Tutorial for the Nitrogen and Phosphorus Pollution Data Access Tool

Part One: How to Use the Data Access Tool

As described in EPA's March 16, 2011 memorandum, "Working Effectively in Partnership with States to Address Phosphorus and Nitrogen Pollution through Use of a Framework for State Nutrient Reductions," (PDF), EPA will work collaboratively with interested and willing states, other partners, and stakeholders to help states develop effective statewide strategies for reducing loadings of nitrogen and phosphorus while they continue developing numeric criteria for these pollutants.

The first elements in EPA's recommended framework are to: 1) prioritize watersheds on a statewide basis for nitrogen and phosphorus loading reductions and 2) set watershed load reduction goals based upon best available information. To support states, other partners, and stakeholders in this important work, EPA has developed a data access tool, providing downloadable data layers and key information on the following:

- the extent and magnitude of nitrogen and phosphorus pollution in our Nation's waters;
- water quality problems or potential problems related to this pollution; and
- potential sources of these pollutants.

This document follows the Recommended Elements of the above memorandum to walk through a case study in using the data access tool, and provides narrative text as well as screenshots. Finally, see "Part Two: How to Download Data" for guidance on downloading data.

1. **Prioritize watersheds on a statewide basis for nitrogen and phosphorus loading reductions**

    A. Use *best available information to estimate Nitrogen (N) & Phosphorus (P) loadings* delivered to rivers, streams, lakes, reservoirs, etc. in all major watersheds across the state on an 8-digit Hydrologic Unit Code (HUC8) watershed scale or smaller watershed (or a comparable basis.)

       Examples of best available information to estimate N & P loadings include **SPARROW** (short for SPAtially Referenced Regressions On Watershed attributes) and **Water Quality Monitoring Sites with N/P** data layers.

    B. *Identify major watersheds that individually or collectively account for a substantial portion of loads* (e.g. 80 percent) delivered from urban and/or agriculture sources to waters in a state or directly delivered to multi jurisdictional waters.

    C. Within each major watershed that has been identified as accounting for the substantial portion of the load, *identify targeted/priority sub-watersheds on a HUC12 or similar scale to implement targeted N & P load reduction activities.* Prioritization of sub-watersheds should reflect an *evaluation of receiving water problems, public and private drinking water supply impacts, N & P loadings, opportunity to address high risk N & P problems, or other related factors.*

Related data layers include **Waters Listed for N/P Impairments**, **Drinking Water Sources**, and **Waters with N/P TMDLs**.


Users' Notes:

- If you are having difficulty seeing the entire Nitrogen and Phosphorus Pollution Data Access Tool geospatial viewer on your screen, you may need to adjust the resolution of your screen to 1,024 x 768 pixels (or higher).
- When the colors for map features in two different data layers are similar, one layer can obscure the other. Turning one of the layers off and then on again can help you better distinguish two or more features. For example, the National Land Cover Dataset layer includes many different colors and can obscure the map features from other data layers. It is also possible to change the transparency of each layer using the slider bar in the Layer Details window.

The screenshots below illustrate **SPARROW N Incremental 2002 (Major River Basins) and P Incremental 2002 (Major River Basins)** yield.
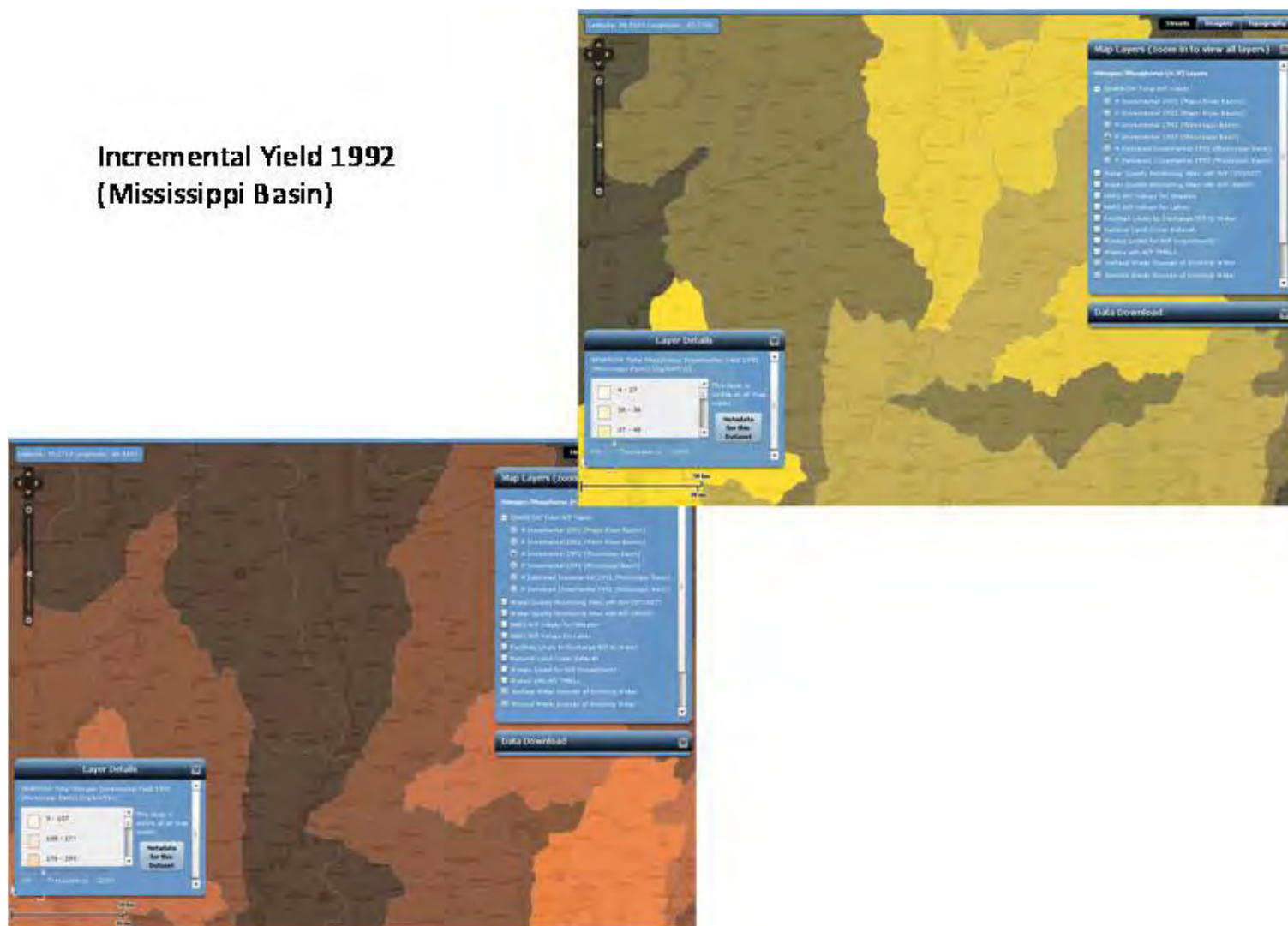- The **load** (a term used interchangeably with "flux") of a river-borne constituent is the amount (mass) that passes a given point on the river over a given period of time.
- The **yield** of a river-borne constituent is the load <u>per unit drainage area</u>.
- **Incremental yield**, which differs from *delivered* incremental yield, is that part of the load <u>per unit drainage area generated within a watershed</u> (as measured at the pore point of the watershed).

