

FINAL REPORT

Regional Water Study

Water Demand and Availability in the Ohio River and Southeast Indiana Region

Prepared for:



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Executive Summary

The Ohio River and Southeast Indiana Region (Region) includes portions of 21 Indiana counties across southeastern Indiana, extending from the Whitewater River basin near the Ohio border to the lower Ohio River counties near Evansville (**Figure ES-1**). This study evaluates water demand and availability across the Region from 2020 through 2070 to determine whether the Region's water resources are sufficient to meet the needs of its communities, industries, and farms and to identify where targeted planning and investment are most needed.

This study was prepared for the Indiana Finance Authority (IFA), at the request of the Indiana Department of Natural Resources (IDNR), pursuant to Executive Order 25-63, to evaluate whether sufficient water resources exist within the Region to meet projected public water supply needs through the year 2070. The results of this study are intended to support state and local decision-makers, public water utilities, and regional stakeholders in planning for reliable and sustainable water supplies across the Region.

Specific objectives of the study are to:

- Quantify current water withdrawals and use across major water-use sectors within the study area.
- Develop projections of future water demand for public water supply and other significant sectors through 2070.
- Evaluate current water availability within the study region.
- Estimate how water availability may change over time under future climate conditions.
- Compare projected water demand with available water supplies to identify potential deficits or areas of limited availability.
- Identify risks, constraints, and potential strategies to improve long-term water supply resilience.

Key Findings

- Land cover in the Ohio River and Southeast Indiana Region is over 46% agriculture and 38% forested.
- Public water suppliers predominantly utilize groundwater as their source of supply.
- Current and Future water demand is dominated by power generation and public water supply withdrawals.
- Regional annual average withdrawals are expected to decrease from 2,013 MGD in 2020 to 761 MGD in 2070, mostly due to decreases in power generation withdrawals.
- In the Whitewater River watershed, annual water availability will decrease slightly by 2070. However, larger seasonal decreases are expected.
- Outside the Whitewater Basin, future water availability is expected to be stable, with continued low availability.

Approach

The study is structured around three major analytical components: (1) development of a 50-year forecast of regional water demand, (2) evaluation and forecasting of regional water availability, and (3) comparison of demand and availability to identify potential future water-supply gaps and opportunities for improved water management.

Water demand estimates were developed from nearly four decades of reported water withdrawals (1985-2023), combined with population, economic, and climate projections, to forecast future demand for public water supply, irrigation, industry, power generation, and other sectors through 2070. Water

withdrawals are used as a proxy for demand, and both groundwater and surface-water resources are evaluated to determine the capacity of regional resources to meet projected needs.

Water availability was evaluated using historical USGS streamflow records, reported water withdrawals, return flows, and future climate projections to estimate how much water is likely to remain available under future conditions while maintaining the minimum streamflow needed to support rivers and aquatic ecosystems.

Setting

The Region includes portions of 21 Indiana counties within the Ohio River Basin, encompassing eight HUC-8 watersheds that range from the Whitewater River Basin in the northeast, to the Ohio River and its outwash deposits along the Region's southern boundary. The largest population centers are Evansville, Jeffersonville, New Albany, and Richmond, and major interstate corridors, including I-64, I-65, I-69, I-70, and I-74, connect communities across the Region. This study combines two planning regions in Indiana: the Southeast Region and the Ohio River Region. The Ohio River Region consists of two HUC-8 watersheds in the southwest corner of the Region, and the Southeast Region contains all the remaining six HUC-8 watersheds illustrated on **Figure ES-1**.

Public water supply is provided by over 100 municipal and community utilities drawing from a mix of groundwater, surface water, and purchased-water sources. Evansville Water Utility, the Region's largest system, serves approximately 182,000 people with surface water from the Ohio River. The Utility is currently planning a transition to groundwater sources. Groundwater remains the predominant source across much of the interior and northern portions of the Region, while surface-water and purchased-water systems are more common along the Ohio River corridor. Outside the urban corridors, land use is predominantly agricultural, with the largest irrigation withdrawals concentrated in Spencer, Posey, Vanderburgh, and Wayne counties.

Ohio River and Southeast Indiana Water Region Fun Facts

- Covers parts of 21 Indiana counties
- 8 HUC-8 watersheds
- 102 public water utilities serve over 870,000 people
- Power generation is the largest water withdrawal, but it will decrease in the future
- Over 80% of the land cover in the Region is forested or agriculture.

