IOWA'S WATER
Ambient Monitoring Program

Iowa STORET Data Retrieval

Iowa's Ambient Water Monitoring Program collects, analyzes and disseminates water-quality information about Iowa's rivers, lakes, groundwater and wetlands. The Iowa Department of Natural Resources (IDNR) stores this data using the U.S. Environmental Protection Agency database called STORET (STOrage and RETrieval). Iowa's STORET (IASTORET) database is managed by the Water Monitoring Section of the IDNR. Water-quality data from IASTORET can be viewed and downloaded for analysis through the Internet on Iowa's STORET home page, **http://wqm.igsb.uiowa.edu/storet**. IASTORET database searches are available from the drop-down menu on the home page. Water-quality data can be retrieved through either station searches or parameter searches.

Searching the Database

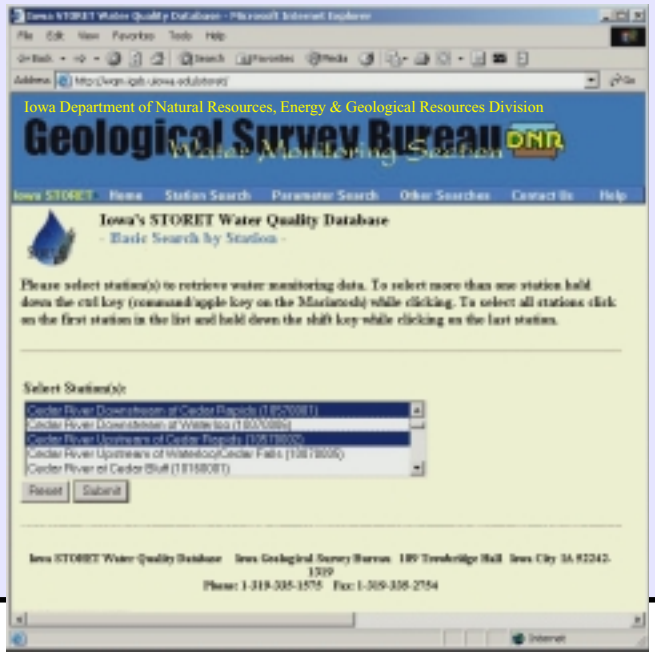
Basic Search: Station Name. From the drop-down menu, choose `Station Search ⇒ Basic Search ⇒ Station Name.` In Windows, multiple stations can be selected by pressing the control key and clicking the mouse at the same time (Ctrl+click) or Shift+click (Figure 1). Once you have selected your stations, click on the "Submit" button.

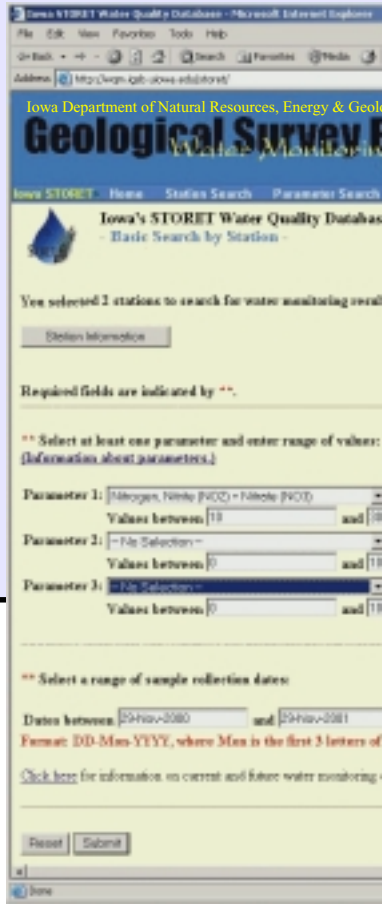
The next screen shows the number of stations you selected. To see detailed information on the selected stations, click the "Station Information" button. To retrieve information from your selected stations, select the water-quality parameters you want to retrieve from the drop-down list of parameters and supply a range of possible values for each parameter (Figure 2). You can query up to three parameters simultaneously with basic searches and up to five parameters in the advanced searches. Select a date range and click the "Submit" button. The final screen will show you water quality results, assuming there is data that matches your search criteria (Figure 3).