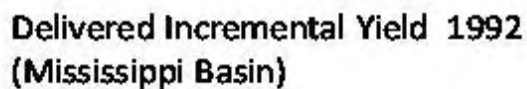*Note that only one SPARROW data layer can be displayed at a time.

Incremental Yield 2002
(Major River Basins)
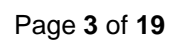
The screenshots below illustrate **SPARROW N Incremental 1992 (Mississippi Basin) and P Incremental 1992 (Mississippi Basin)** yield data layers selected, respectively.

Incremental Yield 1992
(Mississippi Basin)

These screenshots illustrate **SPARROW N Delivered Incremental 1992** and **P Delivered Incremental 1992** yield layers selected, respectively. Delivered incremental yield is that part of the yield generated within a watershed and delivered to a specified location after factoring in the loss of nutrients in transport (also called attenuation) to that location (in this case, delivery to the Gulf of Mexico).



Delivered Incremental Yield 1992
(Mississippi Basin)

These screenshots below illustrate selection of each of the [National Aquatic Resource Surveys] **NARS N/P Values for Streams** and **NARS N/P Values for Lakes** layers, respectively (with all **SPARROW** layers turned off). To generate similar views, zoom in from the national to the state level using the zoom tool (top left) until the **NARS N/P Values** layers can be selected (the check box and layer title will change from grey to white when the layer can be selected), and click the check box for to **NARS N/P Values for Streams**. Then, turn off this layer click the check box for **NARS N/P Values for Lakes** (unless otherwise noted, all screenshots from here forward in this tutorial show the **States** and **HUC8** data layers selected).
