Section II: Project Introduction

Designating the Study Area

Eagle Creek Watershed is located approximately 10 miles northwest of downtown Indianapolis within the Eastern Corn Belt Ecoregion (Central Till Plain Natural Region) in the Upper White River Watershed, IN (Figure II-1). Topography of the watershed is relatively flat and consists of productive soils developed in glacial till and loess. It has a drainage area north of the Eagle Creek Reservoir dam of 162 mi^2. The Eagle Creek Reservoir, which is part of the Indianapolis' public drinking water system, is located completely within Marion County, while the rest of the watershed runs through parts of Marion, Hendricks, Boone, and Hamilton counties (Figure II-1). The watershed is divided into 10 subwatersheds varying in size from 10.4 mi^2 to 20.9 mi^2. The town of Zionsville is the largest urban community within the watershed located approximately 5 miles north-northeast of the reservoir and with a population of approximately 8,800 in 2000 (IBRC, 2002). In 2000, 52% of the watershed land cover was agriculture, 29.9% was herbaceous land cover, 9.3% was forested, and 4.3% was high and low density development. Agriculture and herbaceous land cover has declined while high/low density and herbaceous land cover has increased since 2000. The greatest percent of agricultural land is located at the northern portions of the watershed while the portions closer to Eagle Creek Reservoir are undergoing significant urbanization. Subwatersheds transitioning to suburban development the fastest are Little Eagle Branch-Woodruff Branch, Eagle Creek-Long Branch/Irishman Run, Eagle Creek/Jackson Run, School Branch, and Fishback Creek.

Building Partnerships

In 1995, in response to growing Atrazine concerns in Eagle Creek Watershed, a group of concerned citizens led primarily by a watershed coordinator, who was hired by the Indiana Farm Bureau, began to address water quality issues in the Watershed. Funded by an EPA 319 grant, this group, the Eagle Creek Watershed Taskforce (ECWTF), held monthly meetings with stakeholders such as Veolia Water Indianapolis, LCC (formerly USFilter Indianapolis Water, formerly the Indianapolis Water Company) and the Marion County Health Department (MCHD) and developed a monitoring program for the Watershed **(**Appendix A).

In 2003, the Center for Earth and Environmental Science (CEES) and USFilter Indianapolis Water (now Veolia Water Indianapolis, LCC), joined to form the Central Indiana Water Resources Partnership (CIWRP), a long-term research and development partnership focused on creating a center of excellence in water quality and watershed research. In 2004, building on the work of the ECWTF, CIWRP joined the citizens group to begin implementation of best management practices in Eagle Creek Watershed. The combined efforts of the ECWTF and CIWRP resulted in the creation of the Eagle Creek

