

Forests, Water and People

Drinking water supply and forest lands in Iowa

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

The Process

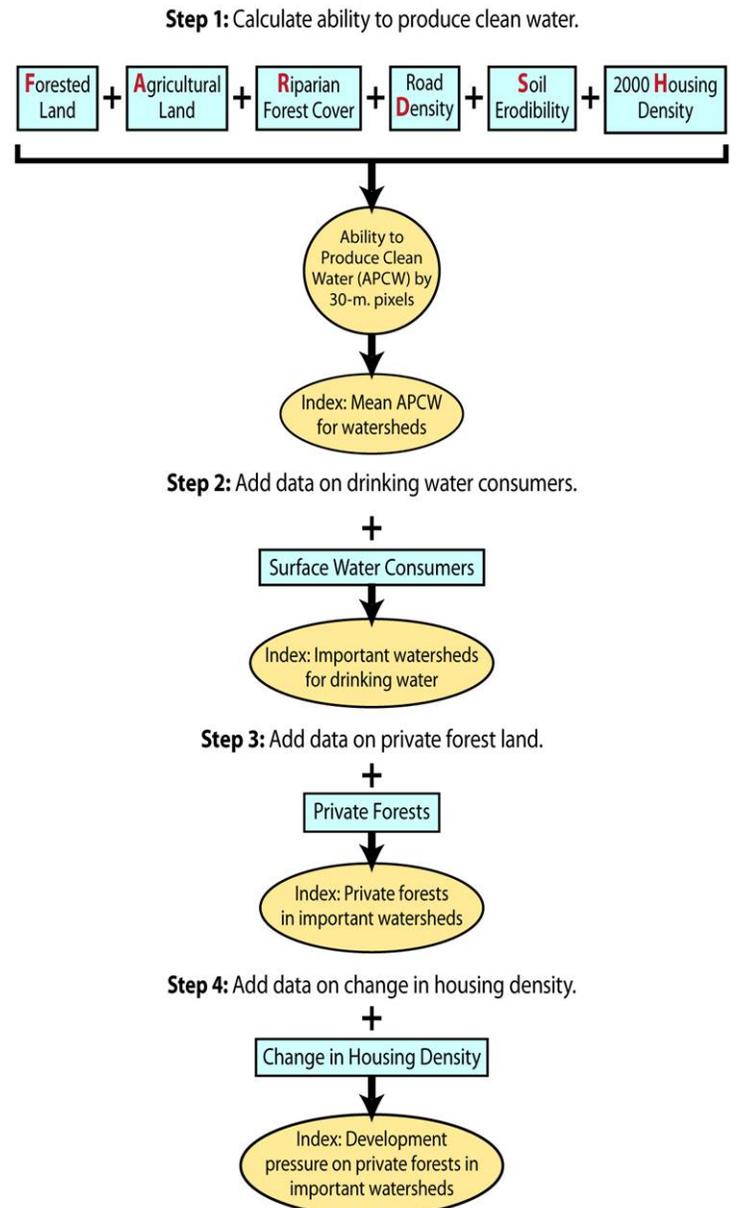
Through a 4 step GIS-based overlay analysis, four indices were developed for each watershed (see Figure 1).



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.



Iowa Results

Highlights

- The watersheds in southeastern Iowa scored above average in each step of the analysis. The State contains large agricultural areas, with no significant areas of forest, and small pockets of housing density change around Des Moines and in the eastern part of the State.
- Those Iowa watersheds that ranked highest in their ability to produce clean water (step 1) are located in the southeastern part of the State, where there is some forested land. The three highest scoring watersheds in step 1 are the Lower Des Moines, Bear-Wyaconda, and North Fabius.
- In the ability of watersheds to provide drinking water to the most people (step 2), several Iowa watersheds scored above average across the State. Scores were highest in the southeast, which has a higher number of surface water consumers. The Copperas-Duck and Lower Des Moines watersheds scored highest in this step.
- In the ability of watersheds to provide drinking water on private lands (step 3), the southeastern corner of Iowa scored highest. The top scoring watersheds are the Lower Des Moines, Bear-Wyaconda, and Copperas-Duck. 92 percent of Iowa's forest land is privately owned and 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 scoring watersheds are the Copperas-Duck and Big Papillion-Mosquito, which ranked in the top half of all the study area's watersheds, and are located in the far western (east of Omaha, Nebraska) and far eastern portions of the State.

