

Map Viewing Resources on the Internet

Introduction

The ability to view geographic data is essential to making informed decisions affecting aquatic resources, including making decisions on compensatory mitigation site selection in a watershed or landscape context. Understanding the spatial relationship among geographic features provides insights that can lead to key insights on processes and structure. In lieu of learning how to operate geographic information system (GIS) software, there are several tools that allows one to view spatial data. This document describes three map viewing tools that are available to the public.

USFWS Wetland Mapper (<http://107.20.228.18/Wetlands/WetlandsMapper.html>)

The USFWS Wetland Mapper (Figure 1) provides the latest available information on Cowardin wetlands in the United States. The data layers are related to Cowardin wetlands including actual classification, data source, and data status. The viewer can choose a background with street maps, aerial imagery, or topographic maps. The site has options to download GIS data for Cowardin wetlands based on state.

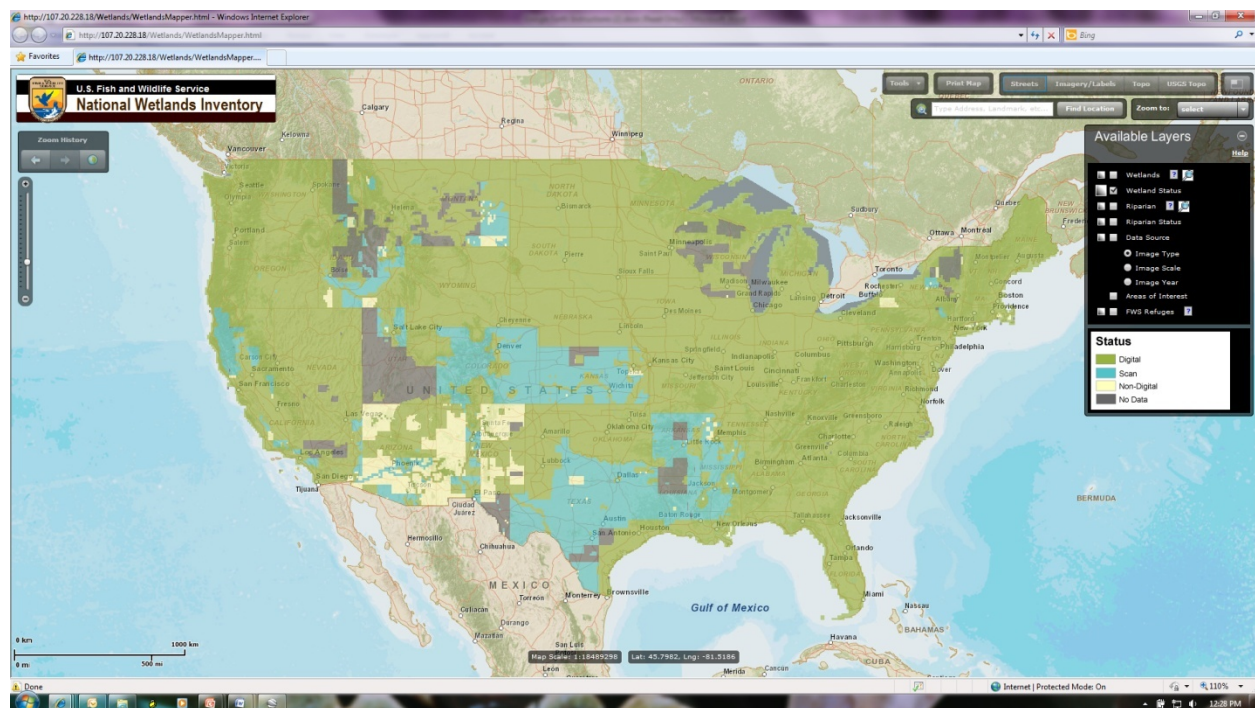


Figure 1. Opening window of the USFWS Mapper.

At higher resolutions, the viewer can see the specific wetland category (Figure 2). The color coding shows the major Cowardin wetland classification and text labels show the specific wetland category, including all descriptors.

