7. Management Measures

Based on thorough evaluation of water quality data and supporting information characterizing the watershed, the work groups identified management measures that will be necessary to achieve recommended pollutant reductions in Plum Creek. Load duration curves provided the basis for defining needed load reductions within each monitoring zone, and SELECT analysis supported focusing on specific sources and target locations within the watershed to most efficiently achieve reduction goals. Figure 7.1 presents a map which establishes specific subwatershed designations (UH-1-3, LO-1-11, and LU-1-21) within each monitoring region. Management measures are proposed to address both bacteria and nutrient concerns. In most cases, steps taken to reduce bacteria loads in the watershed also will result in reductions in nutrient loading. However, because a portion of the nutrient load likely comes from sources not associated with bacteria production (e.g., urban landscaping and cropland), specific measures addressing these sources also have been recommended.

As noted previously, the entire length of Plum Creek has been listed as having concerns for nitrate concentrations. While a portion of the nitrate load in the Plum Creek Watershed likely is due to point and nonpoint source pollution, an examination of groundwater conditions and streamflow data in the area indicates that a significant percentage of the nitrate load originates from natural sources. Data from the TWDB's Water Information Integration and Dissemination database show that groundwater samples in the area have high nitrate levels. For example:

- 106 of 245 well water samples in the watershed exceeded the screening criterion (1.95 mg/L) with an average nitrate concentration of 45 mg/L.
  - 27 of these samples were collected before 1945, 12 of which exceeded the criterion, and the average concentration for all pre-1945 samples was 25 mg/L.
- All 62 samples from Plum Creek Watershed wells sampled within the Leona formation exceeded the standard, with an average concentration of 56 mg/L.
  - 10 of these were collected before 1945, and the average concentration was 47 mg/L.

Because a significant proportion of the water samples tested prior to 1945 (when nitrogen fertilizer use became widespread) had high nitrate concentrations, it can be assumed that the cause is not related to human activity. Instead, historical and current high nitrate levels in the groundwater are likely due to natural geological characteristics. Further, elevated nitrate concentrations measured within Plum Creek are predominantly influenced by this natural occurrence. This conclusion is supported by the fact that the greatest stream nitrate concentrations are found at the Lockhart monitoring station, where groundwater reaches the surface through countless Leona formation springs in the area. The station is located below the springs and exhibits relatively constant elevated nitrate concentrations across streamflow conditions.

As a result, recommended measures for nutrient management focus on the reduction of phosphorus loads. However, because most nutrient management practices also have a simultaneous effect in reducing nitrogen loads (e.g., fertilizer management, removal of animal waste), potential nitrate contributions from anthropogenic sources also will be minimized.

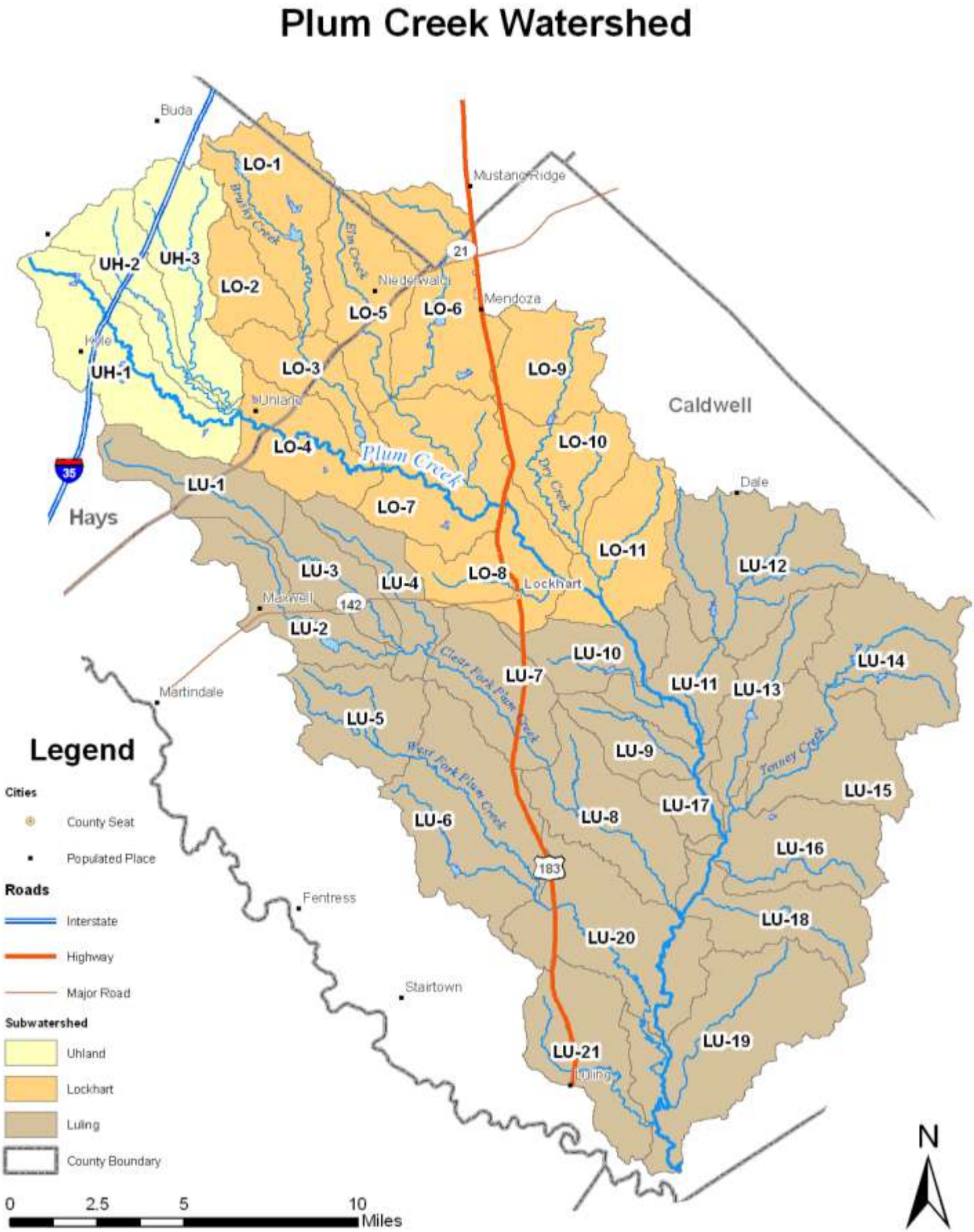

Figure 7.1. Subwatershed map used to target management measures in appropriate areas.