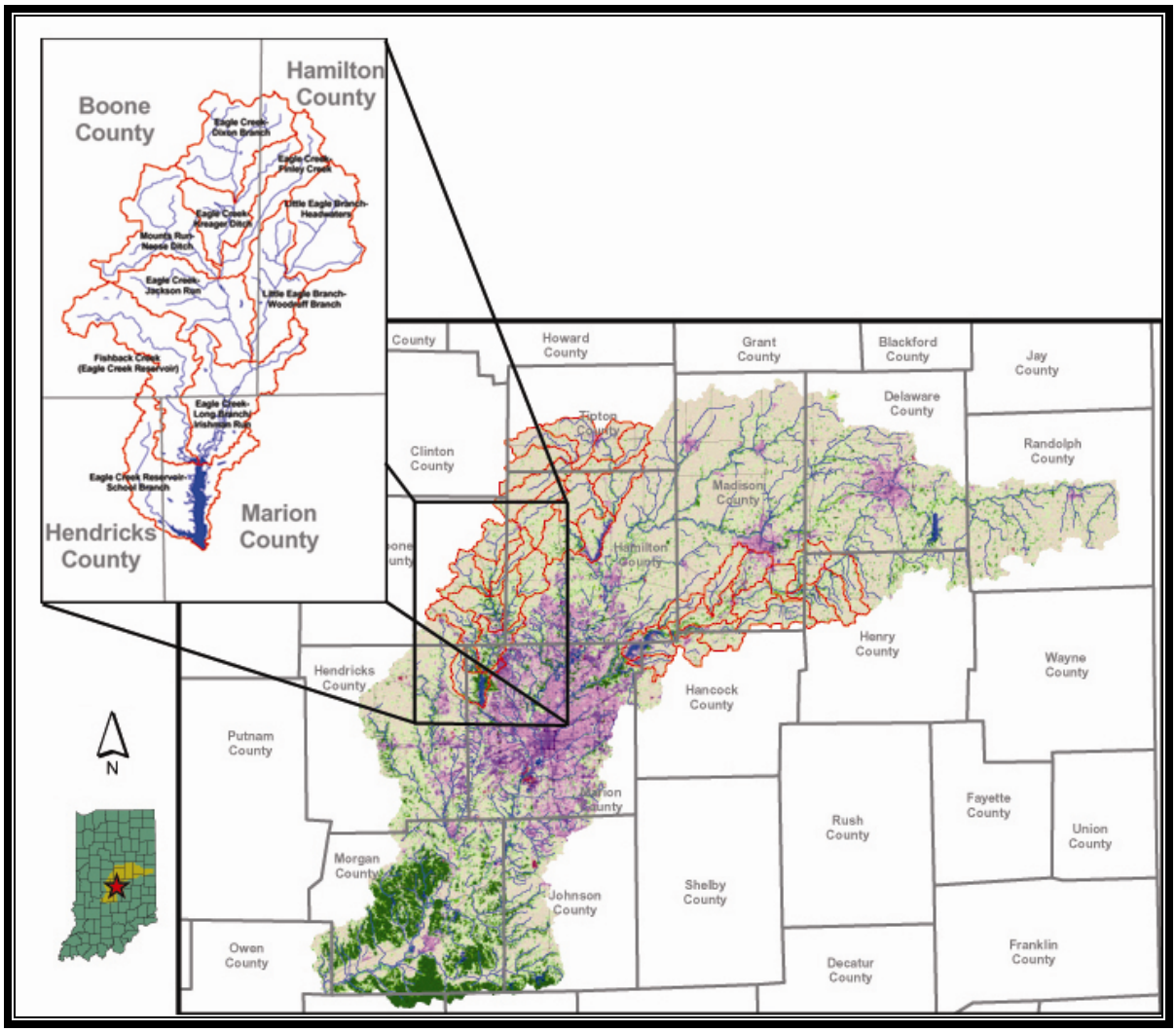

Figure II-1: Eagle Creek Watershed in relation to the Upper White River Watershed

Watershed Alliance (ECWA), a group of citizens, researchers, and managers working together to improve water quality in Eagle Creek Watershed (Appendix B).

Missions

The Eagle Creek Watershed Task Force

The mission of the Eagle Creek Watershed Taskforce is to improve water quality and the environment of Eagle Creek Watershed by working cooperatively with those who impact, and are impacted by watershed activities.

The Eagle Creek Watershed Alliance

The Eagle Creek Watershed Alliance is a broad coalition of individuals, volunteers, foundations, local organizations, utilities, county, state and federal agencies, and universities whose mission is to utilize a holistic approach to watershed management with

the ultimate goals of improving water quality, increasing public awareness of watershed water quality, and encouraging stewardship of the watershed's resources.

The ECWA will coordinate watershed research, water quality monitoring, BMP implementation, and watershed education and outreach programs in an effort to boost community awareness and involvement in local watershed issues

History of Eagle Creek Watershed Management Efforts

1995 and 1996

In 1995 and 1996, due to the timing and intensity of spring rains in relation to the agricultural producers' activities in the fields, the levels of triazines in the Eagle Creek Reservoir's untreated water exceeded the Environmental Protection Agency's (EPA's) drinking water quality standard (3 ppb or 0.003 mg/L) for most of each year. To maintain drinking water quality, the Indianapolis Water Company added powder-activated carbon to their water treatment process, an expensive necessity to ensure safe drinking water for the 80,000 customers whose source water is Eagle Creek Reservoir.

