

Forests, Water and People

Drinking water supply and forest lands in Wisconsin

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 Wisconsin. For more detailed description of methods, and results for the Northeast and Midwest United States, see the [full report](#).

The Process

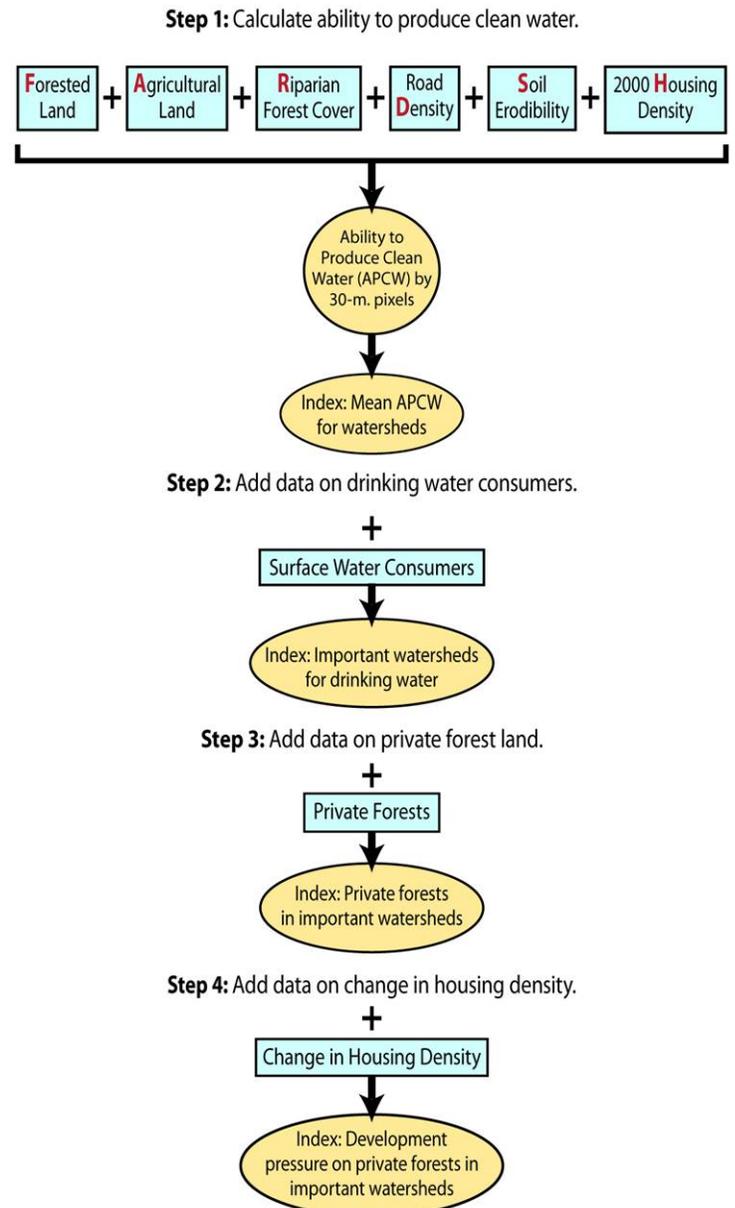
Through a 4 step GIS-based overlay analysis, four indices were developed for each watershed (see Figure 1).



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.



