USING WEB-BASED GIS TO STREAMLINE EPA PERMIT AND GRANT SUBMISSIONS

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Many of US EPA's programs require the submission of spatial locations. Whether submitting a stormwater permit application through EPA's Electronic Notice of Intent (eNOI) system, or applying for a nonpoint source grant or a Beaches Environmental Assessment and Coastal Health (BEACH) Act grant, EPA requires the submission of the spatial location of the site or study area. Under contract with EPA, RTI International (RTI) developed the Web-Based Reach Indexing Tool (WebRIT) that allows states, tribes, grant writers, permit applicants, and others to quickly and easily determine the location of their site or study area. The WebRIT is an ArcIMS application that provides a customized interface to each user, is tightly integrated with other EPA systems including EPA's Central Data Exchange (CDX), and has the ability to store the locations in a central database. This paper discusses how the WebRIT has streamlined the process of EPA grant submissions and permit applications.

Background

WebRIT for the Watershed Assessment, Tracking, and Environmental ResultS (WATERS) database is an Internet mapping tool that allows users to submit and update locational data for a wide variety of environmental programs. To help users identify locations, WebRIT provides point-and-click tools and displays data from various EPA environmental programs and other sources such as the National Hydrography Dataset (NHD) and U.S. Geological Survey (USGS) topographical maps and aerial photos. By assisting users in georeferencing their environmental program data with these easy-to-use, Web-based tools, the WebRIT has helped streamline the EPA permit and grant submission process as well as aided in cross-program collaboration.

The WebRIT currently supports the following programs: BEACH Act grants, the Nonpoint Source Grant Reporting and Tracking System (GRTS) program, Clean Water Needs Survey (CWNS), Drinking Water Intakes (DWI), eNOI, the Permit Application Software System (PASS), the Permit Compliance System (PCS), Special Appropriations Act Projects (SAAP), and the Water Quality Standards (WQS) Program. In future versions, the WebRIT will be available for other program data, such as data from the STOrage and RETrieval (STORET) database and other water quality monitoring stations, Clean Water Act (CWA) Section 303(d) impaired water listings, and more.

The WebRIT contains or uses many data sets from both EPA and USGS. Some of the data sets include NHD, Digital Raster Graphics (DRGs), Digital Orthophoto Quadrangles (DOQs), detailed streets, county boundaries, and zip codes. The WebRIT has the ability to print out topographic maps and aerial photographs with user-defined points displayed on top. The user can also add an annotation (an identifier and description) associated with each of these user-defined points. In addition, the WebRIT provides users the ability to capture latitude/longitude coordinates, add Federal Geographic Data Committee (FGDC)-compliant metadata associated with the event data created, and has many spatial and attribute selection options.

This paper discusses how the WebRIT has helped improve the process of EPA grant submissions and permit applications, and aided in cross-program collaboration and communications by streamlining environmental data submission processes. WebRIT has done this by providing a customized interface to each user, being tightly integrated with other EPA systems and programs, including EPA's CDX, by having the ability to store the locations in a central database, and by providing many easy-to-use advanced tools. For additional Internet information on georeferencing, go to http://www.epa.gov/owow/monitoring/georef/. For additional Internet information on WebRIT, go to http://www.epa.gov/waters/webrit/. For additional Internet information on NHD, go to http://nhd.usgs.gov/.

EPA Office of Water Enterprise Architecture

The WebRIT was developed as part of the WATERS system that unites water quality information that was previously available only from several independent and unconnected databases (see Figure 1). The EPA Office of Water (OW) has various programs that store data in many different databases. Under WATERS, the program databases are connected to a larger framework. This framework is a digital network of surface water features known as the NHD. By using applications like WebRIT to link program data to the NHD, program data can be shared across programs. These linked and spatially enabled data sets provide enhanced ability to perform cross-program analysis enabling informed decision-making. In addition to WebRIT helping programs share important water quality information, the WebRIT also aids in gathering that data by streamlining the EPA grant and permit submission process. Because WebRIT is a
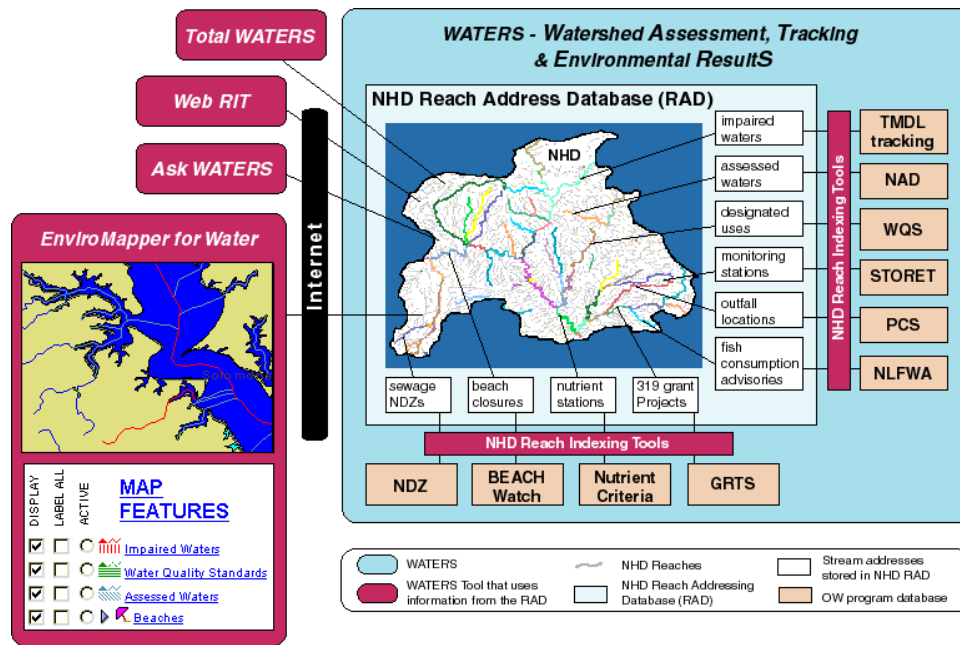
Figure 1. The WATERS Architecture

