



WEST VIRGINIA WATERSHED ASSESSMENT PILOT PROJECT

Elk River, Southeast Flyfishing forum

Elk River End User/Stakeholder Workshop
April 5, 2012

Proposed Interactive Web Mapping Application

1. Intro to web mapping
2. Example screenshots of draft tool format
3. Potential use scenarios
4. Various data layers available for display

Interactive Web Maps

Definition/ synonyms

- An **interactive web map** is an online map that allows users to view/search spatial data as well as manipulate the scale and display of data, and is often dynamically linked to a database containing routinely updated information.
- Generally interchangeable terms:
 - Web mapping application
 - Dynamic online mapping
 - Online map/data viewer
 - Decision support tool*

Interactive Web Maps

The screenshot displays the Google Maps interface for Clendenin, West Virginia. The search bar at the top contains "Clendenin, WV". The main map area shows a topographic view of the town, with a red pin marking the location. A weather overlay is visible, showing a temperature of 56°F and a forecast of mostly cloudy conditions. A terrain overlay is also present, highlighting the elevation of the area. The interface includes navigation controls, a search bar, and a sidebar with various map layers and settings.

Google Clendenin, WV

Get directions My places

Weather

°C | °F km/h | mph | m/s

Weather for Clendenin, West Virginia

56°F 77°F 56°F	S	S	M	T
Mostly Cloudy Humidity: 82% Wind: N at 0 mph weather.com	64°F 43°F	73°F 55°F	76°F 54°F	79°F 49°F
	Hourly 10-Day			

[Maps Labs - Help](#)
Google Maps - ©2012 Google - [Terms of Use](#)

View weather conditions and forecasts around the world.

- Traffic
- Photos
- Weather
- Terrain
- clendenin, WV

Map data ©2012 Google · [Edit in Google Map Maker](#) [Report a problem](#)

Done Internet | Protected Mode: On 125%

What The Web Map Will Do:

Basic

Principles/

Formats

- ❑ Collect and organize a wide variety of current information about an area
- ❑ Display map layers such as political boundaries, roads and structures, hydrography, elevation, topo maps, and aerial imagery at various scales
- ❑ Retrieve attribute information about map features, such as water quality data from sample stations, gas well ownership, and timber harvest extent
- ❑ Search for an area of interest such as watershed, stream, county, or town
- ❑ Display aggregated information that will help locate potential areas for conservation actions, based on user objectives and resources

What The Web Map Will Not Do:

Basic

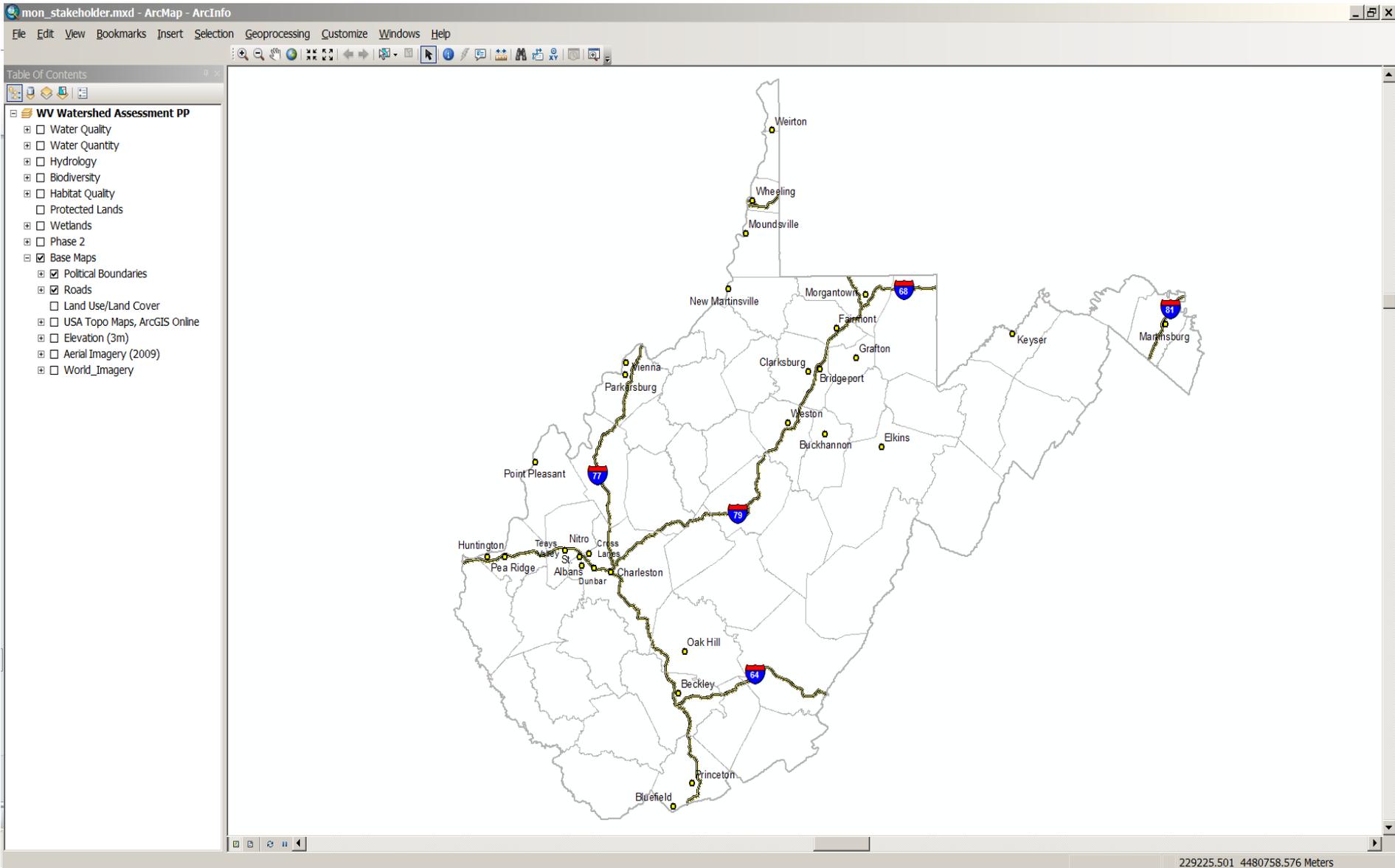
Principles/

Formats

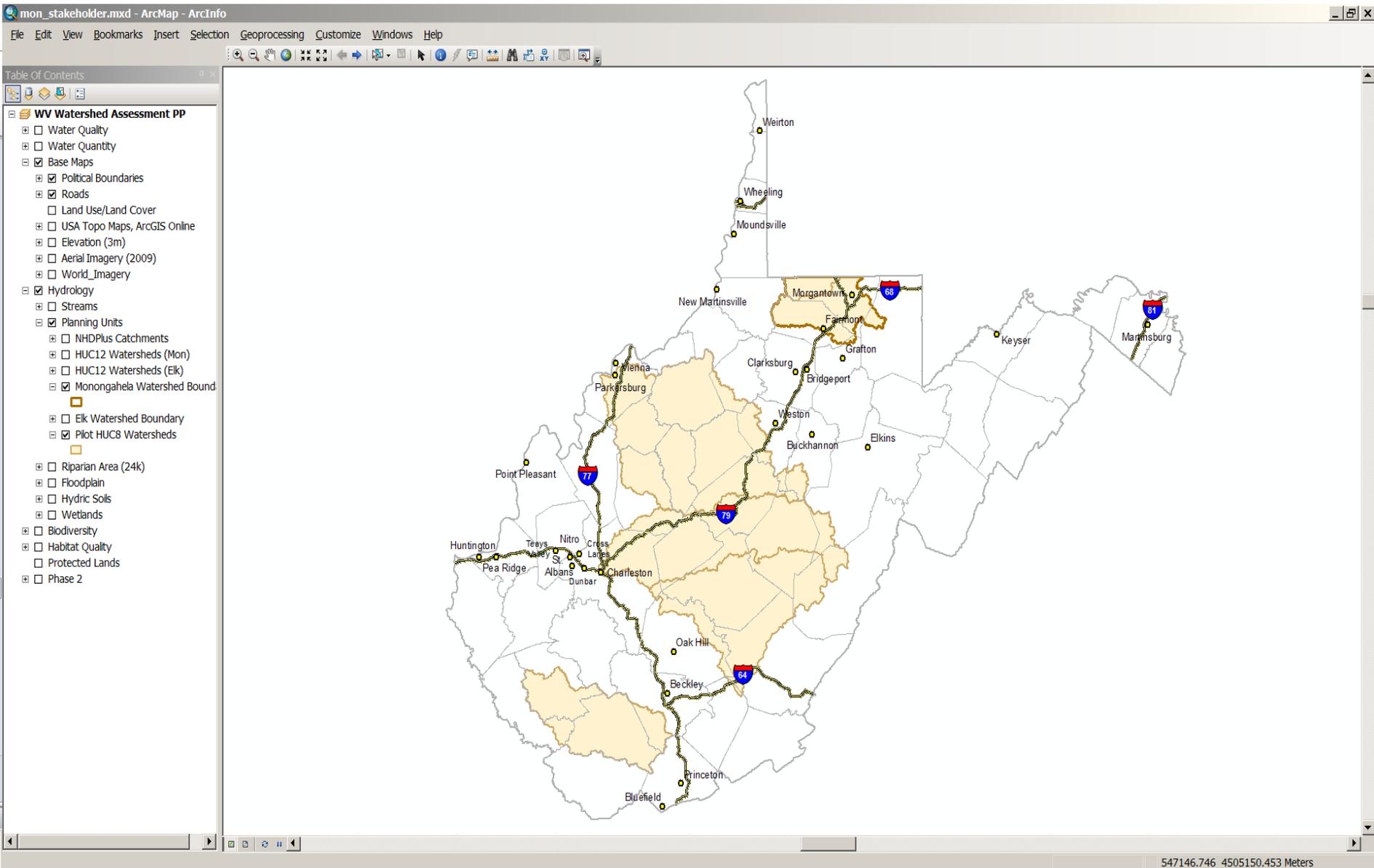
- ❑ Display proprietary or secure information such as public water supplies or endangered species locations
- ❑ Display all information and calculations in real time: datasets will be updated as they become available
- ❑ Pinpoint locations for protection or restoration, or specific actions to be taken: requires site visits and ground-truthing
- ❑ Display property boundaries and ownership

Questions to Consider

- What will be your primary uses of the tool?
- What functionality would help you to get the most from the tool? (e.g. ability to search, view data, get attribute information, etc.)
- What would be the most important feature of the tool for you? The least important?
- How would you like the displays to look?

