

Forests, Water and People

Drinking water supply and forest lands in Massachusetts

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

The Process

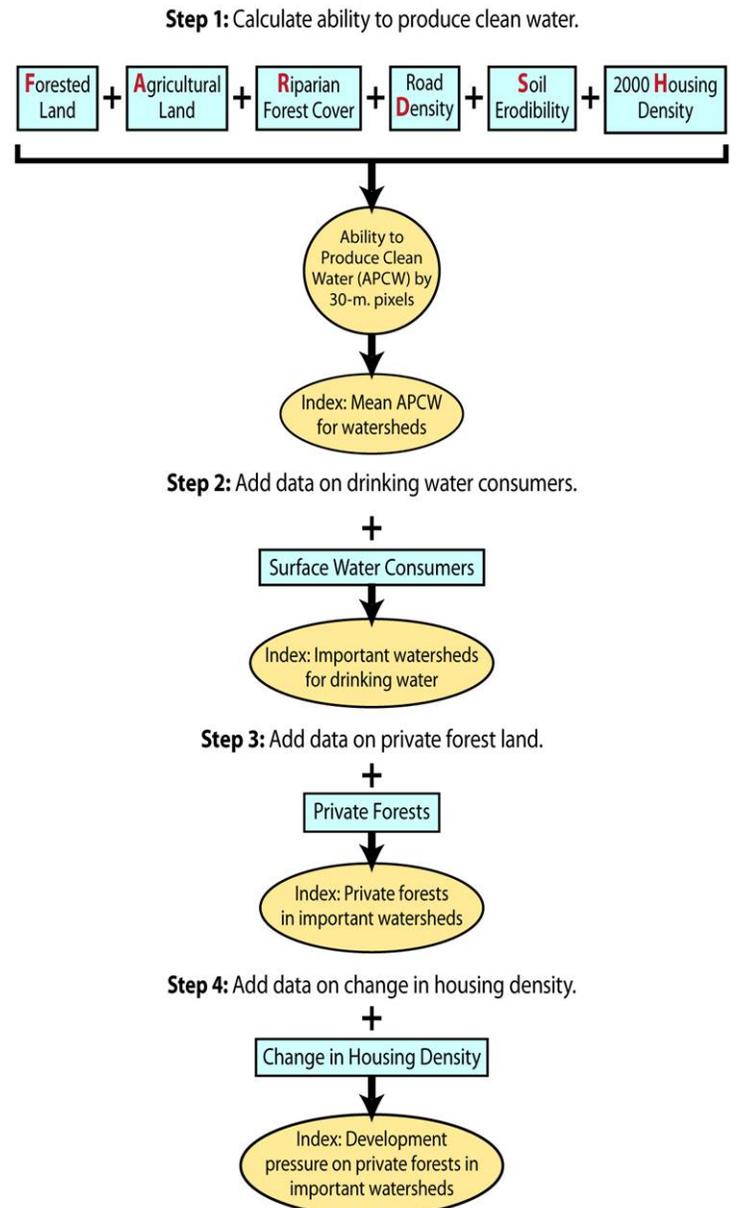
Through a 4 step GIS-based overlay analysis, four indices were developed for each watershed (see Figure 1).



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.



Massachusetts Results

Highlights

- Massachusetts contains both large areas of protected watershed forests and has Boston and surrounding metropolitan area that depends on clean drinking water from Massachusetts' forests. These factors contributed to its high ranking in the ability to produce clean water, providing surface drinking water supply, having private forests that provide drinking water supplies, and having watersheds at risk for development that are also important for drinking water supplies.
- The top watersheds for their ability to produce clean water are located in the western part of the state, which includes the Quabbin watershed lands. The highest ranking watershed in Massachusetts for its ability to produce clean water is the Westfield.
- Due to the fact that forested watersheds in Massachusetts provide drinking water for the Boston metropolitan area, the top watersheds for drinking water supply are located in central and western Massachusetts (Quabbin Reservoir and Berkshire Mountains). Those ranking very high are: Nashua, Farmington, Charles, Blackstone and Middle Hudson watersheds.
- Many of the same watersheds that ranked high for drinking water supply also contain large areas of private forests, particularly in the western part of the state. Watersheds ranking highest are: Chicopee, Westfield, Presumpscot, Piscataqua-Salmon Falls, Nashua and Blackstone watersheds.
- The top watersheds important for drinking water supply located in forests at risk of development are mainly in the eastern portion of the state, specifically portions of the following watersheds: Nashua, Blackstone, and Merrimack.

