

Forests, Water and People

Drinking water supply and forest lands in West Virginia

USDA Forest Service
Northeastern Area
State and Private Forestry



Project Description

In the Northeast and Midwest United States, forests are critically important to the supply of clean drinking water. Protecting and managing forests in source watersheds is an essential part of future strategies for providing clean safe drinking water that citizens can afford. The Forests, Water and People analysis identified private forests that are most important for drinking water supply and most in need of protection from development pressure. This fact sheet gives the results of the analysis for the State of West Virginia. For more detailed description of methods, and results for the Northeast and Midwest United States, see the [full report](#).

The Process

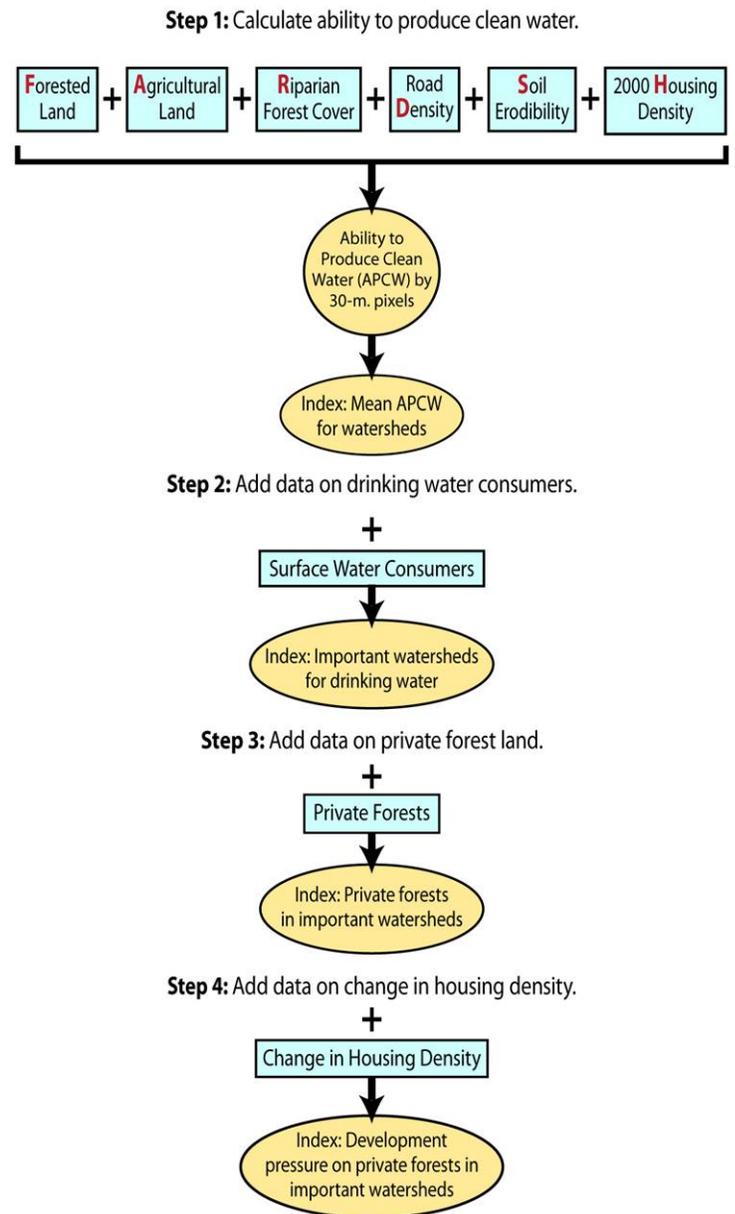
Through a 4 step GIS-based overlay analysis, four indices were developed for each watershed (see Figure 1).



Photo by Michael Land.

"Water, in all its uses and permutations, is by far the most valuable commodity that comes from the forest land that we manage, assist others to manage, and/or regulate."
Policy Statement, National Association of State Foresters

Figure 1. Nine layers of GIS data (boxes) were combined in stepwise fashion, to produce four indices (ovals) of watershed importance for drinking water supplies and the need for private forest management to protect those supplies.