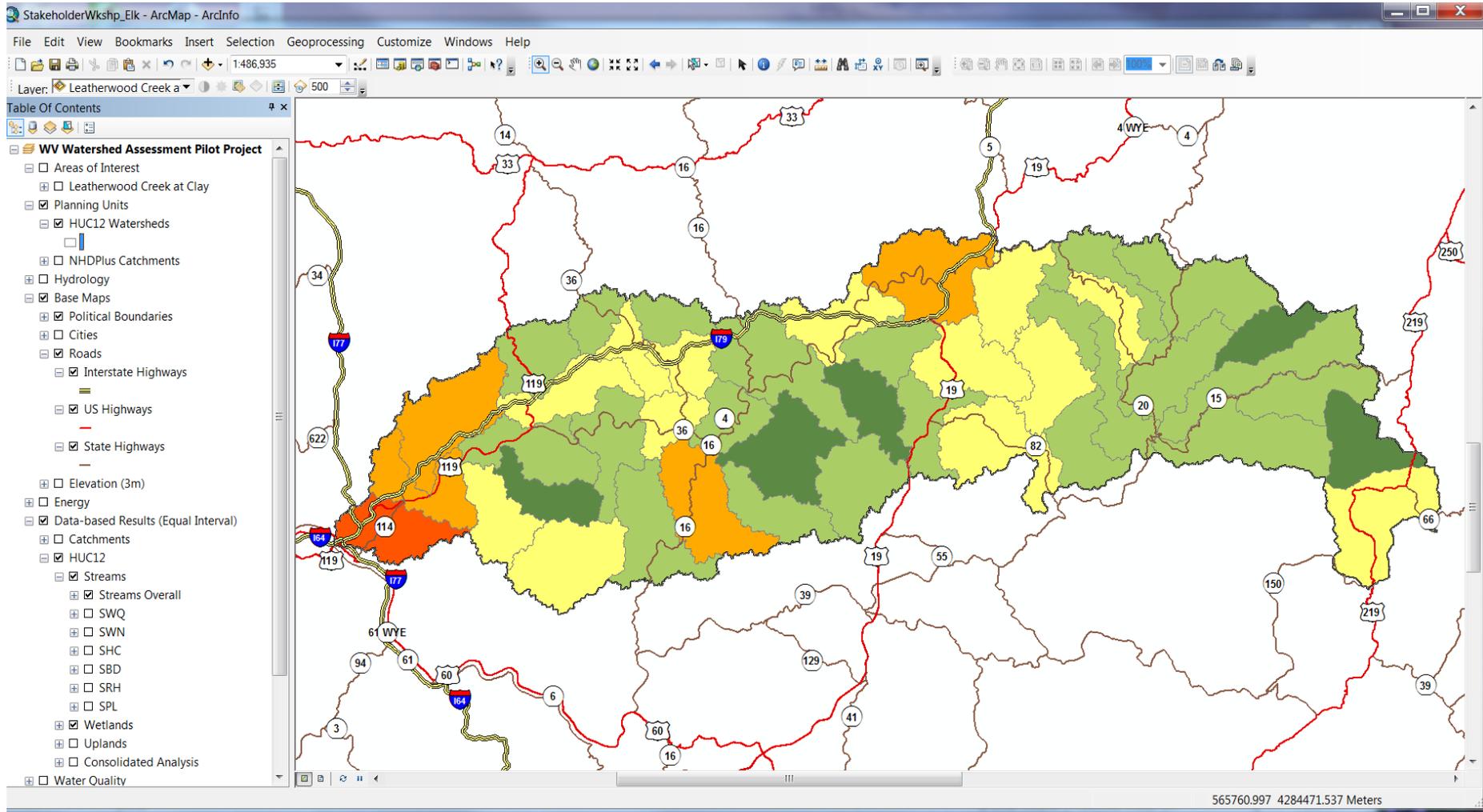


Example of default base map, with layer groups

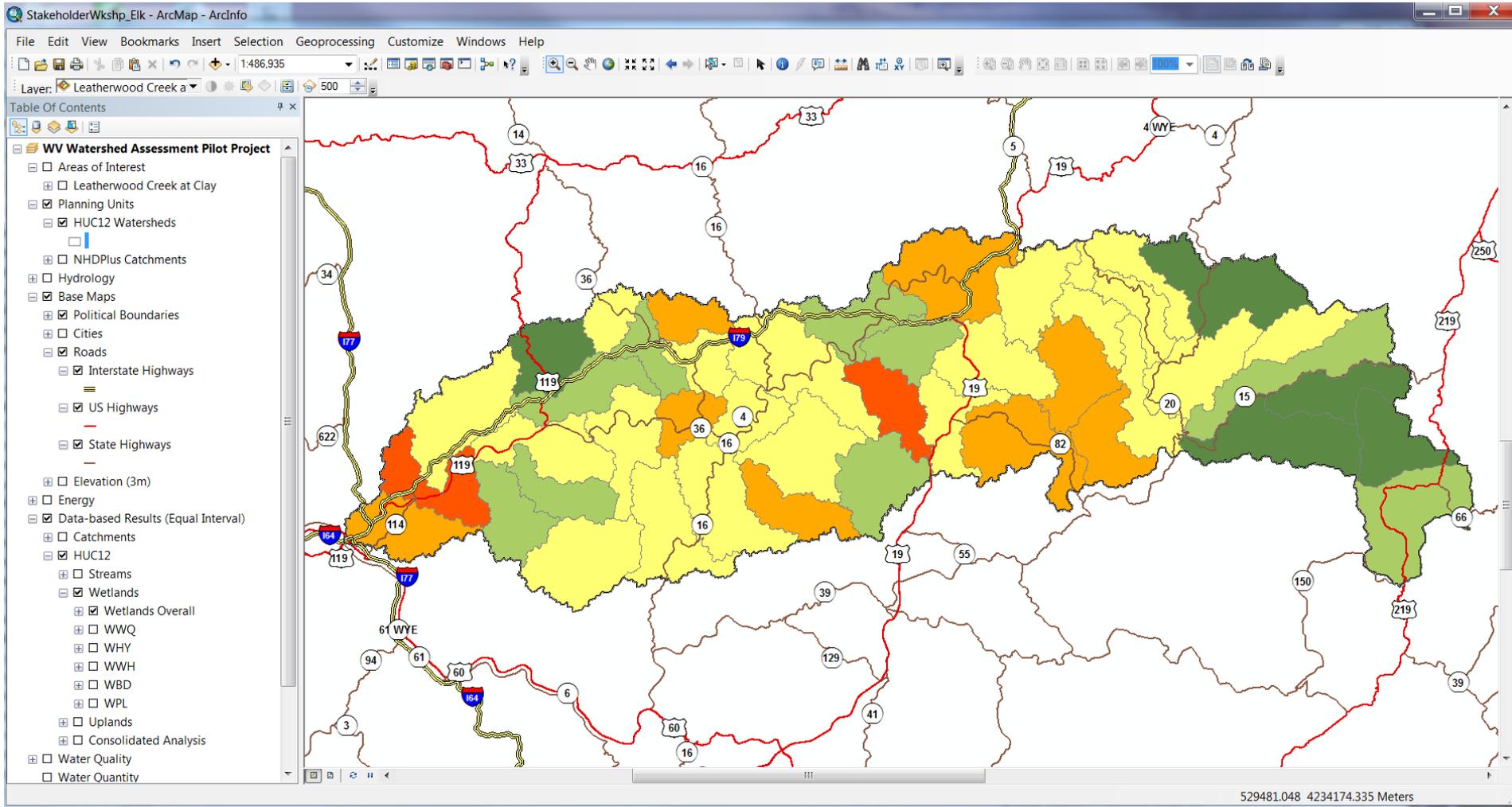


WV Watershed Assessment Pilot Project Initial HUC8s

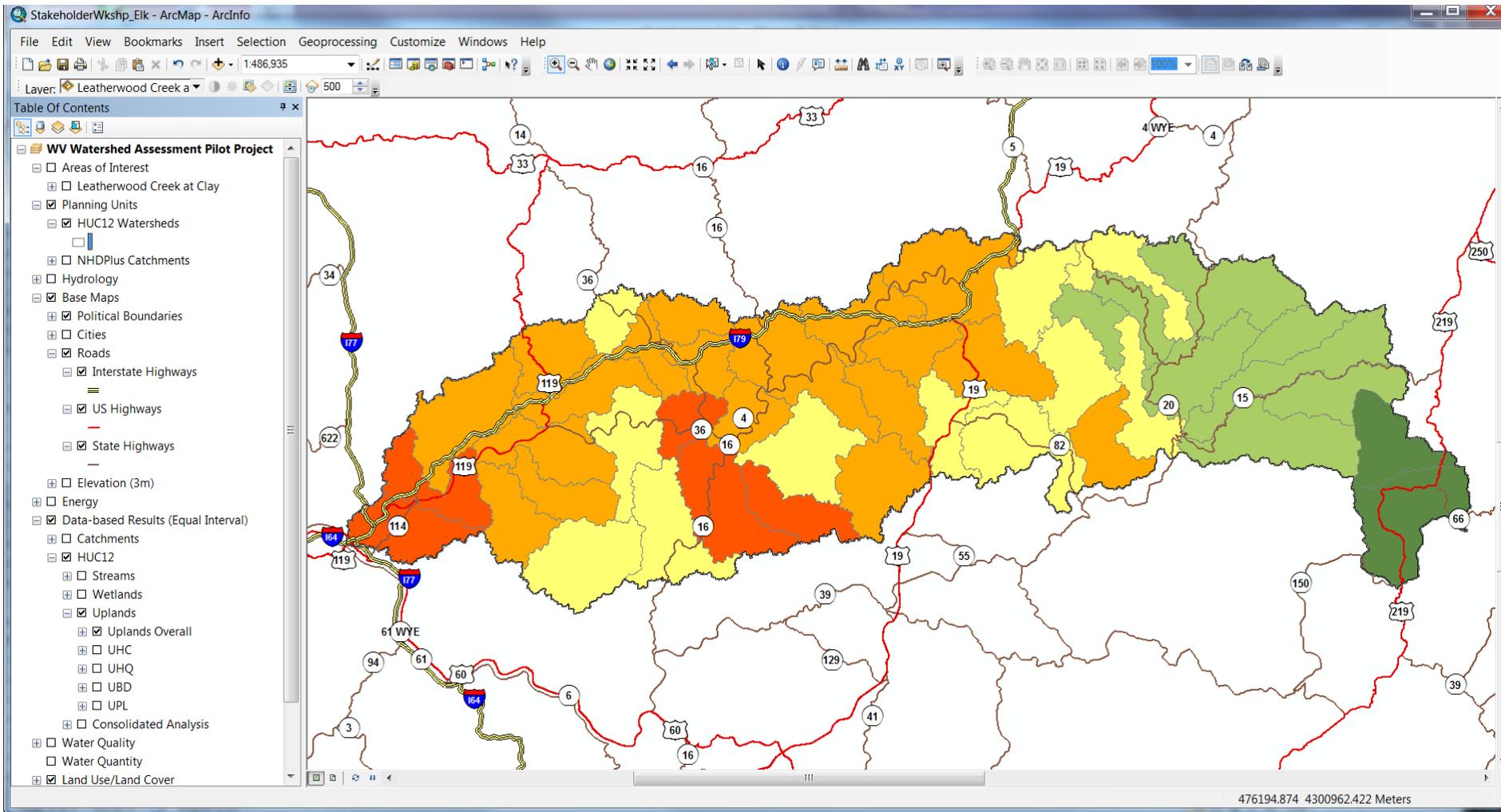
Elk Watershed – HUC12 Level Streams Overall Results, Relative Scale



Elk Watershed – HUC12 Level Wetlands Overall Results, Relative Scale



Elk Watershed – HUC12 Level Uplands Overall Results, Relative Scale



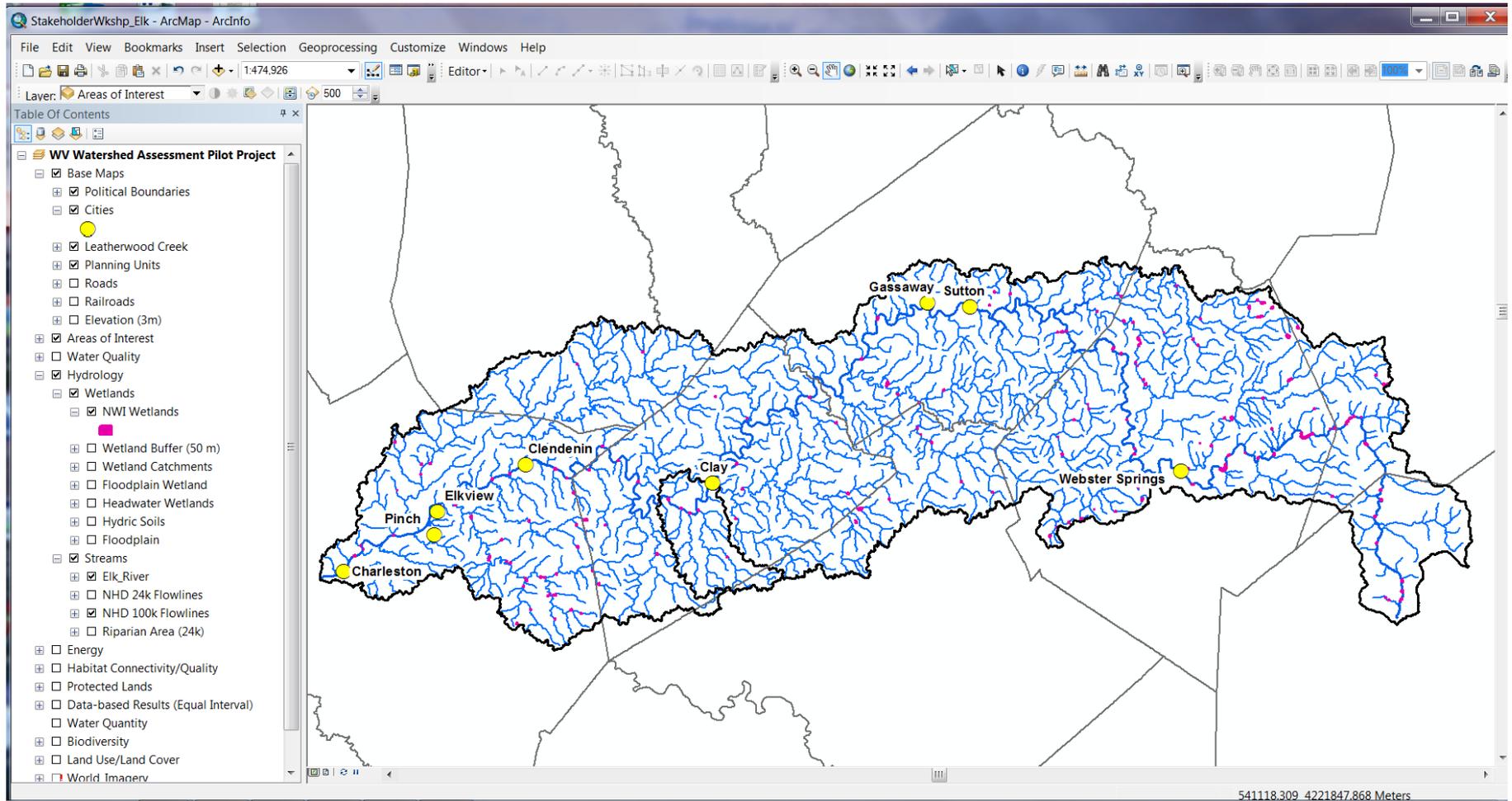
Base layers

Different ways to look at an area:

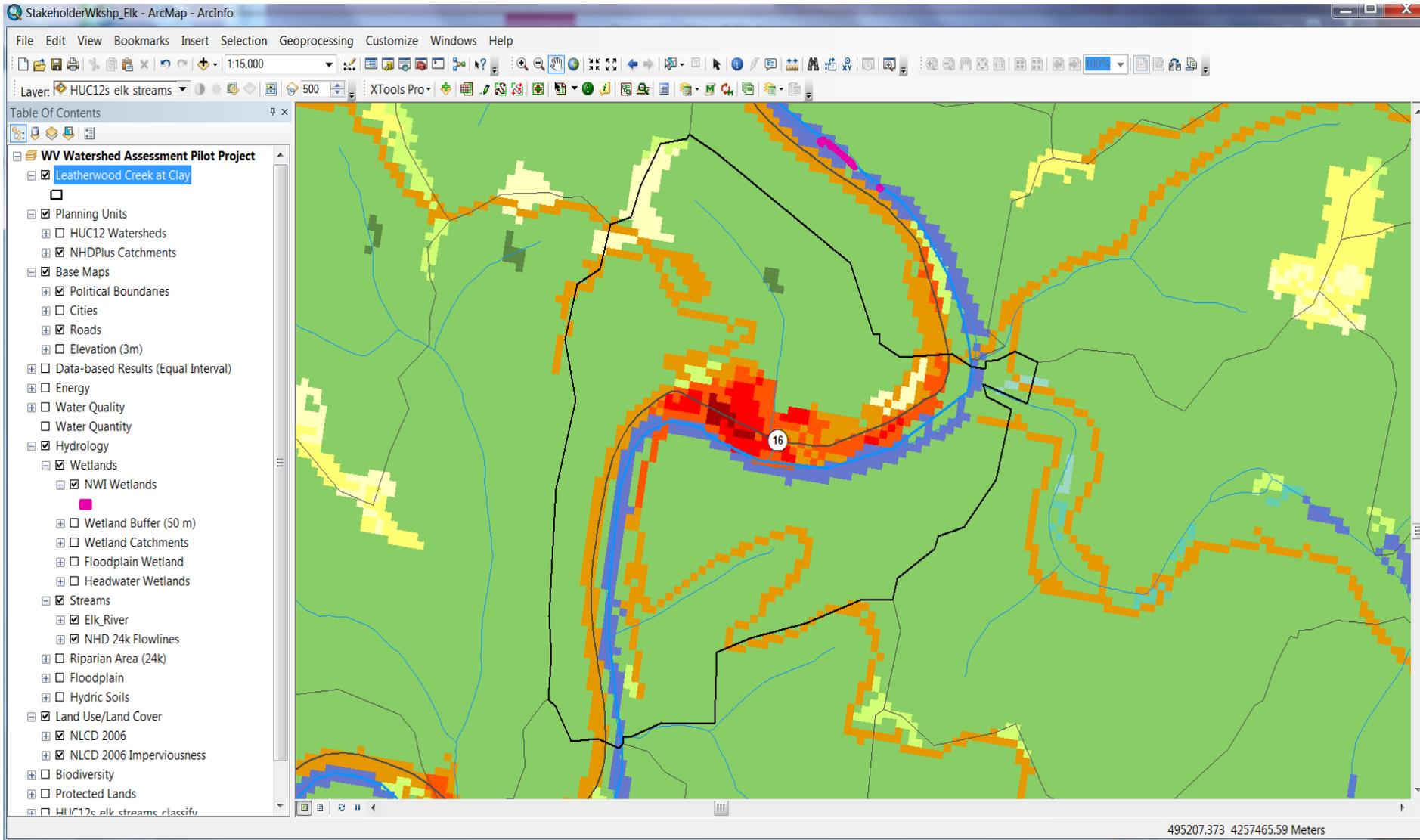
1. Political boundaries/Hydrography
2. Land use/land cover
3. Topographic maps
4. Aerial imagery

Elk Watershed- HUC12 Level

County/City Data; NHD Flowlines, Wetlands, Watershed Boundaries

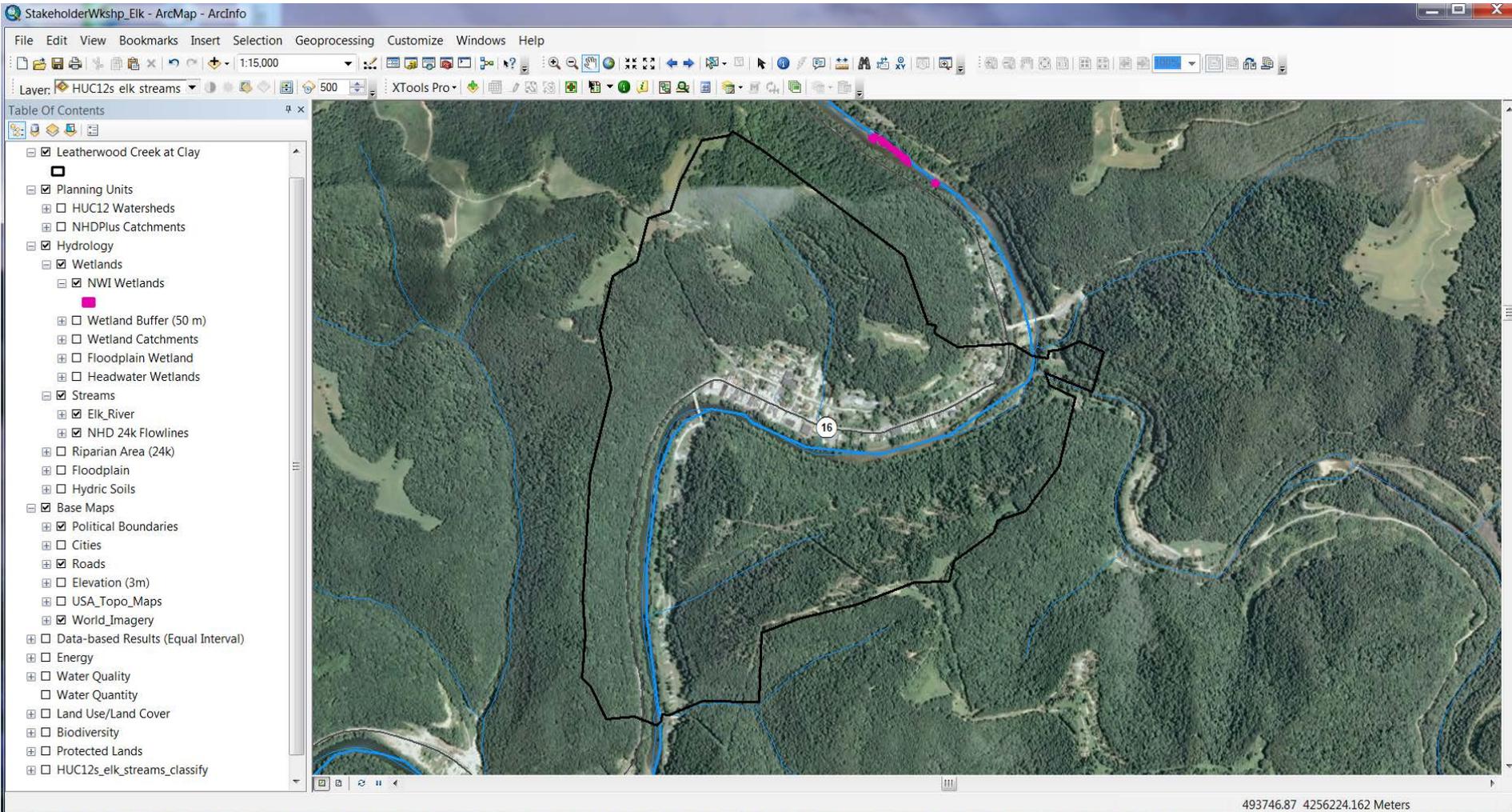


Leatherwood Creek – Catchment Level NLCD 2006 Land Use/Land Cover, Roads



495207.373 4257465.59 Meters

Leatherwood Creek – Catchment Level Aerial Imagery, Hydrography, Roads

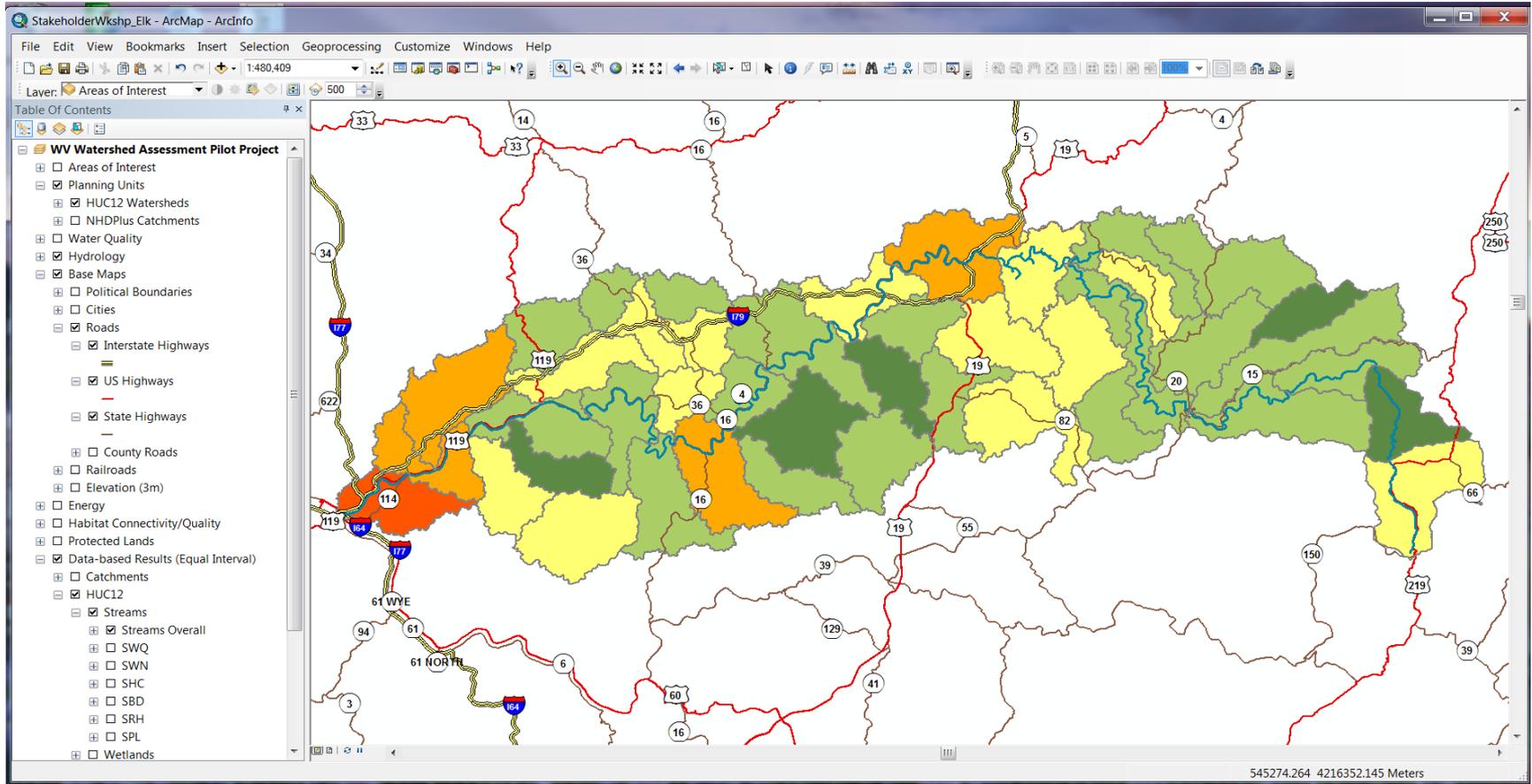


Potential Use Scenarios

Possible goals and decision-making processes, and the layers that can be used:

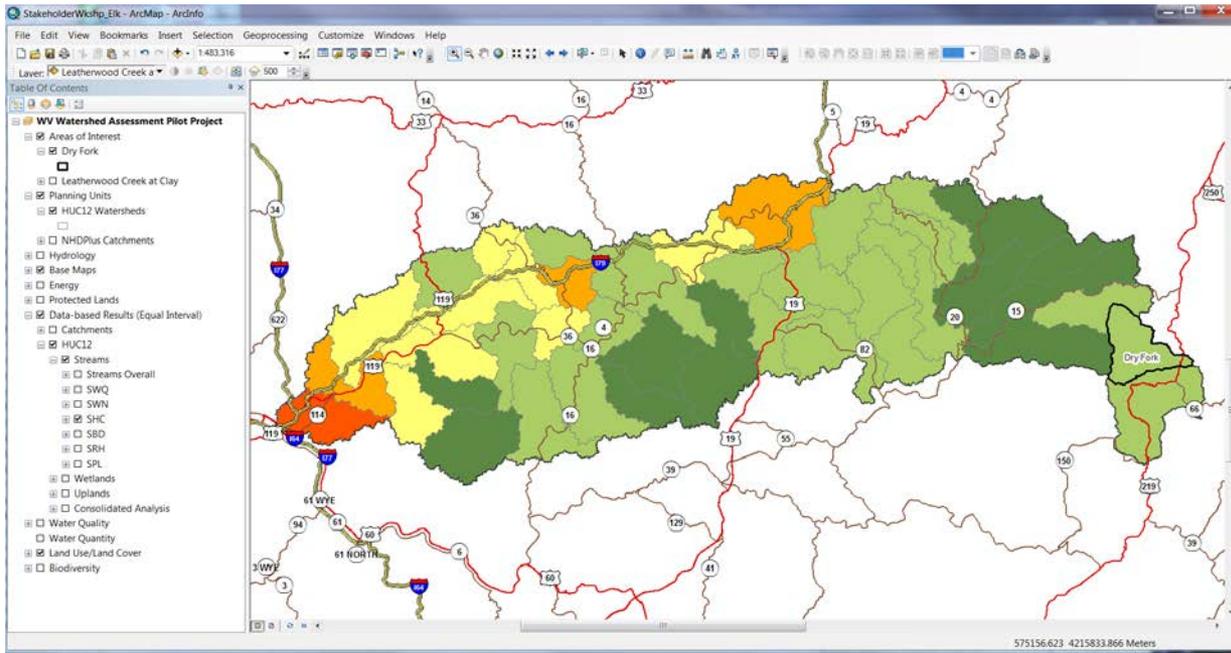
1. Streams/Riparian Protection
2. Wetlands Restoration
3. Uplands Protection

Streams/Riparian Protection

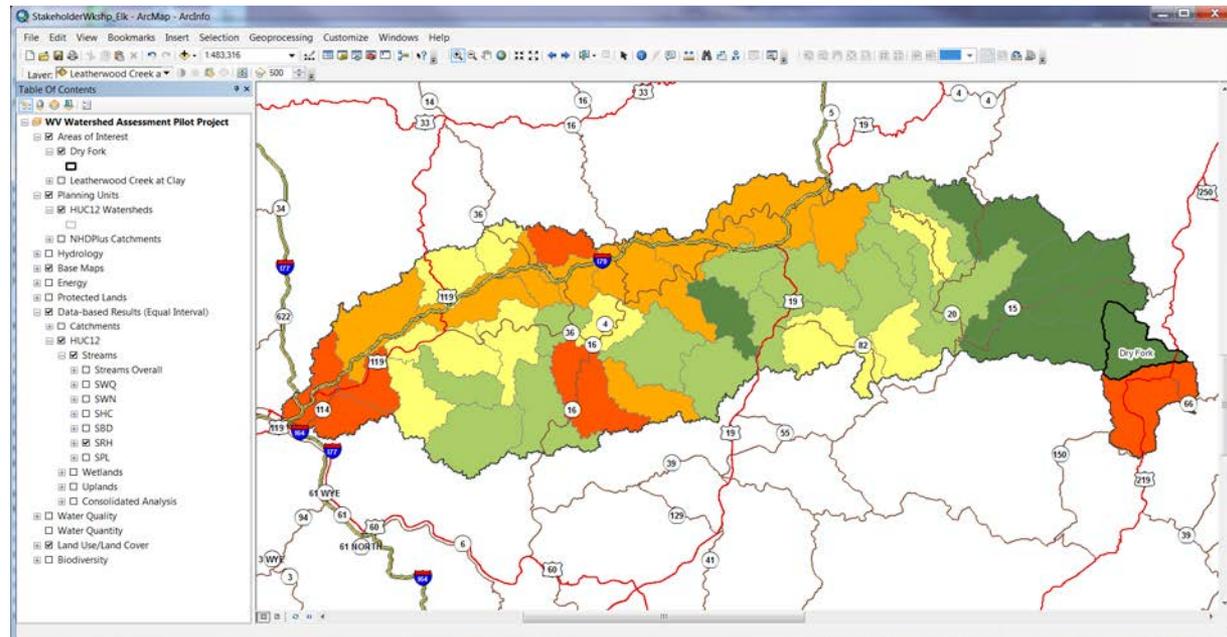


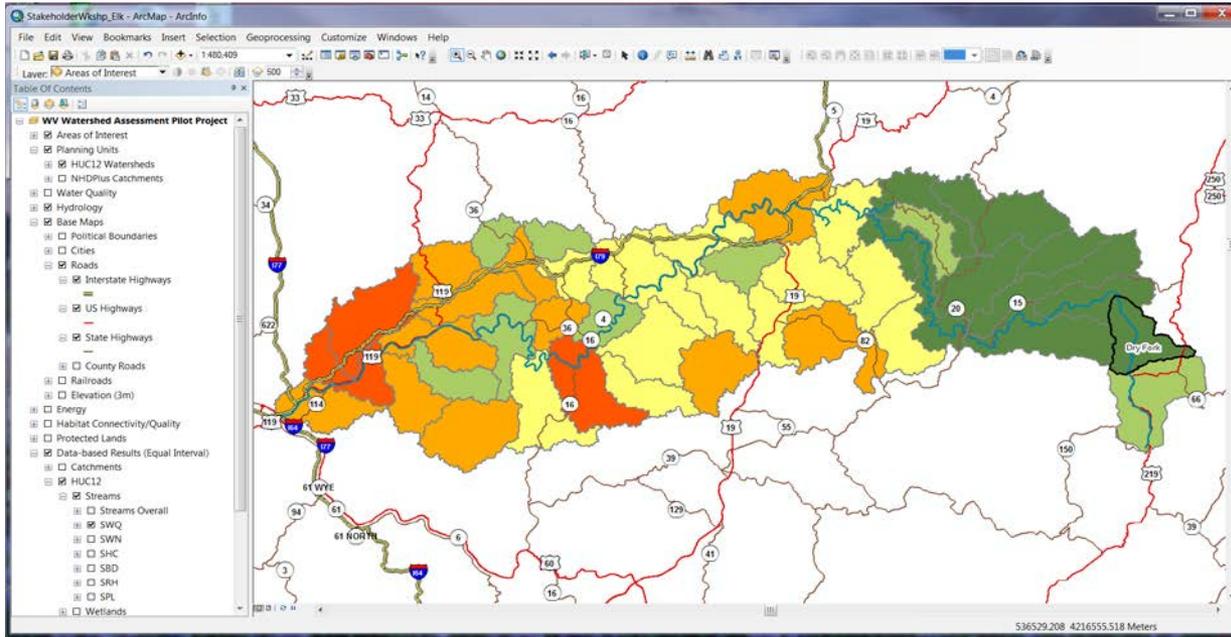
Elk Watershed – HUC12 Level
Streams Overall Results, Relative Scale