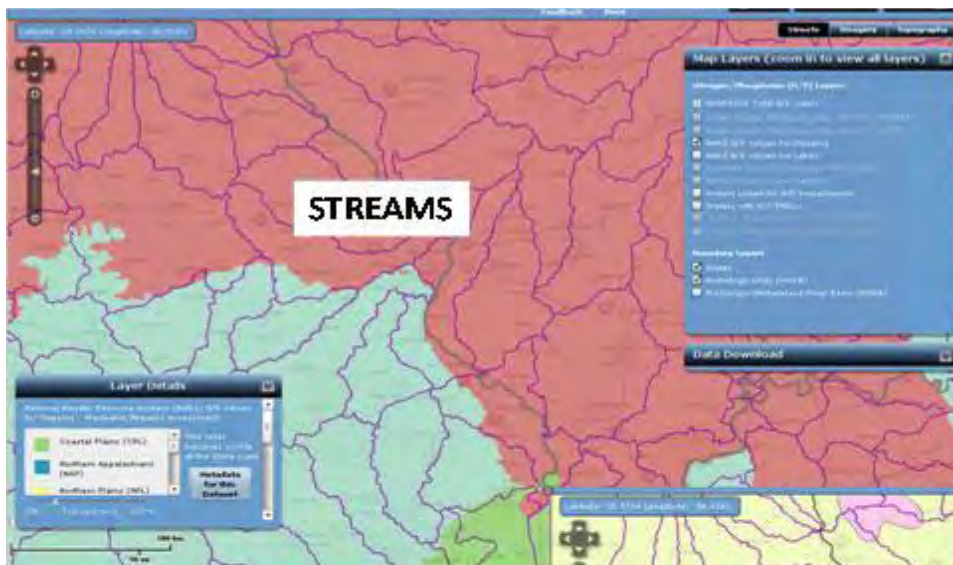
After un-checking **NARS N/P Values for Lakes,** click the check box for **Waters Listed for N/P Impairments** and **Waters with N/P TMDLs**. The screenshot below illustrates the selection of these two layers, in which **Waters Listed for N/P Impairments** appear in red and **Waters with N/P TMDLs** in yellow. A second screenshot below illustrates **Water Quality Monitoring Sites with N/P (STORage and RETrieval database (STORET))** and **Water Quality Monitoring Sites with N/P (National Water Information System (NWIS))** data layers selected, too.
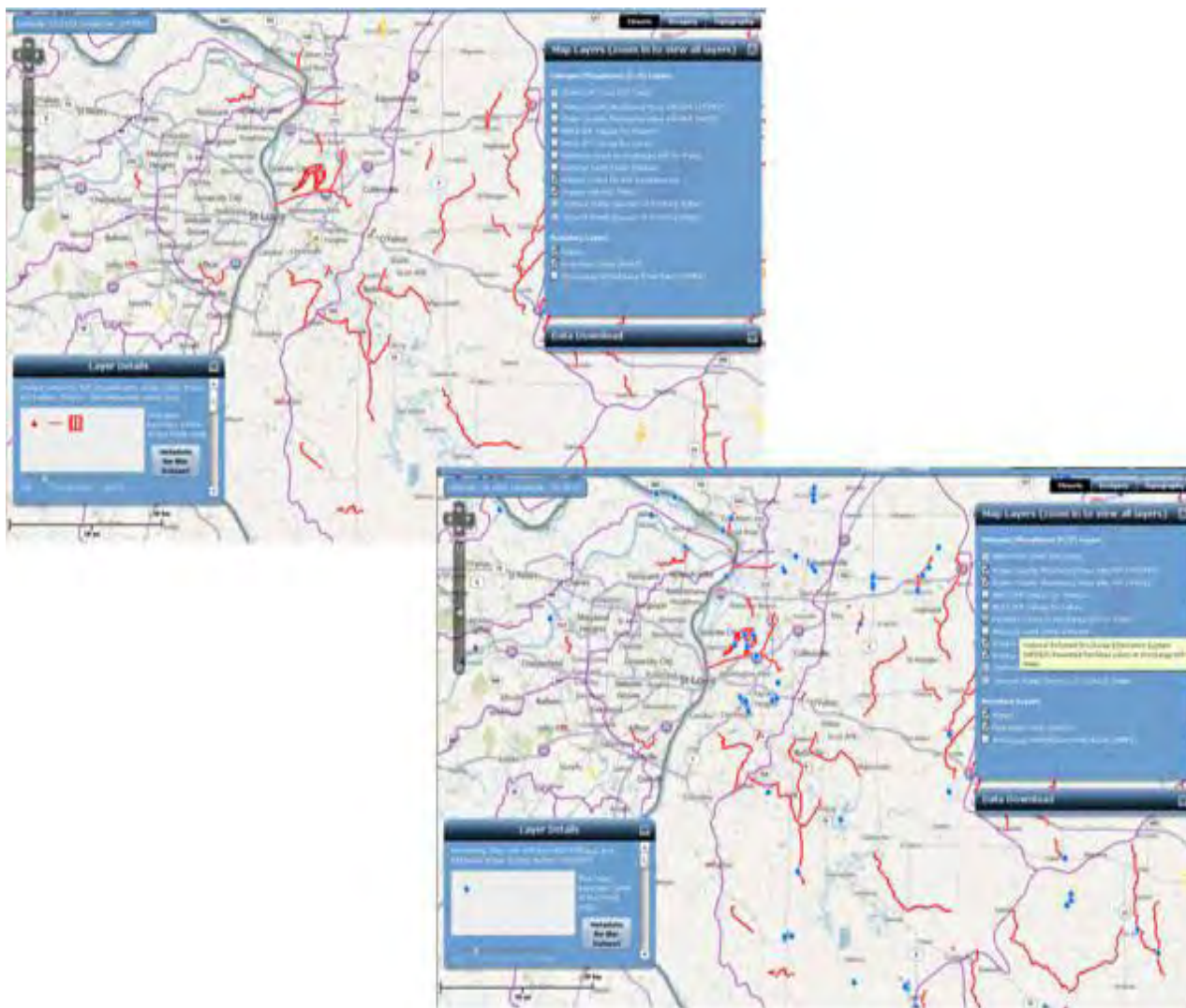
2. **Set watershed load reduction goals based upon best available information**

Establish numeric goals for loading reductions for each targeted/priority sub-watershed (HUC12 or similar scale) that will collectively reduce the majority of N & P loads from the HUC8 major watersheds. Goals should be based upon best available physical, chemical, biological, and treatment/control information from *local, state, and federal monitoring*, guidance, and *assistance activities including implementation of agriculture conservation practices*, *source water assessment evaluations*, *watershed planning activities*, *water quality assessment activities*, *Total Maximum Daily Loads (TMDL) implementation*, and *National Pollutant Discharge Elimination System (NPDES)* permitting reviews.