West Virginia Results

Highlights

- Most of West Virginia’s watersheds scored well in each step of the analysis, particularly steps 1, 3 and 4 due to its large percent of privately owned forest (86 percent), high percent forest land use, and high development pressure, especially around Charleston.
- Most of West Virginia’s watersheds ranked well in their ability to produce clean water (step 1) because forest is the State’s dominant land use – at least half of most watersheds and up to 93 percent of some watersheds are private forest lands. Thirteen watersheds (or one-third of all watersheds) tied for a very high score in step 1.
- In the ability of watersheds to provide drinking water to the most people (step 2), the North Branch Potomac watershed scored the highest, followed by a tie score between the South Branch Potomac, Cacapon-Town, Lower New, Lower Kanawha, and Big Sandy watersheds. Scores were not as high for step 2 because West Virginia is not as densely populated as some other States in the study area.
- In the ability of watersheds to provide drinking water on private lands (step 3), most of West Virginia scored well because the State has 86 percent privately owned forest land. The highest scoring watershed is the North Branch Potomac followed by a tie score between the Lower New, Lower Kanawha, and Big Sandy watersheds.
- Many areas of West Virginia, especially the area around Charleston, scored well in step 4, which ranked watersheds based on their development pressure and land ownership status (private lands ranked higher because they are subject to conversion). The two highest scoring watersheds were the Lower Kanawha and Little Scioto-Tygarts watersheds. These watersheds averaged in the top three percent of the study area’s watersheds.

Table 1. Watershed results for West Virginia

Watershed Name	Hydrologic Unit Code	Mean APCW for watersheds	Surface drinking water consumers	% private forest in watershed	% watershed with housing density increase	Index: Development pressure on private forests important for drinking water supply	
						Score (Step 4)	Rank (Step 4)
Lower Kanawha	05050008	8 of 10	237,703	76 %	7 %	34 of 40	10 of 540
Little Scioto-Tygarts	05090103	8 of 10	89,519	71 %	12 %	34 of 40	10 of 540
Upper Monongahela	05020003	7 of 10	53,780	77 %	12 %	33 of 40	19 of 540
Big Sandy	05070204	8 of 10	106,250	88 %	5 %	33 of 40	19 of 540
North Branch Potomac	02070002	9 of 10	246,757	73 %	3 %	33 of 40	19 of 540
Lower Guyandotte	05070102	8 of 10	91,103	87 %	5 %	32 of 40	34 of 540
Raccoon-Symmes	05090101	7 of 10	141,340	59 %	11 %	31 of 40	50 of 540
Twelvepole	05090102	8 of 10	22,119	77 %	5 %	31 of 40	50 of 540
Lower New	05050004	9 of 10	73,994	75 %	3 %	31 of 40	50 of 540
Middle Potomac-Catoctin	02070008	5 of 10	1,880,230	38 %	36 %	31 of 40	50 of 540
Cacapon-Town	02070003	9 of 10	172,470	66 %	4 %	31 of 40	50 of 540
Lower Monongahela	05020005	6 of 10	691,813	59 %	6 %	30 of 40	61 of 540
Tygart Valley	05020001	8 of 10	68,489	78 %	3 %	30 of 40	61 of 540
Shenandoah	02070007	5 of 10	76,218	44 %	13 %	30 of 40	61 of 540
North Fork Shenandoah	02070006	7 of 10	193,560	40 %	10 %	30 of 40	61 of 540
Little Musringum-Middle Island	05030201	8 of 10	84,011	74 %	3 %	30 of 40	61 of 540
Conococheague-Opequon	02070004	6 of 10	508,521	42 %	14 %	30 of 40	61 of 540
Coal	05050009	9 of 10	21,890	92 %	3 %	29 of 40	76 of 540
South Branch Potomac	02070001	9 of 10	222,157	63 %	1 %	29 of 40	76 of 540
Youghiogheny	05020006	7 of 10	225,013	59 %	5 %	29 of 40	76 of 540
Upper Ohio-Shade	05030202	6 of 10	56,096	66 %	9 %	28 of 40	88 of 540
West Fork	05020002	7 of 10	33,808	71 %	3 %	28 of 40	88 of 540
Upper Kanawha	05050006	9 of 10	12,473	92 %	2 %	28 of 40	88 of 540
Little Kanawha	05030203	8 of 10	101,339	85 %	1 %	28 of 40	88 of 540
Upper Ohio	05030101	5 of 10	437,648	56 %	5 %	28 of 40	88 of 540
Middle New	05050002	8 of 10	47,690	64 %	4 %	28 of 40	88 of 540
Tug	05070201	9 of 10	11,835	93 %	4 %	27 of 40	109 of 540
Upper Guyandotte	05070101	9 of 10	22,838	92 %	1 %	27 of 40	109 of 540
Gauley	05050005	9 of 10	22,279	70 %	2 %	27 of 40	109 of 540