Web-based application, Web applications for other programs can seamlessly integrate their applications with WebRIT, aiding in cross-program collaboration and communication, and providing powerful georeferencing tools for the user. WebRIT is based on the Environmental Systems Research Institute's (ESRI's) hypertext markup language (HTML) viewer and only requires that the user have an Internet Explorer browser. As a Web application, WebRIT easily integrates with other program Web applications.

One of the primary advanced features provided by WebRIT is that the user interface can be completely customized for each program. One benefit of this is that the application can be simplified for users that require only basic functionality, such as for permit submissions. At the same time, the interface can be highly customized based on the EPA program, organization (e.g., state, EPA headquarters, EPA region), and access level to which the user is logged in as in the WebRIT. See Figure 2 for an example of a simplified user interface for PASS users versus the more complex interface, which has many more tools and map layers for BEACH users. This lends to aiding cross-program collaboration in that certain programs can set up their preferences in a way that allows other programs to see their data, which helps programs reconcile their spatial data differences, such as CWNS and PCS do, which will be discussed later in this paper. Another useful advanced feature of the user interface is the ability for WebRIT to open zoomed in to a particular location. This is particularly useful in permit and grant submissions applications such as eNOI where the WebRIT opens already zoomed in to the zip code level of the user's site,
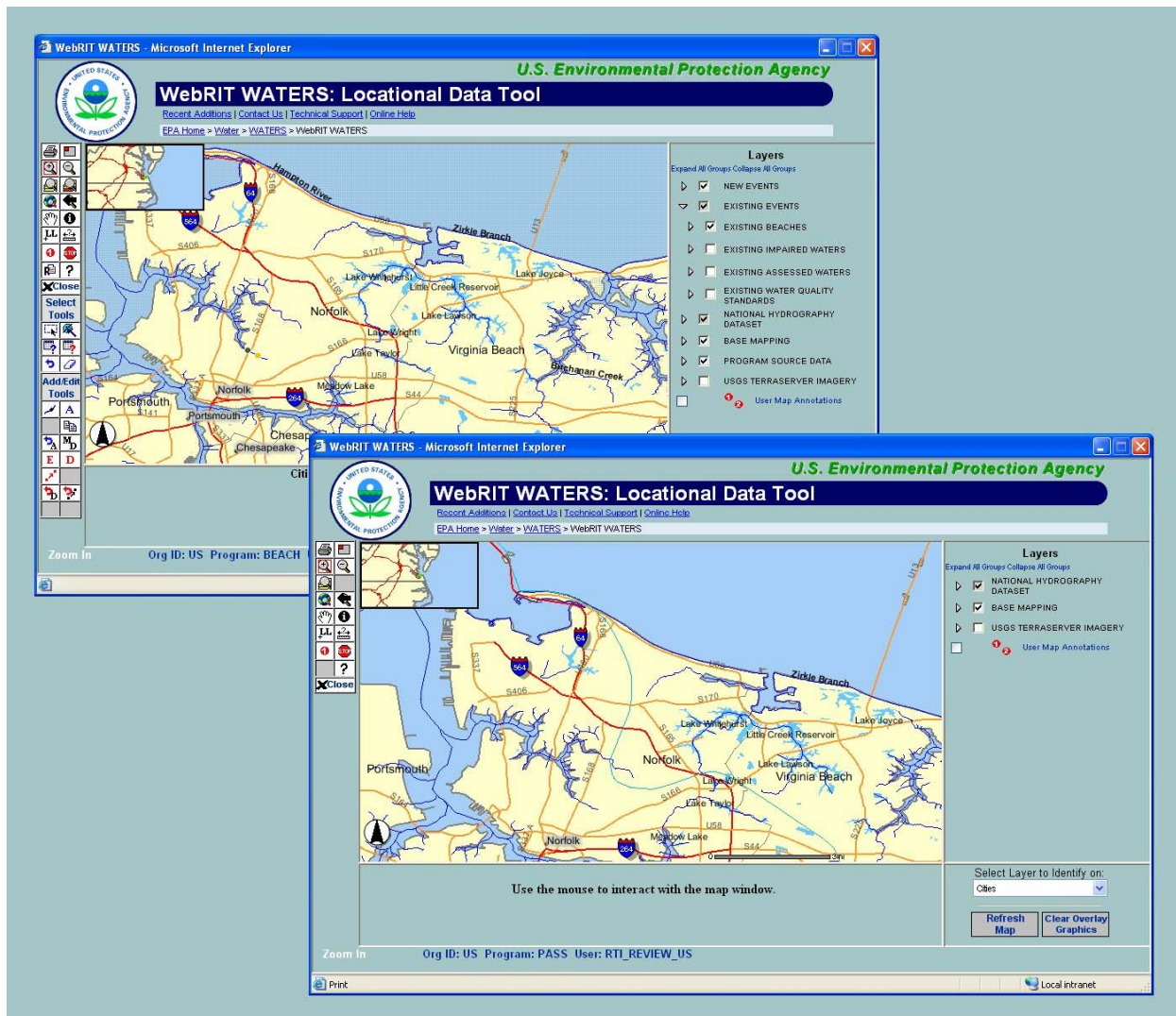
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Figure 2. Interface Comparison for Different EPA Programs