Please note that new monitoring stations are frequently added to IASTORET and newly added stations may not have water-quality data stored in the database yet. Try again at a

Figure 1 (left). *Data retrieval from the IASTORET water quality database using the internet. This example shows selection of two sites on the Cedar River.*

Figure 2 (middle). *After choosing stations, the next screen in a basic search allows for selection of parameters and dates.*





later date if you do not get any results and you expect there to be some.

Basic Search: County. From the drop-down menu, choose `Station Search ⇨ Basic Search ⇨ County.` You may select a county name from the drop-down list, or click on your selection from the map provided. Multiple counties can be selected in Windows using Ctrl+click or Shift+click. Once you have selected your counties, click the "Submit" button. The next screens will have additional search criteria identical to the Station Name search. See *Basic Search: Station Name* above for details.

Basic Search: Hydrologic Unit Code (HUC). From the drop-down menu, choose `Station Search ⇨ Basic Search ⇨ Hydrologic Unit`. You may select a HUC (river basin) from the drop-down list, or click on your selection from the map provided. Multiple HUCs can be selected in Windows using Ctrl+click or Shift+click. Once you have selected your HUCs, click the "Submit" button. The next screens will have additional search criteria identical to the Station Name search. See *Basic Search: Station Name* above for details.

Parameter Search. To search the entire data set for water-quality parameters select `Parameter Search ⇨ Greater Than Values, Less Than Values OR Range of Values.` Enter a date range, parameter and parameter values. Next, click the "Run Report" button. The results page lists station name, sample collection date, parameter, parameter value and parameter units.

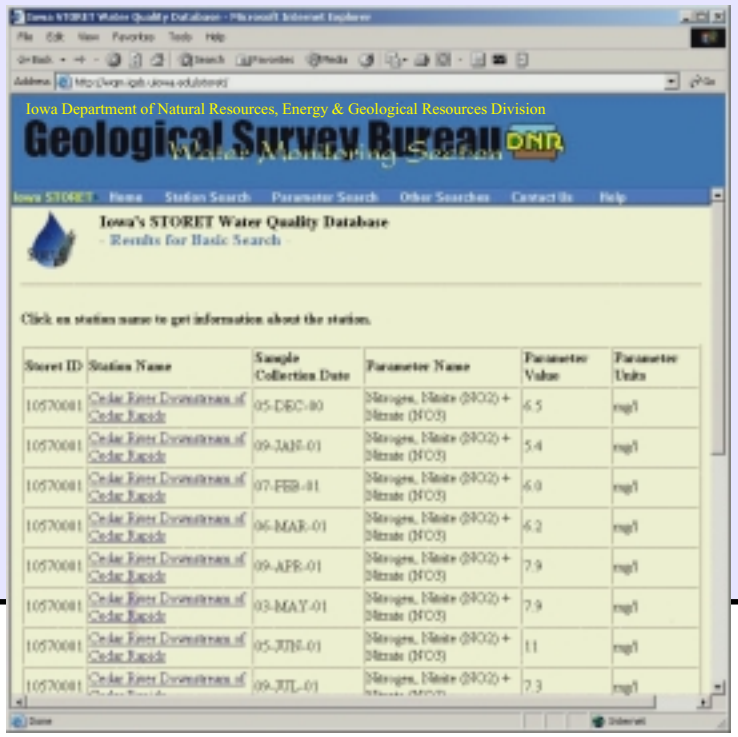
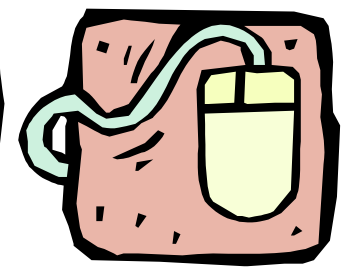


Figure 3 (right). *Results screen in IASTORET. From here, you can export your data.*

Other Searches. You can also search the database for an entire month's worth of data. From the drop-down menu on the home page, choose `Other Searches ⇒ Month and Year.` Select the month and the year you would like to search from the drop-down lists (Figure 4). Next, click the "Run Report" button. The results page lists the station names for that month, sample collection date, parameter, parameter value and parameter units.

