



Water Demand and Availability in the Southwest Indiana Water Planning Region

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Executive Summary

This study evaluates historical and projected water demand and water availability in the Southwest Indiana planning region through 2075. The region includes downstream portions of the Wabash, White, East Fork White, and Patoka River systems. Its central water-planning issue is not a simple lack of water at the regional scale. Major rivers and reservoirs convey and store large volumes, but usable supply depends on where and when water is available, whether it can be treated economically, whether infrastructure can deliver it during peak demand, and whether local aquifers and streams can sustain withdrawals during dry periods.

Current demand is dominated by large energy-production withdrawals. Reported withdrawals in 2023 totaled approximately 790 million gallons per day (MGD), including about 584 MGD for energy production. Most thermoelectric cooling water is returned to the hydrologic system, so reported withdrawal totals substantially overstate consumptive demand. When the analysis is limited to water that is consumed or otherwise not promptly returned, groundwater accounts for approximately 75 percent and surface water for approximately 25 percent. Public supply, crop irrigation, rural livestock use, and some industrial activities therefore become much more prominent in the consumptive water balance than the gross-withdrawal totals suggest.

The location of supply is controlled strongly by geology. Productive groundwater is concentrated in alluvial and glacial-outwash deposits along major river valleys, while many upland areas south of the most recent glacial limit have thin unconsolidated deposits and lower-yielding bedrock aquifers. This pattern helps explain the region's unusually broad rural water-service areas, dependence on reservoirs such as Monroe Lake and Patoka Lake, and concentration of high-capacity irrigation and public-supply wells near river corridors. Karst landscapes create rapid connections between surface water and groundwater, increasing source-water vulnerability, while historical and active coal mining has altered local storage, flow paths, baseflow, and water quality.

Future demand was estimated with methods tailored to each water-use sector. Public-water projections distinguish baseline demand from climate-sensitive seasonal demand; utilities with similar historical behavior were modeled in groups, whereas Bloomington Utilities, Patoka Lake Regional Water and Sewer District, and Indiana-American Water-Terre Haute were evaluated separately. Climate-model influence on seasonal demand was bounded to historically plausible behavior. Crop- and turf-irrigation projections preserve observed monthly patterns and long-term trends, scaling the estimates by forecast climate variables. Other sectors were projected using

Highlights:

Current and future water demand in the Southwest Indiana region is dominated by energy production and public-water supply sector use.

The Southwest Indiana region is characterized by rural land uses including agriculture, forest land, and coal mining.

Public water utilities obtain water from surface-water reservoirs for regional distribution, as well as groundwater (where available) for smaller utilities.

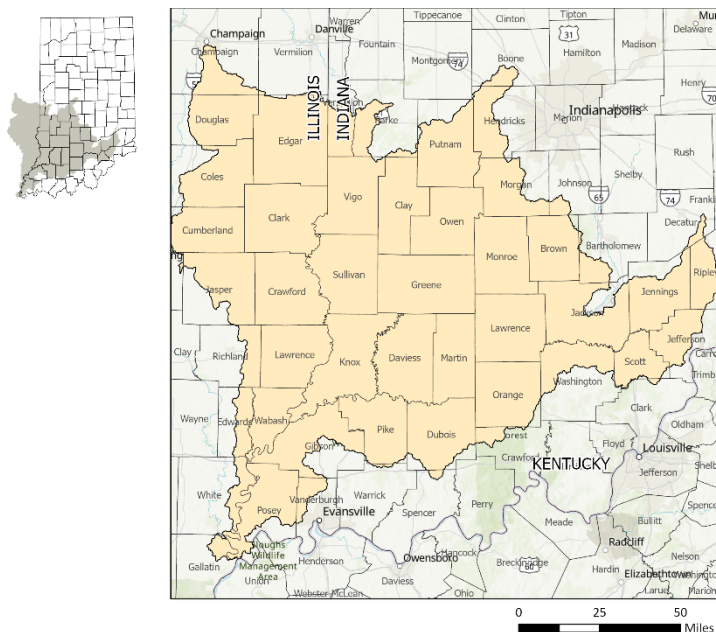
Current water demand in the region is 790 MGD, dominantly from surface water, with only 87 MGD of consumptive water use.

The largest consumptive-use water sector is agriculture (irrigation and livestock), using 59 MGD (at a higher rate during the growing season).

Future water demand in the region is estimated to decrease to 416 MGD by 2070, largely from fuel and technology conversions at energy plants.