Dry Fork Hydrologic Connectivity



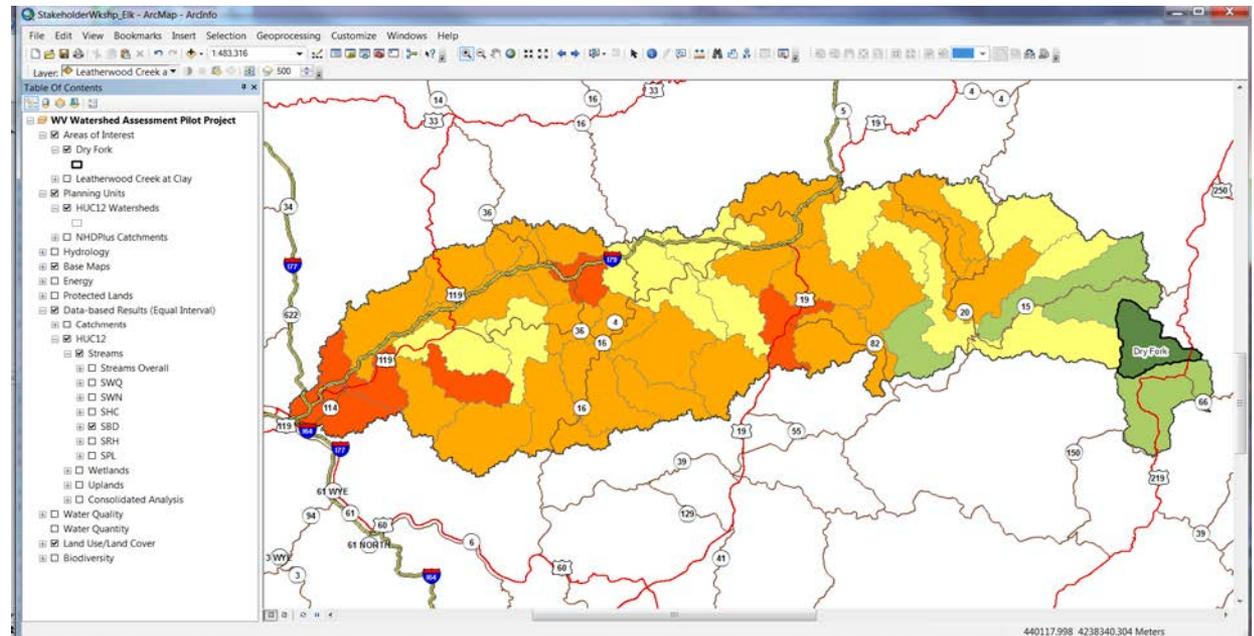
Dry Fork Riparian Habitat

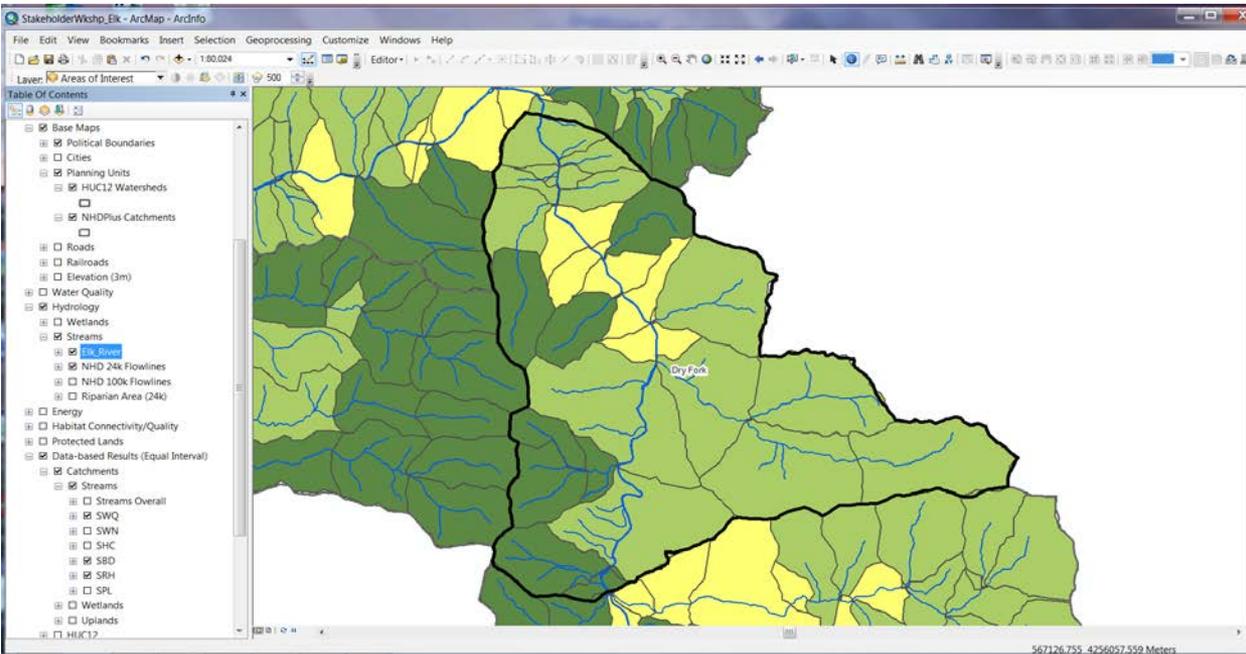




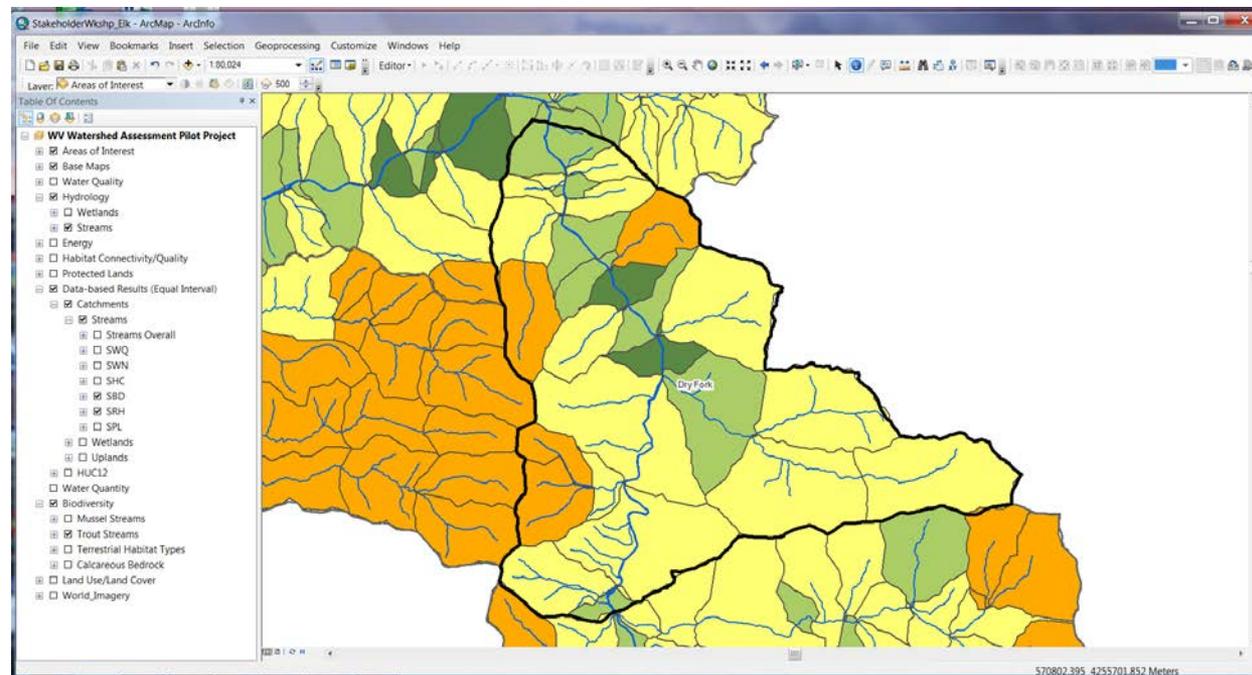
Dry Fork Streams Water Quality

Dry Fork Streams Biodiversity

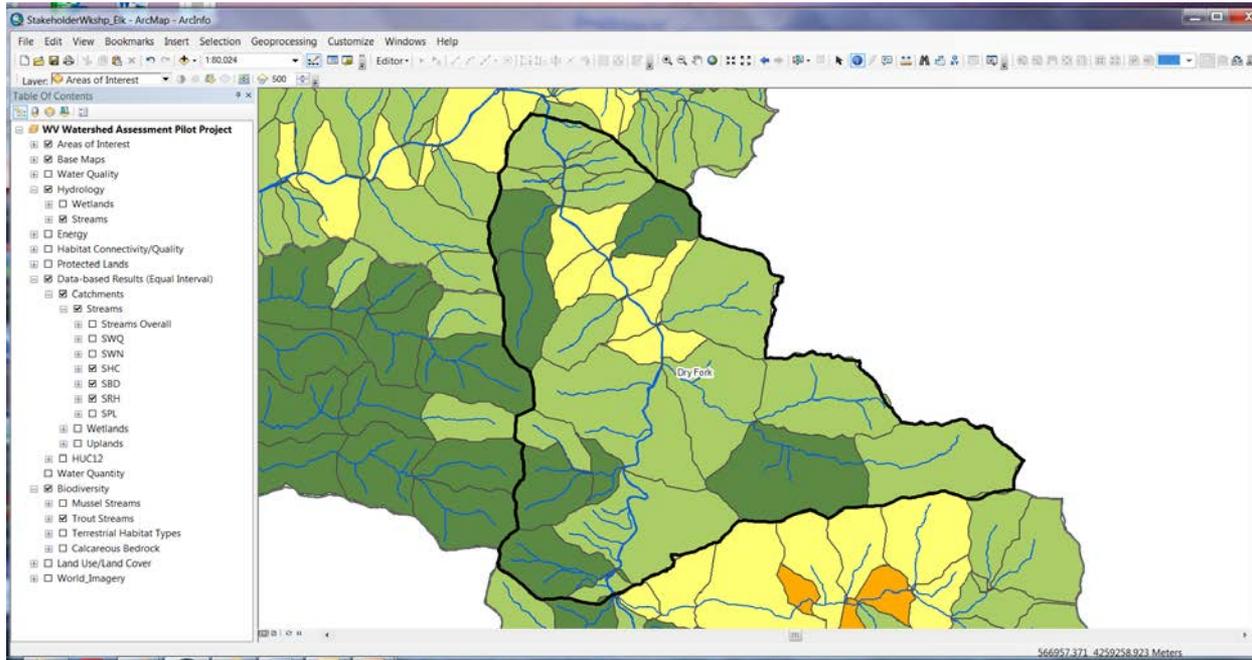




Dry Fork Catchments Streams Water Quality

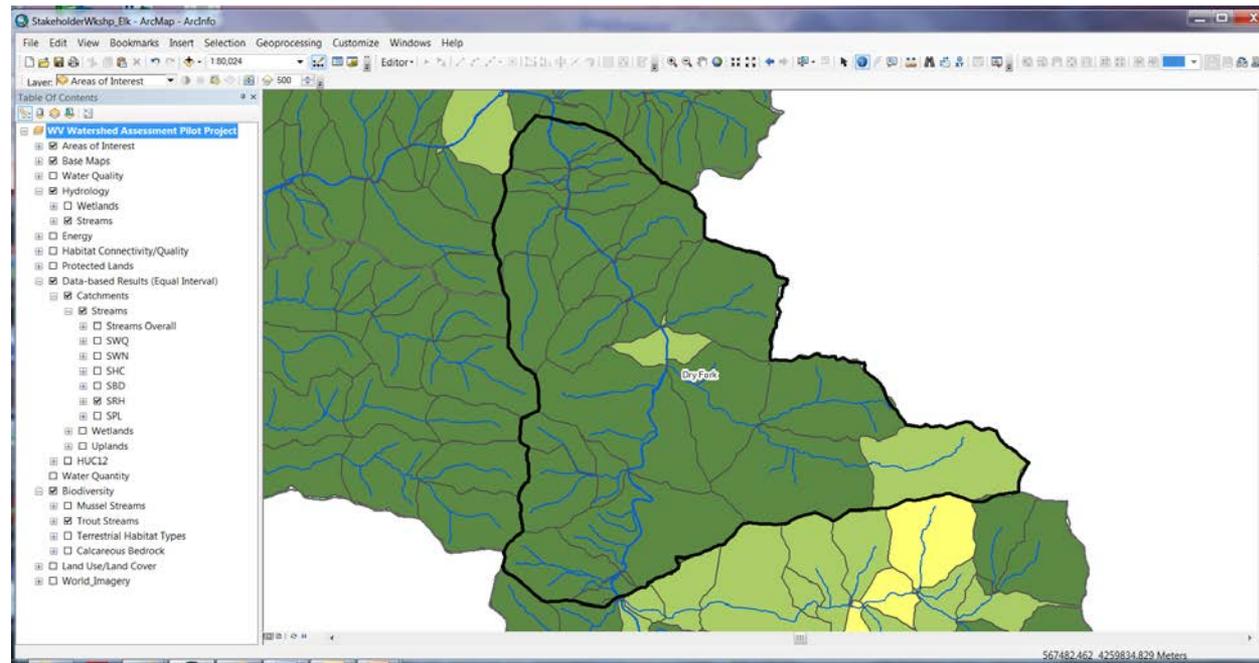


Dry Fork Catchments Streams Biodiversity

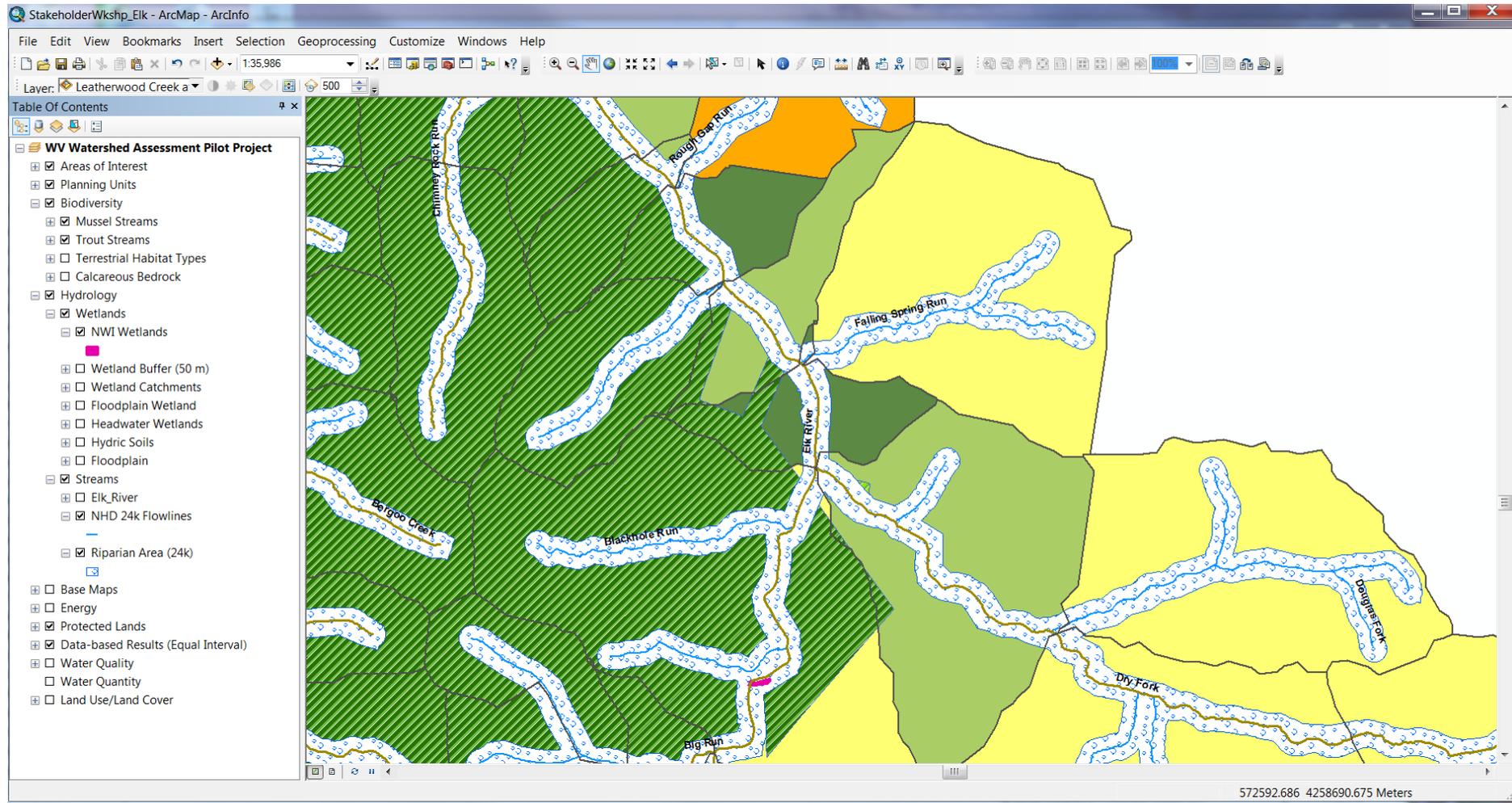


Dry Fork Catchments Hydrologic Connectivity

Dry Fork Catchments Riparian Habitat

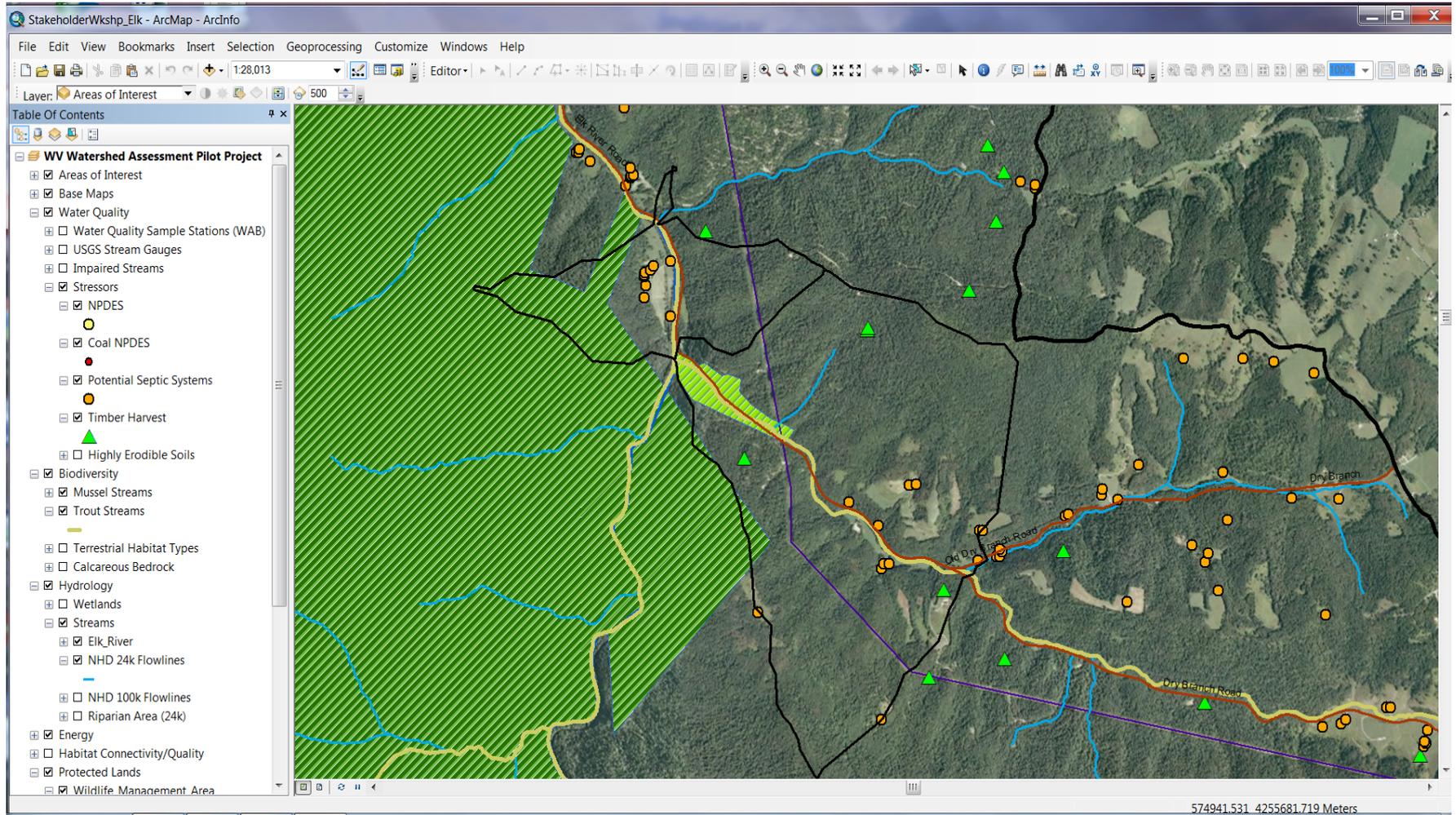


Dry Fork Catchment Level: Biodiversity Results, Riparian Area, Trout Streams, Protected Lands

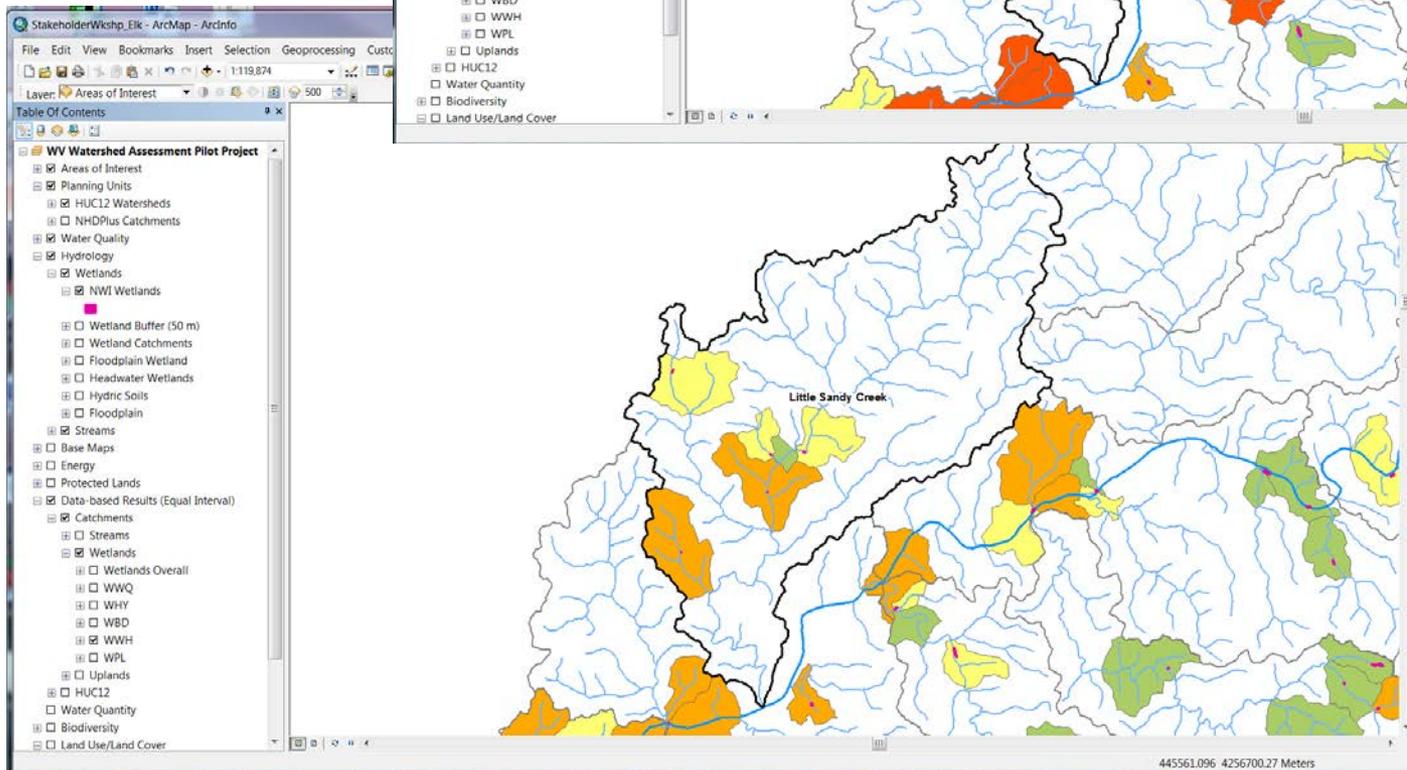
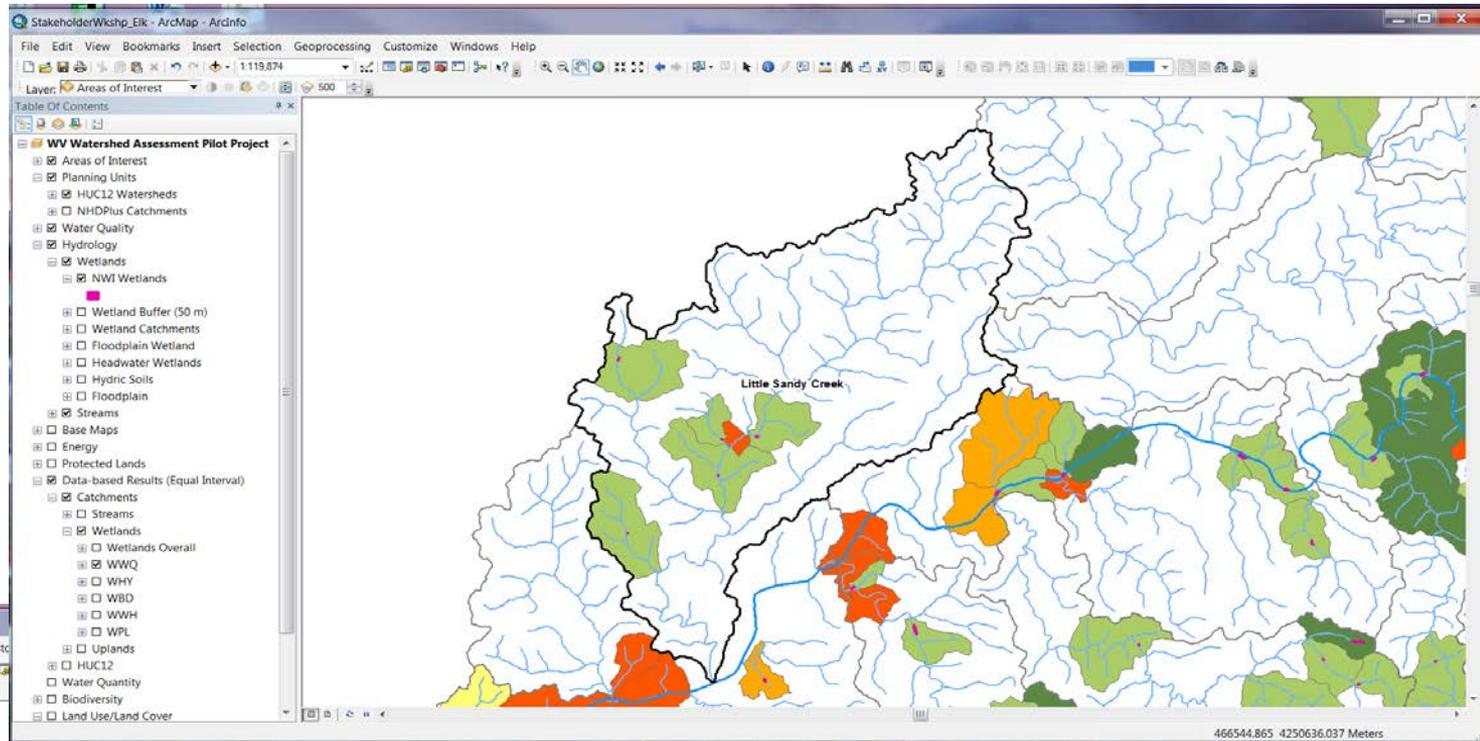


