Filling the Gaps

Combining Remote Sensing & Community Science for Region Wide Conservation of Vernal Pools

Abby Pointer

Michigan Nature Association · Michigan Vernal Pools Partnership

NE-MW Vernal Pools Collaborative (NEMWVPC)

Michigan Nature Association

Partnership Coordinator for the Michigan Vernal Pools Partnership

Michigan Vernal Pools Partnership

NORTHEAST - MIDWEST Vernal Pool Collaborative

Northeast-Midwest VP Collaborative

Integrate remote sensing technology into conservation

Build the first regional vernal pool database

Exchange learning & best practices

Serve as a resource hub for community engagement and awareness

History: Michigan Vernal Pools Partnership

Grounding ourselves in where this work began

2012

Pilot Project

K-12 schools in northern Michigan. Community science seeds planted.

2015

MVPP Founded

Formal partnership — vernal pools had no representation in Michigan policy.

2018

First Annual Meeting

Full statewide citizen science program. Growing data & awareness.

2022

Dedicated Coordinator Hired

New coordination role: consistency, growth, community science & outreach.

Michigan Nature Association — Protecting Michigan's Natural Heritage Since 1952

Michigan Natural Features Inventory

Department of Natural Resources — DNR — Michigan

HRM — Herpetological Resource and Management

Consumers Energy — Count on Us

EGLE

U.S. Fish & Wildlife Service — Department of the Interior

Michigan State University Extension

Michigan Tech Research Institute

Michigan Vernal Pools Partnership

The mission of the Michigan Vernal Pools Partnership is to increase awareness, understanding and protection of vernal pools through conservation, research & mapping, education & outreach, and collaboration.

To achieve its mission, the partnership has developed four goals..

Conservation	Education & Outreach
Encourage vernal pool conservation through local and state measures	Improve awareness, understanding and engagement of land managers, educators, and other targeted audiences to increase effective conservation of vernal pools across Michigan.
Research & Mapping	**Collaboration & Coordination**
Understand the status, distribution and ecology of vernal pools to best inform conservation measures.	Leverage the experience, expertise and resources of partner organizations and others to maximize impact and accelerate progress.


FOR-MAR
Grand Traverse Regional land Conservancy
The Stewardship Network
Connect to Conserve
Huron River Watershed Council
OAKLAND UNIVERSITY
HEADWATERS LAND CONSERVANCY
DEPARTMENT OF NATURAL RESOURCES
DNR
MICHIGAN
GRASS RIVER NATURAL AREA
RiverRaisin WATERSHED COUNCIL
CWC CHIPPEWA WATERSHED CONSERVANCY
MWA
Michigan Wetlands ASSOCIATION
CHARTER TOWNSHIP OF OAKLAND
Huron Pines
LITTLE TRAVERSE CONSERVANCY
HURON-CLINTON METROPARKS
Sea Grant Michigan
EGLE
FOREST HILL NATURE AREA
CITY OF EAST LANSING ENVIRONMENTAL STEWARDSHIP
MARC
LOWER GRAND RIVER ORGANIZATION of WATERSHEDS
MICHIGAN NATURE ASSOCIATION
Michigan Natural Features Inventory
Discover. Define. Deliver.
DUCKS UNLIMITED
BLUE HERON Headwaters Conservancy
LandConservancy OF WEST MICHIGAN
chippewa naturecenter
U.S. FISH & WILDLIFE SERVICE
PARKS & RECREATION WASHTENAW COUNTY Michigan
HRM
NCEC NEWAYGO COUNTY ENVIRONMENTAL COALITION
MY WOODS NATURE TRAIL
THE LITTLE FORKS CONSERVANCY
Consumers Energy
Count on Us®
M FLINT
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Natural Area Preservation
Michigan Tech Research Institute
GRAND RAPIDS PUBLIC MUSEUM
Be curious.
MICHIGAN STATE UNIVERSITY
Extension
OAKLAND COUNTY PARKS
fenner
Kalamazoo Nature Center
www.NatureCenter.org