Table 1. Watershed results for Massachusetts

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)
Nashua	01070004	8 of 10	1,182,444	61 %	18 %	37 of 40	1 of 540
Piscataqua-Salmon Falls	01060003	9 of 10	111,575	76 %	33 %	37 of 40	1 of 540
Merrimack	01070002	8 of 10	732,987	68 %	26 %	36 of 40	4 of 540
Blackstone	01090003	8 of 10	264,074	67 %	17 %	36 of 40	4 of 540
Narragansett	01090004	7 of 10	640,603	58 %	16 %	34 of 40	10 of 540
Chicopee	01080204	9 of 10	1,041,152	67 %	5 %	34 of 40	10 of 540
Middle Hudson	02020006	8 of 10	2,769,134	64 %	7 %	34 of 40	10 of 540
Concord	01070005	8 of 10	134,822	55 %	14 %	34 of 40	10 of 540
Miller	01080202	9 of 10	38,822	67 %	9 %	33 of 40	19 of 540
Middle Connecticut	01080201	9 of 10	147,821	65 %	8 %	33 of 40	19 of 540
Shetucket	01100002	8 of 10	25,112	68 %	13 %	33 of 40	19 of 540
Housatonic	01100005	8 of 10	479,036	65 %	8 %	33 of 40	19 of 540
Farmington	01080207	8 of 10	285,181	66 %	6 %	33 of 40	19 of 540
Quinebaug	01100001	8 of 10	35,501	69 %	16 %	33 of 40	19 of 540
Westfield	01080206	9 of 10	338,282	68 %	2 %	32 of 40	34 of 540
Charles	01090001	8 of 10	745,013	40 %	11 %	32 of 40	34 of 540
Lower Connecticut	01080205	7 of 10	423,759	50 %	10 %	31 of 40	50 of 540
Cape Cod	01090002	7 of 10	341,429	43 %	11 %	31 of 40	50 of 540
Deerfield	01080203	9 of 10	23,300	65 %	4 %	30 of 40	61 of 540
Hudson-Hoosic	02020003	7 of 10	172,918	58 %	6 %	29 of 40	76 of 540

Average or total value for all watersheds listed in Table 1

Mean APCW for watersheds:	8.1	of 10
Important watersheds for drinking water composite score:	17.0	of 20
Private forests in important watersheds composite score:	25.5	of 30
Development pressure on private forests in important watersheds composite score:	33.3	of 40
Forested Land (acres):	9,332,660.7	
Private Forest (acres):	8,108,186.0	
Private Forest Land under Development Pressure by 2030 (acres):	1,273,386.2	

(% private forest land):