Dry Fork Catchment Level: Water Quality Stressors

Roads, Timber Harvest, Structures with Potential Septic Systems

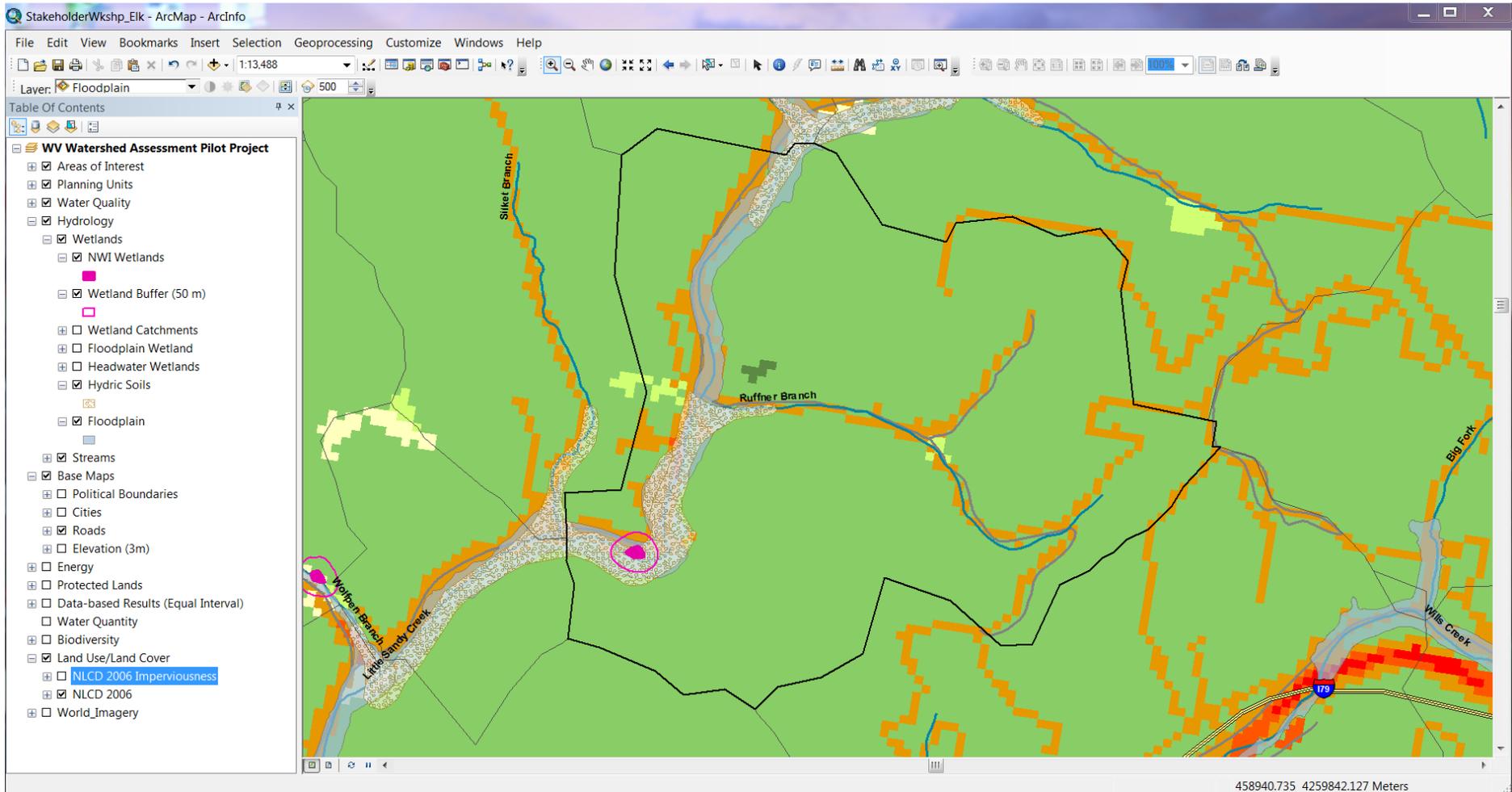


Wetlands Catchment Level Water Quality

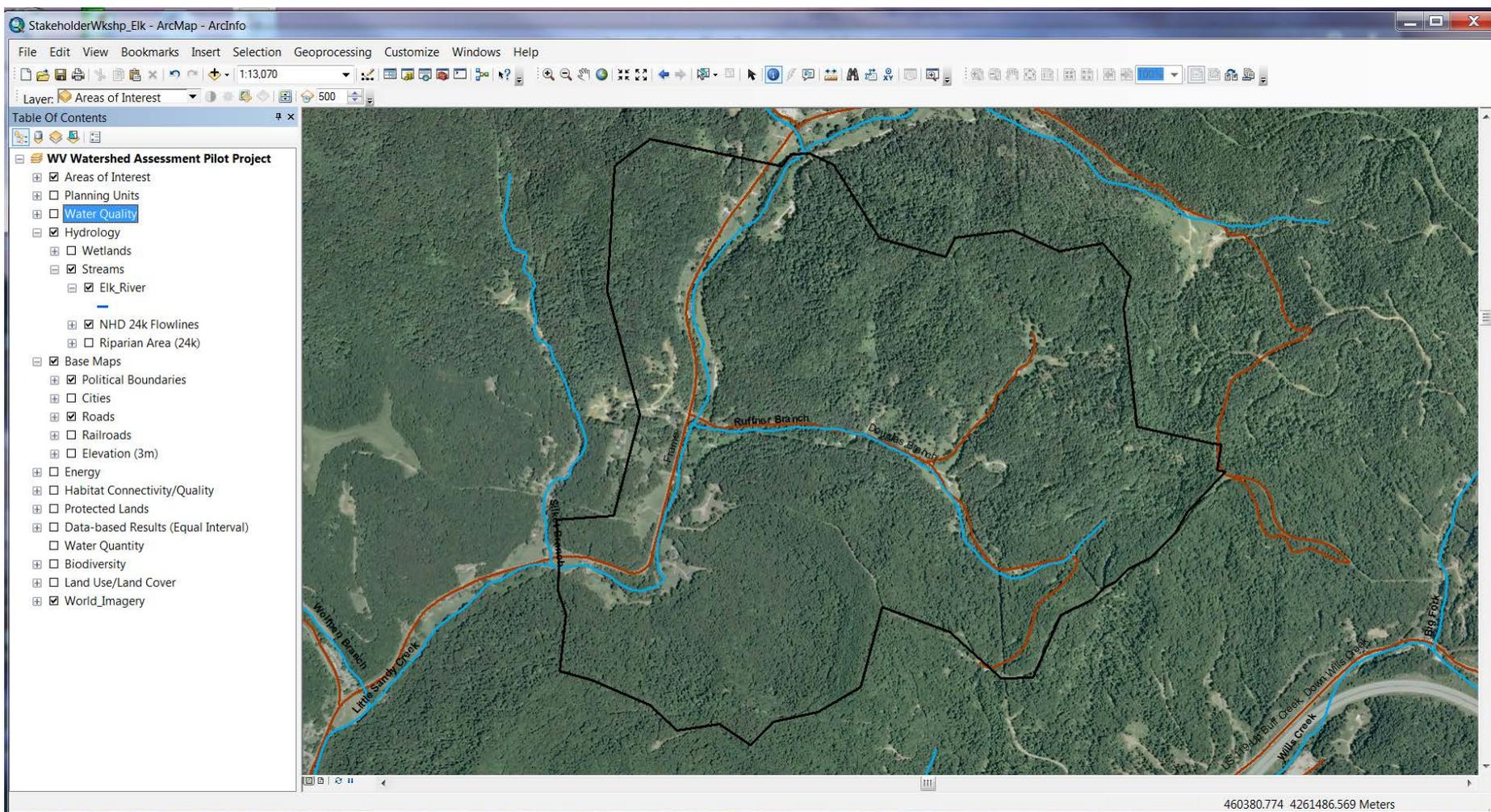


Wetland Habitat Catchment Level

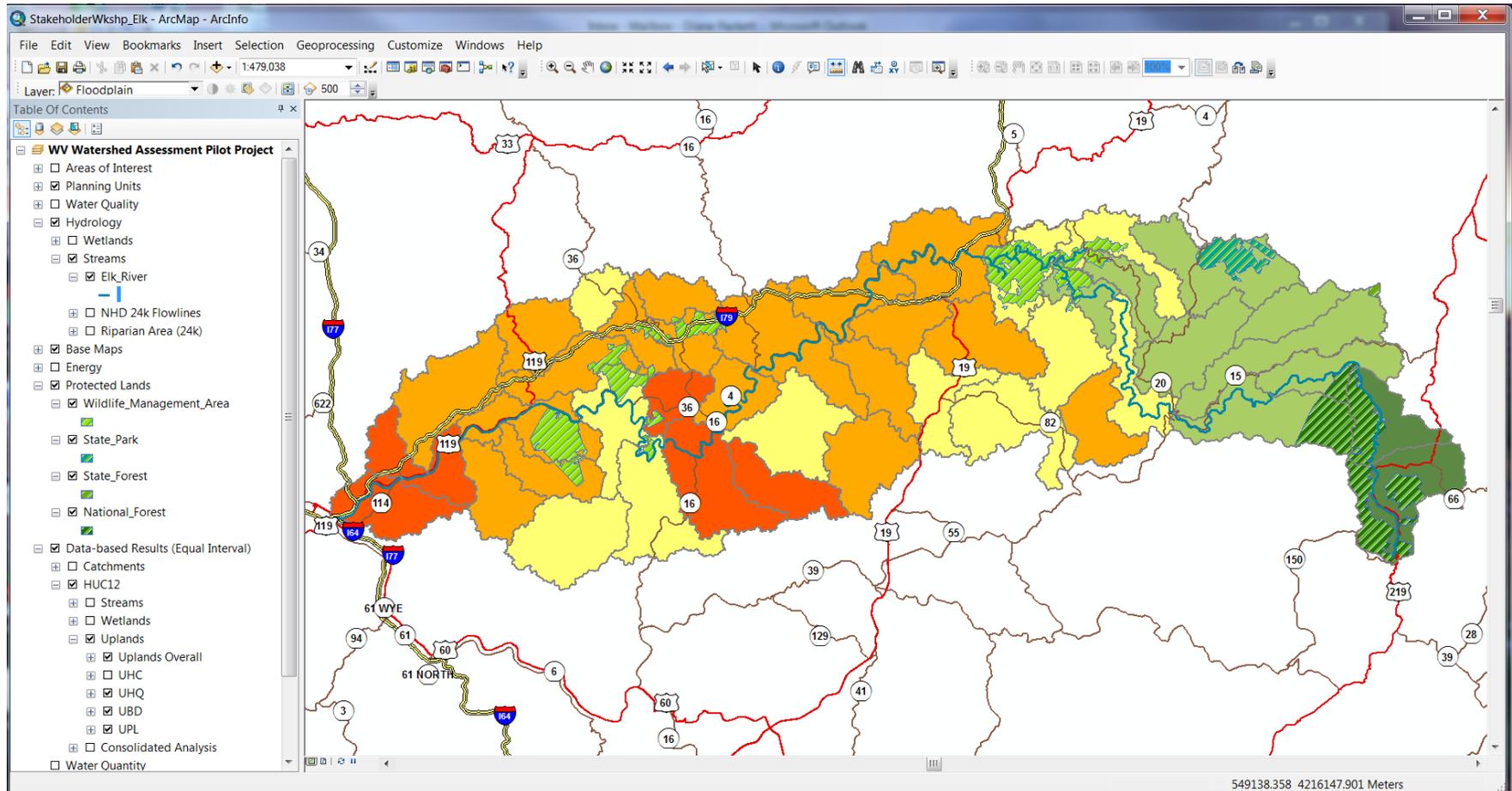
Wetlands Catchment Level – Roads, Land Use, Floodplain, Hydric soils



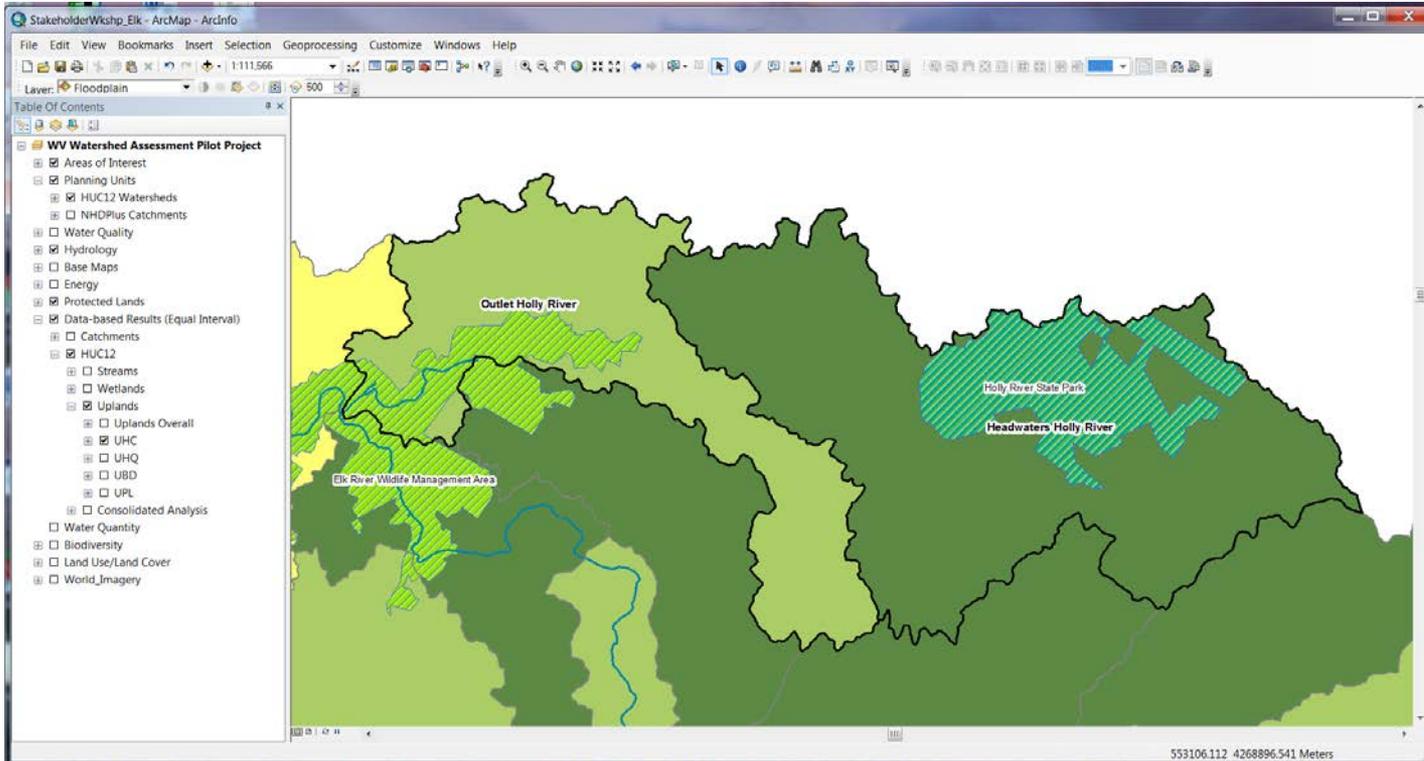
Wetlands Catchment Level – Aerial Imagery



