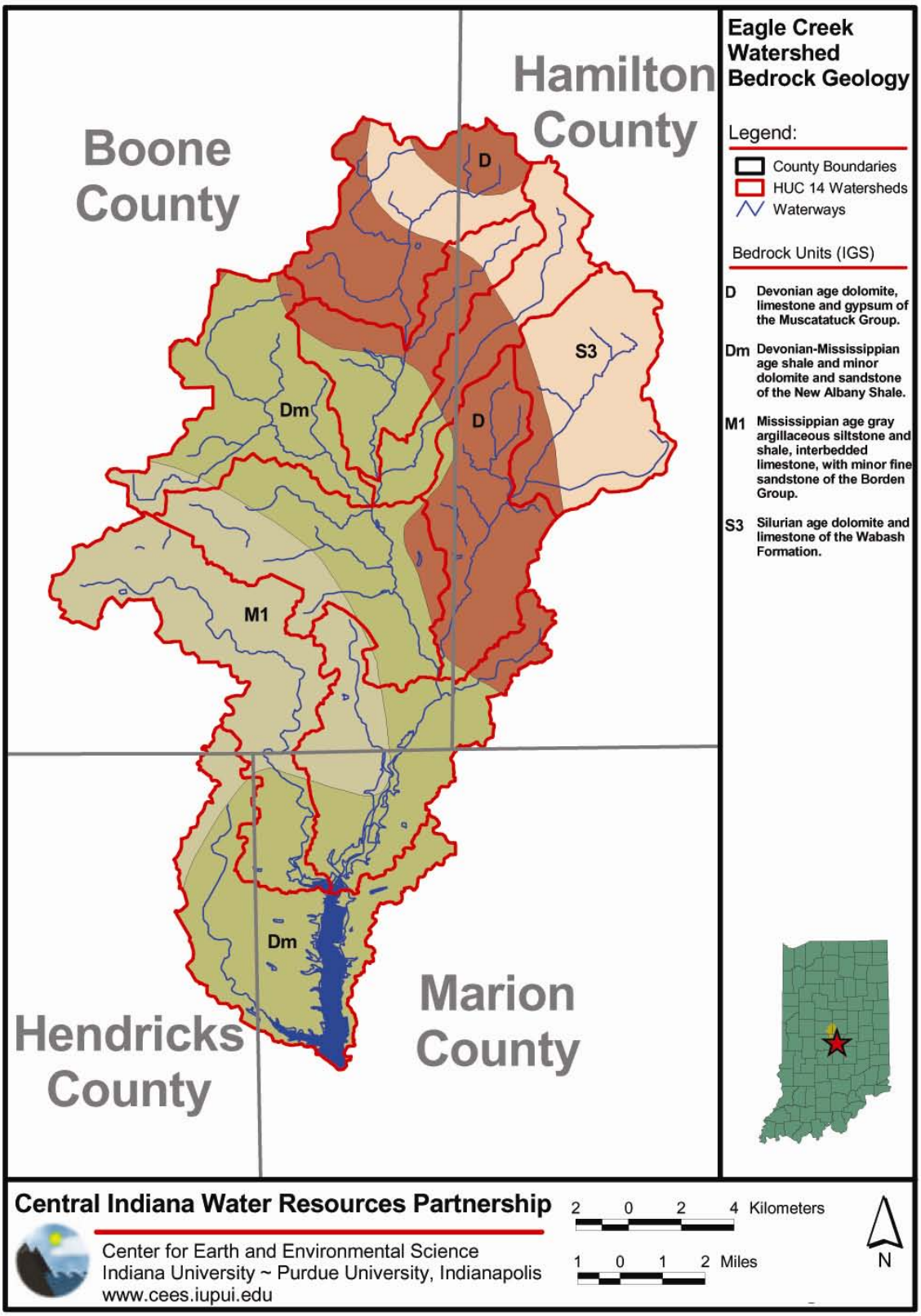

Figure III-12: Eagle Creek Watershed - Bedrock Geology

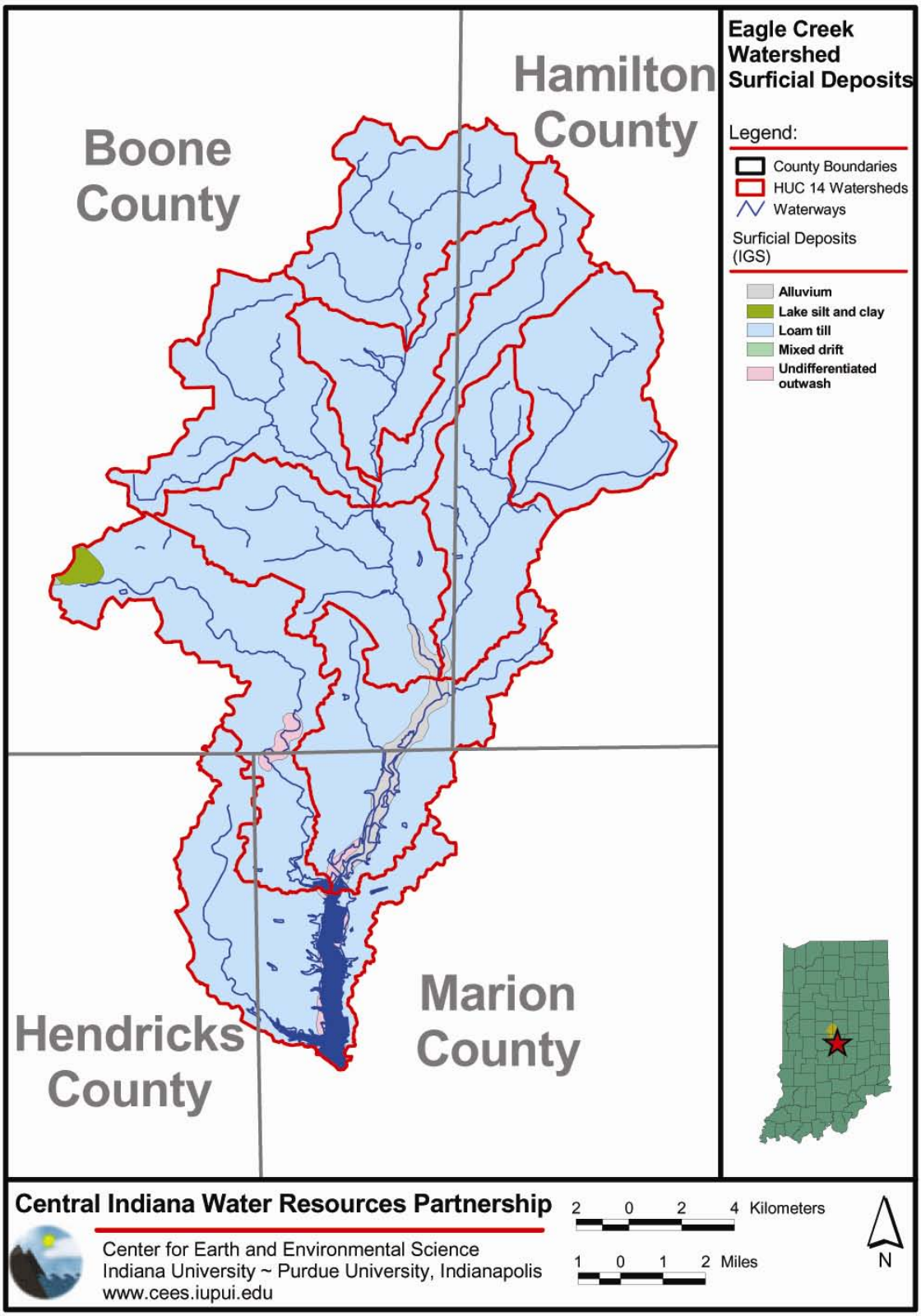

Figure III-13: Eagle Creek Watershed – Surficial Deposits

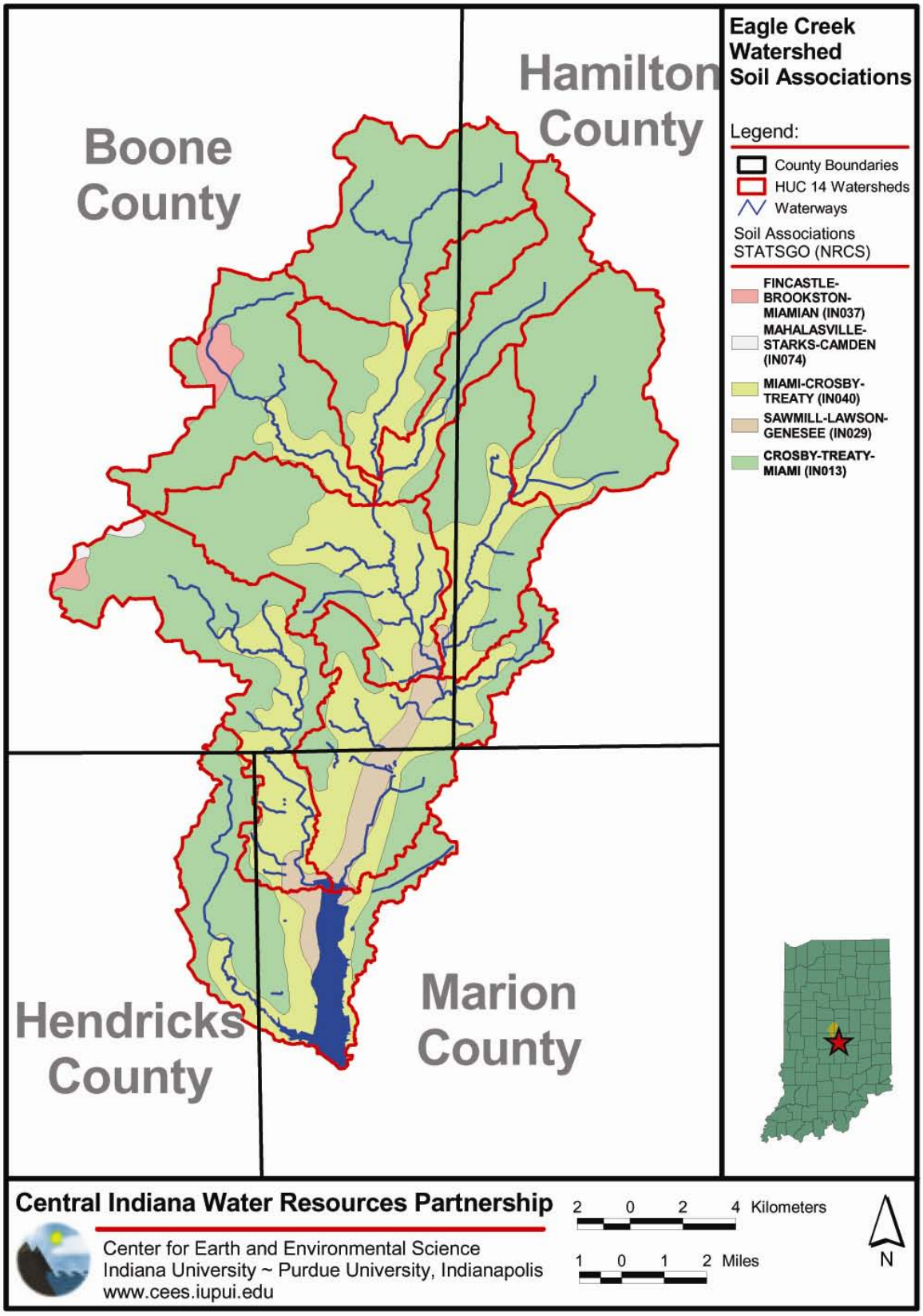

Figure III-14: Eagle Creek Watershed – Soil Associations

Description of Eagle Creek Watershed and Reservoir

The majority of the surface water in Marion County is derived from the Upper White River Watershed (Figure III-15). The Indianapolis drinking water system is fed primarily by the White River and three central Indiana watersheds and three reservoirs (Figure III-16), one of which is Eagle Creek Reservoir.