15.7%

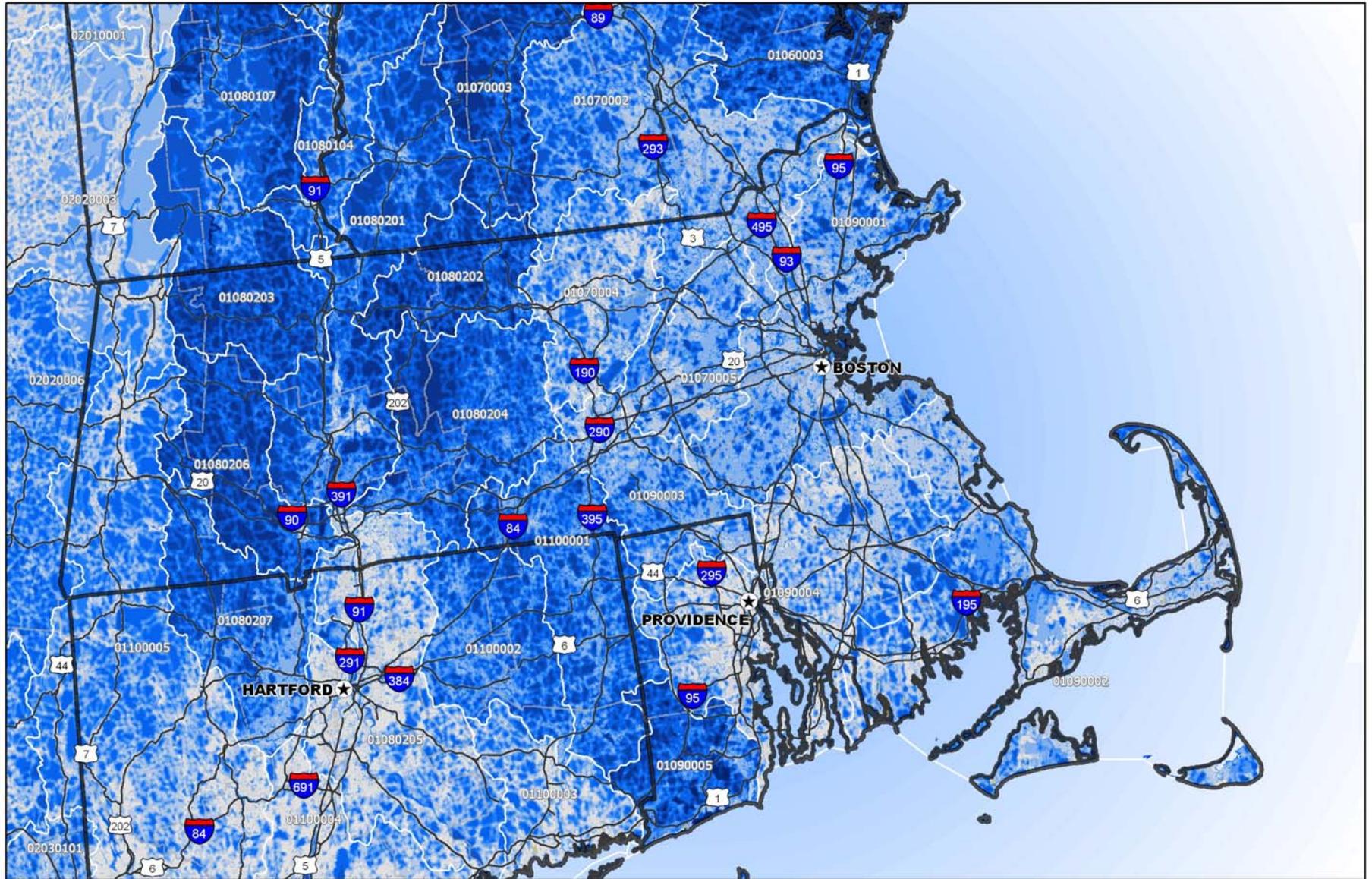
Note: If a watershed fell partially in Massachusetts, the whole watershed was considered for this project. State results reflect the total acreage for all watersheds that impact that State (this may account for a higher acreage figure than if only lands within State boundaries were considered).

Maps

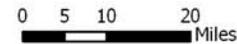
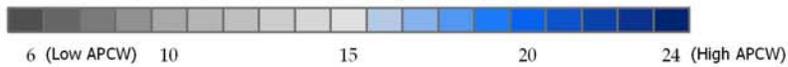
The following maps depict the results of each step in the Forests, Water and People analysis. Each watershed is labeled with the eight-digit HUC and the watershed composite score for the analysis step. (Note: the APCW, 30-m. pixel view does not have a watershed score)

