source water

Applications, Capabilities & Solutions

for baseline monitoring
and early warning
Choose YSI
Reliable data to help you act quickly, work efficiently, and reduce costs.

Source water can be affected by land use, agricultural practices, and climate change.

Monitoring and treatment takes significant investments in time and money. These investments – and public health – may be jeopardized if source water is contaminated.

Trust YSI’s sensors and systems to provide a continuous and comprehensive data record of water quality and quantity, giving you the information you need to make decisions.

We understand the challenges of working in natural environments. Our long-term monitoring systems play a key role in improving water quality and plant efficiency while allowing for early warning and rapid response to events such as algal blooms and floods.

Every environment is unique. Talk with our hands-on applications specialists, who can assist you with your specific monitoring needs.

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Data from YSI instruments gives you insight into source water before it reaches the treatment plant.
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Developing a baseline water quality data set allows you to:

• Characterize water quality and natural fluctuations
• Compare to national standards or other environments
• Measure the impact of storms or land use
• Monitor impact from mixing with other sources
• Improve resource management and evaluate effectiveness of long-term management strategies
• Develop models

YSI’s flexible systems and integration capabilities can help you develop a continuous monitoring system that’s right for you.

Systems include water quality and quantity sensors, floating and fixed platforms, mounting hardware, flexible data collection platforms, and field services.

Reservoir Monitoring

Whether reservoir management concerns relate to surrounding land use, taste and odor problems, or plant efficiency, having baseline data is a critical component in informed decision-making.

Water quality is constantly changing in time and space. YSI’s most comprehensive monitoring system is a vertical profiler that provides continuous water quality data, typically once an hour, throughout the water column.

Profiler data can:
- Monitor total algal biomass that can be used to improve filter run times, identify blooms, and monitor vertical migration of algae
- Detect turnover events
- Monitor the impacts of storms and land use on water quality
- If the vertical profiler is deployed at a water intake, data can be used for:
  - Tracking water quality at various intake depths to ensure the best quality water is entering the plant
  - Improving the efficiency in treatment chemical use and deciding which treatment or pre-treatment protocols should be employed
  - Monitoring blue-green algal biomass to prevent taste and odor events
  - Automating aeration for the treatment of low oxygen conditions, manganese compounds, or to increase vertical mixing

Intake Monitoring

Monitor water as it enters the plant with the HydroSAM wall-mounted flow-through system. HydroSAM is a complete water quality sampling and monitoring station, providing continuous data from a compact system that measures parameters such as dissolved oxygen, pH, turbidity, conductivity, chlorophyll, blue-green algae, and temperature.

The HydroSAM lowers costs associated with running traditional on-line analyzers by:
- Reducing on-site time through easy sensor swap-out system
- Ensuring accurate readings and longer maintenance intervals with wiped sensor technology that minimizes biofouling

We have always wanted a technology such as the Profiler... if we are able to ensure that the algal load in water supplied to the drinking water treatment plant remains low, we can save costs by optimizing the treatment process."
— Terry Bridgman, Field Scientist, Thames Water

YSI offers a wide variety of buoy and platform configurations for vertical profiling.
Baseline monitoring

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Vertical profiler data display changes in water quality throughout the water column over time. The data at right show a stratified water column and the impacts of an aeration system on dissolved oxygen.

Real-time data collection

Next to a water intake, a YSI vertical profiling system moves a YSI water quality sonde up and down the water column, tracking the best depth for extraction.

YSI offers a wide variety of buoy and platform configurations for vertical profiling.

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Early warning

Nutrients, light, and temperature conditions dictate algal growth—and changes in these factors can shift the balance from stable algal populations to an enriched environment that leads to unhealthy blooms.

YSI’s systems continuously monitor key water quality parameters and can trigger alarms or actions when parameters, especially dissolved oxygen or algal biomass, cross user-programmable threshold levels.

Our real-time monitoring systems include rugged platforms, mounting hardware, flexible data collection platforms, telemetry, and field services.

Algal Blooms

YSI’s chlorophyll sensor monitors total algal biomass in water. This can be useful in detecting natural fluctuations and the onset of algal blooms.

Unhealthy blooms significantly impact dissolved oxygen concentration; the ability to monitor algal biomass allows you to forecast changes in dissolved oxygen and the potential onset of anoxic events.

When used with a blue-green algae sensor, the combined data can provide information on the types of algae present such as taste- and odor-causing blue-greens or filter-clogging diatoms.

