North Central Indiana Regional Water Study

EXECUTIVE SUMMARY

Wabash River – Granville Bridge (IFA, 2024a)

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Executive Summary

Study Purpose: The North Central Indiana Regional Water Study (Study) estimated historical and 50-year future water demand and water supply availability. The Study Area encompassed all or portions of 15 counties within the upper Wabash River watershed, including Boone, Clinton, Fountain, Fulton, Howard, Kosciusko, Montgomery, Parke, Pulaski, Tippecanoe, Tipton, Vermillion, Vigo, Warren, and White (**Figure ES-1**).

Study Approach: The water availability estimates presented in this Study are based on data-driven analyses following a methodology similar to that used in previous regional water studies in Indiana, with some refinement. Water availability was calculated as baseflow in a stream or river not allocated to a defined use or purpose, also referred to as excess water in the system. Calculations were conducted, and results are presented, for 16 hydrologic subbasins of the upper Wabash River watershed. Stakeholders throughout the Study Area provided important input to the Study on topics such as future demand assumptions and estimates of water withdrawals and return flows.

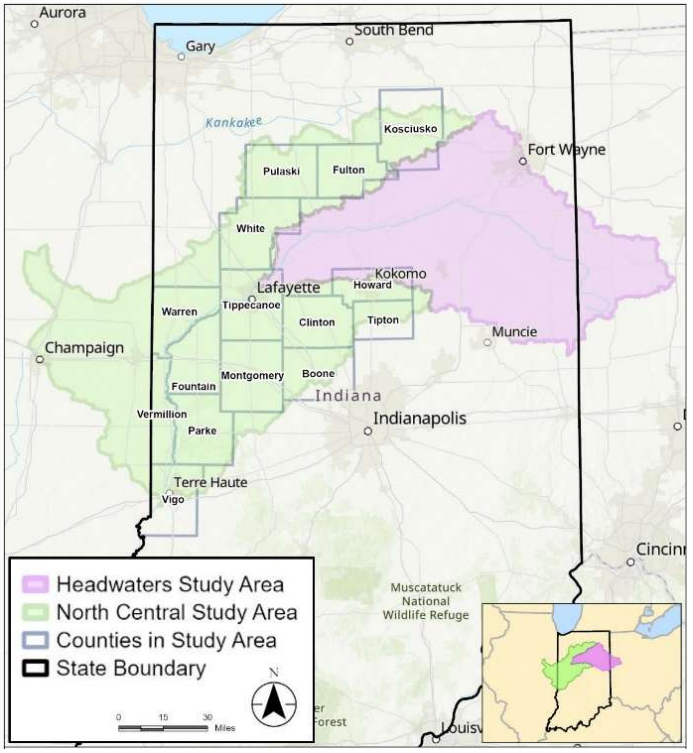

Figure ES-1. North Central Indiana Regional Water Study Area

Regional Setting: North Central Indiana contains a diverse range of hydrology, geology, population centers, land and water uses that vary geographically and with time. The region generally consists of agricultural land surrounding moderately sized population centers, including Lafayette, the tenth largest city in Indiana. The 2022 Study Area population was estimated to be 710,000 in Indiana and 215,000 in Illinois. Much of the Study Area overlies the Mahomet (Teays) Bedrock Valley. The Wabash River, which has the largest watershed of any river in the state, runs through the heart of the Study Area. The Wabash River itself supports most surface water withdrawals within the region, including two energy facilities. The remaining water withdrawals in the region are predominantly from groundwater wells.

Water Demand: Historical water withdrawals within the 15-county Study Area were primarily characterized using monthly water use data by sector from the IDNR Significant Water Withdrawal Facility database. In 2022, total water withdrawals were 789 million gallons per day (MGD). Cooling water for energy production dominates current water withdrawals, and most (~99%) of that water withdrawn is returned to the river (i.e., non-consumptive use). Public supply is the second largest water use sector. Historical water withdrawals peaked in 2006 (**Figure ES-2**). Demand has been dominated by energy production water use in Subbasins 12 and 15. In 2016, one coal energy plant in Subbasin 15 (light pink) went offline; another coal energy plant in Subbasin 12 (light blue) is scheduled to go offline in 2028.