Eagle Creek Watershed and Reservoir

Watershed and Setting

Eagle Creek Watershed (ECW), HUC#05120201120, is located approximately 10 miles northwest of downtown Indianapolis within the Eastern Corn Belt Plains Ecoregion in the state. It has a drainage area north of the Eagle Creek Reservoir dam of 162 mi^2, which runs through parts of Marion, Hendricks, Boone, and Hamilton counties (Figure III-17) with majority of the watershed lying within the southeastern portions of Boone County. The watershed can be divided into 10 subwatersheds varying in size from 10.4 mi^2 to 20.9 mi^2 (Figure III-17 and Table III-1). The main tributaries joining Eagle Creek above the reservoir include Dixon Branch, Finley Creek, Kreager Ditch, Mounts Run, Jackson Run, Woodruff Branch, Little Eagle Branch, and Long Branch. School Branch and Fishback Creek, along with Eagle Creek flow directly into the reservoir. Flow apportionment shows that Eagle Creek with an average measured flow of 100 ft^3/s (USGS Gage # 03353200; Figure III-17; and Figure III-18) contributes 79% of the water to Eagle Creek Reservoir while Fishback Creek has an average calculated flow rate of 37 ft^3/s and contributes 14% and School Branch has an average calculated flow of 17 ft^3/s and contributes 7%.

