

Discrete Water Quality Metadata- Field Methods

Current	Method	Name	Description	Instrument	Manufacturer	Model	Instrument Setup	Comparability Notes	Data From	Data To
Yes	Chlorophyll fluorescence	Chlorophyll fluorescence (<i>in vivo</i>) using a blue LED.	Chlorophyll molecules are induced to fluoresce using a blue LED with a peak wavelength of approximately 470 nanometers (nm). The chlorophyll emits light in the 650 -700 nm region of the spectrum. The amount of fluorescence is measured by a photo diode that is screened by an optical filter that prevents 470 nm excitation light from being detected when it is back-scattered off of particles in the water. The sensor measures overall fluorescence which includes chlorophyll <i>a</i> , <i>b</i> , <i>c</i> , pheophytin <i>a</i> , and non chlorophyll interfering species that fluoresces above 630 nm.	Fluorometric sensor	YSI	YSI 6025	YSI 6600 sonde equipped with YSI 6025 chlorophyll probe.	In October 2011 this setup replaced the Turner Instruments fluorometer. This change was made in order to maintain consistency with fluorescence measured at DWR's real-time monitoring stations.	October 2011	present
No	Chlorophyll	Chlorophyll a	<i>In vivo</i>	Fluorometer	Turner	Model 10-AU	Setup to measure	In April 2003 this	3/13/2003	Sept. 2011

	fluorescence (blue lamp)	fluorescence (<i>in vivo</i>) using blue lamp and narrow filter kit.	chlorophyll a fluorescence is a good indicator of algal biomass levels, since all algae contain chlorophyll a. For accuracy of <i>in vivo</i> measurements, samples must be taken regularly for extraction to correlate with the <i>in vivo</i> readings.		Designs	field fluorometer equipped with flow through implement and temperature compensation.	chlorophyll a in the presence of high blank, humic substances, or chlorophyll b (<i>in vivo</i>) (Optical Kit 10-096R). Including: 10-050R excitation filter, 034-0395R emission filter (680 nm interference filter), 10-032 1ND reference filter	setup replaced the traditional white lamp setup after a comparative study showed it yielded better relationships with extracted values.		
No	Chlorophyll fluorescence (white lamp)	Chlorophyll a fluorescence (<i>in vivo</i>) using white lamp and wide filter kit.	<i>In vivo</i> chlorophyll a fluorescence is a good indicator of algal biomass levels, since all algae contain chlorophyll a. For accuracy of <i>in vivo</i> measurements, samples must be taken regularly for extraction to correlate with the <i>in vivo</i> readings.	Fluorometer	Turner Designs	Model 10-AU field fluorometer equipped with flow through implement and temperature compensation.	Setup with traditional chlorophyll filters (Optical Kit 10-037R). Including the 10-050R excitation filter, the 10-051R emission filter, the 10-032 1ND reference filter, and the 10-045 Daylight White Lamp.	This setup was replaced in April 2003 with the setup for the measurement of chlorophyll a in the presence of high blank, humic substances, or chlorophyll b (<i>in vivo</i>) after comparative study showed it yielded better relationships with extracted values.	1/25/1996	10/21/2003
Yes	Depth of Water	Depth of Water Body	The depth of the water column at the point of sampling is measured to nearest foot (0.3 m)	Either 1) a weighted measuring tape for station accessed by road or 2) an electronic depth	Either 1) n/a for station accessed by road or 2) Ray Marine for stations accessed	Either 1) n/a for station accessed by road or 2) Sea Talk System T50 200MHz for stations accessed by boat.	n/a	Data comparable to other standard methods in this category, within accuracy and precision limits.	1/18/1996	Present

				sounding instrument for stations accessed by boat.	by boat.					
Yes	EPA 120.1 (Field)	Specific Conductance (at 25 °C)	The specific conductance of a sample is measured by use of a self-contained conductivity meter, Wheatstone bridge-type, or equivalent. Samples are preferable analyzed at 25°C. If not, temperature corrections are made and results reported at 25°C.	Electrical conductivity meter	Either 1) for station accessed by road = 1975 to March 2002: Beckman (RC-19) and then from April 2002 and on: YSI (85); or 2) for stations accessed by boat = 1975 to Feb 2001: Beckman (RC-19) then from March 2001 and on: Seabird for stations accessed by boat, Hach for stations accessed by road. From October 2011 to present: YSI 6560	YSI 6560 or Hach	Instruments used have temperature compensation.	Data comparable to other standard methods in this category, within accuracy and precision limits.	1/7/1975	Present
Yes	EPA 150.1 (Field)	pH (Electrometric)	The pH of a sample is	pH Meter	1975 to 1988:	YSI 6589FR	n/a	Data comparable to other	1/7/1975	12/19/1995

			determined electrometrically using either a glass electrode in combination with a reference potential or a combination electrode.		Leeds and Northrup (model 7410) 1989 to 1995: Beckman (pHI 12 or pHI 71) 3/1/2009 to 8/31/2009: SympHony 9/1/2009 to present: YSI (part# 6589FR)			standard methods in this category, within accuracy and precision limits.	3/1/2009	Present
Yes	EPA 170.1 (Field)	Temperature	Temperature measurements may be made with any good grade of mercury-filled or dial type centigrade thermometer, or a thermistor.	Thermometer or thermistor	Either mercury filled thermometer or YSI telethermometer or YSI resistance thermistor	YSI 6560	n/a	Data comparable to other standard methods in this category, within accuracy and precision limits.	1/7/1975	Present
Yes	EPA 180.1 (Field)	Turbidity (Nephelometric)	The method is based upon a comparison of the intensity of light scattered by the sample under defined conditions with the intensity of light scattered by a standard reference suspension. The higher the intensity of scattered light,	Turbidimeter	Either 1) for station accessed by road = 1975 to March 2002: Hach (2100A), then from April 2002 and on: Hach (2100P); or 2) for stations accessed	Models 2100 A or 2100 P Hach; YSI 6136 turbidity sensor	YSI 6600 sonde equipped with YSI 6136 turbidity sensor	Turbidity using light side-scatter measurement. Comparable with other such methods. Not comparable with Jackson Candle methods.	1/7/1975	Present