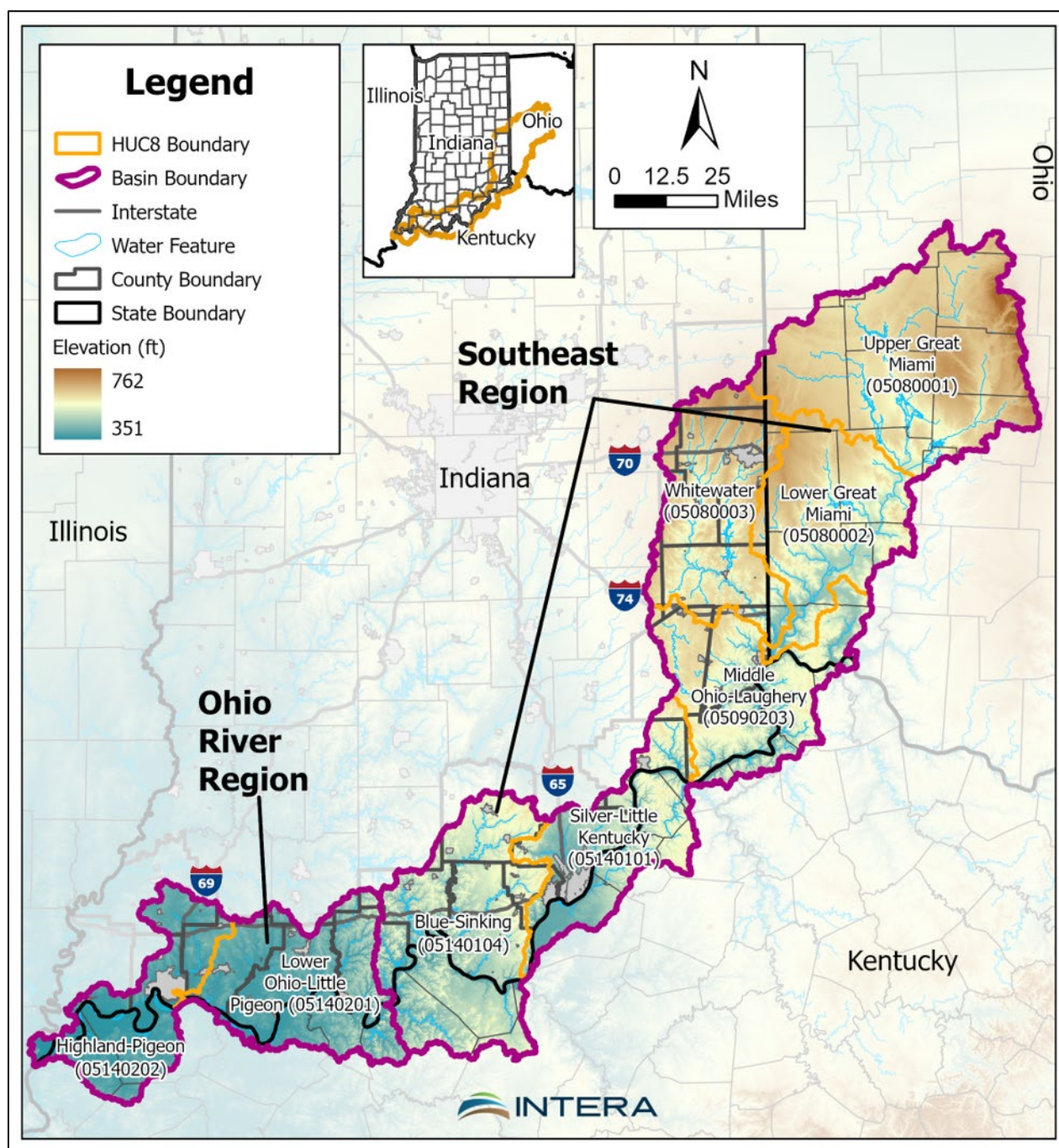


Figure ES-1. Extent of the Ohio River and Southeast Indiana Water Regions. The combined Region includes eight HUC-8 watersheds, two in the Ohio River Region and six in the Southeast Region.