Uplands Protection

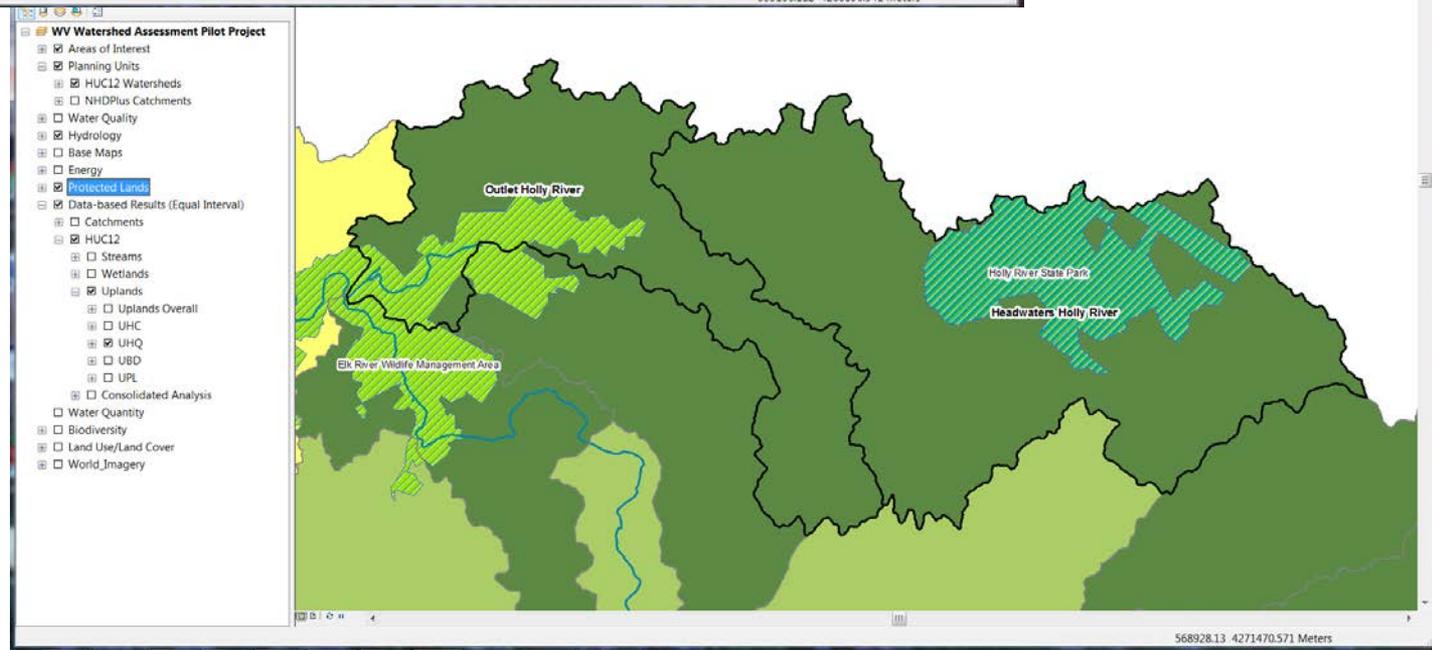


Elk Watershed – HUC12 Level
Uplands Overall Results, with Protected Lands

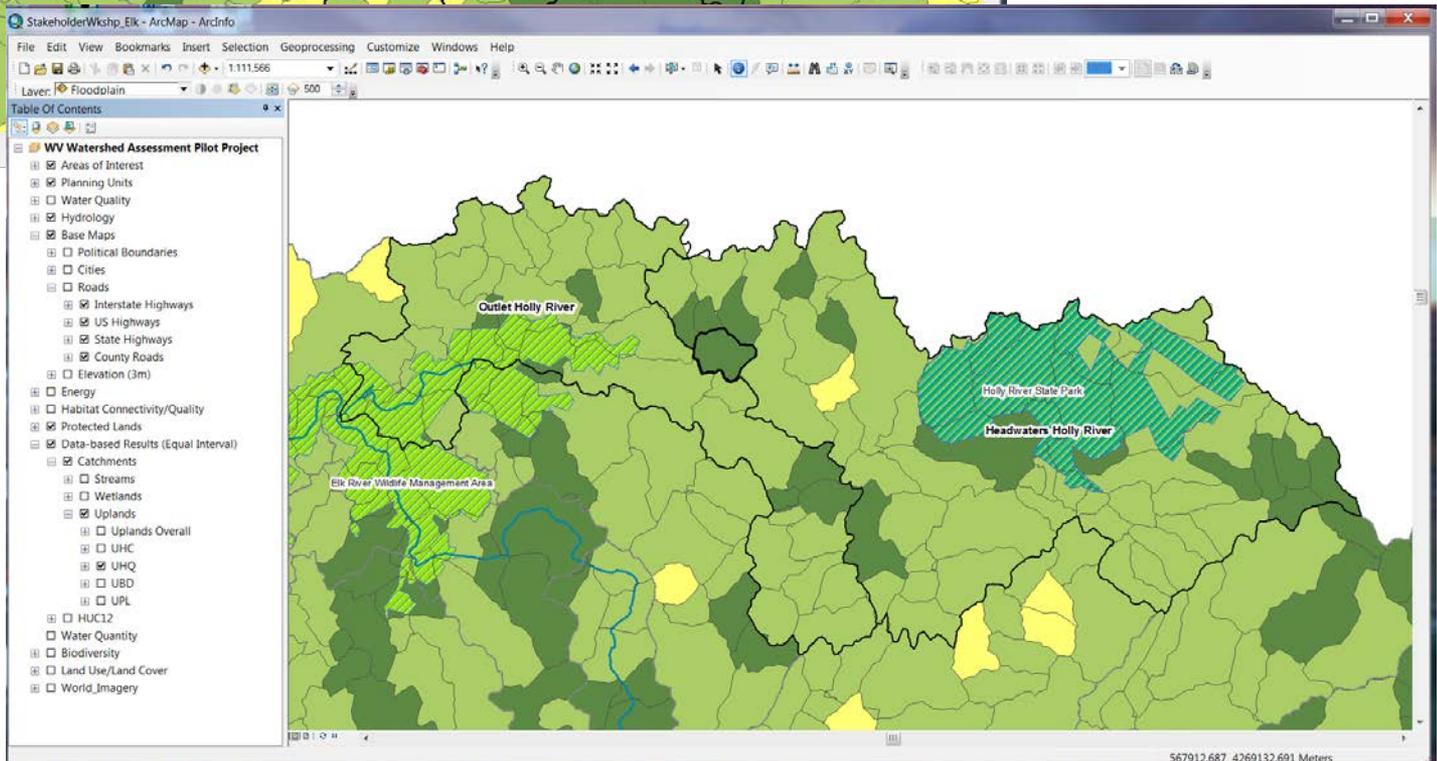
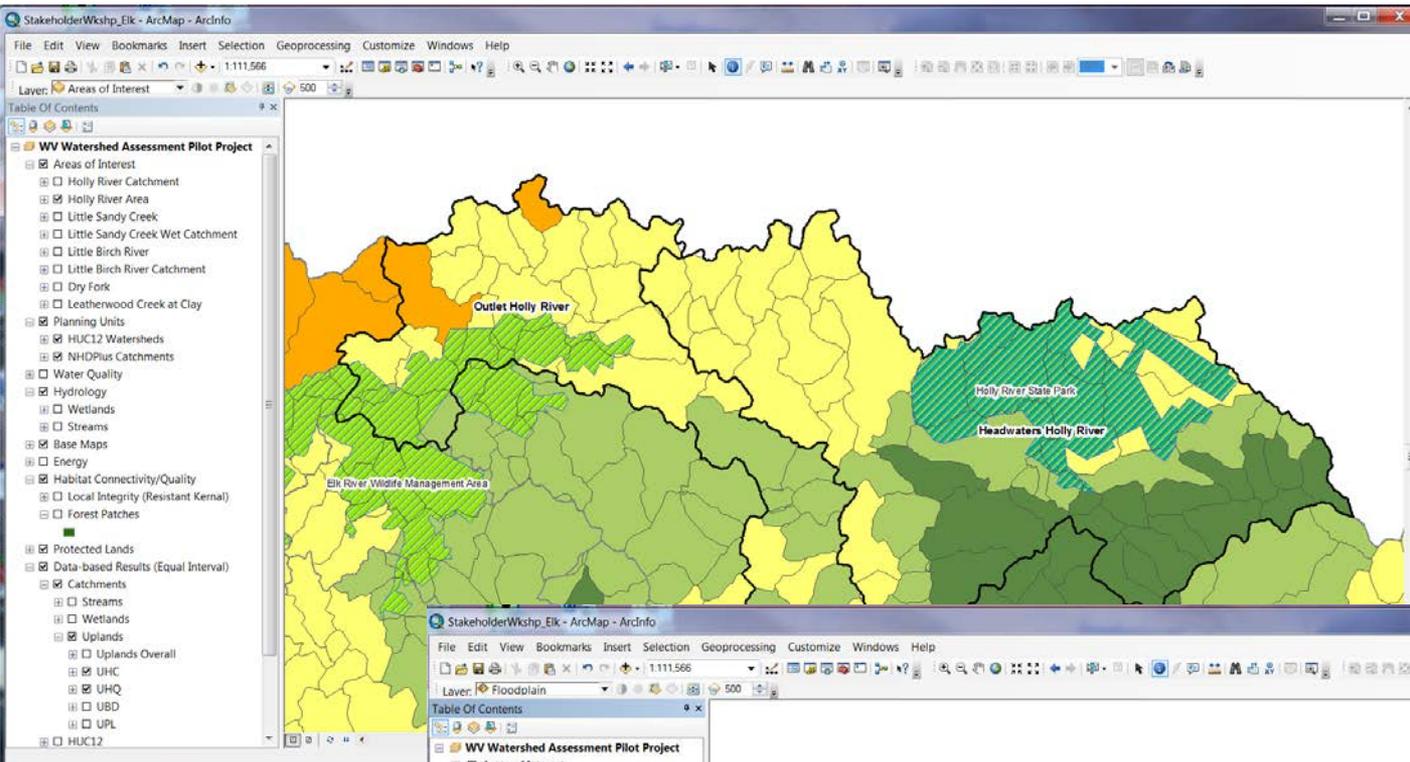


Uplands Habitat Connectivity

Uplands Habitat Quality

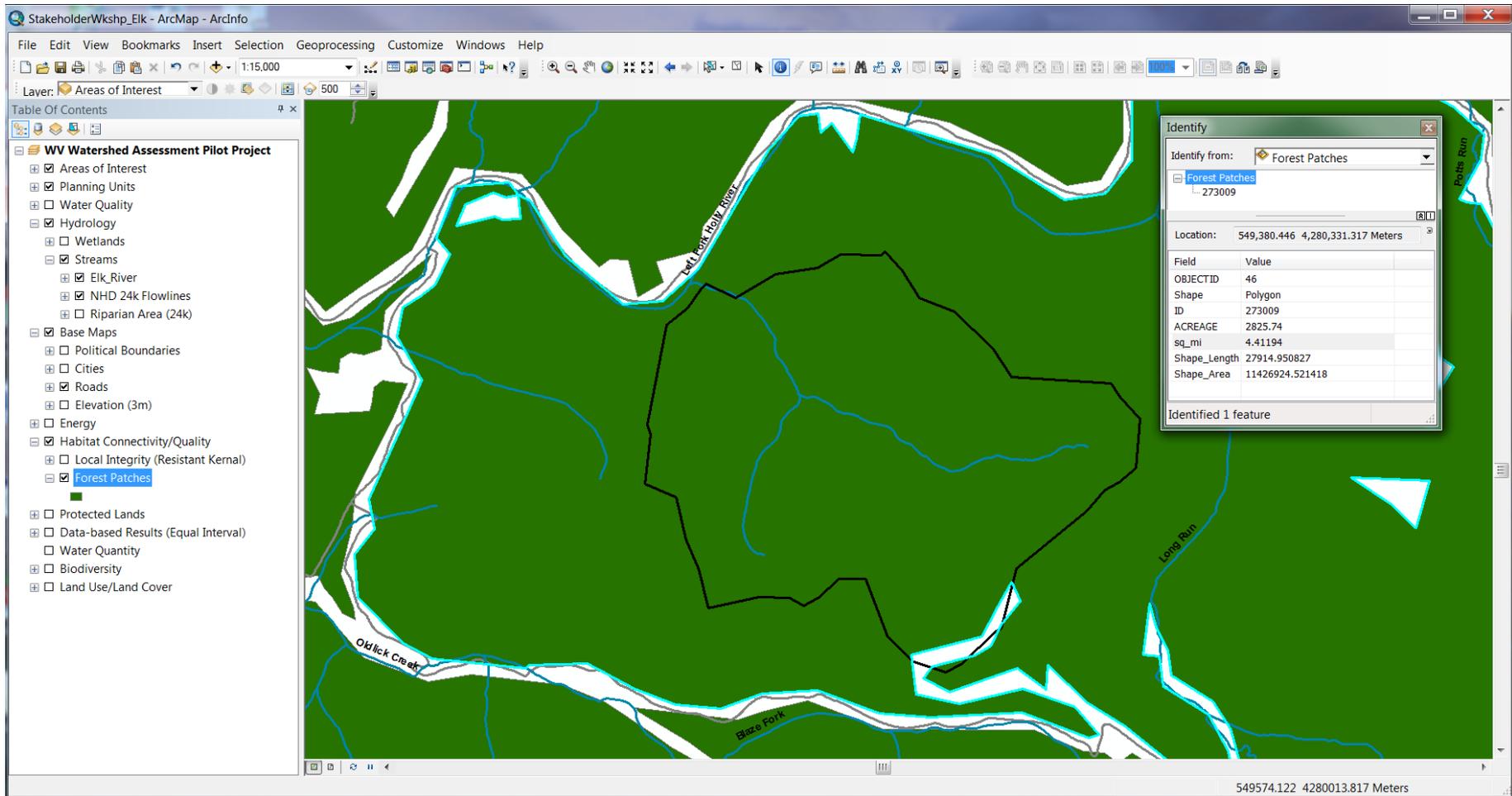


Uplands Habitat Connectivity, Catchment Level

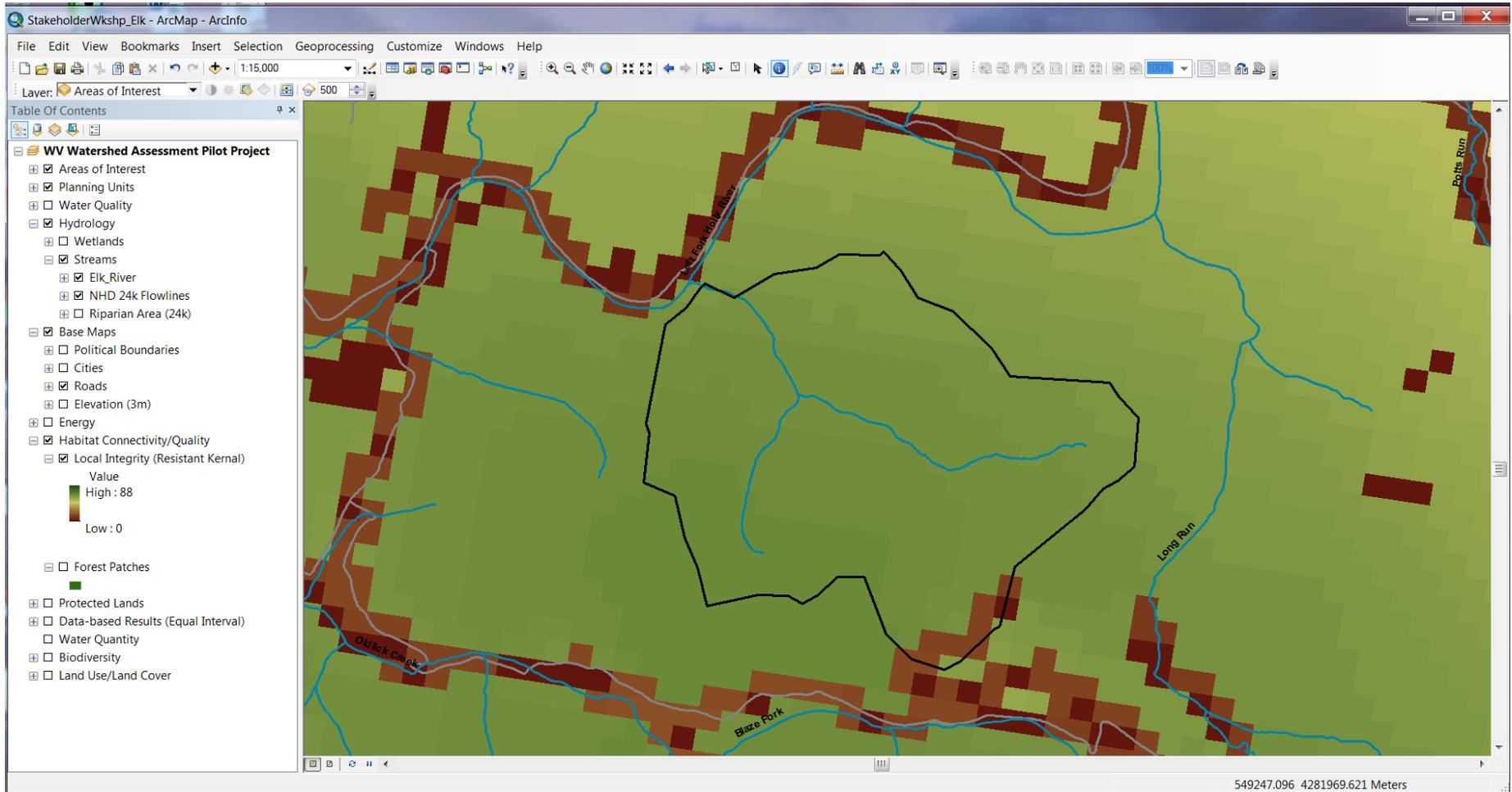


Uplands Habitat Quality, Catchment Level

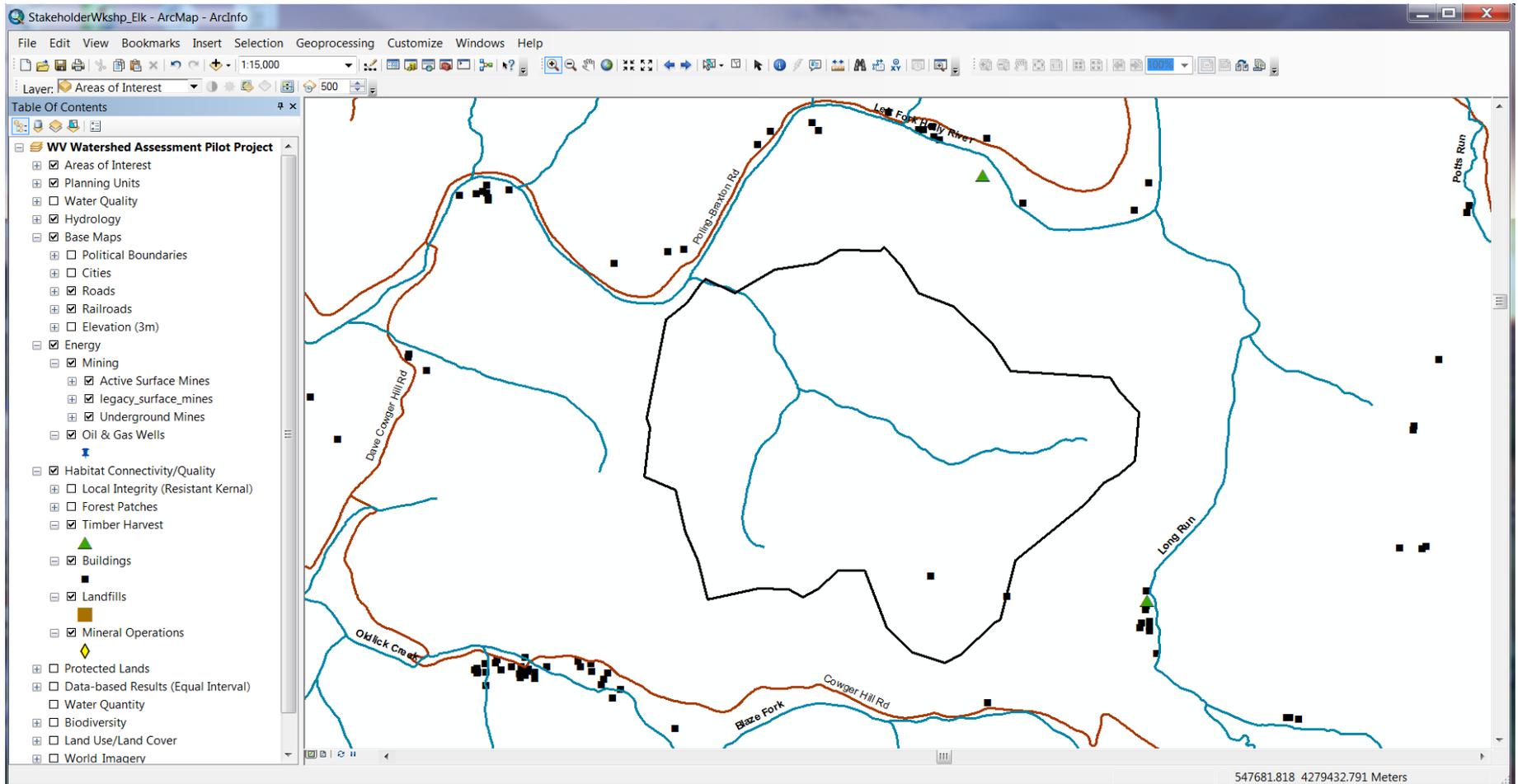
Uplands Habitat Connectivity Metrics dataset (Forest Patches, with attribute information including area)



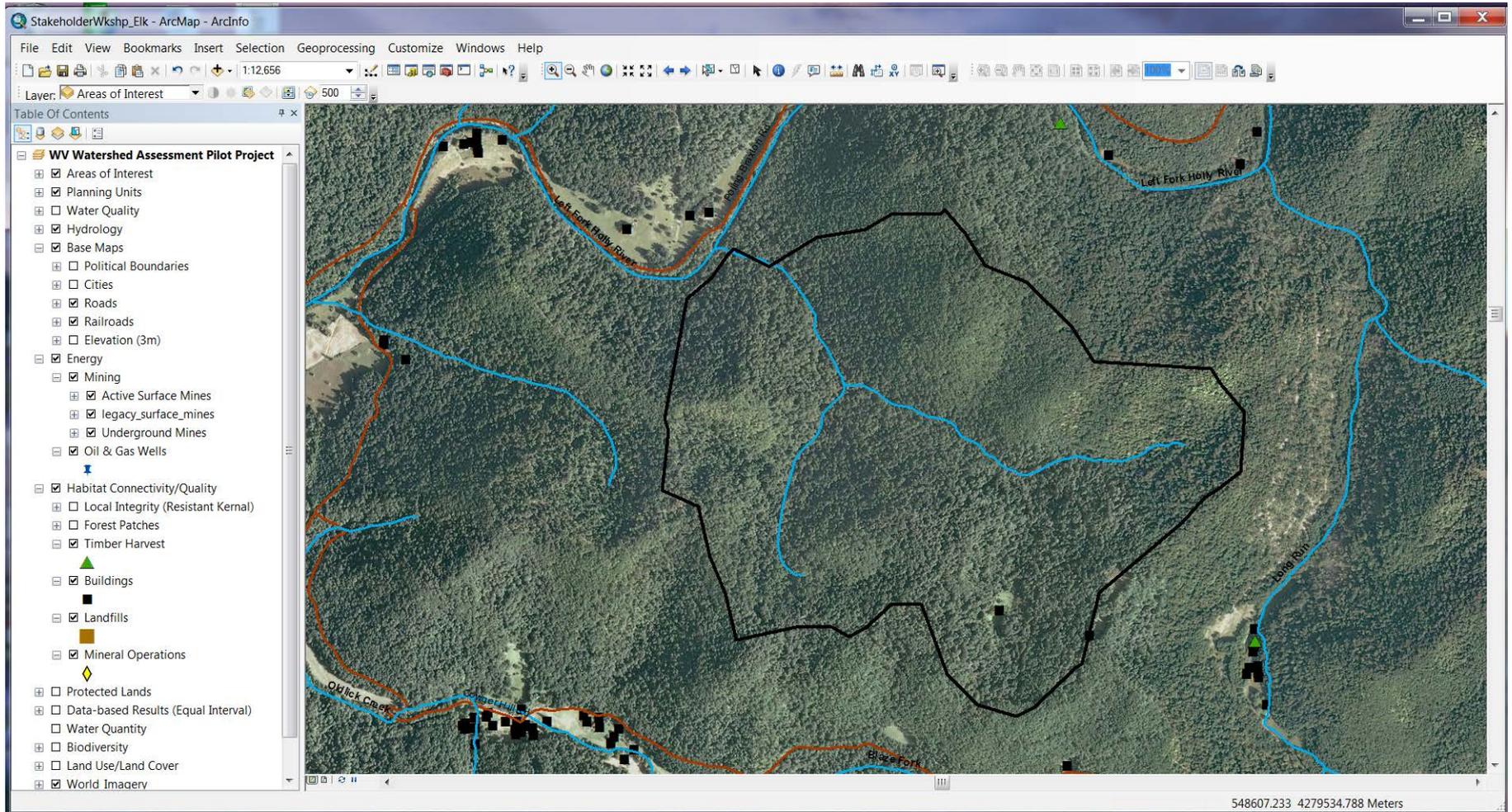
Uplands Habitat Connectivity Metrics Dataset (Local Integrity: Intactness of Landscape)