Wisconsin Results

Highlights

- The watersheds in northern Wisconsin scored above average in each step of the analysis, with the highest scores in step 1. The State contains large forest areas in the north, with more of a mix of agriculture and forested areas in the central part of the State and more agriculture in the south. Development pressure is greatest around Madison, and to the east of the Twin Cities, and is otherwise scattered in the eastern part of the State.
- Those Wisconsin watersheds that scored highest in their ability to produce clean water (step 1) are located in the northern part of the State, where there are large areas of forested land. Eight watersheds in Wisconsin (or sixteen percent of all the State's watersheds) tied for the highest score in step 1.
- In the ability of watersheds to provide drinking water to the most people (step 2), several Wisconsin watersheds scored above average, particularly those in the northern part of the State. The scores were not as high as in other parts of the study area due to the fact that many areas of Wisconsin get their drinking water from ground water supplies, which are not included in this study. The St. Louis and Lake Winnebago watersheds scored highest in this step.
- In the ability of watersheds to provide drinking water on private lands (step 3), the same area in the north scored highest: the St. Louis and Lake Winnebago watersheds. 68 percent of Wisconsin's forest land is privately owned and is therefore subject to conversion.
- Step 4 ranked watersheds based on their development pressure and land ownership status (private lands ranked higher because they are subject to conversion). The highest ranked watershed is the Upper Wisconsin watershed, which ranked in the top twenty-seven percent of all the study area's watersheds, and is located north of Milwaukee and Madison.

Table 1. Watershed results for Wisconsin

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)
Upper Wisconsin	07070001	10 of 10	0	56 %	6 %	25 of 40	148 of 540
Namekagon	07030002	10 of 10	0	47 %	5 %	24 of 40	169 of 540
Lake Winnebago	04030203	3 of 10	171,001	8 %	14 %	24 of 40	169 of 540
Menominee	04030108	9 of 10	0	50 %	6 %	23 of 40	199 of 540
Flambeau	07050002	10 of 10	0	45 %	4 %	23 of 40	199 of 540
Castle Rock	07070003	7 of 10	0	43 %	10 %	23 of 40	199 of 540
Upper St. Croix	07030001	9 of 10	0	45 %	6 %	23 of 40	199 of 540
Wolf	04030202	7 of 10	0	45 %	11 %	23 of 40	199 of 540
Peshigo	04030105	8 of 10	0	47 %	9 %	23 of 40	199 of 540