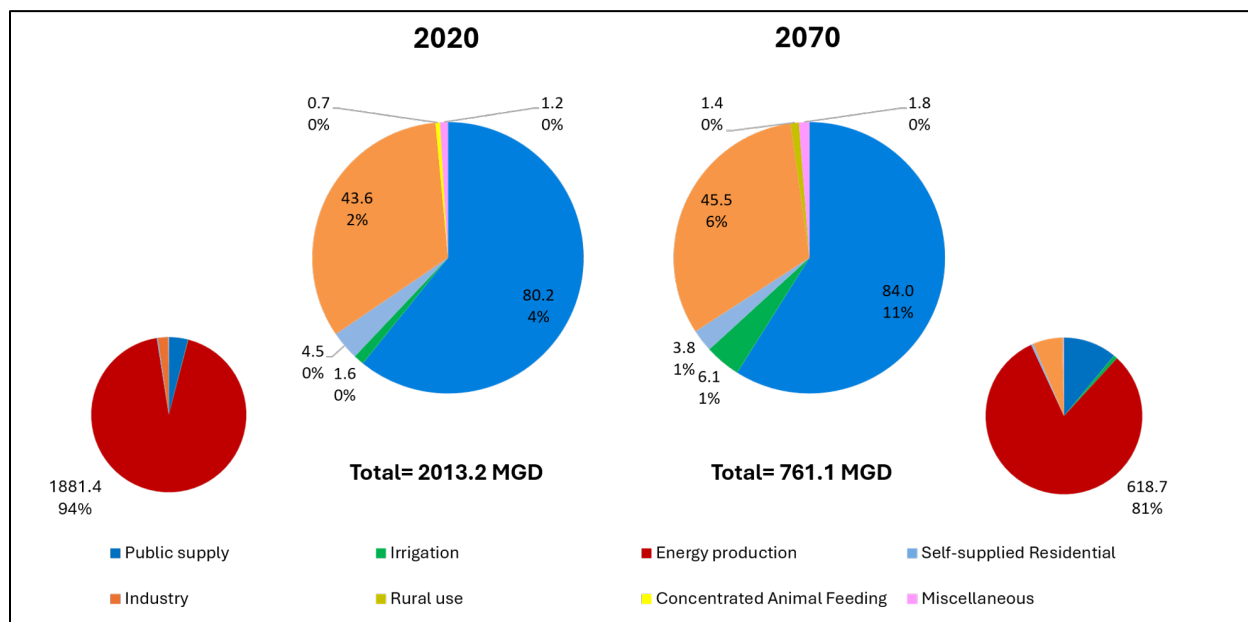


Figure ES-2. Annual average regional water demand in 2020 (left) and 2070 (right) by water-use sector. Note: The small pie charts include power generation, which is the largest water use sector. The large pie charts have power generation removed to make the relative water demand for the smaller sectors visible.

Water Demand

Total regional water demand across all use sectors is projected to fall sharply, from 2,013 million gallons per day (MGD) in 2020 to 761 MGD in 2070, a decline of roughly 62 percent (**Figure ES-2**). This decline is driven almost entirely by the retirement of the Region's once-through coal-fired power plants. Power generation withdrawals, which dominate the regional total, are projected to fall from 1,881 MGD in 2020 to 619 MGD in 2070, with nearly all the decline occurring in Jefferson County.

Among the remaining sectors, industrial withdrawals are projected to grow modestly, from about 44 MGD to about 46 MGD; public water supply demand is projected to rise modestly through the mid-2020s before easing to about 84 MGD by 2070; and irrigation, while a small share of total withdrawals, is projected to grow the fastest in percentage terms, from about 1.6 MGD to more than 6.1 MGD, concentrated in Spencer, Posey, and Vanderburgh counties.

Water Availability

Water availability is assessed on a sub-basin scale, with the Region divided into 11 sub-basins (**Figure ES-3**). Historical water availability, assessed for the period 2007-2023, is positive across nearly all the Region's sub-basins on a seasonal basis; only one sub-basin, Sub-Basin 6, outside the Whitewater

Instream Flow

Instream flow is a minimum streamflow target that protects the water quality, ecological health, and recreational uses of a stream. If the flow in a stream drops below the instream flow target for an extended period time, the health of the stream may be impacted. The Indiana Regional Water Studies have adopted two statistical measures of streamflow to define instream flow: the 7Q10 and the annual Q90.

River watershed, experienced a single historical season (Fall) with streamflow below its minimum instream flow target. The Ohio River and its outwash deposits (Major Sub-Basin 11) have cumulative excess water availability one to two orders of magnitude greater than the Region's other sub-basins, reflecting the much larger flow volumes of the Ohio River itself.