Michigan Natural Features Inventory

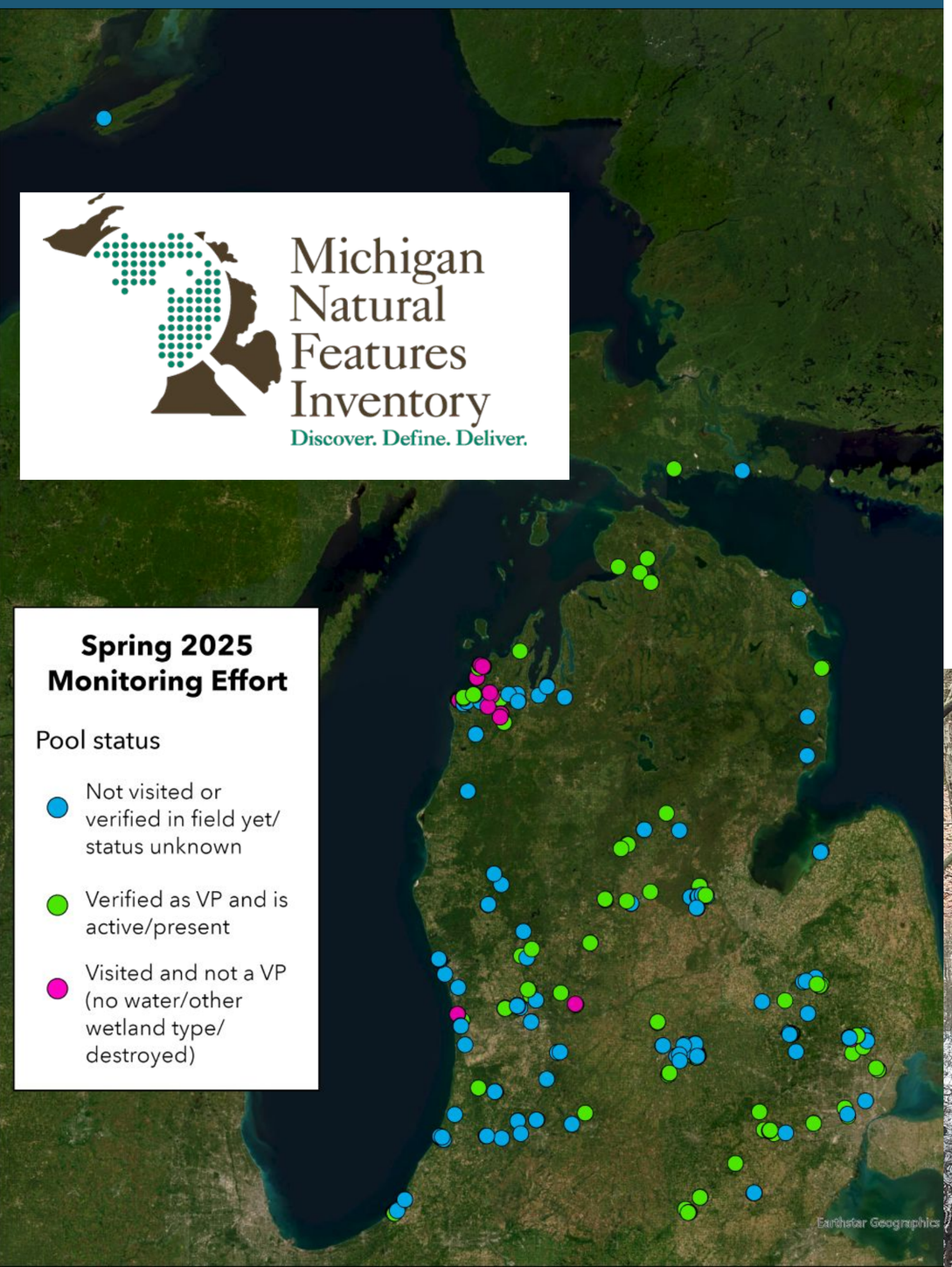
Discover. Define. Deliver.

Spring 2025 Monitoring Effort

Pool status

- Not visited or verified in field yet/ status unknown
- Verified as VP and is active/present
- Visited and not a VP (no water/other wetland type/ destroyed)

Earthstar Geographics



Spring 2025 Stats			
359 New Pools Added	**1439** Pools Updated	**497** First Visits	**116** Second Visits

This effort occured across 41 Michigan counties and there were over 175 volunteers surveying so far this year. We had a 57% increase in monitoring visits compared to 2024!

