

TWO PATHS, ONE COMMON GOOD

Integrating Geospatial Technology and Indigenous Traditional Knowledge for
Long-Term Wetland Stewardship

NAWM WETLAND MAPPING CONSORTIUM – OCTOBER 2026



**Saint Mary's
University**
GEOSPATIAL SERVICES

GEOSPATIAL SERVICES

Who We Are

And integration of academic apprenticeship with focused professional development applying spatial technologies



Spatial Data
Development



Ecological
Function
Assessment



Field
Validation



Internships
and Training



Stakeholder
Engagement



TRANSLATIONAL ECOLOGY

Translational Ecology is an environmental science paradigm that brings stakeholders, Tribal leadership, and academic technicians into equal partnership. It moves land governance away from transactional competition and toward the shared, common good.



COLLABORATION

Co-developed knowledge as true equals from day one.



ENGAGEMENT

Deep relationships that honor sovereignty over bureaucracy.



COMMITMENT

Building long-term tribal trust that outlasts grant cycles.



COMMUNICATION

Active, non-jargon learning exchange in both directions.



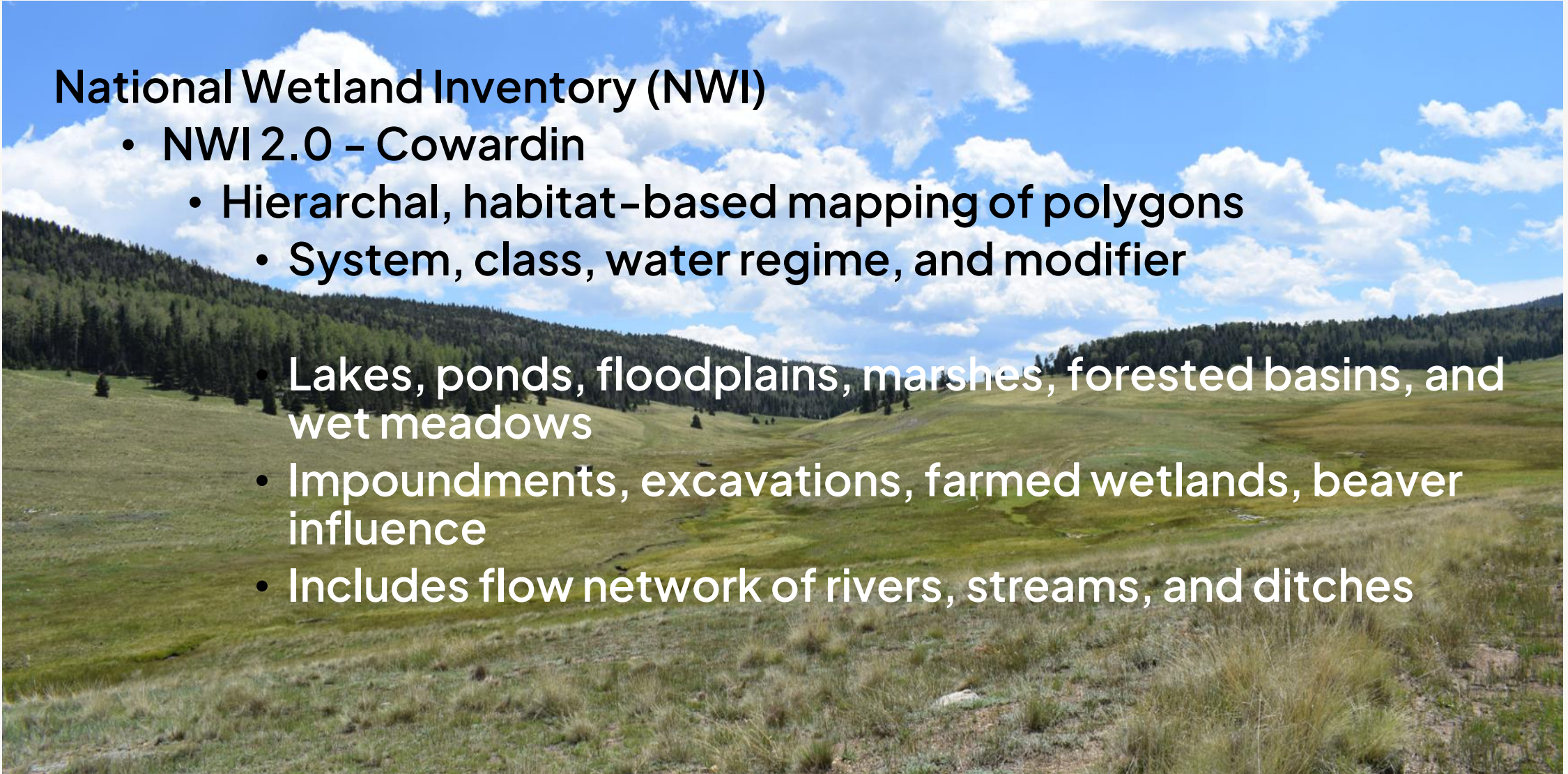
CO-OWNERSHIP

Shared buy-in, ensuring data belongs wholly to the Nation.

WETLAND INVENTORY

National Wetland Inventory (NWI)

- NWI 2.0 – Cowardin
 - Hierarchal, habitat-based mapping of polygons
 - System, class, water regime, and modifier
 - Lakes, ponds, floodplains, marshes, forested basins, and wet meadows
 - Impoundments, excavations, farmed wetlands, beaver influence
 - Includes flow network of rivers, streams, and ditches