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 - Massachusetts



STEP 1 COMPOSITE SCORE, 30m VIEW

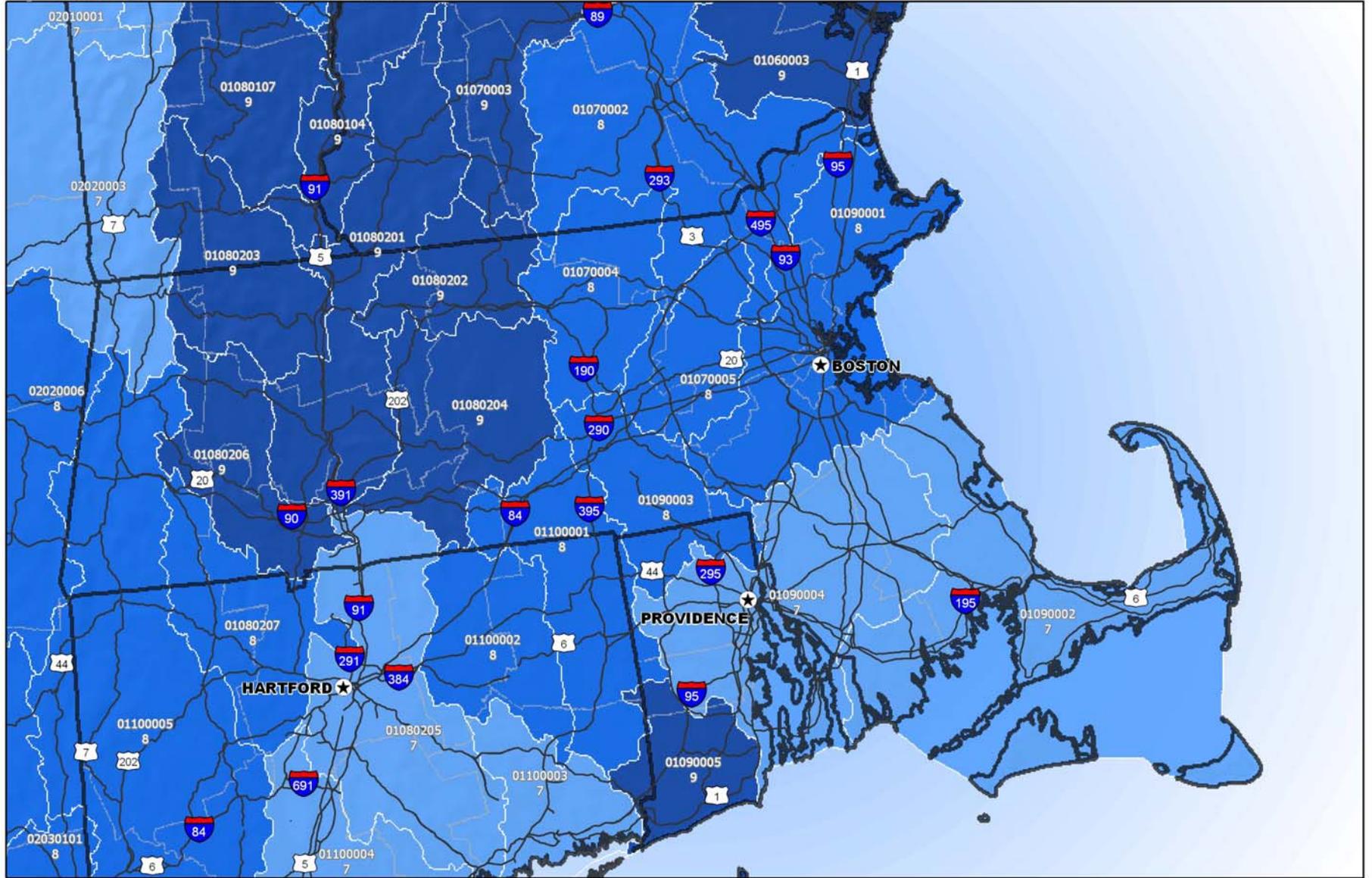


Projection: Albers

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 - Massachusetts