**This summary includes ONLY data submitted via the Survey123 field app and does not include paper data forms that will be entered into the database Fall 2025.*


Of Pools AND People
OHIO VERNAL POOL NETWORK
HOME
VERNAL POOLOOZA
ABOUT
THE NETWORK
LEARN
The Ohio Vernal Pool Network provides educational resources, opportunities and experiences to further the understanding, protection and enjoyment of Ohio's hidden
VERMONT ATLAS OF LIFE
EXPLORE DATA
PROJECTS
NEWSFEED
EVENTS
REPORTS
HELP
ABOUT
DONATE
THE WETLANDS COLLABORATIVE
Determining the Importance of Vernal Pools Across Geophysical and Urbanization Gradients to Inform Regulation, Conservation, and Management
Project Sponsor: US Environmental Protection Agency - Region 2 Wetland Program
Pennsylvania Natural Heritage Program
Home > Ecological Communities > Vernal Pools
Vernal Pools
stablishing a citizen science
alamander & ephemeral pond
nonitoring program in Wisconsin
Michigan Vernal Pools Partnership
Home
About Us
What Are Vernal Pools
Vernal Pool Patrol
Vernal Pool Database
Resources
WATCH "EPHEMERAL"
Vernal Pool Association
Promoting the study, appreciation and protection of vernal pools.
HOME
VERNAL POOLS
ECOLOGY
PROTECTION
EDUCATION
GALLERIES
Get the Field Guide to the Animals of Vernal Pools

Why Vernal Pools Matter

Nature's Nurseries

Critical breeding habitat for spotted salamanders, wood frogs, and other amphibians. No fish = no egg predation. Amphibian populations region-wide depend on healthy pool networks.

Biodiversity Hotspots

Support rare plants, specialist invertebrates, and species found nowhere else in the landscape. Disproportionately high species richness per acre.

Nutrient Cycling Engines

Detritus-based ecosystems. Massive invertebrate biomass moves nutrients from pool into the surrounding forest via emerging insects and migrating wildlife.

Rare Species Habitat

Home to state/federally listed species: spotted salamander, wood frog, fairy shrimp, rare sedges. Irreplaceable — specialist communities cannot simply relocate.

The Conservation Challenge

Mapping Is Hard

Small size, seasonal water, variable appearance by season. Methods vary: aerial photos, LiDAR, field surveys. Inconsistent across all 9 states, making regional data comparison difficult.

Limited Research

'Vernal pools,' 'seasonal ponds,' 'ephemeral wetlands' — different criteria by state and agency. This alone prevents regional coordination and unified datasets.