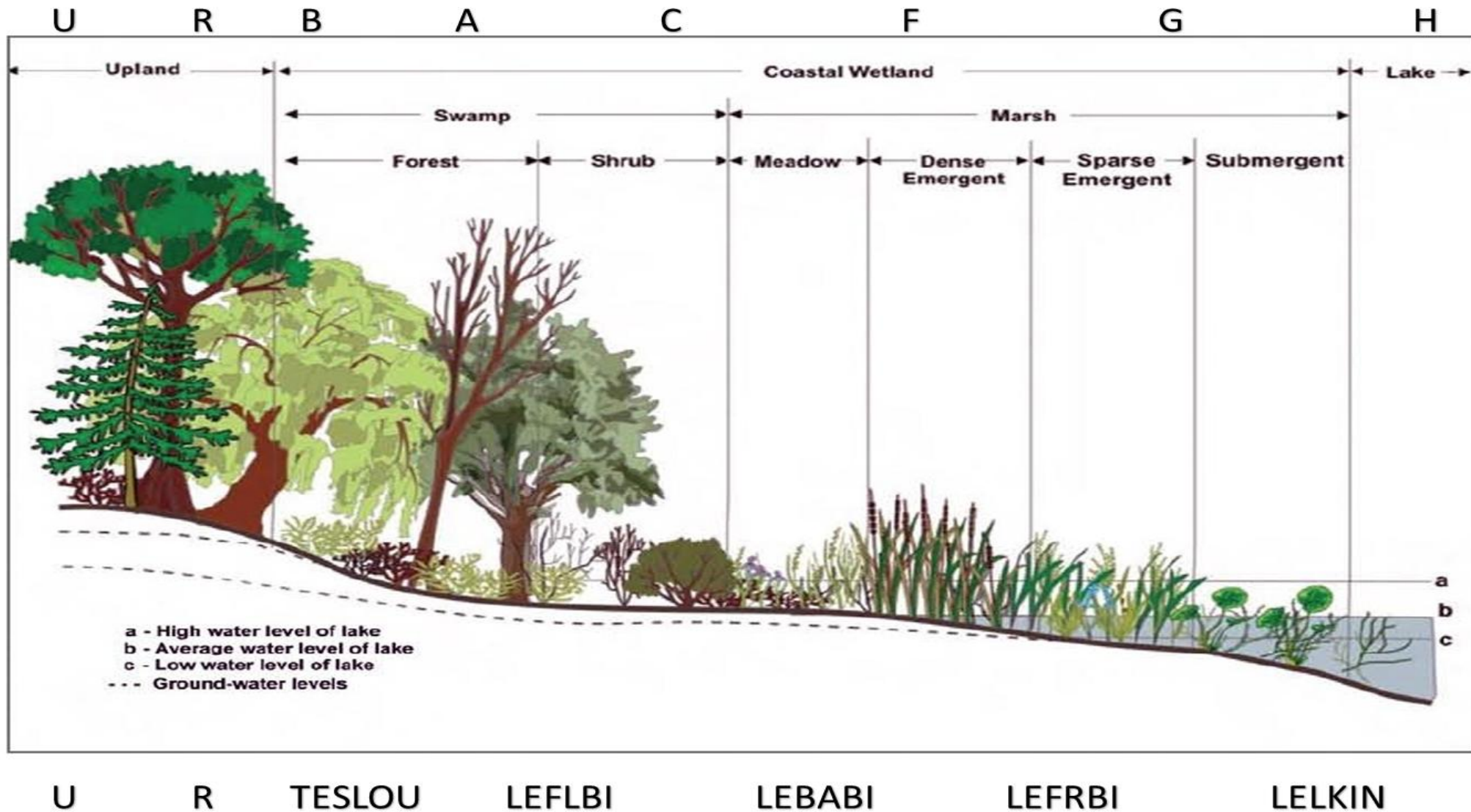


WETLAND INVENTORY

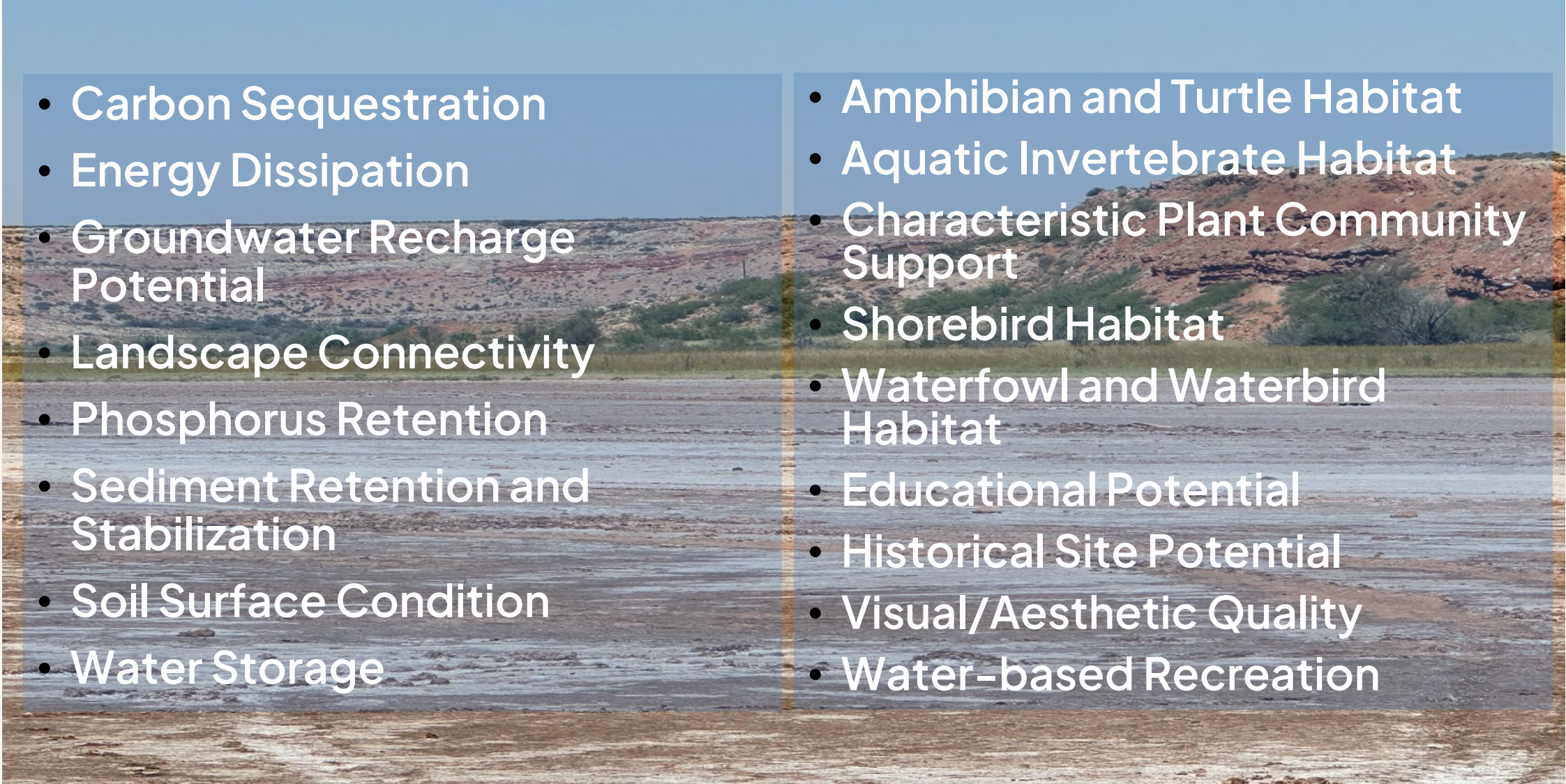
LLWW Classification

- **Landscape:** Lentic (LE), Lotic river (LR), Lotic stream (LS), Terrene (TE)
- **Landform:** Basin (BA), Flat (FL), Slope (SL), Floodplain (FP), Fringe (FR)
- **Water Flow Path:** Bidirectional (BI), Inflow (IN), Isolated (IS), Throughflow (TH), Outflow (OU)
- **Waterbody:** Lake (LK), River (RV), Stream (ST)
- **Typical code:** LSBATH – Lotic Stream, Basin, Throughflow