USGS Mapper (<http://viewer.nationalmap.gov/viewer/nhd.html?p=nhd>)

The USGS Mapper (Figure 3) has a wide variety of layers showing features that can be found on a standard USGS topographic map. The viewer can choose a background with street maps, aerial imagery, or topographic maps. The list of selectable layers include the Watershed Boundary Dataset (WBD) at multiple hierarchies (2-, 4-, 8-, 10-, and 12-digit HUCs), National Hydrography Dataset features (NHD) (USGS bluelines, water features, springs), transportation facilities, land cover (1992, 2001, and 2006), impervious surface (2001, 2006), 1-foot and 1-meter aerial imagery, current and historic topographic maps, and others.

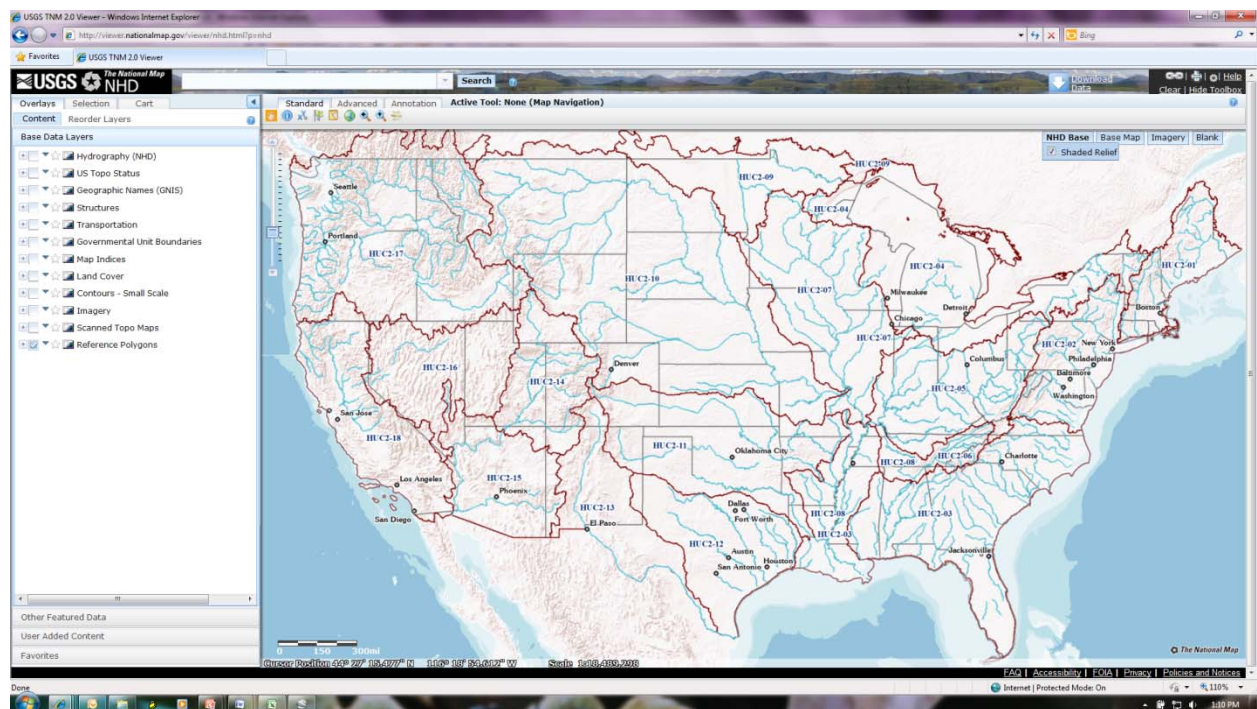


Figure 3. Opening window of the USGS Mapper.

The USGS Mapper allows downloads of many different data categories (Figure 4). Upon clicking the “Download Data” button, a pop-up window appears, showing layers of interest. Depending on the data, these data layers and maps may be downloaded as geodatabases, GeoPDFs, and GeoTIFFs. A highlight of the data is the relatively quick access to historic topographic maps, downloadable as high quality GeoPDFs. The inset toward the right of Figure 4 shows the available historic topographic maps for South Sacramento County, including 7.5-minute maps going back to 1908 and 30-minute maps going back to 1889, and others.

