Document Species, Protect Land

David Fryxell, Ph.D.

THE DENNIS CONSERVATION LAND TRUST

&

Nellie Wilson

Hilltown Land Trust
AN AFFILIATE OF THE TRUSTEES

Dennis Conservation Land Trust

Purposes

- Protect land & water
- Study ecology
- Educate
- Promote the outdoors

Organizational Structure

- 17 Trustees
- 17 Advisors
- > 50 additional volunteers
- 1-2 F/T TCorps Members
- 2.5 F/T staff

Outline

1. Background – Biodiversity
2. Opportunity in Massachusetts
3. State-Listed Species
4. Vernal Pools
5. Community Biodiversity Initiative
6. Discussion

https://www.mass.gov/info-details/biodiversity-goals-for-massachusetts

Background

VIEWPOINT OPEN ACCESS

Conservation Letters
A journal of the Society for Conservation Biology
Open Access

The World Could Reach 30% Protection by 2030, and Still Fail to Conserve Biodiversity without Effective and Well-located Protected Areas

Jonas Geldmann

Center for Macroecology, Evolution and Climate, Globe Institute, University of Copenhagen, Copenhagen, Denmark

Correspondence: Jonas Geldmann (jgeldmann@bio.ku.dk)

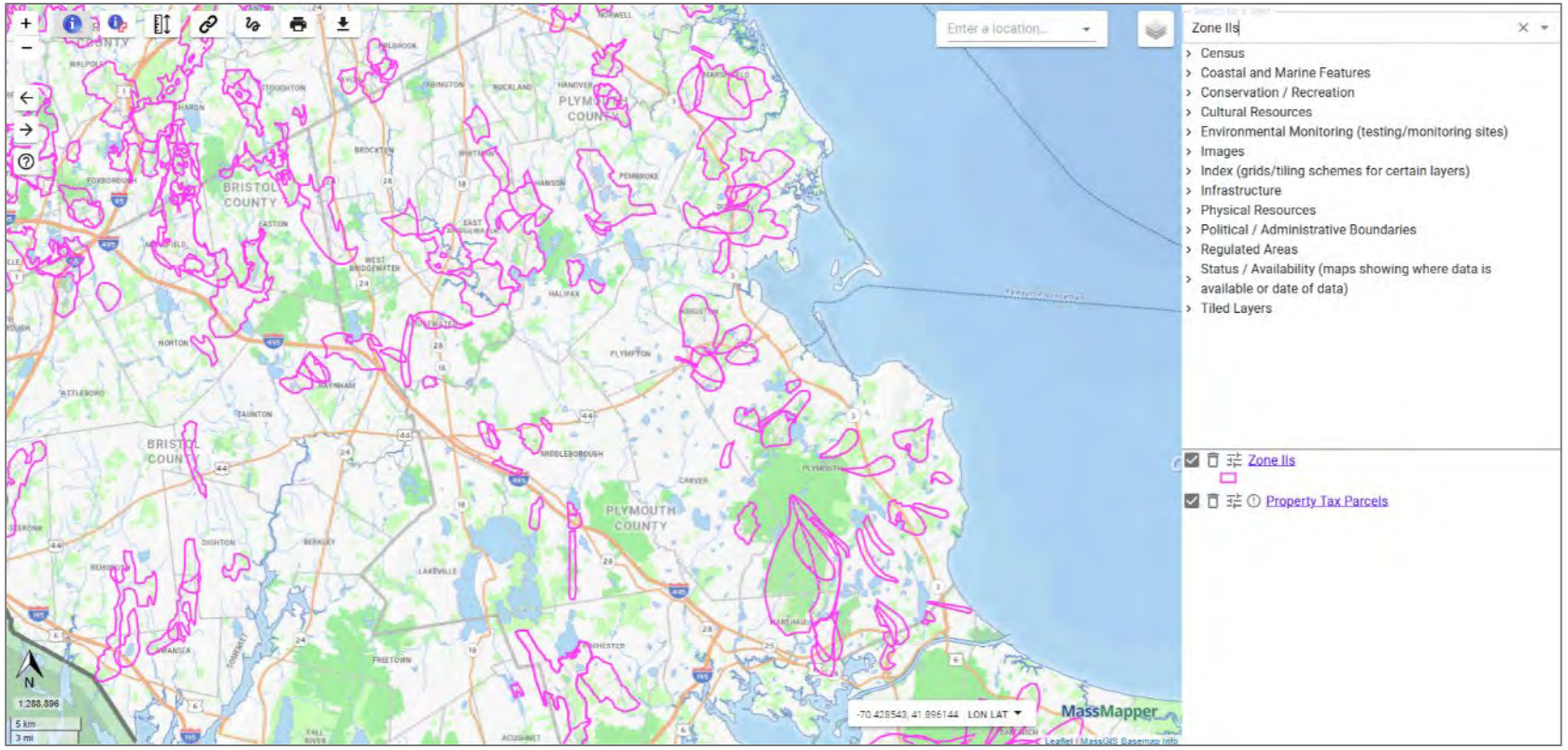
Received: 9 December 2025 | **Revised:** 8 January 2026 | **Accepted:** 10 February 2026

Background

Why Protect Land?

Conservation values

- Water resources
- Agriculture
- Forestry
- Scenery
- Community character
- History
- Ecosystem services
- Recreation
- Biodiversity



MassMapper

An interactive map for Massachusetts

Background

Techniques for Land Protection

Land Acquisition

- Expensive; expertise required

Protective Overlays

- e.g. Conservation Restrictions
- Time consuming, can be expensive; expertise required

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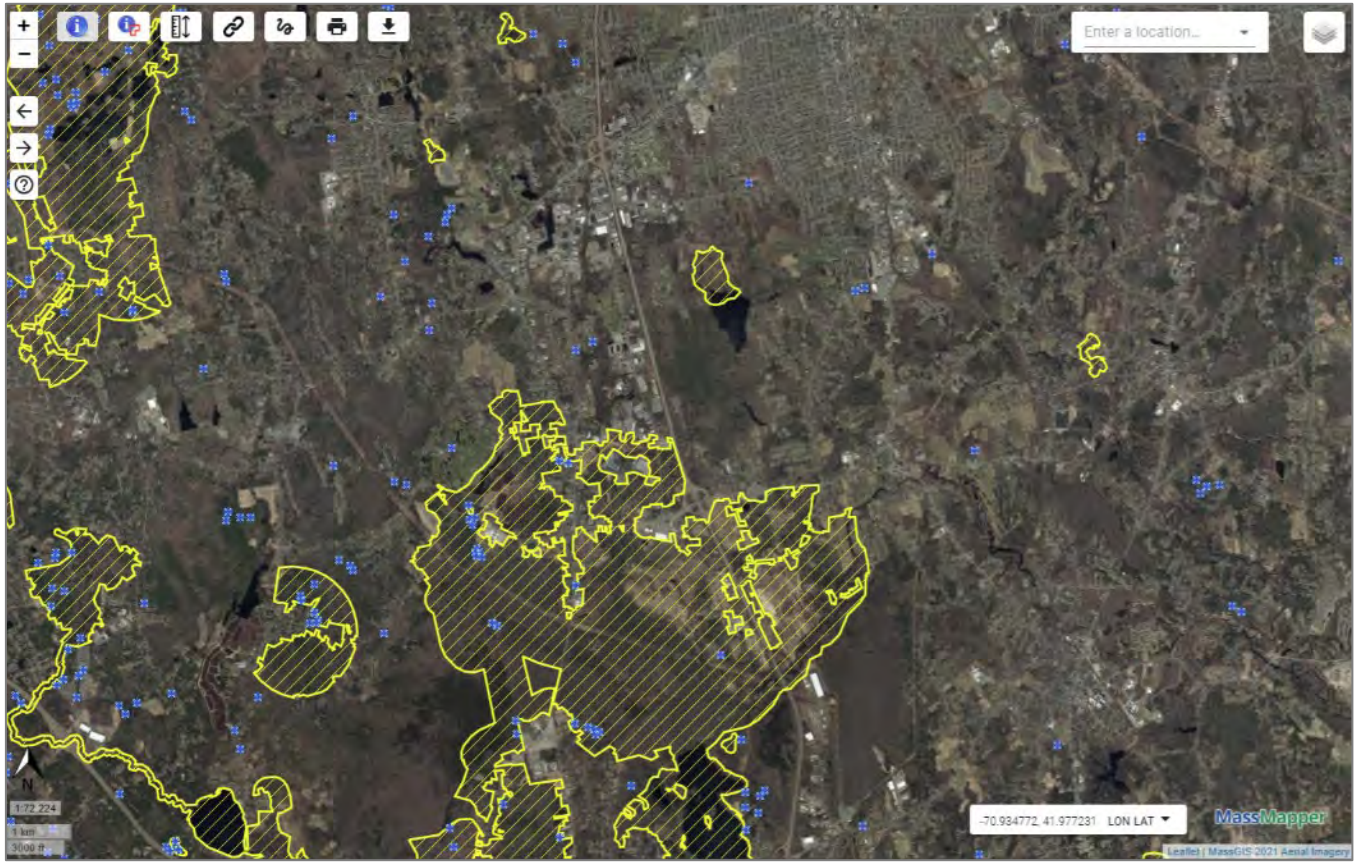
Regulatory Protection: Priority Habitats of Rare Species

- Can be done by trained volunteers

Regulatory Protection: Vernal Pool Certification

- Can be done by trained volunteers



Background - Biodiversity

What is biodiversity?

Biodiversity is the variety of life on Earth

<u>Levels</u>

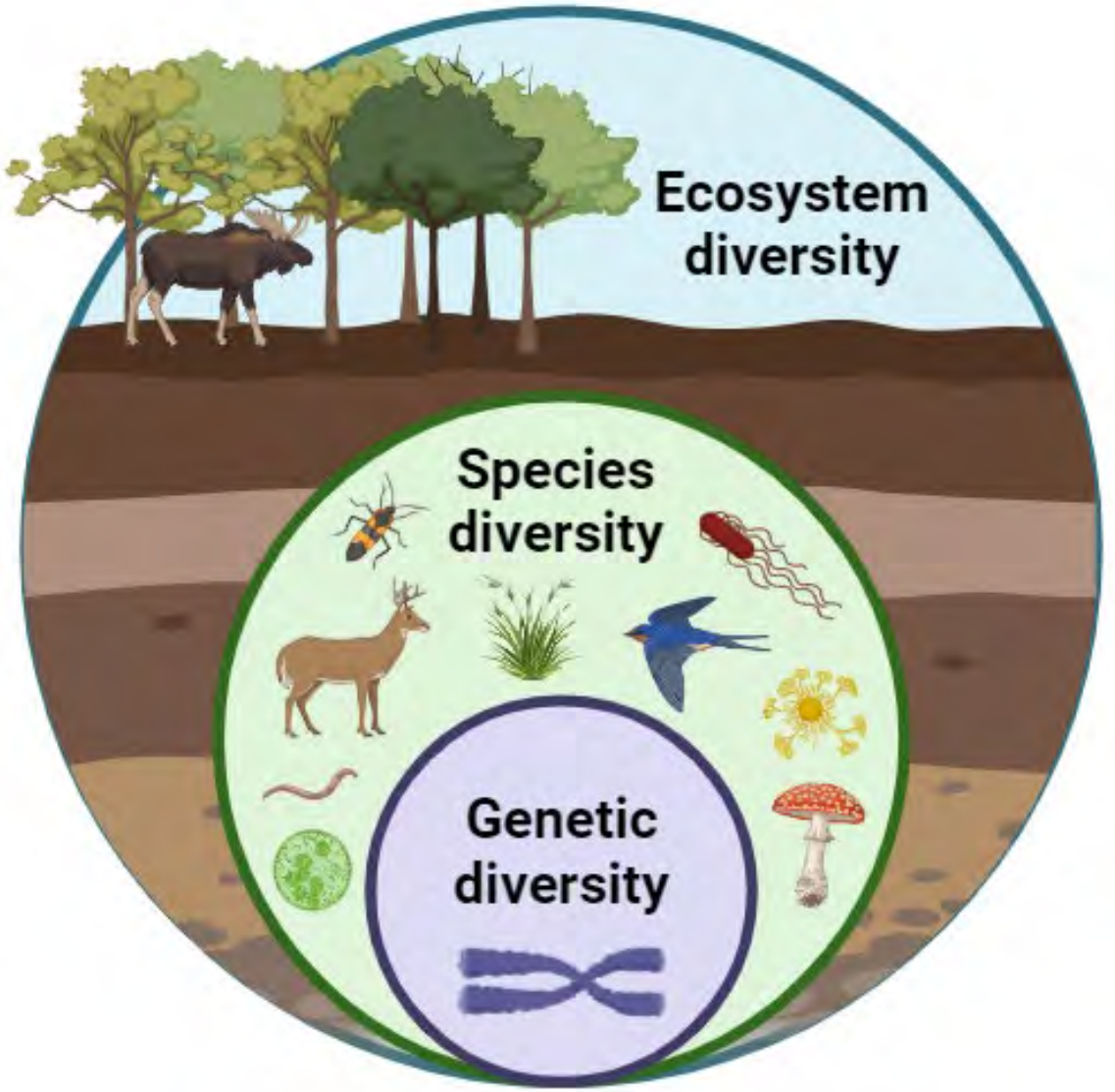
Genes

Traits

Species

Communities

Ecosystems



https://www.khanacademy.org/science/hs-bio/x230b3ff252126bb6:biodiversity-and-human-impacts/x230b3ff252126bb6:biodiversity/a/biodiversity

Background - Threats

What ***threatens*** biodiversity?

IPBES:

1. **Land Use and Sea Change**
   (e.g. habitat loss/frag.)
2. **Direct Exploitation**
   (e.g. harvest, wildlife trade)
3. **Climate Change**
   (e.g. warming, storms,Δprec)
4. **Pollution**
   (e.g. nutrients, pesticides, plastics, light)
5. **Invasive Species**

Comment | Open access | Published: 16 May 2022

Ranking threats to biodiversity and why it doesn't matter

Céline Bellard, Clara Marino & Franck Courchamp

Nature Communications **13**, Article number: 2616 (2022) | Cite this article

41k Accesses | **136** Citations | **143** Altmetric | Metrics

Conservation scientists have proposed several rankings of the relative importance of global threats to biodiversity. Here, we argue that relative ranking of biodiversity threats depends on local context and metrics used, and so has little application for conservation.

"Massachusetts is losing nature at an alarming rate—habitat loss and degradation are the biggest threats to biodiversity."

- Biodiversity Goals for MA

mass.gov

Background – Biodiversity Conservation

What is biodiversity *conservation*?

The practice of …

1. **Assessing (e.g. document spp.)**
2. **Protecting (e.g. land preservation)**
3. **Monitoring**
4. **Managing (minor intervention)**
5. **Restoring (major intervention)**

… the variety of life on Earth

Background – Threats to Conservation

What threatens biodiversity *conservation*?

1. Insufficient knowledge, data

EDITORIAL | 04 February 2026

Biodiversity conservation has an evidence problem – it's time to fix it

Globally, more than one million species are threatened with extinction, but often interventions intended to protect biodiversity are not rooted in robust research. The field has an opportunity to change that.

2. Chronic underfunding

frontiers | Frontiers in Conservation Science

Editorial: Can technology save biodiversity?

Vincent Lostanlen[1], Gladys Barragan-Jason[2], Arnaud Elger[3] and Maxime Cauchoix[2*]

3. Lack of political will

Perspective | Published: 25 March 2021

Biodiversity and the challenge of pluralism

Unai Pascual, William M. Adams, Sandra Díaz, Sharachchandra Lele, Georgina M. Mace & Esther Turnhout

Nature Sustainability **4**, 567–572 (2021) | Cite this article

Background

How do we improve biodiversity conservation?

1. **More knowledge and data**
2. **More funding**
3. **More diverse engagement and political will**

Claim: Engaging <u>local</u> conservation entities and their volunteers is <u>the</u> key path forward for improved biodiversity protection in Massachusetts.

Outline

1. Background – Biodiversity
2. Opportunity in Massachusetts
3. State-Listed Species
4. Vernal Pools
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https://www.mass.gov/info-details/biodiversity-goals-for-massachusetts

Opportunity in Massachusetts

Massachusetts has been a leader in conservation across the globe.