These screenshots illustrate the six available **SPARROW** layers selected in turn (States and HUC8 data layers are not selected in these screenshots of SPARROW.
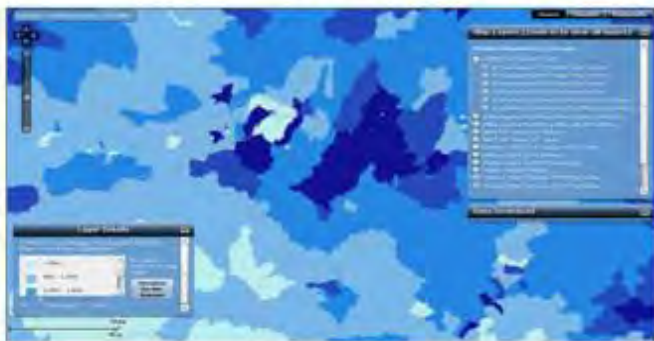
SPARROW N Incremental 1992
(Mississippi Basin)

SPARROW P Incremental 1992
(Mississippi Basin)

SPARROW N Delivered Incremental 1992
(Mississippi Basin)

SPARROW P Delivered Incremental 1992
(Mississippi Basin)

This screenshot illustrates **Water Quality Monitoring Sites with N/P (STORET)**, **Water Quality Monitoring Sites with N/P (NWIS), National Land Cover Dataset**, **Ground Water Sources of Drinking Water, Waters Listed for N/P Impairments**, and **Waters with N/P TMDLs**.
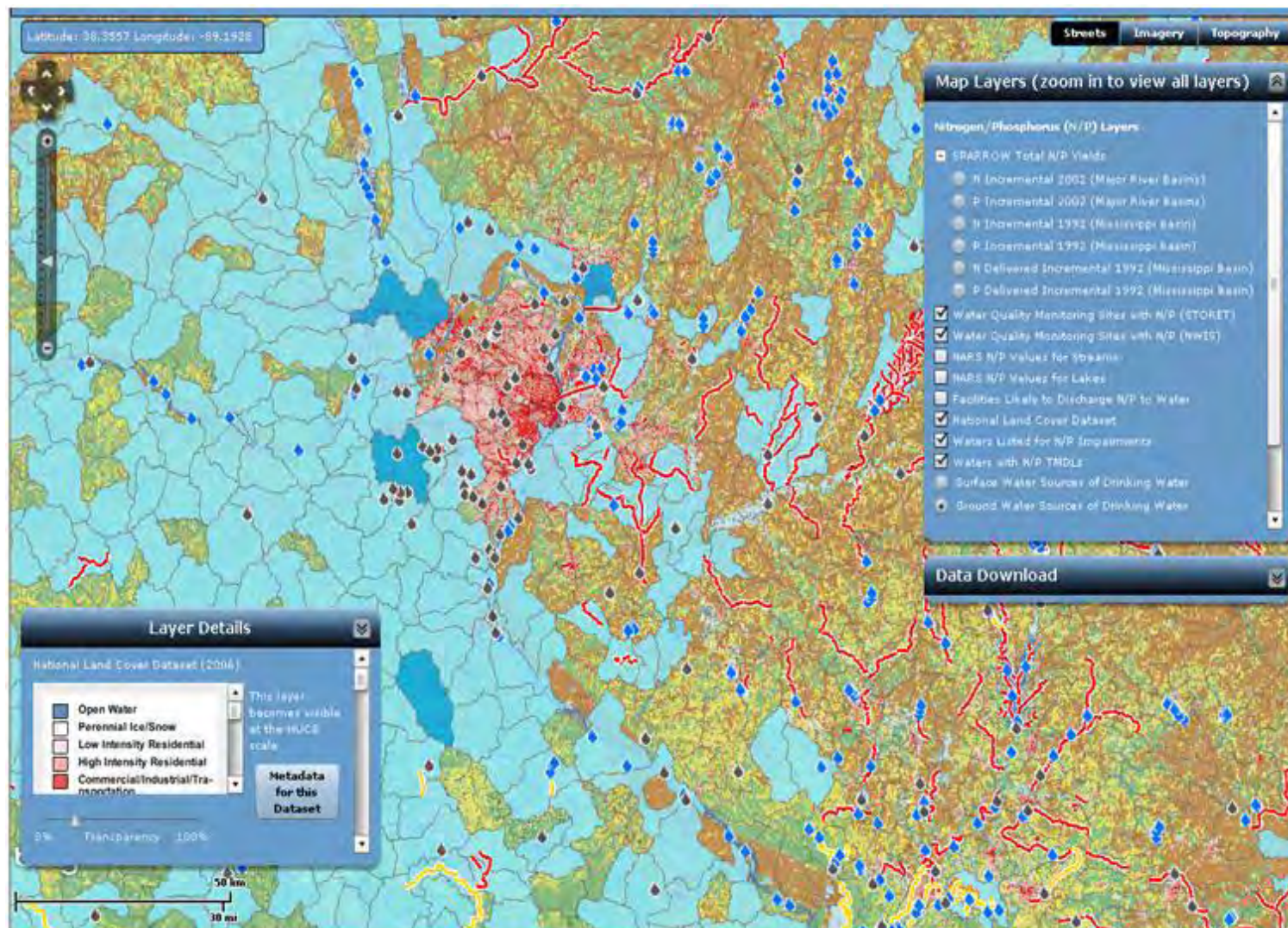