STEP 1 COMPOSITE SCORE

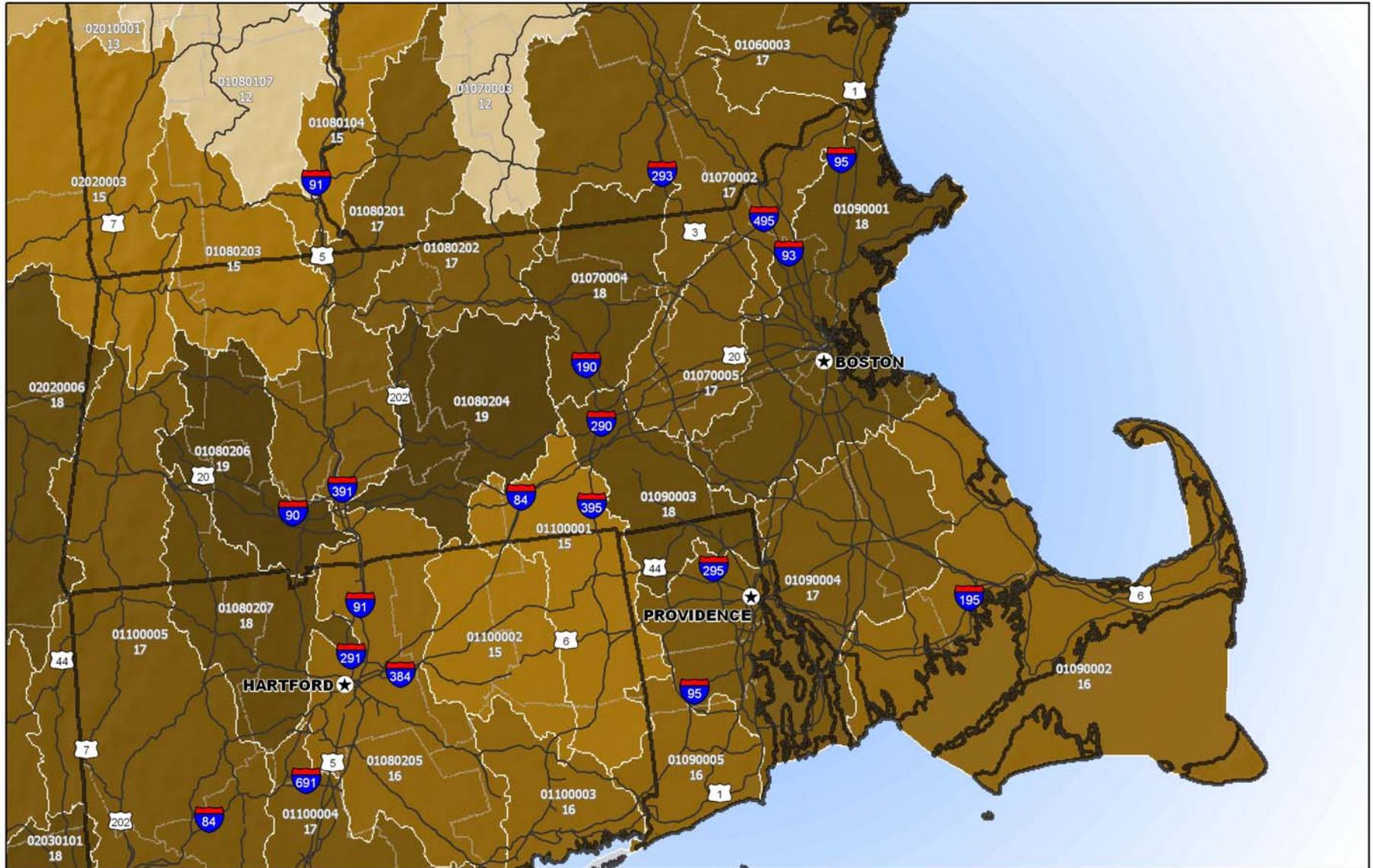


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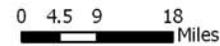
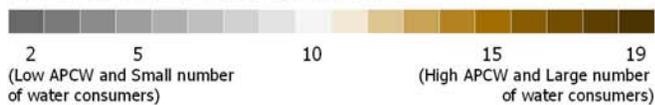
Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score