helping to make the whole process easier and faster. Additionally, WebRIT provides the functionality to capture the latitude and longitude and add it to the user's application; in the case of the eNOI, it adds the latitude/longitude to the permit form for the user. This coordination between program databases improves communication, efficiency, and accuracy, enabling OW to better support its mission and needs.

Streamlining EPA's Environmental Data Submission Processes

CDX

EPA's CDX provides a single point of entry for all EPA stakeholders (state and local governments, tribes, industry, etc.) to submit environmental data to EPA. CDX manages the user accounts and grants the user access to the appropriate EPA programs. Through CDX, stakeholders fill out an electronic form that is then instantly submitted to EPA rather than mailing multiple paper forms as done

in the past. Using this electronic method, CDX is able to implement data constraints so only valid data values are submitted to EPA. This is a vast improvement over the free text of paper forms. Through CDX, data can be submitted to EPA in a variety of formats including Web forms, extensible markup language (XML), binary, or a flat file. Using CDX, EPA is able to reduce the cost of submitting and processing data submissions.

The WebRIT is the primary means of submitting spatial data to EPA through the Web. WebRIT provides a consistent method for submitting, validating, and updating spatial data linked to NHD as well as spatial data not linked to NHD. Using WebRIT, EPA is able to streamline the spatial data submittal process and thus reduce costs.

Prior to CDX and WebRIT, users would need to go to multiple Web sites to submit data to EPA, and how these data were obtained from those Web sites was often inconsistent. Also, if paper forms were used to submit data to EPA, data quality and consistency were concerns. Prior to WebRIT, EPA stakeholders would deliver spatial data to EPA in a variety of formats including paper maps, text descriptions, latitude/longitude with or without metadata, or in a digital format such as an ESRI shapefile with or without metadata. WebRIT provides users with a consistent means of obtaining spatial data to submit to EPA that ensures data quality.

Integrating WebRIT with CDX provides EPA stakeholders with a single point of entry for submitting all attribute and spatial data to EPA and was a logical next step in streamlining the environmental data submission process for EPA stakeholders. Two examples of integration of WebRIT and CDX are the electronic Beach Environmental Assessment and Coastal Health System (eBeaches) and EPA's Stormwater eNOI.