The knowledge of high Atrazine levels in the watershed coupled with an increased public concern that was not always grounded in "solid science", catalyzed a dialogue between Novartis (formerly Ciba), a company that utilizes Atrazine in some of their products, the (then) Indianapolis Water Company , and the Indiana Farm Bureau. These three organizations expressed a strong desire to make permanent changes within Eagle Creek Watershed that would result in better quality water; not only in terms of Atrazine, but also in terms of all water quality parameters.

From the beginning, initial efforts were hampered by the lack of consistent data. With the exception of Indianapolis Water Company records from their raw water intake (located in the reservoir itself) and the 1982 Indiana Heartland Model Implementation Project Report, little more than general, discontinuous data existed, especially for the watershed.

In the spring of 1997, meetings were held with individuals from various technical agencies such as Soil and Water Conservation Districts, the Natural Resources Conservation Service, and other successful watershed protection groups. From these contacts, a model based on other successful efforts came forth.

1997

In 1997, Indiana Farm Bureau hired a watershed coordinator to focus the work of the ECWTF. This year, the ECWTF with the help of the Indianapolis Water Company began a detailed monitoring study of the Watershed. This would provide crucial bench marking from with which to measure future progress. So while efforts were underway to develop a contact list of potential stakeholders for the steering committee, a monitoring program was established in the watershed.

The monitoring program was a cooperative venture between Indiana Farm Bureau and the Indianapolis Water Company. The Indianapolis Water Company ran chemical analyses on water samples free of charge for eight different water quality parameters (i.e. Triazines, Ammonia, Nitrates, Nitrites, Turbidity, Fecal Coliform (*E. Coli*.), Total Coliform, and Hetrotropic Plate Counts. In later years, sulfates and chlorides were added.

Samples were collected at ten sites scattered throughout the four-county watershed. The sample sites and frequency where chosen to assess tributary water quality during the agricultural/construction season. Generally, the sampling was intended to be every week for the months of April through June (when lawn, agricultural, and construction impacts are most likely to be intensified due to early season rains), and then every other week until the end of October. With only a few isolated exceptions, this schedule was followed every year since 1997. These samples provided a valuable baseline water quality data for the watershed.

At this time, the Steering Committee submitted an application for an EPA 319 grant application.

1997 – 2002

ECWTF data collection and watershed educational programs continued in the watershed. This included mailings and articles in local newspapers and public tours of septic fields and ECWTF sample sites. At this time, the EPA 319 grant was approved for funding and work on a Watershed Management Plan began.

2002 – 2003

ECWTF submitted and received an EPA 319 grant to support an *E. coli* DNA ribotyping study in Eagle Creek Watershed. This grant was also supported by funding from the Sierra Club. Another 319 grant was submitted to begin Phase I Implementation for best management practices in the watershed. This grant wasn't successful due to lack of supporting data in the Watershed Management Plan.

2004 – 2005

ECWTF began work with the Center for Earth and Environmental Science at Indiana University – Purdue University, Indianapolis (IUPUI) to submit another EPA 319 grant to begin Phase I Implementation for best management practices, detailed loading studies in the watershed, and collaboration to complete the Watershed Management Plan.

A History of Eagle Creek Watershed Research Efforts

IDEM Assessment Information Management System (AIMS): Documented 23 watershed stations in Eagle Creek Watershed and 20 stations in Eagle Creek Reservoir. Water samples are analyzed for nearly 50 chemical parameters; however, not all sites are monitored for all 50 parameters.

Indiana Heartland Model Implementation Project (1982): Examined watershed data from 1971 – 1980 and reservoir data from 1980-1981; showed that non-point source pollution is a problem in Eagle Creek Watershed and the affects of best management practices.

IDEM Lake Water Quality Assessment Program: Sampling occurred on Eagle Creek Reservoir, Geist Reservoir, and Morse Reservoir once in the 1970s, once in the 1980s, 1991, 1995, and 1996. Physical, chemical, and biological data were gathered to determine the lakes trophic status based on the Indiana Trophic State Index.

