4.6 Artic Brook (aka, Stream on Valley Ave)

An IC method analysis for Maine's Artic 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.

4.6.1 Watershed Description

The watershed for the Artic Brook is located within the city of Bangor, ME and is shown on Figure 4-13. The watershed is characterized by forest, commercial, industrial, and residential development (Table 4-18). The drainage area is 621 acres (0.97 sq. miles).

Artic Brook (HUC: ME0102000510) is located in Bangor, Maine and is part of the Kenduskeag Drainage Basin. Artic Brook drains into the Kenduskeag Stream, which leads into the Penobscot River. Artic Brook is a Class B river at 0.5 miles in length. According to the Maine Integrated Water Quality Report, Class B waters are defined as general-purpose water 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, Artic Brook is listed for aquatic life. According to the Water Quality Report the impairment listing criteria for aquatic life is the following: 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 4-18 Artic Brook: Major Landuse Distribution

Landuse	Percentage of Watershed
Commercial-Industrial-Transportation	24%
Low Intensity Residential	19%
Grasslands	12%
High Intensity Residential	11%
Dense Residential Developed	10%
Coniferous/Deciduous Forest	9%
Crops/Ground	3%
Other	11%

4.6.2 Available Data

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

Figure 4-14 provides a landuse map for the Artic 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.

4.6.3 Impervious Cover and Pollutant Load Calculation

To calculate watershed impervious cover, the Artic 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 4-19 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 Artic Brook watershed is 38 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 Artic Brook.

Table 4-19 Artic Brook: Estimated Percent Impervious Cover by Landcover

Landuse	Estimated Percent Impervious Cover
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 4-20 provides estimated existing % IC and target % IC values for the Artic 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 4-20 Artic Brook: Estimated Existing and Target TMDL Values for Key Parameters

Parameter	Estimated Conditions	
	Existing	TMDL Target
Impervious Cover	38%	9%
Optional:		
Annual Runoff Volume	780 acre-ft	260 acre-ft
Total Suspended Solids	160,000 lbs	55,000 lbs
Total P	670 lbs	220 lbs
Soluable P	270 lbs	91 lbs
Total N	5,000 lbs	1,700 lbs
TKN	3,600 lbs	1,200 lbs
Nitrate & Nitrite	1,400 lbs	460 lbs
Copper	28 lbs	9 lbs
Lead	140 lbs	47 lbs
Zinc	340 lbs	110 lbs