Streamflow measured in Eagle Creek Watershed at Zionsville (U.S. Geological Survey streamflow gaging station 03353200) shows that flow highest in March with a monthly average of 192 ft^3/s and lowest in September with a monthly average of 21 ft^3/s (Figure III-18). Monthly averages are taken from a 1957-2002 record (USGS, 2003). Average annual runoff in Eagle Creek at Zionsville for the 1958-97 water years is about 13 inches (Stewart *et al*., 1998).

Agriculture is the dominant land use within the subwatersheds, with the exception of Little Eagle Branch-Woodruff Branch and Eagle Creek-Long Branch/Irishman's Run which are transitioning to suburban development (Figure III-17).

Climate

Monthly precipitation normals for the Eagle Creek Watershed taken from 1971-2000 Whitestown, IN data show lowest precipitation occurring in February with an average of 2.35 inches, and highest precipitation occurring in July with an average of 4.54 inches of rainfall. The mean annual precipitation for the Eagle Creek Watershed area is 41.37 inches. Monthly mean temperatures for this area from 1971-2000 show January

as having the lowest average temperature of 26.0°F and July as the being the warmest month with an average temperature of 74.7°F (PAMG, 2003).

Eagle Creek Reservoir History, Use, and Morphological Data

History –
The City of Indianapolis constructed the Eagle Creek Reservoir, prior to and through 1967. The primary purpose for its development was flood control on Eagle Creek. Historically, Eagle Creek would seasonally flood areas of Indianapolis and the Town of Speedway as it approached its confluence with the White River. In 1976, the Reservoir began use as a drinking water supply for the City and the 56th St. causeway was built. The causeway had the effect of creating two basins: a northern and southern basin in which flow is constricted to a 50 yard opening (Figure III-19).

Use –
The Reservoir is a small (2.1 mi^2) impoundment located on the Northwest side of Indianapolis (86.31W 39.83N, 86.30W 39.87N) located completely within Marion county. The Indiana Department of Environmental Management has listed Eagle Creek Reservoir's designated uses (as defined by IAC 327) for Full Body Contact Recreation, Warm Water Aquatic Life, and Public Water Supply. The reservoir's multiuse designation complicates reservoir management. Eagle Creek Park, which surrounds the northern end of the reservoir, utilizes it for recreational purposes, including swimming, boating, fishing, and sporting events such as rowing competitions. Eagle Creek Park also manages the abandoned quarry on the northeastern section of the reservoir which serves as a bird sanctuary. The City of Indianapolis uses the reservoir as a drinking water source water for the T.W. Moses Drinking Water Plant, which provides drinking water for over 80,000 Indianapolis residents.

Morphological Description –
The reservoir has a mean depth 18 ft and a calculated residence time of 51 days. Characterization of Eagle Creek Reservoir using Indiana's Trophic State Index (ITSI) showed that the reservoir is in the mesotrophic to eutrophic range; however, characterization of the reservoir using 2003 data show that the reservoir is currently in a eutrophic to hypereutrophic state: with an average Total Phosphorous concentration of 93.5 µg P/L (R: 14 – 680 µg P/L; N = 127), an average Secchi Disk Depth of 1.0 meters (R: 0.35 – 4.2 m; N = 48), sustained hypolimnetic anoxia, and the occurrence of blue-green algae, assessment of Eagle Creek Reservoir using the ITSI resulted in a score of 55, an ITSI score in eutrophic to hypereutrophic state (Pascual and Tedesco, 2004). Morphological data for Eagle Creek Reservoir are summarized in Table III-2.

