

## 4.7 Tributary to Bond Brook, Maine

An IC method analysis for Maine's Tributary to Bond Brook 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.

### 4.7.1 Watershed Description

The watershed for the unnamed Tributary to Bond Brook is located within the city of Augusta, ME and is shown on Figure 4-15. The watershed is characterized by commercial, industrial, forest, and residential development, as provided in Table 4-21. The drainage area is 1,114 acres (1.74 sq. miles).

The unnamed Tributary to Bond Brook (HUC: ME0103000312) is part of the Lower Kennebec River Watershed. The Tributary begins near Augusta, Maine and joins Bond Brook. Bond Brook drains into the Kennebec River, which flows into the Gulf of Maine. The Tributary to Bond Brook is a Class B river at 2.0 miles in length. According to the Maine Integrated Water Quality Report, Class B waters are defined as general-purpose waters and are managed to attain good quality water. Well-treated discharges with ample dilution are allowed (MEDEP, 2004).

Under the 2004 Maine Integrated Water Quality Report, Tributary to Bond Brook is listed for Aquatic Life impairment. According to the Water Quality Report, the impairment listing criteria for aquatic life is as follows; "discharges shall not cause adverse impact to aquatic life in that the receiving waters shall be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes to the resident biological community" (MEDEP, 2004).

**Table 4-21 Tributary to Bond Brook: Major Landuse Distribution**

<b>Landuse</b>	<b>Percentage of Watershed</b>
Commercial-Industrial-Transportation	25%
Deciduous Forest	19%
Low Intensity Residential	11%
Grasslands	10%
Deciduous/Coniferous Forest	9%
Dense Residential Developed	6%
Coniferous/Deciduous Forest	5%
Crops/Ground	4%
Coniferous Forest	4%
Sparse Residential Developed	4%
Other	4%

#### 4.7.2 Available Data

The State of Maine Department of Environmental Protection (MEDEP) provided a CD containing the state's best available GIS coverages for the Tributary to Bond Brook watershed. This data included landuse for the State of Maine, a shapefile of the Tributary of Bond Brook watershed, and an orthophoto of the watershed area.

Figure 4-16 provides a landuse map for the Tributary to Bond Brook watershed. The landuse coverage is a combination of Maine Gap Analysis (GAP) landcover and USGS Multi Resolution Landcover Characterization (MRLC) landcover and was created by MEDEP. This coverage includes those classes from the GAP and MRLC layers that were best suited to calculating impermeability of watersheds. Both GAP and MRLC landcover datasets were based on 1992 LandSat TM Satellite Imagery, so the combined coverage also would be dated 1992.

#### 4.7.3 Impervious Cover and Pollutant Load Calculation

To calculate watershed impervious cover, the Tributary to Bond Brook's watershed was digitally intersected with the Maine combined landcover layer 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 4-22. 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 Tributary to Bond Brook is 27 percent impervious. The Impervious Cover Model predicts severe degradation of stream quality for greater than 25 percent impervious cover. Thus, the impervious cover model predicts severe water quality degradation in the Tributary to Bond Brook.

**Table 4-22 Tributary to Bond Brook: Estimated Percent Impervious Cover by Landcover**

<b>Landuse</b>	<b>Estimated Percent Impervious Cover</b>
Commercial-Industrial-Transportation	79%
Dense Residential Developed	65%
High Intensity Residential	65%
Highways/Runways	75%
Low Intensity Residential	25%
Sparse Residential Developed	20%
Urban/Industrial	72%
Other	0%

Table 4-23 provides estimated existing % IC and target % IC values for the tributary to Bond Brook 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 41.4 inches (Augusta Airport, WorldClimate.com) and a fraction of annual rainfall events that produced runoff of 0.9 (Schueler, 2003) were used.

**Table 4-23 Tributary to Bond Brook: Estimated Existing and Target TMDL Values for Key Parameters**

Parameter	Estimated Conditions	
	Existing	TMDL Target
Impervious Cover	27%	9%
<u>Optional:</u>		
Annual Runoff Volume	1,040 acre-ft	480 acre-ft
Total Suspended Solids	220,000 lbs	96,000 lbs
Total P	900 lbs	390 lbs
Soluble P	370 lbs	160 lbs
Total N	6,700 lbs	2,900 lbs
TKN	4,900 lbs	2,100 lbs
Nitrate & Nitrite	1,900 lbs	810 lbs
Copper	40 lbs	20 lbs
Lead	200 lbs	80 lbs
Zinc	500 lbs	200 lbs