- **Zoning Act**
- **Community Preservation Act**
- **Article 97**
- **Wetlands Protection Act**
- **Endangered Species Act**
- **Article 89 - Home Rule**

The Massachusetts Endangered Species Act and its implementing regulations

(1) protects rare species and their habitats by prohibiting the "Take" of any plant or animal species listed as Endangered, Threatened, or Special Concern

(2) establish procedures for the listing and protection of rare plants and animals

(3) outline project review filing requirements for projects or activities that are located within a Priority Habitat of Rare Species…

-Mass.Gov

Opportunity in Massachusetts

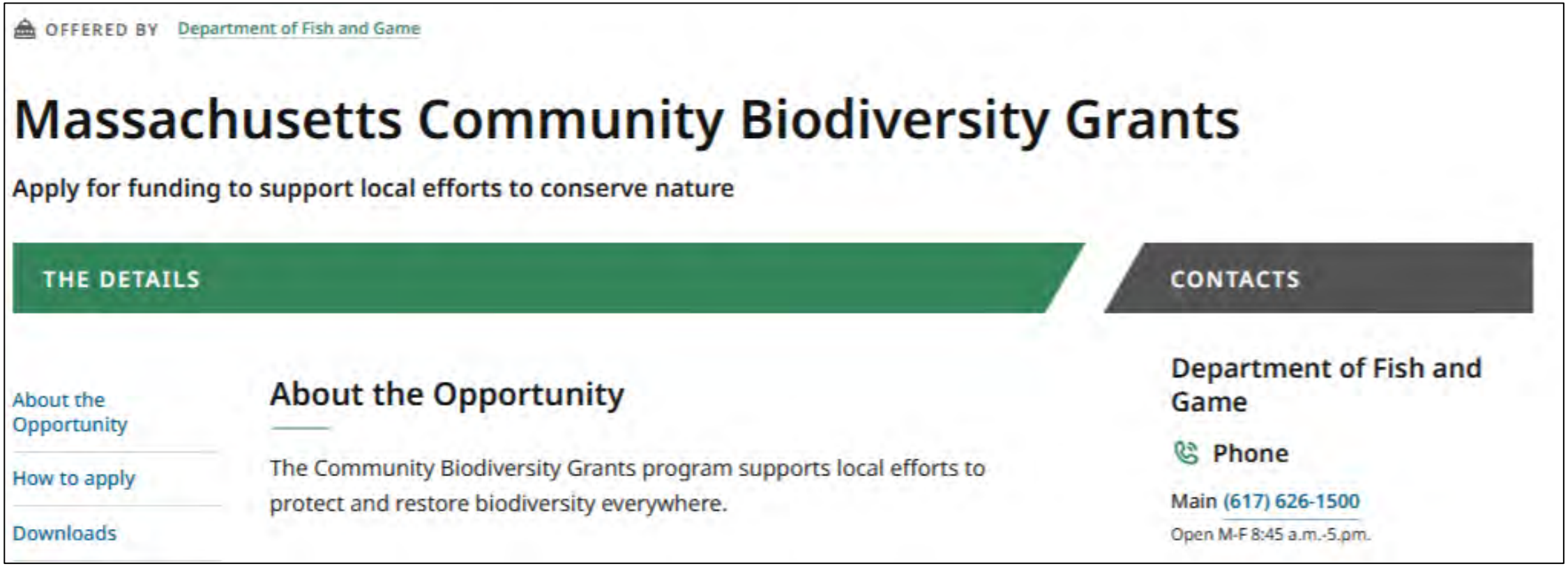
Massachusetts aims to be a biodiversity conservation leader.

9/21/2023: Exec. Order No. 618 “To support, complement, and advance Massachusetts’s biodiversity conservation efforts…”

2025: Established Biodiversity Conservation Goals

1. **Protect: Land, habitat, and wildlife corridors; People and nature from pesticides, pollution, plastics**
2. **Restore: Most important habitats, especially culverts**
3. **Sustain: Funding, wild foods, agriculture, and blue economy**
4. **Connect: Inclusion and workforce development**

Opportunity in Massachusetts



OFFERED BY Department of Fish and Game

Massachusetts Community Biodiversity Grants

Apply for funding to support local efforts to conserve nature

THE DETAILS

CONTACTS

About the Opportunity

How to apply

Downloads

About the Opportunity

The Community Biodiversity Grants program supports local efforts to protect and restore biodiversity everywhere.

Department of Fish and Game

Phone

Main (617) 626-1500

Open M-F 8:45 a.m.-5.pm.

How to improve biodiversity conservation?

1. More **knowledge and data**
2. More **funding**
3. More **diverse engagement** and **political will**

Opportunity - Massachusetts

How do we improve biodiversity conservation?

1. **More knowledge and data**
2. **More funding**
3. **More diverse engagement and political will**

Claim: Engaging local conservation entities and their volunteers is the key path forward for improved biodiversity protection in Massachusetts.

Opportunity: MA has robust network of local conservation entities who know their towns, can raise local funds, have trusted volunteer labor, and can create political will for biodiversity conservation

- **Mass. Land Trust Coalition – >122 Member Land Trusts, 83 locally based**
- **Conservation Commissions – 351, >100 with staffed departments**

Opportunity - Massachusetts

Biodiversity Reporting

Biodiversity Protection

	Vernal Pool Species	State-Listed Species
Relevant law	MA Wetlands Protection Act	MA Endangered Species Act
No. target species	6	453
Evidence reported through	MassWildlife Heritage Hub	MassWildlife Heritage Hub
Evidence leads to	Vernal Pool Certification	Updated Priority Habitat Maps

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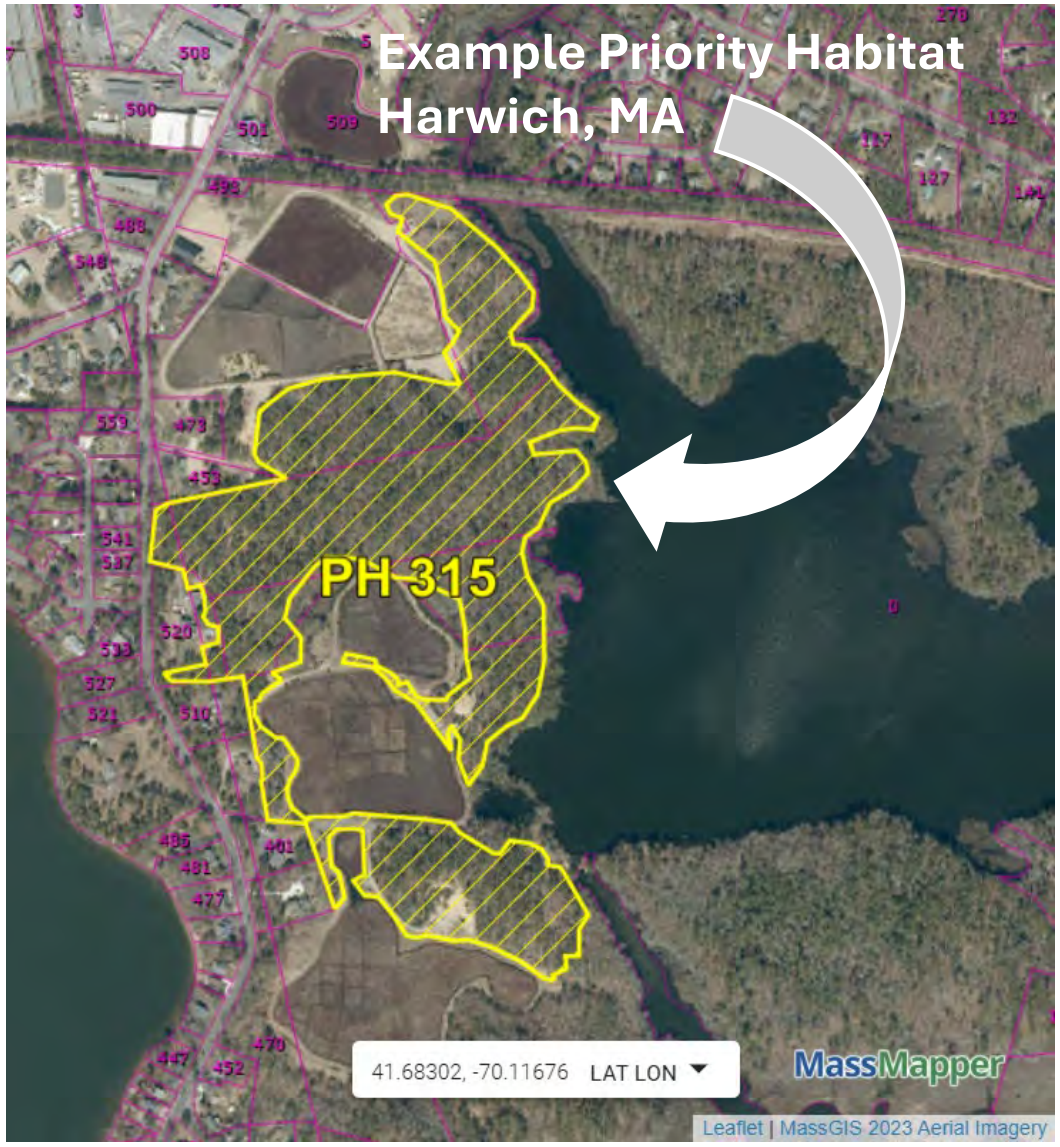
https://www.mass.gov/info-details/biodiversity-goals-for-massachusetts

State-Listed Species – Reporting Process

- Train staff or volunteers to ID state-listed species
- Find an individual, or ideally, quantify a population
- Snap photos, count individuals, note location
- Submit to MassWildlife
- They verify ID, add the observation to their Rare Species Viewer database
- Next time they update “Priority Habitat” maps, they will consider incorporating your observation



Opportunity - Massachusetts

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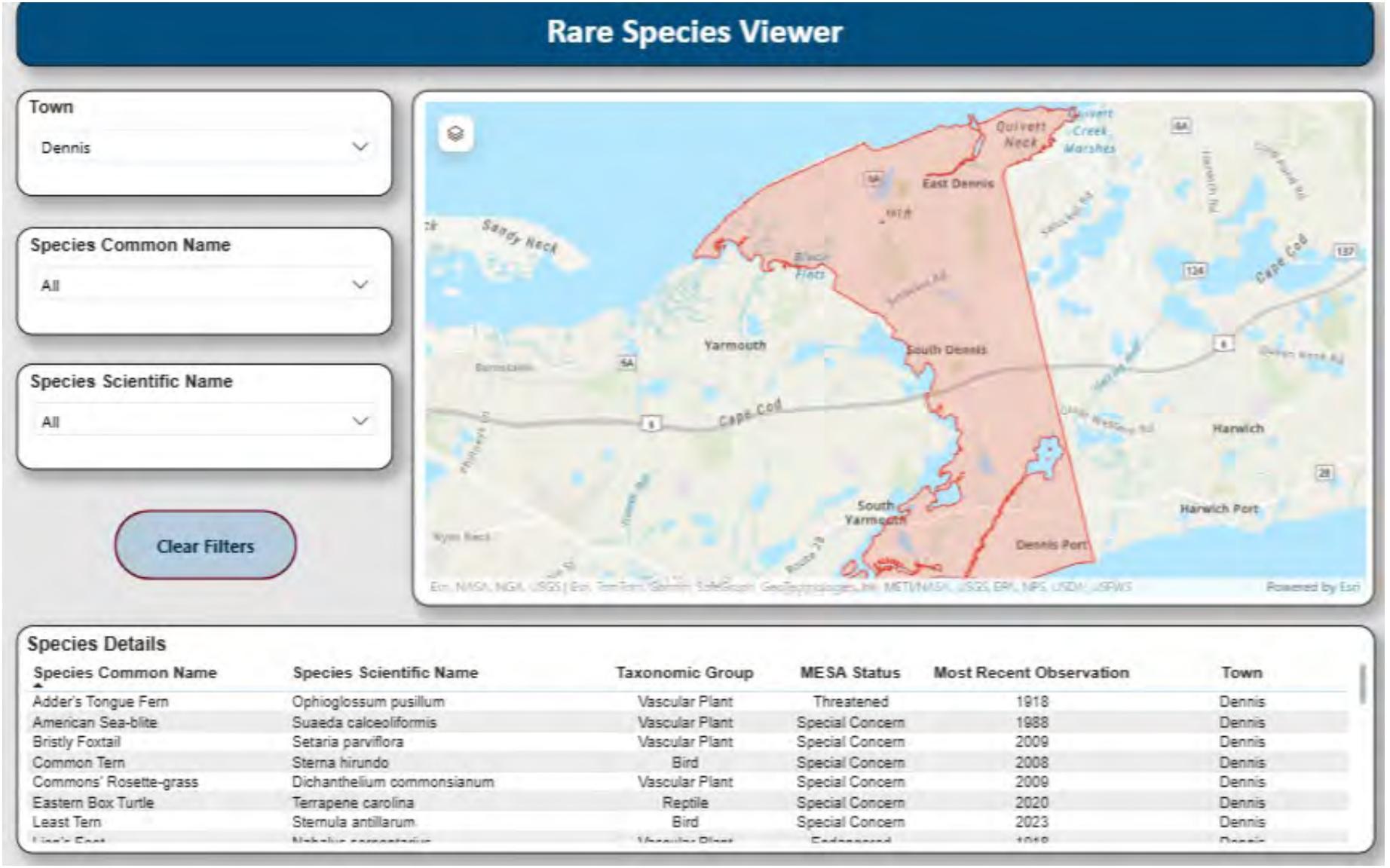
Observations "expire"	Never	After 25 years

State-Listed Species – Rare Species Viewer Data

- Database of observations of state-listed species by town
- Precise location of species is hidden, but available to landowners upon request
- Includes most recent observation year only



https://www.mass.gov/info-details/rare-species-viewer

State-Listed Species

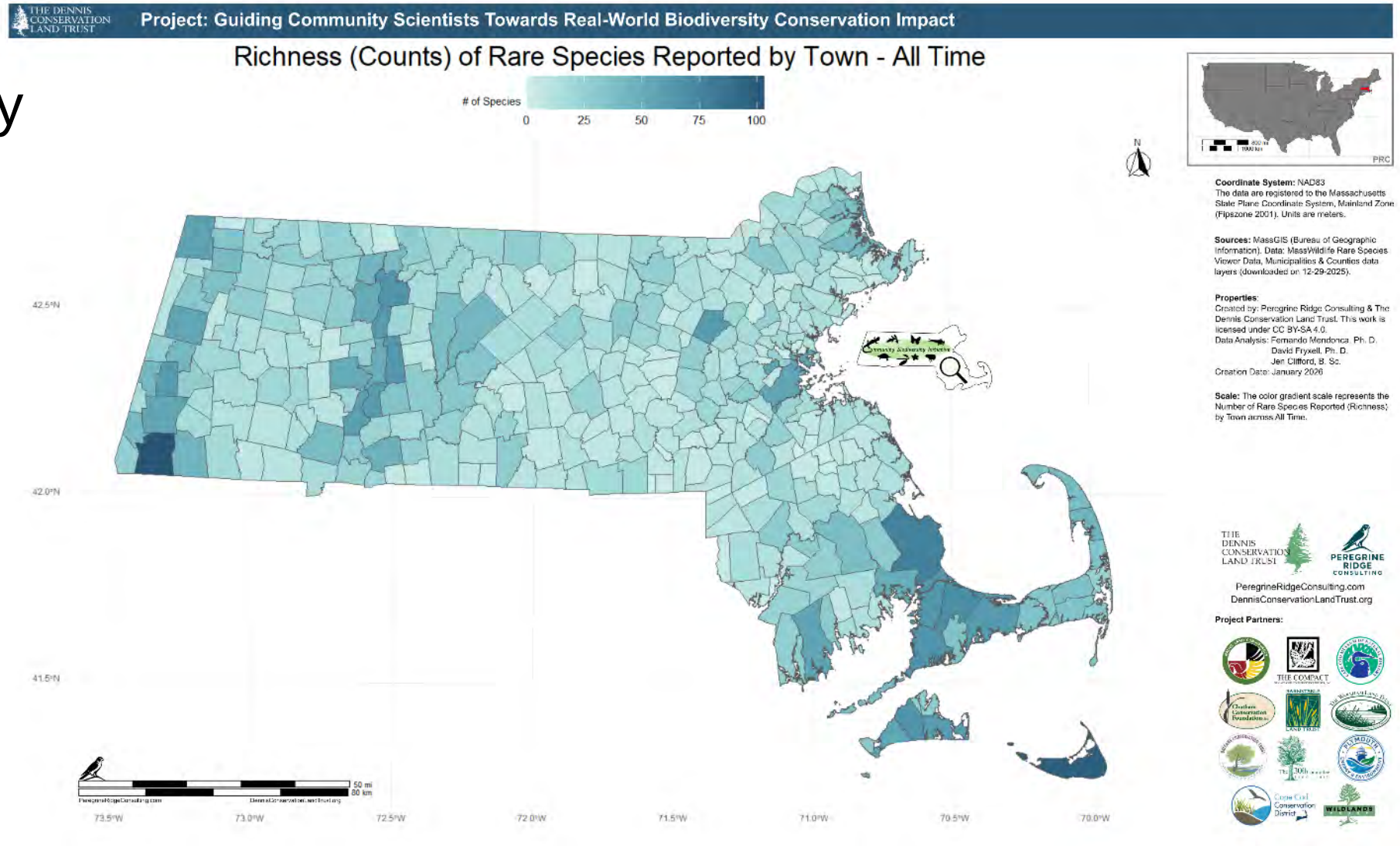
How many state-listed species have ever been reported?