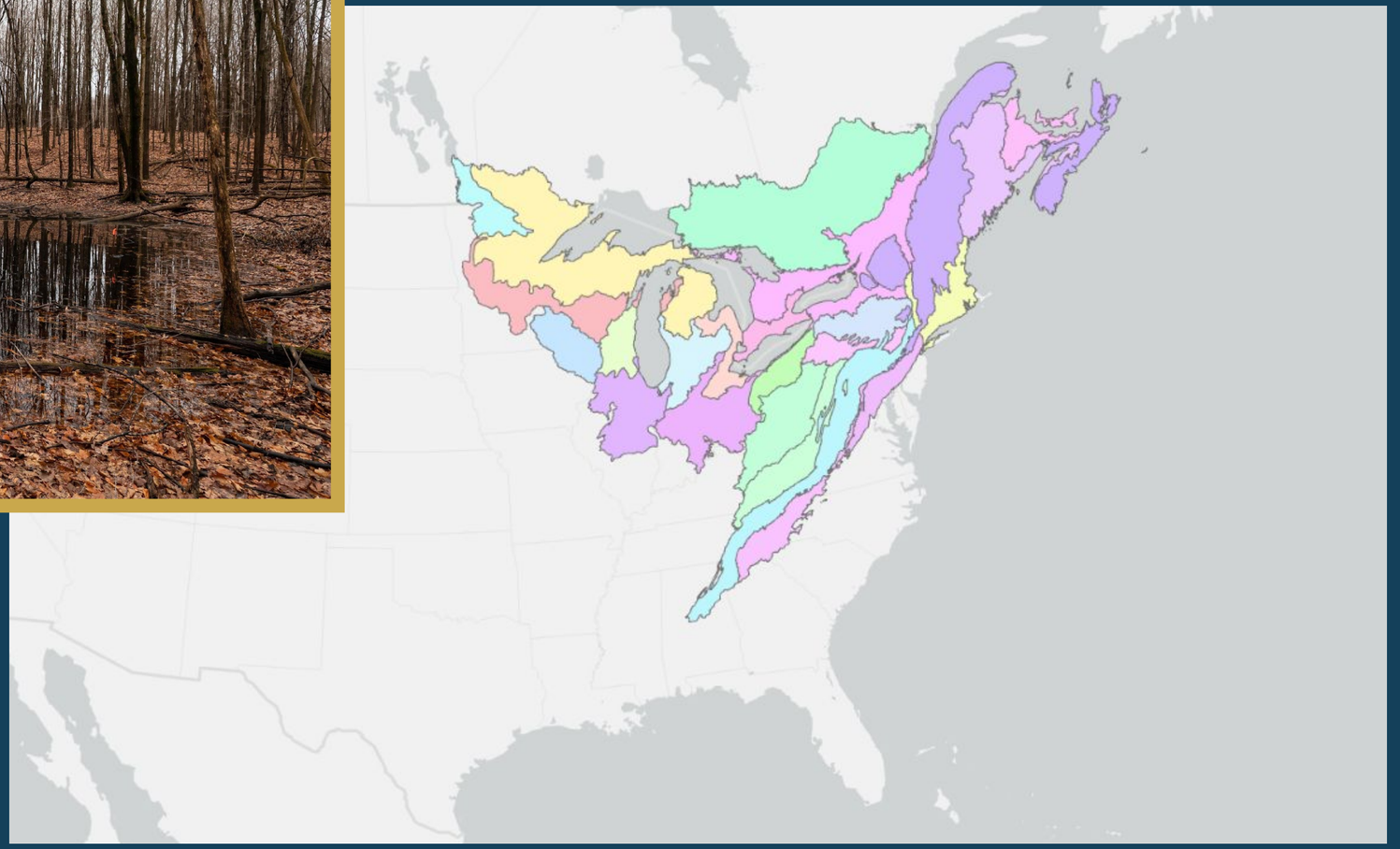
Limited Protection & Policy Gaps

Small size often exempts pools from wetland regulations. Most NE/Midwest states lack dedicated vernal pool protection. Legally invisible — and therefore vulnerable to destruction.

Lack of Awareness

Dry and inconspicuous in summer. Out of sight, out of mind for landowners, planners, and policymakers. Conservation can't happen for places nobody knows exist.

Working at the Scale of the Resource Base



The Road to NASA Funding

Three attempts — persistence pays off

2016

Try 1 — Inspired by the Northeast

First attempt to bring NASA remote sensing to vernal pool mapping. Directly inspired by successful Northeastern mapping work. Important groundwork — but did not receive funding.

Not Funded

2020

Try 2 — Room to Improve

Stronger remote sensing component. Reviewers flagged insufficient citizen science infrastructure to verify model outputs in the field. New role was created in 2022 to bolster the partnership — and to strengthen this for round three.

Not Funded — Beef Up Citizen Science

2024

Try 3 — It Worked!

Smaller funding pool, fewer partners funded — but the Northeast was included for the first time. Key breakthrough: PALSAR satellite radar enables hydroperiod mapping at regional scale. Vernal pool ecosystems are similar across the region — sharing methods makes sense.