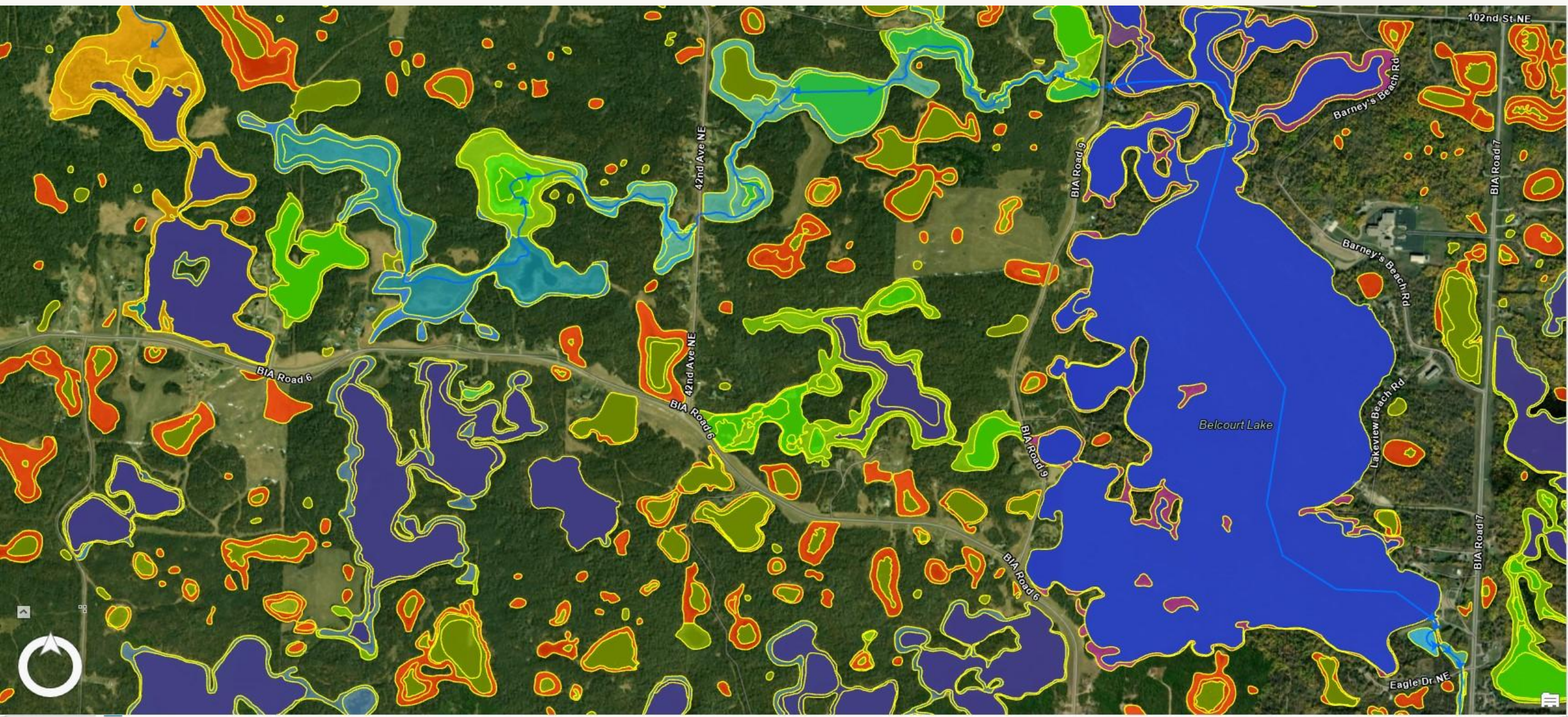
WETLAND INVENTORY



WETLAND FUNCTIONS

- 
- Carbon Sequestration
 - Energy Dissipation
 - Groundwater Recharge Potential
 - Landscape Connectivity
 - Phosphorus Retention
 - Sediment Retention and Stabilization
 - Soil Surface Condition
 - Water Storage
 - Amphibian and Turtle Habitat
 - Aquatic Invertebrate Habitat
 - Characteristic Plant Community Support
 - Shorebird Habitat
 - Waterfowl and Waterbird Habitat
 - Educational Potential
 - Historical Site Potential
 - Visual/Aesthetic Quality
 - Water-based Recreation

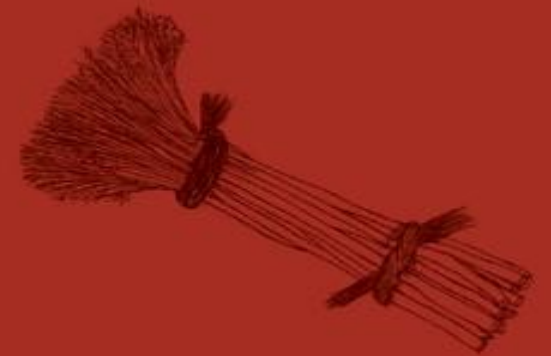
HABITAT PRIORITIZATION



FORT BERTHOLD TAT – FIRST FOODS INITIATIVE



Gilbert Livingston Wilson
Edited and annotated by Michael Scullin



Uses of Plants *by*
the Hidatsas of *the*
Northern Plains

TRIBAL WETLAND RAM

Our custom ****Rapid Assessment Method (RAM)**** bridges quantitative ecological metrics with qualitative Indigenous values, elevating traditional priority zones into scientific baselines.

FUNCTIONAL GROUP	WESTERN SCIENCE METRICS (ABIOTIC)	INDIGENOUS & TEK METRICS (CULTURAL/BIOTIC)
Water Quality & Flow	Sediment Retention, Nutrient Stabilization, Floodwater Storage	Hydrological integrity of wild rice waterways, fish health baseline
Habitat & Biodiversity	Amphibian/Turtle nesting metrics, forest cover index	Sustenance for native waterfowl, availability of nesting materials
Cultural & Spiritual Heritage	Visual/Aesthetic ratings, regional green space index	Fort Berthold Hidatsa Ethnobotany, historical sites, sacred spaces
First Foods & Medicines	Biomass calculation, general vegetation canopy indices	Acreage and health of harvestable sweetgrass, willow, and sage

STANDING ROCK SIOUX – FIRST FOODS INITIATIVE



WILD RICE PROPOGATION

STANDING ROCK SIOUX INITIATIVE

-  **Protecting Manoomin:** Safeguarding wild rice, a foundational cultural relative and First Food.
 -  **Data-Driven Protection:** Using updated wetland inventory models to locate highly functional hydrological zones.
- Coordinated Action:** Connecting community harvesters with spatial mapping analysts to prioritize restoration sites.