Oconto	04030104	7 of 10	0	35 %	15 %	23 of 40	199 of 540
St. Louis	04010201	10 of 10	15,171	38 %	2 %	22 of 40	229 of 540
Lake Dubay	07070002	7 of 10	0	43 %	7 %	22 of 40	229 of 540
Black-Presque Isle	04020101	10 of 10	0	56 %	2 %	22 of 40	229 of 540
Brule	04030106	10 of 10	0	52 %	2 %	22 of 40	229 of 540
Beartrap-Nemadji	04010301	9 of 10	0	44 %	3 %	21 of 40	264 of 540
Bad-Montreal	04010302	9 of 10	0	52 %	1 %	21 of 40	264 of 540
Upper Chippewa	07050001	9 of 10	0	50 %	2 %	21 of 40	264 of 540
South Fork Flambeau	07050003	10 of 10	0	41 %	2 %	20 of 40	289 of 540
Door-Kewaunee	04030102	5 of 10	0	25 %	21 %	20 of 40	289 of 540
Upper Fox	04030201	6 of 10	0	26 %	12 %	20 of 40	289 of 540
Pike-Root	04040002	1 of 10	28,456	13 %	12 %	20 of 40	289 of 540
Jump	07050004	8 of 10	0	58 %	1 %	20 of 40	289 of 540
Lower St. Croix	07030005	5 of 10	0	24 %	22 %	20 of 40	289 of 540
Upper Fox	07120006	1 of 10	94,487	17 %	17 %	20 of 40	289 of 540
Duck-Pensaukee	04030103	5 of 10	0	26 %	23 %	20 of 40	289 of 540
La Crosse-Pine	07040006	5 of 10	0	39 %	12 %	20 of 40	289 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)
Black	07040007	7 of 10	0	37 %	3 %	19 of 40	320 of 540
Baraboo	07070004	5 of 10	0	30 %	12 %	19 of 40	320 of 540
Red Cedar	07050007	5 of 10	0	32 %	7 %	18 of 40	337 of 540
Ontonagan	04020102	10 of 10	0	34 %	1 %	18 of 40	337 of 540
Lower Wisconsin	07070005	5 of 10	0	39 %	6 %	18 of 40	337 of 540
Kickapoo	07070006	6 of 10	0	47 %	2 %	18 of 40	337 of 540
Eau Claire	07050006	6 of 10	0	28 %	4 %	17 of 40	352 of 540
Lower Chippewa	07050005	5 of 10	0	30 %	6 %	17 of 40	352 of 540
Coon-Yellow	07060001	5 of 10	0	37 %	3 %	17 of 40	352 of 540
Rush-Vermillion	07040001	3 of 10	0	15 %	19 %	17 of 40	352 of 540
Trempealeau	07040005	5 of 10	0	36 %	2 %	15 of 40	394 of 540
Buffalo-Whitewater	07040003	5 of 10	0	33 %	3 %	15 of 40	394 of 540
Sugar	07090004	1 of 10	0	12 %	14 %	14 of 40	407 of 540
Lower Fox	04030204	1 of 10	0	7 %	29 %	14 of 40	407 of 540
Manitowoc-Sheboygan	04030101	1 of 10	0	15 %	12 %	14 of 40	407 of 540
Crawfish	07090002	2 of 10	0	7 %	14 %	14 of 40	407 of 540
Upper Rock	07090001	1 of 10	0	10 %	19 %	14 of 40	407 of 540
Grant-Little Maquoketa	07060003	5 of 10	0	23 %	2 %	14 of 40	407 of 540
Milwaukee	04040003	1 of 10	0	16 %	15 %	14 of 40	407 of 540
Des Plaines	07120004	1 of 10	0	10 %	17 %	13 of 40	427 of 540
Apple-Plum	07060005	5 of 10	0	23 %	1 %	13 of 40	427 of 540
Kishwaukee	07090006	1 of 10	0	7 %	7 %	11 of 40	454 of 540
Pecatonica	07090003	1 of 10	0	10 %	3 %	9 of 40	484 of 540
Lower Rock	07090005	2 of 10	0	9 %	3 %	9 of 40	484 of 540