This screenshot illustrates **Water Quality Monitoring Sites with N/P (STORET)**, **Water Quality Monitoring Sites with N/P (NWIS)**, **Facilities Likely to Discharge N/P to Water**, **Waters Listed for N/P Impairments**, **Surface Water Sources of Drinking Water,** and **Waters with N/P TMDLs**.
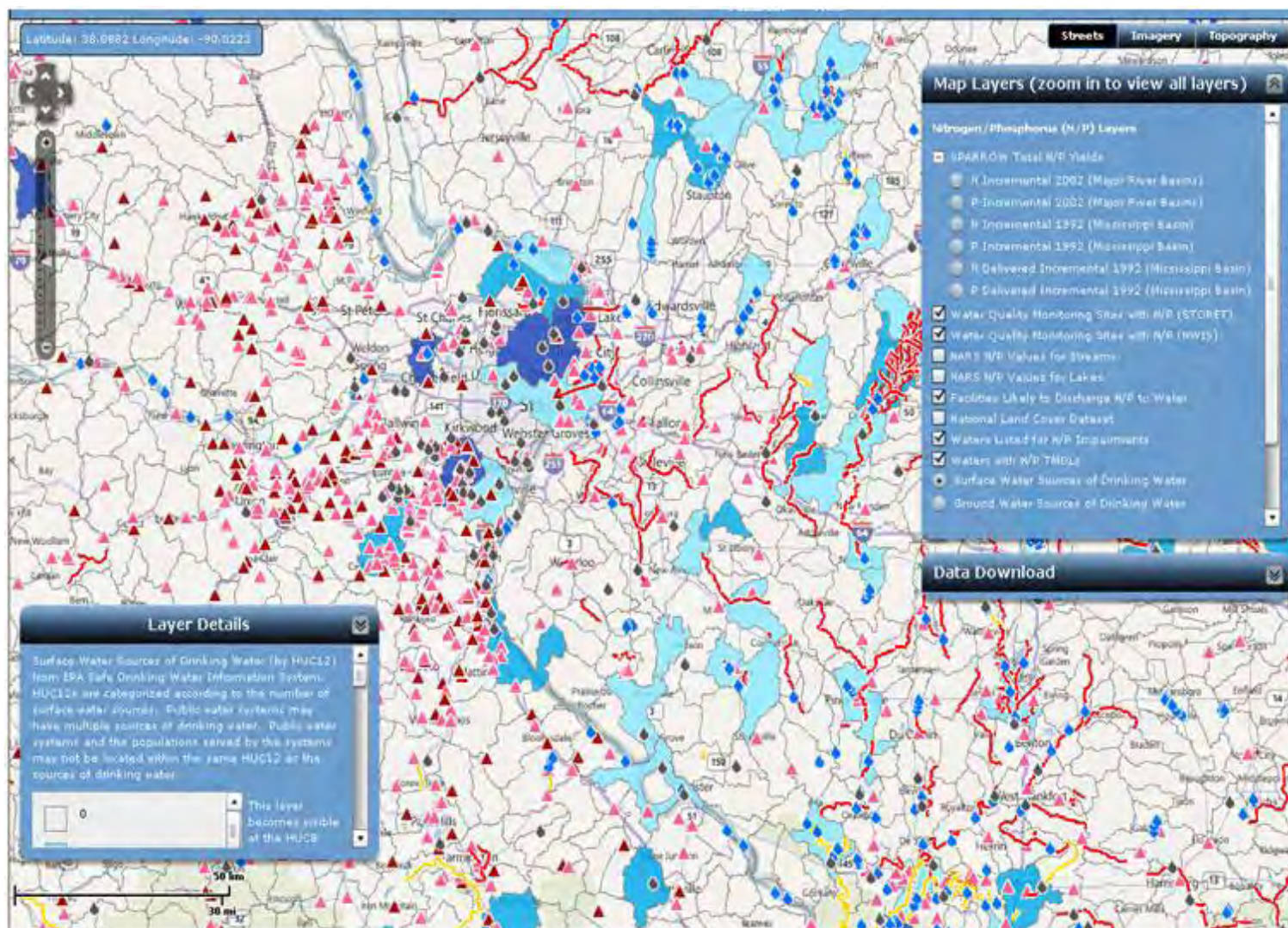
3.   **Ensure effectiveness of point source permits in targeted/priority sub-watershed for:**

   A.   Municipal and Industrial Wastewater Treatment Facilities that contribute to significant measurable N & P loadings;

   B.   All Concentrated Animal Feeding Operations (CAFOs) that discharge or propose to discharge; and/or

   C.   Urban Stormwater sources that discharge into N & P-impaired waters or are otherwise identified as a significant source.

