



THAMES RIVER WATCH

Understanding the health of the tidal Thames



WHAT IS THAMES RIVER WATCH?

Thames River Watch is a citizen science project that involves Londoners in getting a better understanding of the health of the tidal Thames. The project was launched in February 2014 and in the first year engaged volunteers in monitoring water quality, litter and invasive non-native species along the tidal Thames from Teddington out to the wider Kent and Essex estuary. Since the

project launch, Thames River Watch has delivered 8 Thames foreshore clean-up and access events that were attended by 311 people, 10 education sessions with schools that engaged 305 children in learning about the health of the river, and 14 training sessions that have trained 108 volunteers in carrying out environmental monitoring along the tidal Thames.

8

Thames foreshore clean-up and access events that were attended by **311 people**



10

education sessions with schools that engaged **305 children** in learning about the health of the river



14

training sessions that have trained **108 volunteers** in carrying out environmental monitoring along the tidal Thames.



THE HEALTH OF THE RIVER THAMES

The River Thames is an icon of London which is enjoyed and admired by millions of people every year. However, the health of the tidal Thames is widely misunderstood. In 1957 the river was declared 'biologically dead' by researchers at the Natural History Museum, because of high levels of industrial and sewage pollution. Since then, there has been a dramatic recovery but the River Thames

still faces many challenges. These include the untreated sewage that flows into the river on rainy days – which amounts to 39 million tonnes in a typical year – and plastic litter that blights the foreshore and river. The Thames River Watch project enables people to get involved so that we can better understand the challenges that the river still faces and gather data on the health of London's iconic river.

THAMES RIVER WATCH 2014 - WHAT WE HAVE LEARNT

WATER QUALITY SURVEYING

In the first year of the project the main focus for our citizen science volunteers has been collecting water quality data. The commitment of volunteers to gather data in year one has been remarkable - since the project began, 53 Thames River Watch volunteers have collectively analysed 417 water quality samples at 67 different locations along the tidal Thames (sampling points are marked on the river map below) over 308 days of the year. This equates to over 200 volunteer hours dedicated to learning about the water quality of the tidal Thames.

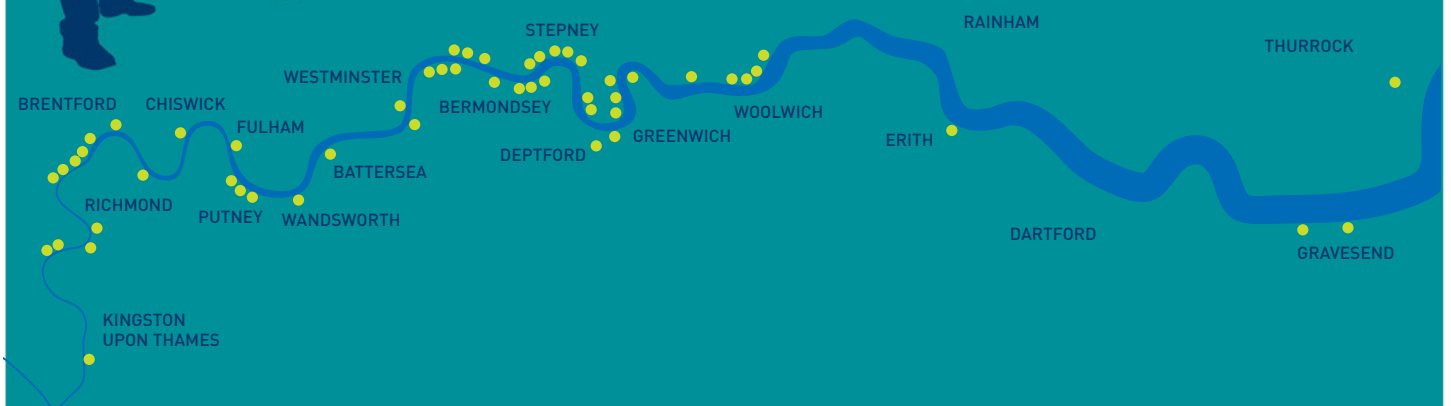
Thames River Watch volunteers safely access the Thames foreshore and collect water samples from the edge of the river. These samples are then analysed on the foreshore using simple but reliable testing equipment to ascertain the temperature, dissolved oxygen, pH and turbidity levels of the river. Volunteers also take a small amount of river water away which is then analysed for the presence of coliform bacteria. All of the results that our citizen science volunteers gather are reported to Thames River Watch through our online survey system.



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Samples have been taken on 308 different days in a year



200

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WHAT CAN WE LEARN FROM ALL THE FACTS AND FIGURES?

	Minimum value	Maximum value	Average value*
Temperature	7 °C	25 °C	18 °C
Dissolved oxygen	4 ppm	12 ppm	10 ppm
pH	6	8	8
Turbidity	12 NTU	240 NTU	14 NTU

* Mode Average – this is the value that appeared most often in the set of data

The minimum, maximum and average water temperatures recorded indicate that the **temperature** of the Thames follows the natural seasonal variation that would be expected. As natural processes are sensitive to changes in temperature, this seasonal variation in water temperature affects all life in the river - from micro-organisms to fish. In winter, when the river is colder, life in the river slows down, especially for micro-organisms. In summer, when the river is warmer, all the natural processes are accelerated which can cause dissolved oxygen levels to change more quickly, as oxygen is used up by the living organisms in the river. Also, at the outer ranges of their ideal temperature (over 23°C), organisms become stressed and less able to tolerate pollution and diseases. Less than 2% of all samples taken recorded temperatures over 23°C. These peak values in water temperature were all recorded in July and August, when we would expect water temperatures to be at their highest. Volunteers also test the temperature of the Thames because the water temperature can affect other factors, such as the amount of dissolved oxygen – when water is warmer it cannot hold as much oxygen.

