4.3 Peters River

An IC method analysis for Massachusetts' Peters River watershed was performed to complete a TMDL allocation. The IC method was applied to estimate existing and target % IC in the overall watershed and in each sub-watershed.

4.3.1 Watershed Description

The watershed for the Peters River is located within Bellingham, Franklin, and Wrentham town boundaries and is shown on Figure 4-6. The watershed is characterized by forest, residential development, and agriculture, as tabulated in Table 4-8. The drainage area is 5,039 acres (7.9 sq. miles).

The Peters River is situated in South Central Massachusetts and is a major tributary within the Blackstone River Basin. The Peters River, at 7.1 miles, begins at the Outlet Curtis Pond in Bellingham, Ma. The River joins the Mill River and drains into the Blackstone River in Rhode Island. The drainage area of the Blackstone River Basin is 540 square miles of which approximately 335 square miles lie in Massachusetts including portions of Bristol, Middlesex, Norfolk, and Worcester counties (MADEP, 2001).

The Peters River is designated as a Class B river. The Massachusetts Blackstone River Basin 1998 Water Quality Assessment Report states that: "These waters are designated as a habitat for fish, other aquatic life, and wildlife, and for primary and secondary contact recreation. Where designated, they shall be suitable as a source of water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value" (MADEP, 2001).

Present uses of Peters River have not been assessed. The Peters River has been placed on the Clean Water Act 303(d) list for metals and fecal coliform bacteria. Under the Massachusetts Water Quality Standards 314 CMR 4.00, fecal coliform bacteria shall not exceed a geometric mean of 200 organisms per 100 ml in any representative set of samples nor shall more than 10% of the samples exceed 400 organisms per 100 ml (MADEP, 2002).

Table 4-8 Peters River: Major Landuse Distribution

Landuse	Percentage of Watershed
Forest	56%
Residential: Larger than 1/2 acre lots	14%
Residential: 1/4 - 1/2 acre lots	11%
Cropland	4%
Abandoned agriculture; power lines;	4%
Pasture	3%
Other	9%

4.3.2 Available Data

The State of Massachusetts provided a GIS shapefile containing sampling locations within the watershed. The watershed boundary GIS layer and landcover was obtained from MassGIS. Figure 4-7 provides a landuse map for the Peters River watershed. The MassGIS Landuse datalayer has 37 land use classifications interpreted from 1999 aerial photography.

4.3.3 Impervious Cover and Pollutant Load Calculation

To calculate watershed impervious cover, the Peters River watershed was digitally intersected with the MassGIS landuse datalayer, and the area of each landuse category calculated. Watershed impervious percentage was then calculated based on the assumed impervious percentages for each landuse as shown in Table 4-9. The assumed percentage of impervious cover for each landuse was derived using recommended percentages in TR-55, Urban Hydrology for Small watersheds (USDA, 1986). The results of this analysis indicate the Peters River watershed is 7 percent impervious. The Impervious Cover Model predicts sensitive stream quality for less than 10 percent impervious cover. Thus, the impervious cover model predicts sensitive water quality in the Peters River.

Table 4-9 Peters River: Estimated Percent Impervious Cover by Landcover

Landuse	Estimated Percent Impervious Cover
Transportation	90%
Commercial	85%
Industrial	72%
Residential: Multi-family	65%
Residential: Smaller than 1/4 acre lots	52%
Residential: 1/4 - 1/2 acre lots	31%
Residential: Larger than 1/2 acre lots	16%
Other	0%

Table 4-10 provides estimated existing % IC and target % IC values for the Peters River watershed. For illustrative purposes, estimated annual stormwater runoff volume and estimated annual pollutant loads for selected parameters are also provided, using annual rainfall and estimated event mean concentration of pollutants from (Schueler, 2003). For this watershed, an annual rainfall of 41.51 inches (Boston, NOAA.com) and a fraction of annual rainfall events that produced runoff of 0.9 (Center for Watershed Protection, 2003) were used.

Table 4-10 Peters River: Estimated Existing and Target TMDL Values for Key Parameters

Parameter	Estimated Conditions	
	Existing	TMDL Target
Impervious Cover	7%	9%
Optional:		
Annual Runoff Volume	1,813 acre-ft	2,055 acre-ft
Total Suspended Solids	390,000 lbs	440,000 lbs
Total P	1,600 lbs	1,800 lbs
Soluable P	640 lbs	720 lbs
Total N	12,000 lbs	13,000 lbs
TKN	8,500 lbs	9,600 lbs
Nitrate & Nitrite	3,200 lbs	3,700 lbs
Copper	66 lbs	75 lbs
Lead	330 lbs	380 lbs
Zinc	800 lbs	900 lbs

