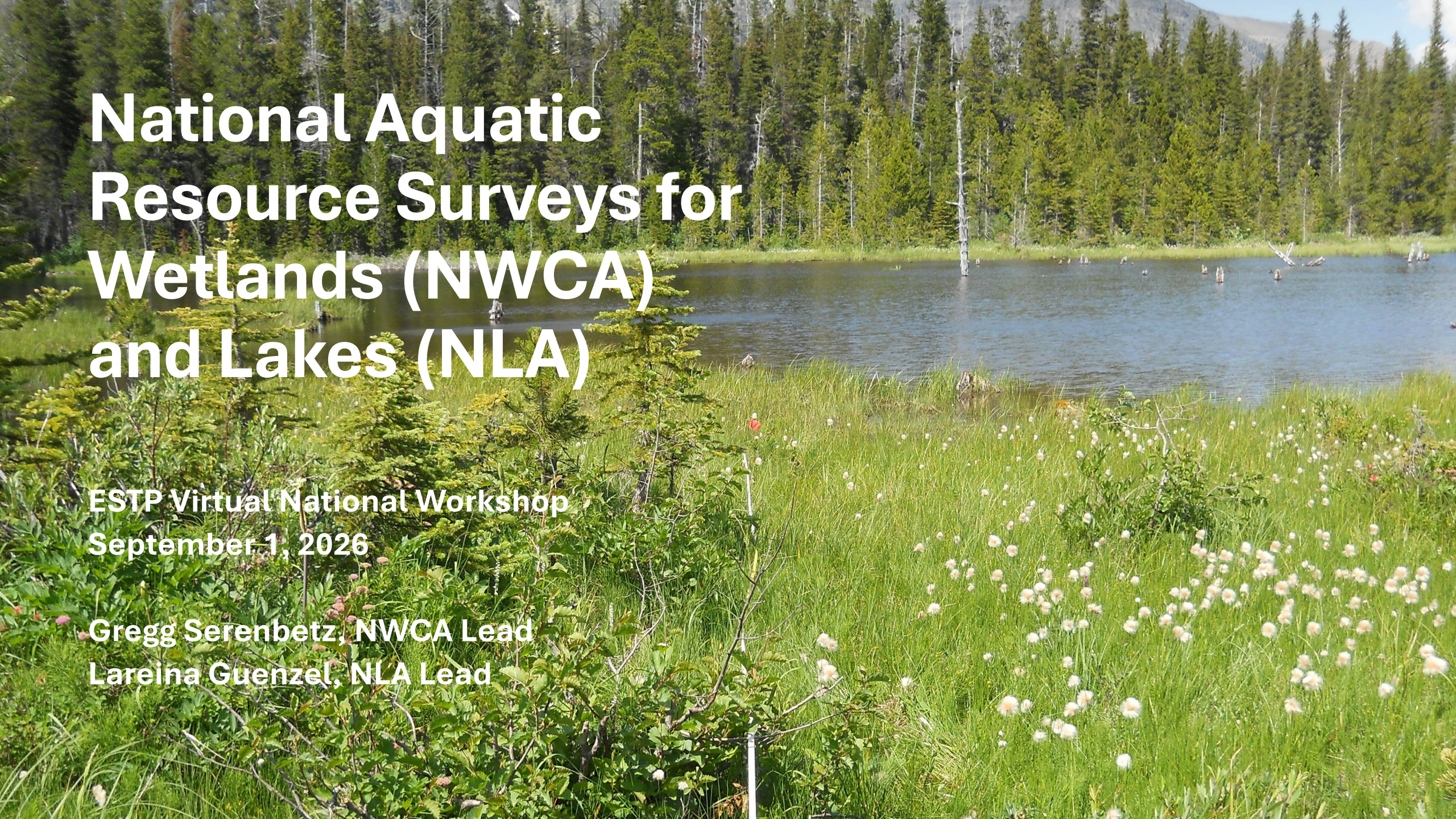




National Aquatic Resource Surveys for Wetlands (NWCA) and Lakes (NLA)

ESTP Virtual National Workshop
September 1, 2026

Gregg Serenbetz, NWCA Lead
Lareina Guenzel, NLA Lead

National Aquatic Resource Surveys:

A Partnership among EPA, States and Tribes



Coastal



Streams and Rivers



Wetlands



Lakes

1. Assess biological and recreational condition and changes over time of the nation's waters using indicators of condition and stress.
2. Rank stressors based on the relative associations between indicators of condition and indicators of stress.
3. Build/enhance state and Tribal monitoring and assessment capacity.

