around the swamp: (i) open-water swamp surface at several sites (interior prairies and near the outflows; $n = 4$), (ii) wells open to the UFA directly beneath or immediately adjacent to the swamp ($n = 4$), (iii) spatially distributed tapwaters supplied by municipal wells that are also open to the UFA ($n = 12$), and river water ($n = 12$). All water samples were collected in 20 mL high-density polyethylene bottles with minimal headspace, sealed and kept cool to prevent evaporation.

Isotopic analysis of the 2025 samples was performed using a Picarro L2140-i cavity ring-down laser spectrometer at the Evaristo Lab at the University of Georgia. Each sample was injected nine times, and the first six injections were discarded to eliminate memory effects. The spectrometer was calibrated using three standards (USGS 46-48) that spanned the range of expected terrestrial $\delta^{18}O$ and $\delta^{2}H$ values, all cross-referenced to the VSMOW-SLAP international scale. Results are reported in permille (‰) notation relative to VSMOW. The analytical precision (1σ) for the 2025 measurements was approximately ±0.025‰ for $\delta^{18}O$ and ±0.1‰ for $\delta^{2}H$, better than the 1997 data quality.

We performed a two-endmember mixing analysis (also see Supporting Information) to quantify the contribution of swamp water to the UFA, treating swamp surface water as one endmember ($n = 4$) and regional groundwater ($n = 15$) as the other endmember. The groundwater endmember consists of wells that are open to the UFA from Flowpaths 1 and 2 in the Clark et al. (1997) dataset. For each UFA well, the fraction of swamp water, f_{swamp}, was computed as:

$$f_{swamp} = \frac{\delta_{well} - \delta_{regional}}{\delta_{swamp} - \delta_{regional}} \quad \text{(Eq. 1)}$$

using $\delta^{18}O$ values (and cross-checked with $\delta^{2}H$ for comparison). In Equation 1, δ_{well} is the $\delta^{18}O$ isotope value in sampled wells and tapwaters, δ_{swamp} is the value in swamp water (-1.7 ± 0.58; $n = 4$), and $\delta_{regional}$ is the value in UFA wells along Flowpaths 1 and 2 in the Clark et al. (1997) dataset (-3.86 ± 0.43; $n = 15$). This linear mixing approximation assumes that isotope effects like evaporation only modify the swamp endmember and that there are no other distinct sources (e.g., no significant paleowater component with a vastly different signature beyond the chosen endmembers). The range of f_{swamp} across sites provides an estimate of how much of the UFA water under the swamp is derived from swamp infiltration. We performed this analysis for each of the two field campaigns.

The 'offset' of a water sample from the (local meteoric water line, LMWL) has been shown useful in characterizing the magnitude of evaporative enrichment (Evaristo *et al* 2015). To quantify the offset between UFA water, swamp water, river water and precipitation, we calculated the line-conditioned excess (LCE):

$$LCE = [\delta^{2}H - a\delta^{18}O - b]/S \quad \text{(Eq. 2)}$$