Thames River Watch volunteers also monitor **coliform bacteria** in the Thames. These bacteria are found in the intestinal tract of animals and humans. Although harmless themselves, they can indicate presence of pathogens and viruses. These enter the water when there is a sewage discharge into the Thames, and from animal waste. A startling 98% of all samples taken recorded presence of coliform bacteria, indicating the prevalence of sewage pollution in the river.

An average **Dissolved oxygen** value of 10ppm (parts per million) indicates that in many cases there were good oxygen levels at the time of testing. However, the minimum recorded value of 4ppm suggests that there are times when the amount of dissolved oxygen in the water is

extremely low. Dissolved oxygen is essential for river life, such as fish and invertebrates, to survive. When untreated sewage is discharged into the Thames, microorganisms in the river use the dissolved oxygen in the water to break down the organic material from the sewage. This means that oxygen is no longer available for other forms of river life which can lead to large scale fish kills such as those in 2004 and 2011, when thousands of fish died after sewage entered the river. This effect is worsened in periods of high temperature, which decreases the amount of oxygen the water can hold. We hope to explore the relationship between Combined Sewage Outfall events and dissolved oxygen levels further in year two of the project.

An average **pH** of 8 is neither too acid nor too alkali and shows that the river can provide a healthy environment for wildlife. The healthy range for pH for the Thames is from 6 to 9 and all of the samples collected and analysed by our citizen science volunteers showed levels inside this range. Regulations which reduce or ban contaminants that affect the pH of the river have been a major factor in improving the pH of the tidal Thames.

The **turbidity** data tells a more complex story. Turbidity is a measure of the amount of particulate matter suspended in the water. We would expect high turbidity on the tidal Thames because of silt and sediment, which form part of the natural ecology of the river. An average turbidity value of 14NTU indicates low turbidity (clear water). However, the spread of data recorded for turbidity is much more varied than for our other parameters - 20% of all samples taken recorded low turbidity (clear water), 23% recorded moderate turbidity (cloudy water) and 56% recorded high turbidity (very cloudy water). Turbidity will naturally change depending on the season and when the sample is taken within the tidal cycle of the Thames.

WHAT DOES THIS TELL US ABOUT THE HEALTH OF THE TIDAL THAMES?

The water quality data collected in the first year of Thames River Watch gives us an excellent baseline. It tells us that, although the tidal Thames is mostly functioning as we would expect based on the parameters that we have tested for, there are times when the health of the river drops drastically – when the water temperature is too high and the dissolved oxygen is too low. There is also almost constant contamination of the river with coliform bacteria, largely due to sewage pollution. **The tidal River Thames still faces many challenges on its way to recovery.**

If you would like to look at the Thames River Watch data in more details please visit our website – www.thames21.org.uk/project/thames-river-watch/ and view our interactive data maps. As the project continues and more data is collected by our citizen science volunteers, we would like our data to help us better understand the incidences when the health of the river drops – what is causing these and what might be done to further improve the health of the tidal Thames?

CHALLENGES IN DATA COLLECTION

Since the beginning of Thames River Watch we have tried to ensure that the data collected by our citizen science volunteers is scientifically sound and accurately reflects the health of the river. However, we are aware that there are some limitations in our sampling approach. For example, the water at the edge of the river, where our samples are taken, may contain more dissolved oxygen than the water deep in the river channel because the river water is aerated as it tumbles over the foreshore. In addition, our citizen science volunteers at present carry out their water quality tests at different times and on different days each week. This approach offers flexibility for volunteers to take part when they have time to do so, but it has presented some challenges in terms of comparing data recorded along the river, particularly for the turbidity results. In the second year of Thames River Watch we plan to work further with the Environment Agency to see how the Thames River Watch data compares to water quality data they collect and consider how we could improve our approach to monitoring the tidal Thames in order to further strengthen the project.



LITTER SURVEYING

For litter monitoring in the first year of Thames River Watch we have focused on refining and trialling the survey method. Our approach to monitoring litter on the Thames foreshore is to use a linear transect from the top of the foreshore to the bottom and to record the quantity of litter items that we find in each square metre along this line. The rubbish is recorded according to types of materials found e.g. plastic, metal, paper,

glass. The 2015 Big Count events will see the adoption of this new approach. We will continue to collect data during 2015 through Thames River Watch clean-up events and hope to be able to analyse trends in the type and quantity of litter collected by the time of the Big Count 2016.



INVASIVE NON-NATIVE SPECIES SURVEYING

For invasive non-native species monitoring in the first year of Thames River Watch we have focused on refining the recording methodology. Our methodology ties in with the approach of the London Invasive Species Initiative (LISI) and we are focusing on recording the presence or absence of invasive non-native species. In the first year of the project we trained 14 volunteers in how

to identify and record these species along the Thames. We will continue to train more volunteers during 2015 and hope to have more data on the invasive non-native species present along the Thames by the time of the Big Count 2016.



GET INVOLVED!

To build on the success of the first year of the project we are looking for more volunteers to get involved. We especially would like more citizen science volunteers along the lower part of the tidal Thames – from Woolwich out to the estuary in the east. Everybody is welcome to be part of Thames River Watch and participants do not need any prior knowledge of the Thames and/or water quality etc. as you will receive the training (and equipment) you need. You simply need to be keen to make a difference for the River Thames and have some time at hand. So whether you have a couple of hours to spare once a month or would like to add to your daily dog walk – or whether you are from the local community, a riverside business, school or other organisation, we'd be delighted to have you involved.



If you would like to find out more about the project, how to get involved or details of any of our upcoming events or training sessions please contact us.

www.thames21.org.uk

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