#### 4.7.4 Summary and Conclusions

Tributary to Bond Brook, Maine

Section 303(d) listed impairments: Aquatic life support

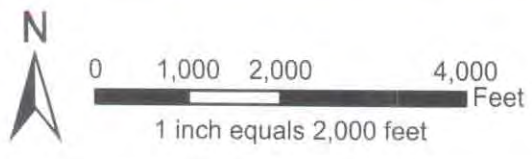
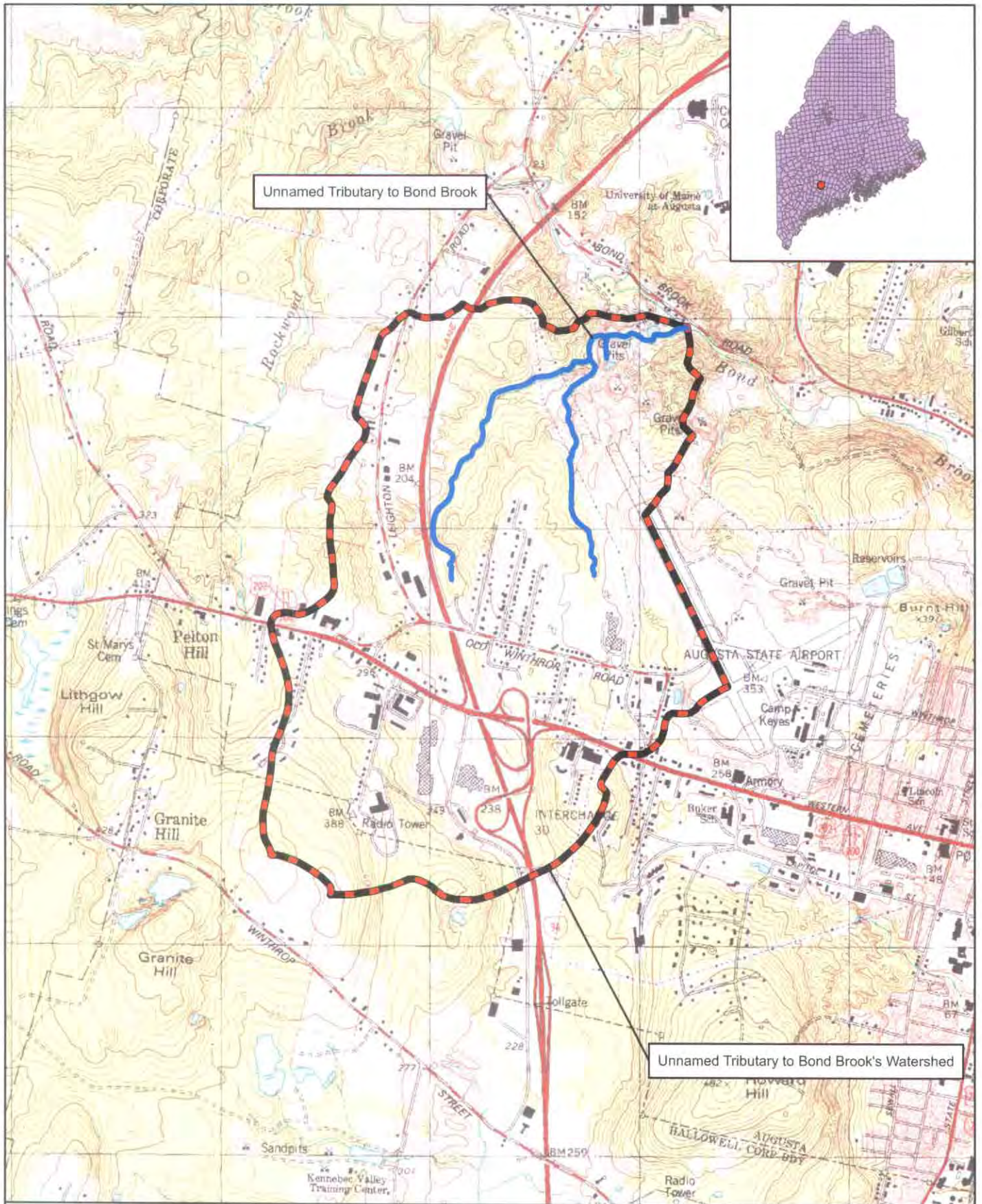
Size of watershed: 1.7 square miles