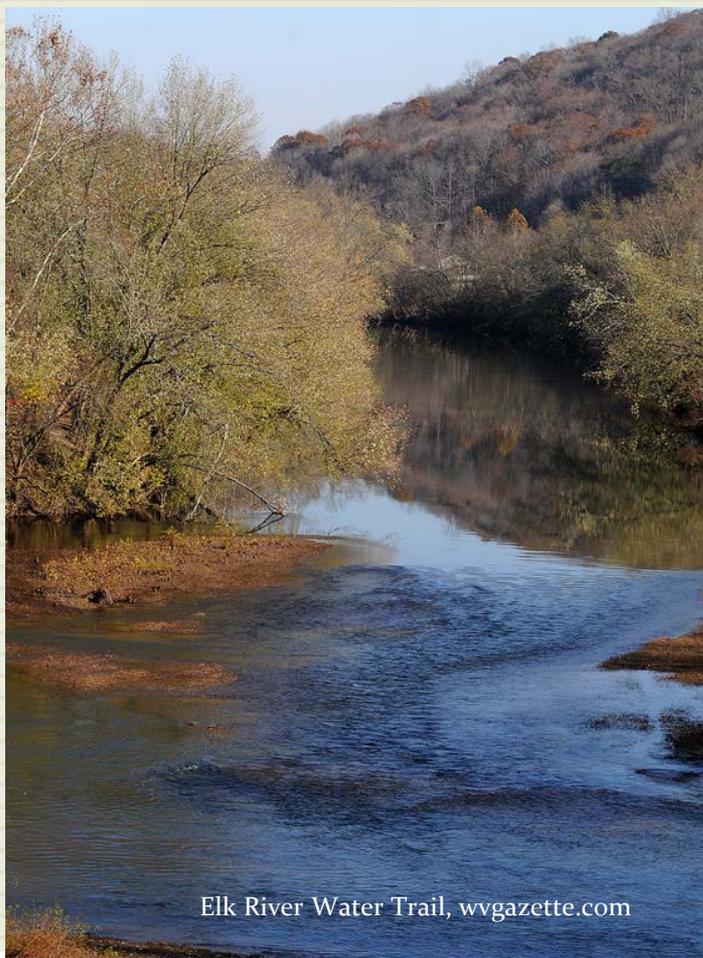


Uplands Habitat Connectivity Metrics Datasets (Mining, Wells, Buildings, Roads/Rail, Landfills Mineral Operations, Timber Harvesting)

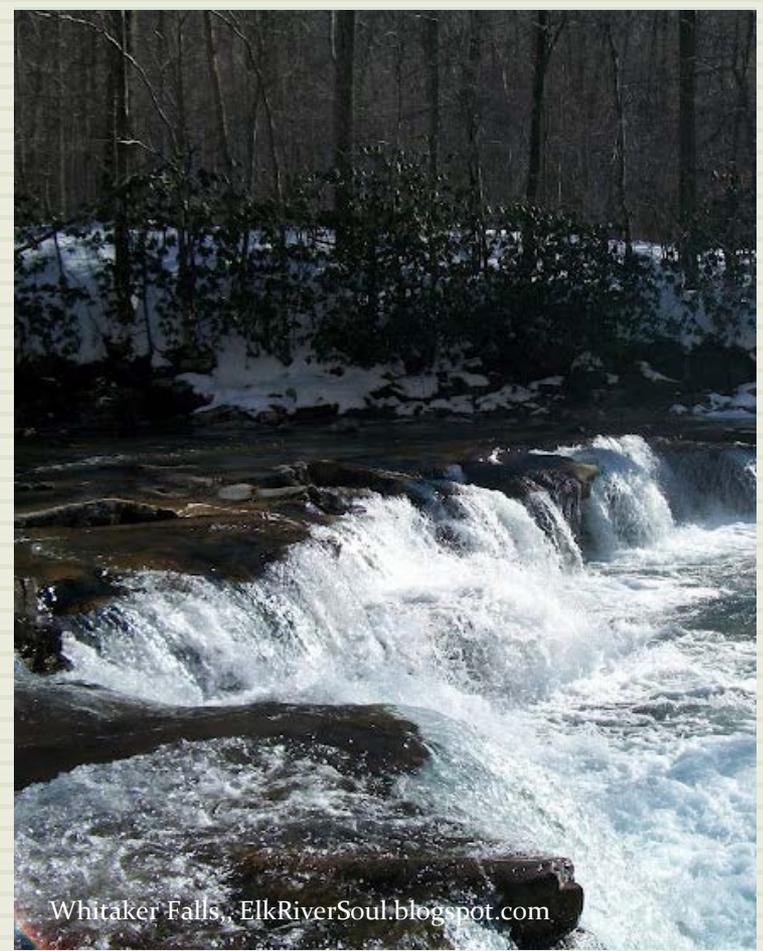


Uplands Habitat Connectivity Metrics Dataset With Aerial Imagery





Elk River Water Trail, wvgazette.com



Whitaker Falls, ElkRiverSoul.blogspot.com

COMMENTS/QUESTIONS?

Web Mapping Tool Examples

How would you like the data presented?

1. WV DEP Mining Data Explorer Tool
2. TNC Two Hearted Watershed Conservation Data Viewer

EPA Watershed Quality Assessment

<http://www.epa.gov/waters/ir/index.html>

U.S. ENVIRONMENTAL PROTECTION AGENCY



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On This Page

- [Assessment Summary](#)
- [Causes of Impairment](#)
- [Probable Sources Contributing to Impairment](#)
- [TMDL Alternatives by Cause of Impairment](#)
- [Cumulative TMDLs by Pollutant](#)

[West Virginia State Report](#)

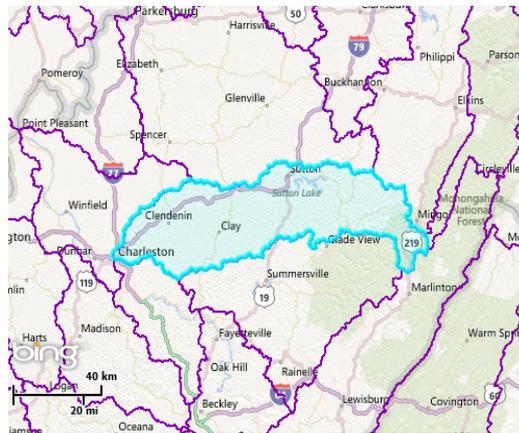
For More Information:

[Download Excel compatible information](#)

[Download GIS Information](#) (Internet Explorer only)

[Water Quality Data Available for this Watershed](#)

West Virginia, Elk Watershed



Click on the watershed for an interactive map

Search for a waterbody within Elk

Enter Waterbody Name:

Assessment Summary for Reporting Year 2010 West Virginia, Elk Watershed

No assessment data have been reported to EPA for this watershed.

Frequent Questions

- [About This Database \(Integrated Report\)](#)
- [Assessing Water Quality \(Questions and Answers\)](#)
- [Integrated Reporting Guidance](#)
- [Previous National Water Quality Reports](#)
- [EnviroMapper for Water](#)
- [AskWATERS](#)
- [EPA WATERS Homepage](#)
- [Exchange Network](#)
- [Assessment Database](#)
- [Statewide Statistical Surveys](#)
 - [Statistical Survey Template \(Excel, 585 KB\)](#)

EPA My WATERS Mapper

My WATERS Mapper | WATERS | US E...

EPA MyWATERS Mapper

Water Program Snapshots

Click on a button below to view a state-wide snapshot.

Pollutant Discharge Permit Status

Water Infrastructure Needs

Water Quality Assessment Information

Drinking Water Information

Water Impairments

Water Monitoring Data

Other EPA Water Data

Features at this Location

There is 1 feature at this location.

Zoom in Closer

Query Results

Subbasins (HUC8) results for 05050007

View Results as Tabular Grid | View Results as Nested Tree Nodes

Organization	Station	Start Date	Characteristics	Results
211WVOWR WV Div of Environmental Protection, Office of Water Resource	KE-000-004.50 Elk River at Coonskin Park, W.Va.	01/30/2004	148	2580
211WVOWR WV Div of Environmental Protection, Office of Water Resource	KE-000-026.2 Elk River at Queen Shoals, W.Va.	02/25/2000	45	247

Get more results for a single monitoring station:

- All Stations-
- All Stations-
- 211WVOWR / KE-000-004.50
- 211WVOWR / KE-000-026.2
- 211WVOWR / KE-000-054.6
- 211WVOWR / KE-000-089.5
- 211WVOWR / KE-000-106.5
- 211WVOWR / KE-000-150.5

Download XML Data

Download CSV

Text View of Data

WV DEP Interactive Web Maps (GIS Server)

WVDEP GIS Server - Windows Internet Explorer

http://gis.dep.wv.gov/index.html

West Virginia DEP
Technical Applications and GIS Unit

Flash Interactive Mapping Applications

-  [Mining Data Explorer](#)
-  [Water Withdraw Tool](#)
-  [Open Dump Cleanup Projects](#)
-  [Resource Extraction Viewer](#)
-  [7Q10 Flow Estimates](#)
-  [Flow distance above public water supplies](#)

Legacy Mapping Applications

- Enviromap Explorer
- Landfill Closure Projects
- Oil & Gas Well Search

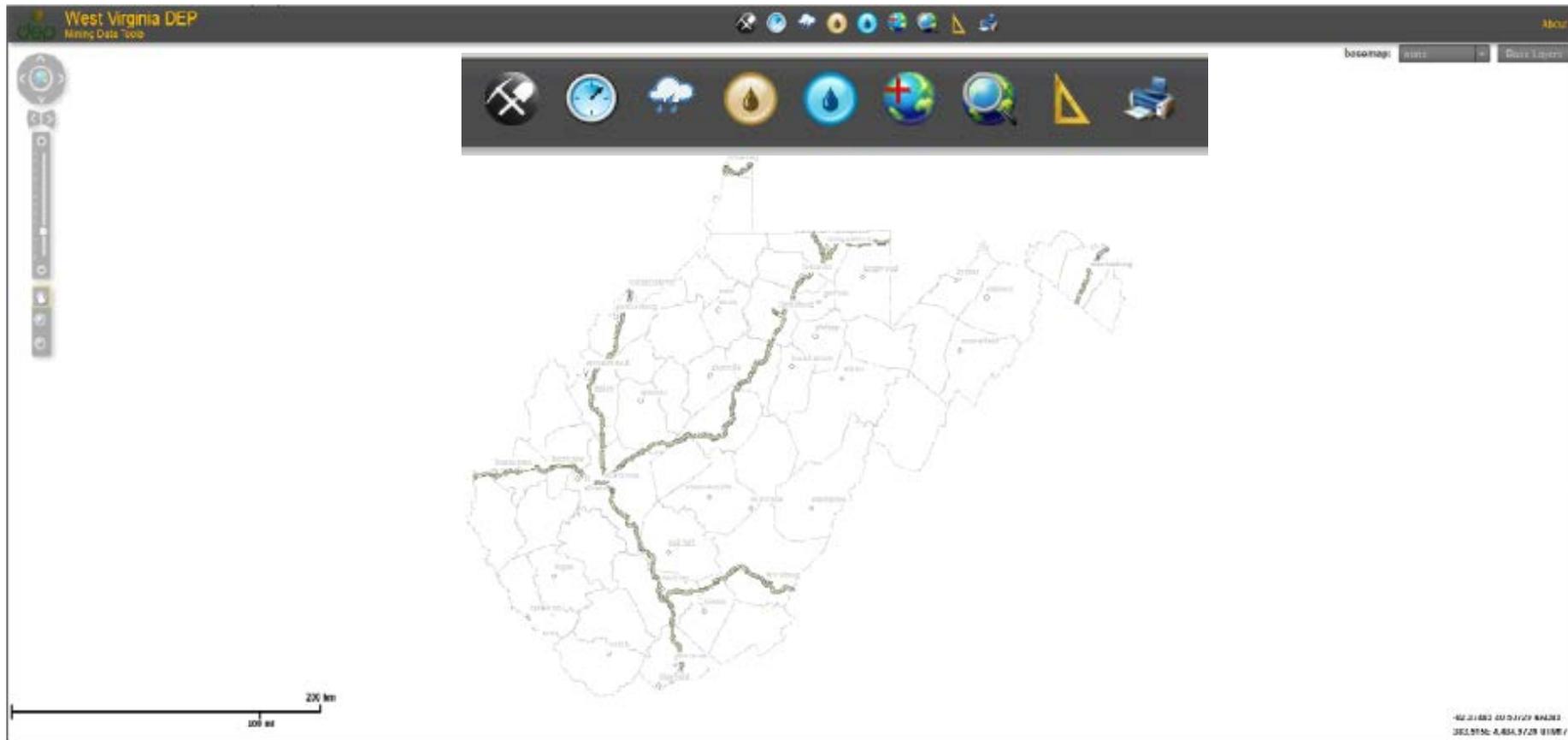
Map Services

- Rest Interface-- ArcGIS Server 1
- [Rest Interface-- ArcGIS Server 2](#)

Internet | Protected Mode: On 125%

<http://gis.dep.wv.gov/index.html>

WV DEP Mining Data Tool



<http://tagis.dep.wv.gov/mining/>

WVDEP Internet Mapping - Windows Internet Explorer

http://tags.dep.wv.gov/mining/

Convert Select

Favorites -- The Charleston Gazette - ... Grist Environmental News, ... ConserveOnline - Connectin... Online Conversion - Conver... Intermountain BBC News WUnderground Gmail Welcome OnEarth Magazine

WVDEP Internet Mapping

West Virginia DEP
Mining Data Tools

basemap: none Base Layers

Mining Layers

Permit Search Identify Layers Legend

- spoil fills
- refuse fills
- permit bdy
- underground mining
- mining limits

Layer transparency:

Done

Internet | Protected Mode: On 125%

-84.59117 40.77680 NAD83
196,930E 4,520,187N UTM17

Mining Layers – Permit Boundary; Underground mining

WVDEP Internet Mapping - Windows Internet Explorer
http://tags.dep.wv.gov/mining/

West Virginia DEP
Mining Data Tools

basemap: none Base Layers

Mining Layers

Permit Search Identify Layers Legend

- spoil fills
- refuse fills
- permit bdy
- underground mining
- mining limits

Layer transparency:

Drawing Layers...

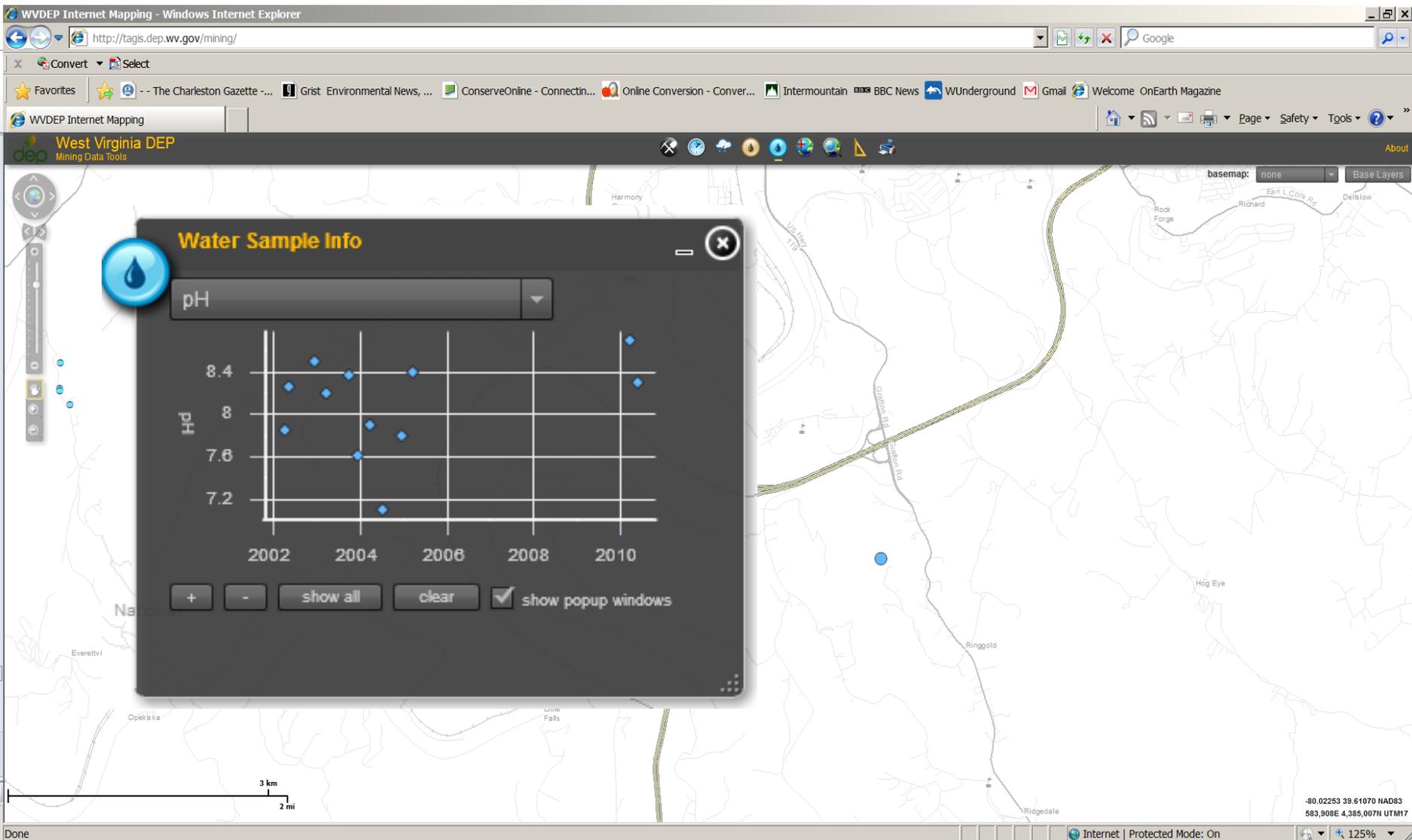
100 mi

-84.59117 40.77680 NAD83
196.930E 4,520,187N UTM17

Internet | Protected Mode: On 125%

The image shows a screenshot of a web-based mapping application. The browser window is titled 'WVDEP Internet Mapping - Windows Internet Explorer' and the address bar shows 'http://tags.dep.wv.gov/mining/'. The page header includes the West Virginia DEP logo and 'Mining Data Tools'. A 'Mining Layers' panel is open on the left, showing a list of layers with checkboxes. The 'permit bdy' and 'underground mining' layers are checked. Below the list is a 'Layer transparency' slider and a 'Drawing Layers...' section. The main map area displays a map of West Virginia with purple shaded regions representing mining permit boundaries and underground mining areas. A toolbar with various icons is visible above the map. At the bottom right, there is a coordinate display and a status bar showing 'Internet | Protected Mode: On' and '125%' zoom level.