eBeaches

Before CDX and the WebRIT, BEACH (CWA Section 303i) Grant recipients submitted their spatial data to EPA by providing text descriptions or sometimes just the name of a beach. Now, using the new electronic Beach Environmental Assessment and Coastal Health System (eBeaches), state and local agencies can easily submit their annual beach water quality and swimming advisory information to EPA. This is a CDX system that provides the forms for state and local agencies to submit their attribute data. These same eBeaches users, while submitting programmatic and monitoring data via CDX, have the capability to link to the WebRIT to submit the spatial location of the beaches, thus providing the eBeaches users with one location to submit their data to EPA (see Figures 3 and 4). WebRIT allows the user to select beach locations and submit metadata describing how the locations were determined. When the user selects beach locations, they are translated into NHD reach addresses, captured in the WebRIT database, and, after validation, are transferred to the NHD Reach Address Database. Now with the
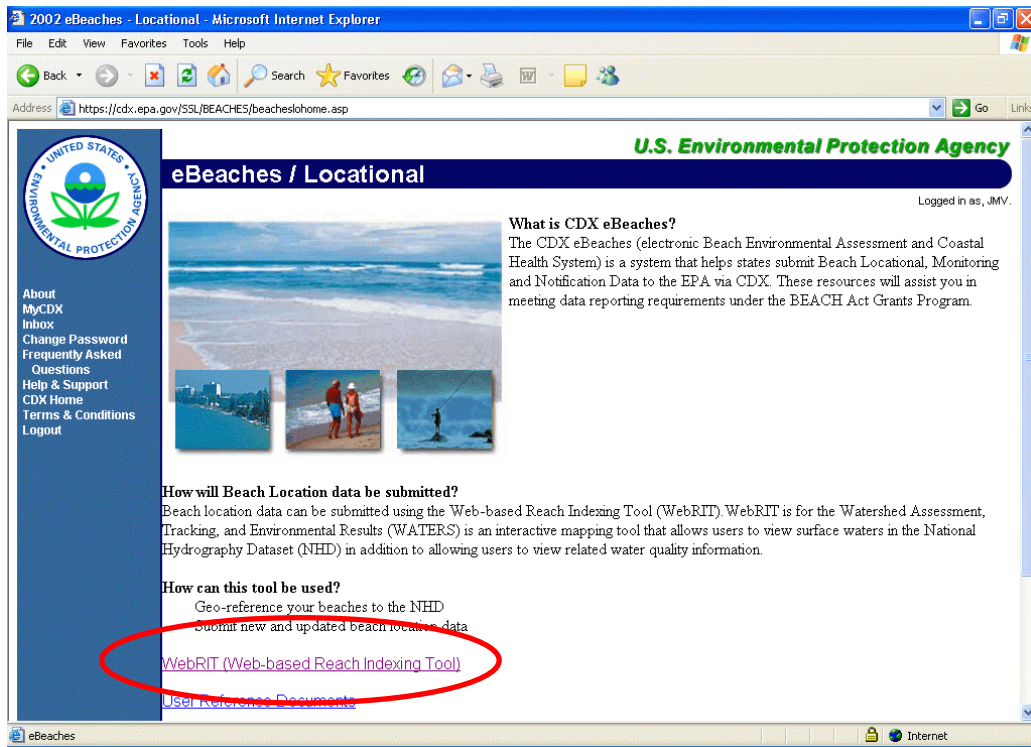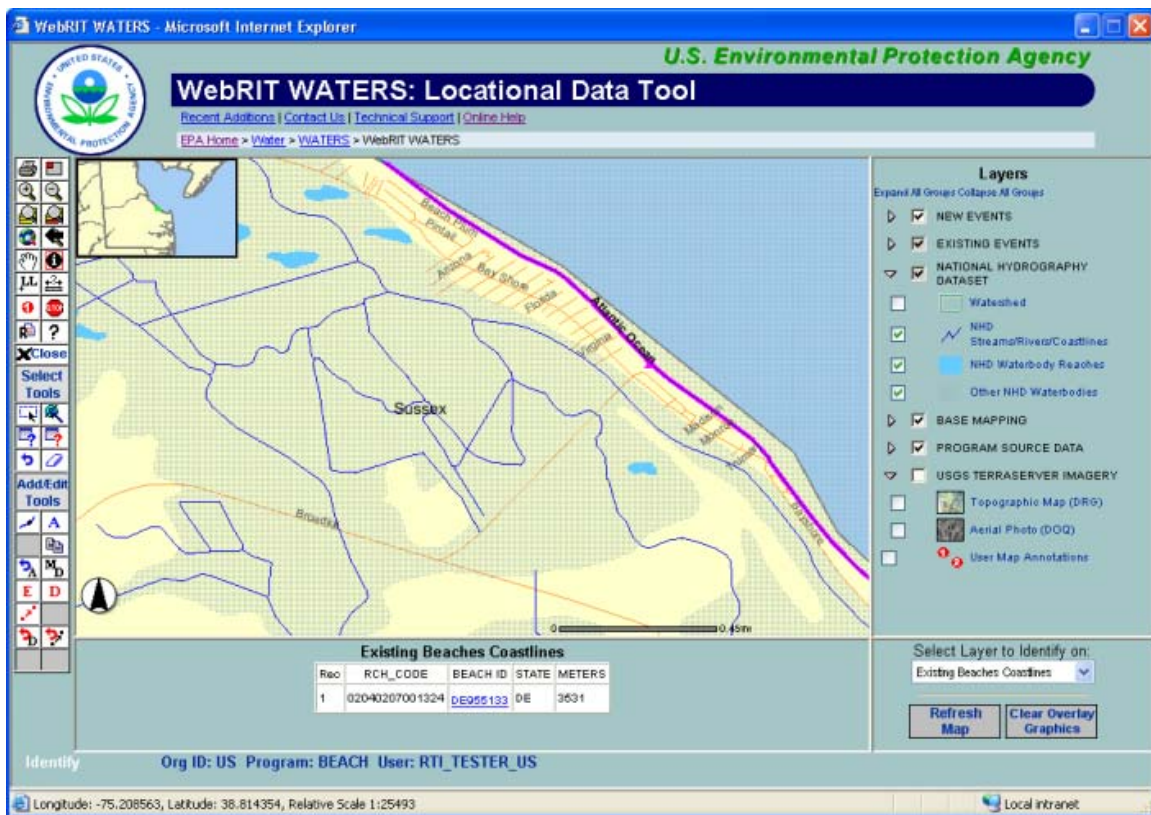
Figure 3. eBeaches link to WebRIT

Figure 4. WebRIT Interface for EPA's BEACH Program

integration of CDX-eBeaches and WebRIT, state and local agencies can submit accurate beach locations along with beach water quality and swimming advisory information to EPA very efficiently and easily.

eNOI

Another example of WebRIT's integration with CDX is the EPA's eNOI. This paperless permit application site is for owners or managers of construction sites and industrial facilities that need to apply for coverage under EPA's Construction General Permit (CGP) or Multi-Sector General Permit (MSGP-2000), respectively. By integrating with eNOI, WebRIT is helping make the permit process faster, more cost efficient, and more accurate. To use eNOI, users register through CDX and fill out the eNOI form online.