Average or total value for all watersheds listed in Table 1

Mean APCW for watersheds:	5.6	of 10
Important watersheds for drinking water composite score:	7.1	of 20
Private forests in important watersheds composite score:	12.1	of 30
Development pressure on private forests in important watersheds composite score:	18.5	of 40
Forested Land (acres):	22,365,813.0	
Private Forest (acres):	15,294,503.3	
Private Forest Land under Development Pressure by 2030 (acres):	1,051,239.0	
(% private forest land):	6.9%	

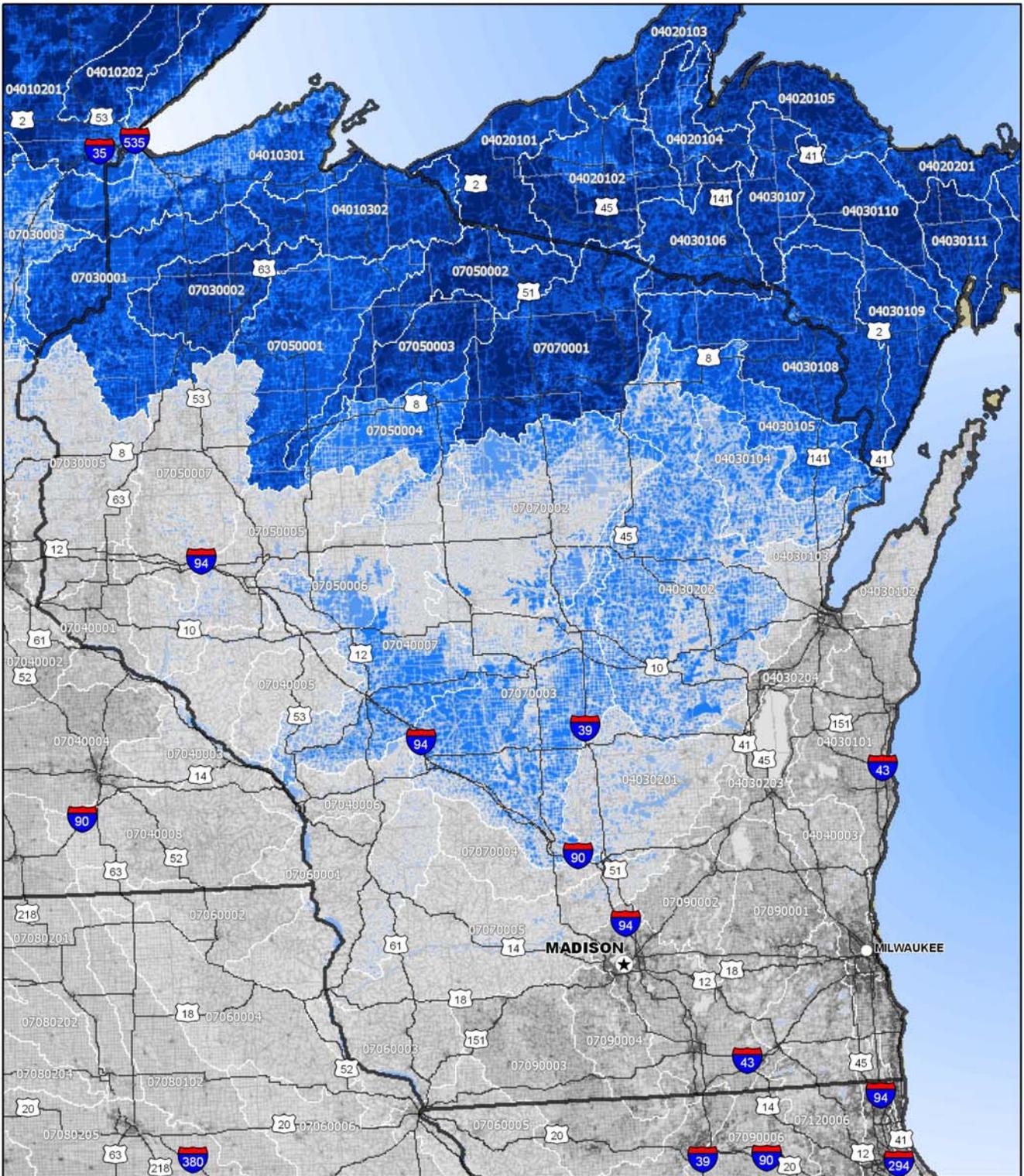
Note: If a watershed fell partially in Wisconsin, the whole watershed was considered for this project. State results reflect the total acreage for all watersheds that impact that State (this may account for a higher acreage figure than if only lands within State boundaries were considered).

Maps

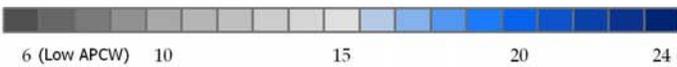
The following maps depict the results of each step in the Forests, Water and People analysis. Each watershed is labeled with the eight-digit HUC and the watershed composite score for the analysis step. (Note: the APCW, 30-m. pixel view does not have a watershed score)

