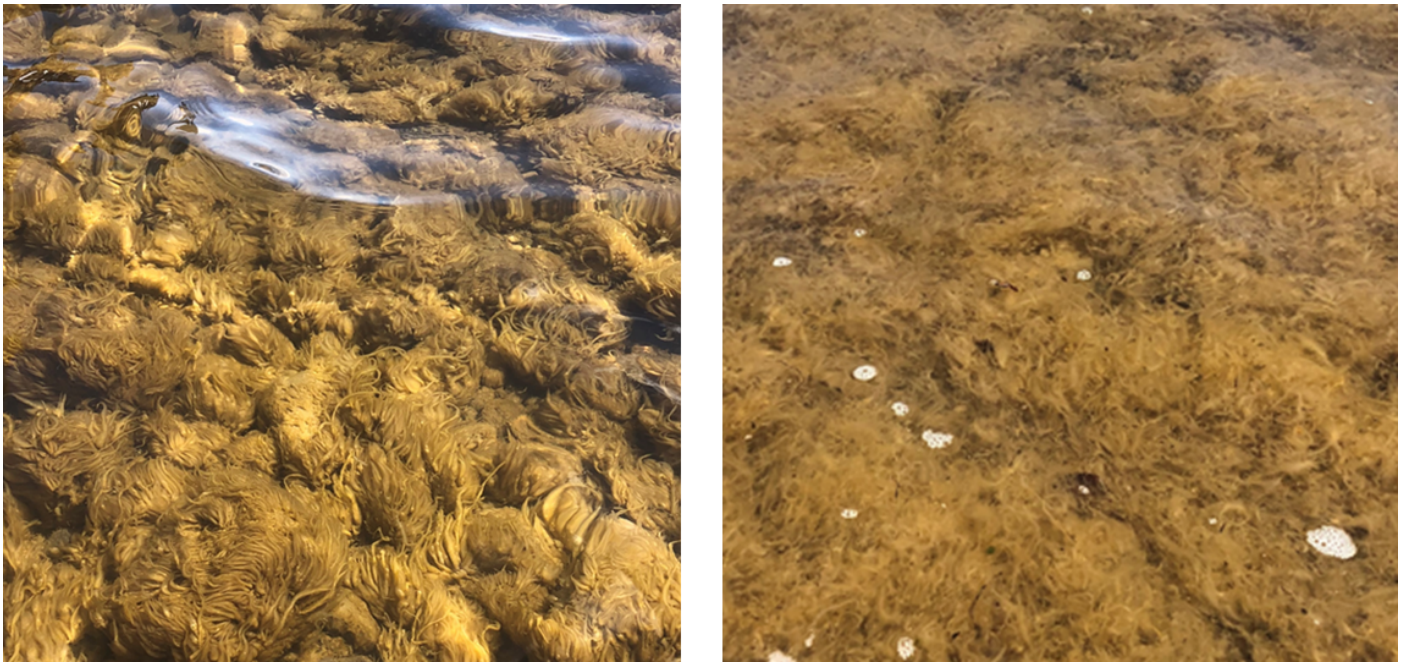

Figure 7: Photos of periphyton that is attached to the rocks (left) and detached due to wind and wave action (right). The images were taken at a Lake Tahoe beach in early spring. No cyanobacteria or toxins were detected in the samples collected from this location.

Figure 8: Photos of metaphyton along the bottom of the water column and beginning to wash up along the shore of two different Lake Tahoe beaches.

Although periphyton and metaphyton typically are not harmful, low levels of harmful algal toxins have been detected in the material washing up on the shorelines of Lake Tahoe. Due to the large accumulations of material and sometimes low levels of toxins caution advisory signs have been placed at several Lake Tahoe beaches to warn the public of the potential danger.

Figure 9: Photos showing examples of large accumulations of material washing up on shore and beginning to decay causing nuisance odors. The material is a combination of different algae and low levels of harmful toxins.

Extra Resources

- Incident Report Map – you can zoom into Lake Tahoe to see if areas around the California side of the lake have advisory signage recommended (this map is updated in near real-time)
- Report a bloom in California
- How to keep you, your family, and pets safe from HABs
- Frequently asked questions for HABs
- Harmful Algal Bloom Portal - website that contains many other resources including visual guides to help identify blooms
- Partner monitoring information