Each applicant is required to provide the latitude and longitude of their construction site or industrial facility as part of the Notice of Intent (NOI) form. Prior to CDX and WebRIT, the method available to apply for permits for construction sites and industrial facilities was to fill out a paper form. The paper form provided guidelines for values such as the latitude/longitude, but these could not be enforced on a paper form, causing a source for common mistakes and delays. Paper forms are also time-consuming to process, making the process of receiving a permit very slow and tedious.

Now with WebRIT integrated with the eNOI, the user easily launches into the WebRIT from the eNOI Web form. A second login is not required to open the WebRIT because the passing of credentials is all handled in the interaction between CDX-eNOI and WebRIT. WebRIT automatically opens zoomed in to the zip code of the construction site and provides a simple set of tools and map layers to assist the user in finding the exact site location. Once the site location is found, the user simply selects WebRIT's latitude/longitude tool and then clicks the site location. The WebRIT then returns the latitude/longitude and appropriate EPA Environmental Data Registry (EDR) Method, Accuracy, and Description (MAD) codes to the eNOI form using EPA standard XML tags (see Figure 5). This locational information is then stored in the eNOI database. By using CDX and WebRIT, the process for receiving a CGP and MSGP is streamlined to provide quality data and an expedited permit application process.
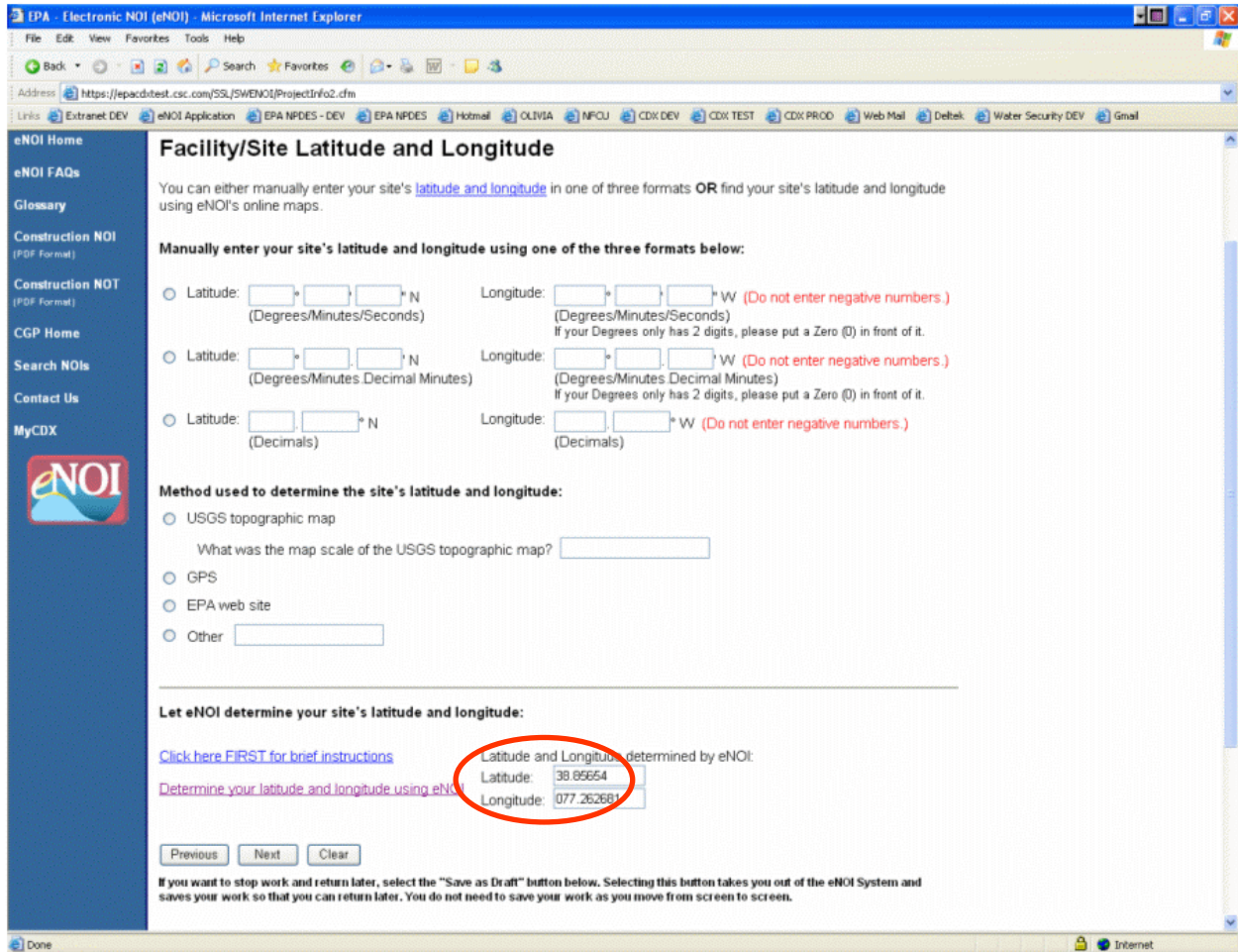
Figure 5. eNOI with Latitude/Longitude provided by WebRIT