Table 1. Watershed results for Iowa

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)
Copperas-Duck	07080101	3 of 10	244,854	16 %	4 %	20 of 40	289 of 540
Big Papillion-Mosquito	10230006	1 of 10	564,688	4 %	10 %	20 of 40	289 of 540
Lower Des Moines	07100009	6 of 10	82,686	27 %	1 %	19 of 40	320 of 540
Bear-Wyaconda	07110001	6 of 10	31,667	28 %	0 %	17 of 40	352 of 540
Coon-Yellow	07060001	5 of 10	0	37 %	3 %	17 of 40	352 of 540
North Fabius	07110002	6 of 10	19,210	26 %	0 %	16 of 40	380 of 540
Skunk	07080107	3 of 10	53,842	14 %	2 %	15 of 40	394 of 540
Lake Red Rock	07100008	4 of 10	14,000	11 %	3 %	15 of 40	394 of 540
North Racoon	07100006	3 of 10	203,825	3 %	2 %	15 of 40	394 of 540
Lower Iowa	07080209	1 of 10	69,120	8 %	4 %	14 of 40	407 of 540
Platte	10240012	3 of 10	7,868	11 %	5 %	14 of 40	407 of 540
Upper Chariton	10280201	3 of 10	38,620	18 %	0 %	14 of 40	407 of 540
Grant-Little Maquoketa	07060003	5 of 10	0	23 %	2 %	14 of 40	407 of 540
Apple-Plum	07060005	5 of 10	0	23 %	1 %	13 of 40	427 of 540
Lower Big Soix	10170203	2 of 10	128,000	2 %	3 %	13 of 40	427 of 540
Upper Grand	10280101	4 of 10	20,908	15 %	1 %	13 of 40	427 of 540
One Hundred and two	10240013	2 of 10	9,872	8 %	2 %	12 of 40	442 of 540
Root	07040008	4 of 10	0	20 %	1 %	12 of 40	442 of 540
Lower Grand	10280103	4 of 10	8,971	18 %	0 %	11 of 40	454 of 540
Maquoketa	07060006	4 of 10	0	14 %	1 %	11 of 40	454 of 540
Middle Des Moines	07100004	5 of 10	0	5 %	2 %	11 of 40	454 of 540
Thompson	10280102	4 of 10	18,209	16 %	0 %	11 of 40	454 of 540
Lower Cedar	07080206	2 of 10	0	10 %	3 %	10 of 40	465 of 540
Flint-Henderson	07080104	4 of 10	0	16 %	1 %	10 of 40	465 of 540
Lower Platte	10200202	2 of 10	0	6 %	6 %	10 of 40	465 of 540
Turkey	07060004	4 of 10	0	19 %	0 %	10 of 40	465 of 540
Blackbird-Soldier	10230001	2 of 10	7,512	4 %	2 %	10 of 40	465 of 540
