SurfaceWaterQuality

DWS surface water quality record – in-browser app • Hydrogeological Repository

What it does

SurfaceWaterQuality puts the Department of Water and Sanitation's surface water quality record behind a map. **5 043 monitoring points, 922 415 samples and 13.3 million values for 91 variables**, from rivers, dams, estuaries, lakes, wetlands and pans, sampled between **1960 and 2024**. Find sites by name or station number, by quaternary catchment, or by distance from a town or a coordinate; compare up to ten at once; chart any variable measured at them over time; and draw the six hydrochemical diagrams ChemGraphs draws – Piper, Durov, expanded Durov, Stiff, Schoeller and the USSL sodium–salinity plot – straight from the national record.

It is ChemGraphs pointed at a database instead of a spreadsheet. The chemistry, the diagrams, the date slider and the analyses table are ChemGraphs' own, unchanged, so a Piper drawn here and the same analyses drawn there agree.

Where the data comes from

Seven extracts from the DWS National Water Management System (WMS), made in May 2024 and merged into one database:

Extract	Points	Period	What it holds
Rivers, files a and b	3 926	1960–2024	The long major-ion and nutrient record at river points – EC, pH, Ca, Mg, Na, K, Cl, SO_4, alkalinity, F, Si, the nitrogen and phosphorus species and the indices derived from them. 10.1 million values.
Dams	1 117	1962–2024	The same variables at dams, estuaries, lakes, wetlands and pans, including depth profiles in the larger impoundments. 2.8 million values.
Data files 1–4	2 349	2018–2024	Recent sampling at a subset of the same points, adding dissolved metals and COD, microbiology, chlorophyll, dissolved oxygen, temperature, turbidity, Secchi depth and the corrosivity and saturation indices.

Values are reported as DWS published them. Nothing is corrected, infilled or re-derived; the app summarises and draws the record, and does not modify it.

How the extracts were merged

The overlap was checked, not assumed. Data file 1 repeats the long files' major ions from 2018. Of its 406 515 values that match a long-file value for the same point, date, depth and variable, 406 195 are identical and most of the remaining 320 are replicate pairs listed the other way round. The long files are taken as the record for any variable they carry, and file 1 contributes only what they lack.

One sampling event is often several rows. A mercuric-chloride bottle and an unpreserved one go to different benches, so WMS writes one row per preservative. Rows are merged on point, date, time, depth and kind of sample, and a second sample – a replicate – is kept only where the same variable occurs twice in one event. There are 402 replicates in 922 415 samples.

Four things to know before trusting a number

Convention	What it means for a figure
Below detection	DWS publishes a result below the laboratory's detection limit at half that limit, with nothing else to mark it – 14 735 of 14 758 sub-limit chlorides in one river file sit at exactly half their limit. The app flags a value wherever it is less than the limit published beside it (1.04 million values, 7.9 % of the database), counts it at the half-limit, and greys any statistic resting more than half on such values.
Field and laboratory	85 797 samples are field readings of EC and pH taken with a probe. They are kept apart from the 836 618 laboratory samples, drawn fainter on the charts, and never reach a diagram.
Nitrate	DWS reports nitrate plus nitrite as N for 630 295 samples and nitrate alone for 41 950. The diagrams use NO_3-N where it exists and the sum otherwise; nitrite is normally a small share of it.
Estuaries	344 points are on estuaries and lagoons, where EC runs into the thousands of mS/m with the tide. That is sea water on a Piper, not a pollution signal, and the map gives estuaries a symbol of their own.

What you get

Output	Detail
Map	Every monitoring point over the quaternary catchments and the river network, on a street, aerial or hybrid base map, shaped by kind of water body and optionally shaded by median EC. Click to select; Ctrl+click to add; click the map itself to take the catchment you clicked.
Search	By WMS point number, DWS station number or words in the name; by quaternary or tertiary catchment; or within 5 to 100 km of one of 1 943 towns or a coordinate. Filters by kind of water body, by whether a site has a full major-ion analysis, and by whether WMS lists it as active.
Record and statistics	Each site's position, catchment, record and sample counts, and a table of the median, mean, 5th and 95th percentiles, extremes, latest value or count of any group of variables, side by side. A period, a depth setting and a field-reading setting apply to everything below them.
Charts	Any measured variable over time, one line per site, with values below the detection limit as open markers and field readings as a fainter dotted line; its spread at each site; and its median by month of the hydrological year, October to September.
Diagrams	Piper, Durov, expanded Durov, Stiff, Schoeller and SAR, one visit at a time on a date slider, up to a date, or the whole period, each with PNG and SVG export.
Report	A standalone report of the selection – map, sites, statistics, charts, the diagrams chosen and the analyses behind them – with Print / Save as PDF and Download HTML buttons. It states the period, depth and field-reading settings, since none of the three is visible in the numbers.
Exports	Every value at the selected sites in long form, with unit, detection limit and flag; the statistics; the charted variable; the analyses with every derived figure; the search results; and the whole point and variable catalogues. CSV throughout, nothing rounded.

Stiff shapes on the map

Each selected site can be drawn on the map as a small Stiff diagram – Na+K against Cl+NO_3, Ca against alkalinity, Mg against SO_4, cations left – using the Stiff tab's own arithmetic, all on one scale given in the map key so width compares between sites. **Newest analysis on the diagrams** draws one real analysis, and on "One visit" follows the date slider. **Median of the period** draws the median of each ion group over every full analysis in the period: steadier, but taken ion by ion, so it is a summary rather than a water anyone sampled, and its ion balance need not close. The shapes carry into the PNG export and the report.

How a run works

Step	What happens
1. Find sites	Search, then pick sites on the map or in the list; up to ten at a time.
2. Record and statistics	Set the period, depth and field readings; read each site's record and its statistics.
3. Water quality over time	Choose a variable; see it over time, its spread and its seasonal pattern.
4. Hydrochemical diagrams	Step through the record on the date slider, or draw it whole.
5. The analyses	Every analysis on the diagrams, with what was derived from it.
6. Report	Everything above for the selection, in one printable page.
7. Export	CSV of the values, the statistics or the analyses.

Why this one is not entirely in your browser

The database is half a gigabyte, so it stays on the server: a site's values are fetched when it is first selected, and every statistic, chart and diagram is computed in the browser. Nothing about your selection is stored.

Limitations worth knowing

- There is no comparison with a water quality guideline. Which guideline applies depends on the use; HealthRisk is the app for that question.
- There are no trend tests, no flow adjustment and no outlier removal. A value that looks impossible is shown as DWS published it, so it can be queried rather than silently disappear.
- Depth matters in an impoundment. The default, "Surface samples only", keeps the surface grab and the integrated 0–5 m sample; full profiles are one setting away.
- A point's quaternary is the one its coordinate falls in, which agrees with the WMS drainage region for 96.2 % of points; the 40 outside every boundary use the WMS one.
- A long record drawn whole is thousands of marks on a diagram. Narrow the period, or step through it one visit at a time.

Credit

The record is the work of the Department of Water and Sanitation's monitoring programmes and laboratories. Cite it as: DWS (2024). National Water Management System data extracted on 2024-05-08 and 2024-05-22. Department of Water and Sanitation, Pretoria. DWS cannot be held responsible for the accuracy of the data or for interpretations made from it. The diagram methods and their references are in the ChemGraphs info sheet.

Beta. SurfaceWaterQuality is published for evaluation and feedback. Check any figure you rely on against the original record before using it in an assessment.