453 spp. listed today

Scale 0-100 spp.

Pattern reflects:

- Historic data
- Nat. hab. variation
- Level of reporting



Data: MassWildlife Rare Species Viewer

State-Listed Species

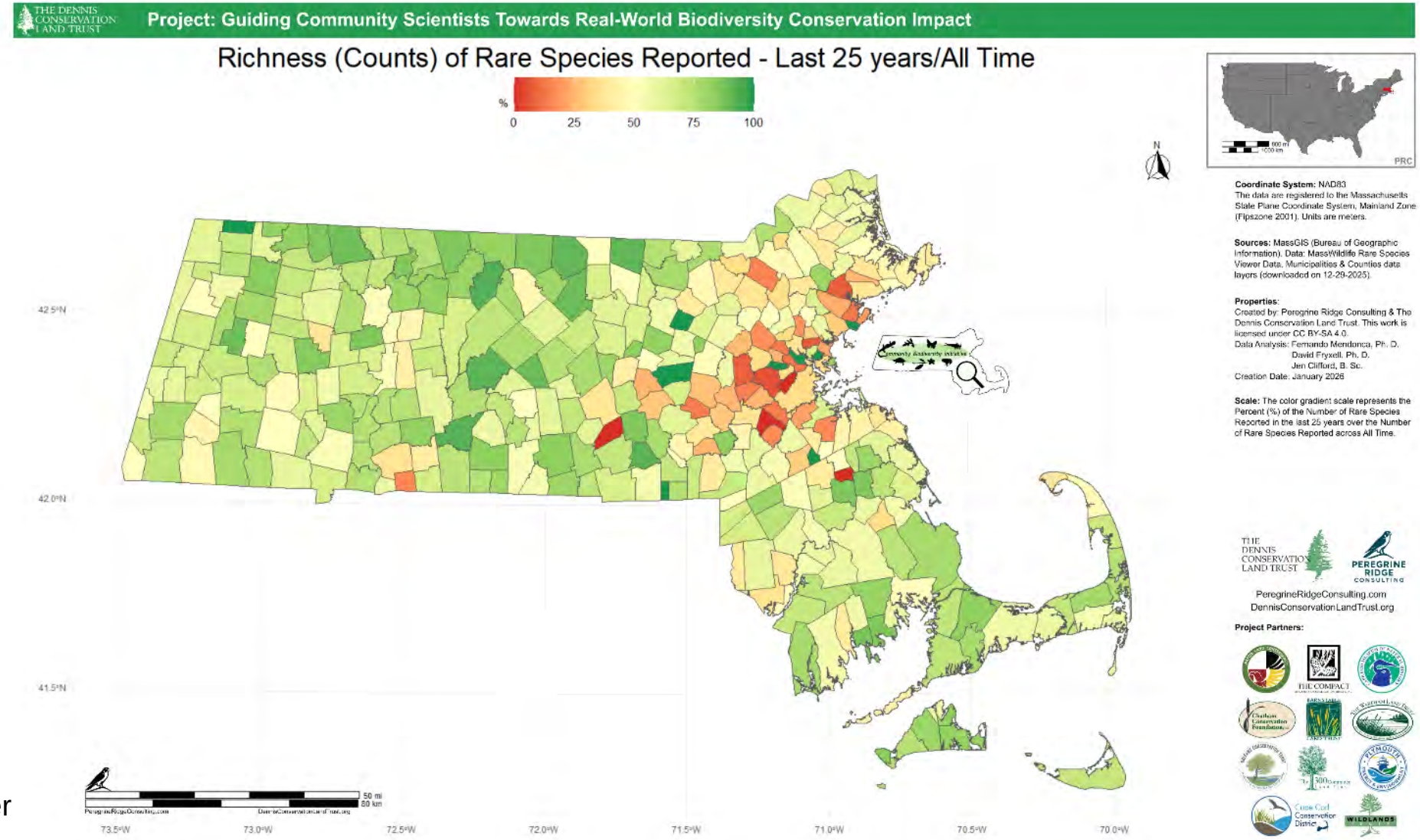
What proportion of species reports are “active” (last 25 years)?

Richness last 25 years / all time

i.e. they remain eligible for PriHab

Reflects comb. of true species loss, lack of reporting, etc.

Data: MassWildlife Rare Species Viewer



State-Listed Species

What proportion of expected species have been reported in last 25 years?

Expected spp. distr. from iNaturalist's "Geomodel Predictions"

- 348 / 453 species

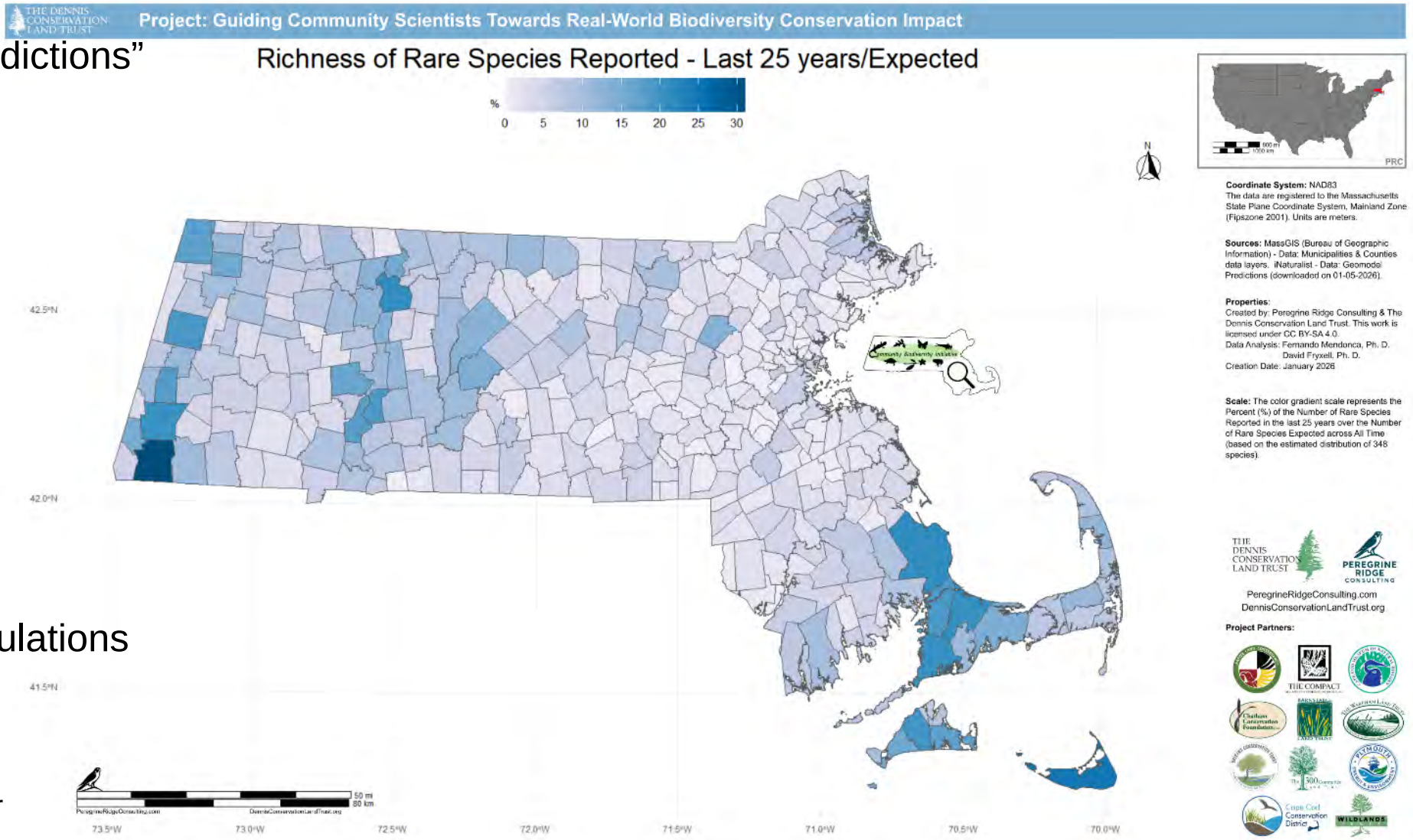
Results

- Avg. 5%
- 0% in ~10 towns
- Plymouth (21%),
- Nantucket (25%)
- Sheffield (31%)

Conclusions

- Suggests lots of new populations to be discovered / reported
- Towns vary significantly

Data: MassWildlife Rare Species Viewer



State-Listed Species

How well are we keeping up with reporting?

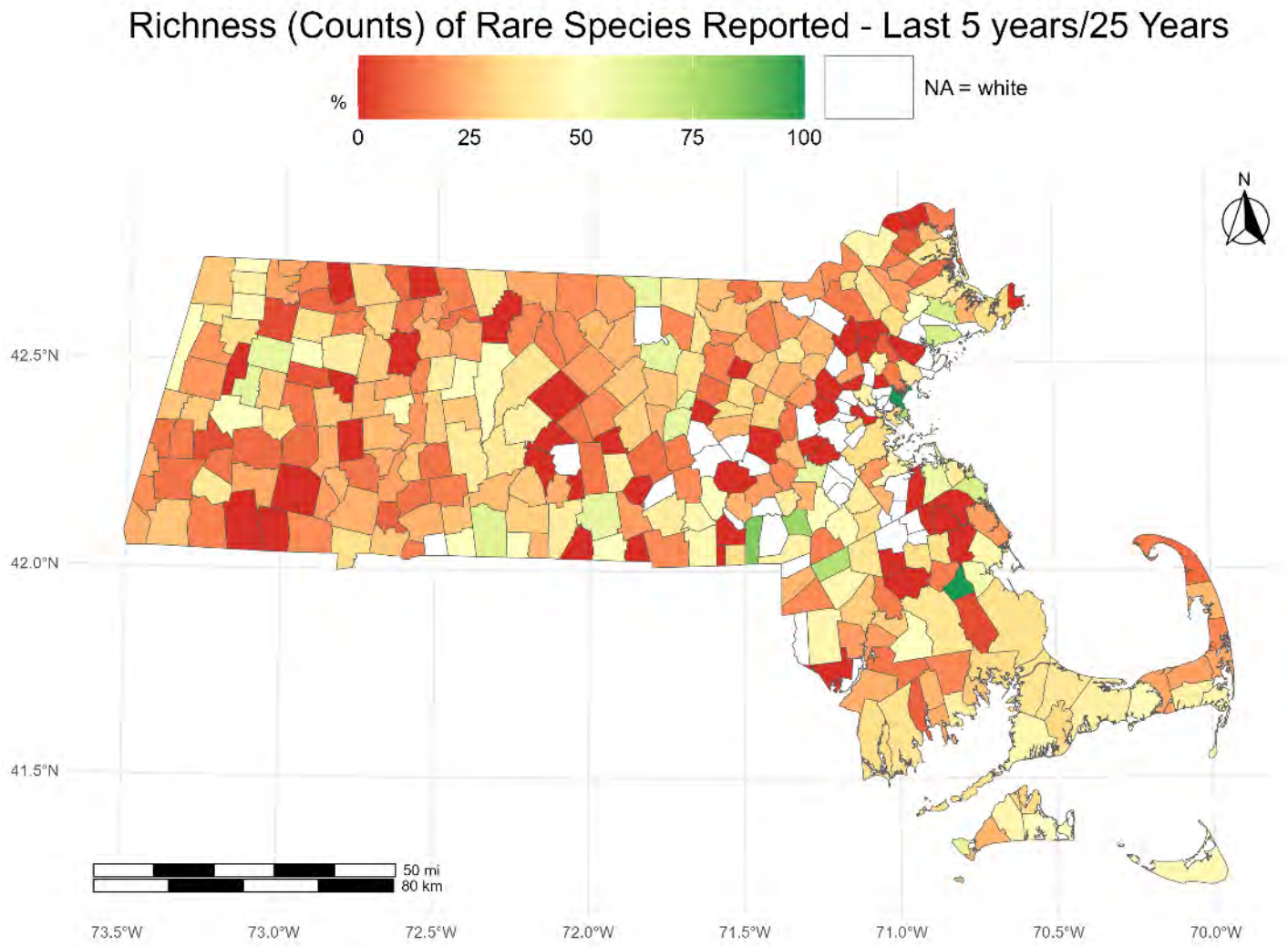
Best indicator of how well we are monitoring and reporting

Metric: Spp. Richness
5 years / 25 years

Premise: Known populations of state-listed should be monitored at least every five years

Removed towns <3 observations

Average: 26%



Data: MassWildlife Rare Species Viewer

State-Listed Species

With > 450 listed spp., which species to target?

1. Those with range overlap in your area
2. Readily ID'd by non-experts (>50%)
3. "Take" (collection permit) not required for ID
4. Others
   - By taxonomic group
   - By habitat type
   - Personal / organizational interest

State-Listed Species - Practical Tips

Low Hanging Fruit

- Upload others' observations
- Focus on just a few species (or habitats)
- Monitor existing Priority Habitats
  - If you own or manage the land
  - Or, if no one else is actively monitoring it
    - Contact NHESP
- Survey historic PriHabs

Collect Good Evidence

- High quality geo-referenced photos or videos
- Quantitative data -> increased (P) -> PriHab
- With time, work towards standardized data collection

Guidance: State-Listed Species

Creating “Guide to Rare Species of Cape Cod”

Focused on key features for ID and reporting

Work-in-progress

To schedule field trainings with expert naturalists

Heartleaf Twayblade
Neottia cordata

Type of Species: Plant (Orchid)
Population Status: Endangered

Towns Found on Cape Cod

Barnstable, Yarmouth, Harwich.
Most recently observed in 2020.

Distinguishing Characteristics

The Heartleaf Twayblade is a perennial orchid that stands about 10-20cm in height. The plant gets its name from its heart-shaped leaves that appear halfway up its stem. The leaves usually come in pairs of 2, but sometimes the plant will have 4 leaves. These leaves are between 1-3 cm long.

When in bloom, the Heartleaf Twayblade bears flowers that are light green with dusky purple outer edges. One flower petal called the lip typically extends downwards and is longer than the others. The petal is linear and cleft, giving it the appearance of a body and legs supporting the rest of the flower. The Heartleaf Twayblade's flowers are arranged in a raceme, meaning they are borne from short floral stalks that sprout from the stem of the plant. The flowers are typically 0.3cm in diameter, so they can be difficult to observe from afar.

Habitat
- Wet, mossy, coniferous woods such as Atlantic White Cedar Swamps.
- Cool, moist, mossy environments.

Other Aids to Identification
- Associated with other plant species that live in similar habitats, including clear patches of sphagnum and mossy hummocks.

Similar Species

The Green and White Adder's Mouth are both similar in size to the Heartleaf Twayblade, but have differently-shaped flowers and only one heart-shaped leaf. These species have been observed in Massachusetts, but not on Cape Cod.

Green Adder's-Mouth
Malaxis unifolia

White Adder's-Mouth
Malaxis monophyllos

Optimal Time for ID

Jan	Feb	Mar	Apr	May	Jun
Jul	Aug	Sep	Oct	Nov	Dec

The Heartleaf Twayblade flowers between late May and early July.