Upper Iowa	07060002	4 of 10	0	17 %	0 %	10 of 40	465 of 540
South Skunk	07080105	3 of 10	0	6 %	3 %	9 of 40	484 of 540
Middle Cedar	07080205	3 of 10	0	5 %	2 %	9 of 40	484 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)
Upper Wapsipinicon	07080102	4 of 10	0	8 %	1 %	9 of 40	484 of 540
Blue Earth	07020009	3 of 10	10,947	3 %	1 %	9 of 40	484 of 540
Keg-Weeping Water	10240001	1 of 10	2,500	6 %	2 %	9 of 40	484 of 540
South Raccoon	07100007	3 of 10	1,175	6 %	0 %	8 of 40	498 of 540
Winnebago	07080203	3 of 10	0	3 %	1 %	8 of 40	498 of 540
Upper Cedar	07080201	3 of 10	0	5 %	1 %	8 of 40	498 of 540
Middle Iowa	07080208	2 of 10	0	8 %	1 %	8 of 40	498 of 540
Little Sioux	10230003	3 of 10	8,388	2 %	1 %	8 of 40	498 of 540
Nowaway	10240010	2 of 10	1,783	7 %	0 %	8 of 40	498 of 540
North Skunk	07080106	2 of 10	0	6 %	1 %	7 of 40	511 of 540
East Fork Des Moines	07100003	4 of 10	0	2 %	0 %	7 of 40	511 of 540
Boone	07100005	4 of 10	0	2 %	0 %	7 of 40	511 of 540
Lower Wapsipinicon	07080103	2 of 10	0	9 %	1 %	7 of 40	511 of 540
Floyd	10230002	2 of 10	0	1 %	1 %	7 of 40	511 of 540
Upper Des Moines	07100002	4 of 10	0	2 %	0 %	7 of 40	511 of 540
West Nowaway	10240009	2 of 10	5,690	4 %	0 %	7 of 40	511 of 540
Shell Rock	07080202	3 of 10	0	4 %	0 %	7 of 40	511 of 540
West Fork Cedar	07080204	4 of 10	0	3 %	0 %	7 of 40	511 of 540
Monona-Harrison Ditch	10230004	2 of 10	0	1 %	1 %	6 of 40	528 of 540
East Nishnabotna	10240003	2 of 10	0	2 %	1 %	6 of 40	528 of 540
Upper Iowa	07080207	3 of 10	0	3 %	0 %	6 of 40	528 of 540
Tarkio-Wolf	10240005	2 of 10	0	7 %	0 %	6 of 40	528 of 540
Rock	10170204	2 of 10	0	1 %	0 %	5 of 40	535 of 540
Maple	10230005	2 of 10	0	2 %	0 %	5 of 40	535 of 540
Nishnabotna	10240004	1 of 10	0	8 %	0 %	5 of 40	535 of 540
Boyer	10230007	2 of 10	0	3 %	0 %	5 of 40	535 of 540
West Nishnabotna	10240002	2 of 10	0	2 %	0 %	5 of 40	535 of 540