For more information: <https://www.epa.gov/national-aquatic-resource-surveys>





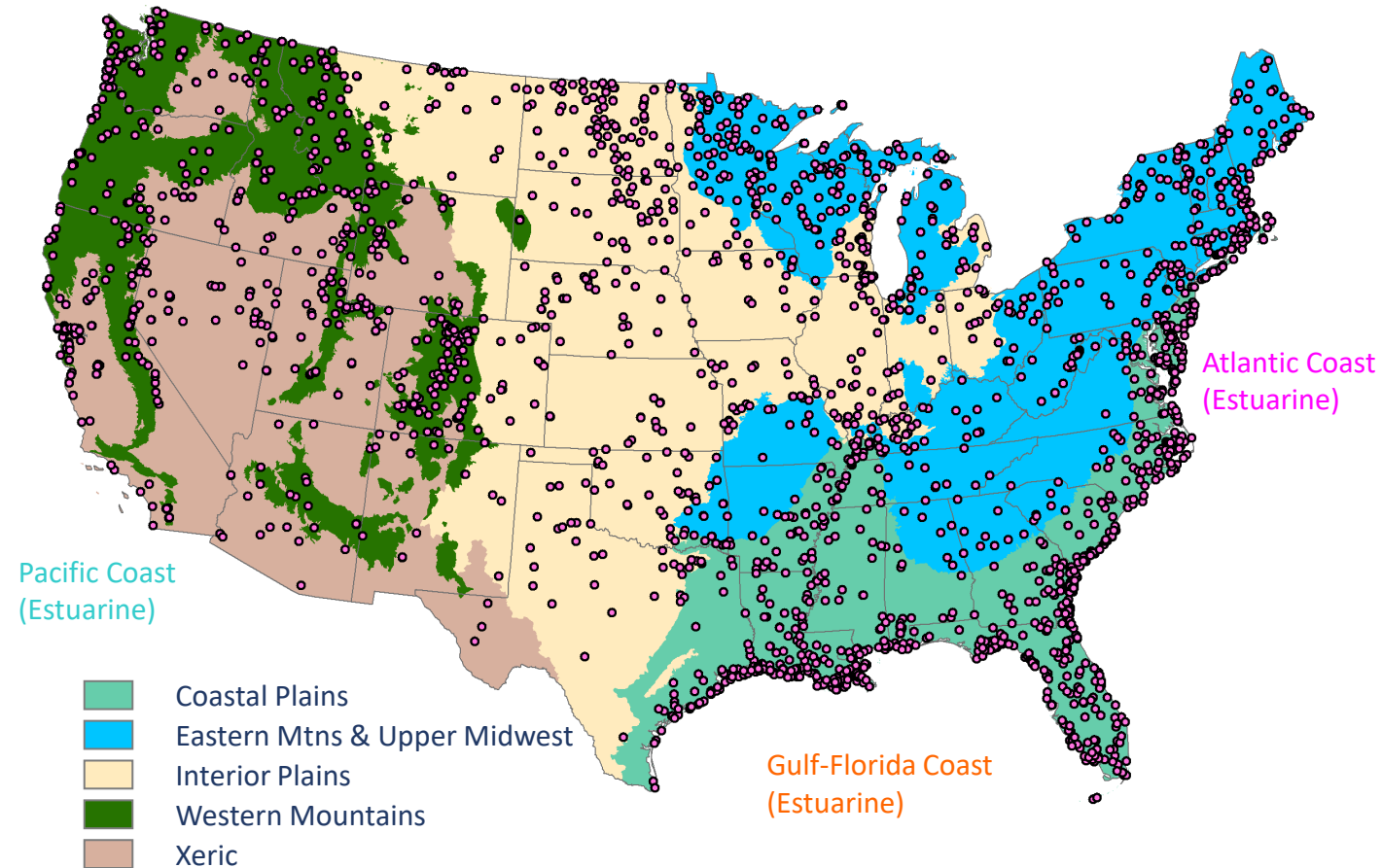
NWCA overview

- Statistical survey to assess and report on condition of U.S. wetlands
- Collaboration between EPA and State and Tribal WQ and wetland agencies
- Surveys conducted every 5 years
 - 2011, 2016, 2021, 2026
- One of 4 companion surveys under EPA's National Aquatic Resource Survey (NARS)
- Supports EPA, State and Tribal responsibilities under CWA

NWCA survey design

- 1,000 sites sampled across conterminous U.S. each survey cycle
- Statistical design allows extrapolation of results to entire population of interest
- NWCA Target Population: Tidal and nontidal wetlands with rooted vegetation and, when present, shallow open water < 1m deep
- National Wetland Inventory (US FWS) maps used to identify sampling locations

Sampled sites 2011-2021



NWCA sampling protocols

Vegetation

- Presence and cover of each vascular plant species
- Cover of all vascular species by strata
- Cover of bryophytes, lichens, and algae
- Tree counts, cover, and snags
- Ground cover (water, bare ground, litter, woody debris)

Disturbance

- Presence, severity of physical alterations
- Assessed inside core assessment area and 100m area outside

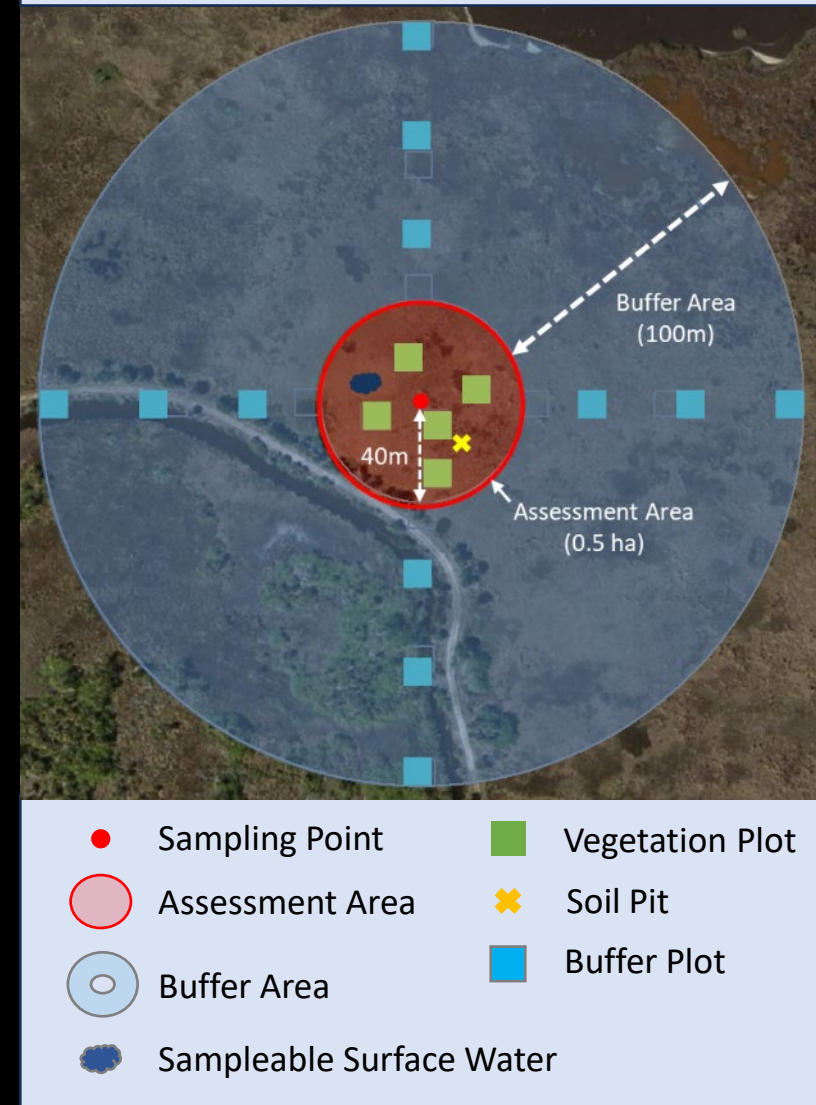
Soil

- Morphology (color, texture, redox features)
- Depth to water table
- Hydric soil field indicators
- Chemical analysis
 - Metals
 - Carbon
 - Nutrients

Hydrology

- Water sources
- Hydrology indicators (USACOE)
- Chemical analysis
 - Nutrients
 - Microcystin

