

RIVER REFUGIUM PROJECT

Watershed-Scale Nutrient Recovery Infrastructure

APPENDIX B

National Watershed Priority Map

Deployment sequencing across tiers, basins, and tribal corridors

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ABSTRACT

This appendix defines the national deployment priority structure for the River Refugium Project: which watersheds come first, why, how they influence regional scaling, and which are targeted in first-, second-, and third-wave deployment.

Prioritization follows three principles. Follow the pollution: nodes go where nutrient density and suspended organics are strongest. Follow the water consolidation: nodes go where multiple rivers merge, maximizing feedstock per intake. Follow the economic advantage: nodes go where land, labor, and regulatory cooperation produce workable returns.

The graphic map is maintained as a standalone document, Figure B-1, and depicts tier zones, nutrient convergence flows, and the five priority sites from Appendix C. This narrative edition carries the full deployment logic independently of the figure.

1. Prioritization Logic

Three principles govern sequencing, and they are applied in order rather than balanced.

Follow the pollution first, because nutrient density is simultaneously the environmental case and the feedstock supply, and a facility placed on thin water is expensive to run and slow to prove anything. Follow the water consolidation second, because a node at a confluence draws load from several basins through one intake, which is the cheapest possible increase in feedstock concentration. Follow the economic advantage third, because a site that satisfies the first two and cannot be built, staffed, or permitted is not a site.

The order matters. A location that is economically ideal and nutritionally thin scores well on the third principle and fails the first, and no amount of favorable land cost compensates for a feedstock supply that cannot fill a reactor.

2. Tier 1 Priority Watersheds

Tier 1 watersheds carry the first ten to twenty commercial nodes. They offer the highest nutrient load, the most reliable flow, the clearest environmental benefit, the greatest biomass potential, the lowest operational risk, and the best economic viability.

2.1 Lower Mississippi Basin — Primary Target

Memphis to New Orleans, with focus on the Arkansas-Mississippi borderlands. This corridor carries peak nutrient concentration from the entire Midwest, with warm climate, low land cost, and available labor. Downstream Gulf hypoxia impact is direct and measurable. Federal, state, and tribal interest potential is high. This is where the industry begins.

2.2 Ohio River Basin

Cairo to Louisville to Cincinnati to Pittsburgh. Second-largest nutrient contributor to Gulf hypoxia, with mixed agricultural and urban inputs across a large industrial corridor. The Ohio is the first major upstream

expansion frontier and the basin where acid mine drainage begins to appear as a co-occurring problem, making it the natural early proving ground for the sequestration configuration.

2.3 Missouri River Lower Basin

Kansas City to Jefferson City to the St. Louis confluence. High sediment and nutrient load from Great Plains agriculture, with strong influence on the Mississippi main stem. Capable of hosting multiple second- and third-wave nodes.

2.4 Arkansas River Basin

Tulsa to Fort Smith to Little Rock to Pine Bluff. High nutrient inflow, warm southern climate, low land cost. Functions as the strategic duplication corridor for Mississippi-style nodes, which matters because the second successful node in a new basin is what converts a result into a pattern.

2.5 Red River Basin

Southern Oklahoma, northern Texas, Louisiana. Nutrient-rich with severe seasonal variation and significant agricultural and municipal load. Suited to third- or fourth-wave Mississippi-region deployment once seasonal handling is characterized.

3. Tier 2 Priority Watersheds

Tier 2 watersheds have high viability with seasonal constraints, mid-range nutrient load, or more complex regulatory landscapes. Target range is nodes twenty through forty.

- Illinois River — among the most nutrient-rich rivers per mile in the country, feeding directly into the Mississippi main stem.
- Chesapeake Bay tributaries — Susquehanna, Potomac, James, Patuxent. High political will, established funding streams, strong academic infrastructure for independent verification.
- Central Valley, California — nutrient-rich agricultural drainage where water scarcity creates an additional mandate and makes the recovered-water fraction more valuable than elsewhere.
- Florida nutrient hotspots — Lake Okeechobee, St. Lucie, Caloosahatchee. Severe algal bloom conditions, warm climate, high public visibility.
- Great Lakes tributaries — Maumee, Fox, Milwaukee, Saginaw. Major bloom drivers with substantial political and academic attention.

4. Tier 3 Priority Watersheds

Tier 3 regions are viable but not prioritized unless local incentives are exceptional, tribal opportunity is strong, or political support is unusually durable. Examples include the Colorado River, Snake River, Brazos and Trinity Rivers, the Tennessee above the Ohio confluence, and Upper Mississippi tributaries in Minnesota and Iowa.

5. Tribal Priority Corridors

Tribal lands constitute opportunity zones at any tier, and the reasons are structural rather than incidental: sovereign permitting authority, distinct incentive structures, local land control, water rights flexibility, and in many cases an explicit institutional interest in nation-to-nation environmental restoration.

High-potential corridors include Cherokee Nation on Arkansas River tributaries, Choctaw and Chickasaw in the Red and Arkansas basins, Navajo Nation in the San Juan watershed, and Ojibwe and Odawa nations across Upper Midwest and Great Lakes tributaries.

Tribal nodes can skip tiers, because sovereignty changes the permitting and economic calculus rather than merely easing it. This is treated in the framework as jurisdictional fact and not as a consultation courtesy.

6. Deployment Summary

Wave	Node Count	Watersheds
Tier 1	10–20	Lower Mississippi, Ohio, Lower Missouri, Arkansas, Red
Tier 2	20–40	Illinois, Chesapeake tributaries, Florida hotspots, Great Lakes feeders, California Central Valley, selected Texas basins
Tier 3	Opportunistic	Colorado Basin, Tennessee system, Upper Mississippi, Brazos and Trinity, selected Pacific Northwest rivers
Tribal	Cross-tier	Any tier as sovereignty, incentive, and local interest align

7. What the Map Is For

The map creates predictable deployment timing, maximizes environmental return per dollar, and aligns expansion with pollution gradients rather than with political boundaries. It gives investors and agency partners a legible expansion path, anticipates tribal collaboration as a core scaling mechanism rather than an afterthought, and lets a reader visualize multi-decade watershed restoration as a sequence rather than an aspiration.

Its practical function is to ensure the first nodes are placed where success is most likely and most visible. A first node that works in the hardest available conditions proves less than a first node that works cleanly and generates a dataset the next ten sites can use.

Notes

Citations follow Chicago Notes-Bibliography style. Internal Cernunnos Foundation and Bright Meadow Group documents are cited by title and year. Figures marked ■ are provisional academic proxies pending replacement by measured pilot values.

1. Figure B-1. National Watershed Priority Map. Bright Meadow Group, Version 3.0, August 2026. Maintained as standalone PDF.
2. USGS, *Nutrient Loads and Trends in Major U.S. Rivers; Gulf Hypoxia Assessment*.
3. USGS, *SPARROW Model — Nutrient Load Estimates for Major U.S. Basins*.

4. *USDA Conservation Effects Assessment Project (CEAP), national reports on agricultural nutrient runoff.*
5. *Bright Meadow Group, "RRP0003 — Consolidated Technical Whitepaper," Version 3.0, §12.1 and §14. CF/BMG, August 2026. Tribal sovereignty and deployment sequencing.*
6. *Bright Meadow Group, "RRP0003-apC — Initial Five Recommended Sites," Version 3.0. CF/BMG, August 2026.*