The 2070 Study Area-wide projected water demand is 260 MGD. The 2070 projected demand is similarly distributed between public supply (78 MGD, or 30 percent of total, an increase from 70 MGD in 2022), irrigation (70 MGD, 27 percent of total, an increase from 42 MGD in 2022), industrial (66 MGD, 25 percent of total, an increase from 37 MGD in 2022), and other water use sectors (**Figure ES-2**). Public supply water demand is projected to increase, but slightly less than industrial and irrigation water demands, due in part to declining population forecasts in some of the subbasins.

The past 15 years have shown a decrease in surface water withdrawals and an increase in groundwater withdrawals. Since 2007, annual surface water withdrawals have decreased 50%, from around 1,250 MGD to less than 650 MGD. Over that same period, groundwater withdrawals have varied from year to year, but in total have increased 6%, from just over 110 MGD to just under 120 MGD. Surface water withdrawal reductions are largely due to decreased river withdrawals for use as cooling water in coal-based electricity generating facilities, while increases in groundwater withdrawals are primarily attributed to increased irrigation. Historically, public supply, industrial use, and irrigation in the Study Area have all been sourced primarily from groundwater.

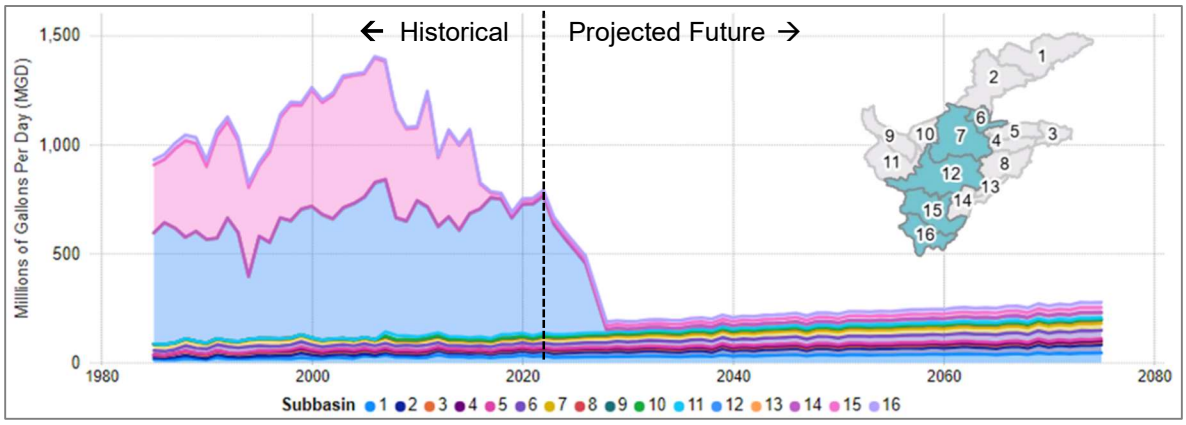

Figure ES-2. Historical (1985 to 2022) and Future Projected (2023 to 2072) Annual Water Demand in the North Central Indiana Study Area, by Subbasin, with Subbasin Inset Map (Wabash mainstem subbasins in blue)

Historical Water Availability: Historical water supply exceeds historical water demand in most locations and most seasons, but may be approaching a condition of total water allocation and limited excess during particularly dry seasons. Historically, there has been sufficient water for human and ecological needs in most locations and most seasons. Variations in natural baseflow are the main driver of cumulative excess water availability, and there is a strong seasonal variation across subbasins that is largely influenced by geology. Spring typically has had highest availability due to higher natural baseflow, followed by winter. During these wetter seasons, precipitation and snowmelt recharge into local aquifers, driving groundwater levels higher and producing higher baseflow. Fall is generally the most limiting season, followed by summer, due to low streamflow, low natural baseflow (the portion of streamflow that is from groundwater discharge and not surface runoff), and higher water withdrawals. During dry seasons, stored groundwater is discharged back into river systems as aquifer levels decline.