Standard Sampling Layout



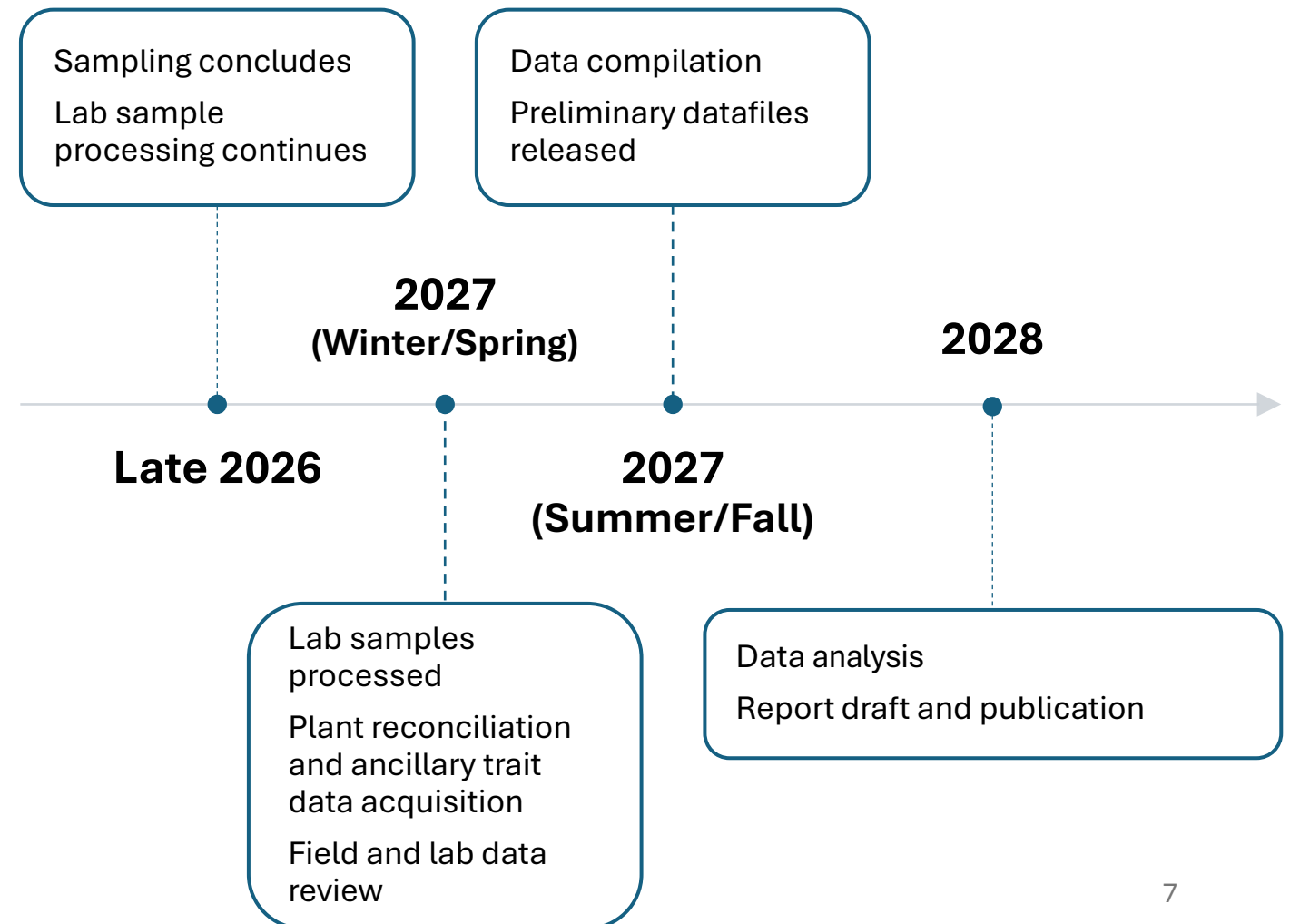
2026 field season

- 926 sampling sites
 - 871 conterminous U.S.
 - 55 Guam
- 38 field crews
- States/Tribes Participation
 - 28 field crews
 - 14 State labs
 - 123 trained in NWCA protocols





Project Timeline



Accessing NWCA data

- Datafiles available for download from NARS website
- Several tools developed to assist in data exploration
 - Plant and soil data
 - Reference sites

Filter data by survey:

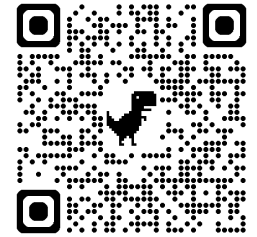
Filter data by indicator:

National Aquatic Resource Surveys Data

Survey	Indicator	Data	Metadata
Wetlands 2021	Site Information	NWCA 2021 Site Information - Data (csv)	NWCA 2021 Site Information - Metadata (txt)
Wetlands 2021	Site Information	NWCA21 AA Characterization - Data (csv)	NWCA 2021 AA Characterization Metadata (txt)
Wetlands 2021	Surface Water Characterization	NWCA 2021 Surface Water Characterization - Data (csv)	NWCA 2021 Surface Water Characterization Metadata (txt)
Wetlands 2021	Water Chemistry	NWCA 2021 Water Chemistry - Data (csv)	NWCA 2021 Water Chemistry - Metadata (txt)
Wetlands 2021	Hydrology	NWCA 2021 Hydrology Sources - Data (csv)	NWCA 2021 Hydrology Sources - Metadata (txt)
Wetlands 2021	Hydrology	NWCA 2021 Hydrology Indicators USACOE - Data (csv)	NWCA 2021 Hydrology Indicators USACOE - Metadata (txt)
Wetlands 2021	Physical Alterations	NWCA 2021 Physical Alterations - Data (csv)	NWCA 2021 Physical Alterations - Metadata (txt)
Wetlands 2021	Algal Toxins	NWCA 2021 Algal Toxin - Data (csv)	NWCA 2021 Algal Toxin - Metadata (txt)
Wetlands 2021	Vegetation	NWCA 2021 Plant Species Cover Height - Data (csv)	NWCA 2021 Plant Species Cover Height - Metadata (txt)

<https://www.epa.gov/national-aquatic-resource-surveys/data-national-aquatic-resource-surveys>





NARS Data Download Tool

NARS Data

Metadata

About

Select Survey

Wetlands (NWCA)

Select Survey Year

2021

Select NARS Dataset of Interest

Water Chemistry/Chlorophyll a

Select State(s) of Interest

All States

Select Site Information to Add

EPA Region HUC12

Assemble/Update Dataset

Dataset: NWCA2021_Water Chemistry/Chlorophyll a

Export Data As:

CSV

XLSX

Show 10 entries

Search

PUBLICATION_DATE	UNIQUE_ID	UID	SITE_ID	DATE_COL	VISIT_NO	PSTL_CODE	LAT_ANALYS	LON_ANAL
All	All	All	All	All	All	All	All	All
5/9/2024	NWC_TX-10194	2015093	NWC21-TX-10027	4-May-21	1	TX	28.79502	-95.1
5/9/2024	NWC_TX-10239	2015098	NWC21-TX-10043	6-May-21	1	TX	29.8695	-94.8
5/9/2024	NWC_AZ-10391	2015099	NWC21-AZ-10384	6-May-21	1	AZ	34.209956	-113.69
5/9/2024	NWC_AZ-10399	2015101	NWC21-AZ-10352	7-May-21	1	AZ	35.194465	-113.39