Watershed Name	Hydrologic Unit Code	Mean APCW for watersheds	Surface drinking water consumers	% private forest in watershed	% watershed with housing density increase	Index: Development pressure on private forests important for drinking water supply	
						Score (Step 4)	Rank (Step 4)
Elk	05050007	9 of 10	11,773	88 %	1 %	24 of 40	169 of 540
Cheat	05020004	9 of 10	15,406	55 %	2 %	24 of 40	169 of 540
Greenbrier	05050003	9 of 10	17,131	63 %	1 %	24 of 40	169 of 540
Upper Ohio-Wheeling	05030106	5 of 10	117,322	64 %	1 %	24 of 40	169 of 540
Upper James	02080201	9 of 10	11,979	45 %	1 %	21 of 40	264 of 540

Average or total value for all watersheds listed in Table 1

Mean APCW for watersheds:	7.7	of 10
Important watersheds for drinking water composite score:	14.7	of 20
Private forests in important watersheds composite score:	23.7	of 30
Development pressure on private forests in important watersheds composite score:	29.0	of 40
Forested Land (acres):	21,407,260.1	
Private Forest (acres):	18,396,298.8	
Private Forest Land under Development Pressure by 2030 (acres):	870,742.5	
(% private forest land):	4.7%	

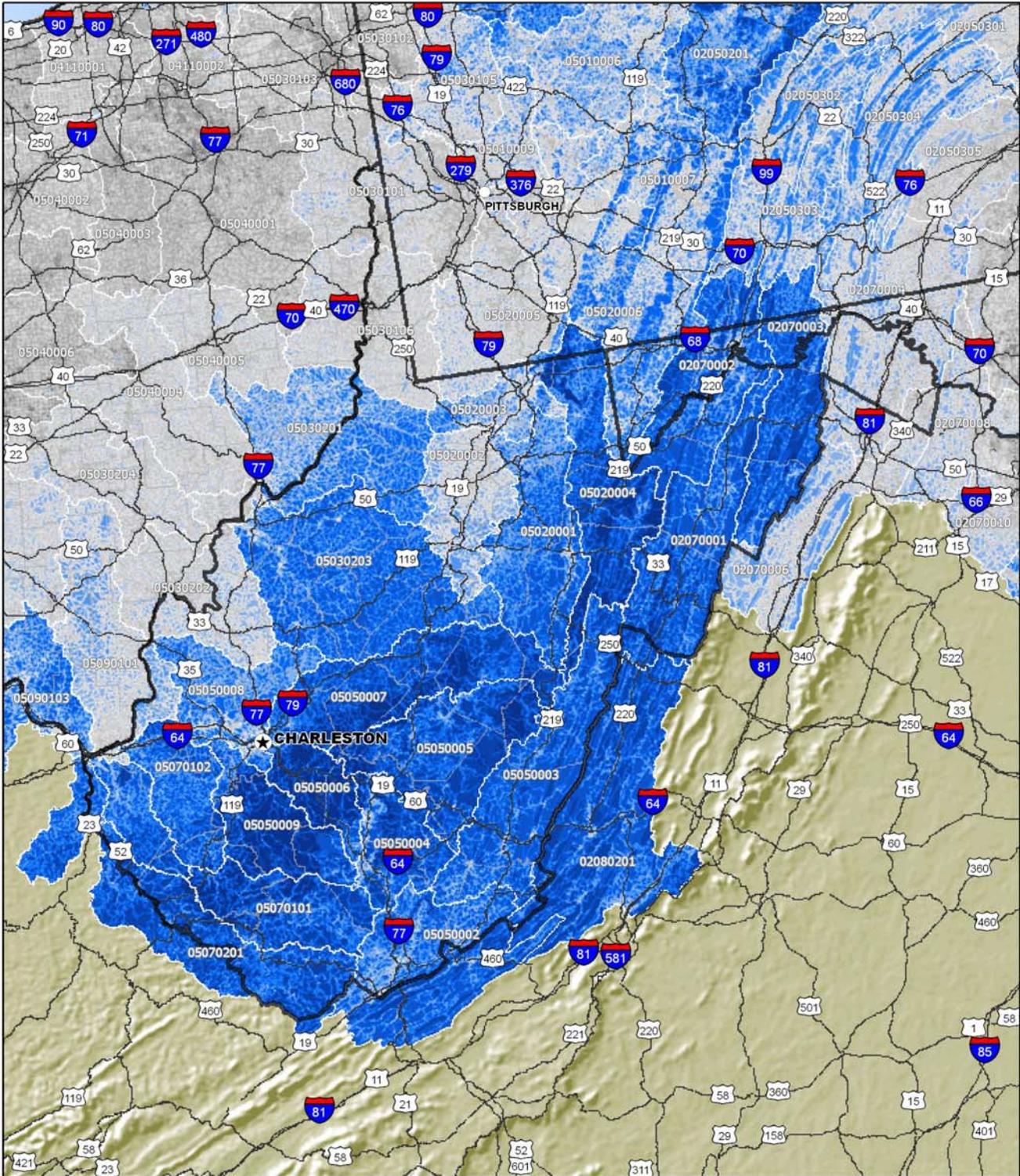
Note: If a watershed fell partially in West Virginia, the whole watershed was considered for this project. State results reflect the total acreage for all watersheds that impact that State (this may account for a higher acreage figure than if only lands within State boundaries were considered).

