

Turbidity

Fact Sheet

What is it?

Turbidity is a measure of the amount of suspended particles in the water. Algae, suspended sediment, and organic matter particles can cloud the water making it more turbid.

Why is it Important?

Suspended particles diffuse sunlight and absorb heat. This can increase temperature and reduce light available for algal photosynthesis. If the turbidity is caused by suspended sediment, it can be an indicator of erosion, either natural or man-made. Suspended sediments can clog the gills of fish. Once the sediment settles, it can foul gravel beds and smother fish eggs and benthic insects. The sediment can also carry pathogens, pollutants and nutrients.

How is it Measured?

- Secchi disc (for standing water only): The observer measures the depth at which the secchi disc is no longer visible. The results are measured in feet or meters.
- Transparency tubes: The observer views an object or a Secchi pattern through the water in a tube, adding water gradually till the object is no longer visible. The results are measured in centimeters or inches.
- Dual cylinder kit: The observer views an object through the water in a cylindrical tube and visually compares it to increasing amounts of a standard added to clean water in an identical tube, till the turbidities match. The results – amount of standard added until it matched the sample -can be converted to Jackson Turbidity units (JTUs).
- Turbidity meter: This measures how much light is scattered when directed at a water sample. The units are reported in nephelometric turbidity units (NTUs) or Formazin turbidity Units (FTU) which, numerically, mean the same thing. The meters are also called nephelometers or turbidimeters.

Note: NTUs and JTUs should not be used interchangeably. JTUs are based on viewing an object through a tube of water. NTU or FTU are a measure of the light scattered at 90 degrees.

What Factors Affect It?

Natural Factors

- Algae and nutrient loading
- Suspended sediment from erosion and sediment transport
- Seasonal weather, storm events
- Local stream morphology will determine whether sediments are deposited or eroded

Turbidity

Fact Sheet (continued)

Human Factors

- Erosion due to removal of riparian vegetation, changes in stream morphology or stream flow patterns
- Excessive nutrient loading and algal growth

What are Expected Turbidity Levels?

Since the rivers, lakes, bays, and ocean waters of California are home to small, suspended plants and animals called plankton, turbid water is natural. The level of turbidity will vary from lake to lake and river to river depending on the nutrient loading, geology and stream dynamics. For example, Lake Tahoe is renowned for its clear water. On the other hand, algae in the presence of nutrients produce very turbid water in Clear Lake. Another source of turbidity is sediment, which is naturally transported and deposited. Here are some typical turbidity values for different water bodies:

Water type	Turbidity Level
Water bodies with sparse plant and animal life	<0.1 NTU
Drinking water	<0.1 NTU
Typical groundwater	<1 NTU
Water bodies with moderate plant and animal life	1-10 NTU
Water bodies enriched with nutrients, supporting large plumes of planktonic life	10-50 NTU
Winter storm flows in creeks and rivers	20 -1000 NTU

What are the Water Quality Benchmarks?

Water quality objectives are included in the Regional Water Quality Control Board's Basin Plans. The water quality objectives vary from region to region in California. Therefore, you should check with the Regional Water Quality Control Board in your area.

Most of the nine Regions' water quality objectives for turbidity require that surface waters (except ocean waters) be free of changes in turbidity that cause nuisance or adversely affect the beneficial uses of water. In addition, most of the nine Regions' Basin Plans state that turbidity should not increase by a certain percent above naturally occurring levels. The following examples were taken from Basin Plans in 1996 and are applicable to surface waters only (excluding the Pacific Ocean).

- In the North Coast Region (Region 1), turbidity shall not increase more than 20 percent above natural levels.
- In the San Francisco Bay Region (Region 2), turbidity (due to waste discharge) shall not increase more than 10 percent above natural levels where natural tur-

Turbidity

Fact Sheet (continued)

bidity is greater than 50 NTU.

- In the Central Coast Region (Region 3), increases in turbidity shall not exceed the following limits:

Natural Turbidity	Maximum Increase
0–50 JTU	20%
50–100 JTU	10 JTU
> 100 JTU	10%

- In the Los Angeles Region (Region 4), increases in turbidity shall not exceed the following limits:

Natural Turbidity	Maximum Increase
0–50 NTU	20%
> 50 NTU	10%

- In the Central Valley Region (Region 5), increases in turbidity (attributable to controllable water quality factors) shall not exceed the following limits:

Natural Turbidity	Maximum Increase
0–5 NTU	1 NTU
5–50 NTU	20%
50–100 NTU	10 NTU
> 100 NTU	10%

- In the Lahontan Region (Region 6), turbidity shall not increase more than 10 per cent above natural levels.
- The Colorado River Basin Region (Region 7) has a Basin Plan that does not include a numerical turbidity objective.
- In the Santa Ana Region (Region 8) and the San Diego Region (Region 9), increases in turbidity (due to controllable water quality factors) shall not exceed the following limits:

Natural Turbidity	Maximum Increase
0–50 NTU	20%
50–100 NTU	10 NTU
> 100 NTU	10%

- The San Diego Region Basin Plan also has transparency objectives for lagoons, estuaries, and San Diego Bay. The objectives are based on Secchi disc measurements.

Turbidity

Fact Sheet (continued)

Sources and Resources

This Fact Sheet is implemented by the Clean Water Team (CWT), the Citizen Monitoring Program of the California State Water Resources Control Board. This fact sheet has been revised by CWT from an original document authored by Gwen Starrett, former State Coordinator for Citizen Monitoring. Please contact your Regional CWT Coordinator for further information and technical support. For an electronic copy, to find many more CWT guidance documents, or to find the contact information for your Regional CWT Coordinator, visit www.swrcb.ca.gov/nps/volunteer.html. If you wish to cite this FS in other texts you can use "CWT 2004" and reference it as follows: "Clean Water Team (CWT) 2004. Turbidity Fact Sheet, FS-3.1.5.0(Turb). in: The Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment, Version 2.0. Division of Water Quality, California State Water Resources Control Board (SWRCB), Sacramento, CA."