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Bridle Shiner
Notropis bifrenatus

Type of Species: Fish
Population Status: Special Concern

Towns Found on Cape Cod

Bourne, Falmouth, Barnstable, Yarmouth, Brewster, Harwich, Chatham, Truro.
Most recently observed in 2019.

Distinguishing Characteristics

The Bridle Shiner is a small, straw-colored minnow that is typically less than 50mm in length. It has a distinct dark lateral band that starts at its snout and stretches the length of its body to its back fin. This lateral line is generally incomplete and has 32-36 scales. The Bridle Shiner's side scales have distinct dark outlines and are said to be loose. The fish's breast is between 90-100% scales and its belly is fully scaled.

The Bridle Shiner has a distinctive large eye and a pointed, slightly subterminal mouth. The fish generally has 8 dorsal rays, 7 anal rays, 8 pelvic rays, and 12 pectoral rays.

Habitat
- Clear water in slack areas of streams and rivers.
- Lakes and ponds.
- Among sites with moderate levels of submerged vegetation (especially in the bottom 25 cm of these sites). Bridle Shiners use this vegetation for cover when threatened by larger fish.

Other Aids to Identification
- Sites with Bridle Shiner tend to have more aquatic vegetation with feather-like leaves.

Similar Species

Creek Chub
Semotilus atromaculatus

Juvenile Creek Chubs can have a prominent dark lateral band, similar to a Bridle Shiner. However, these fish and most other minnow species have smaller scales than Bridle Shiners. Creek Chubs can also be distinguished by a dark spot at the base of the dorsal fin.

Optimal Time for ID

Jan	Feb	Mar	Apr	May	Jun
Jul	Aug	Sep	Oct	Nov	Dec

Late May through the end of July is the breeding season for the Bridle Shiner.

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State-Listed Species

Recap – State-Listed Species

1. >450 species protected under MESA
2. Specific populations are protected, once reported, as NHESP Priority Habitat
3. Creation & maintenance of Priority Habitat depends on voluntary observations uploaded through Heritage Hub
4. Priority Habitats expire after 25 years if species is not monitored and reported
5. Most species can be identified by nonexperts
6. Lots left to do, two main paths forward:
   A. Discover new or rediscover historic populations
   B. Monitor existing PriHabs

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Vernal Pools

Biodiversity Reporting

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Vernal Pools – Background

What are Vernal Pools?

- Isolated depressions
- Seasonally inundated
- Support “obligate species”

e.g. amphibians, inverts

- Vulnerable
  - Development
  - Climate change
- Unlike other wetlands,

many not protected under WPA unless “Certified”

Vernal Pool Association

Promoting the study, appreciation and protection of vernal pools.

Vernal Pools – Certification

Obligate Spp. on CC

5+ egg masses

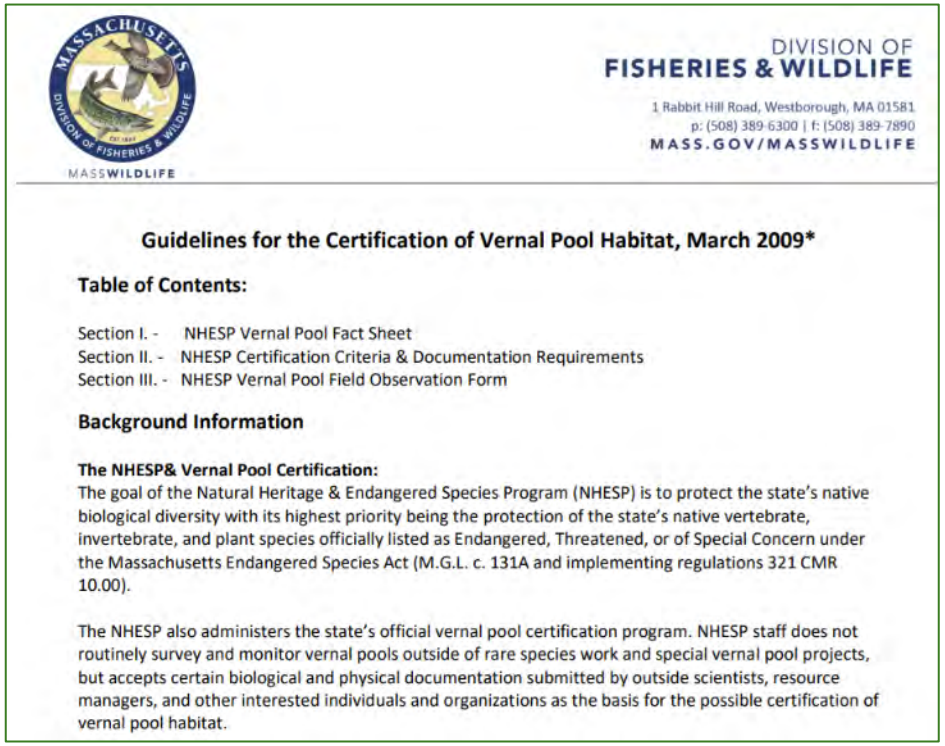
Season: Mid March – Early May

Any # of adult Fairy Shrimp

Certified Vernal Pools Map

Vernal Pools – Certification

“Obligate Species Method”



MASSWILDLIFE

DIVISION OF
FISHERIES & WILDLIFE

1 Rabbit Hill Road, Westborough, MA 01581
p: (508) 389-6300 | f: (508) 389-7890
MASS.GOV/MASSWILDLIFE

Guidelines for the Certification of Vernal Pool Habitat, March 2009*

Table of Contents:

Section I. - NHESP Vernal Pool Fact Sheet
Section II. - NHESP Certification Criteria & Documentation Requirements
Section III. - NHESP Vernal Pool Field Observation Form

Background Information

The NHESP& Vernal Pool Certification:
The goal of the Natural Heritage & Endangered Species Program (NHESP) is to protect the state's native biological diversity with its highest priority being the protection of the state's native vertebrate, invertebrate, and plant species officially listed as Endangered, Threatened, or of Special Concern under the Massachusetts Endangered Species Act (M.G.L. c. 131A and implementing regulations 321 CMR 10.00).

The NHESP also administers the state's official vernal pool certification program. NHESP staff does not routinely survey and monitor vernal pools outside of rare species work and special vernal pool projects, but accepts certain biological and physical documentation submitted by outside scientists, resource managers, and other interested individuals and organizations as the basis for the possible certification of vernal pool habitat.

https://www.mass.gov/info-details/vernal-pool-certification

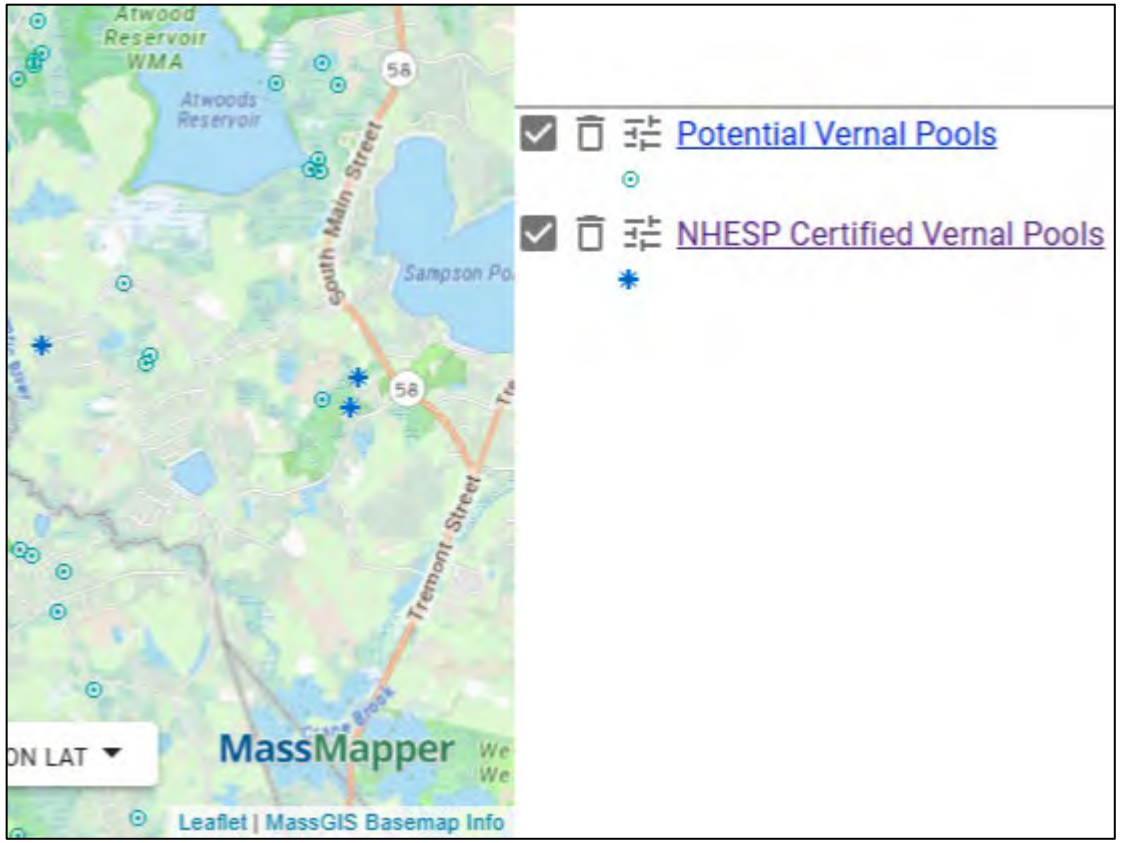
BIOLOGICAL CRITERIA		PHYSICAL CRITERIA	
Obligate Species Accepted - one or more of the following	**Breeding Evidence Accepted** - one or more of the following from at least one obligate species must be documented by photos, video, or audio (chorusing)	**Physical Features Accepted**	**Physical Evidence Accepted**
Wood frog *(Lithobates sylvaticus)* **Spotted salamander** *(Ambystoma maculatum)* **Blue-spotted salamander** * *(A. laterale)* **Jefferson salamander** * *(A. jeffersonianum)* **Marbled salamander** * *(A. opacum)*	**Adult wood frogs -** • Full chorus (calls constant, continuous, & overlapping) - map location of chorus (pool) and site where recording was taken; **OR** • 5+ mated pairs **OR** **Adult salamanders -** • Congressing **OR** • Spermatophores **OR** • Marbled salamander attending a nest **OR** **Egg masses -** • TOTAL of 5 egg masses - any combination, regardless of species **OR** • 1 egg mass of a MESA-listed salamander or nest and eggs of marbled salamander **OR** **Larvae -** • Any number of larvae **OR** **Transforming juveniles -** • Still in pool with tail and/or gill remnants.	Pool with no permanently flowing outlet.	Good quality photos or video of the entire pool holding water including any inlets or outlets (e.g., any streams, culverts, etc). *See 'Tips for Photographing Evidence Required for Vernal Pool Certification'.*
Fairy shrimp *(Anostraca: Eubranchipus)*	Photo or video of adult specimen(s).	Same as above.	Same as above.

Vernal Pool Certification – Data

Certification: How are we doing?

Datasets:

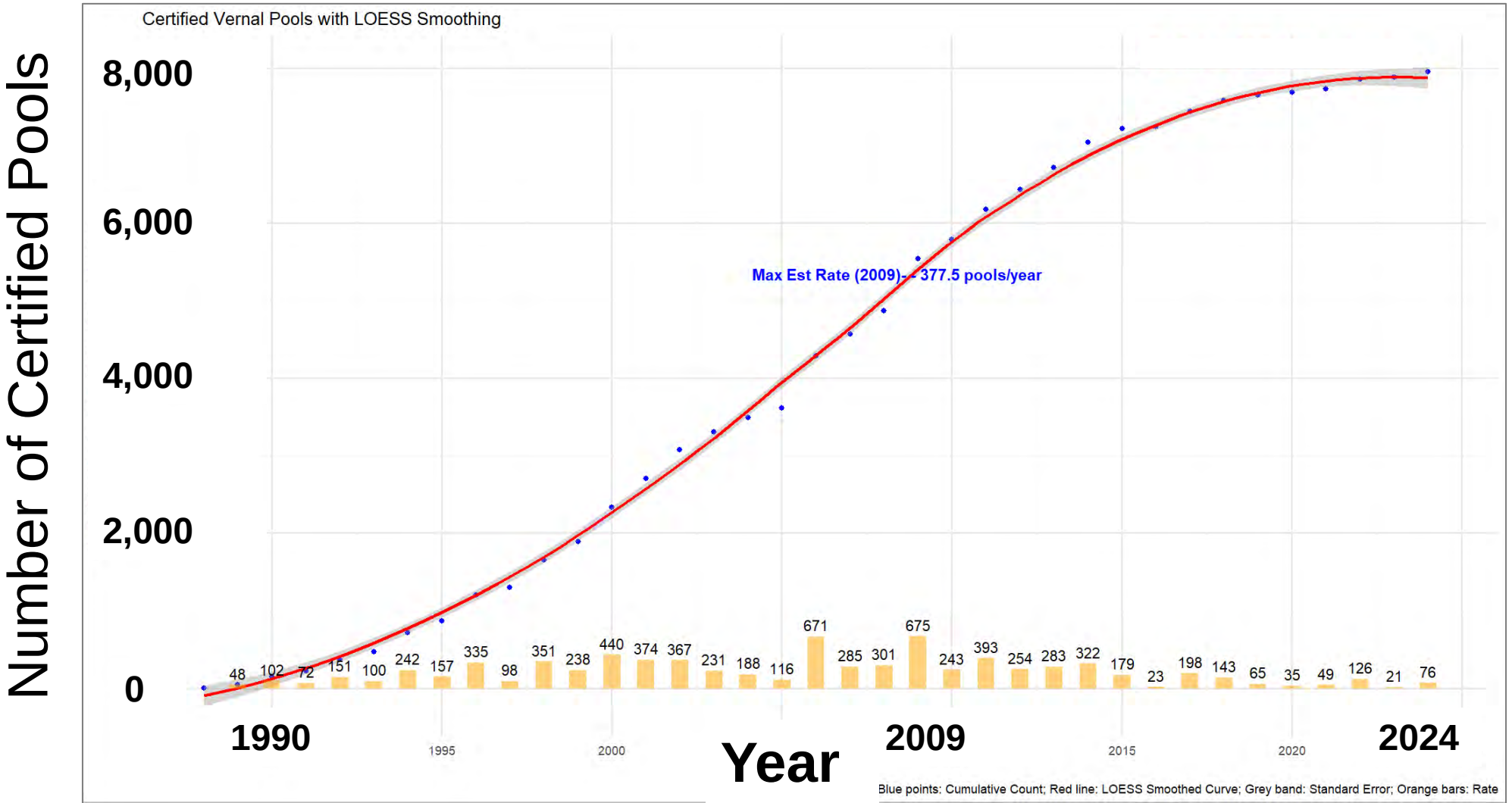
- Potential Vernal Pools (PVP) datalayer, identifies landscape depressions that may function as vernal pools based on aerial imagery (Burne 2001)
  - Field tests show 80%+ certifiable
  - Not a regulatory datalayer
  - Static; older technology
- NHESP Certified Vernal Pools (CVP) datalayer, which contains the locations and certification dates of certified vernal pools



Vernal Pool Certification – Data

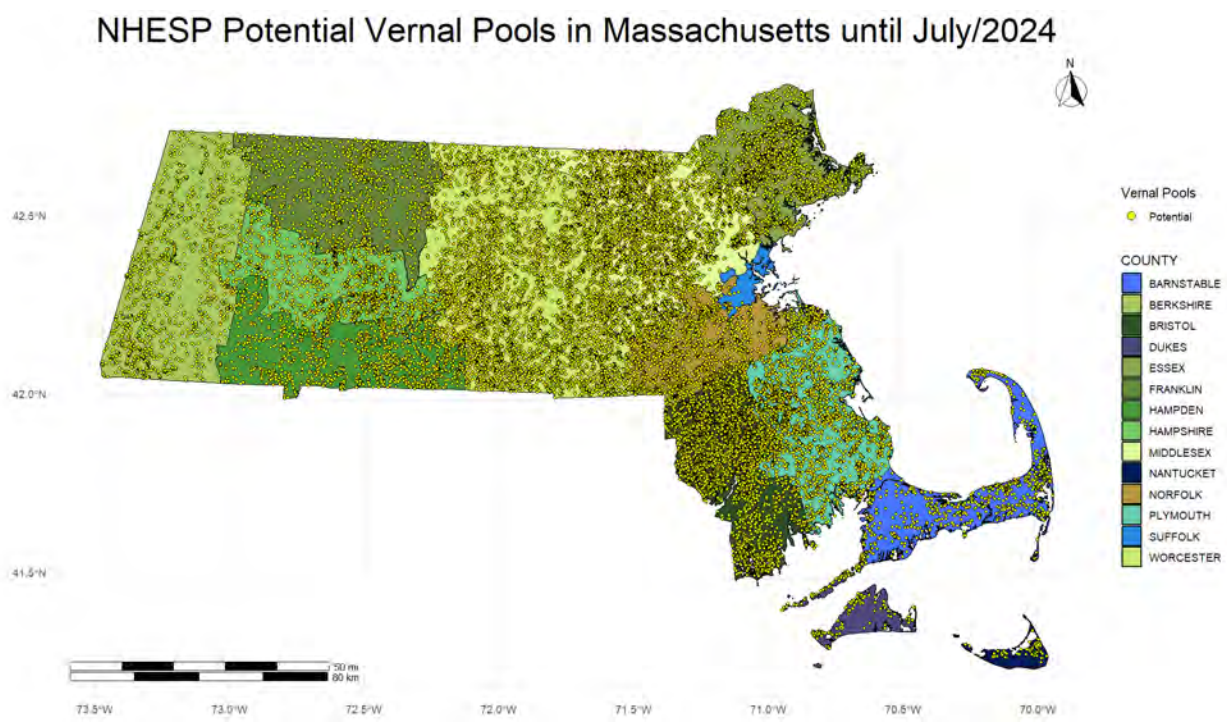
How frequently have pools been certified?