The screenshot below illustrates the **Facilities Likely to Discharge N/P to Water** data layer selected. To download CAFO data,

1.   Expand the "Data Download" box, found below the "Map Layers" box.
2.   Follow the instructions within the upper portion of the "Data Download" box to download the "NPDES Concentrated Animal Feeding Operations (CAFO) Summary."
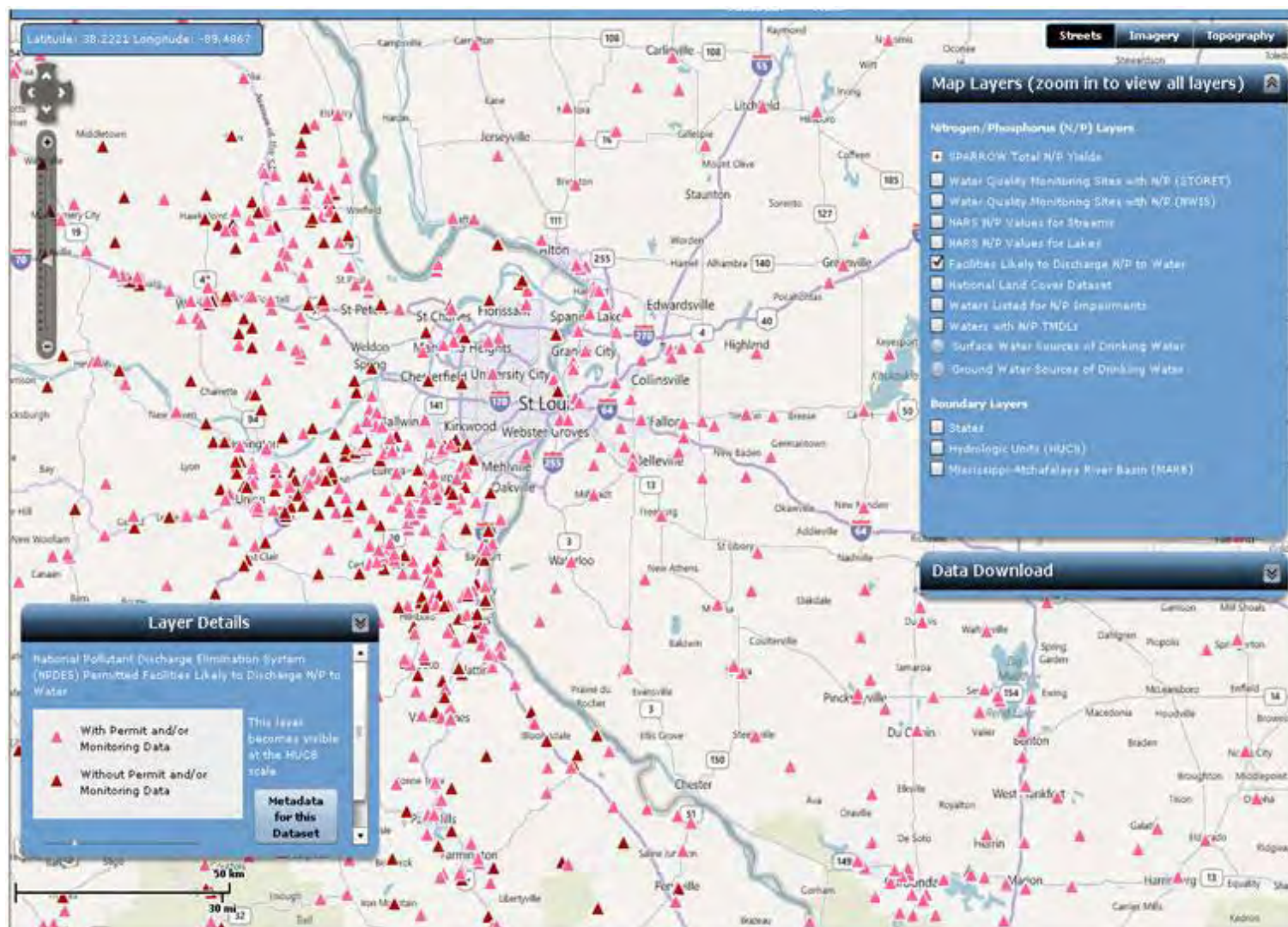
4.   **Agricultural areas**

In partnership with Federal and State Agricultural partners, NGOs, private sector partners, landowners, and other stakeholders, develop watershed-scale plans that target the most effective practices where they are needed most. Look for opportunities to include innovative approaches, such as targeted stewardship incentives, certainty agreements, and N & P markets, to accelerate adoption of agricultural conservation practices. Also, incorporate lessons learned from other successful agricultural initiatives in other parts of the country.