Maps

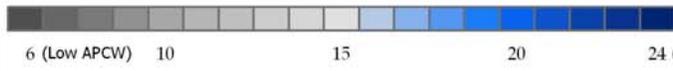
The following maps depict the results of each step in the Forests, Water and People analysis. Each watershed is labeled with the eight-digit HUC and the watershed composite score for the analysis step. (Note: the APCW, 30-m. pixel view does not have a watershed score)

All of the maps were produced by Rebecca Whitney Lilja, Office of Knowledge Management, Northeastern Area State and Private Forestry.

Ability to Produce Clean Water (APCW) (Step 1), 30-m View - West Virginia



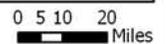
STEP 1 COMPOSITE SCORE, 30-m VIEW



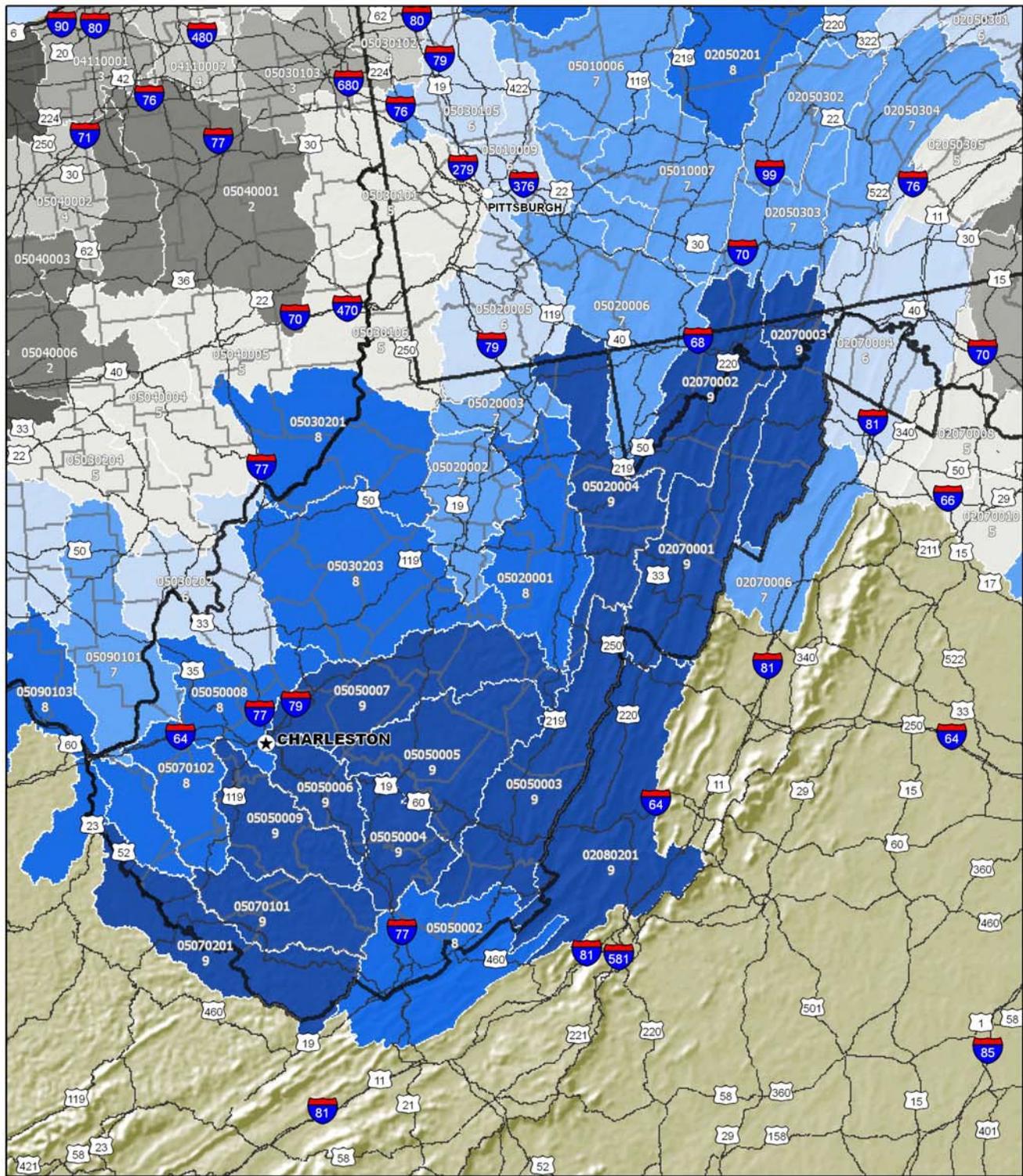
Projection: Albers



Watershed labels describe the 8-digit hydrologic unit code (HUC)



Mean Ability to Produce Clean Water (APCW) by Watershed (Step 1, Continued) - West Virginia