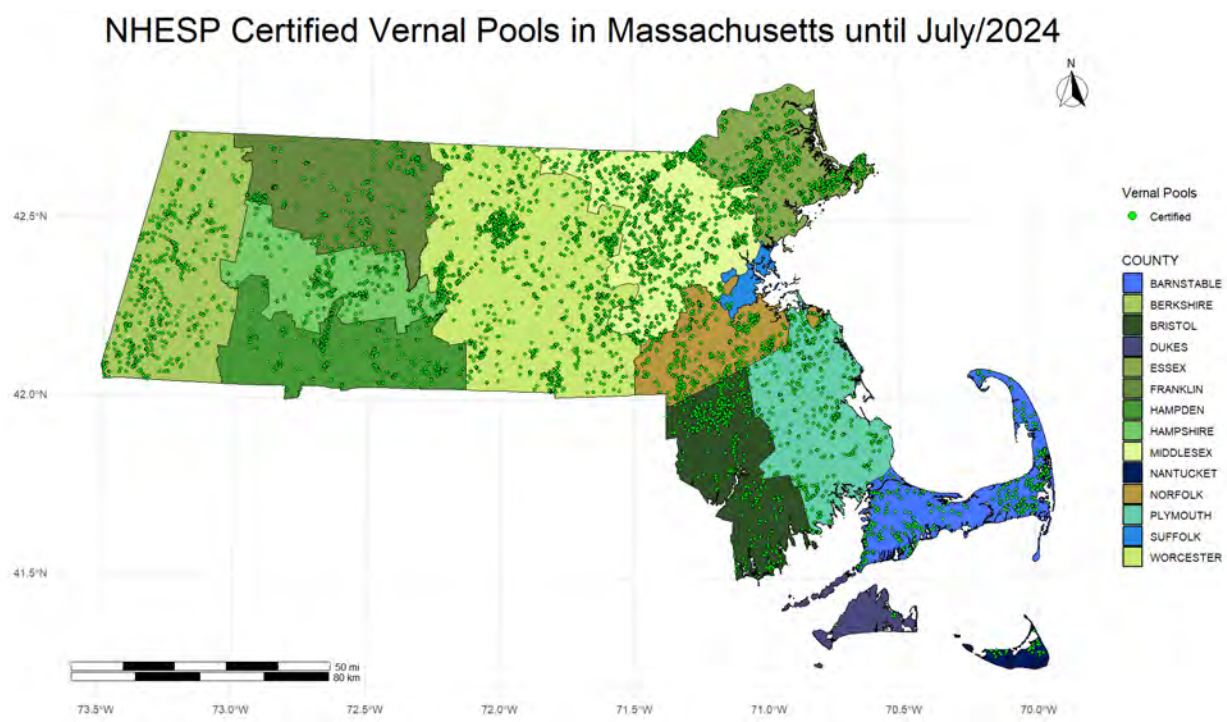
Cumulative Count of Certified Pools through Time



Vernal Pool Certification – Data

Why the decline in cert. rates? Are most pools already certified?





Potential Vernal Pools: **28,864**

Certified Vernal Pools: **7,956**

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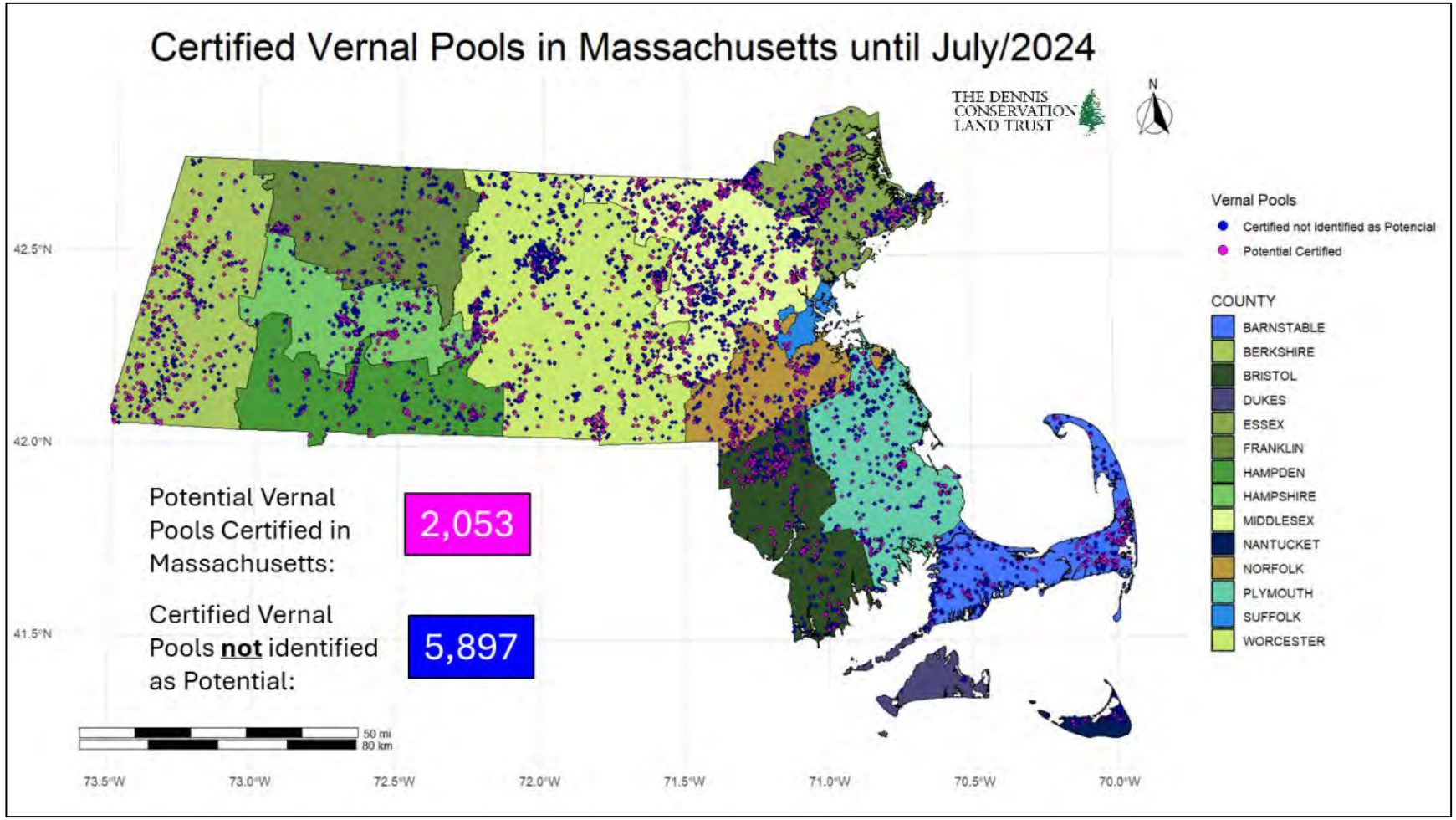
Vernal Pool Certification – Data

Were most of today's certified pools identified in the PVP layer?

- 20 meter buffer around cert. pools
- Contain PVP?
- Results:
  - 26% CVPs were PVPs
  - 74% CVPs not a PVP
- 15,000 PVPs left to certify, but 74% certified pools not PVPs -> 57,000 VPs left to certify in the state
- Enormous remaining opportunity / need



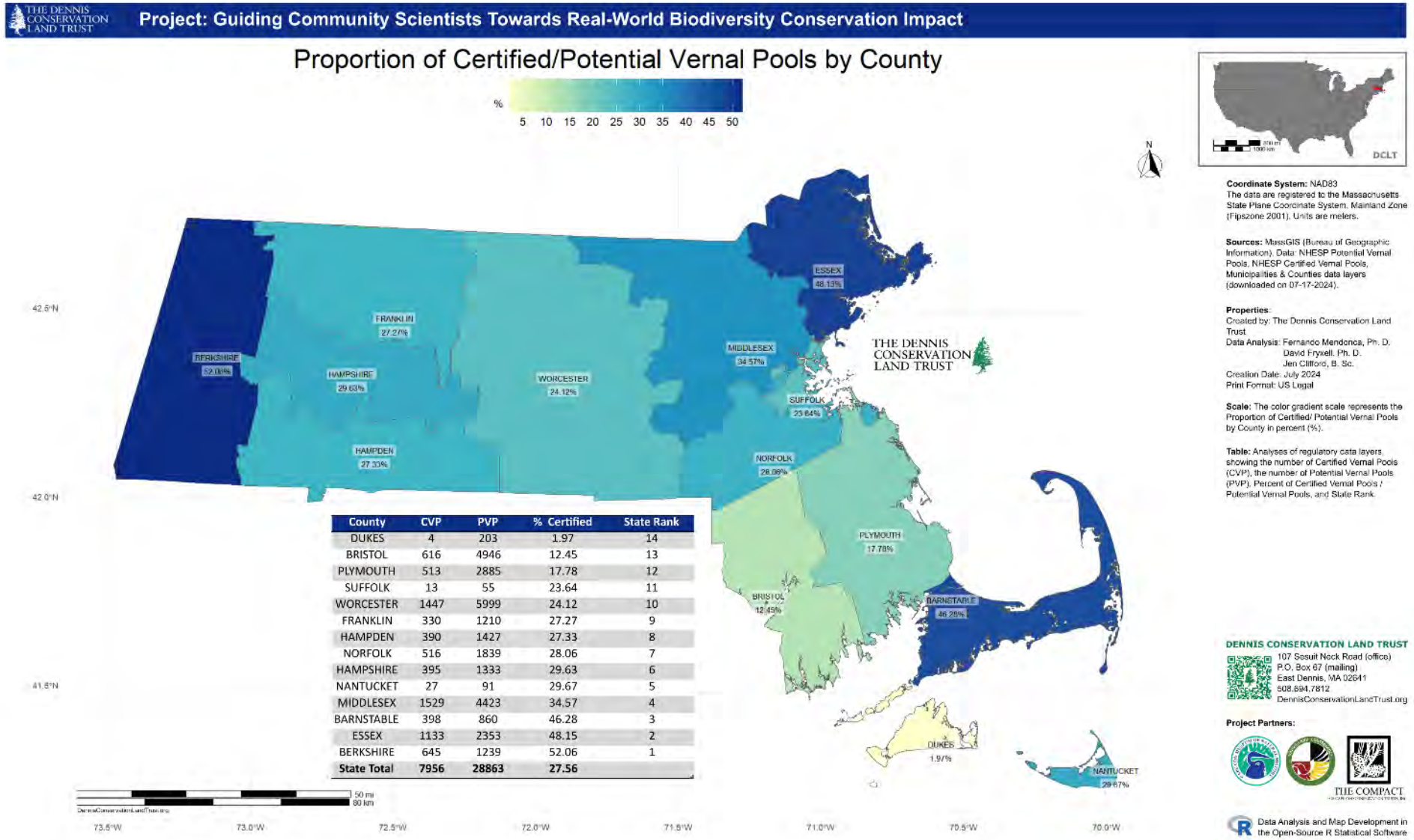
Vernal Pool Certification – Data

Spatial patterns: Where has certification happened most?

Metric:
CVP / # PVP

Berkshire – 52%
Essex – 48%
Barnstable – 46%
....
Plymouth – 18%
Bristol – 12%
Dukes – 2%

Widespread opportunity



County	CVP	PVP	% Certified	State Rank
DUKES	4	203	1.97	14
BRISTOL	616	4946	12.45	13
PLYMOUTH	513	2885	17.78	12
SUFFOLK	13	55	23.64	11
WORCESTER	1447	5999	24.12	10
FRANKLIN	330	1210	27.27	9
HAMPDEN	390	1427	27.33	8
NORFOLK	516	1839	28.06	7
HAMPSHIRE	395	1333	29.63	6
NANTUCKET	27	91	29.67	5
MIDDLESEX	1529	4423	34.57	4
BARNSTABLE	398	860	46.28	3
ESSEX	1133	2353	48.15	2
BERKSHIRE	645	1239	52.06	1
State Total	7956	28863	27.56	

Vernal Pool Certification – Data

Which towns to target?

23 Towns at 0%

....

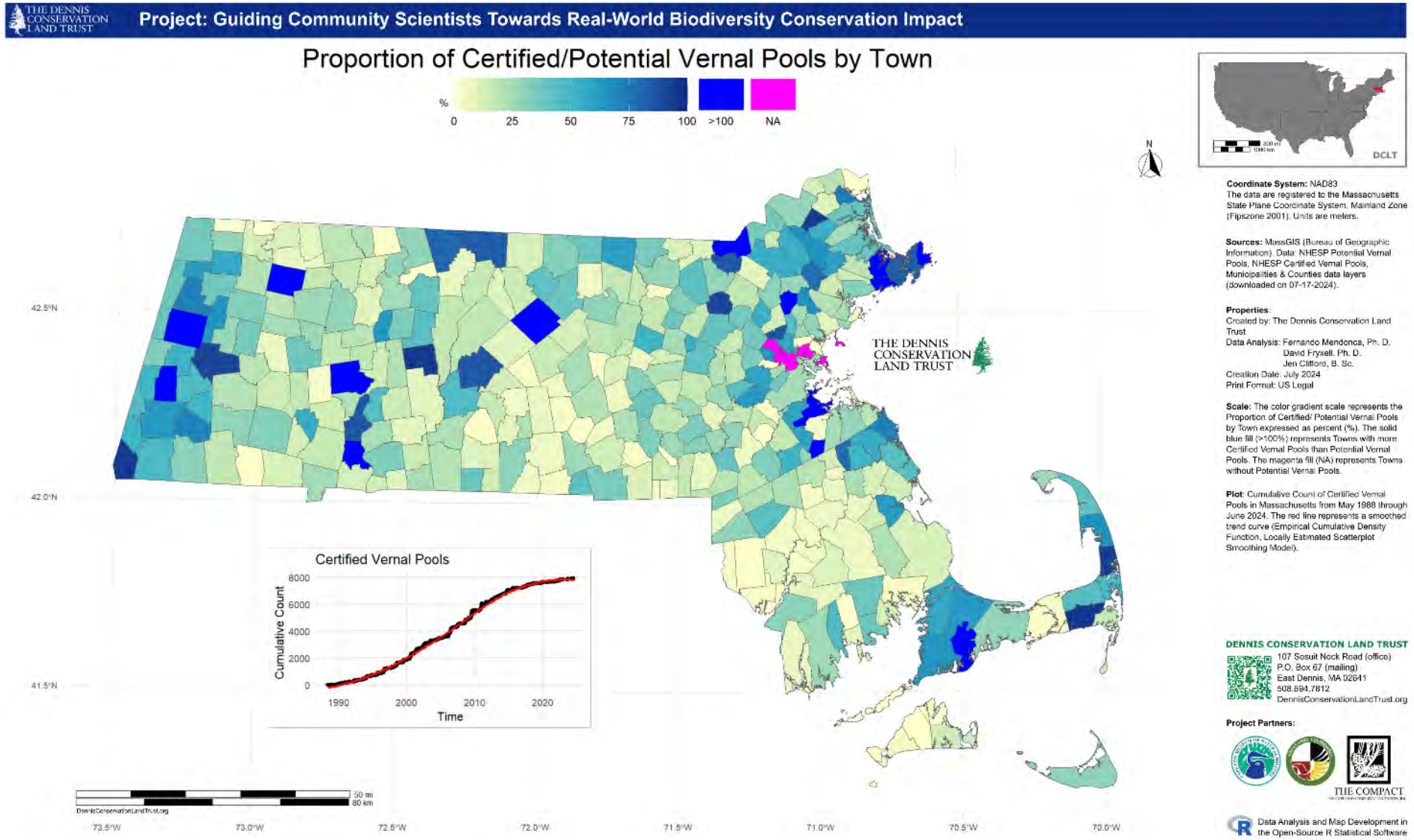
Holbrook – 189%

Quincy – 240%

Dracut – 264%

Towns vary widely, even neighboring towns

Why?