Exporting Data

Microsoft Excel. There are two methods of exporting data to Excel. *First Method.* From the drop-down menu, choose an advanced search `(Station Search ⇒ Advanced Search ⇒ Station Name, County OR Hydrological Unit)` or a parameter search `(Parameter Search ⇒ Greater Than Values, Less Than Values OR Range of Values).` Make your selections on the query page. At the bottom of the page in the "Format the output of the query" section, select an "Output Format" of Excel from the drop-down box, then "Run Report." Save the resulting query as *yourfilenamehere.xls.* Be sure to add the .xls to your filename so Excel will recognize the file when you open it. Next, open *yourfilenamehere.xls* in Excel. The data from IASTORET is not true Excel format; therefore you will need to resave the file. Choose `File ⇒ Save As.` In the "Save As" dialog box (Figure 5), change the "Save as Type" in the drop-down at the very bottom to a "Microsoft Excel Worksheet (*.xls)."



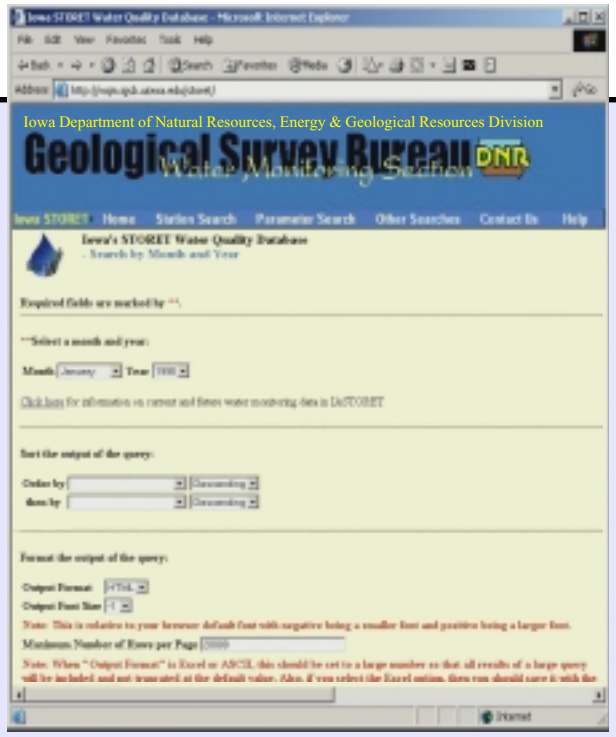


Figure 4. *Other searches by month and year in IASTORET.*

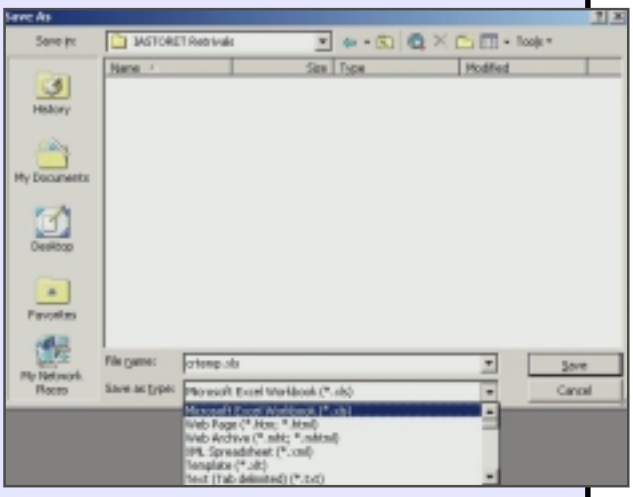


Figure 5. *"Save As" dialogue box, where you can save files downloaded from IASTORET as Microsoft Excel.*

Second Method. If you have Microsoft Excel 2000 or higher, you can cut and paste directly into your spreadsheet. From the results screen in IASTORET, place your cursor in the top left cell, click the left mouse button and drag the cursor to the bottom right cell. Hit Ctrl+C (both keys at the same time) to copy the results to the clipboard. Now open a new Excel spreadsheet, place the cursor in the top left cell and hit Ctrl+V to paste the results.

Microsoft Access. To export data to Access, first save the IASTORET results as an Excel file using one of the procedures described above. Start a new Access database and select `File ⇒ Get External Data ⇒ Import`. From the resulting dialogue box, find and select your IASTORET results Excel file, click "Import," and create a new Access table of results in your database. You may have to change the "Files of Type" drop-down box at the bottom of this dialog box to read "Microsoft Excel (*xls)."