Projected Future Water Availability: Projected future water availability in the Study Area will likely differ from recent history because of projected future water demands and the effects of climate change.

Notably, fall cumulative excess water availability is projected to continue to decrease in the future, regardless of whether additional climate change is factored into the analysis. On a seasonal average basis, future cumulative excess water availability remains positive across all subbasins, indicating that there is enough water in those conditions. Seasonal variability similar to that observed historically is projected in the future, with cumulative excess water availability highest in the spring, relatively similar in the winter and summer, and lowest in the fall at all subbasins.

Fall cumulative excess water availability is likely to decrease, with all subbasins showing a 5% to 34% decrease (**Figure ES-3**), primarily due to lower estimated fall baseflow under future conditions. Future water availability is projected to remain varied across the Study Area, with subbasins along the Wabash River exhibiting greater cumulative excess water availability than tributary subbasins. Future fall cumulative excess water availability in the Wabash River subbasins will be even more reliant on baseflow and upstream reservoir releases from the Wabash River Headwaters region.

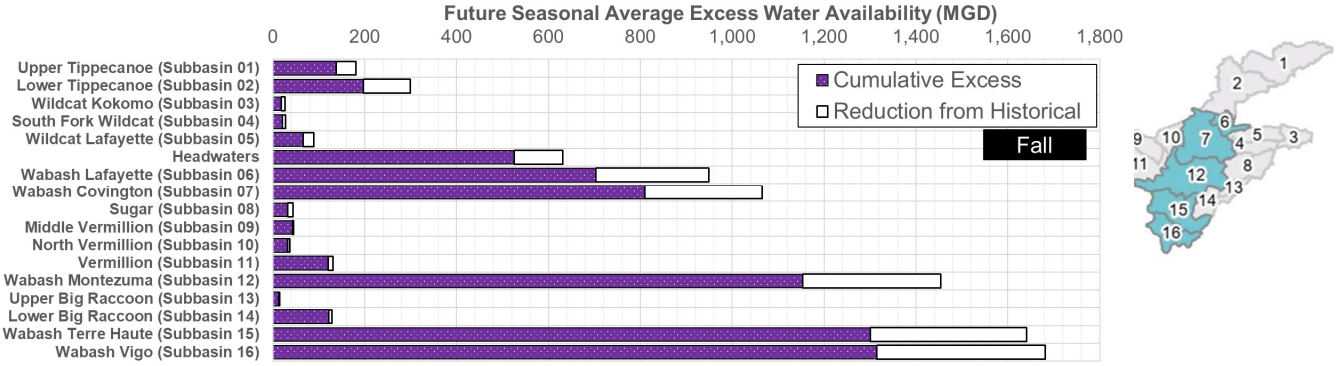

Figure ES-3. Projected Future Fall Season Cumulative Excess Water Availability by Subbasin

Figure ES-4 compares historical and projected future fall cumulative excess water availability at representative “typical” (median), “dry year,” and “drought” conditions. Median fall cumulative excess water availability in most subbasins will likely decrease, with upper tributary subbasins (01-05) showing the largest reduction. In many subbasins, particularly the Tippecanoe River (Subbasins 01-02), Wildcat Creek (03-05), and portions of the Wabash mainstem (07), the projected reductions are expected to be more pronounced in drought years.