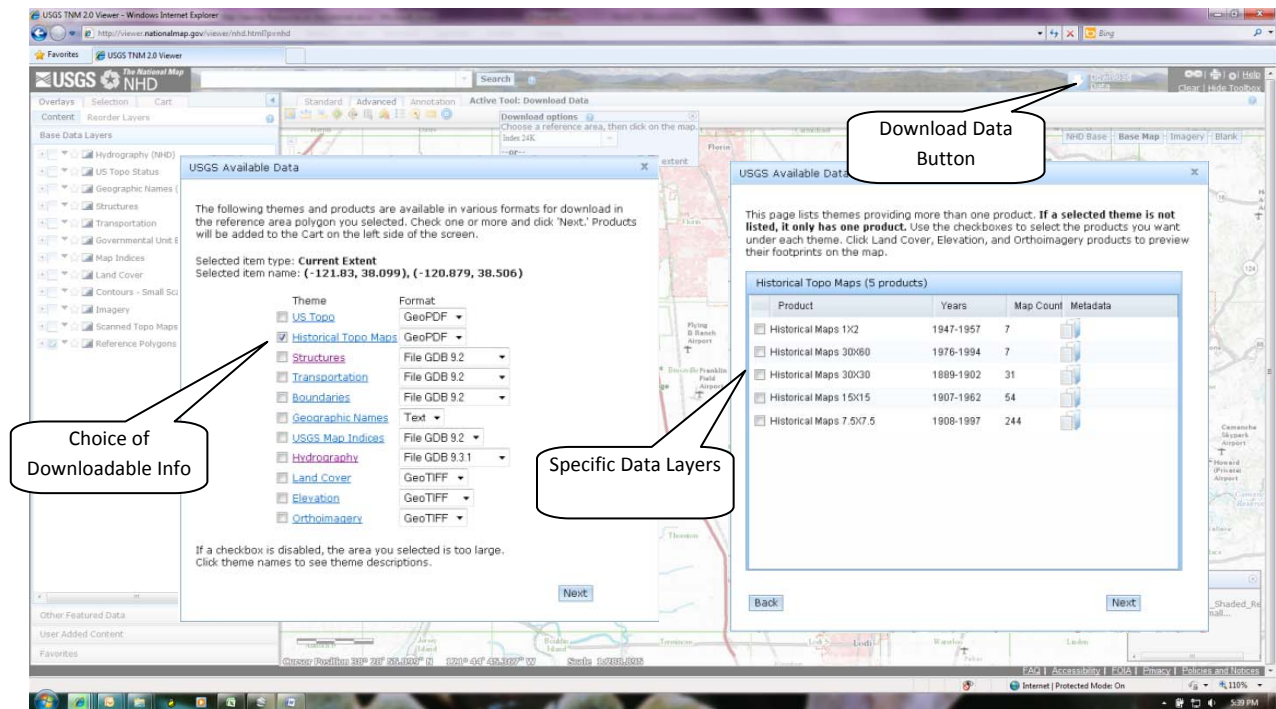


Figure 4. The screens on the USGS Mapper allowing for downloading of data including current and historic topographic maps as GeoPDFs; structures, transportation, boundaries, and hydrography (as a geodatabase); and land cover, elevation, and orthoimagery as GeoTIFFs.

Google Earth Pro

Google Earth Pro (Figure 5) is stand-alone software that integrates on-line images and layers of polygons, lines, and points written in keyhole markup language (KMLs). This software can be used to view common aerial images while allowing views of customizable layers without the need to learn GIS software. Many GIS layers in geodatabase or shapefile formats can be converted to KMLs and viewed in Google Earth Pro.