The screenshot below illustrates the **National Land Cover Dataset** layer selected, which reveals land use for row crops, pasture/hay, and other agricultural uses.
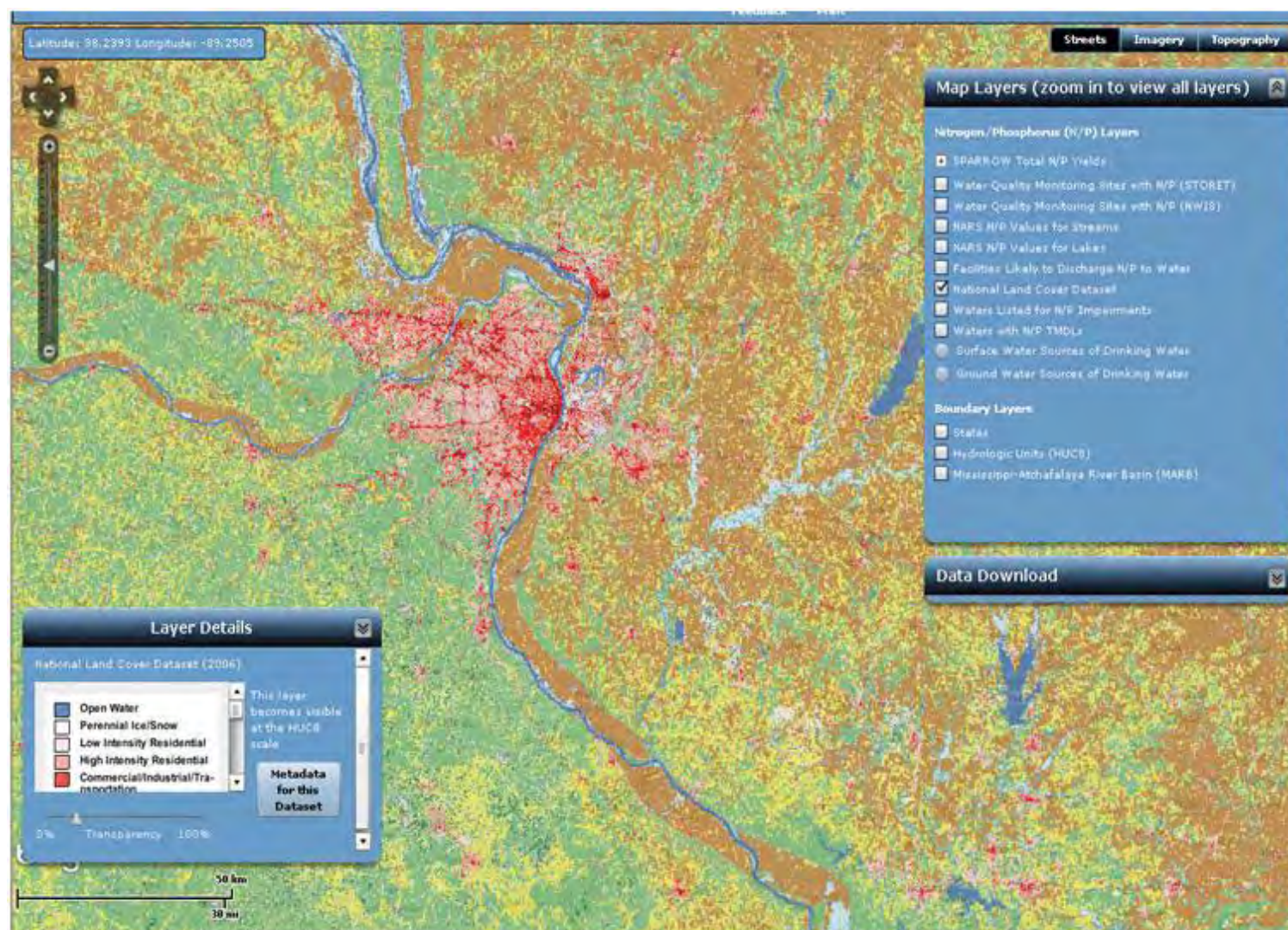
5. Stormwater and septic systems

Identify how the State will use state, county and local government tools to assure N and P reductions from developed communities not covered by the Municipal Separate Storm Sewer Systems (MS4) program, including an evaluation of minimum criteria for septic systems, use of low impact development/ green infrastructure approaches, and/or limits on phosphorus in detergents and lawn fertilizers.

6. **Accountability and verification measures**

   A. *Identify where and how each of the tools identified in sections 3, 4 and 5 will be used within targeted/priority sub-watersheds to assure reductions will occur.*

   B. Verify that load reduction practices are in place.

   C. To assess/demonstrate progress in implementing and maintaining management activities and achieving load reductions goals: *establish a baseline of existing N & P loads and current Best Management Practices (BMP) implementation in each targeted/priority sub-watershed, conduct ongoing sampling and analysis to provide regular seasonal measurements of N & P loads leaving the watershed*, and provide a description and confirmation of the degree of additional BMP implementation and maintenance activities.