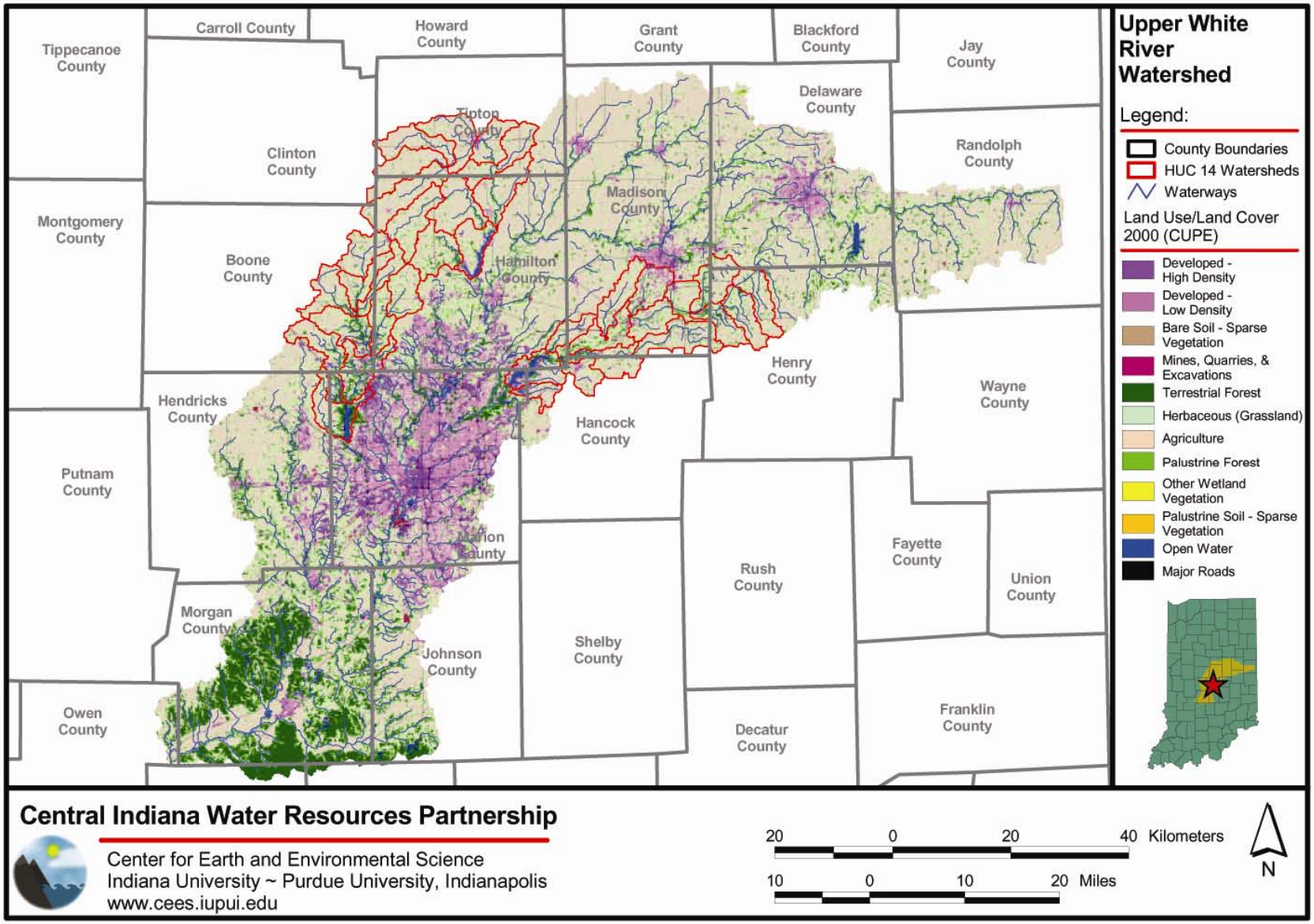

Figure III-15: Upper White River Watershed

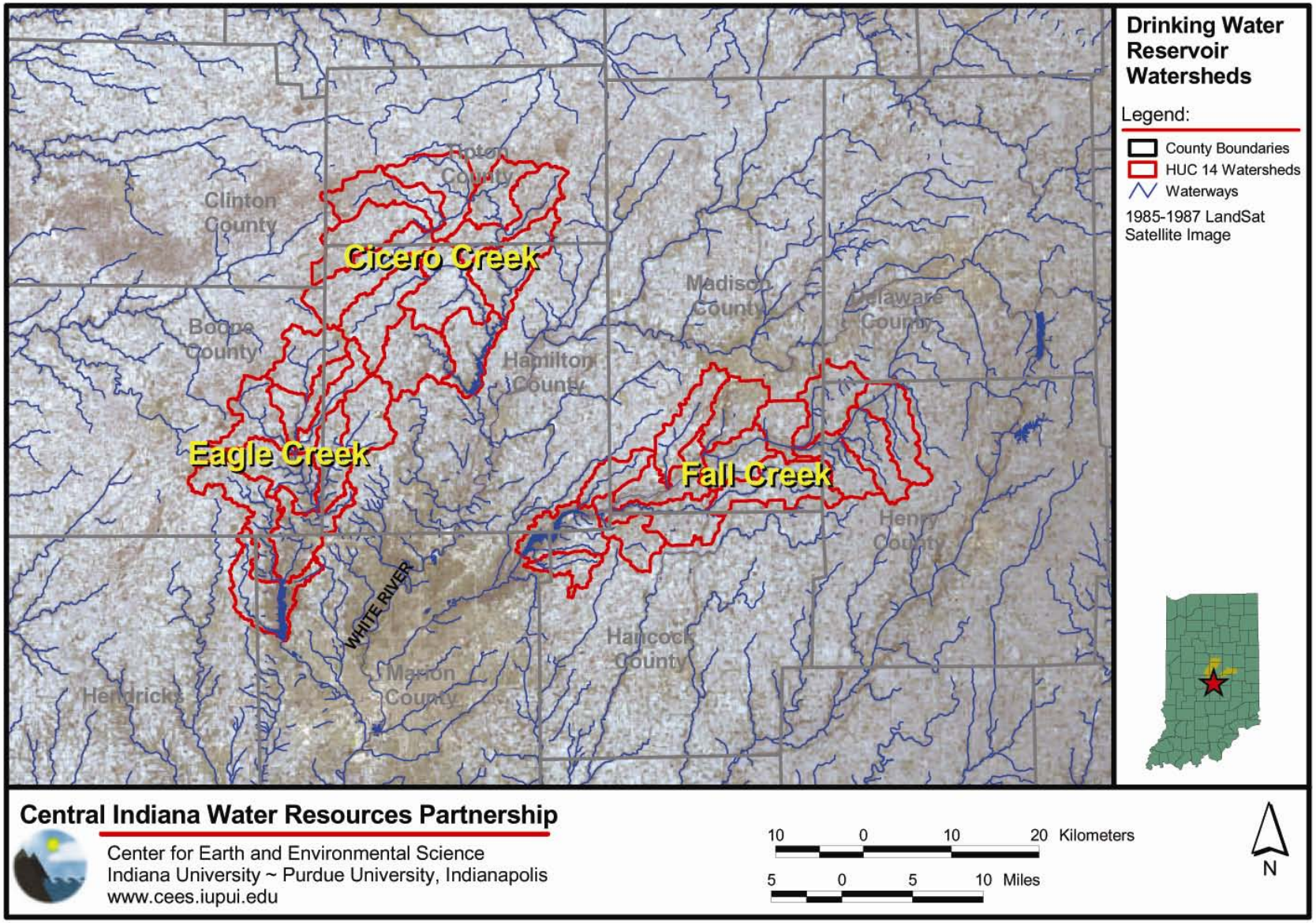

Figure III-16: Indianapolis Drinking Water Reservoirs and Their Watersheds

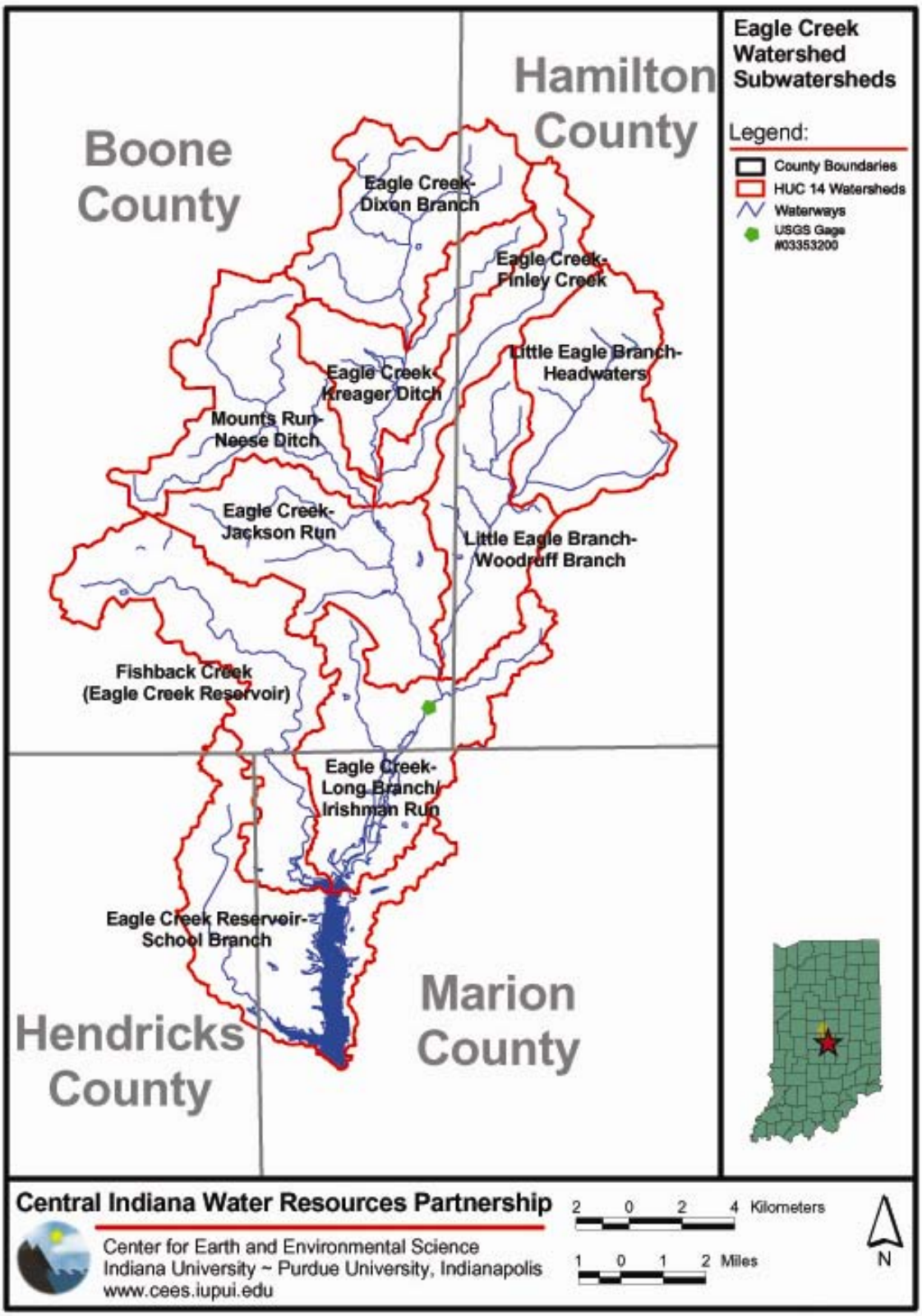

Figure III-17: Eagle Creek Watershed – Subwatersheds, Political Boundaries, and location of USGS Gage # 03353200 on Eagle Creek.

Table III-1: Eagle Creek Subwatersheds and the Associated Drainage Area

Subwatershed	Area (km^2)	Area (mi^2)	Area (Acres)
Eagle Creek-Dixon Branch	42.5	16.4	10,492
Eagle Creek-Finley Creek	26.9	10.4	6,638
Eagle Creek-Kreager Ditch	31.3	12.1	7,727
Little Eagle Branch-Headwaters	40.6	15.7	10,034
Mounts Run-Neese Ditch	41.2	15.9	10,183
Little Eagle Branch-Woodruff Branch	35.1	13.6	8,680
Eagle Creek-Jackson Run	48.5	18.7	11,991
Fishback Creek (Eagle Creek Reservoir)	54.1	20.9	13,353
Eagle Creek-Long Branch/Irishman Run	48.5	18.7	11,978
Eagle Creek Reservoir-School Branch	51.0	19.7	12,591
Eagle Creek Watershed Total	419.7	162.0	103,667