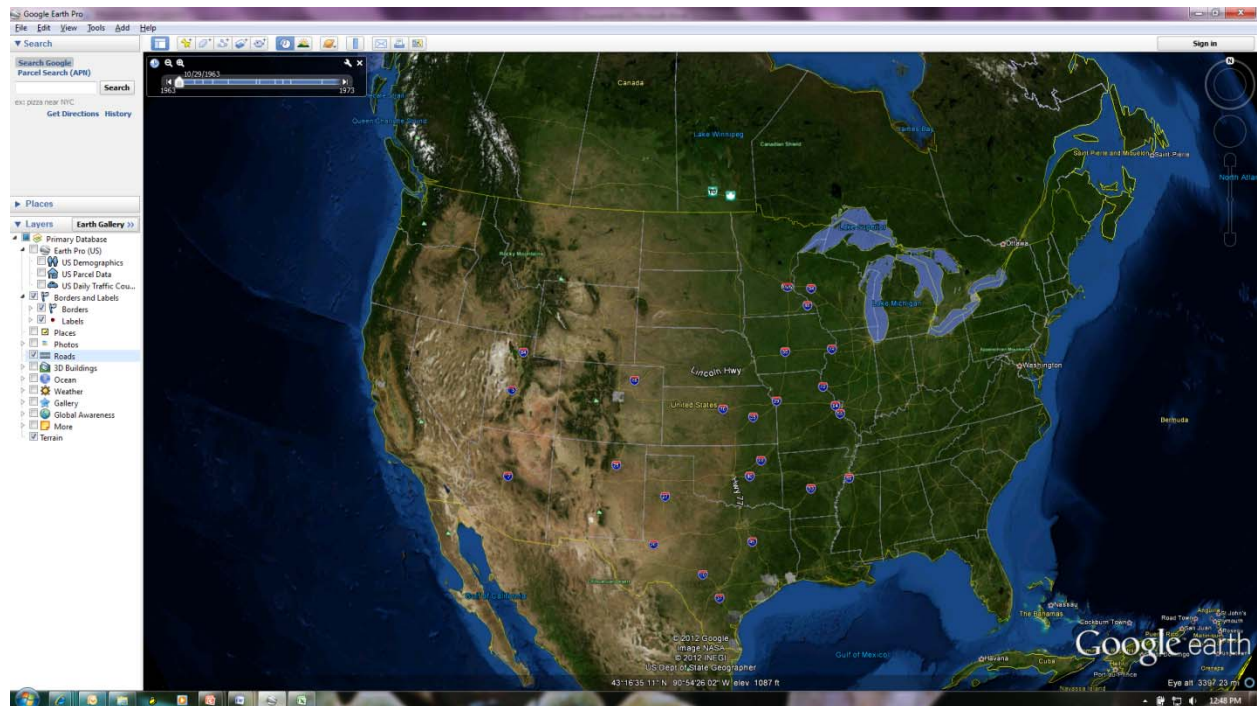


Figure 5. Opening window of Google Earth Pro.

A key feature of the software is the ability to view historic aerial images (Figure 6). On the toolbar, clicking the historic aerial photograph button activates the historic aerial photograph slider. On the slider, available historic aerial photographs are shown as white bands and moving the slider to the white band activates those historic aerial photographs. As can be seen in this aerial view of Shepherdstown, West Virginia, historic aerial photographs are available for certain parts of a geographic area and for only certain time periods.



Figure 6. Aerial photographs in the Shepherdstown area. Current photograph is from 4/22/1989. Availability of historical aerial photographs varies depending on location.

A useful capability of Google Earth Pro is the ability to access other internet data services and servers. EPA has developed a downloadable KML tool that allows access to EPA water quality data services within the Watershed Assessment, Tracking and Environmental Results (WATERS) program (<http://www.epa.gov/waters/tools/WATERSKMZ/WATERSKMZ.html>). The KML tool allows viewing of some of the features found in the USGS Mapper including watershed boundaries from the Watershed Boundary Dataset and water features from the National Hydrography Database. In addition, the KML tool allows one to view current EPA data without having to download multiple GIS files including data on 303(d) impaired waterbodies, combined sewer overflows, fish consumption advisories, facilities that discharge to water, and others. In addition, the KML tool provides GIS functionality.