Mining Layers – Permit Boundary; Underground mining



Water sample data graph, trend over time

Trout Unlimited Conservation Success Index

Trout Unlimited
Conserving, protecting and restoring North America's coldwater fisheries and their watersheds.

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HOME » SCIENCE » CONSERVATION SUCCESS INDEX (CSI)

Conservation Success Index (CSI)

A Strategic Approach to Fisheries and Watershed Conservation

Click on a region to explore the CSI analyses

[CA Salmon](#) | [Sierras](#) | [Intermountain West](#) | [Desert Southwest](#) | [Midwest](#) | [East](#)

Trout Unlimited developed the Conservation Success Index (CSI) in order to become more strategic and effective in our conservation efforts. Using the CSI, we can quantify and map the conservation status of all native coldwater fishes so that comparisons of existing condition, threats, future security, and management opportunities can be made across watersheds, river basins, and entire species. This enables us to deliver conservation in context.

The CSI integrates population data from various assessments completed by state and federal agencies with spatial data on habitat and threats gathered by TU

The CSI provides relative scores of conservation status for subwatersheds.

Internet | Protected Mode: On



TROUT UNLIMITED

Conserving, protecting and restoring North America's coldwater fisheries and their watersheds.

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- CSI Home
- East
- Atlantic Salmon
- Brook Trout
- California Salmon
- Sierra Nevada
- Intermountain West
- Desert Southwest
- Midwest
- CSI User Guide(pdf -4.5mb)
- CSI Methods
- Contact Us

Brook Trout

Salvelinus fontinalis

Rev. 1.5 - 8/2007

- [Species Summary](#) | [CSI Maps](#) | [CSI Data](#)
- [Interactive Map](#) | [Google Earth](#) | [Rule Set\(.doc\)](#)

CSI Score by Subwatershed



Show Pushpins

- 510215
- 510252
- 510272
- 510275
- 510288
- 510329
- 51044
- 510544
- 510576
- 51063
- 510633
- 510954
- 540625
- Aaron Run



[CSI Home](#)[East](#)[Atlantic Salmon](#)[Brook Trout](#)[California Salmon](#)[Sierra Nevada](#)[Intermountain West](#)[Desert Southwest](#)[Midwest](#)[CSI User Guide \(pdf-4.5mb\)](#)[CSI Methods](#)[Contact Us](#)

Brook Trout

Salvelinus fontinalis

Rev. 1.5 - 8/2007

[Species Summary](#) | [CSI Maps](#) | [CSI Data](#)
[Interactive Map](#) | [Google Earth](#) | [Rule Set\(.doc\)](#)

Subwatershed Name:	Elk River
Subwatershed ID:	540441
Area (Acres):	20935
Total CSI	28
Subwatershed Population Status	Extirpated
Subwatershed Conservation Strategy	Restore, then reintroduce

CSI Groups	Score	Mean Score For All Subwatersheds
* Click on a Group to see its Indicator details.		
Habitat Integrity	12 / 25	13.2
Future Security	16 / 25	18.1

Habitat Integrity CSI = 12

CSI Indicator Scores	Mean Score For All Subwatersheds
* Click on an Indicator to see its details.	
CSI 1: Land Stewardship - 1	1.7
CSI 2: Watershed connectivity - 1	1.2
CSI 3: Watershed conditions - 4	3.7
CSI 4: Water quality - 1	2.5
CSI 5: Flow regime - 5	4.2

CSI Methods

Contact Us

CSI Groups **Score** **Mean Score For All Subwatersheds**

* Click on a Group to see its Indicator details.

Habitat Integrity	12 / 25	13.2
Future Security	16 / 25	18.1

Habitat Integrity CSI = 12

CSI Indicator Scores

Mean Score For All Subwatersheds

* Click on an Indicator to see its details.

[CSI 1:Land Stewardship - 1](#) 1.7

Protected acres	0
Total acres	20935
Acres public land	0

Fraction protected land	0
Fraction public land	0

[CSI 2:Watershed connectivity - 1](#) 1.2

Number of barriers in subwatershed (6th level HUC)	20
Number of barriers in watershed (5th level HUC)	521

[CSI 3:Watershed conditions - 4](#) 3.7

Average road density (miles/square mile)	3.77
Percent forested	0.8216

[CSI 4:Water quality - 1](#) 2.5

Roads within 150 ft of streams (miles)	1.92
Miles perennial streams	35.51
Presence of 303(d) waters	1
Percent agricultural land	0.1464



TNC Interactive Conservation Maps

The screenshot shows a web browser window displaying the TNC Interactive Conservation Maps website. The browser's address bar shows the URL http://maps.tnc.org/web_maps.html. The website features the TNC logo and a navigation menu with links for HOME, GIS DATA, MAPS, and ABOUT. The main heading is "Interactive Conservation Maps", followed by a paragraph: "Click on a map to explore an interactive, web-based map viewer created by Nature Conservancy staff around the world. Maps will open in a new window." Below this are six map thumbnails, each with a title and a "+ View Description" link. The first three thumbnails are: "The Nature Conservancy's Core Data (public)", "The Nature Conservancy's Core Data (internal)", and "Two-Hearted River Watershed Conservation". The last three thumbnails are: "Visit a Preserve Experience Station with the Conservancy", "Conservation Action Plan Project", and "The Nature Conservancy Great Lakes Project". To the right of the thumbnails is a section titled "Want your own interactive web map?" with a paragraph of text and a link to "our help". At the bottom of the browser window, the status bar shows "Local intranet | Protected Mode: Off" and a zoom level of "125%".

Conservation Maps - The Nature Conservancy - Windows Internet Explorer
http://maps.tnc.org/web_maps.html
tnc web map

Convert Select
Favorites -- The Charleston Gazette ... Grist Environmental News, ... ConserveOnline - Connect... Online Conversion - Conver... Intermountain BBC News WUnderground Gmail Welcome OnEarth Magazine
Conservation Maps - The Nature Conser... Page Safety Tgols

The Nature Conservancy
Protecting nature. Preserving life.™

TNC MAPS HOME GIS DATA **MAPS** ABOUT

Interactive Conservation Maps

Click on a map to explore an interactive, web-based map viewer created by Nature Conservancy staff around the world. Maps will open in a new window.

The Nature Conservancy's Core Data (public)
+ View Description

TNC Staff Only
(login w/ email account)
The Nature Conservancy's Core Data (internal)
+ View Description

Two-Hearted River Watershed Conservation
+ View Description

Visit a Preserve Experience Station with the Conservancy

Conservation Action Plan Project

The Nature Conservancy Great Lakes Project

Want your own interactive web map?

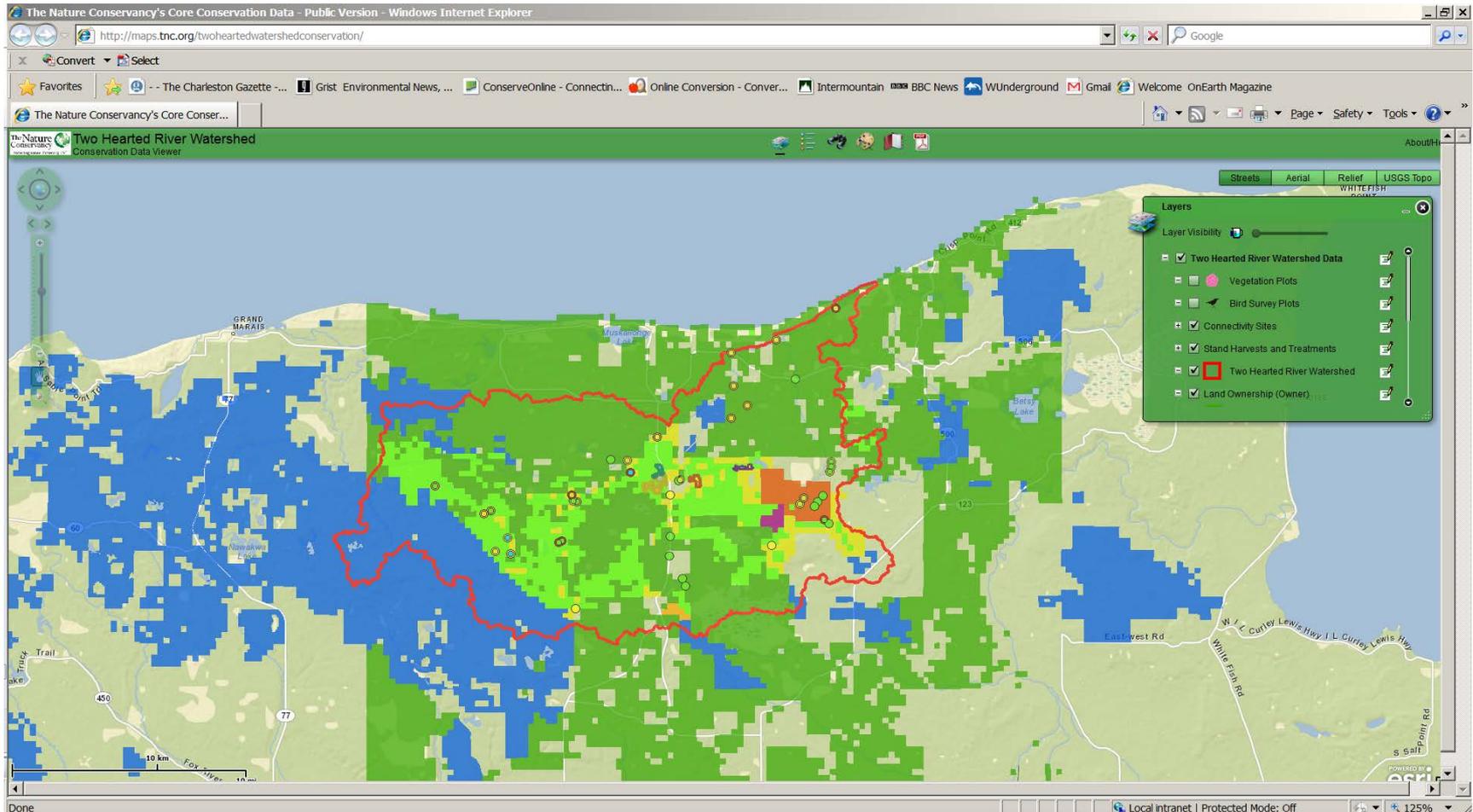
If you are interested in creating your own map and publishing it online, check out a [comparison of several web map options](#) to do so (or view the [same comparison in a spreadsheet format](#)). For additional information (including detailed guidance on using ArcGIS Server), please see [our help](#).

Staff of The Nature Conservancy can contact the [Conservation Data & Information Systems Team](#) for assistance.

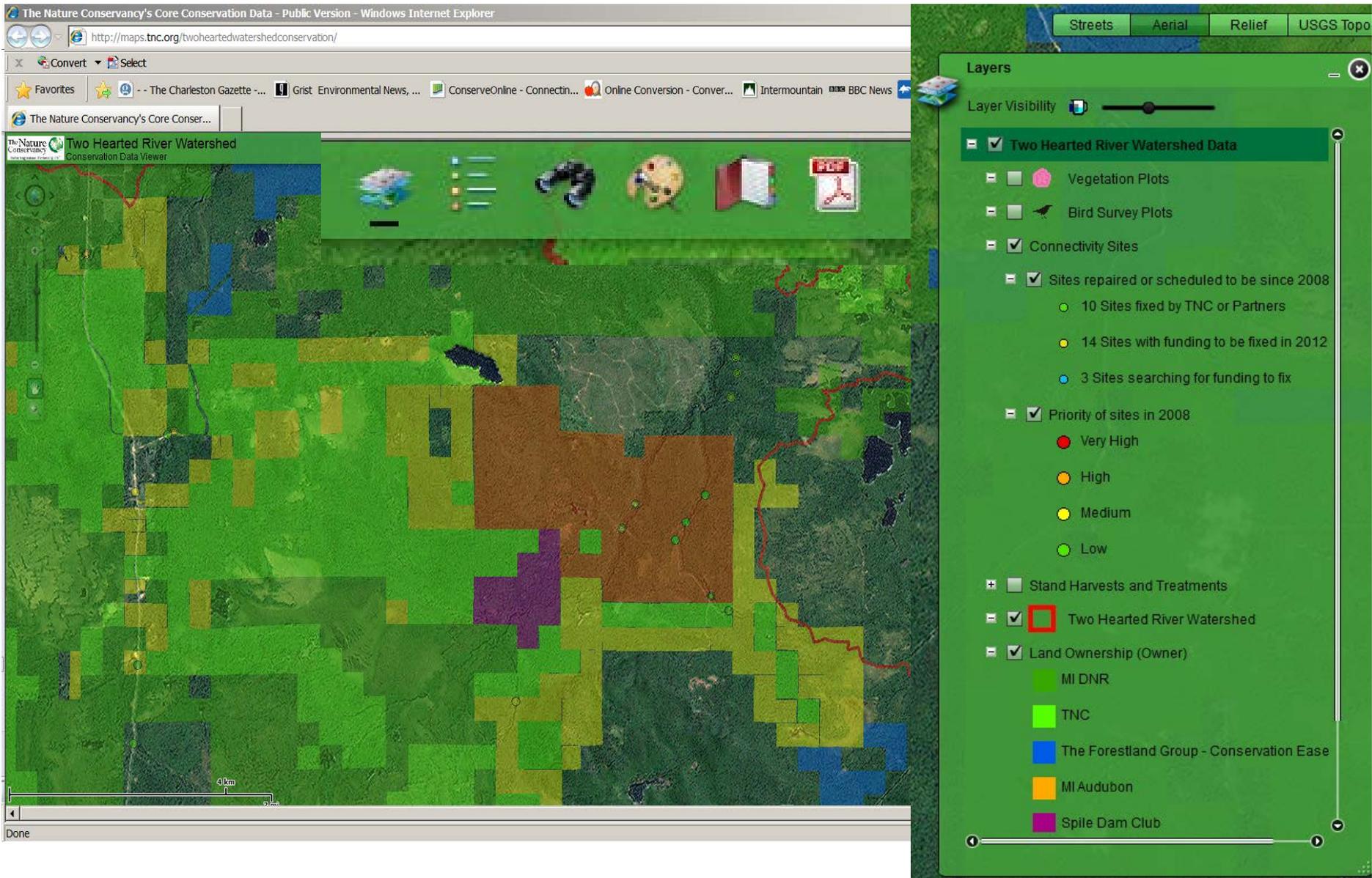
Local intranet | Protected Mode: Off 125%

http://maps.tnc.org/web_maps.html

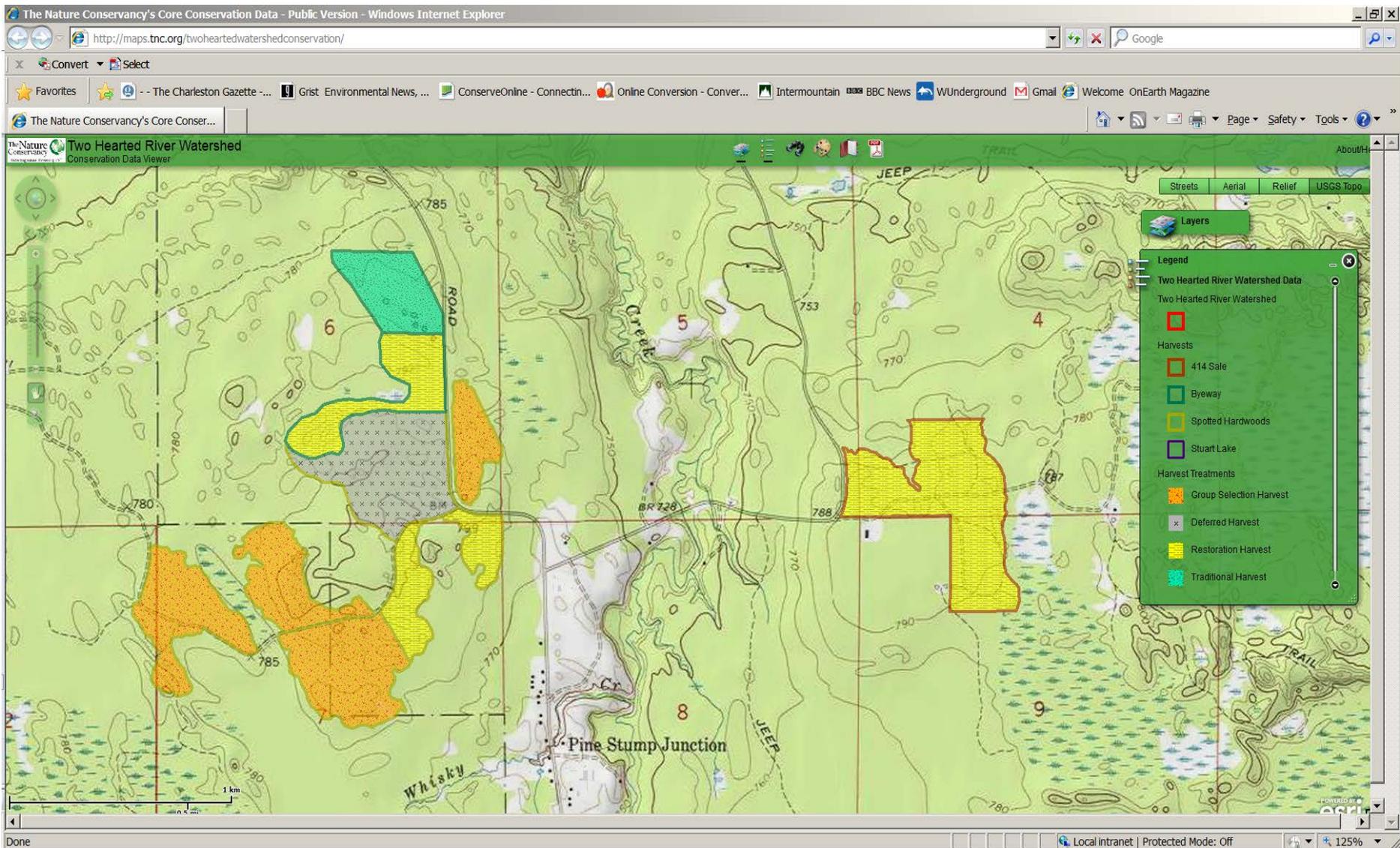
TNC Two Hearted River Watershed Conservation Map



<http://maps.tnc.org/twoheartedwatershedconservation/>



Aerial imagery base layer; expanded Layers contents w/symbology definition



Topographic maps base layer; Legend box for Stand Harvests and Treatment data

Questions to Consider

- What do you envision your primary uses of the tool may be?
- What functionality is desired for you to get the most from the tool? (e.g. ability to search, view data, get attribute information, etc.)
- What would be the most important feature of the tool for you? The least important?
- How would you like the displays to look—Do these existing tools have features you like?



COMMENTS/QUESTIONS?