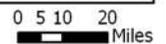


STEP 1 COMPOSITE SCORE

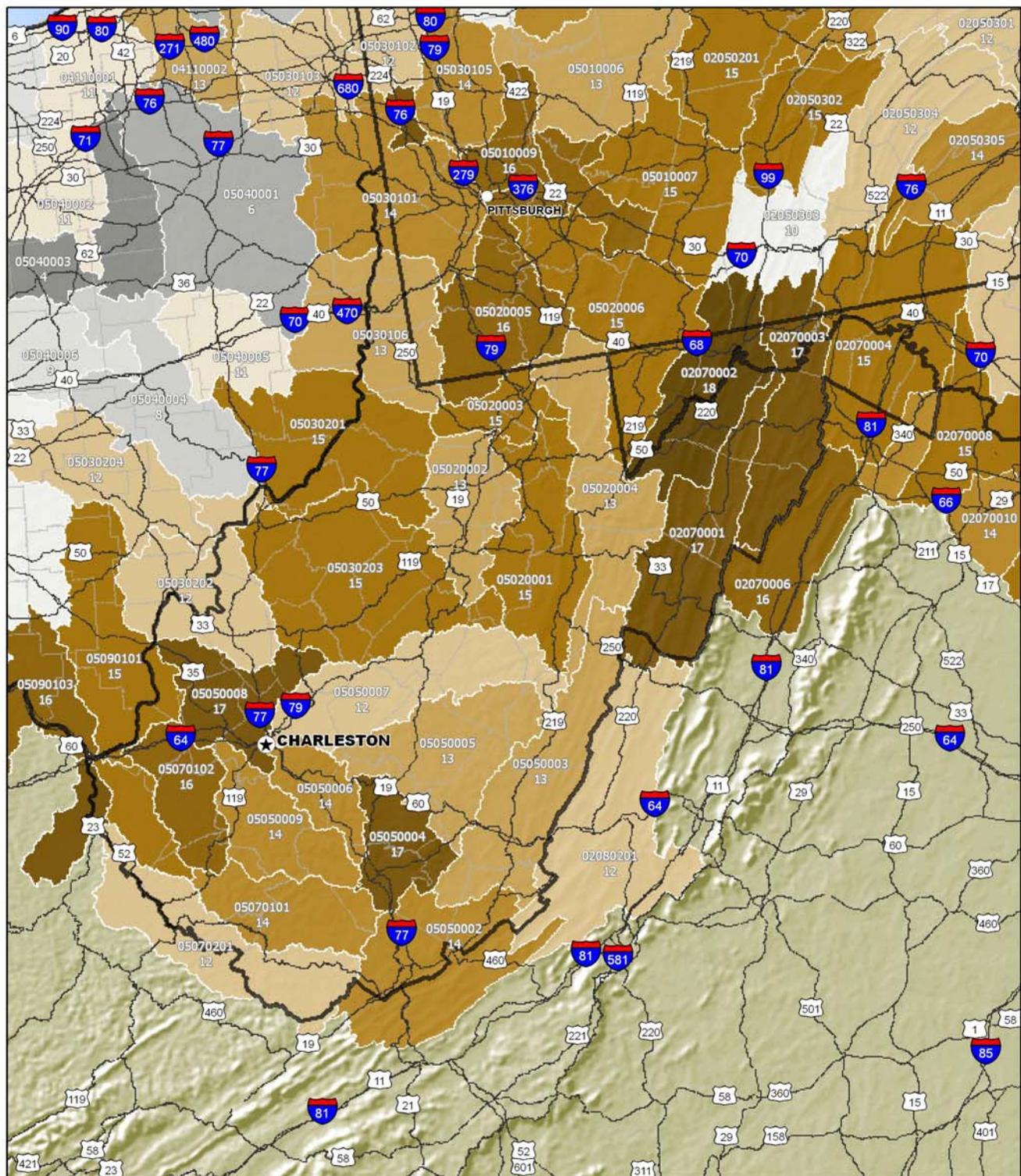


Projection: Albers

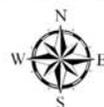
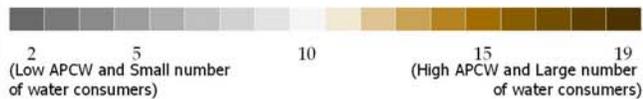
Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score