Vernal Pool Certification – Data

What explains highly localized pattern?

Harwich
- Initiative of ConCom

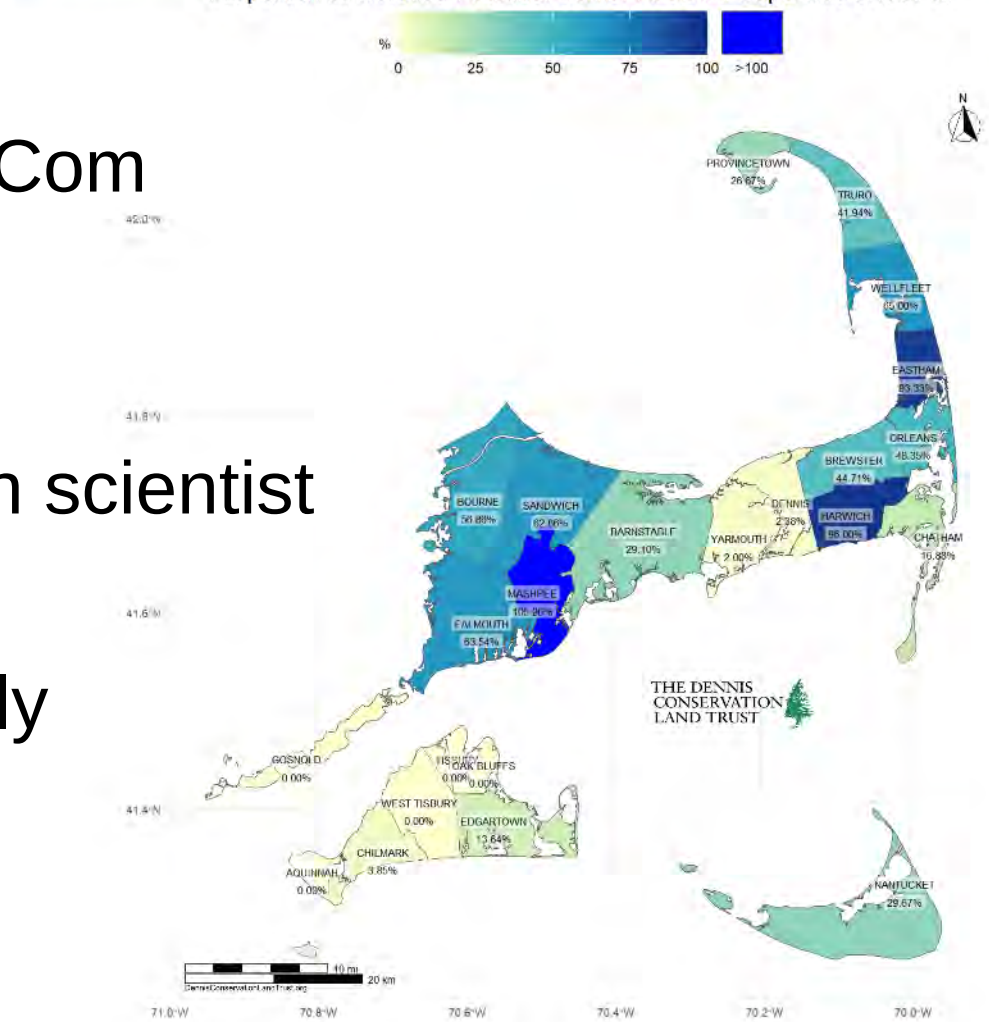
Eastham
- Individual citizen scientist

Yarmouth, recently
- Initiative of S.B.

THE DENNIS CONSERVATION LAND TRUST

Project: Guiding Community Scientists Towards Real-World Biodiversity Conservation Impact

Proportion of Certified/Potential Vernal Pools on Cape Cod & Islands



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BARNSTABLE County

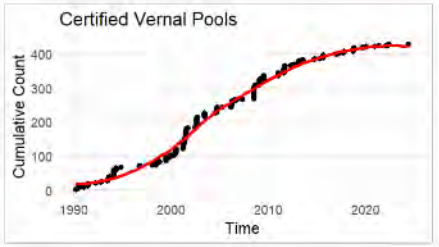
Town	CVP	PVP	% Certified	County Rank	State Rank
YARMOUTH	1	50	2.00	15	322
DENNIS	1	42	2.38	14	319
CHATHAM	13	77	16.88	13	218
PROVINCETOWN	8	30	26.67	12	151
BARNSTABLE	39	134	29.10	11	137
TRURO	13	31	41.94	10	85
BREWSTER	38	85	44.71	9	77
ORLEANS	44	91	48.35	8	69
BOURNE	29	51	56.86	7	52
SANDWICH	22	35	62.86	6	42
FALMOUTH	61	96	63.54	5	41
WELLFLEET	13	20	65.00	4	37
EASTHAM	28	30	93.33	3	19
HARWICH	48	50	96.00	2	15
MASHPEE	40	38	105.26	1	14
BARNSTABLE Total	**398**	**860**	**46.28**		

DUKES County

Town	CVP	PVP	% Certified	County Rank	State Rank
AQUINNAH	0	28	0.00	3	327
GOSNOLD	0	77	0.00	3	327
OAK BLUFFS	0	4	0.00	3	327
TISBURY	0	7	0.00	3	327
WEST TISBURY	0	39	0.00	3	327
CHILMARK	1	26	3.85	2	304
EDGARTOWN	3	22	13.64	1	242
DUKES Total	**4**	**203**	**1.97**		

NANTUCKET County

Town	CVP	PVP	% Certified	County Rank	State Rank
NANTUCKET	27	91	29.67	1	129
NANTUCKET Total	**27**	**91**	**29.67**		



Coordinate System: NAD83
The data are registered to the Massachusetts State Plane Coordinate System, Mainland Zone (Fipszone 2001). Units are meters.

Sources: MassGIS (Bureau of Geographic Information). Data: NHESP Potential Vernal Pools, NHESP Certified Vernal Pools, Municipalities & Counties data layers (downloaded on 07-17-2024).

Properties:
Created by: The Dennis Conservation Land Trust
Data Analysis: Fernando Mendonca, Ph. D.
David Fryxell, Ph. D.
Jen Clifford, B. Sc.
Creation Date: July 2024
Print Format: US Legal

Scale: The color gradient scale represents the Proportion of Certified/ Potential Vernal Pools by Town expressed as percent (%). The solid blue fill (>100%) represents Towns with more Certified Vernal Pools than Potential Vernal Pools.

Table: Analyses of regulatory data layers, showing the number of Certified Vernal Pools (CVP), the number of Potential Vernal Pools (PVP), Percent of Certified Vernal Pools / Potential Vernal Pools, County Rank, and State Rank.

Plot: Cumulative Count of Certified Vernal Pools on Cape Cod from May 1988 through June 2024. The red line represents a smoothed trend curve (Empirical Cumulative Density Function, Locally Estimated Scatterplot Smoothing Model).

DENNIS CONSERVATION LAND TRUST
107 Sesuit Neck Road (office)
P.O. Box 67 (mailing)
East Dennis, MA 02641
508.694.7812
DennisConservationLandTrust.org

Project Partners:

THE COMPACT

Data Analysis and Map Development in the Open-Source R Statistical Software

Vernal Pools – Starting a Program

1. **Review MW's VP Certification Guide; focus on "obligate species method"**

2. **Staff and volunteers should attend an in-person certification training**

3. **1st to 2nd season: Staff leads field work, focus on properties already protected**

4. **2nd season and beyond: Volunteers lead field work, staff provides pool priorities**

5. **Longer term**

   - **Re-check uncertified pools; high year-to-year variability**
   - **Seek landowner permission on private, unprotected property**
   - **Learn, use where needed the "facultative species method" or new tools e.g. passive audio recorders**
   - **Longer term, consider transition - > quantitative monitoring program**

Vernal Pools – Why Certify?

Regulatory Protection

- **Certification triggers permit review for proposed work under MWPA**
- **In towns with protective local regs: CVPs may have regulated buffer zones, too**

Land Protection

- **Certification adds "conservation value" and improved funding opportunities**

Other

- **Land use planning: Example: determining wastewater recharge sites in Dennis**
- **Mosquito control: MA BMPs: Do not treat certified vernal pools with chem. pesticides**

This is why certification on protected lands is important, too

Bottom Line

- **Certification transforms an otherwise invisible habitat feature into a highly visible and protected biodiversity asset.**

Hilltown Land Trust
AN AFFILIATE OF THE TRUSTEES

Vernal Pool Assessment Training

community science, engagement and education

About Hilltown Land Trust

Affiliate of the Trustees of Reservations since 2009

Mission: Hilltown Land Trust conserves and stewards land through strong relationships to ensure clean water, wildlife habitat, climate resilience, recreational opportunities, and healthy farmland for the benefit of all.

Organization: 6 staff, 1 TerraCorps Member, 10 Board Members, 2 Honorary Board Members

Committees: Engagement, Executive, Governance, Project Management, Stewardship (Vernal Pool Subcommittee), Re-Imagining Conservation Working Group

Volunteer Projects: Event Support, Land Monitor, Land Steward, Photographer (Vernal Pool Assessment being added)

Vernal Pool Program History

Started by Meredyth Babcock, Wild & Scenic Westfield River Committee called "Vernal Pool Plunge"

2019 offered 3-day training

Charlie Eiseman, Naturalist, lead 2019 training & recorded training video for future use

2020 Vernal Pool Plunge program passed to Hilltown Land Trust

2022 offered 2-day training

2023 offered evening webinar and field walk (not a full training)

2024 & 2025 offered events for alumni of training

Challenges & Successes

- Original structure of having “town reps” didn’t work
- Individuals submitting data did not work for most
- No connecting events after training
- No easy way of tracking work done

- Some people continued to work independently
- Pools were certified
- HLT vernal pool committee formed to support program
- Alumni events renewed interest
- Now part of HLT’s biomonitoring program

Successes Continued

- 38 new Vernal Pools certified by NHESP in the Hilltowns between 2019-2025 (*Note: NHESP has about a 2 year backlog of submissions not yet certified*)
- Vernal Pool video recorded with Wild & Scenic: https://youtu.be/R5RPlADnvHU
- Vernal Pool Plunge field trips collected data on 4 new pools in 2025

Future

Training to be offered in April 2026 “Vernal Pool Assessment Training”

Creating community of volunteers

Centralizing data submission to NHESP Heritage Hub

Educational outreach and networking

Connecting with Conservation Commissions

Larger Biomonitoring initiatives

Vernal Pool Plunge Supplies

Supplies Provided for Field Trips:

- *A Field Guide to the Animals of Vernal Pools* by Leo P. Kenney & Matthew R. Burne
- Net (pool skimmer nets work really well)
- Forms and clipboards
- Small containers for photographing larvae (white and clear)
- Black umbrella or black plastic folder to reduce glare off of water when taking photos
- Disposable gloves (Nitrile/Vinyl)

Supplies Recommend People Bring:

- Camera or smartphone (video/audio recording capability)
- GPS unit or smartphone (Google maps works well for getting coordinates even when no cell reception)
- Notebook pen/pencil
- Polarized sunglasses
- Knee boots or hip waders

Decontamination Protocol

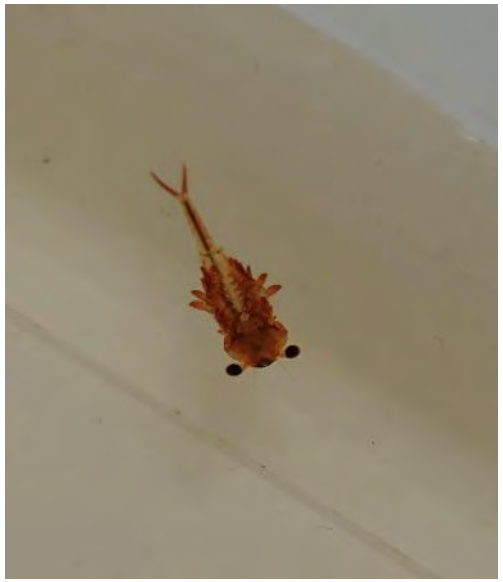
Protocol protects from transmission of Ranavirus and chytridiomycosis between vernal pools.

Supplies:

- Pump spray bottles of bleach solution and water to rinse
- Dish pan or small tote to wash equipment in
- Brush to clean off debris from boots and equipment

Set up washing station away from vernal pools/wetlands. Have each participant wash and rinse boots before going to pool and between pools that are not directly adjacent to each other.

Vernal Pool Association for more info: https://www.vernalpool.org/decontamination



Further Resources

Hilltown Land Trust Vernal Pool Program: https://www.hilltownlandtrust.org/vernal-pool-plunge

Vernal Pool Listserv: https://groups.io/g/vernalpool

NHESP Vernal Pool Certification info: https://www.mass.gov/info-details/vernal-pool-certification

Vernal Pool Field Observation Form: https://www.hilltownlandtrust.org/wp-content/uploads/2026/03/Vernal-Pool-Field-Observation-Form.pdf

Acknowledgements

Hilltown Land Trust staff: Calla Jones, TerraCorps Land Stewardship Coordinator; Jess Applin, Land Conservation & Stewardship Manager; Sarah Welch, Community Engagement Manager

Meredyth Babcock, Wild & Scenic Westfield River: https://westfieldriverwildscenic.org/

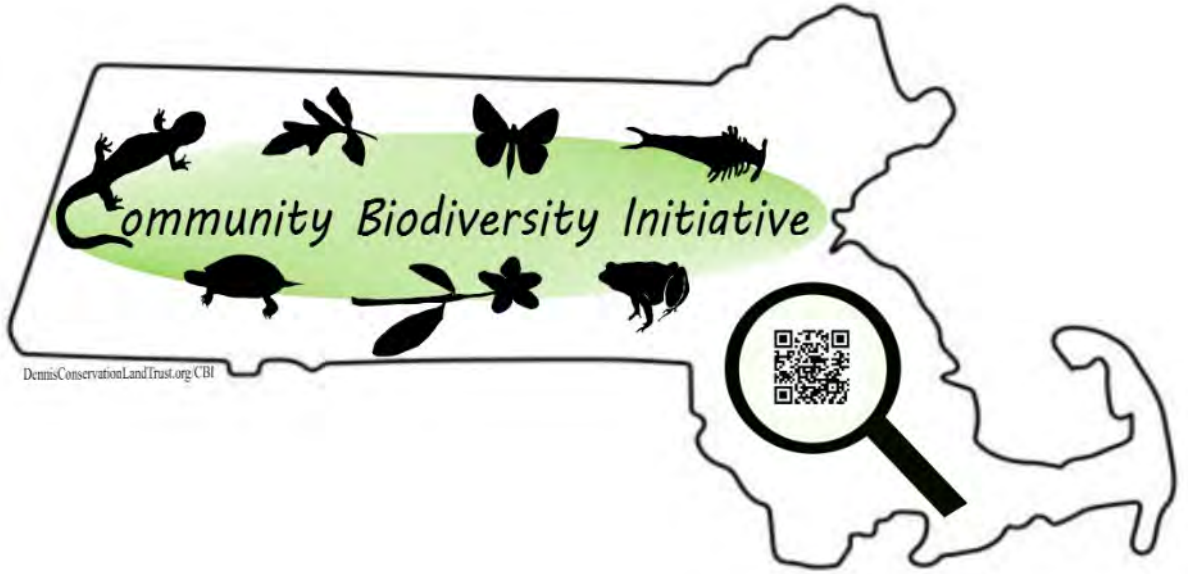
Charlie Eiseman, Naturalist: https://charleyeiseman.com/

Calla Jones, contact for HLT Vernal Pool Program: calla@hilltownlandtrust.org

Outline

1. Background – Biodiversity
2. Opportunity in Massachusetts
3. Vernal Pools
4. State-Listed Species
5. Community Biodiversity Initiative
6. Discussion

https://www.mass.gov/info-details/biodiversity-goals-for-massachusetts



David Fryxell, Ph.D. THE DENNIS CONSERVATION LAND TRUST

Fernando De Mendonça, Ph.D. PEREGRINE RIDGE CONSULTING

Jen Clifford, Leeza Barstein, Charly Raymond, Lydia Rheinhardt

TerraCorps | AmeriCorps Massachusetts | MASSACHUSETTS SERVICE ALLIANCE

Guiding citizen scientists toward real-world biodiversity conservation impact

Goal 1: Motivate involvement in species reporting, where needed most, by publishing ranking metrics

Goal 2: Lower the barrier to entry for partner entities developing new reporting programs

NATIVE LAND CONSERVANCY

WILDLANDS TRUST

THE DENNIS CONSERVATION LAND TRUST

Cape Cod Museum of Natural History
Cape Cod's Nature Place

THE COMPACT
OF CAPE COD CONSERVATION TRUSTS, INC.