GRTS

Under section 319 of the CWA, states, territories, and Indian tribes receive grant money to support a variety of activities including technical assistance, financial assistance, education, training, technology transfer, demonstration projects, and monitoring to assess the success of specific nonpoint source implementation projects. These section 319 nonpoint source grants are tracked using EPA's GRTS. WebRIT is designed to facilitate data entry and storage of spatial information for projects stored in GRTS. WebRIT allows users to locate their project areas and delineate them using the NHD, the national standard for storing surface water location information. Before WebRIT was available for GRTS, the GRTS user had to manually enter an NHD reach code into GRTS. This was not always easy for a user because they had to obtain the NHD and be able to access the reach codes on their own. A project may have covered more than one reach code or just part of a reach code, and GRTS could not accommodate this. Using this old system, there was no way to ensure from which version of NHD the reach codes came. Now using WebRIT, the GRTS user is able to easily obtain the NHD reach codes and can be more

accurate. WebRIT has control over the version of NHD, allows users to assign multiple or even partial NHD reaches to a project, and stores the data in a central database. Using WebRIT, the GRTS locational data is more accurate, easier to collect, and is managed and stored using a method consistent with other EPA programs.

PASS

The National Pollutant Discharge Elimination System (NPDES) PASS is a software solution provided by EPA to facilitate applications for NPDES permits. Previously, applicants were required to manually complete one or more paper applications. PASS improves this process by seamlessly guiding the applicant through the necessary application form(s). However, even though the software now guides users through much of the process, users still need to produce and submit topographic maps with a 1-mile radius buffer marking their site. WebRIT helps streamline this process by providing the permit applicant and other users with initial latitude/longitude collection and validation capabilities, and by incorporating USGS Terra Server topographic maps and aerial photos centered on a user-defined point with the 1-mile buffer automatically added. Also, a user-specific annotations layer was added so that annotation markers can be added to the map on the acetate layer. The user's annotation layer is listed in the WebRIT table of contents and can be turned on/off similar to any other layer in the application. When the user prints the map using the print tool provided, the user's specific annotation marker, identifier, and description are displayed on the map. This enables NPDES permit applicants to meet permit requirements for submitting topographic maps marked with facility locations to EPA. An example of the annotation functionality can be seen in Figure 6, and an example of a map with a buffer automatically added around the PASS users' site is shown in Figure 7.

Cross-Program Collaboration

CWNS-PCS

EPA's Office of Wastewater Management conducts the CWNS on a periodic basis. The CWNS includes a collection of locational information for publicly owned wastewater collection and treatment facilities, facilities for control of sanitary sewer overflows, combined sewer overflows (CSOs), stormwater control activities, nonpoint sources, and programs designed to protect the nation's estuaries.

