

## Monitoring Monday – Let's look at Turbidity

Join us each Monday as the Clean Water Team shares resources on a water quality topic. Today we will look at turbidity in preparation for [Lakes Appreciation Month](#) and the [Secchi Dip-In](#), both start July 1, 2022.

Turbidity is one of the five water quality vital signs. These five parameters (turbidity, temperature, pH, dissolved oxygen, and conductivity) are basic to life within aquatic systems. Impairments of these can be observed as impacts to the flora and or fauna with a given waterbody.

Turbidity is the measure of relative clarity of a liquid. It is an optical characteristic of water and is a measurement of the amount of light that is scattered by material in the water when a light is shined through the water sample. The higher the intensity of scattered light, the higher the turbidity. Material that causes water to be turbid include clay, silt, very tiny inorganic and organic matter, algae, dissolved colored organic compounds, and plankton and other microscopic organisms.

High concentrations of particulate matter affect light penetration and ecological productivity, recreational values, and habitat quality, and cause lakes to fill in faster. Suspended sediments can clog the gills of fish. Once the sediment settles, it can foul gravel beds and smother fish eggs and benthic insects. In streams, increased sedimentation and siltation can result in harm to habitat areas for fish and other aquatic life. Particles also provide attachment places for other pollutants, notably metals and bacteria. Suspended particles diffuse sunlight and absorb heat. This can increase temperature and reduce light available for algal photosynthesis. For these reasons, turbidity readings can be used as an indicator of potential pollution in a water body.

Sediment often tops the list of substances or pollutants causing turbidity. However, any watershed has multiple sources of the pollutants or physical features that can affect water clarity. These can be divided into natural or background, and human induced sources. Natural sources can include erosion from upland, riparian, stream bank, and stream channel areas; however, this is difficult to measure due to agriculture and development activity. Human activities can accelerate erosion. Tannic acids often associated with peat and bog areas cause water to be colored resulting in turbidity. Algae that grow with nourishment from nutrients entering the stream through leaf decomposition or other naturally occurring decomposition processes, or enriched runoff from lawns or agricultural areas can also be sources of turbidity. Stream channel movement can also release sediment.

Turbidity is commonly measured in Nephelometric Turbidity Units (NTU). The nephelometric method compares how light is scattered in a water sample against the amount of

light scattered in a reference solution. An electronic hand-held meter is often used to measure turbidity.

Turbidity measurements can also be made by use of a Secchi disc or similar instrument. To obtain a measurement, the Secchi disk is lowered into the water while observing the depth at which it disappears. It is lowered some more and then raised while observing the depth at which it reappears. The Secchi disk measurement is the average of the two observations.

Turbidity tubes apply the principles of measuring water clarity using a Secchi disk to shallow bodies of water where a Secchi disk is unusable.



The Secchi Dip-In is a demonstration of the potential of volunteer monitors to gather environmentally important information on our lakes, rivers, and estuaries. Volunteers have been submitting information during the annual Dip-In since 1994. Please join them in this international effort to track changes in water quality! Although we gladly welcome data year-round, we have historically observed the Secchi Dip-In during Lakes Appreciation Month, where we celebrate our lakes throughout the month of July each year. [www.nalms.org/secchidipin/](http://www.nalms.org/secchidipin/)

#### **Take a Dip with the Clean Water Team (Video)**

[www.youtube.com/watch?v=-bLohlyZr64](http://www.youtube.com/watch?v=-bLohlyZr64)

#### **Instructions for Making a Transparency Tube to Measure Water Transparency**

<https://www.globe.gov/documents/11865/354449/Instrument+Construction+Instructions+for+Making+a+Secchi+Disk+and+Transparency+Tube+to+Measure+Water+Transparency/0bb1be64-c9b5-4437-ac86-3fc1a867a77d>

#### **Build Your Own Secchi Disk! (Video)**

[www.youtube.com/watch?v=sbQ2nVt\\_5GY&t=16s](http://www.youtube.com/watch?v=sbQ2nVt_5GY&t=16s)

## **RESOURCES**

**Information Paper: Measuring Suspended Solids and Water Column Turbidity**

[www.waterboards.ca.gov/water\\_issues/programs/swamp/docs/cwt/guidance/315.pdf](http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/315.pdf)

**Fact Sheet: Turbidity Fact Sheet**

[www.waterboards.ca.gov/water\\_issues/programs/swamp/docs/cwt/guidance/3150en.pdf](http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/3150en.pdf) English

[www.waterboards.ca.gov/water\\_issues/programs/swamp/docs/cwt/guidance/3150sp.pdf](http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/3150sp.pdf) Español

**How Turbidity Meters Work (Video)**

[www.youtube.com/watch?reload=9&v=qz8xHQJw6qY](http://www.youtube.com/watch?reload=9&v=qz8xHQJw6qY)

This video is for informational purposes only and does not constitute an endorsement.

**Measuring Transparency (Water Clarity) Video Playlist**

[https://www.youtube.com/playlist?list=PLMSa5d-ill6Mk6rqYNNNo6EbpZc\\_FK86be](https://www.youtube.com/playlist?list=PLMSa5d-ill6Mk6rqYNNNo6EbpZc_FK86be)

**MURKY WATERS: Gaining Clarity on Water Transparency Measurements**

[www.waterboards.ca.gov/water\\_issues/programs/swamp/docs/cwt/guidance/3150a.pdf](http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/3150a.pdf)

**Turbidity Measurement**

[www.youtube.com/watch?v=qz8xHQJw6qY](http://www.youtube.com/watch?v=qz8xHQJw6qY)

**Turbidity and Water**

[www.usgs.gov/special-topic/water-science-school/science/turbidity-and-water?qt-science\\_center\\_objects=0#qt-science\\_center\\_objects](http://www.usgs.gov/special-topic/water-science-school/science/turbidity-and-water?qt-science_center_objects=0#qt-science_center_objects)

**Vital Signs: The Five Basic Water Quality Parameters**

[www.waterboards.ca.gov/water\\_issues/programs/swamp/docs/cwt/guidance/310.pdf](http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/cwt/guidance/310.pdf)

**Water Quality Goals – Turbidity**

[https://public3.waterboards.ca.gov/wqgapps/WQ\\_view.jsp?backUrl=turbidity&chemName=Turbidity](https://public3.waterboards.ca.gov/wqgapps/WQ_view.jsp?backUrl=turbidity&chemName=Turbidity)

[www.waterboards.ca.gov/water\\_issues/programs/water\\_quality\\_goals/search.html](http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/search.html)

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