Average or total value for all watersheds listed in Table 1

Mean APCW for watersheds:	3.1	of 10
Important watersheds for drinking water composite score:	5.5	of 20
Private forests in important watersheds composite score:	7.5	of 30
Development pressure on private forests in important watersheds composite score:	10.2	of 40
Forested Land (acres):	5,762,449.9	
Private Forest (acres):	5,319,297.2	
Private Forest Land under Development Pressure by 2030 (acres):	93,081.3	
(% private forest land):	1.7%	

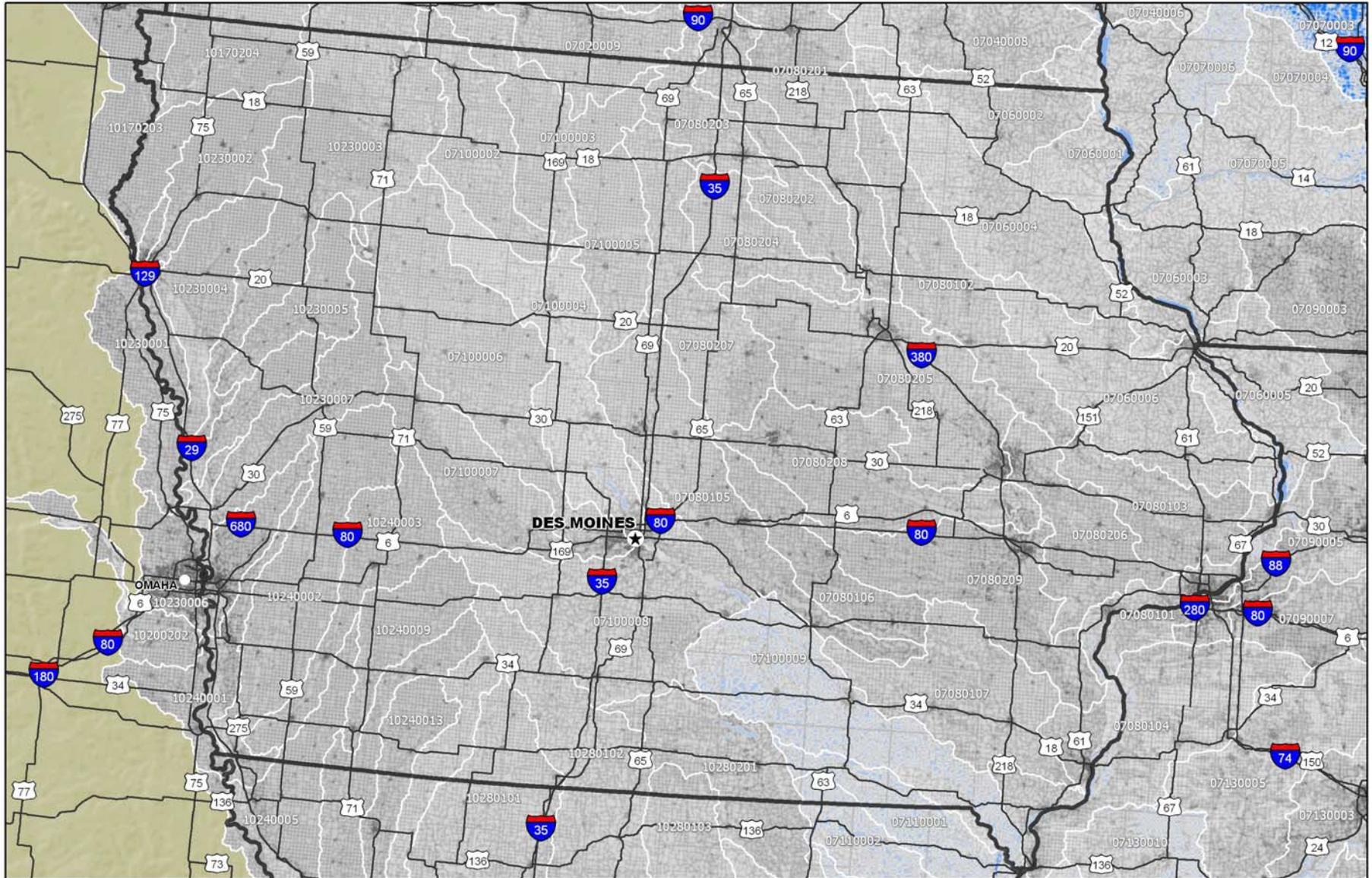
Note: If a watershed fell partially in Iowa, the whole watershed was considered for this project. State results reflect the total acreage for all watersheds that impact that State (this may account for a higher acreage figure than if only lands within State boundaries were considered).

Maps

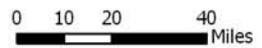
The following maps depict the results of each step in the Forests, Water and People analysis. Each watershed is labeled with the eight-digit HUC and the watershed composite score for the analysis step. (Note: the APCW, 30-m. pixel view does not have a watershed score)