FUNDED

Overall Goal & Scope of NASA Grant

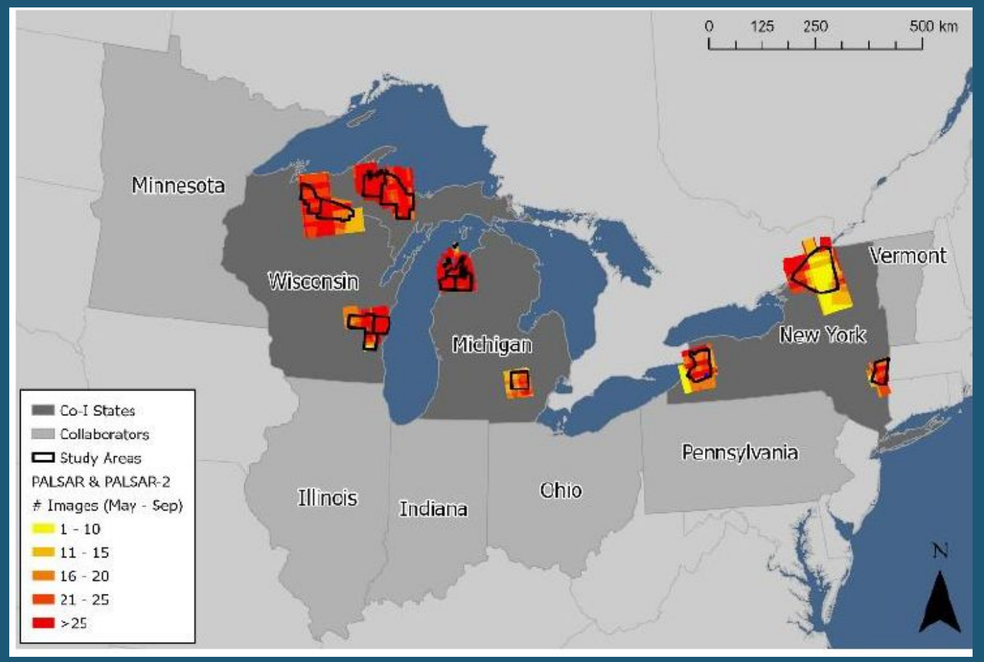
To design a regional vernal pool citizen science program and form a Vernal Pool Collaborative in order to map, monitor, and share information about vernal pools across the scale of the northern temperate forests.

Mapping & Monitoring

Michigan

Wisconsin

New York



NE-MW VPC

Michigan

Wisconsin

New York

Pennsylvania

Ohio

Illinois

Indiana

Minnesota

Vermont

Maine

New Jersey

Long Term Vision

Further Science

Early consensus on key issues/topics across region will enable more states to map vernal pools given future funding (not reinventing the wheel every time)

Improve Conservation

From a conservation/protection perspective, regional organizing efforts can have more sway than individual voices

NORTHEAST - MIDWEST
Vernal Pool
Collaborative

Common Definition

Temporarily or seasonally flooded wetlands, typically small and shallow. No permanently flowing inlet/outlet. Fishless. Found in a variety of forested landscapes — approved definition adopted by the NMVPC in January 2026.

- Flooded at least 2 consecutive months in spring; floods at least once every 5 years
- Dry by late spring, summer, or fall
- Variable hydrology — wet year vs. dry year
- Small & shallow: <2.5 ac, most <0.25 ac, <1m deep
- Found in upland forests, lowland forests, floodplain forests — fishless or no permanent predatory fish

The Technology: Radar + LiDAR + Citizen Science

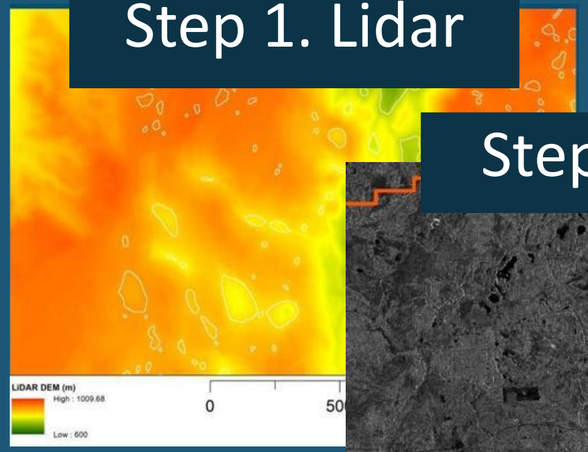
PALSAR Satellite Radar

- ALOS-2 PALSAR-2 is an L-band SAR sensor (~24 cm wavelength) — penetrates forest canopy to detect inundation via double-bounce effect
- Radar penetrates cloud cover & forest canopy — sees water where optical sensors cannot
- Captures hydroperiod: seasonal timing and duration of inundation
- Combined with LiDAR DEMs for depression analysis; pools filtered by size (100m²–1 ac), canopy cover, and distance from rivers (>10m)