Marion County Health Department (1995 – Present): Sited 11 stations in Eagle Creek Watershed around Eagle Creek Reservoir and 1 station on Eagle Creek Reservoir. Sampling occurs on a bi-weekly basis during the growing season and includes the measurement of *in-situ* water quality parameters (dissolved oxygen, temperature, pH, conductivity, and total dissolved solids) and the analysis of soluble nitrogen compounds, ortho-phosphorous, and several herbicides and pesticides.

IDEM Zooplankton Study (2000): Zooplankton were sampled from Eagle Creek Reservoir and Geist Reservoir on August 10, 2000 using an underwater light trapping technique. Data showed that algaecide treatment did not affect mid-summer zooplankton community over the period of the study.

Eagle Creek Watershed Taskforce, ECWTF (1997 – 2003): Funded through an IDEM 319 Grant, the ECWTF sited 10 stations in Eagle Creek Watershed for bi-weekly sampling for chemical and biological analysis during the growing season; showed that *E. coli* and Atrazine contamination is a problem in Eagle Creek Watershed.

Veolia Water Indianapolis (formerly USFilter and Indianapolis Water Company): Two watershed sampling stations were sited in Eagle Creek Watershed and monitored from October 2002 to present. Water samples are collected bi-weekly and analyzed for chemical water constituents (e.g., nutrients). Water from the T.W. Moses Drinking Water Plant intake on Eagle Creek Reservoir intake also sampled bi-weekly and analyzed for *E. coli*, Atrazine, nutrients, and other chemical water constituents.

Central Indiana Water Resources Partnership: Several studies on the watershed and reservoir have been completed, initiated, and proposed through the CIWRP partnership:

- 2002 – Geologic and Climatological Setting Analysis for Eagle Creek Reservoir, Geist Reservoir, and Morse Reservoir (Tedesco et al., 2003)
- 2002 – Surficial Sediment Characterization for Eagle Creek Reservoir, Geist Reservoir, and Morse Reservoir (Tedesco et al., 2003)
- 2003 – Eagle Creek Reservoir: Responses to Algaecide Treatment (Pascual and Tedesco, 2004)
- 2003 – Phytoplankton Ecology of Eagle Creek Reservoir, IN (Pascual and Tedesco, 2004)

2003 – Eagle Creek Reservoir Zooplankton Growth Responses to the Blue-green Algae *Microcystis* and *Anabaena* (Trierweiler and Pascual, in progress)
2003 – Seasonal Loading Contributions to Eagle Creek Reservoir, Geist Reservoir, and Morse Reservoir from Non-point Watershed Sources (Shrake, Hall, Tedesco and Atekwana, in progress)
2003 – Internal Phosphorus Cycling in an Urban Drinking Water Reservoir, Eagle Creek Reservoir (Raftis Master's Thesis, in progress)
2003 – *E. coli* distribution in Eagle Creek Watershed (Kuhn, Master's Project, in progress)
2004 – Eagle Creek Reservoir Nutrient Mass Balance (Pascual, Shrake, Tedesco, Hall, in progress)
2004 – Phytoplankton Succession and Ecology in a non-Algaecide Treatment Year (Pascual, in progress)
2004 – Effects of Watershed Residential Development on Stream Loading and Water Quality (Casey, Master's Thesis, in progress)
2004 – Watershed Input Tracking of Allochthonous Organic Matter and Nutrients to Eagle Creek, Geist, and Morse Reservoirs (Mattox and Filley, in progress)
2005 – Eagle Creek Watershed Alliance: Phase 1 Watershed BMP Implementation, Education and Public Outreach Grant (Tedesco and Vidon, Proposed IDEM 319 Grant)
2005 – Nutrient and Sediment Stream Budgets of Streams Under the Influence of Agriculture, Urbanization, and In-transition areas in Eagle Creek Watershed, IN (Campbell and Vidon, in progress)
2005 – Nutrient Limitation and Phytoplankton Succession in Eagle Creek Reservoir (Pascual, in progress)
2005 – Hyperspectral remote sensing of blue-green algae in Central Indianapolis' Reservoirs (Lin, Tedesco, Pascual, Randolph and Hall, in progress).