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



STEP 2 COMPOSITE SCORE

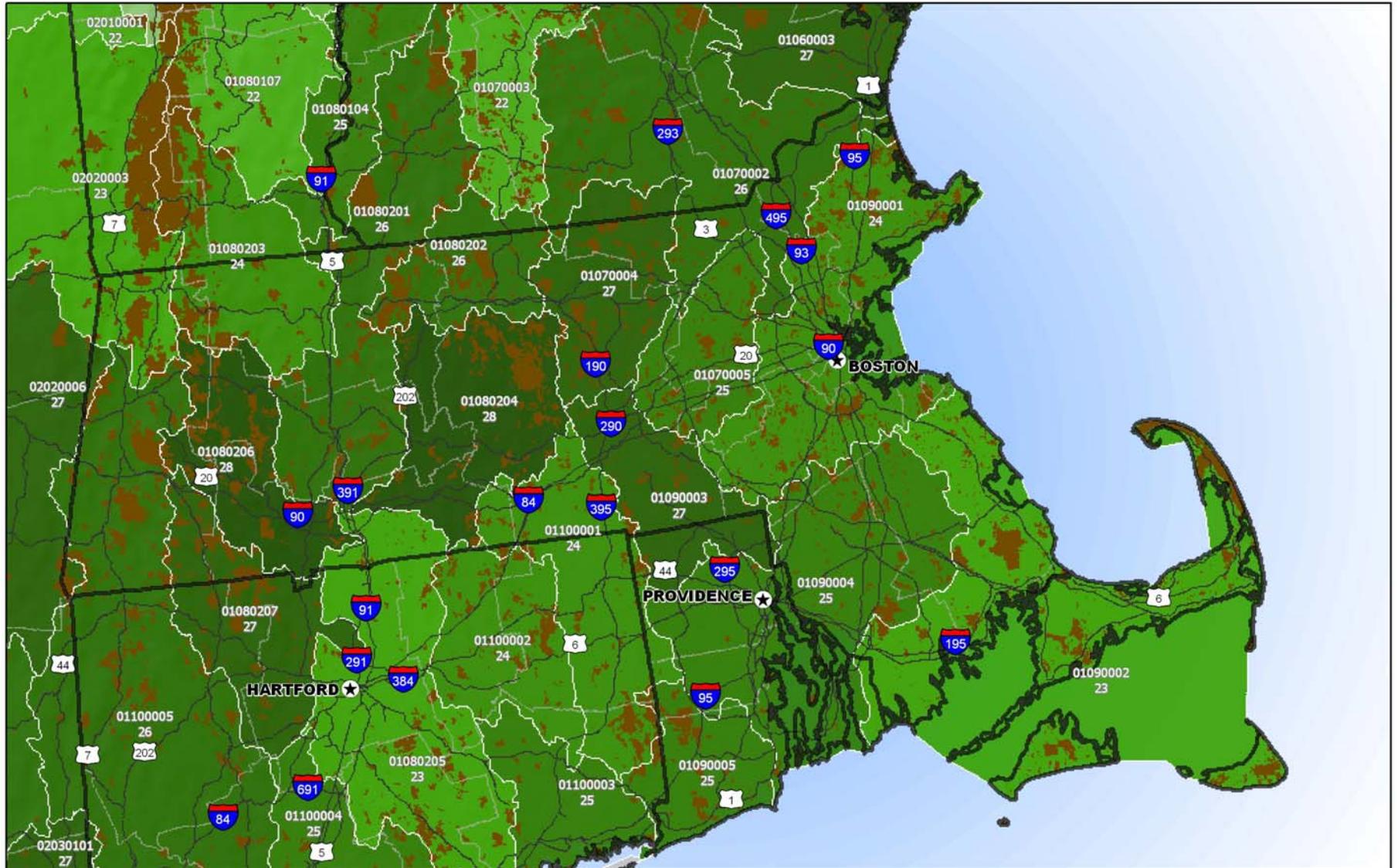


Projection: Albers

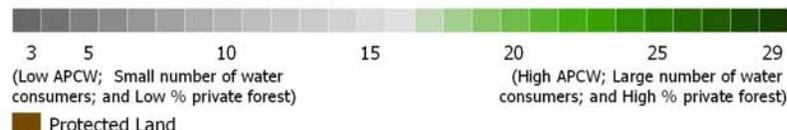
Watershed labels describe the 8-digit hydrologic unit code (HUC) and watershed composite score