EPA's PCS provides information on companies that have been issued permits to discharge wastewater into waters of the United States. This information includes the locations of the facilities as well as the locations of the facility-owned pipes.
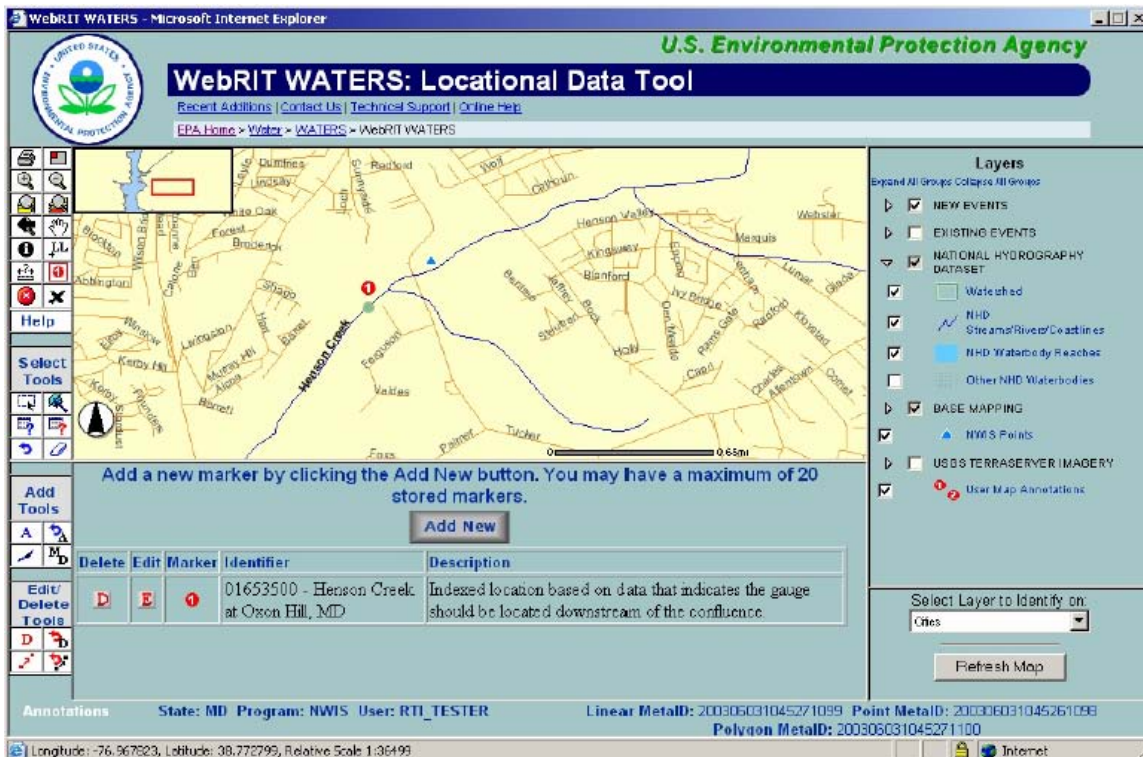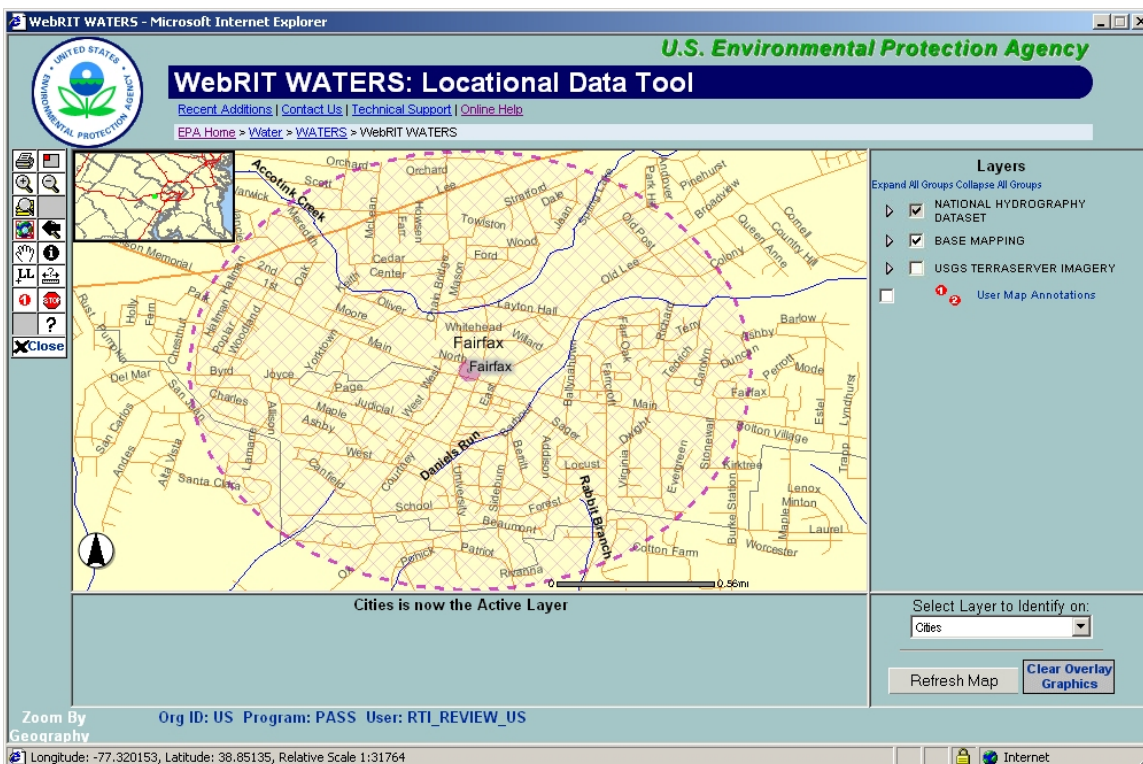
Figure 6. User Map Annotation

Figure 7. Zoom to Location with Buffer for PASS Program

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Both the CWNS and PCS programs are using the WebRIT to facilitate their individual locational data improvement initiatives. Thousands of facility and pipe locations have been preloaded into WebRIT, and the application is being made available to states and others for visual review and correction of these locations.

In addition to facilitating these programs' individual review, WebRIT has been customized to allow these programs to reconcile differences between the two program databases. CWNS and PCS both record locational data for an overlapping set of facilities. Where facilities exist in both the CWNS and PCS databases, these programs are using WebRIT to view the locations and associated metadata from both programs. This allows these distinct EPA programs to reconcile locational differences and use the best available locational data.

WQI-CWS/DWI

The EPA sets standards that, when combined with protecting ground water and surface water, are critical to ensuring safe drinking water. EPA works with its regional offices, states, tribes, and its many partners to protect public health through implementing the Safe Drinking Water Act and the CWA. The Community Water Systems (CWS) or DWIs regulated by EPA, and delegated states and tribes, provide drinking water to 90 percent of Americans. WQS define the goals for a waterbody by designating its uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollutants.

WebRIT has facilitated an integrated review and correction process between DWI and CWS programs. Once DWI locations are reviewed, corrected, and validated via WebRIT, WQS reviews and updates their locations and verifies that the designated uses are appropriate for DWI locations. WebRIT allows these two programs to collaborate and ensures that not only are their locations accurate, but that designated uses are appropriate for waterbodies at or near DWIs, thus ensuring safe drinking water. Figure 8 shows an example of the WQS-CWS screen.