- Filter survey data by state(s) and join site information to datasets of interest

View the reference sites used to set benchmarks

1) Select Survey

Wetlands (NWCA)

2) Select Indicator

Vegetation MMI (VMMI)

3) Select Region/Group

Inland herbaceous (PRLH)

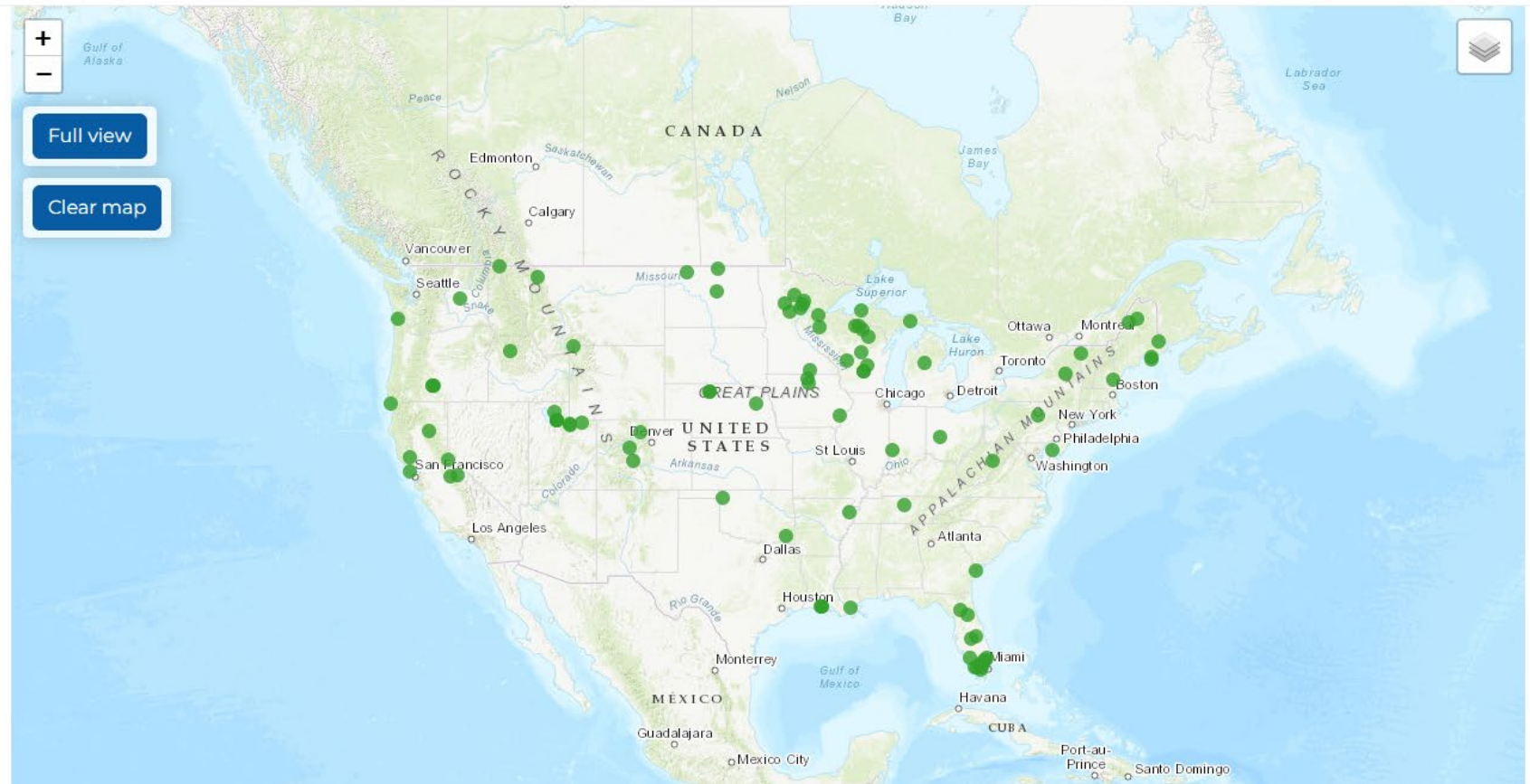
Select

Download

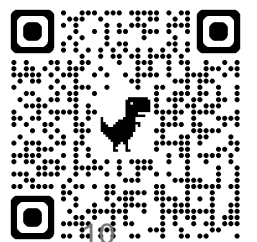
Site Map

Screening Process

Indicator Benchmarks



- Access and visualize reference sites used to set condition benchmarks for reporting
- View the reference sites for specific indicators on a map
- Download a file with site information (ID, site coordinates, indicator results)



Wetland Plant Explorer Tool

NWCA Wetland Plant Explorer Tool

Species

Site

Enter a plant species:

LEMNA MINOR

Download Species Data

Common name: COMMON DUCKWEED

Genus: LEMNA

Family: LEMNACEAE

USDA Plant Profile

Percentage of sites with physical alteration disturbance:

13%

Low

39%

Moderate

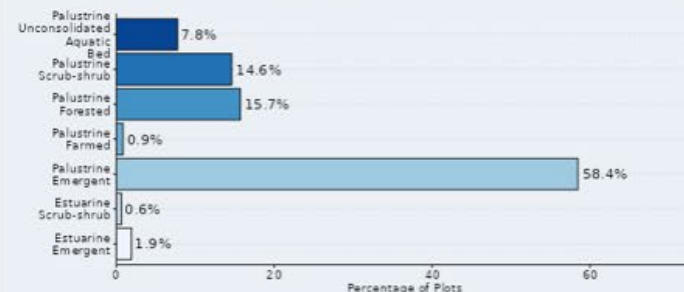
47%

High

0%

Not Assessed

Wetland types where LEMNA MINOR is found:



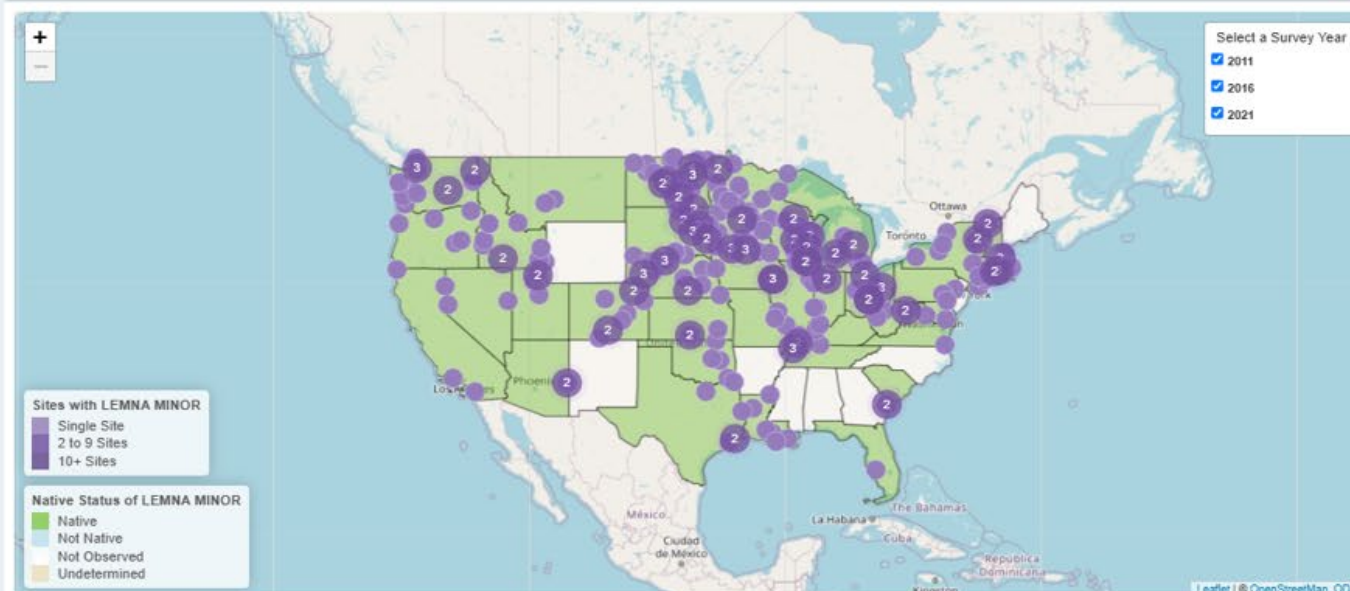
Sites with LEMNA MINOR

Single Site
2 to 9 Sites
10+ Sites

Native Status of LEMNA MINOR
Native
Not Native
Not Observed
Undetermined

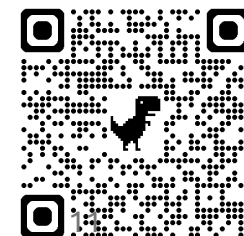
Wetland Indicator Status (WIS)

Region	WIS
Arid West	OBL
Atlantic and Gulf Coastal Plain	OBL
Eastern Mountains and Piedmont	OBL
Great Plains	OBL
Midwest	OBL
Northcentral and Northeast	OBL
Western Mountains	OBL

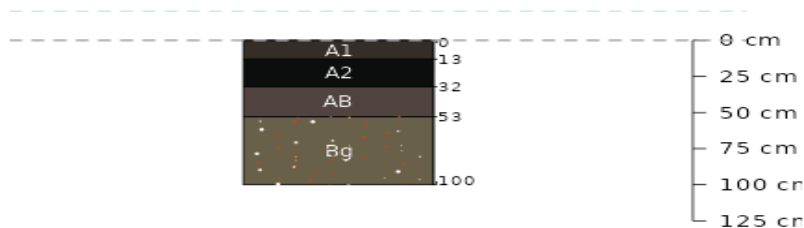


Select a Survey Year
☒ 2011
☒ 2016
☒ 2021

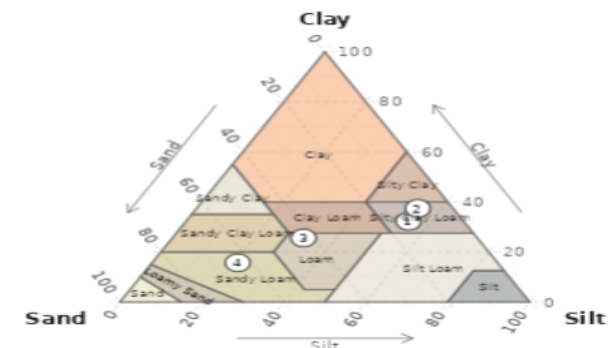
- Explore and visualize plant data from different datafiles and across survey years
- Search for a particular plant species and locate observations across conterminous US
- Locate an NWCA site or geographic region and download list of plants observed with cover and attribute data for that site/region



Soil Profile - NWCA16_MN-0001



Soil Texture - NWCA16_MN-0001



Pit Characteristics - NWCA16_MN-0001

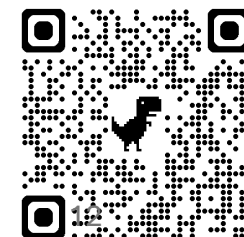
Pit Characteristic	Observed
Water Level (at time of sampling)	21 cm above surface
Reduced Matrix Color	N 2.5 / 0
Oxidized Color	N 2.5 / 0
Pit Depth	100 cm

[View Hydric Soil Indicators](#)

Horizon Information - NWCA16_MN-0001

Horizon	Horizon Name	Horizon Depth	Redox Concentrations	Redox Depletions
1	A1	13 cm		
2	A2	32 cm		
3	AB	53 cm		
4	Bg	100 cm	10%	5%

- Displays soil data from NWCA surveys
- Select site on map to view results, location info, and specific soil data for that site
- Select a soil parameter (i.e., lead) to see relative concentrations at sites across U.S.



Home / National Aquatic Resource Surveys

National Aquatic Resource Surveys

Background ▾

NARS Data ▾

National Coastal Condition Assessment

National Lakes Assessment

National Rivers and Streams Assessment

National Wetland Condition Assessment

Outreach Materials

[Contact Us about National Aquatic Resource Surveys](#)

National Wetland Condition Assessment 2021 Results

EPA is releasing the results of the second National Wetland Condition Assessment (NWCA). The NWCA 2021 reports on the condition of wetlands in the conterminous United States.

Key Findings



High-level summary of findings from the 2021 survey.

Report and Data



Report, technical support document, and data files.

Ecoregional Results



Information on the NWCA indicators for the five ecological regions.

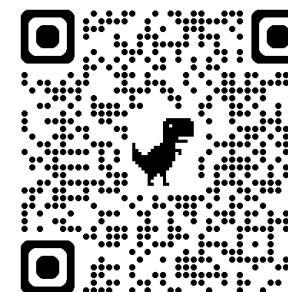
NWCA Data Dashboard



View results and download customized charts with the NWCA dashboard.