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 - Wisconsin



STEP 1 COMPOSITE SCORE, 30-m VIEW



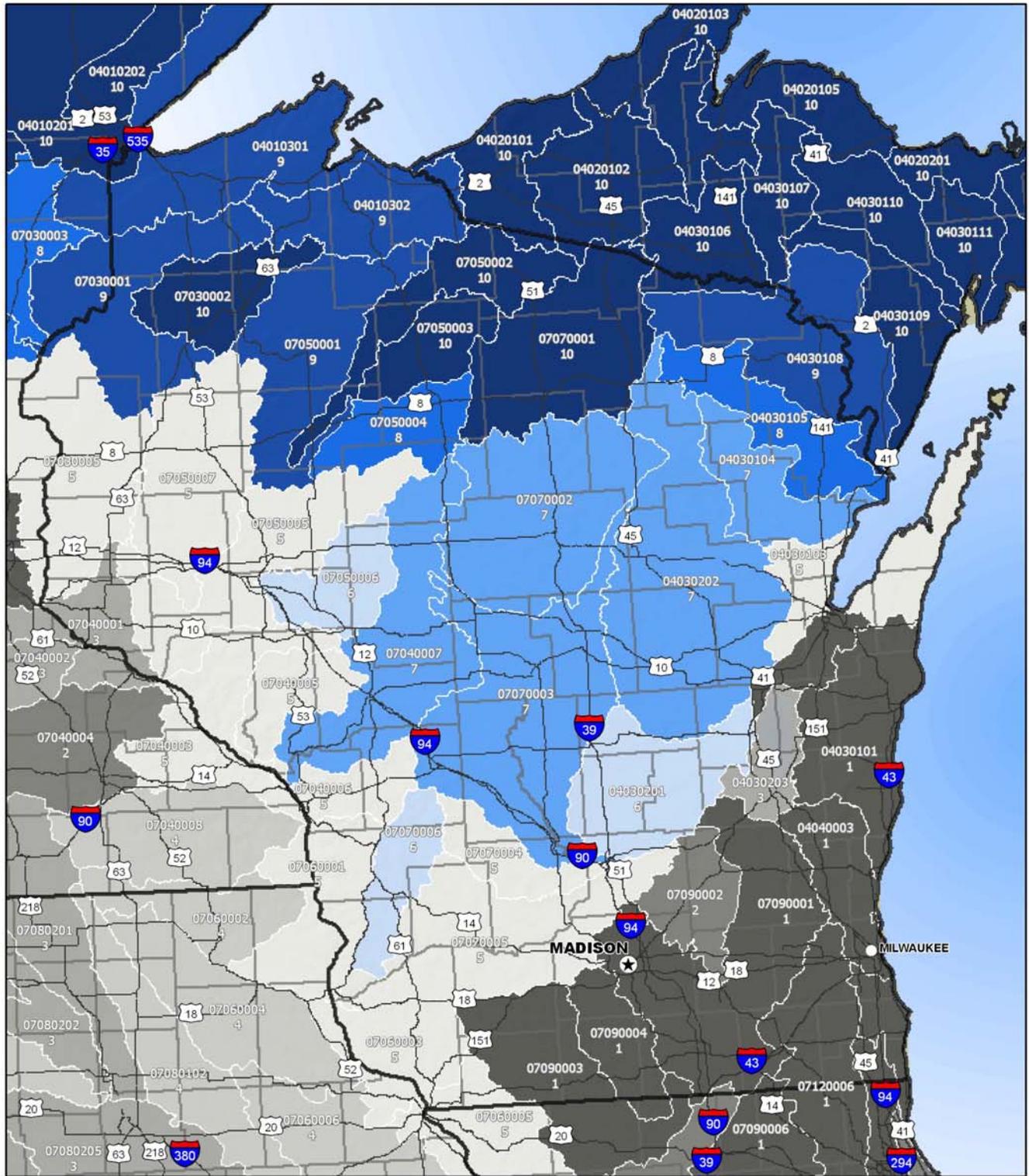
Projection: Albers



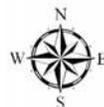
Watershed labels describe the 8-digit hydrologic unit code (HUC)