Looking forward, the Whitewater River watershed and the rest of the Region diverge sharply. In the Whitewater watershed (Sub-Basins 1 through 5), projected cumulative excess water availability declines in every sub-basin, and the number of sub-basins experiencing at least one seasonal occurrence of negative cumulative excess water availability grows from none historically to all five sub-basins in the future, with occurrences concentrated in Fall.

Outside the Whitewater watershed, future conditions are more stable. The only sub-basin (Sub-Basin 6) that experienced a historical occurrence of negative cumulative excess water availability is projected to have no such occurrences in the future, and Sub-Basins 7 through 11, including the Ohio River mainstem, remain fully positive throughout the planning horizon, though the Ohio River itself is expected to see reduced Fall streamflow by 2070 (**Figure ES-3**).

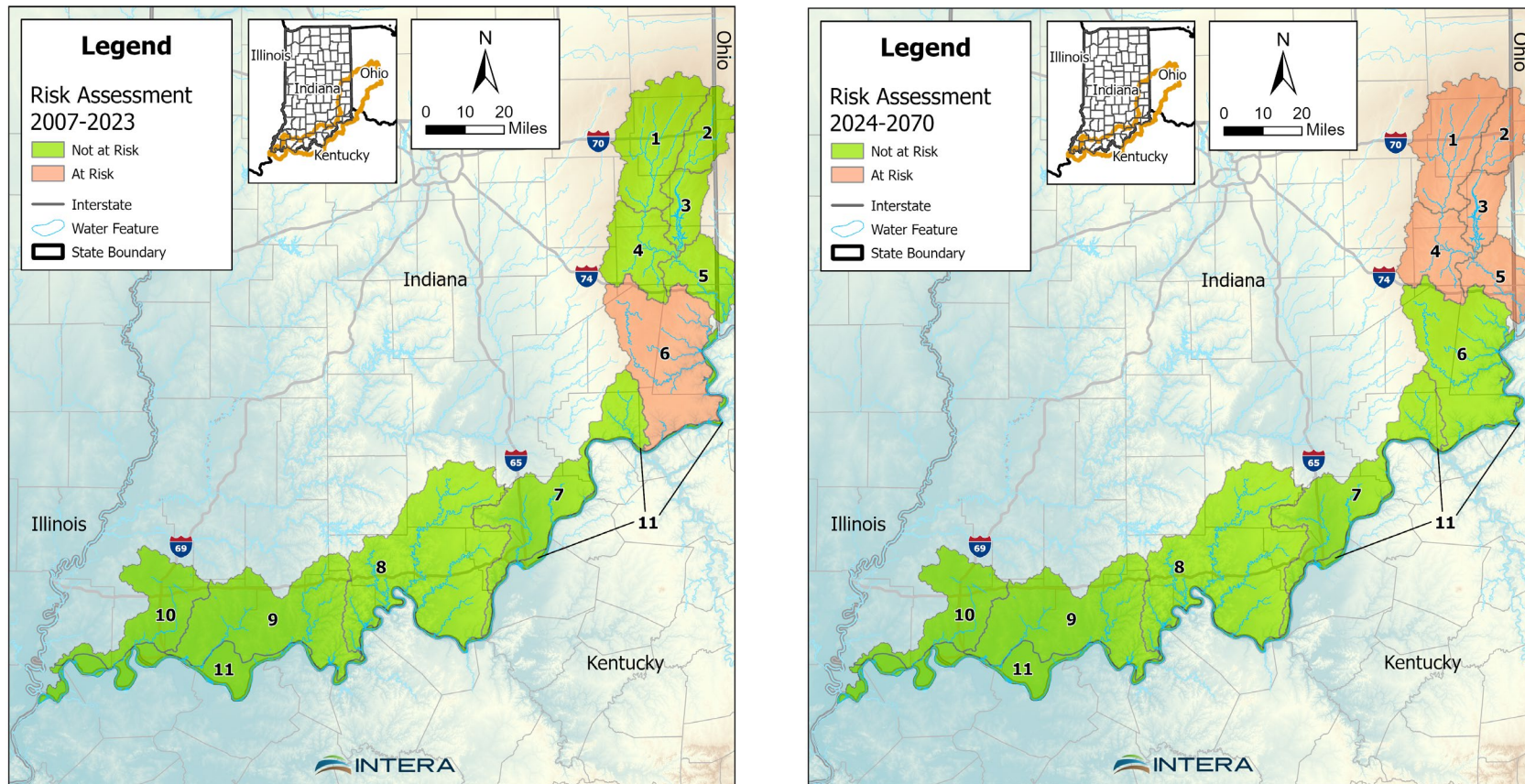


Figure ES-3. At-risk major sub-basins in the historical (left) and projected future (right) period. Green represents basins that have not and are not expected to exceed their seasonal cumulative excess water availability. Orange shows sub-basins that have dropped below the minimum instream flow target at least once (left) or are predicted to in the future (right).