By selecting "add" from the "Data Download" box drop-down ("Action") and then clicking on a point on the Data Access Tool geospatial viewer, the HUC8 is selected; click on the point again on the Data Access Tool and "Features at this Location" box (see screenshot below) pops up for that HUC8. A summary of relevant data layers at that location is available. This summary includes HUC8 number, Water Quality Monitoring Sites, Facilities Likely to Discharge N/P to Water, National Land Cover Dataset, and more.
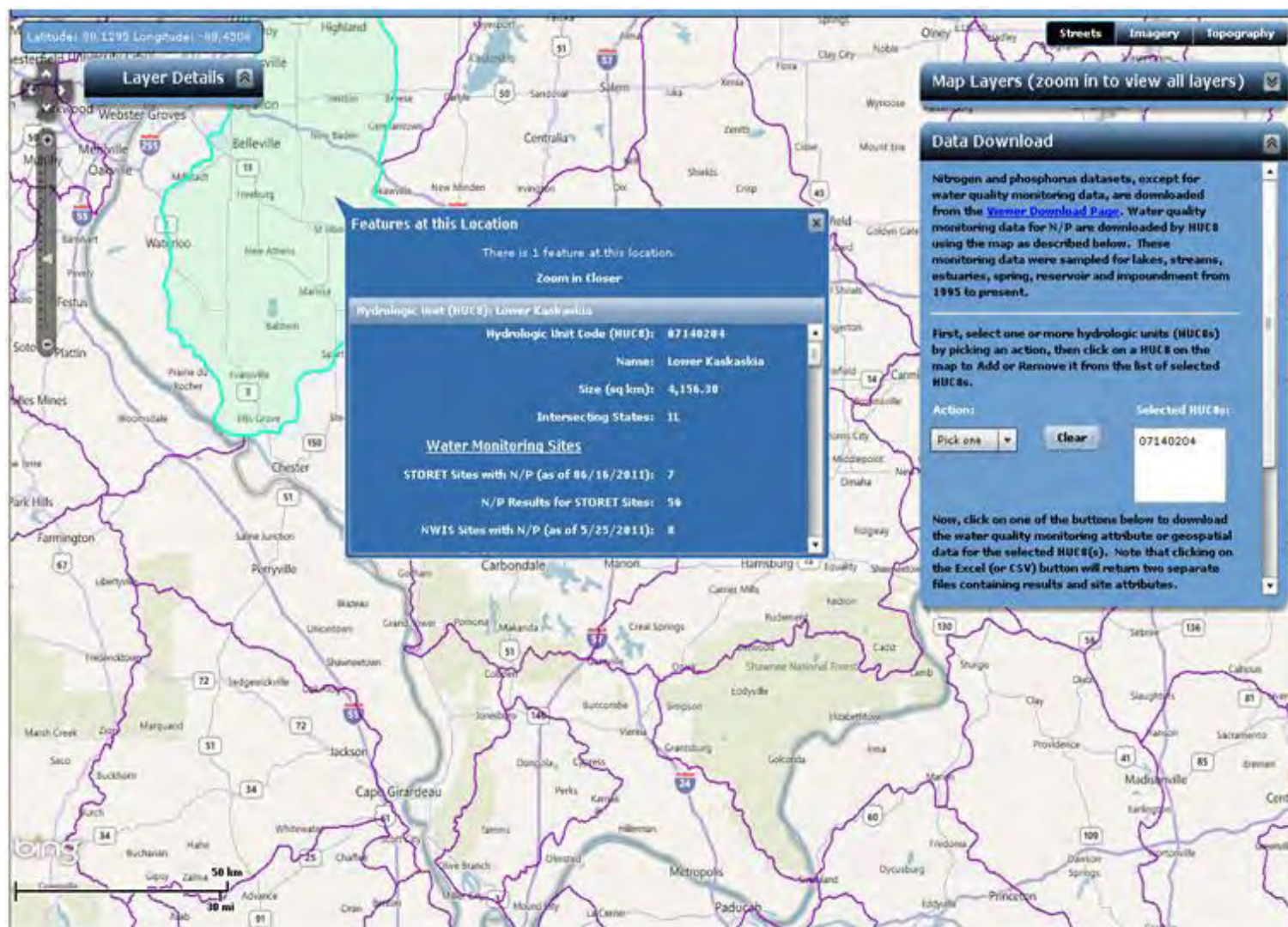
7. **Annual public reporting of implementation activities and biannual reporting of load reductions and environmental impacts associated with each management activity in targeted watersheds**

    A. Establish a process to annually report for each targeted/priority sub-watershed: status, challenges, and progress toward meeting N & P loading reduction goals, as well as specific activities the state has implemented to reduce N & P loads such as: reducing identified practices that result in excess N & P runoff and documenting and verifying implementation and maintenance of source-specific best management practices.

    B. Share annual report publically on the state's website with request for comments and feedback for an adaptive management approach to improve implementation, strengthen collaborative local, county, state, and federal partnerships, and identify additional opportunities for accelerating cost-effective N & P load reductions.

8. **Develop work plan and schedule for numeric criteria development**

Establish a work plan and phased schedule for N and P criteria development for classes of waters (e.g., lakes and reservoirs, or rivers and streams). The work plan and schedule should contain interim milestones including but not limited to data collection, data analysis, criteria proposal, and criteria adoption consistent with the Clean Water Act. A reasonable timetable would include developing numeric N and P criteria for at least one class of waters within the state (e.g., lakes and reservoirs, or rivers and streams) within 3-5 years (reflecting water quality and permit review cycles), and completion of criteria development in accordance with a robust, state-specific workplan and phased schedule.

Part Two: How to Download Data

To download **Water Quality Monitoring Sites with N/P data** (STORET and NWIS),

1. Expand the "Data Download" box, found below the "Map Layers" box.
2. Follow the instructions within the bottom portion of the "Data Download" box.

To download data layers other than the **Water Quality Monitoring Sites with N/P data**,

3. Expand the "Data Download" box, found below the "Map Layers" box.
4. Follow the instructions within the upper portion of the "Data Download" box.

You can download data in several formats, including Microsoft Excel tables (.xls), Comma Separated Values (.csv), and geospatial Keyhole Markup Language (.kml), which can be imported into and viewed in such applications as Google Earth.