TURTLE MOUNTAIN – FIRST FOODS INITIATIVE



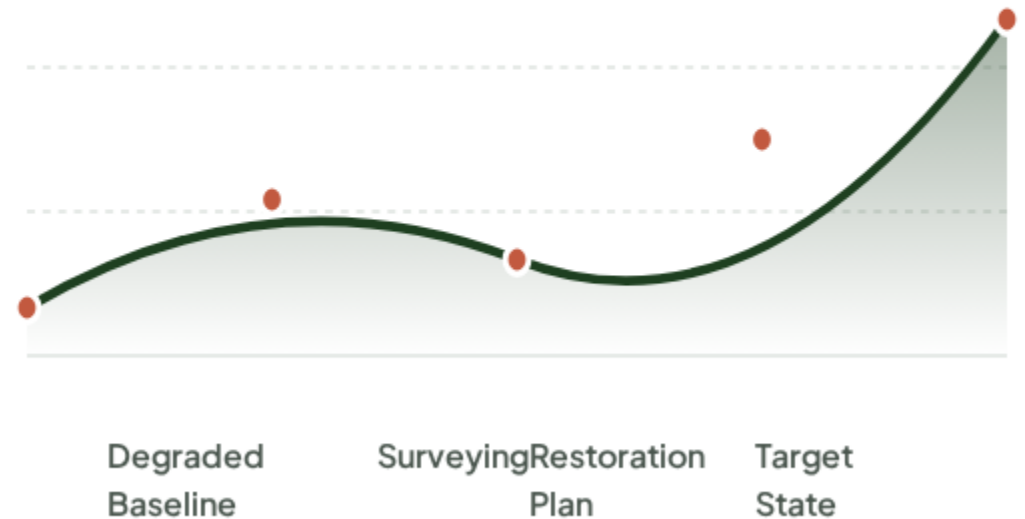
TURTLE MOUNTAIN - LAKE BELCOURT MODELING

HABITAT & FLOW MODELING

Advanced spatial technology utilizing LLWW (Landscape, Landform, Waterbody, Waterflow) categorizations helps identify critical ecological corridors.

- 🎯 **Targeted Prescription:** Models high-value nesting environments for turtle and waterfowl populations.
- 💧 **Dynamic Sinks:** Maps precise wetland boundaries to plan infrastructure setbacks.

ESTIMATED WATERFOWL NESTING HABITAT VALUE (INDEX TRENDS)