Percent of IC in watershed: 27%

##### Applicability of IC method to this watershed

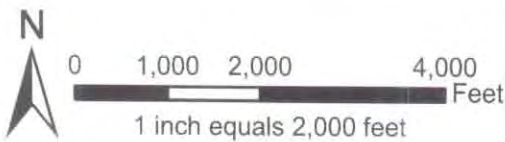
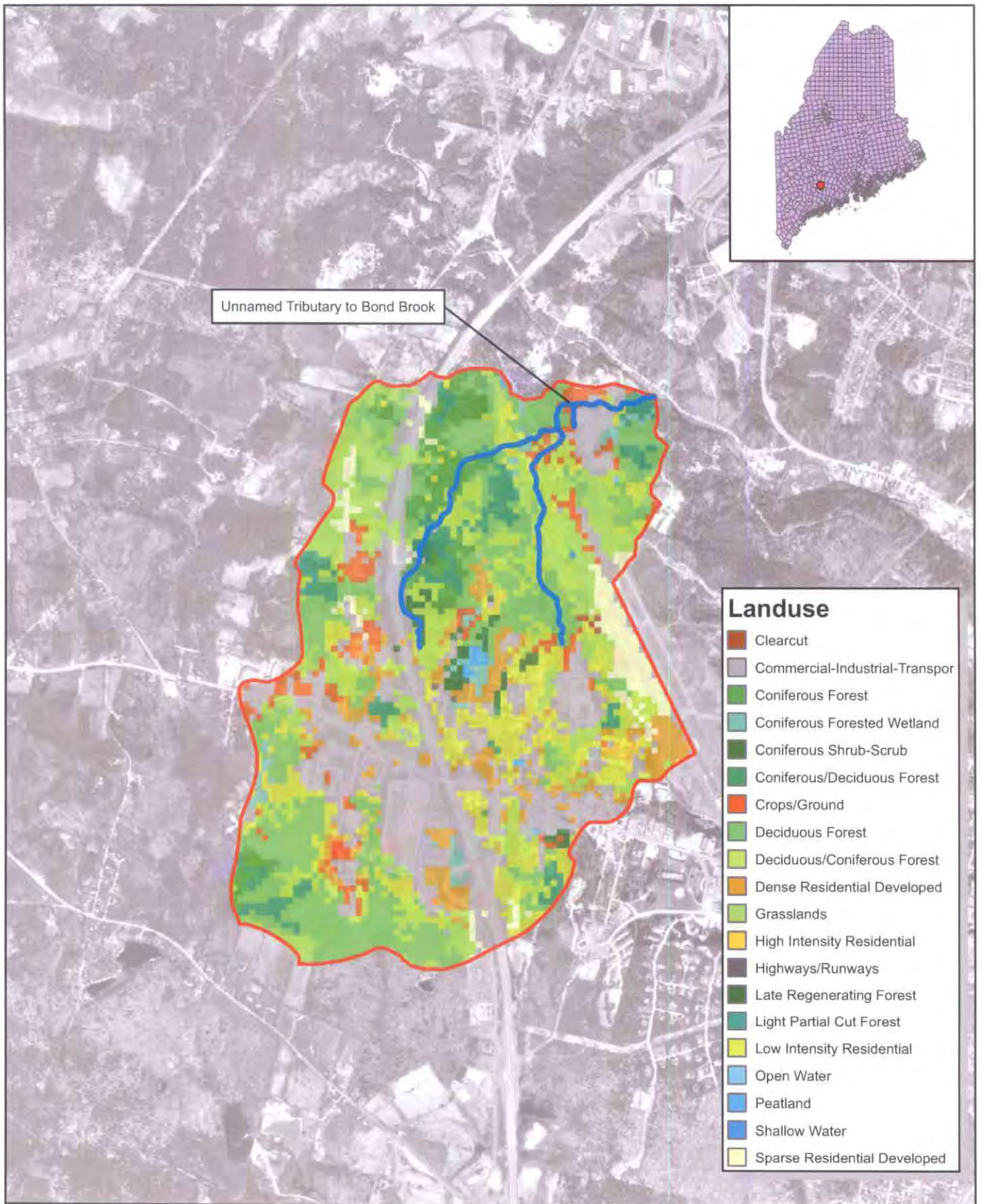
There were no problems using available data to calculate the percent IC for this watershed. It is a small watershed and the land cover map provides adequate detail on the types of development and their concentrations in the watershed.

The analysis shows a large difference between the existing and target IC levels. Consequently, the IC method appears to be a good approach for the aquatic life support impairment in this watershed.



**TRIBUTARY TO BOND BROOK WITH  
WATERSHED BOUNDARY INDICATED**  
AUGUSTA, ME

FIGURE  
**4-15**



TRIBUTARY TO BOND BROOK LANDUSE MAP  
AUGUSTA, ME

FIGURE  
4-16