Project Methodology

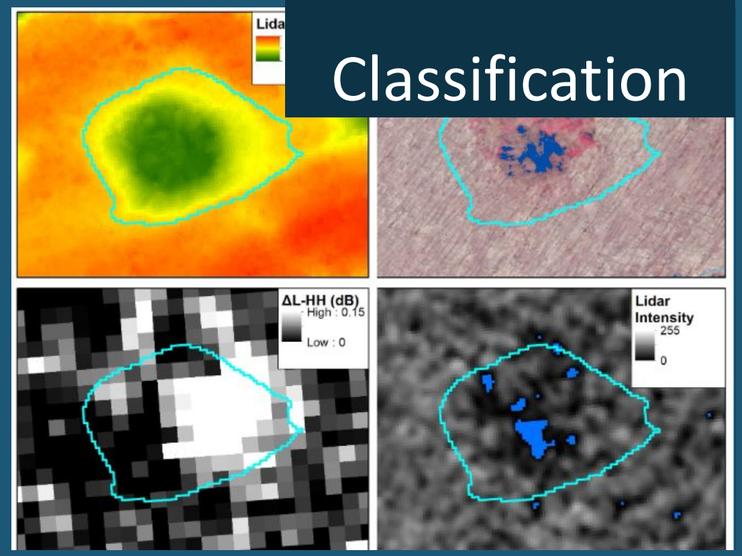
1. **Radar-LiDAR Mapping**
   Generate Potential Vernal Pool (PVP) maps — confidence graded 1-4 based on PALSAR-2 SAR, LiDAR intensity, and optical NIR criteria
2. **Citizen Science Verification**
   Trained volunteers confirm pool presence in the field
3. **Data Integration**
   Remote sensing + ground-truth merged into regional dataset
4. **Ongoing Monitoring**
   Repeated surveys track pool health and hydroperiod change

Step 1. Lidar



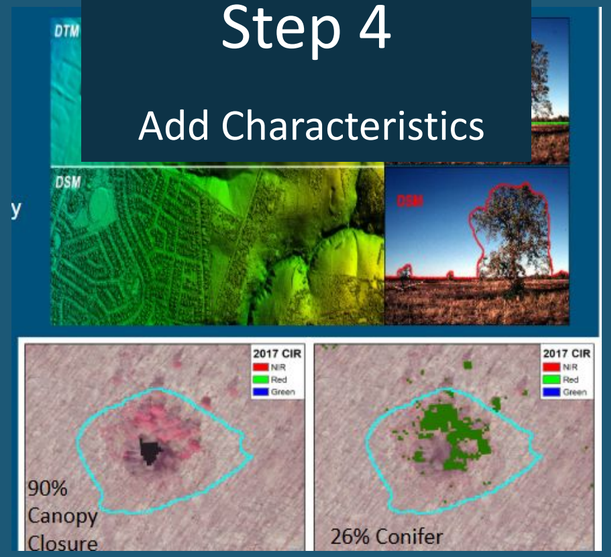
Step 2. SAR

Step 3. Classification



Step 4

Add Characteristics



Step 5.

Field Verification!

Michigan Natural Features Inventory

Statewide Program Coordinators:

Yu Man Lee & Courtney Ross

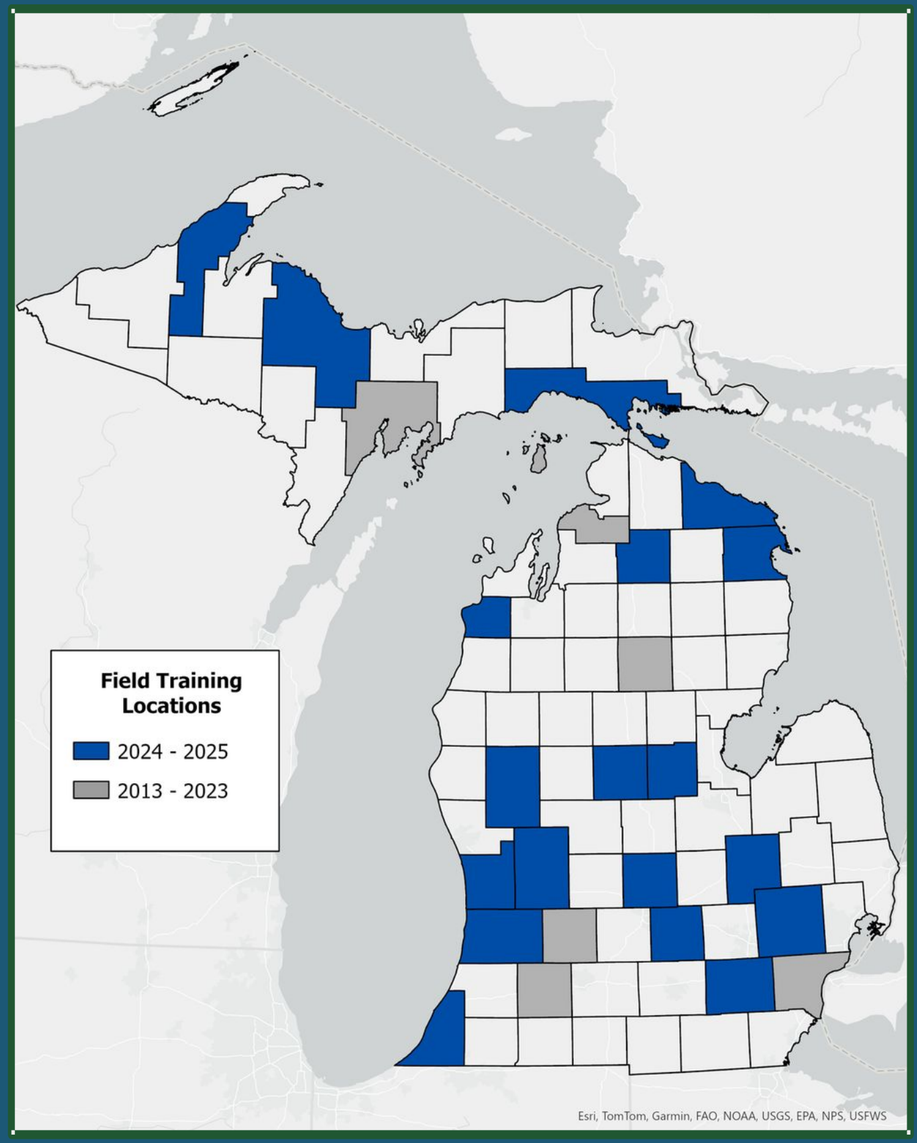
Virtual & Field Training

Monitoring Form & Protocol Discussion

Surrounding Habitat & Botany Exploration

Pool Sampling & Species Identification

Survey123 Field App & Data Entry Review

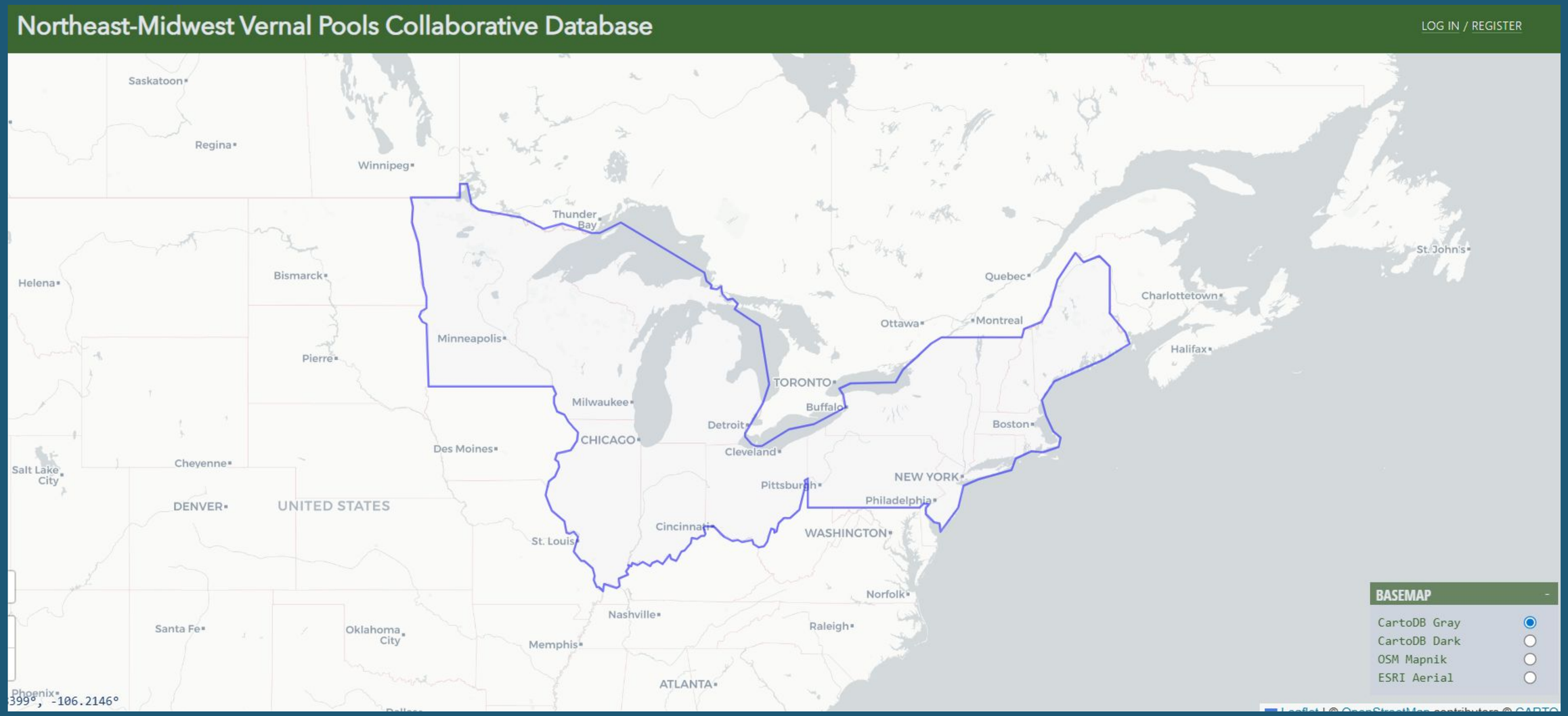


Data Collection - VP Ecology & Threats

- Physical, hydrological, and biological characteristics
  - Vernal pool type
  - Indicator, rare & other species
  - Pool size, water depth & temperature, soils
  - Landscape
  - Disturbances / threats

Anna Sheppard

Data Storage & Sharing



This Is Everyone's Problem

Inconsistent conservation leaves pools vulnerable regardless of state lines

9 States
in NE-MW with no unified mapping or policy approach

No Floor
in wetland policy — pools too small to trigger legal protection

Millions
of forested acres relying on vernal pool networks for biodiversity

A pool protected in Michigan may be lost just across the border in Ohio. Without shared definitions, shared data, and shared policy frameworks, we each work in silos — and vernal pools pay the price. The only solution is a regional, coordinated approach. That is exactly what NEMWVPC is building.

NE-MW Vernal Pools Collaborative (NEMWVPC)

A regional coalition — with a great acronym

11 Member States

- Wisconsin
- Illinois
- Indiana
- Ohio

Michigan ★ (Home!)

Pennsylvania

New York

Vermont

Maine

Goals & Long-Term Vision

- Develop a unified regional vernal pool identification & mapping framework
- Connect state partnerships through shared protocols and data standards
- Leverage PALSAR satellite data for landscape-scale hydroperiod detection
- Build citizen science infrastructure to verify and monitor mapped pools
- Inform state-level policy with consistent, credible, regional data