BARNSTABLE LAND TRUST

Chatham Conservation Foundation, Inc.

ORLEANS CONSERVATION TRUST
Protecting Nature for Our Community

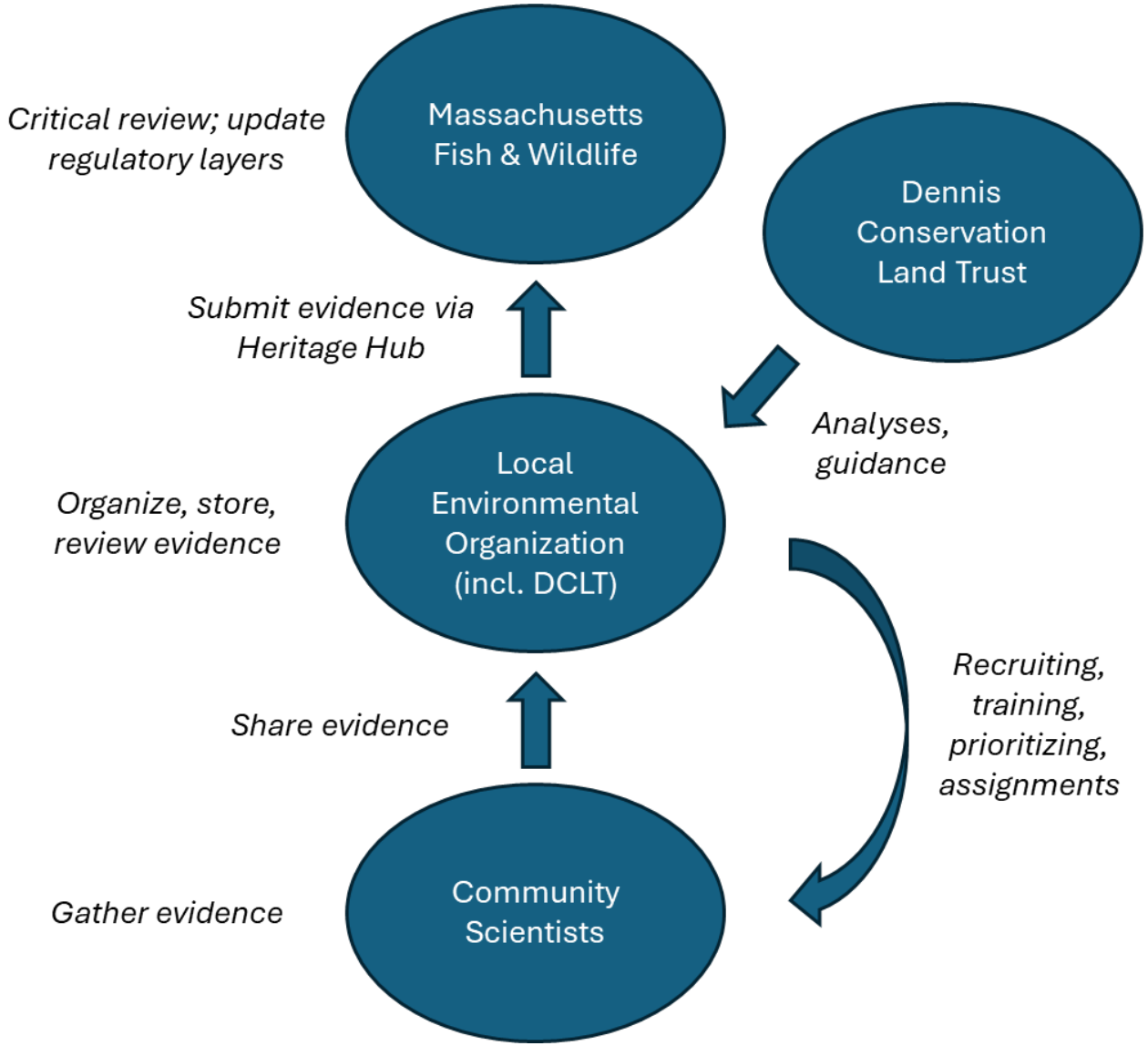
PLYMOUTH ENERGY & ENVIRONMENT

THE WAREHAM LAND TRUST
Uniting to Preserve Our Diverse Lands & Natural Resources

Cape Cod Conservation District

The 300 Committee Land Trust

CBI – Emerging Model



CBI – Collaboration

The Partner Pledge

1. Commit to submitting 3 high quality observations to Mass Wildlife each year
2. Follow best practices for field work*
3. Keep listed spp. observations confidential

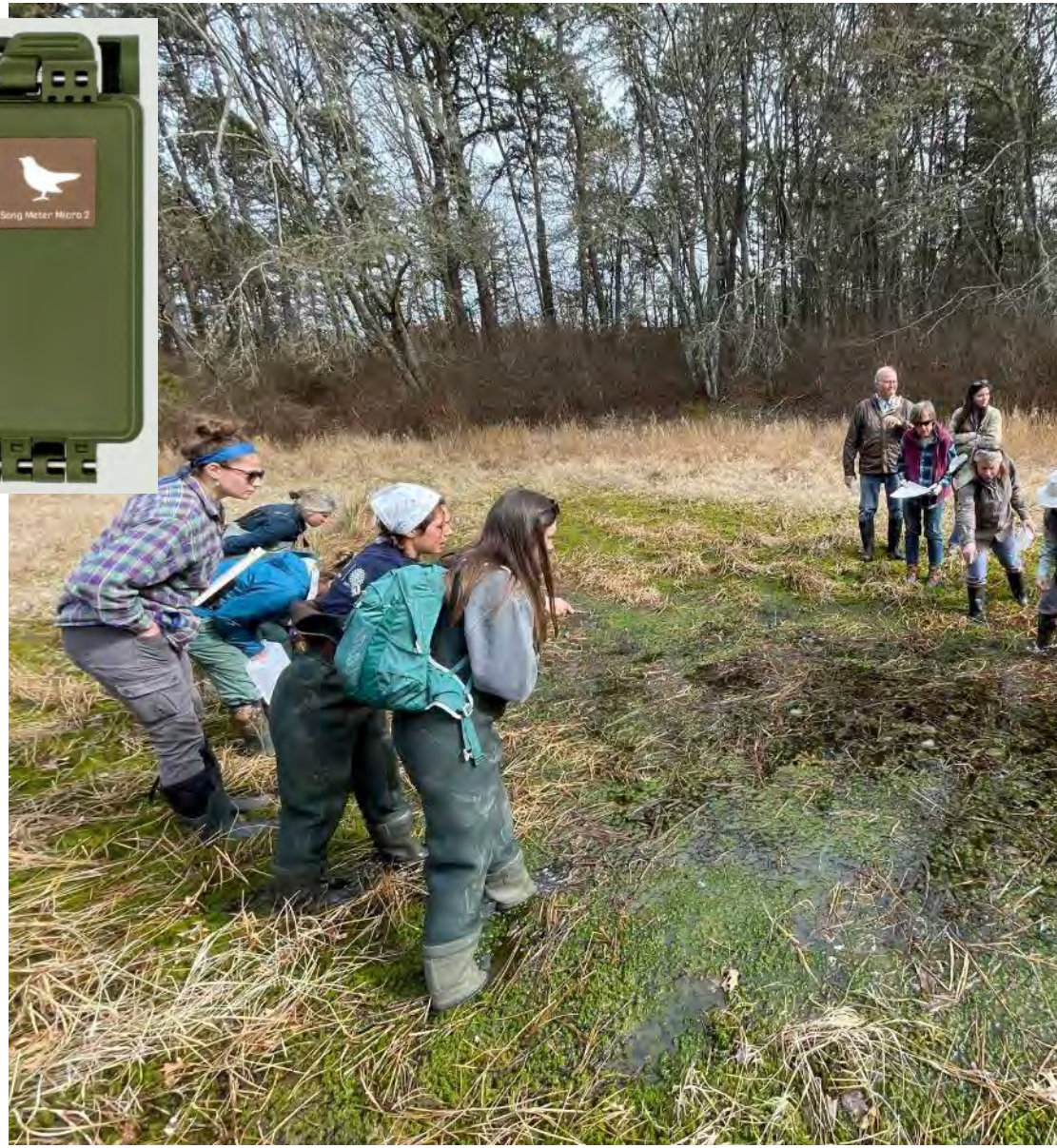
Why Become a Project Partner?

- Help develop best practices, hone materials
- Help build momentum, motivate others to get involved
- Network; receive guidance and resources
- Collectively, advocate for funding: MassWildlife, and grant programs

*for example, avoiding trampling of vegetation, obtaining landowner permission, obtaining permits where necessary, thoroughly sanitizing waders & other equipment after use in wetlands

Guidance for Partners

- Standard field data sheets
- Standard template letter to request landowner access permission
- Gear and equipment sharing
- Standard best practices
    - Land access and safety
    - Wildlife handling restrictions
    - Protection of state-listed species
    - Minimizing habitat disturbance
    - Disease prevention
- In-person certification trainings and specialized equipment / spp. ID training
    - **If you want a training in your area, LMK.**



Best Practices

Land access and safety: Landowner permission must be obtained prior to site visits. Field teams will consist of 2–3 individuals to balance safety and minimize habitat disturbance. All team members must carry charged mobile phones and appropriate lighting when working near dusk.

Wildlife handling restrictions: Amphibians and egg masses will rarely be handled. Photographic documentation will be obtained using non-invasive methods (e.g., white background trays). When handling is unavoidable, sterile nitrile gloves will be used and disposed of between sites.

Protection of state-listed species: State-listed species will be avoided without appropriate permits. Observations will be documented or reported directly to NHESP, with location data kept confidential to prevent disturbance by others or poaching.

Minimizing habitat disturbance: Time spent wading and sediment disturbance will be minimized. Once sufficient evidence is collected, teams will exit the pool. Where appropriate, passive acoustic monitoring (e.g., recording calling wood frogs) will be used as an alternative to repeated physical entry.

Disease prevention: Visits to multiple pools during a single outing will be limited to nearby sites only. All gear will be sanitized off-site between outings following the Northeast Partners in Amphibian and Reptile Conservation (PARC) Protocol, as recommended by MassWildlife.

Pollution Prevention: Reduce use of insect repellant, sunscreen, and lotions, especially on hands

CBI Guidance – Prioritizing Pools

Which pools to target?

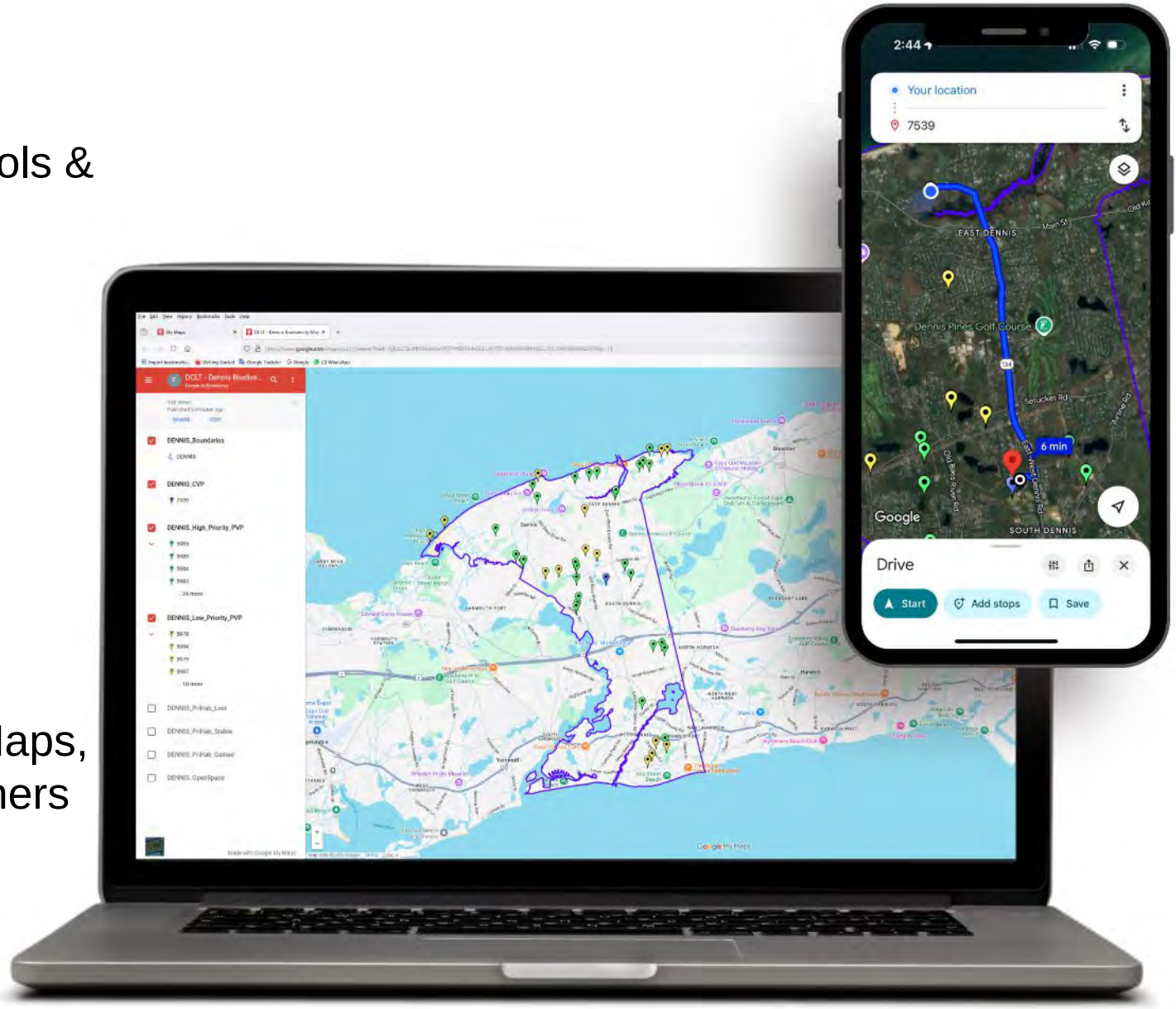
Downloaded state's Certified, Potential V. Pools & DEP Wetlands Datalayers

Assigned each pool to categories:

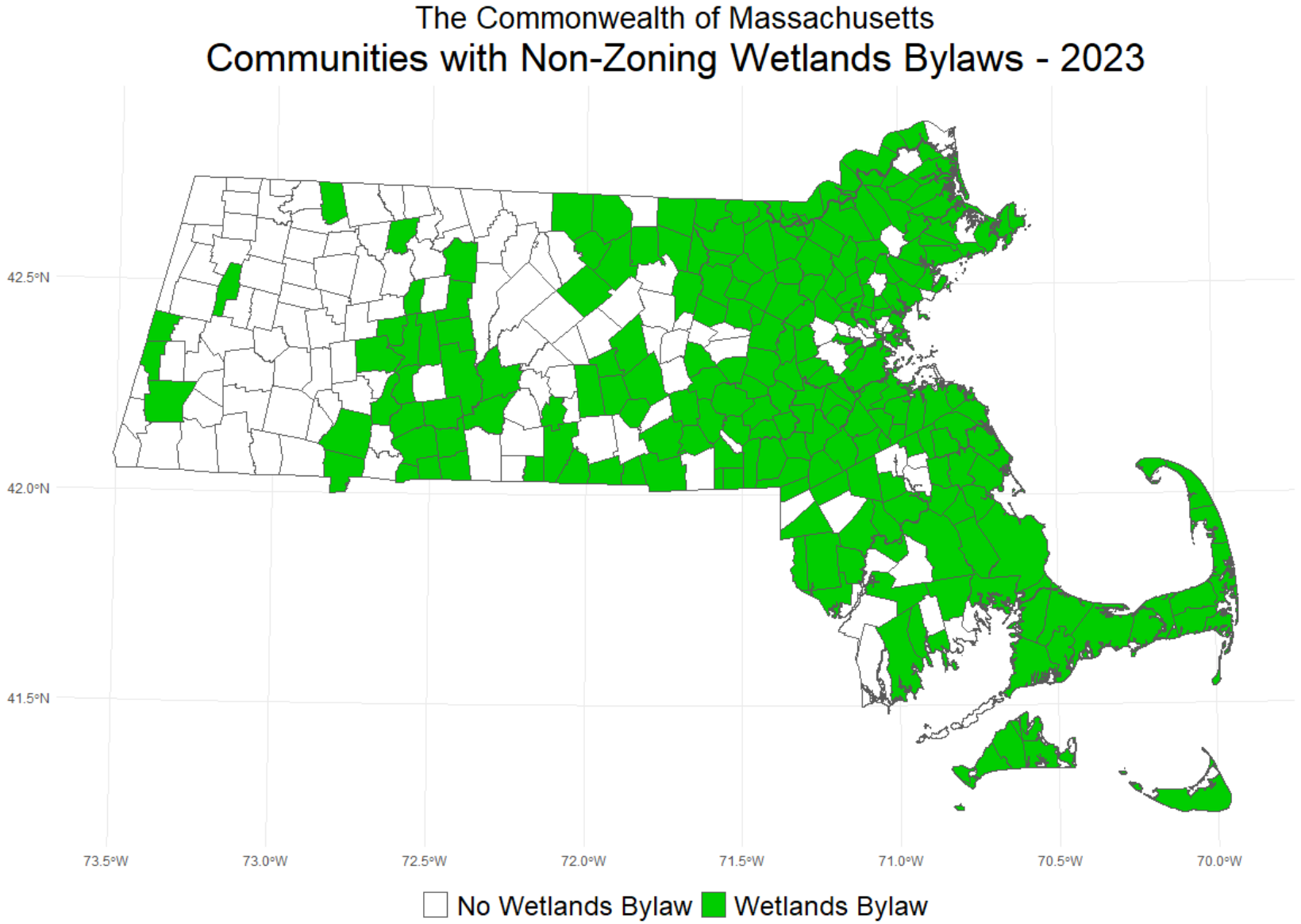
1. Already certified pools
2. Higher priority pools for certification
3. Lower priority pools (larger sized)

Exported our "Priority Pool Map" to Google Maps, added public lands, shared with Project Partners

Next steps: Additional priority criteria



CBI Guidance – Vernal Pools – Next Steps



Take-Home Messages

1. Biodiversity conservation needs data, funding, and political will
2. Funding will always be limited; new technologies will be insufficient
3. MA has robust network of local conservation entities, with trusted volunteers
4. MA has an ideal system for community (and volunteer) involvement in biodiversity ***protection*** through spp. reporting to NHESP
5. On average only 5% of expected state-listed species in a town have been reported to NHESP within the last 25 years; suggests many new populations left to discover, report, monitor, and protect.
6. On average, only 26% of state-listed species reported in a town are reported again within 5 years; populations should be regularly monitored.
7. Vernal pool certification rates have dropped substantially in recent years
8. Roughly 50,000 certifiable vernal pools remain to be certified in MA
9. Nearly every town has remaining certification opportunities
10. Local conservation entities, overseeing trained volunteers, will make the difference.

Does this work?

At DCLT, with little time allocated, since 2023

- Found 2 threatened, 1 endangered, and 1 sp. of special concern never before reported in town (pending review)
- Found 1 new population of a threatened species; evidence was accepted by NHESP
- 19 vernal pools certified or in process (mostly in process…)
- Small team of volunteers now leading field work

This isn’t new, and yes, it works!

- Native Plant Trust
- Hilltown Land Trust’s Vernal Pool Certification program
- Harwich Conservation Trust’s box turtle program
- Many others…

What we lack is local involvement with state-wide coverage.

Acknowledgments

DCLT Volunteers: Sharon Stewart, Ann Risso, Gail Hart, Betsy Perry, Linda Blake

Funding: ISLAND FOUNDATION

Advice: Tim Simmons, Matt Penella, Micah Jasny, Rebecca Quiñones, Owen Nichols, Andrea Bogomolni, Brad Timm, Nathan Cristofori, Scott Smyers, and many others

Conclusion

Where does your community stand?

Town vernal pool certification ranking maps by county available in print.

All maps and rankings will soon be posted and publicly available. Stay updated:

DennisConservationLandTrust.org/CBI

Instagram: @communitybiodiversity

Instagram: @dennisconservationland

HilltownLandTrust.org

calla@hilltownlandtrust.org

PEREGRINE RIDGE CONSULTING

info@PeregrineRidgeConsulting.com

Vernal Pools – Equipment Sanitation

After visiting each vernal pool "area," away from wetlands

- Scrub / rinse debris
- Immerse in 1.6% bleach solution for 5 minutes
- Rinse with water
- Air dry completely
- For smaller equipment, use 70%+ ethanol or grain alcohol

Also applies to other field work in wetlands

Disinfection of Field Equipment for Amphibian Pathogens

Minimizing Spread of Chytrid Fungi (Bd & Bsal) and Ranavirus

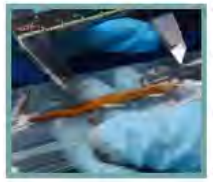
NORTHEAST PARC PARTNERS IN AMPHIBIAN AND REPTILE CONSERVATION

Importance of Disinfection The spread of pathogens is a major threat to amphibians and reptiles worldwide.[1-5] This is particularly true for ranavirus (RV) and the two chytrid fungi, *Batrachochytrium dendrobatidis* (Bd) and *B. salamandrivorans* (Bsal), responsible for the disease, chytridiomycosis. Humans can move pathogens from one place to another and from one organism to another in little time and over great distances. With the increasing threat of infectious diseases among amphibians and reptiles worldwide, anyone engaged in educational, recreational, commercial, or professional activities in wetlands and aquatic habitats can play an important role in helping prevent the spread of pathogens by employinng basic disinfecting procedures to prevent pathogen spread.

Before Leaving for the Field Multiple chemicals are effective for inactivating Bd, Bsal and most RVs including Virkon Aquatic ®, bleach and ethanol [6-13] (see page 2 for detailed comparisons). To ensure maximum efficacy, prepare fresh only as much solution as you will need for that day's activity (e.g., sampling event, wetland survey, or fishing trip).

Suggested equipment:

- Brushes for scrubbing and removing mud and vegetation from equipment.
- Hand sanitizers and antiseptic alcohol wipes.
- Handheld bottles and/or pump sprayers for applying disinfectant and water.
- Clean rinse water.



- Powderless, nitrile gloves for handling animals. These should be discarded between animals.
- Small plastic bags. Avoiding direct contact with animals minimizes pathogen transfer and stress.
- Different sets of equipment for each site if disinfecting between sites is not possible.
- Trash bags.

Quick Reference

Virkon Aquatic	Bleach	Ethanol
1% solution	1.6% solution	70% solution
recommended for large equipment and gear	*recommended for large equipment and gear*	*recommended for delicate equipment*

Read table for addition details and instructions

Instructions for Large Machinery Brush and scrub off mud (bio-degradable soap optional), disinfect with Virkon or bleach and rinse all exterior surfaces of boats, canoes, vehicles or trailers and their tires. See Julian *et al.* 2020[14] for more details on heavy equipment disinfection.

After Sampling & Before Moving to Another Site

1. Brush off mud and vegetation from field equipment (e.g., nets, buckets, boots). Soil or mud reduces effectiveness of the disinfection process.
2. Generously spray or immerse all items in disinfection solution.
   - Disinfectants are highly toxic to aquatic organisms; apply disinfectants at least 50 m (150 ft) from any natural water source.
   - NEPARC suggests 5 minutes of contact time in field situations, which is sufficient time for all 3 recommended disinfectants (table).
3. Rinse treated items well with water to minimize damage to equipment and to prevent exposing the next location to residual disinfectant (see pg. 2).
4. Use alcohol wipes or ethanol to disinfect calipers, measuring boards, and other sensitive equipment that was in contact with water or animals.

Scrub and Rinse

Disinfect

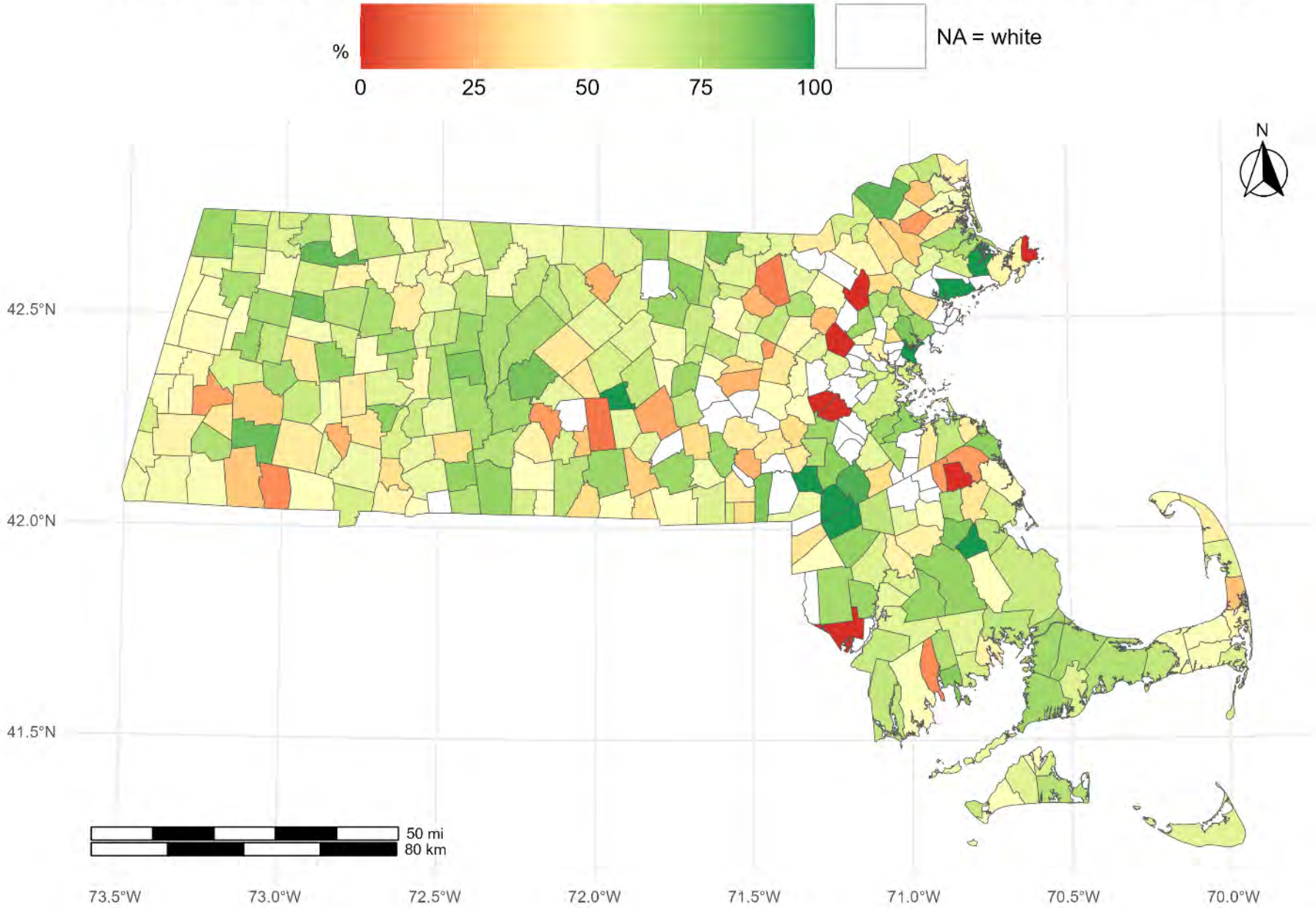
Rinse

End of the Day After returning from the field, all equipment should be washed and thoroughly disinfected. Set up two buckets or large tubs: one with water and one with disinfection solution.

- Brush or scrub off any soil or vegetation and rinse with water.
- Immerse in disinfectant and leave for 5 minutes of contact time.
- Rinse thoroughly with water.
- Hang equipment and gear, and allow them to air dry completely.

NEPARC Publication 2022- 02

Richness (Counts) of Rare Species Reported - Last 10 years/25 Years



BIOLOGICAL CRITERIA		PHYSICAL CRITERIA	
Obligate Species Accepted - one or more of the following	**Breeding Evidence Accepted** - one or more of the following from at least one obligate species must be documented by photos, video, or audio (chorusing)	**Physical Features Accepted**	**Physical Evidence Accepted**
Wood frog *(Lithobates sylvaticus)* **Spotted salamander** *(Ambystoma maculatum)* **Blue-spotted salamander** * *(A. laterale)* **Jefferson salamander** * *(A. jeffersonianum)* **Marbled salamander** * *(A. opacum)*	**Adult wood frogs -** • Full chorus (calls constant, continuous, & overlapping) - map location of chorus (pool) and site where recording was taken; **OR** • 5+ mated pairs **OR** **Adult salamanders -** • Congressing **OR** • Spermatophores **OR** • Marbled salamander attending a nest **OR** **Egg masses -** • TOTAL of 5 egg masses - any combination, regardless of species **OR** • 1 egg mass of a MESA-listed salamander or nest and eggs of marbled salamander **OR** **Larvae -** • Any number of larvae **OR** **Transforming juveniles -** • Still in pool with tail and/or gill remnants.	Pool with no permanently flowing outlet.	Good quality photos or video of the entire pool holding water including any inlets or outlets (e.g., any streams, culverts, etc). *See 'Tips for Photographing Evidence Required for Vernal Pool Certification'.*
Fairy shrimp *(Anostraca: Eubranchipus)*	Photo or video of adult specimen(s).	Same as above.	Same as above.

BIOLOGICAL CRITERIA		PHYSICAL CRITERIA	
Facultative Species Accepted - two or more of the following	**Breeding Evidence Accepted -** one or more of the following from at least two facultative species must be documented by photos, video, or audio (chorusing)	**Physical Features Accepted**	**Physical Evidence Accepted**
Spring peeper *(Pseudacris crucifer)* **Gray treefrog** *(Hyla versicolor)* **American toad** *(Anaxyrus americanus)* **Fowler's toad** *(Anaxyrus fowleri)*	**Adults –** • Full chorus (calls constant, continuous, & overlapping) - map location of chorus (pool) and site where recording was taken; **OR** • 5+ mated pairs **OR** **Egg masses –** • Any number of egg masses **OR** **Larvae –** • Any number of larvae **OR** **Transforming juveniles –** • Still in pool with tail remnants.	Pool with no permanently flowing outlet. **AND** Evidence that there is no established, reproducing fish population.	Good quality photos or video of the entire pool holding water including any inlets or outlets (e.g., any streams, culverts, etc.). **AND** Good quality photos or video of the entire pool dry. *See 'Tips for Photographing Evidence Required for Vernal Pool Certification'.*

CBI Guidance – Prioritizing Pools

Prioritizing: Which specific pools to target?

1. PVPs not already certified

2. Small size