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



STEP 3 COMPOSITE SCORE



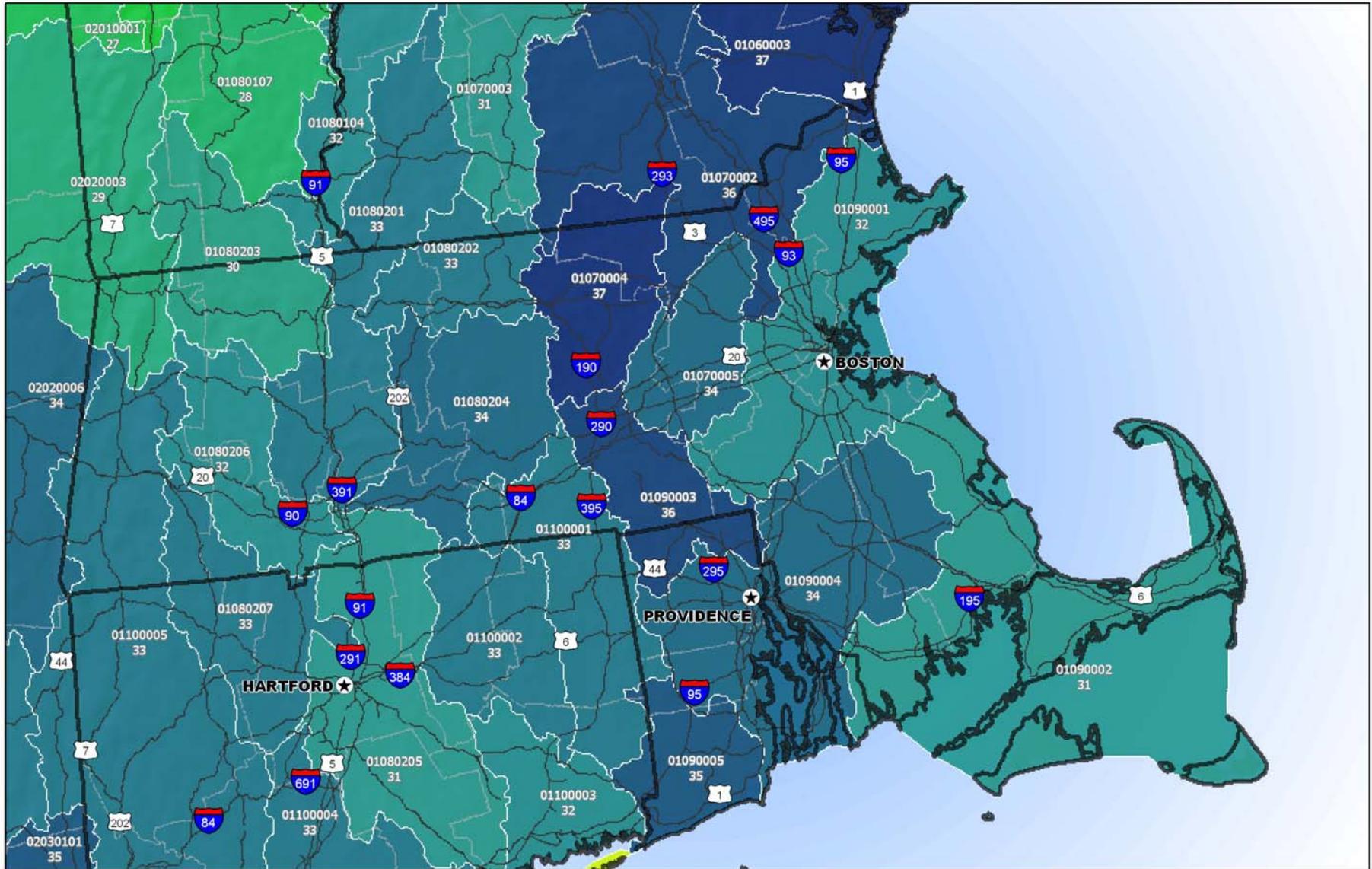
Projection: Albers

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 - Massachusetts



STEP 4 COMPOSITE SCORE



0 4.5 9 18 Miles

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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