Importance of watersheds for drinking water supply (Step 2) - West Virginia



STEP 2 COMPOSITE SCORE

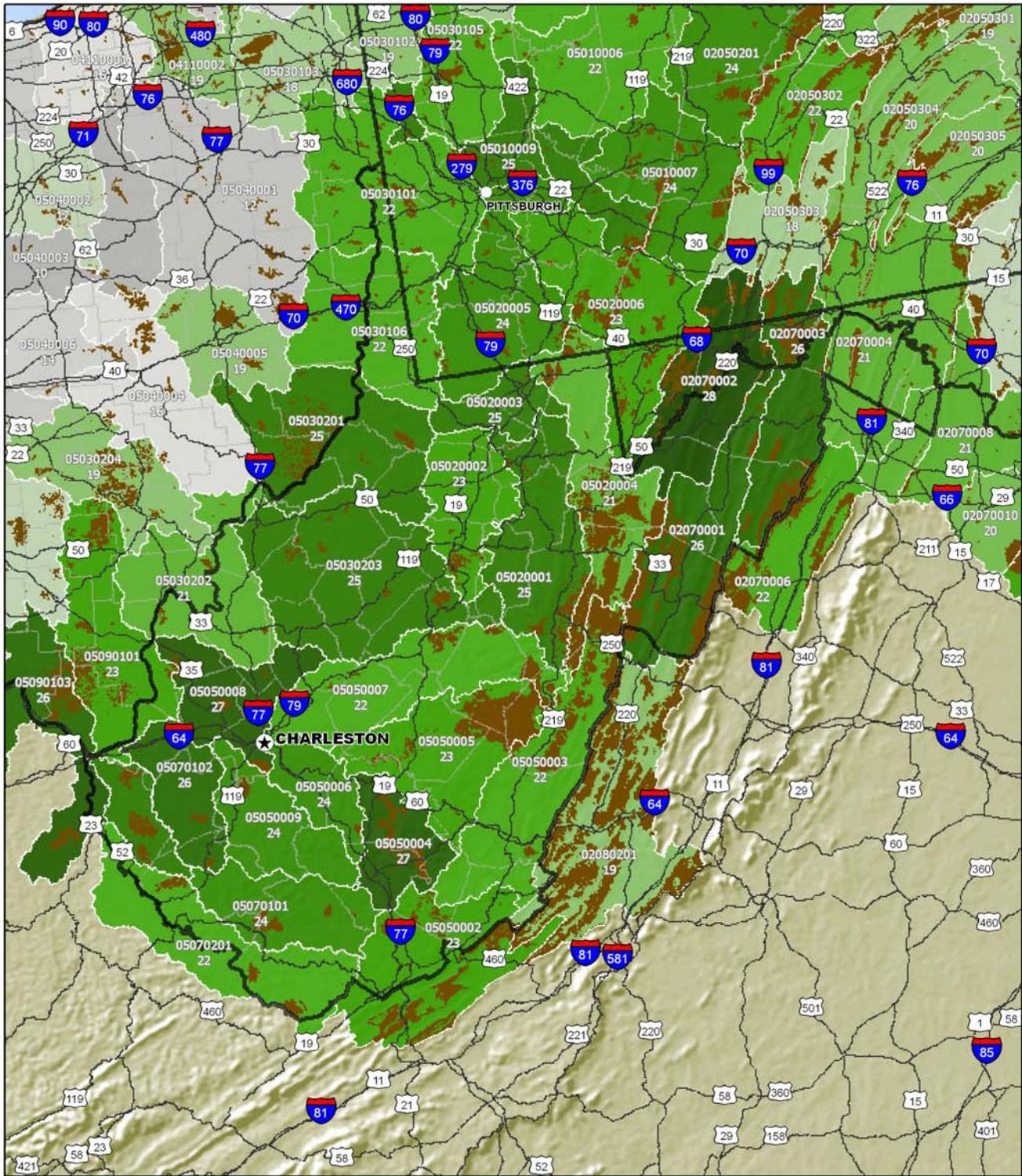


Projection: Albers

Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score



Importance of watersheds and private forest for drinking water supply (Step 3) - West Virginia