			the higher the turbidity.		by boat = 1975 to December 1998: Hach (2100A), then from January 1999 to September 2011: Turner Designs (10AU). October 2011 to present: YSI turbidity sensor					
Yes	EPA 360.2 (Field)	Oxygen, Dissolved (Modified Winkler, Full-bottle technique)	The sample is treated with manganous sulfate, potassium hydroxide, and potassium iodide (the latter two reagents combined in one solution) and finally sulfuric acid. The initial precipitate of manganous hydroxide, Mn(OH) combines with the dissolved oxygen in the sample to form a brown precipitate, manganic	Bench (pretitration chemicals in powder pillow form from Hach Chemical Co.) Shift from phenylarsine oxide (PAO) to sodium thiosulfate in 1989.	n/a	n/a	n/a	Data comparable to other standard methods in this category, within accuracy and precision limits.	1/7/1975	Present

			hydroxide, MnO(OH). Upon acidification, the manganic hydroxide forms manganic sulfate which acts as an oxidizing agent to release free iodine from the potassium iodide. The iodine, which is stoichiometrically equivalent to the dissolved oxygen in the sample, is then titrated with sodium thiosulfate or phenylarsine oxide (PAO).							
Yes	Field Notes	Notes taken in the field	Notes are taken in the field to document any particular event or condition regarding the sampling event	n/a	n/a	n/a	n/a	n/a	1/18/1996	Present
Yes	GPS Location	Determine geographic coordinates using the Global Positioning System.	GPS is funded by and controlled by the U. S. Department of Defense (DOD). While there are many thousands of civil users of GPS world-wide, the system was designed for and is operated by the U. S.	Global Positioning System	Various	Various	Read NAD83 datum coordinates	Data comparable to other standard methods in this category, within accuracy and precision limits.	3/11/2004	Present

			military. GPS provides specially coded satellite signals							
No	Light extinction	Depth at which sunlight is extinguished to 1% of surface intensity.	As a light meter is lowered in the water, depth and light measurements are recorded to establish a curve of light extinction. The depth at which only 1% of the surface light intensity remains is read from the curve and recorded.	Light meter	Whitney	LMT-8A	n/p	Data consistent over time, however comparability to other measurements in this category is unknown.	1/7/1975	12/11/1986
Yes	Secchi Disk	Transparency / light penetration below water surface	The Secchi disk (a plastic disk 20 cm in diameter with alternate black and white quadrants) is lowered into the water where the surface is calm and shaded since glare and surface movements interfere with the observer's vision. The depth at which the disk's black and white quadrants just become indistinguishable is recorded.	Secchi Disk	n/a	n/a	n/a	Data comparability to other data mediocre, because of the method's dependence on operator and procedure characteristics.	1/7/1975	Present

No	Serial identification	Serial number applied to field datasheet for identification	Each datasheet used in the field is identified by a serial number.	n/a	n/a	n/a	n/a	n/a	1/3/1983	12/8/1993
No	Tide slack level	Tidal level of the targeted water slack	For data consistency and ease of operation, water sampling events are planned to occur within an hour of the predicted high water slack time at each station. The tidal level (i.e. HH for "Higher High", LH for "Lower High") corresponding to this target time	n/a	n/a	n/a	n/a	n/a	1/3/1983	12/19/1995
No	Tide slack time	Predicted time of slack water (reference: Golden Gate)	For data consistency and ease of operation, water sampling events are planned to occur within an hour of the predicted high water slack time at each station. The predicted high water slack time at the Golden Gate (San Francisco Bay Entrance) is read from the NOAA tide tables and time	n/a	n/a	n/a	n/a	Data based on tide prediction models, not on actual observations.	1/18/1996	2003

			modifiers (i.e. time lags in hours and minutes) specific to each station are added to it to estimate the predicted high water slack time at each stations. These station specific target times are recorded for each sample.							
Yes	Weather Observations	Subjective weather observations	A qualitative statement on general weather conditions is recorded on the field datasheet.	n/a	n/a	n/a	n/a	Comment only. Cannot be compared to other data because the procedure is not precisely defined.	1/18/1996	Present
No	Wind Direction	Wind Direction	Wind direction is obtained with the wind vane associated with the anemometer and recorded on the field sheet. Readings are made in increments of 360/16 degrees (i.e. 22.5 degrees), with North at 0.	Wind Vane	Either 1) for stations accessed by road: a Dwyer hand-held wind speed indicator or 2) for stations accessed by boat: a Danforth electronic wind speed indicator.	n/p	n/p	Data comparable to other such measurements, however accuracy and precision are limited.	1/23/1984	12/19/1995
No	Wind Velocity	Wind Velocity	Wind speed is measured with the anemometer and recorded on	Anemometer	Either 1) for stations accessed by road: a	n/p	n/p	Data comparable to other standard methods in this	1/7/1975	12/19/1995

			the field sheet.		Dwyer hand-held wind speed indicator or 2) for stations accessed by boat: a Danforth electronic wind speed indicator.			category, within accuracy and precision limits.		
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