0 5 10 20 Miles

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

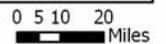


STEP 1 COMPOSITE SCORE

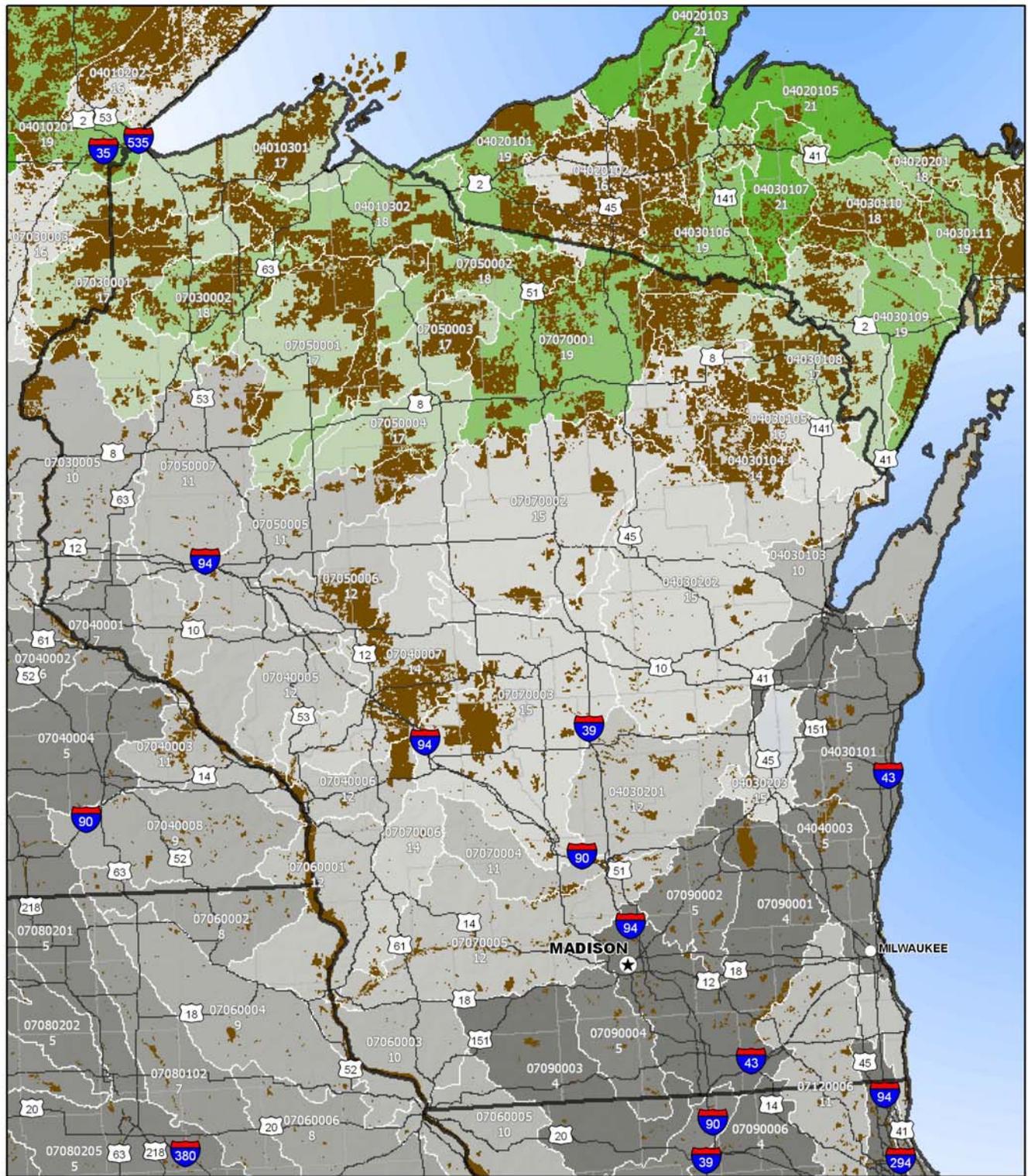


Projection: Albers

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) - Wisconsin

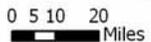


STEP 3 COMPOSITE SCORE

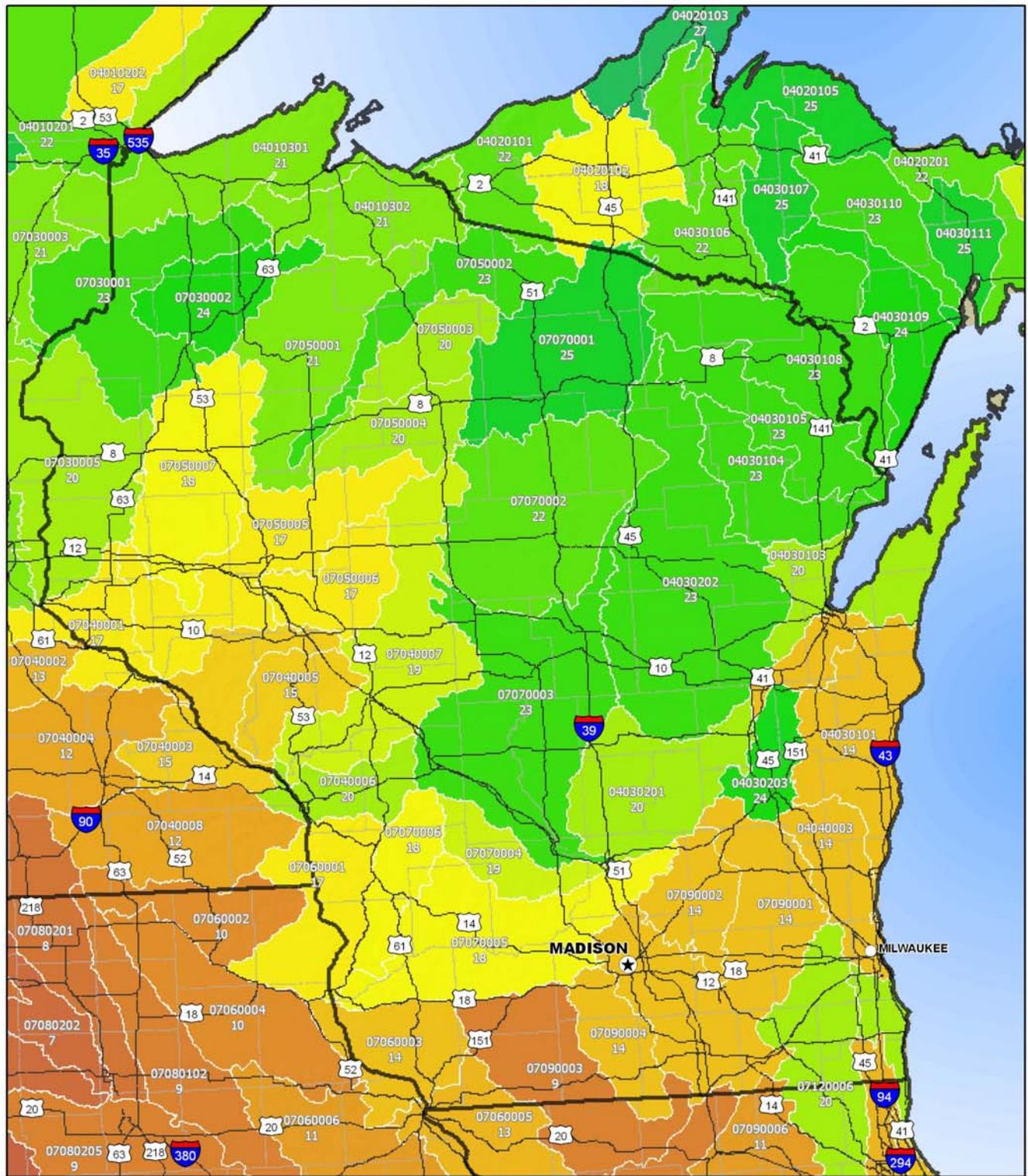


Projection: Albers

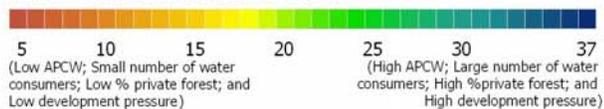
Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score



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

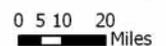


STEP 4 COMPOSITE SCORE



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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