Acknowledgements

Many, many hours of labor have gone into making IASTORET accessible to all Iowans. The Water Monitoring Section would like to recognize the efforts of IDNR staff Joost Korpel, Rick Langel and Bill Bunker for their dedication and willingness to go above and beyond the call of duty.

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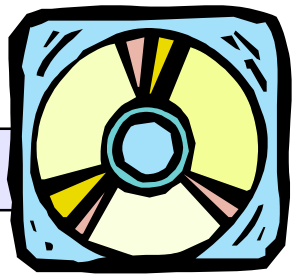
Analyzing Data: A Simplified Example



Step 1. Suppose you would like to plot temperature trends on the Cedar River at two stations for a three-year period. From the IASTORET home page, select `Station Search` ⇨ `Advanced Search` ⇨ `Station Name`. On the "Advanced Search by Station" page, choose: a date range of 1-Jan-1999 to 31-Dec-2001, and the stations Cedar River Downstream of Cedar Rapids, and Cedar River Upstream of Cedar Rapids using the Ctrl+click method of selection. Select the "Temperature, water" parameter and sort first by "Station Name" and then by "Sample Collection Date," both "Ascending."

Step 2. Select "Excel" from the "Output Format" drop-down box, then "Run Report." Save the resulting file as *CRTemp.xls* and open it up in Excel. Choose `File` ⇨ `Save As`. In the "Save As" dialog box, change the "Save as Type" in the drop-down at the very bottom to a "Microsoft Excel Worksheet 4.0 (*.xls)."

Step 3. The parameter values on your *CRTemp.xls* spreadsheet will be formatted as a "general" character string, and will need to be converted to a numeric string to perform statistical or mathematic functions. Create a new column of values called *Numeric Values*. By right-clicking on the column header for this new column (the blue cell labeled "8" directly to the right of the *Parameter Units* column), choose "Format Cells" on the menu that pops up. Format the new column as "number" to two decimal-place accuracy.

Step 4. In the third row of your *Numeric Values* column, type the function "=value()", place the cursor between the brackets, click on the first value in the *Parameter Value* column to get something like "=VALUE(RC[-2])." Finish by hitting enter. This results in a formatted numeric value (10.50).

Step 5. Copy this numeric value function (not the value itself) and paste it into all the remaining cells of your *Numeric Values* column by placing the cursor in the bottom-right of this formatted cell until you see a solid black plus