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

Step 1 - Ability to Produce Clean Water, 30m View - Iowa



STEP 1 COMPOSITE SCORE, 30m VIEW

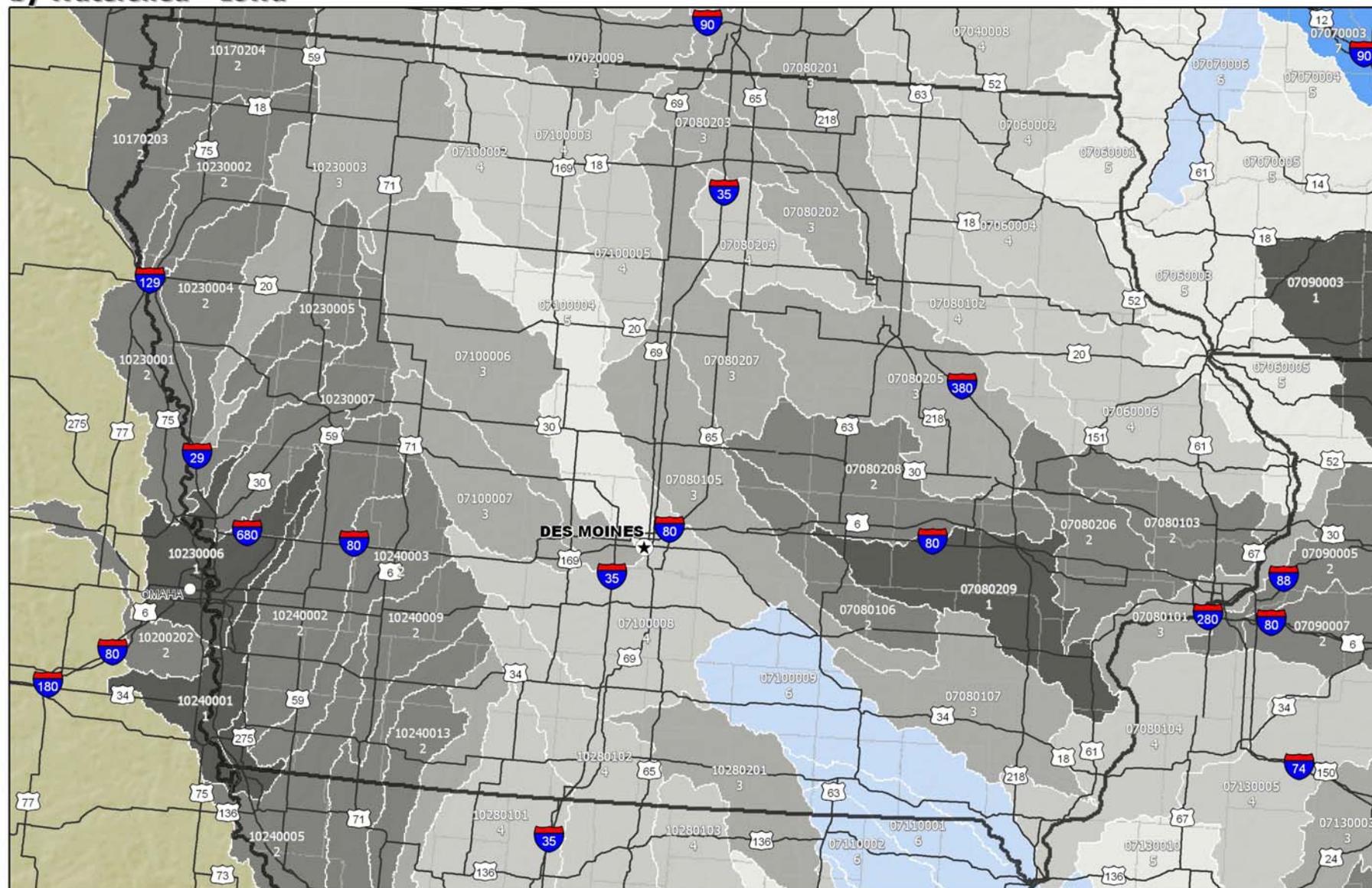


Projection: Albers

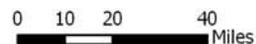
Watershed labels describe the 8-digit hydrologic unit code (HUC)

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Step 1 (Continued) - Mean Ability to Produce Clean Water by Watershed - Iowa