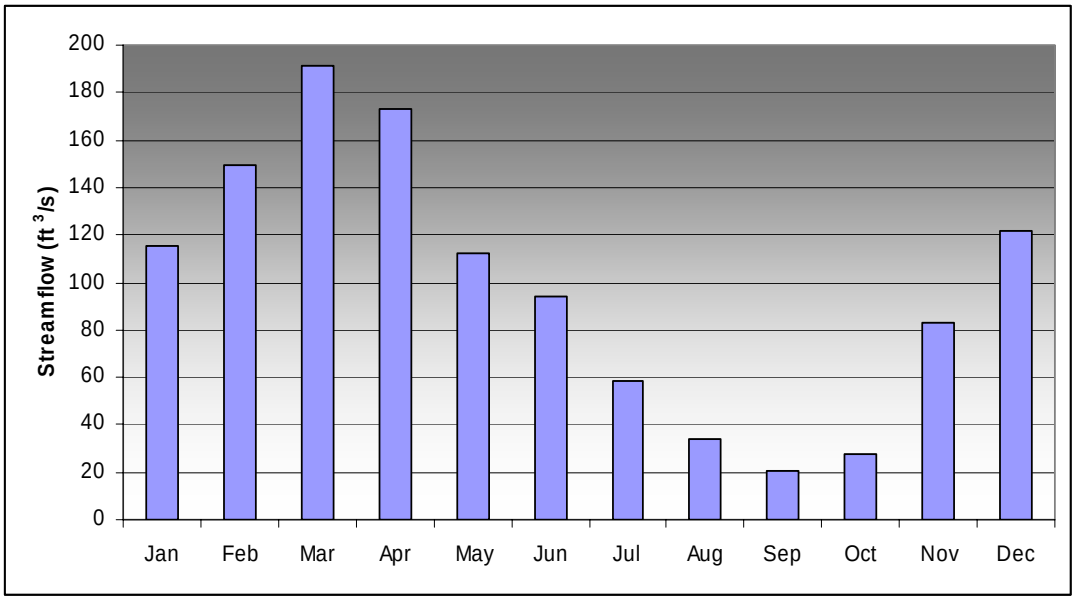

Figure III-18: Eagle Creek Monthly Mean Streamflow (Zionsville, IN; USGS Gage 03353200; 1957-2002; Figure III-17)

Figure III-19: Eagle Creek Reservoir overlay of Eagle Creek and valley (1941), showing the location of the 56th St. Causeway opening and the original location of streambed. Black arrow shows location of land bridge opening. Yellow arrow shows pre-flood Eagle Creek streambed.

Table III-2: Morphological Data for Eagle Creek Reservoir

Lake surface area	1.9	km^2
Northern Basin	0.8	km^2
Southern Basin	1.1	km^2
Quarry	0.2	km^2
Mean Depth	5.5	m
Lake Volume	5,500	million gallons
Calculated Residence Time	51	days

As a eutrophic reservoir, nuisance algal blooms are a common occurrence, threatening all of the Reservoir's designated uses. Of particular concern is the protection of the Reservoir as a drinking water supply. As the T.W. Moses Drinking Water Plant uses Eagle Creek Reservoir as its source water, algal blooms of nuisance (e.g., taste and odor or filter-clogging algae) or harmful (toxin producing algae) create challenges to maintaining finished drinking water quality: this treatment plant is not technologically equipped with a process that can adequately address the levels of algal produced taste and odor compounds historically measured in the Reservoir. Water conditions in Eagle Creek Reservoir define the parameters for treatment at the TWM plant (there is no groundwater or additional surface water source with which to blend and, therefore, amend Reservoir water). Therefore, protecting Eagle Creek Reservoir is critical to protecting drinking water resources in Indianapolis.

EAGLE CREEK RESERVOIR – AT A GLANCE

- Ownership – The City of Indianapolis
- Original purpose – Flood control
- Date into service – 1968
- Water surface area – 1,350 acres
- Maximum depth – 40 feet; 54 feet
- Watershed area above dam – 162 square miles
- Storage capacity – 7.8 billion gallons
- Dependable water supply yield – 15.4 MGD
- Rated capacity of TWM plant – 16 MGD[1]
- Permanent pool elevation – 790.0 feet M.S.L.
- Overall dam length – 4,200 feet
- Dam height above valley – 75 feet
- Water depth at dam – 40 feet
- Type of embankment structure – Earthen fill
- Type of outlet structure – Six Tainter Gat