In most future years, seasons, and across subbasins, future supplies nearly always exceed future demands (including instream flows), leaving positive cumulative excess water availability. Similar to the historical period analysis, water supply is projected to remain abundant during most years and seasons. Under future dry conditions, current supply-demand imbalances are likely to get worse. Future fall water availability is likely to be substantially reduced relative to historical conditions, consistently by 15%-30% across the Study Area subbasins. Future seasonal variability in water availability is projected to increase. Future conditions in spring are anticipated to be wetter, while conditions in the fall are anticipated to be drier. This creates greater seasonal imbalances, resulting in larger annual flow volumes but also more stress on the water system anticipated in the fall. Lastly, upstream reservoirs are projected to more frequently contribute the majority of future cumulative excess water availability during the fall season along the mainstem of the Wabash River.

Water Resource Risks, Opportunities, and Recommendations: With recent increasing drivers for economic development, Indiana is rapidly approaching a crossroads in water management. While multiple risks could threaten water availability and suitability into the future, numerous opportunities exist to more effectively manage and protect the region's finite water resources.

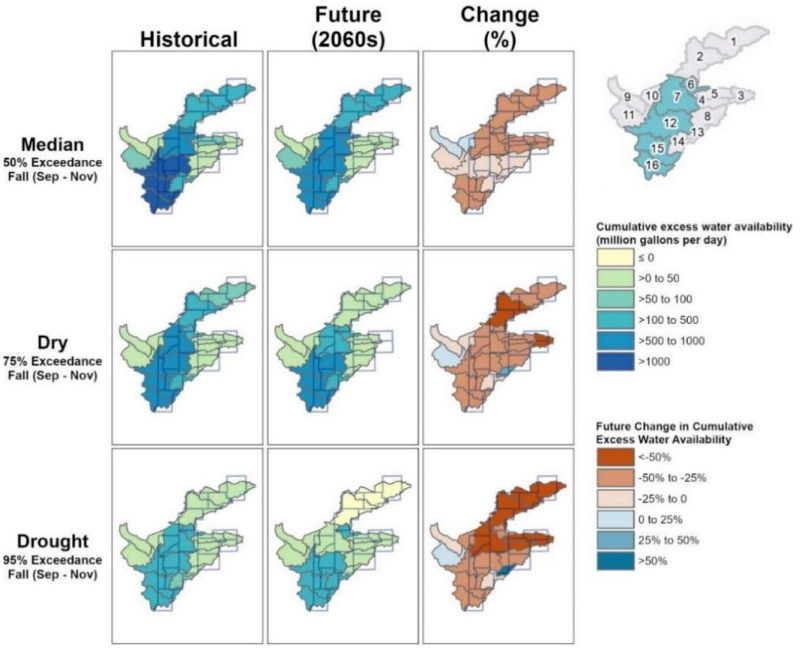

Figure ES-4. Changes Between Historical and Projected Future Fall Cumulative Excess Water Availability for Median (50%), Dry (75%), and Drought (95%) Conditions

Risks: Water supply utilities and providers across Indiana and around the country are continuously managing multiple existing and potential future risks. This Study focused on water availability and the suitability of available water for use. Five specific related risks and uncertainties – climate change, water quantity, water quality, the difficulty in predicting future conditions, and local impacts of additional water development – are identified and described in the Study report.

Opportunities and Recommendations: The North Central Indiana region is not yet coming up against the 'hard boundary' of simply not enough available, affordable, reliable water supply to meet projected demand. This Study, however, identified some current and projected future localized limitations (i.e., within certain subbasins) and annual and seasonal variability limitations on water availability that merit consideration. Accordingly, nine potential approaches are recommended that can individually and/or collectively contribute toward an increase in future available water supply to maintain or strengthen the people, environment, productivity, and economy of North Central Indiana. This includes strategies to:

- enhance the supply of surface water and/or groundwater, including recommendations (1) groundwater exploration and development; (2) reservoir storage reallocation; (3) increased or expanded water storage; and (4) alternative water supplies
- decrease the demand for water, including recommendation (5) water conservation and water use efficiency
- better understand and manage water as a limited resource, including recommendations (6) data collection, monitoring networks, and modeling; (7) communication, coordination, and education; (8) water policy and practice; and (9) recommended follow-on analyses.