STEP 1 COMPOSITE SCORE

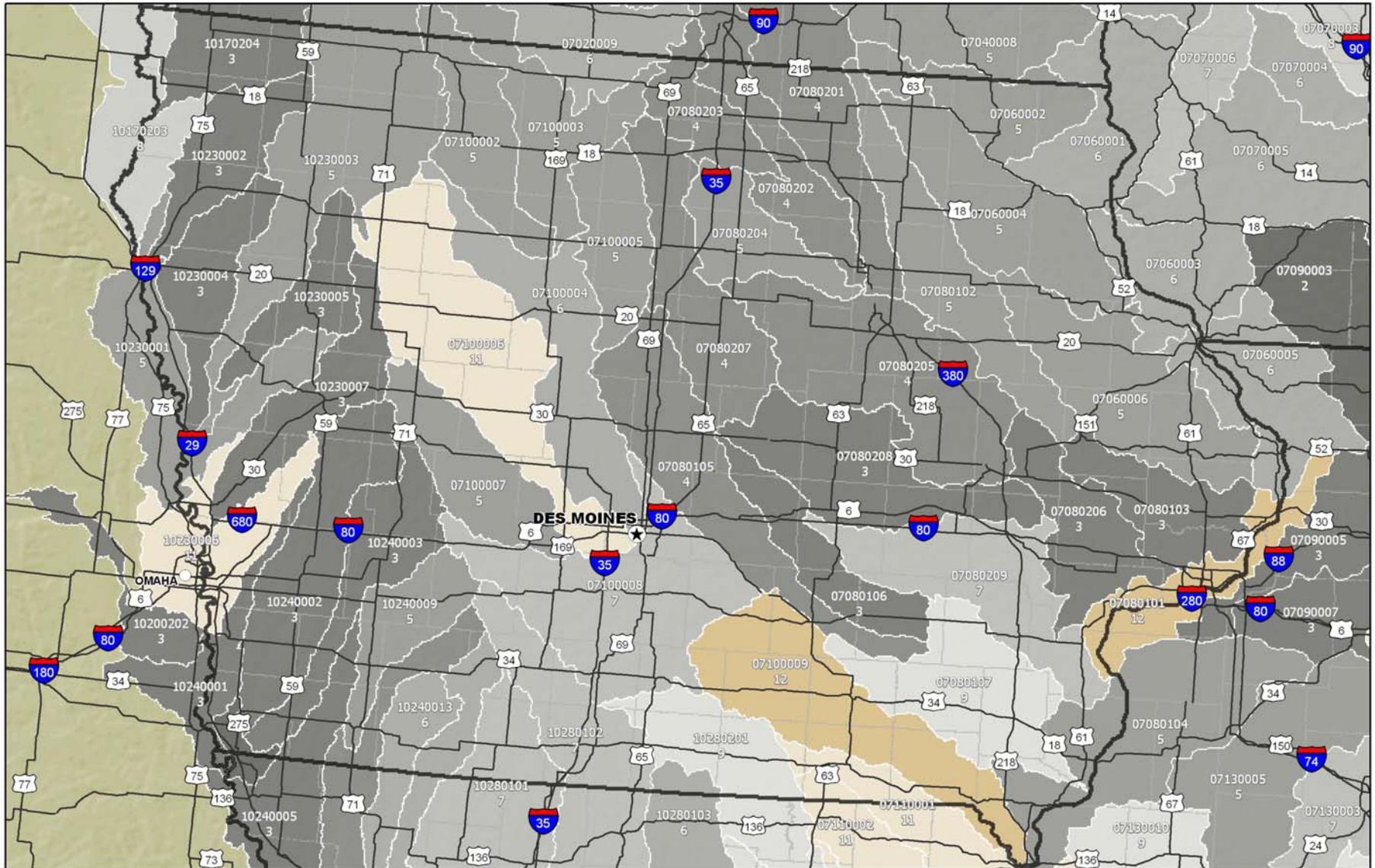


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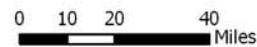
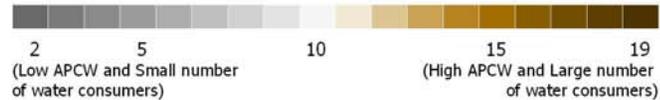
Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score

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Step 2 - Importance of watersheds for drinking water supply - Iowa