- Establish a lasting collaborative that outlives any single grant cycle

Year 2 Progress!

What we accomplished April 2025 – April 2026

Satellite Data Processing

PVP maps delivered for 6 NY counties + 2 WI priority areas. 750 field points per NY county; 500 for Kettle Moraine SF. Confidence graded 1–4.

Collaborative Launched

5 NMVPC workshops held. Common vernal pool definition approved Jan 2026. Shared data standards adopted by NY and WI for 2026 season.

Protocol Development

NMVPC database live at pools.mtri.org. Volunteers in NY and WI can sign up for pools, submit observations, and access monitoring data.

NY POOLS Launched

New York launched NY POOLS citizen science program in 2026. 52 volunteers trained across Columbia, Erie, and Albany Counties in March.

Michigan: 560 Active Volunteers

331 attended virtual trainings; 222 new recruits in 2026 alone. 28 local program coordinators. 348 new pools mapped and 811 site visits in 2025.

NMVPC Collaborative Website

vernalpoolscollaborative.org launched as the regional hub. Logo and visual identity developed. Species ID guides published for NY and WI.

Get Involved!

Join Citizen Science - Ohio has an iNaturalist Project!

Get your account at iNaturalist· Go to: www.inaturalist.org/ and sign up

· Choose a username and password; provide an email

· Under PROJECTS search for Ohio Vernal Pool Network

· Excellent tutorials and help pages are available at Ohio has an iNaturalist program!

Connect Yourself or Your Organization

The NMVPC spans 11 states from Maine to Minnesota. State agencies, land trusts, universities, and nature centers — join via vernalpoolscollaborative.org.

Thank You!!

Questions & Discussion

Michigan Vernal Pools Partnership

Michigan Nature Association

NE-MW Vernal Pools Collaborative (NEMWVPC)

apointer@michigannature.org