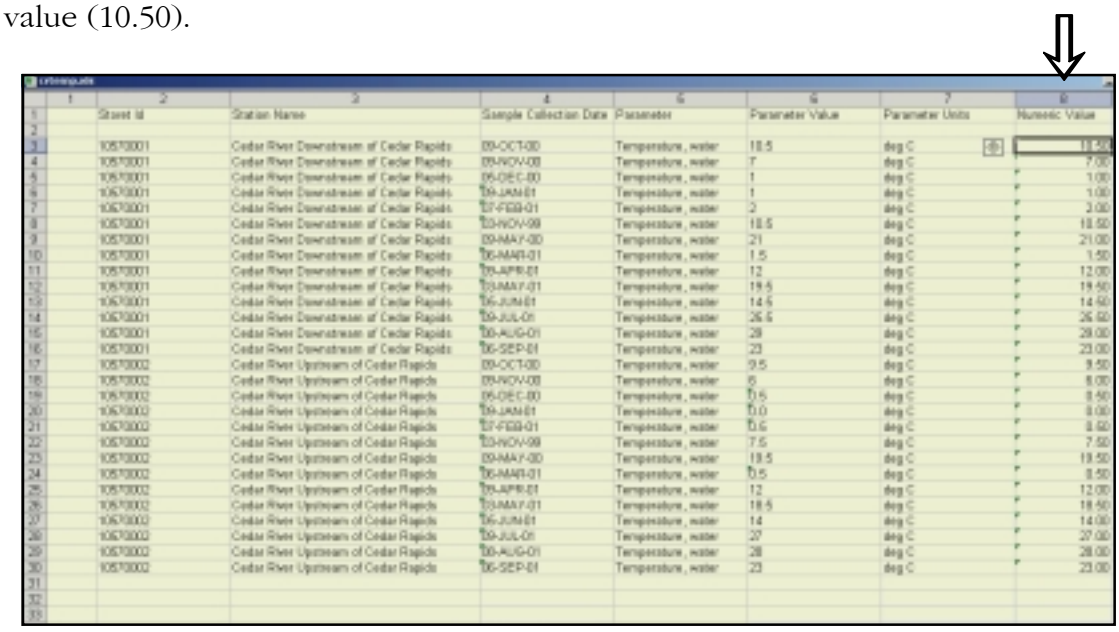


Figure 6. *Original STORET download format for Microsoft Excel. Parameter values are converted to numeric values in* CRTemp *spreadsheet.*

sign (+) and dragging it down to the last cell in that column, even with the last value in the *Parameter Value* column (Figure 6). This will convert the rest of your values to numeric values.

	1	2	3	4	5
1		03-NOV-99	09-MAY-00	09-OCT-00	09-NOV-00
2	Cedar River Downstream of Cedar Rapids	10.5	21	10.5	7
3	Cedar River Upstream of Cedar Rapids	7.5	19.5	9.5	6
4					

Figure 7. *Pivot table created from* CRTemp *worksheet.*

Step 6. For result analysis and graphing you may have to transpose your data (from vertical placement to horizontal placement), a procedure commonly known as a Pivot Table Function. For our example, we will manually create a pivot table. Do not confuse this procedure with the Pivot Table Reporting option contained within Excel, which does something completely different. Create a new worksheet using `Insert ⇒ Worksheet` on the main menu.

Step 7. Select one of each of the individual stations in the *CRTemp* worksheet by using Ctrl+click (one Cedar River Upstream and one Cedar River Downstream – use column 3, row 3 and column 3, row 17). Next, copy and paste them onto the new worksheet starting in the second row (Figure 7).

Step 8. On the *CRTemp* worksheet, press the shift key and drag the mouse to select our range of dates in the "Sample Collection Date" column (03-NOV-99 through 06-SEP-01, or rows 3-16 on our *CRTemp* worksheet – these dates are the same for both stations). Copy those dates. Select `Edit ⇒ Paste Special` into the first row, second column by selecting the "Paste: Values" and "Transpose" options in the resulting dialog box.

Step 9. The data values should be copied one station at a time (rows 3-16 for the Cedar River Downstream site and rows 17-30 for the Cedar River Upstream site in the *Numeric Values* column) and pasted with `Edit ⇒ Paste Special` and the "Paste: Values" and "Transpose" options as above. Place the values for each station next to their corresponding station on the new worksheet (Figure 7).

Your data is now arranged to use the charting tool in Excel, or your favorite charting application (Figure 8). For assistance on more detailed data analyses, look for the FAQ on the STORET Web site at **http://wqm.igsb.uiowa.edu/storet**.

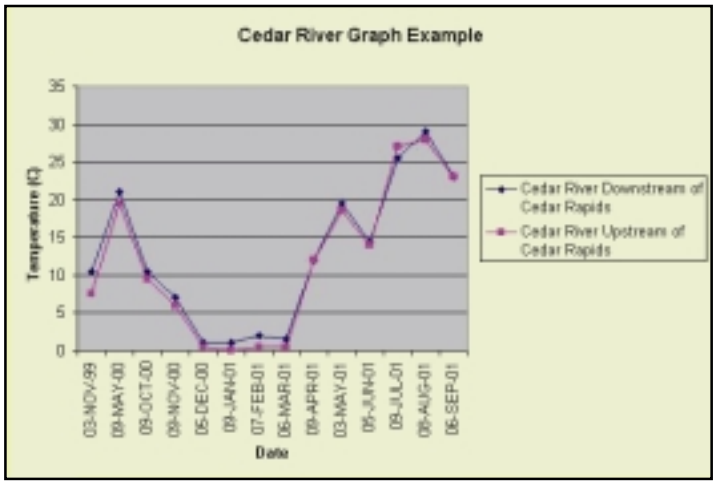


Figure 8. *Once data has been transposed, it can be displayed using the Excel charting tool.*