Public water utilities are estimated to experience a very modest increase in water demand in the next 50 years (from 100 MGD to 103 MGD).

Summer and Fall water availability is supported by reservoir releases and wastewater return flows, particularly along major downstream river corridors.



facility information, sector trends, planned operational changes, and simplified return-flow rules where historical records did not support stable predictive relationships.

The future-demand outlook contains several important structural changes and uncertainties. Retirement or conversion of once-through thermoelectric facilities can sharply reduce gross surface-water withdrawals, even as new industrial processes may increase consumptive use. Proposed data centers are a potentially important but highly project-specific load because water demand depends on facility scale,

cooling technology, power supply, reuse, and whether water is purchased from a utility or self-supplied; in this study, proposals are therefore identified as planning risks rather than treated as uniform regional demand. Agricultural demand remains spatially concentrated, and facility-level records show that some irrigators have shifted a larger share of withdrawals into May and September even though most facilities show no statistically detectable change in seasonal timing.

This study used two methods to estimate historical and future natural baseflow, which is a major input to the water-availability calculations. Historical and future availability were evaluated by streamgage-defined subbasins using both local excess water availability (“local water availability”) and cumulative excess water availability (“cumulative water availability”). Local water availability represents water generated within a subbasin after accounting for instream-flow (habitat) thresholds, water withdrawals, wastewater returns, and reservoir operations.

Cumulative water availability includes upstream flow contributions routed through the river network. Future conditions were evaluated using two selected five-year periods from the climate projection: a relatively wet future period centered on 2050 and a relatively dry future period centered on 2070. Under the climate scenario evaluated, average annual local water availability is projected to decline in every regional basin during both future periods relative to historical conditions, even during the relatively wet 2050 period.

Winter is projected to be an important seasonal exception, with both local and cumulative availability projected to increase in 2050 across all four river systems relative to the historical Winter baseline. Availability is projected to be lower during the other seasons, with the greatest limits generally projected during Fall. By the dry 2070 period, local water deficits are projected during multiple seasons in several regions, and cumulative Fall deficits are also projected across much of the study area. Together, the future results project a shift toward wetter Winter conditions and drier conditions during Summer and Fall. Both methods used to estimate natural baseflow show this same broad pattern of future drying, even though they produce different estimates of how much water may be available.

Downstream river corridors are projected to retain much larger cumulative than local availability because of the inclusion of water generated and managed upstream. This distinction is particularly important along the White and Wabash Rivers, where cumulative availability is estimated to remain substantial even as locally generated availability is projected to decline. Future downstream water availability is therefore projected to depend more heavily on rainfall and streamflow, water use and return flows, reservoir operations, and water-management decisions elsewhere in the watershed.

The Patoka River is projected to remain the most water-limited of the four regional river systems, and the results show that reservoir operations can play an important role in maintaining water availability during low-flow periods. In this analysis, future reservoir releases followed historical monthly operating patterns; the model did not simulate how lake levels and stored volumes would change during a prolonged drought. It is therefore uncertain whether the modeled releases could be maintained throughout a long dry period. Overall, the projections show that future water availability may depend not only on how much water is present, but also on when, where, and how it is used and managed throughout the river system.

Public utilities are affected by both source-water and infrastructure risks. Large service areas and wholesale networks move water across subbasin boundaries, so the subbasin of withdrawal may differ from the subbasin of use and wastewater return. Bloomington's Lake Monroe withdrawals and Patoka Lake Regional Water's distribution network are prominent examples. Peak seasonal demand can approach treatment or system capacity even where the raw-water source remains adequate. Water-quality risks include rapid contaminant transport in karst voids, acid mine drainage and mineralized mine water, nutrients and pathogens, disinfection byproducts, and emerging contaminants. Small rural utilities also account for a disproportionate share of drinking-water compliance violations, reflecting possible technical, managerial, and financial constraints, as well as source-water conditions.

Taken together, the results show a region with substantial water in major rivers and reservoirs but uneven local resilience. The most consequential planning signals are the decline in locally generated future water, the coincidence of Summer demand with the season of least recharge and lowest flow, increasing dependence on upstream inflows and managed storage, concentration of productive aquifers along river corridors, and the importance of treatment and distribution capacity. These findings are scenario-based rather than predictions of a single inevitable future, but they identify where utilities and other water users are most sensitive to climate variability, development, infrastructure limits, source-water quality, and cross-basin dependence.