Findings and Recommendations

The water demand and availability analysis indicates that the Ohio River and Southeast Indiana Region is not approaching a region-wide water deficit, but the Whitewater River watershed faces a growing and increasingly frequent **seasonal** risk to streamflow availability, particularly in Fall, even as total regional demand declines overall due to power plant retirements.

Layered onto this seasonal availability risk are ongoing risks from climate, water quality, and aging infrastructure. The Region faces the largest projected increase in extreme heat of any part of the state, present-day drought has already reduced Ohio River flows to historical lows, and the Region's water and wastewater infrastructure—illustrated by Evansville's 90-year-old cast iron water mains and multi-hundred-million-dollar combined sewer overflow obligations—is in many places well past its designed service life. Nitrate risk in the Whitewater Valley aquifer and per- and polyfluoroalkyl substances (PFAS) detections in the Ohio River add further water-quality pressure, while emerging data center development along the Clark County corridor introduces a new source of water and power demand for which the Region has not previously had to plan.

As regional planning progresses in the Ohio River and Southeast Indiana Region, the following recommendations will benefit the Region's water resources:

1. **Conservation review of new withdrawals** - Ensure that any future proposal for new or increased withdrawals in the Region documents sound and economically feasible conservation and efficiency measures, consistent with the Indiana's Water Shortage Plan's drought-response framework and IDNR's authority under IC 14-25-7-14.
2. **Ohio River low-flow resilience** - Incorporate the projected decline in minimum Fall water availability and recent flash-drought experience into intake, raw-water, and drought-contingency planning for utilities along the Ohio River Corridor. Explore water treatment technologies related to PFAS removal.
3. **Hydrologic monitoring** - Increase the number of active USGS stream and groundwater monitoring stations in the Region to better assess water availability. The Ohio River and Southeast Indiana Region has far less active monitoring than other regions in the state.
4. **Brookville Reservoir** - Explore water supply development in the Whitewater River watershed using storage in the Brookville Reservoir owned by the State of Indiana. The State has access to a nominal yield of 80.6 million gallons of water per day from the reservoir under contract with the federal government. Little of that storage has been accessed for water supply in the past.
5. **Irrigation efficiency** - Target irrigation efficiency incentives and drought-contingency programs toward Spencer, Posey, and Vanderburgh counties, where irrigation withdrawals show the strongest increasing seasonal peaks.
6. **Industrial and energy production sectors** - Continue to support industrial water recycling and process efficiency improvements to offset the Region's modest long-term growth in industrial withdrawals and coordinate with power generation operators along the Ohio River corridor to sustain the ongoing decline in thermoelectric withdrawals.
7. **Public water supply infrastructure** - Encourage full participation in, and expansion upon, the existing Indiana water loss audit requirements among the Region's nearly 100 public water

utilities. Continue the Region-wide capital needs and condition-rating inventory prioritizing state revolving fund/Indiana Finance Authority funding toward smaller systems with high per-connection project costs.

8. **Peak-day demand management** - Adopt local ordinances or incentive programs addressing discretionary summer outdoor water use, consistent with the pronounced seasonal peak observed in public supply demand across the Region.
9. **Water quality protection** - Expand nitrate monitoring in the Whitewater Valley and Ohio River Outwash aquifer systems and in the karst counties; continue PFAS compliance support for utilities ahead of federal deadlines; support continued combined sewer overflow separation planning at Evansville, Jeffersonville, and New Albany; continue acid mine drainage remediation in the southwestern coal counties.
10. **Data centers and emerging demand** - Establish a coordinated review of cumulative water withdrawals, associated power-generation cooling water and wastewater discharges from data center development.
11. **Regional monitoring and data** - Continue and expand SWWF reporting compliance and biennial water loss audits; track peaking factors and demand data across utilities to refine future planning updates to this Study.