One feature of the EPA KML tool is the ability to identify and characterize the contributing watershed upstream of a stream reach (Figure 7). By placing the cursor over a blueline stream and clicking, a pop-up window appears. One can then identify pollution sources upstream and downstream of the point, identify the size and the boundaries of the contributing watershed, and summarize attributes of the contributing watershed including estimated flows, stream order, and land cover based on 1992 satellite imagery. These estimates are based on 1:100,000 scale data from the NHDPlus (the main high resolution NHD datasets are generally characterized at a 1:24,000 scale).

Another feature of the EPA KML is the ability to obtain more information on specific features of interest, including impaired water bodies (Figure 8). In viewing a feature of interest such as an impaired water body, by placing a cursor over the feature and clicking, a pop-up window appears. From this pop-up window, one can click on a link that would describe the nature of impairment of the water feature.

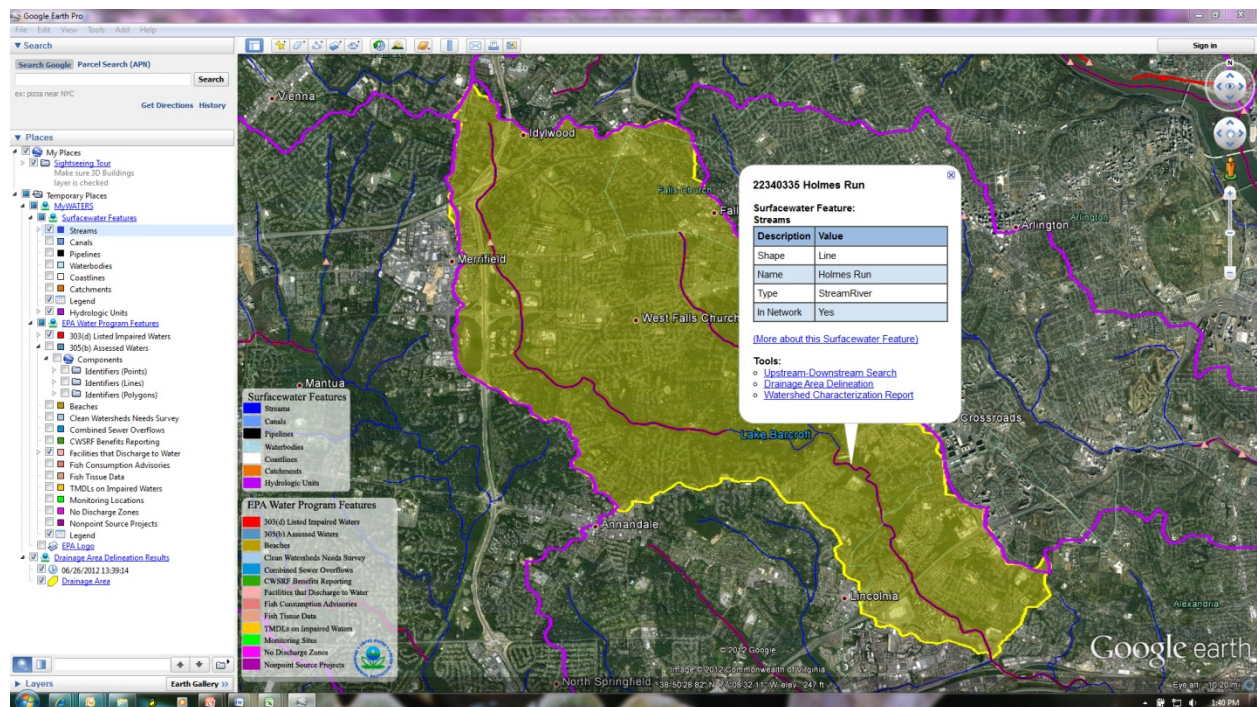


Figure 7. Example of an additional features of EPA's KML tool for identifying watershed upstream of a point and characterizing watershed condition.