4.3.4 Summary and Conclusions

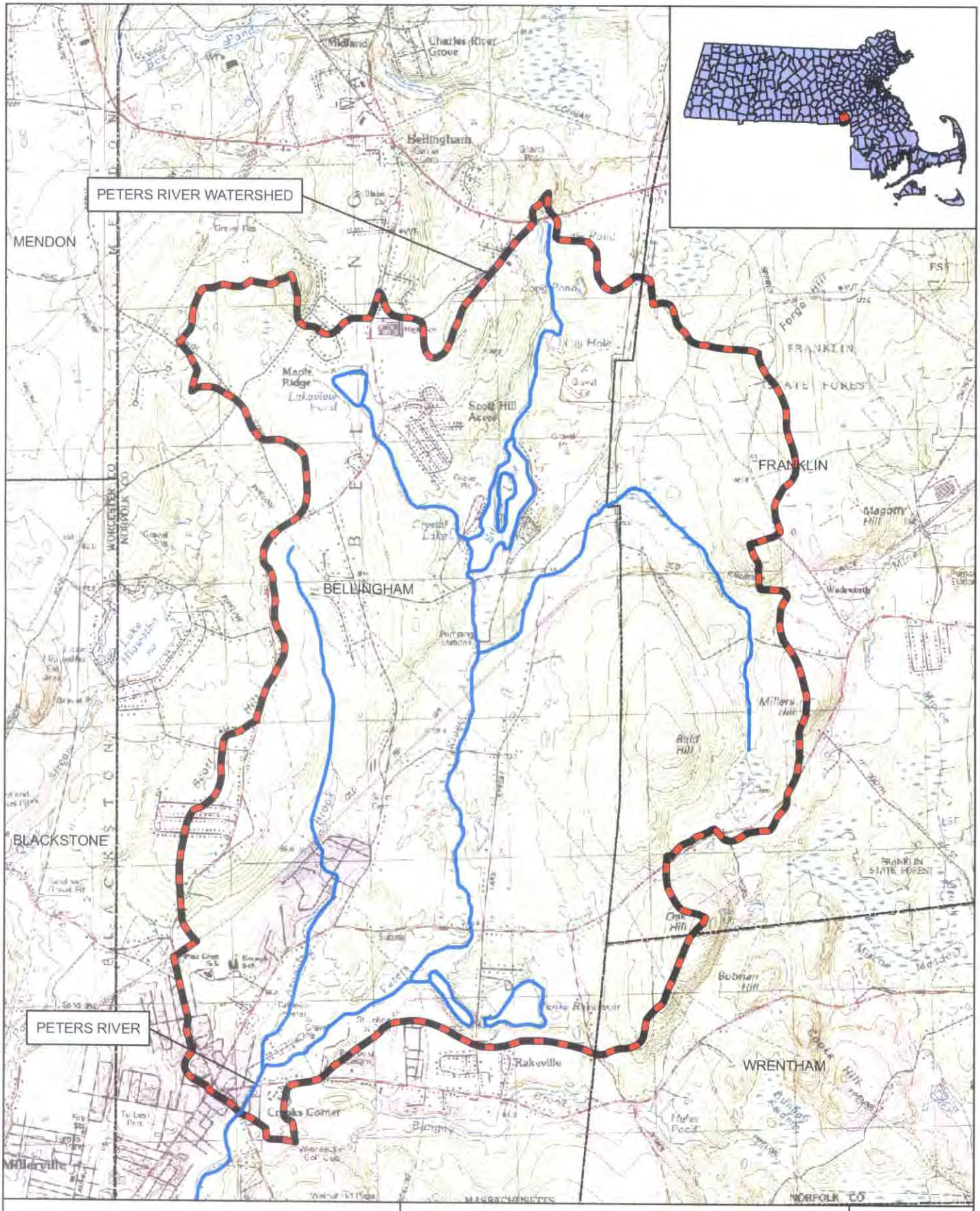
Peters River, Massachusetts

Section 303(d) listed impairments:	Metals
	Fecal coliform bacteria
Size of watershed:	7.9 square miles
Percent of IC in watershed:	7%

Applicability of IC method to this watershed

There were no problems using available data to calculate the percent IC for this watershed. It is a relatively small watershed and the land cover map provides adequate detail on the types of development and their concentrations in the watershed, although it might have been productive to separate the watershed into sub-basins based on the river branches shown on the map.

However, the cause of the impairment appears to be specific and known, and consequently, EPA would expect a specific TMDL to be developed for fecal coliform bacteria and metals. The fact that the existing %IC is lower than the TMDL target %IC indicates that stormwater runoff volume may not be the cause, and additional stressor identification is necessary. For these reasons, the IC method is not the appropriate method for TMDL development in this watershed.