STEP 2 COMPOSITE SCORE

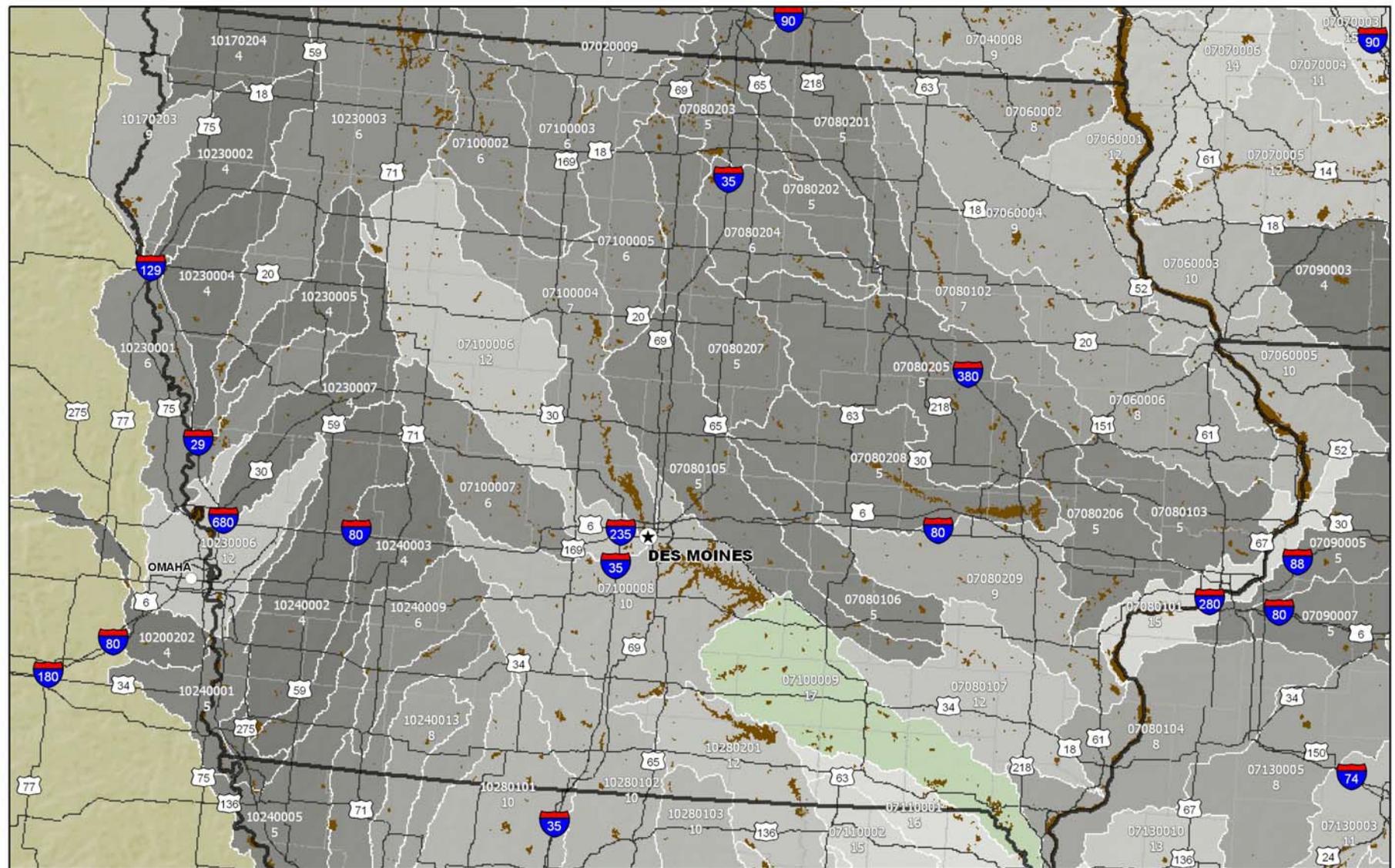


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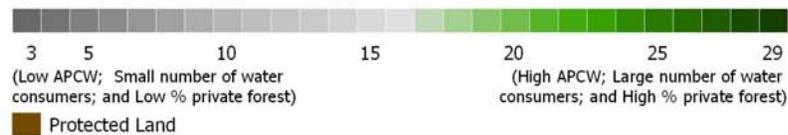
Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score

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Step 3: Importance of watersheds and private forest for drinking water supply Iowa