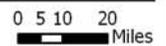


STEP 3 COMPOSITE SCORE

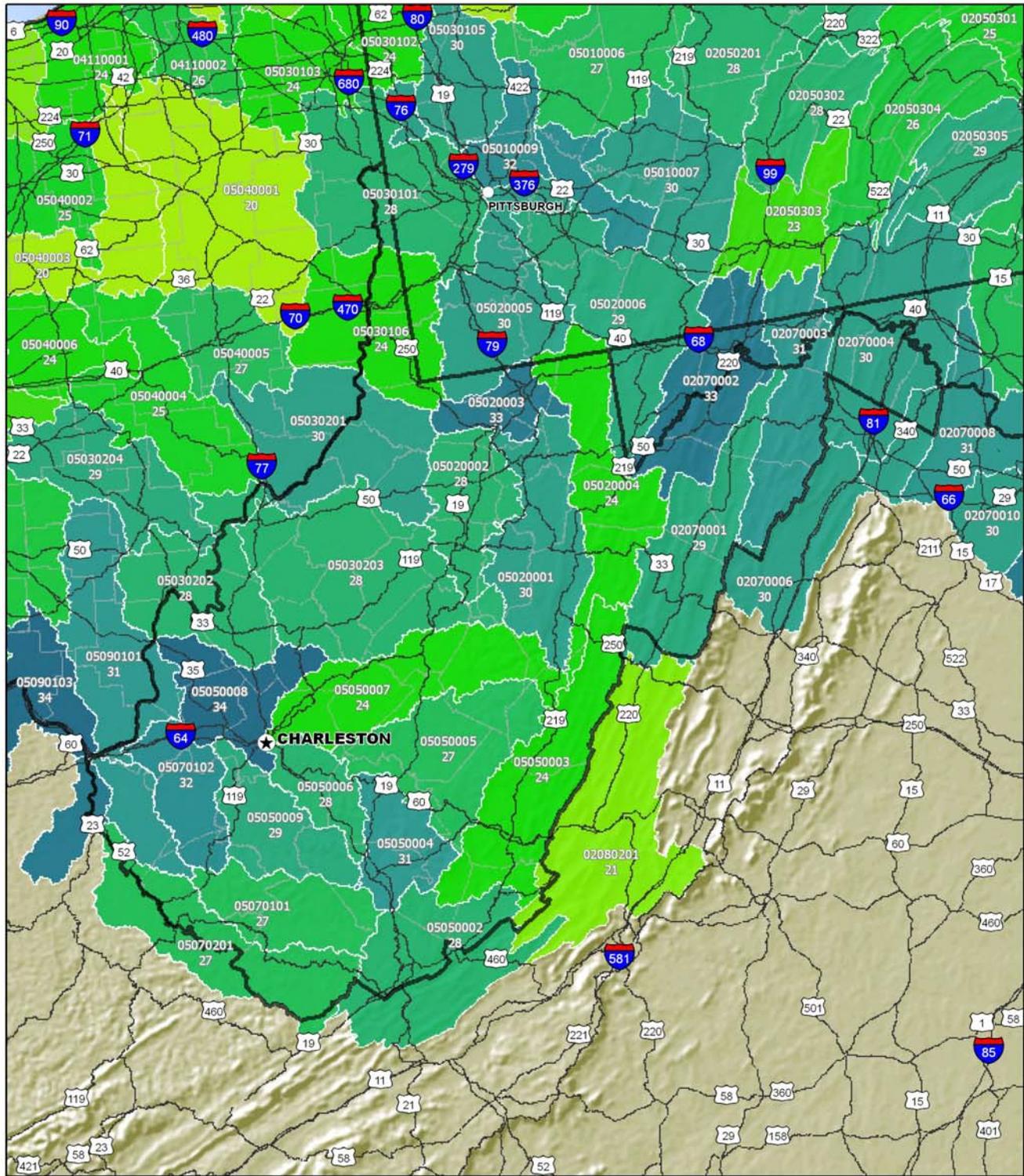


Projection: Albers

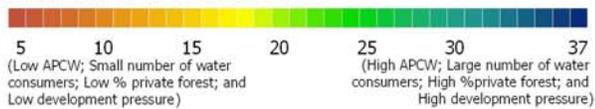
Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score



Development pressure on private forests in drinking water supply watersheds (Step 4) - West Virginia

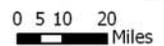


STEP 4 COMPOSITE SCORE



Projection: Albers

Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score



References

Table 2. Datasets used in the Forests, Water and People Analysis

Attribute	Dataset	Source*
Forest land	1992 National Landcover Dataset	U.S. Geological Survey 1999
Agricultural land by watershed	1992 National Landcover Dataset	U.S. Geological Survey 1999
Riparian forest cover by watershed	1:100,000-scale National Hydrography Dataset, buffered to 30 meters	Hatfield 2005
Road density	2002 Bureau of Transportation Statistics (BTS) Roads	U.S. Department of Transportation 2002
Soil erodibility	STATSGO Soil Dataset, kffact	Miller and White 1998
Housing density by watershed	Housing density in 2000	Theobald 2004
Surface drinking water consumers per unit area	Public Drinking Water System (PWS) Consumers by eight-digit HUC; City Drinking water consumers for New York City, Philadelphia, St. Louis, St. Paul, and Washington DC	U.S. Environmental Protection Agency 2005