NWCA Website

Results, data and information on survey design, indicators, and methods available at:



<https://www.epa.gov/national-aquatic-resource-surveys/nwca>

Survey contact:

Gregg Serenbetz
Serenbetz.Gregg@epa.gov

NLA 2027 Updates

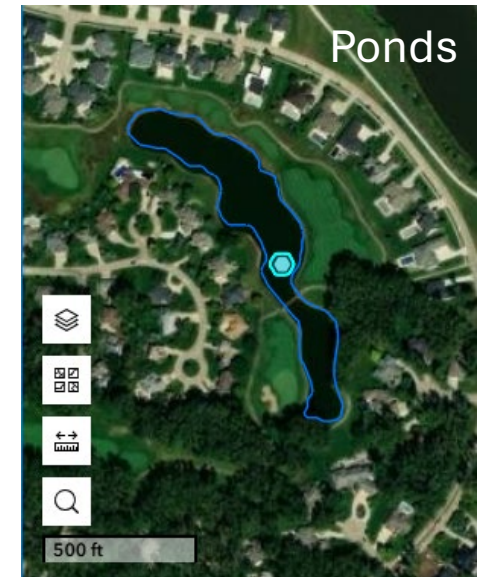
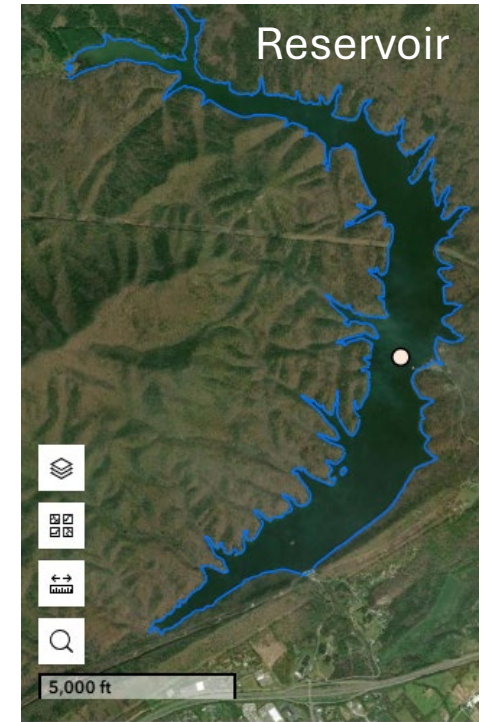
- 1) Survey design and participation
- 2) Indicators and research proposals
- 3) Site evaluation updates
- 4) NLA timeline

**NLA Comments or
Questions?**
Lareina Guenzel
guenzel.lareina@epa.gov



NLA Target Population

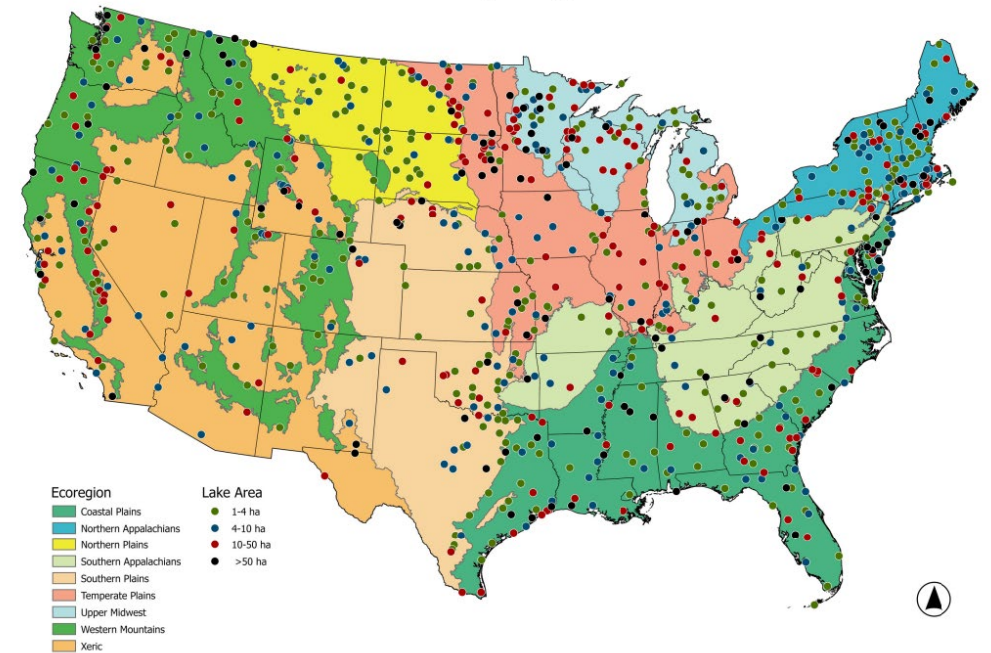
- The *target population* is the set of lakes whose physical, chemical, and biological condition we are interested in estimating
- A natural or human-made lake, pond, or reservoir is a *target* lake if it is:
 - At least 1 ha (in area), 1 meter (in depth), 0.1 ha (in open water area)
 - Excludes waterbodies used for aquaculture, sewage treatment, tidally influenced coastal waterbodies, Great Lakes, etc.



NLA 2027 Design and Partners

- 856 CONUS lakes (50% resample, 50% new)
 - 40 AK lake sampling for a subset of indicators
- Field work participants
 - 42 states
 - 5 tribes
 - 1 river basin
- 4 state intensifications (MI, MN, WI, ND)

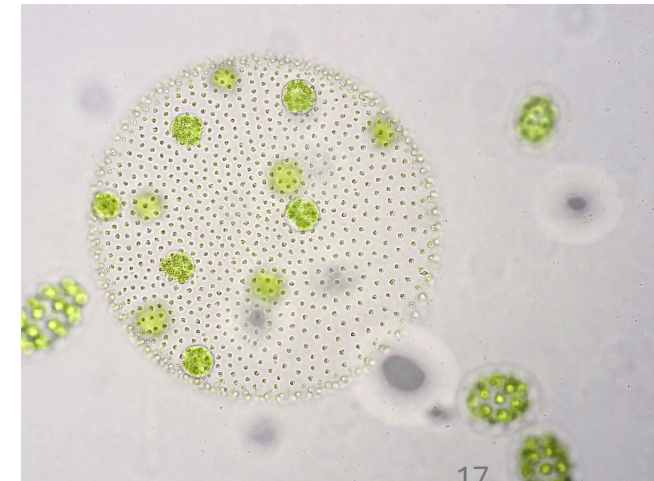
NLA 2027 Survey Design Base Sites



NLA Survey Indicators

Consistent with prior NLAs

- Atrazine
- Enterococci
- Microcystins
- Dissolved oxygen
- Water chemistry and chl a
- pHAB
- Phytoplankton
 - considering an alternate, higher level of identification to reduce costs
- Benthic Macroinvertebrates
- Zooplankton



2027 Research Proposals



1. Remote sensing for cyanobacteria (USGS/NASA/EPA)

- USGS samples – 2 additional chlorophyll filters and water sample for non-targeted cyanotoxin analysis
- In situ chlorophyll a and phycocyanin profiles
 - Optional for crews with sensors
- Collaboration opportunities with NASA radiometry teams



2. N2 gas saturation (EPA OASES)

- Surface water nitrogen gas sample

3. PFAS bioaccumulation pilot study (EPA OASES)

- Co-collection of sediment, water and fish for PFAS analysis in a subset of lakes



2027 Site Evaluation: General Overview

Objective: to determine whether a random sample point selected as part of survey design satisfies the following:

1. Target population? 
2. Accessible? 
3. Sampleable? 

Sites failing to meet these criteria are dopped and replaced with an alternate candidate lake (oversample) using established replacement procedure.