N

0 1,500 3,000 6,000 Feet

1 inch equals 3,000 feet

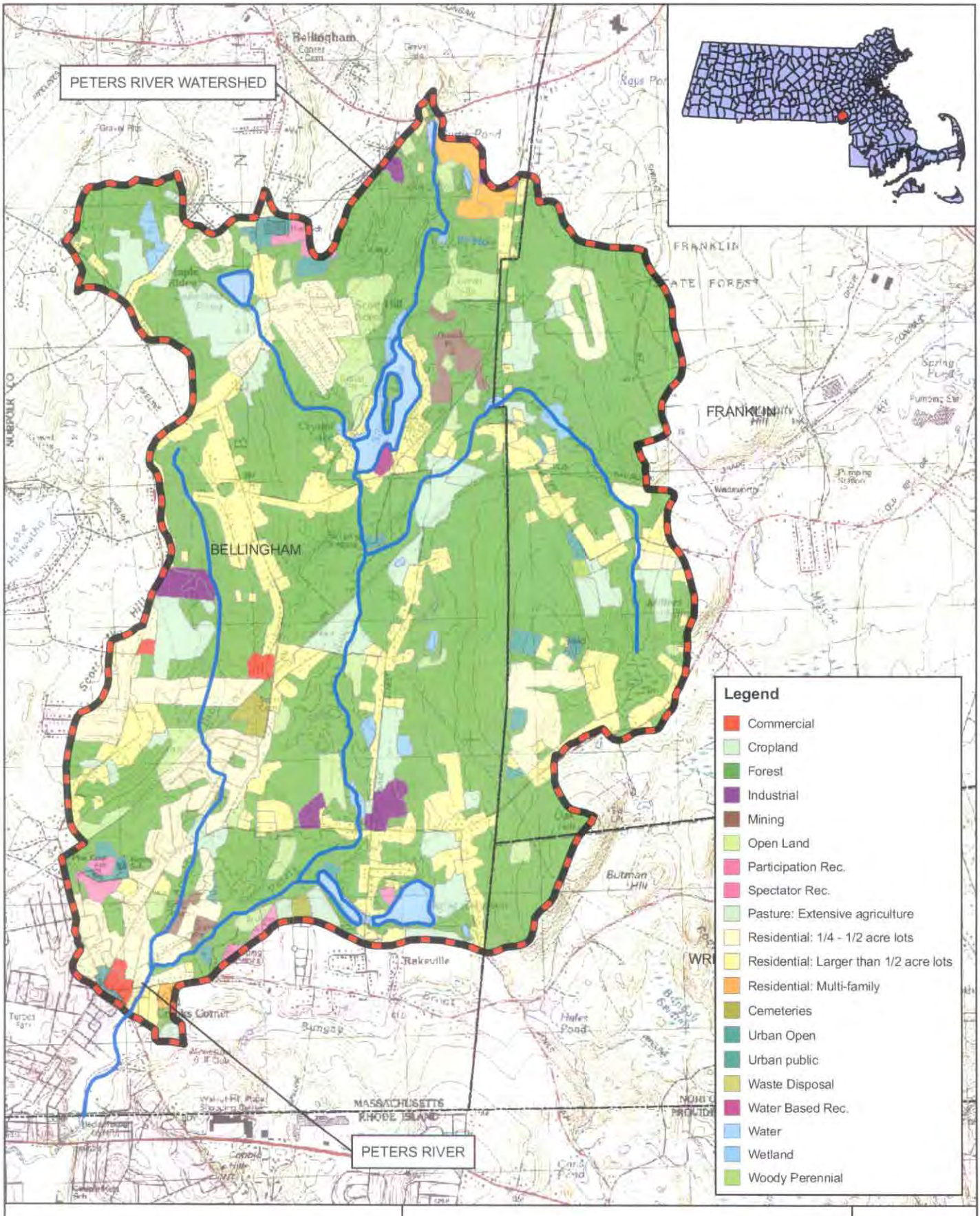
PETERS RIVER WITH WATERSHED BOUNDARY INDICATED

BELLINGHAM, MASSACHUSETTS

NOTE:
PETERS RIVER WATERSHED DOES NOT INCLUDE BANGAY BROOK.

FIGURE

4-6



N

0 1,500 3,000 6,000 Feet

1 inch equals 3,000 feet

PETERS RIVER LANDUSE MAP

BELLINGHAM, MASSACHUSETTS

NOTE:
PETERS RIVER WATERSHED DOES NOT INCLUDE BANGAY BROOK

FIGURE
4-7