Treatment Chemical Use

Through continuous monitoring of water quality with a YSI sonde, treatment plants can significantly reduce the use of treatment chemicals while improving water quality and plant efficiency.

Monitoring systems located at water intakes provide the data you need to choose the best water to bring into the plant, determine which treatment chemicals or processes to use, and provide continuous feedback on the effectiveness and duration of treatment—reducing operating costs and improving water quality.

Data can be used to:
• Improve chemical use efficiency, resulting in improved water quality and lower operating costs
• Decrease filter run times
• Decrease total organic loading

Nutrient Monitoring

Continuous monitoring with a YSI system, including nutrients (below), provides near real-time data and thus quicker response than spot sampling or lab analysis.

Data from 9600 nitrate analyzer, 6-Series sonde, and EcoNet can:
• Provide early access to remote monitoring sites
• Provide early warnings about public health concerns such as high nitrogen levels or algal blooms in source water

Taste & Odor Events

Certain water quality conditions trigger blooms of blue-green algae (BGA) which can lead to the production of taste- and odor-causing compounds (geosmin and MIB) and potentially produce cyanotoxins such as microcystins. This is a major water quality concern for drinking water utilities, which may have difficulty detecting these events early enough to take treatment measures to prevent poor quality or hazardous water from reaching the consumer.

The blue-green algae sensor monitors BGA biomass by detecting the fluorescence from unique pigments. Data can be used to:
• Trigger treatment strategies specific to blue-green algae
• Warn recreational users when water is unsafe for swimming or boating

Reduce Disinfection By-products

The interaction of chlorine with naturally occurring organic matter results in production of disinfection by-products such as trihalomethane.

To minimize exposure to this by-product, use chlorophyll and blue-green algae sensors to:
• Monitor organic load in water and select the optimal water for entry into the treatment plant
• Select the appropriate pre-treatment process to reduce organic load before chlorination

Leading Sensor Technology

Reliable, field-proven sensors are the cornerstones of our rugged instruments— and their highly accurate data are the foundation of successful monitoring programs.

Virtually maintenance free: Integrated wipers for optical dissolved oxygen, pH, ORP, turbidity, chlorophyll, and blue-green algae sensors prolong maintenance intervals, lowering operation costs.

Chlorophyll and blue-green algae sensors

“We’re able to study daily, seasonal, and yearly variations, cycles, and trends and also compare those with the effects of weather on algal productivity. All data is being archived for further analysis.”

— Dr. Joseph Ramus, Marine Laboratory, Duke University
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During floods and storms, sediment is easily stirred up and transported throughout a water network. Its suspension can affect drinking water quality and present challenges to a treatment plant.

When faced with a decision about where to withdraw drinking water – from primary or secondary sources – use a 6-Series sonde, in conjunction with our profiling system, to obtain a continuous and reliable record of the vertical distribution of turbidity.

A 6-Series sonde, such as the 6920 V2, measures temperature, optical dissolved oxygen, and turbidity and provides insight into the impacts of CSOs. Wipers on the instrument’s sensors prevent biofouling and ensure data accuracy.

Quickly measure discharge volumes in rivers and inflow rates in reservoirs with SonTek/YSI RiverSurveyor® 3D Acoustic Doppler system.

From a moving boat, compute a complete channel cross-section, velocity profile, and total discharge in minutes.

Assess contamination in drinking water wells with the Model 30 conductivity meter. This basic handheld instrument quickly samples and calculates salinity levels to determine the relative health of wells that may have been flooded with debris or wastewater.

Stormwater runoff from parking lots and other water-impervious surfaces can lead to contamination from pollutants such as oil.

YSI offers an integrated package that includes a hydrocarbon sensor and water quality sonde to provide a complete water quality record of the impact of stormwater on source water.
In addition to monitoring for baseline water quality, professionals must be prepared for large-scale events such as storms and floods, which threaten to contaminate drinking water sources.

YSI multiparameter sondes and SonTek/YSI velocity instruments quickly and easily characterize water quality and quantity before, during, and after these events.

**Combined Sewer Overflow**

Heavy rainfall or snowmelt can overwhelm the capacity of pipes where rainwater, industrial wastewater, and domestic sewage are combined. The drawback is that untreated water could discharge into nearby streams and rivers.

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“YSI equipment performance has been excellent. We were able to upgrade our locations to real-time data transmission without a single problem. We’re collecting some very valuable data.”