2027 Site Evaluation: Out with the old...

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Links and Resources

Contracts

Cross Survey

NCCA

NLA

NRSA/WSA

NWCA

Return to classic SharePoint

NLA > NLA 2022 > Site Evaluation Materials > Original State Site Evaluation Spreadsheets

Share Copy link Add shortcut to OneDrive

All Documents

Name	Modified
NLA_2022_SiteEvaluationSpreadsheet_AL.xlsx	November 30, 2021
NLA_2022_SiteEvaluationSpreadsheet_AR.xlsx	January 20
NLA_2022_SiteEvaluationSpreadsheet_AZ.xlsx	November 10, 2021
NLA_2022_SiteEvaluationSpreadsheet_CA.xlsx	May 23, 2022
NLA_2022_SiteEvaluationSpreadsheet_CO.xlsx	November 10, 2021
NLA_2022_SiteEvaluationSpreadsheet_CT.xlsx	November 10, 2021
NLA_2022_SiteEvaluationSpreadsheet_FL.xlsx	November 10, 2021
NLA_2022_SiteEvaluationSpreadsheet_GA.xlsx	November 10, 2021
NLA_2022_SiteEvaluationSpreadsheet_IDA.xlsx	June 2, 2022
NLA_2022_SiteEvaluationSpreadsheet_ID.xlsx	May 26, 2022

NLA_2022_SiteEvaluationSpreadsheet_AR

Search for tools, help, and more (Alt + Q)

File Home Insert Share Page Layout Formulas Data Review View Help Draw

Undo Paste Cut Copy Format Painter Clipboard

Calibri (Body) 11 A A B I U Font

Wrap Text Merge & Center Alignment

General Number Conditional Formatting Styles Cell Styles Insert Delete Format Cells

AutoSum Clear Sort & Find & Filter Sensitivity Add-ins

STATE	EPA_REG	SITE_ID	PANEL_USE	LATITUDE	LONGITUDE	GNIS_NAME	AREA_HA	OWNERSHIP	SITEID_2017	EVAL_2017	US_L3CODE	Q1. IS WATERBODY A LAKE?	Q1a. IF Q1 IS NO, SELECT MOST APPLICABLE REASON, GO TO Q8, THEN EVALUATE NEXT AVAILABLE REPLACEMENT LAKE
AR	06	NLA22_AR-10001	NLA22_17RVT2FT	34.1739	-90.81417		11.3	Non Federal	NLA17_AR-10005	Target_Inaccess	73		
AR	06	NLA22_AR-10002	NLA22_17RVT2FT	35.21048	-93.8756	Fletcher Lake	9.8	Non Federal	NLA17_AR-10006	Lake_Special_Purpose	37		
AR	06	NLA22_AR-10003	NLA22_17BaseFT	35.01247	-92.8255	South Fouché Site Sev	20.3	Non Federal	NLA17_AR-10007	Lake_Special_Purpose	36		
AR	06	NLA22_AR-10004	NLA22_17BaseFT	34.88872	-91.24761		2.4	Non Federal	NLA17_AR-10008	Lake_Special_Purpose	73		
AR	06	NLA22_AR-10005	NLA22_17Base	35.10314	-90.67794		2.4	Non Federal	NLA17_AR-10013	Not_Lake	73		
AR	06	NLA22_AR-10006	NLA22_22BaseFT	36.17826117	-90.4579101		8.5	Non Federal			74		
AR	06	NLA22_AR-10007	NLA22_22BaseFT	33.85307325	-91.51052946	Walnut Lake	35.2	Non Federal			73		
AR	06	NLA22_AR-10008	NLA22_22BaseFT	34.66057661	-91.66310008		2.0	Non Federal			73		
AR	06	NLA22_AR-10009	NLA22_22BaseFT	34.4038395	-93.09574264		1.8	Non Federal			36		
AR	06	NLA22_AR-10010	NLA22_22Base	34.9206617	-90.31927109	Horseshoe Lake	965.8	Non Federal			73		
AR	06	NLA22_AR-10011	NLA22_17Over	36.35088	-90.80319	Peachtree Lake	7.7	Non Federal	NLA17_AR-10014	Target_Sampled	73		
AR	06	NLA22_AR-10012	NLA22_17Over	33.62821	-91.18942	Whitehill Lake	23.6	Non Federal	NLA17_AR-10015	Not_Lake	73		
AR	06	NLA22_AR-10013	NLA22_17Over	34.76559	-92.11244	Hills Lake	63.2	Non Federal	NLA17_AR-10016	Target_Sampled	73		
AR	06	NLA22_AR-10014	NLA22_17Over	35.98651	-90.37738		7.4	Non Federal	NLA17_AR-10017	Not_Lake	73		
AR	06	NLA22_AR-10015	NLA22_17Over	36.04535	-90.91562		3.8	Non Federal	NLA17_AR-10018	Not_Lake	73		
AR	06	NLA22_AR-10016	NLA22_17Over	34.18909	-91.56508	Big Grassy Brake	1.7	Non Federal	NLA17_AR-10019	Not_Lake	73		
AR	06	NLA22_AR-10017	NLA22_17Over	34.5506	-91.6872		221.6	Non Federal	NLA17_AR-10020	Not_Lake	73		
AR	06	NLA22_AR-10018	NLA22_17Over	33.63998	-94.14226		2.2	Non Federal	NLA17_AR-10021	Target_Sampled	35		
AR	06	NLA22_AR-10019	NLA22_17Over	33.3449	-92.52257	Mud Lake	12.6	Non Federal	NLA17_AR-10022	Target_Sampled	35		
AR	06	NLA22_AR-10020	NLA22_22Over	34.25870242	-91.54671364		68.2	Non Federal			73		
AR	06	NLA22_AR-10021	NLA22_22Over	34.87375822	-91.16674091	Lake Greenlee	109.3	Non Federal			73		
AR	06	NLA22_AR-10022	NLA22_22Over	34.53168709	-94.16468284	Powell Lake	6.0	Non Federal			36		
AR	06	NLA22_AR-10023	NLA22_22Over	34.79243757	-90.76519703		4.0	Non Federal			73		
AR	06	NLA22_AR-10024	NLA22_22Over	34.16150517	-91.77290632		6.4	Non Federal			73		
AR	06	NLA22_AR-10025	NLA22_22Over	34.74363411	-91.90463084		7.0	Non Federal			73		
AR	06	NLA22_AR-10026	NLA22_22Over	33.00546678	-91.17860663		1.2	Non Federal			73		
AR	06	NLA22_AR-10027	NLA22_22Over	36.35449138	-91.60425159	Camp Kia Kima Lake	6.8	Non Federal			39		
AR	06	NLA22_AR-10028	NLA22_22Over	35.47540645	-91.12596204		1.3	Non Federal			73		