SALMON DNA BASELINE

QUINULT HOMELAND FISHERIES

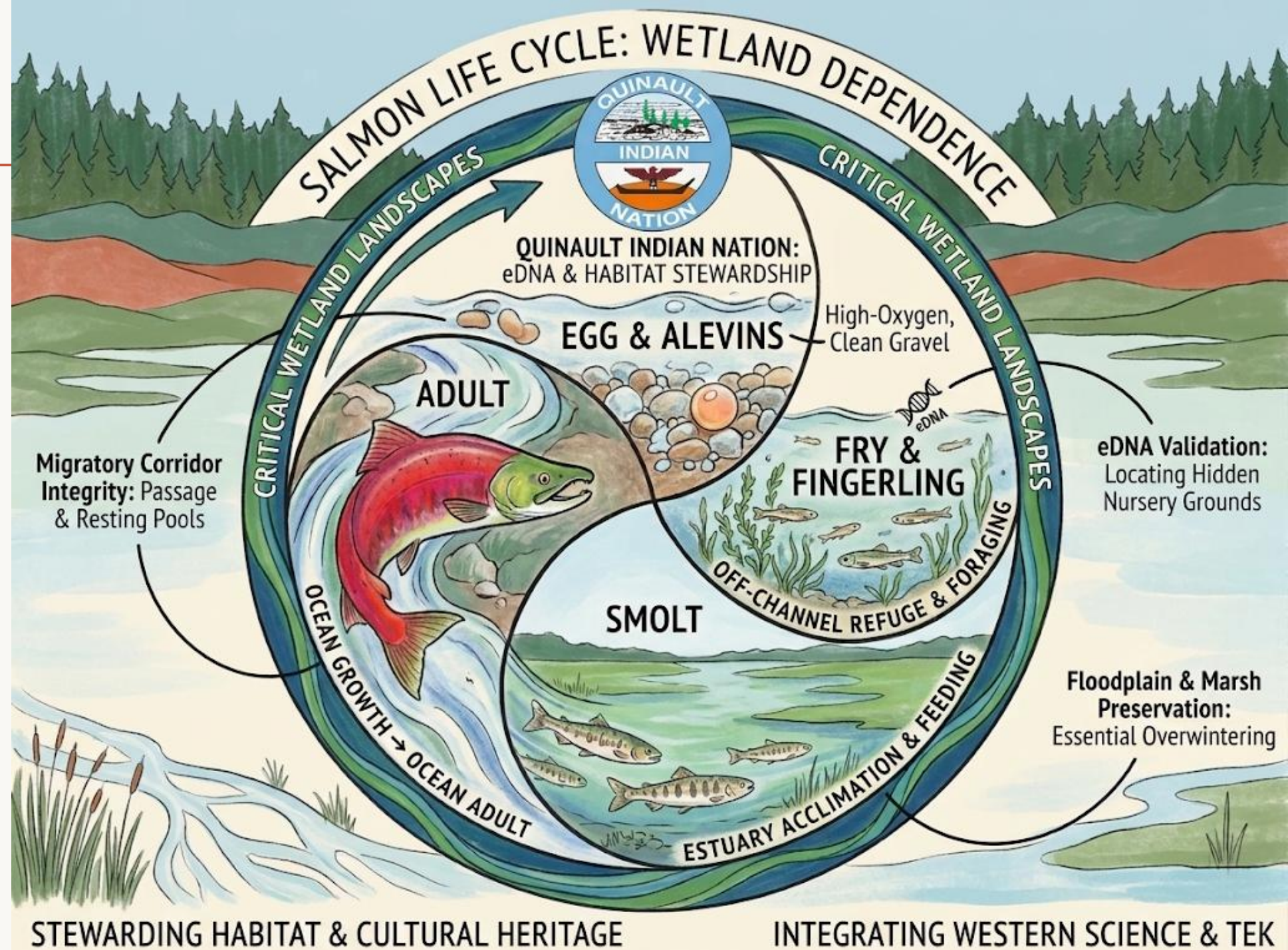
In partnership with the Quinault Indian Nation, advanced biological and spatial techniques were combined to establish genetic and habitat baselines for salmon populations.

By analyzing Environmental DNA (eDNA) alongside localized hydrological maps, tribal managers gain empirical, courtroom-ready proof of ecological viability, fortifying sovereignty over their sacred salmon waters.



METRICS

- Expanding known habitat ranges above barriers
- Identifying Off-Channel and Floodplain Refuge
- Uncovering non-visual spawning grounds
- Pinpointing Salmon lifecycle specifics
- Targeting priority restoration and passage projects



OUR SHARED FUTURE



FOR THE SEVEN GENERATIONS

Empowering Indigenous Nations to safeguard ancestral waters, secure federal environmental funding, and preserve sacred resources using collaborative geospatial science.

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IMAGE SOURCES



https://www.wisconsinwetlands.org/wp-content/uploads/2019/08/rice-stand-6-peter.david_.jpg

Source: www.wisconsinwetlands.org



https://www.nps.gov/olym/planyourvisit/images/stream_river_quinault_450-w.jpg?maxwidth=650&autorotate=false

Source: www.nps.gov