— Tom White, Senior Project Manager, City of Indianapolis Office of Environmental Services
Water shortages

Water management under drought conditions, or other shortages, requires resourcefulness and efficiency.

Continuous monitoring with YSI's instruments and systems will help you determine if the decreased volume and flow of water is leading to adverse conditions such as concentrated contaminants.

**Flow Rates**

Track all available water resources during a drought by measuring velocities of waterways and streams – as shallow as one inch.

The SonTek/YSI FlowTracker™ is an easy-to-use handheld instrument which automatically computes discharge using standard USGS/ISO methods. Built-in quality checks make the most efficient use of your time, ensuring your data is accurate the first time.

**Algal Blooms**

As water levels decrease, nutrients become concentrated, often triggering algal blooms. High algal biomasses at intakes can result in several serious issues, including increasing filter run times and the production of taste- and odor-causing compounds from blue-green algae.

Chlorophyll and blue-green algae sensors provide continuous data which can be used to efficiently manage water treatment timing, such as chemical use or aeration, to prevent or minimize the effect of algal blooms.

**Primary & Secondary Sources**

Drought conditions can deteriorate water quality and force the use of secondary water sources such as rivers or storage reservoirs. In such cases, continuous water quality monitoring near treatment plant intakes and in secondary sources is critical to direct management decisions.

To generate the most useful data, a multiparameter sonde can be integrated into a vertical profiler or EcoNet system. This can dramatically improve the quality of water entering treatment plants by continuously monitoring at various water intake depths, enabling you to select the optimal source.

By measuring both level and velocity, then indexing to the mean channel velocity, our discharge data improved dramatically.”

— Keith Ging, Senior Hydrologist, Lower Colorado River Authority

**Low Oxygen Events**

Low dissolved oxygen levels during drought can lead to the formation of manganese and iron compounds, increase internal phosphorus loading, or produce noxious gases. Additionally, algal blooms can cause dramatic fluctuations in DO and decomposition of blooms can create anoxic conditions which lead to fish kills.

A 6600 V2-4 sonde with ROX™ optical DO sensor provides continuous in situ data for several months. No other system is as reliable and accurate for long-term monitoring deployments.
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**Ground water monitoring**

*Well Monitoring Network*

Low-flow sampling is a widely used method to identify contamination in an aquifer or well. This method places a minimal amount of stress on the water system. A 556 multiparameter sampling instrument with flow cell quickly provides data for key parameters before and during low-flow sampling: pH, temperature, specific conductance, ORP, and dissolved oxygen.

For continuous monitoring of a network of wells, the slender 600XLM sonde easily fits down 2-inch wells and logs *in situ* measurements of depth (using a highly accurate vented level sensor), conductivity, temperature, pH, and DO.

*Salt Water Intrusion*

When water resources are used heavily, water table levels can drop. This creates a risk that salt water can infiltrate the ground water system and degrade drinking water quality.

A 556 sampling instrument or slender 600LS monitoring sonde can capture valuable conductivity and calculated salinity data to keep you informed of changes in ground water.

*Pollutant Monitoring*

Short-term projects such as construction can affect the water quality of nearby aquifers. Continuous monitoring with an easy-to-use 600OMS with turbidity sensor throughout the project can characterize the potential impacts from sediment, spills, and other pollutants.

*Level Monitoring*

For level sampling or monitoring, the small-diameter YSI Level Scout™ or 600LS sonde provides accurate level and temperature data. Data are logged internally and easily downloaded or accessed remotely via telemetry.

**Drinking Water Monitoring**

Measure free chlorine concentrations and other parameters of concern with Drinking Water Multiprobes. These portable systems are easy to move and set up at multiple sites, providing greater flexibility than large, wall-mounted systems.

YSI’s free chlorine sensor has been tested by the US EPA, USGS, and US Department of Defense.

These sondes provide continuous data, an improvement over spot sampling protocols because the data stream is captured continuously. For example, chlorine levels can decrease relative to detention time in reservoirs or conductivity levels can spike after a rainfall.

**Process Monitoring**

Obtain data quickly by connecting a Drinking Water Multiprobe and flow cell to a 6500 Environmental Process Monitor. With multiple current loop channels, this integrated system easily delivers uninterrupted data to a plant’s SCADA system and allows technicians to quickly access information.