Private forest by watershed	Protected Areas Database, Version 4; Wisconsin Stewardship Data	Conservation Biology Institute 2006; U.S. Geological Survey, Upper Midwest Environmental Sciences Center 2005
Development pressure per unit area	Housing density in 2000 and 2030	Theobald 2004

*Note: See the [full report](#) for complete reference citations.

Watershed Resources

Northeastern Area Watershed— <http://www.na.fs.fed.us/watershed>

Forest-to-Faucet Partnership—<http://www.wetpartnership.org/index.html>

Trust for Public Land Source Water Stewardship Project—<http://www.tpl.org/>

Forests on the Edge—<http://www.fs.fed.us/openspace/fote/index.html>

American Water Works Association—Professional and Technical Resources—
<http://www.awwa.org/Resources/index.cfm?&navItemNumber=1416>

Source Water Collaborative—<http://www.protectdrinkingwater.org/>

Environmental Protection Agency—Surf Your Watershed—<http://cfpub.epa.gov/surf/locate/index.cfm>

Environmental Protection Agency—Safe Drinking Water Information System—
http://www.epa.gov/enviro/html/sdwis/sdwis_ov.html

This project was a collaborative effort between the Northeastern Area and Dr. Paul K. Barten, Associate Professor, University of Massachusetts-Amherst and Co-director of the Forest-to-Faucet Partnership.

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