Future Plans

Single Sign On

RTI is currently working with EPA on a pilot single sign on (SSO) service. SSO is a mechanism whereby a single action of user authentication and authorization can permit a user to access all computers and systems where the user has access permission without the need to enter multiple passwords. SSO will provide secure credential management and efficient centralized administration.
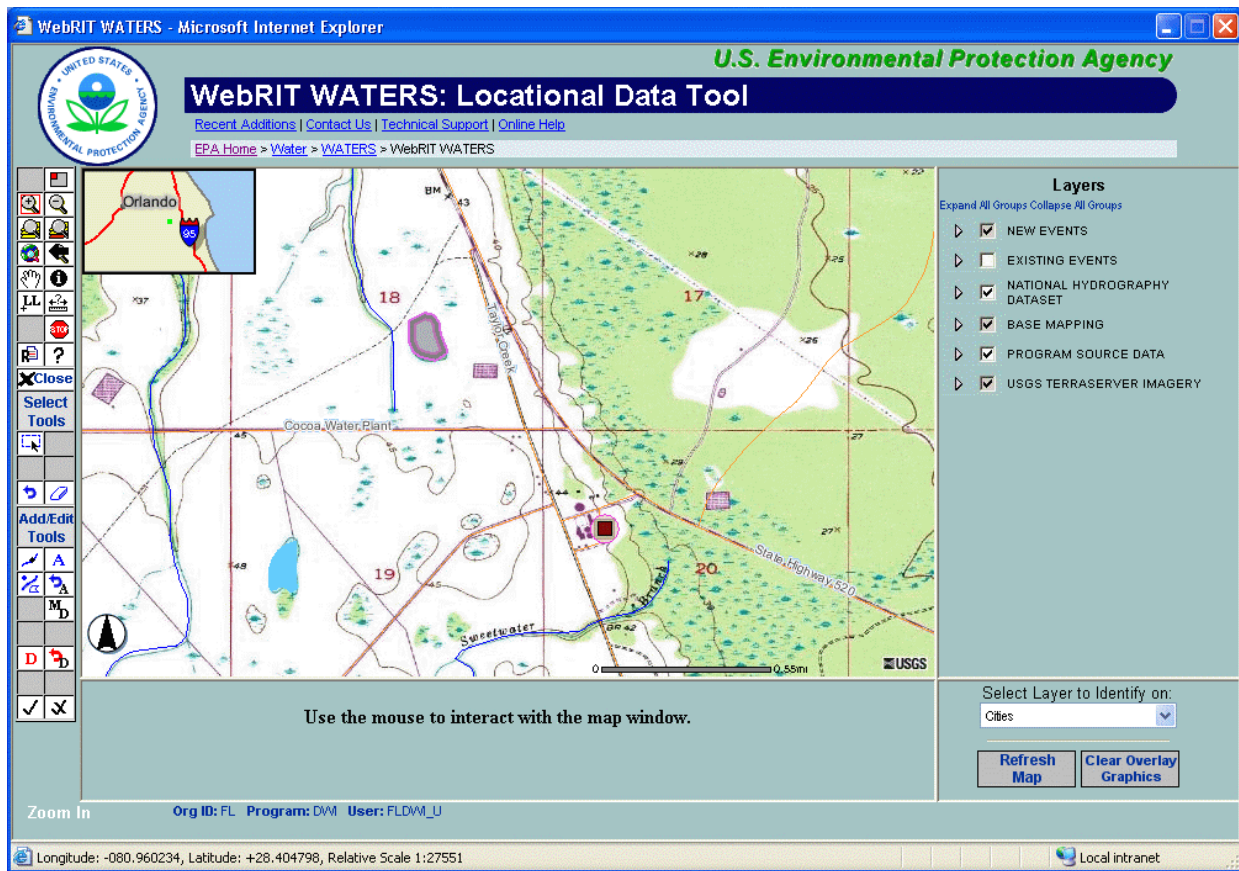
Figure 8. WQS-CWS Location Validation

Once implemented, SSO will allow WebRIT to seamlessly and securely interact with other EPA applications on different servers without requiring the user to log in multiple times, thus further streamlining and improving the EPA's environmental and locational data submission.

Conclusions

Numerous EPA programs protect human health and the environment. These programs generate large amounts of information stored among many different EPA databases. WebRIT has helped improve program efficiency, communication, and analytical capacity by providing a consistent method for submitting, validating, and updating spatial data, thus ensuring data quality so that the environmental information they contain can easily be shared and combined.

Integrating WebRIT with CDX has provided EPA stakeholders with a single point of entry for submitting all attribute and spatial data to EPA and has streamlined the environmental data submission process for grant programs such as the BEACH program and permit submission applications such as the EPA's Stormwater eNOI. WebRIT has also helped streamline the submission process by integrating with

other non-CDX programs by providing users with a consistent means of obtaining spatial data to submit to EPA, ensuring data quality and helping to reduce costs. GRTS and PASS are two example programs.

In addition to streamlining the submission process, WebRIT has been customized to aid in cross-program collaboration and communications by allowing programs to reconcile differences between two different program databases. By allowing different EPA programs to reconcile their locational differences, it ensures the best available locational data. CWNS with PCS and WQS with CWS are two examples of how WebRIT helps programs streamline their processes to achieve their locational data improvement initiatives.

Future plans of implementing a SSO and plans of having users submit data directly to a WebRIT service will further aid in streamlining and improving the EPA's environmental and locational data submission processes.

Acknowledgements

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