Define setpoints for four parameters and trigger alarms if water quality exceeds safe ranges.

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**Distribution monitoring**

With millions of miles of pipe in distribution systems, safe delivery of drinking water is critical.

Continuous monitoring provides an assurance of safety, alerting utilities to sudden changes in the system due to aging pipes, storm or flood events, or even security breaches.

YSI’s specialized drinking water sondes take readings at any point along the distribution system – treatment plant, water tanks, pumping stations – and provide a comprehensive view of water quality before it reaches the customer.

**Well Monitoring Network**

Salt Water Intrusion

Pollutant Monitoring

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A portable 556 multiparameter instrument with flow cell quickly samples ground water wells.

The vented pressure transducer on all 6-Series sondes, such as the 600LS, meets the USGS Office of Surface Water accuracy specification for use in stream gauging applications.

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Ground water and aquifers are important sources of drinking water.

For ground water monitoring, determining the quality of the water as well as its quantity and location (depth or level) are key data sets for local water utilities as well as citizens with private wells.

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YSI’s portable drinking water monitoring system is easy to set up and use (no reagents) for side-stream measurements throughout a distribution system.

A portable 556 multiparameter instrument with flow cell quickly samples ground water wells.

Drinking water in a water tower comes from two sources – the main distribution line from the plant when pumps are filling the tank or the tank itself when the tank is discharging water into the distribution system. Data, collected in 15-minute intervals, revealed that free chlorine changed radically in discrete steps, a pattern which wasn’t observed at the plant.
### Features/Parameters
- **Flow cell**
- **Internal power (batteries)**
- **Internal memory**
- **Fits 2” wells**
- **RS-232 & SDI-12 standard**
- **Field-replaceable probes**

### Sensors
- **Conductivity**
- **Depth**
- **Dissolved oxygen**
- **Dissolved oxygen, optical**
- **Free chlorine**
- **Nitrate**
- **Open channel flow**
- **ORP**
- **pH**
- **Resistivity**
- **Salinity**
- **Specific conductance**
- **Temperature**
- **Total dissolved solids**
- **Turbidity**
- **Vented level**
- **Currents/Tides/Waves**
- **Discharge**
- **Flow**
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### Specifications