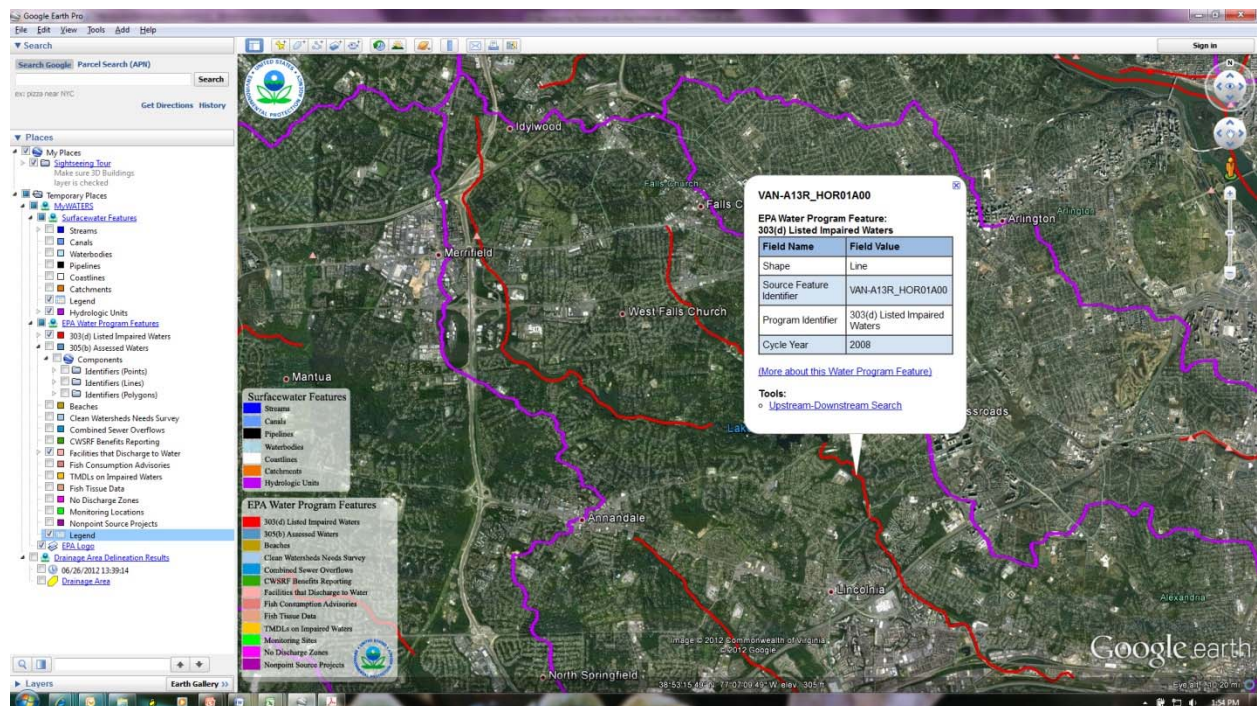


Figure 8. Example of an additional feature of EPA's KML tool for identifying a selected feature. The feature of interest is an impaired water feature under 303(d) of the CWA. Clicking on the available link would provide more information on the nature of impairment.

Summary

Table 1 summarizes the feature of the different map viewers. Overall, the USGS Mapper has more features that may be of interest to people dealing with aquatic resource issues. The multiple sources of information (many of which are unique) and the ability to download data would be useful for many aquatic resource managers. Lastly, this tool is free and easily accessible via a standard web browser. Google Earth Pro with EPA's KML tool has additional features related to characterizing watershed and identifying sources of degradation. The main drawback is the association with the Google Earth Pro program, which may not be available to everybody.

Table 1. Summary of mapping tools.

Mapper	Aerial Imagery	Topo Maps	Watershed Boundaries	Wetlands	Geology	USGS Bluelines	Land Cover	Impervious Cover	Stream Flows	Impaired Waters	Pollutant Sources	Downloads
FWS Mapper	Current	Current		Cowardin								Wetland layers
USGS Mapper	Current	Current+ Historic	Yes	Cowardin	Yes	Yes	Yes (1992, 2001, 2006)	Yes (2001, 2006)				Many layers
Google Earth Pro	Current+ Historic		Yes			Yes	Summary Data for 1992		Yes	Yes	Yes	Some layers