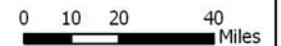


STEP 3 COMPOSITE SCORE



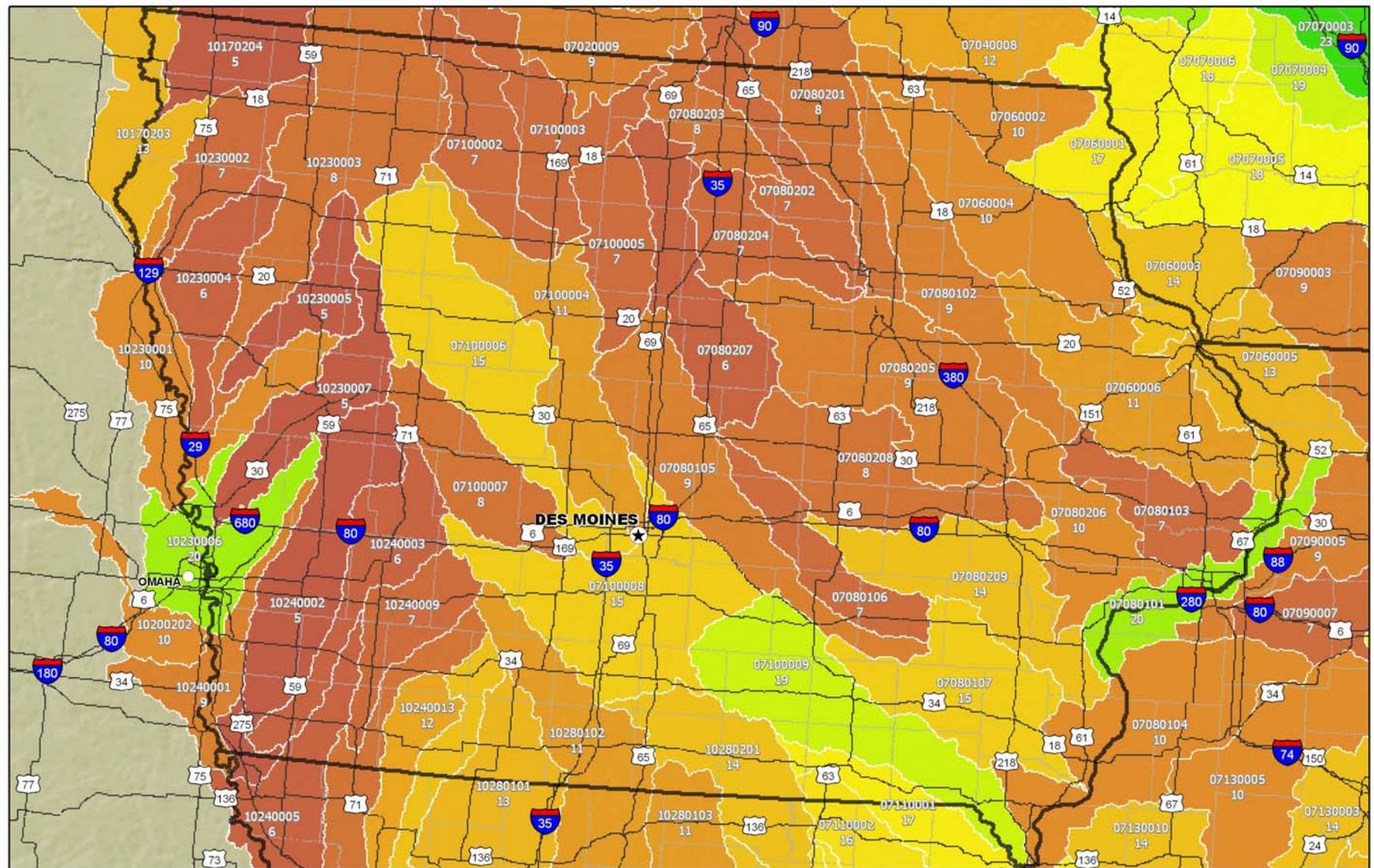
Projection: Albers

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

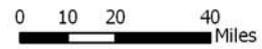
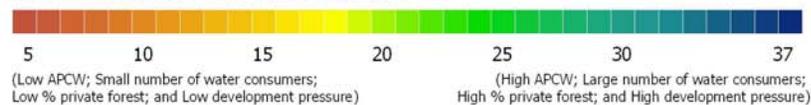


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Step 4: Development pressure on private forests in drinking water supply watersheds - Iowa



STEP 4 COMPOSITE SCORE



Projection: Albers

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

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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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