<table>
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<tr>
<th>Sensor Specifications</th>
<th>Range</th>
<th>Resolution</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td>-5 to 30°C</td>
<td>±0.1°C</td>
<td>±0.15°C</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>0 to 14 units</td>
<td>±0.01 unit</td>
<td>±0.2 unit</td>
</tr>
<tr>
<td><strong>Shallow depth</strong></td>
<td>0 to 9.1 m (0 to 30 ft)</td>
<td>±0.018 m (±0.06 ft)</td>
<td>±0.018 m (±0.06 ft)</td>
</tr>
<tr>
<td><strong>Medium depth</strong></td>
<td>0 to 61 m (0 to 200 ft)</td>
<td>±0.12 m (±0.4 ft)</td>
<td>±0.12 m (±0.4 ft)</td>
</tr>
<tr>
<td><strong>Deep depth</strong></td>
<td>0 to 200 m (0 to 656 ft)</td>
<td>±0.5 m (±1.6 ft)</td>
<td>±0.5 m (±1.6 ft)</td>
</tr>
<tr>
<td><strong>Vented level</strong></td>
<td>0 to 9.1 m (0 to 30 ft)</td>
<td>±0.001 m (±0.004 ft)</td>
<td>±0.003 m (±0.01 ft)</td>
</tr>
<tr>
<td><strong>Open channel flow</strong></td>
<td>Calculated measurement, requires vented level</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Free chlorine</strong></td>
<td>0 to 3 mg/L</td>
<td>±15% of reading or 0.05 mg/L, whichever is greater**</td>
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<td><strong>ORP</strong></td>
<td>-999 to +999 mV</td>
<td>±0.1 mV</td>
<td>±0.2 mV in Redox standard solutions</td>
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<td><strong>Salinity</strong></td>
<td>0 to 70 ppt</td>
<td>±0.01 ppt</td>
<td>±1% of reading or 0.1 ppt, whichever is greater</td>
</tr>
<tr>
<td><strong>Nitrates/nitrogen</strong></td>
<td>0 to 20 mg/L-N</td>
<td>±10% of reading or 2 mg/L, whichever is greater</td>
<td>±10% of reading or 2 mg/L, whichever is greater</td>
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<tr>
<td><strong>Ammonium/ammonia/nitrogen</strong></td>
<td>0 to 200 mg/L-N</td>
<td>±10% of reading or 2 mg/L, whichever is greater</td>
<td>±10% of reading or 2 mg/L, whichever is greater</td>
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<tr>
<td><strong>Chloride</strong></td>
<td>0 to 1000 mg/L</td>
<td>±15% of reading or 5 mg/L, whichever is greater</td>
<td>±15% of reading or 5 mg/L, whichever is greater</td>
</tr>
<tr>
<td><strong>Turbidity</strong></td>
<td>0 to 1000 NTU</td>
<td>±2% of reading or 0.3 NTU, whichever is greater, in YSI AMCO-ABPA polymer standards</td>
<td>±2% of reading or 0.3 NTU, whichever is greater, in YSI AMCO-ABPA polymer standards</td>
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<tr>
<td><strong>Rhodamine WT</strong></td>
<td>0 to 200 μg/L</td>
<td>±5% of reading or ±1 μg/L, whichever is greater</td>
<td>±5% of reading or ±1 μg/L, whichever is greater</td>
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<tr>
<td><strong>TriOS Hydrocarbon</strong></td>
<td>0.50 mg/L</td>
<td>0.1 μg/L</td>
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<tr>
<td><strong>Chlorophyll</strong></td>
<td>0 to 400 μg/L chl a; 0.1% FS; 0.1 RFU</td>
<td>±10% of reading or 0.1 μg/L chl a; 0.1% FS; 0.1 RFU</td>
<td>±10% of reading or 0.1 μg/L chl a; 0.1% FS; 0.1 RFU</td>
</tr>
<tr>
<td><strong>Blue-green algae</strong></td>
<td>0 to 280,000 cells/mL</td>
<td>±15% of reading or 2% cells/mL, whichever is greater</td>
<td>±15% of reading or 2% cells/mL, whichever is greater</td>
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<tr>
<td><strong>Phycocyanin</strong></td>
<td>0 to 280,000 cells/mL</td>
<td>±15% of reading or 2% cells/mL, whichever is greater</td>
<td>±15% of reading or 2% cells/mL, whichever is greater</td>
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<tr>
<td><strong>Phycocyanin</strong></td>
<td>0 to 280,000 cells/mL</td>
<td>±15% of reading or 2% cells/mL, whichever is greater</td>
<td>±15% of reading or 2% cells/mL, whichever is greater</td>
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</tbody>
</table>

### Notes:
- Maximum depth rating for optical probes is 61 m (200 ft).  **Calculated parameters.**
- Standard = Available on 6600 V2-2 only; **Available on 6920 V2-4 or 6820 V2-4 only.
- Customer Selectable = Available on 600XL V2 and 600XLM V2.
- Special Order = Availble on 600XL V2-2 only.  

### Additional Notes:
- **Algal Chlorophyll and Phycocyanin Detection**
- **ORP**
- **pH**
- **Salinity**
- **Turbidity**
- **Vented level**
- **Open channel flow**

*Maximum depth rating for optical probes is 61 m (200 ft).  **Calculated parameters.**
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<tr>
<th>Feature/Parameter</th>
<th>5600 V2</th>
<th>6600 V2</th>
<th>6800 V2</th>
<th>6920 V2</th>
<th>600XL V2</th>
<th>600XLM V2</th>
<th>Argonaut V2</th>
<th>Argonaut V2</th>
<th>River Surveyor V2</th>
<th>Field Reader</th>
<th>Level Scout</th>
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* Freshwater only. ** Calculated parameters. Standard = Available on 6600 V2 only. Customer Selectable = Available on 5600 V2 and 6000 V2. Special Order = Available on 6000 V2 only. + Fits 1” wells. ± Ventilated level, range = 0 to 9.1 m (0 to 30 ft) ±0.018 m (±0.06 ft). ~ Operating temperature for Level Scout = -20 to 50°C; accuracy = ±1.0°C for 2 Mb versions and ±0.2°C for 4 Mb versions. ~~ Vented level for Level Scout: range = 0 to 211 m (0 to 700 ft). § Estimated from cultures of Microcystis aeruginosa. §§ Estimated from cultures of Synechococcus sp. and fluorometric extraction of chlorophyll a. Actual detection limits will vary depending on natural algae assemblage. |||
To order or for more information, contact YSI.

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ISO 14001
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