4.6.4 Summary and Conclusions

Artic Brook, Maine

Section 303(d) listed impairments: Aquatic life support

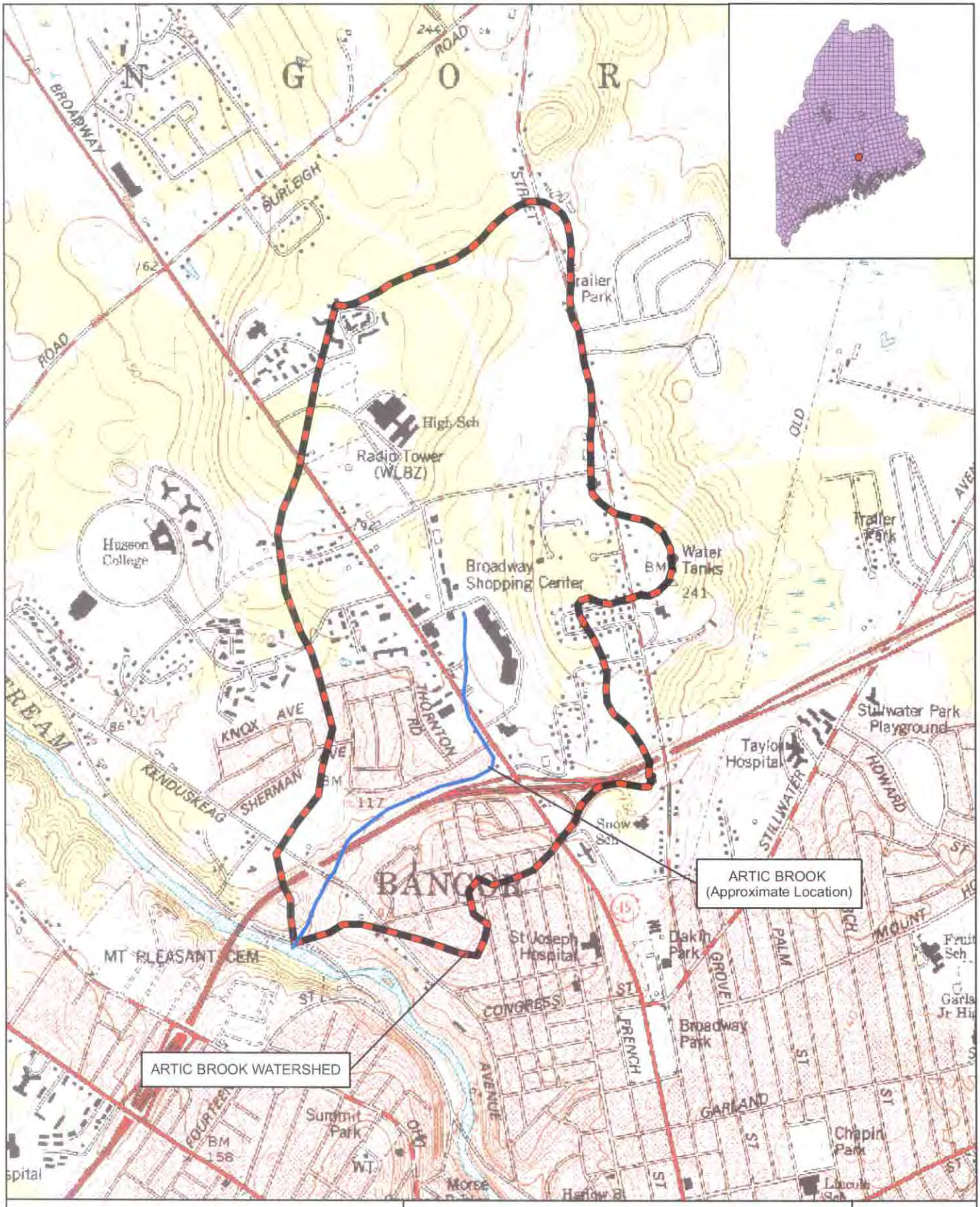
Size of watershed: 1 square mile

Percent of IC in watershed: 38%

Applicability of IC method to this watershed

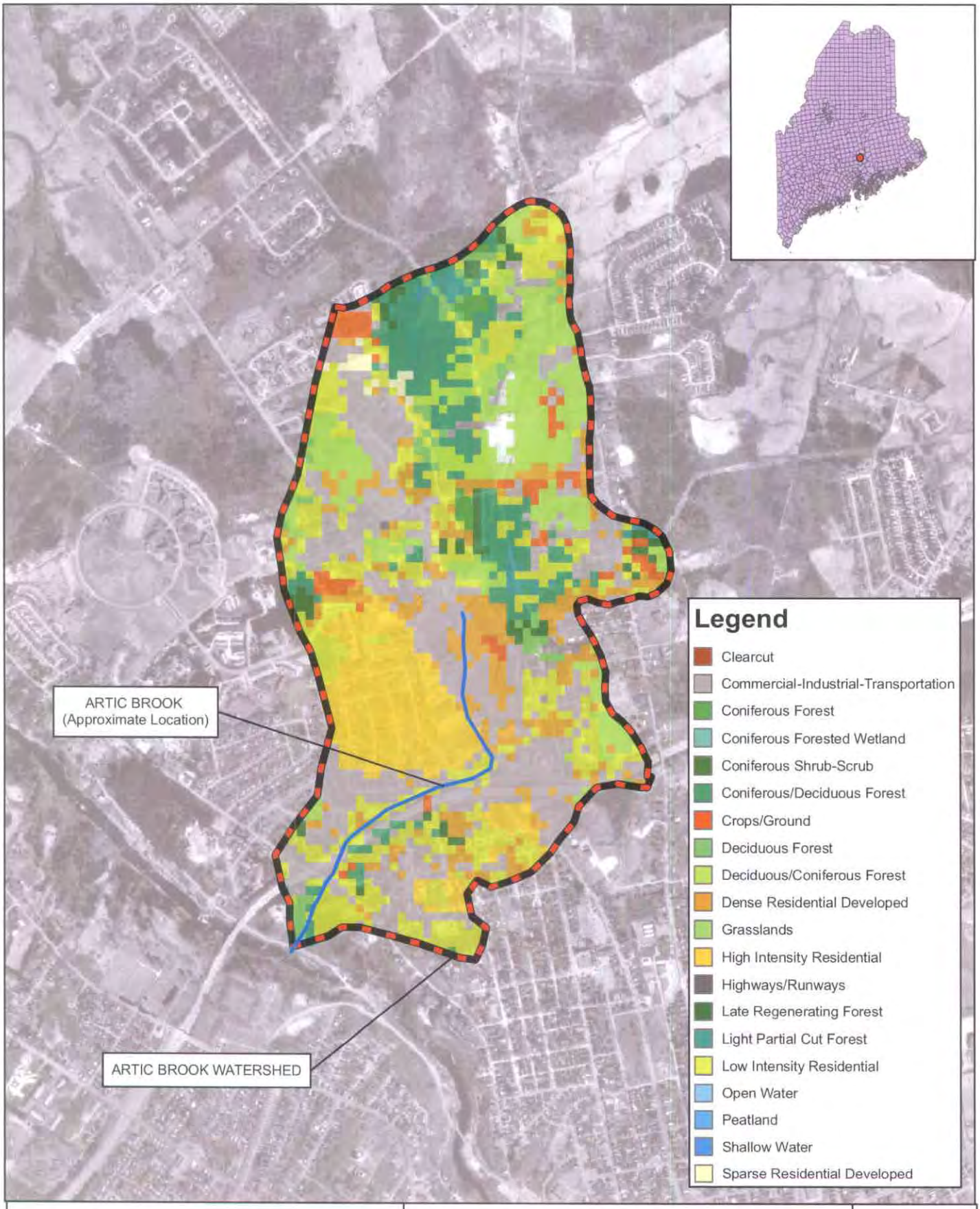
There were no problems using available data to calculate the percent IC for this watershed. It is a small watershed and the land cover map provides adequate detail on the types of development and their concentrations in the watershed.

The analysis shows a large difference between the existing and target (9%) IC levels. Consequently, the IC method appears to be a good approach for the aquatic life support impairment in this watershed.



ARTIC BROOK WITH
WATERSHED BOUNDARY INDICATED
BANGOR, ME

FIGURE
4-13



N

0 750 1,500 3,000 Feet

1 inch equals 1,500 feet

ARTIC BROOK LANDUSE MAP

BANGOR, ME

FIGURE

4-14