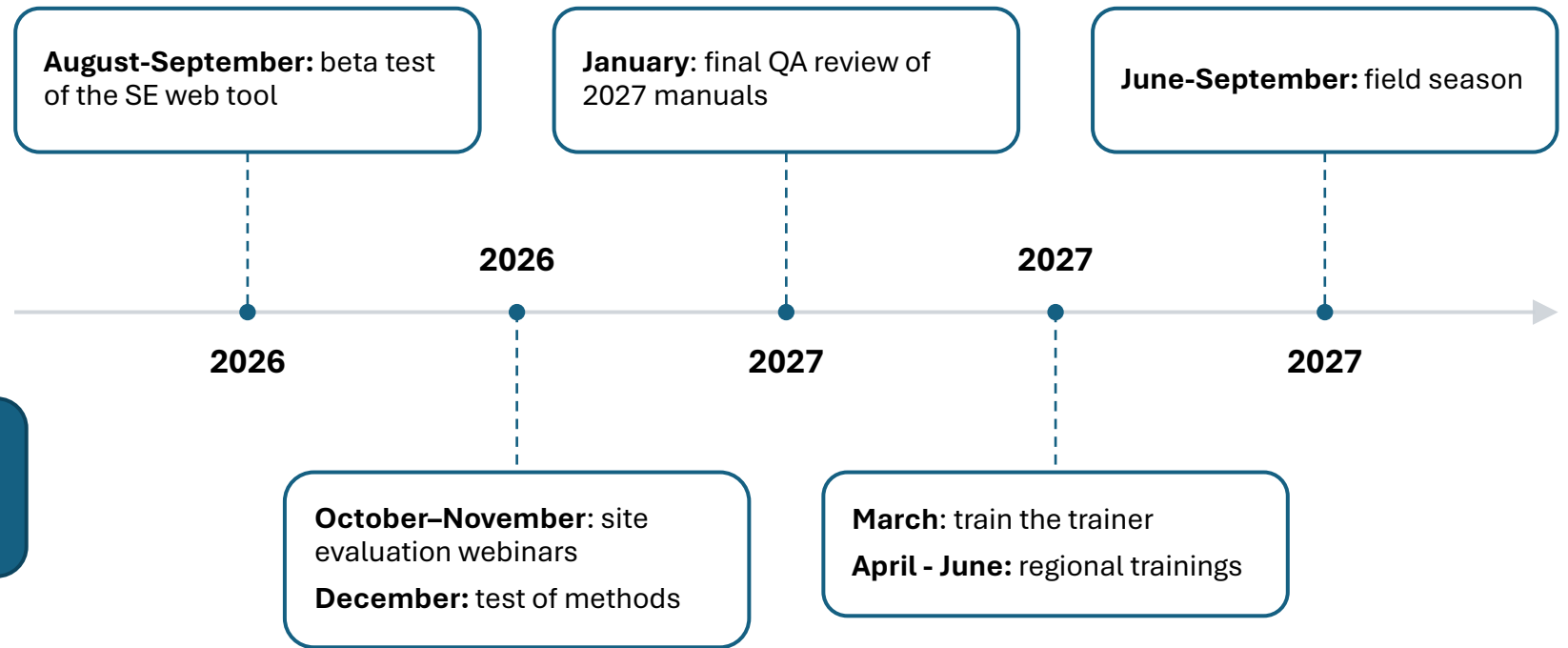
2027 Site Evaluation: In with the new

The screenshot displays the 2027 Site Evaluation web application interface. The main map shows a satellite view of a lake area with a green overlay indicating a specific site. A green box labeled "Map" points to the map area. To the right, a "Layers" panel lists "NLA2027_Design_Polygons" and "NHDPlus HR - NHDWaterbody". Below the layers panel, a "Manager Name" field is set to "PADUS - PADUS4". A green box labeled "SmartForm" points to the "Edit feature" form on the right, which contains questions about the waterbody type and lake name. Below the map, a "Tools" bar contains various icons for map interaction. At the bottom, a "Site Evaluation Spreadsheet" table lists site data.

STATE	EPA_REG	SITE_ID	PANEL_USE	LATITUDE	LONGITUDE	GNIS_NAME	AREA_HA	OWNERSHIP	NLA22_Si
KS	Region_07	NLA27_KS-10008	NLA27_22Base	39.257152	-95.647040	None	1.423885	Non Federal	NLA22_KS
KS	Region_07	NLA27_KS-10009	NLA27_22Base	37.226083	-94.996183	None	11.382875	Non Federal	NLA22_KS
KS	Region_07	NLA27_KS-10010	NLA27_27Base	38.676885	-95.597472	Pomona Lake	1530.198685	Non Federal	NA
KS	Region_07	NLA27_KS-10011	NLA27_27Base	38.792381	-97.583940	None	12.752212	Non Federal	NA

What's next for NLA?

Comments or Questions?
Lareina Guenzel
guenzel.lareina@epa.gov



Resources

- [National Water Quality Inventory Report to Congress](#)
- [NARS website](#)
- NARS Tools
 - [NARS Population Estimate Calculation Tool](#)
 - Provides EPA, partners and others a streamlined way to analyze survey data
 - [Survey Design Tool](#)
 - Supports states and others in designing a statistical survey
 - [NARS Data Download Tool](#)
 - Created so states, Tribes, scientists and EPA can more easily access data from NARS website
 - [NARS Reference Site Visualization Tool](#)
 - Created to address state request to better understand reference sites/benchmarks developed for NARS indicators
 - [Lake Context Tool](#)
 - For partners, lake associations, volunteers, etc. to place data they have in context with national and regional ranges for a select set of variables
 - [Aquatic Resource Monitoring and Assessment Dashboard](#)
 - For states/Tribes and territories - making state-scale survey information more accessible
- [LakeCat](#)
- [StreamCat](#)



QUESTIONS