Addendum

Rhode Island Freshwater Wetlands Monitoring and Assessment Program

Mapping and Verification of Vernal Pools, Pilot 2
March 15, 2024

Addendum to update the
Quality Assurance Project Plan (QAPP) for
Mapping and Verification of Vernal Pools
Dated: December 14, 2022
Approved: December 20, 2022

Rhode Island Department of Environmental Management (RI DEM)
Office of Water Resources

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Introduction:

This Addendum provides details for collecting new vernal-pool verification data using methods and quality-assurance procedures detailed in an existing approved QAPP titled *Mapping and Verification of Vernal Pools*, dated December 14, 2022; hereafter, the 2022 VP Verification QAPP (RIDEM 2022). This pilot project (hereafter, the Project) is an extension of a prior effort to test mapping and verification methods at Rhode Island vernal pools in 2022 (Kutcher and Parent 2023). This Addendum covers the new mapping locations, the task schedule, and minor refinements made to the field form to clarify certain elements of data collection; all other aspects of the Project conform to the original 2022 VP Verification QAPP. Only sections that are relevant to this second pilot Project are detailed below.

1.2 Table of Contents

1.5 Problem Definition/Background (EPA QA/R-5 A5)

The DEM Office of Water Resources has been working with state and local partners to develop methods to characterize freshwater wetlands and inform the goals and objectives of the Rhode Island Freshwater Wetland Monitoring and Assessment Plan (WMAP; NEIWPCC and DEM 2006) with support and guidance from the United States Environmental Protection Agency (U.S. EPA 2006). Vernal Pools are listed in the WMAP as among wetlands that are vulnerable to loss and degradation and have been recognized in Rhode Island as wetlands of high ecological value (Leeson et al. 2018). Vernal pools are seasonal ponds that support certain obligate amphibians and invertebrates, and they are afforded specific protections under new state wetland rules (250-RICR-150-15-3) that took effect on July 1, 2022. DEM has identified statewide mapping and verification of vernal pools as a priority for wetland program development and contracted with the Rhode Island Natural History Survey (RINHS) which assembled a team of mapping and vernal-pool experts (hereafter the *VP Team*) to recommend mapping and verification methods.

In Spring of 2022, RINHS worked with DEM and Dr. Jason Parent (URI, Parent Lab) to map potential vernal pools (PVPs) remotely, using a geographic information system (GIS). The mapping included (1) the visual interpretation of multiple years of two-dimensional leaf-off aerial photographic imagery (photointerpretation or PI), and (2) the development and application of a model based on light-detecting aerial radar (LiDAR) to detect small wetland depressions in the landscape. The effort also tested vernal pool verification field methods that were previously

developed and applied in an earlier project (DEM 2011) and are detailed in the 2022 VP Verification QAPP.

The mapping errors for the volunteer photointerpretation were similar to results reported from other studies in the region, whereas mapping errors for the LiDAR model were somewhat higher. Based on the combined results from the 2022 pilot, the VP Team advised DEM that neither method, as tested, was ideal for statewide implementation, because photointerpretation was not efficient enough and LiDAR accuracy was less than desirable. The VP Team suggested that mapping efficiency and accuracy could be significantly improved by using a revised strategy. Data collection detailed in this Addendum will support the assessment of a revised *hybrid* approach for statewide PVP mapping that includes LiDAR modeling followed by targeted photointerpretation of LiDAR-generated features. It will also provide the locations and characteristics of vernal pools for areas of Rhode Island that have not been previously mapped.

1.6 Project/Task Description and Schedule (EPA QA/R-5 A6)

This Project will test the accuracy of the hybrid PVP mapping approach by field-verifying the resulting PVPs using methods and quality assurance procedures detailed in the 2022 VP Verification QAPP. The hybrid mapping data will be produced by the University of Rhode Island Environmental Data Center (URI EDC) under a separate approved QAPP titled *Mapping of Potential Vernal Pools in Rhode Island Using a LiDAR Model and Photointerpretation, Pilot 2* dated January 19, 2024; hereafter, the 2024 PVP Mapping QAPP (RIDEM 2024). Verification data collected in this Project will be applied to analyses that will assess the errors of commission (features mapped that are not vernal pools) and errors of omission (actual vernal pools missed by mapping) for the hybrid mapping approach.

Task 1. The Wetland Scientist and a field assistant will visit PVP locations in the field during March, April, and early May of 2024, times when vernal-pool-dependent amphibians are breeding and their egg masses are typically visible during a single site inspection. Upon locating each PVP, the Wetland Scientist will inspect the feature for biological and physical vernal pool indicators as outlined in the revised field form and instructions (Appendix A-1). Data will be handled and quality assured according to the 2022 VP Verification QAPP.

The Field Data Sheet and instructions were revised according to recommendations of prior work (Kutcher and Parent 2023), as follows:

- Section 1
  - Changed *aquatic feature present* to *aquatic depression present* (i.e., pool present) to allow the surveyor to disqualify linear water features from consideration as vernal pools in the field.

- Distinguished in the instructions that the aquatic depression must be flooded during the wet phase (i.e., March through June) to run the wet-phase survey.

- Section 2
  - Updated terminology from "other indicators observed" to "other amphibian species observed" for consistency with the wetland rules.
- Section 3
  - Added class settings to differentiate pools (in the field) as (1) *Isolated in upland,* (2) *Within larger wetland,* for (3) *Partly within larger wetland.* Modified Sec. 3 *other feature characteristics*, as needed to avoid redundancy.
- Section 4
  - Defined pool bottom mucky versus firm in guidance
  - Removed perimeter measurement; measuring this metric in the field was found to be problematic.
- Section 5
  - Set a default for *Distance to nearest…* to >300 feet

Task 2. Vernal pool verification data collected for this Project will be analyzed against the hybrid PVP mapping data to determine mapping errors for that mapping project. This task will be conducted under the 2024 PVP Mapping QAPP with the technical assistance of the Wetland Scientist. The analyses will provide DEM managers and the VP Team information on the efficiency and effectiveness of the hybrid mapping approach and its suitability for statewide PVP mapping.

2.1 Experimental Design (EPA QA/R-5 B1)

Study Site

Vernal pool verifications subject to this Addendum will be piloted on state management areas within the Rhode Island portions of the Upper Five-mile and Clear River watersheds in northwestern Rhode Island, and may be expanded to properties within the Chepachet River and Branch River watersheds, if time allows (Fig. 1).

PVP verification surveys will follow methods and quality assurance procedures detailed in the 2022 VP Verification QAPP with classification adjustments made to reflect the changes outlined in Sec 1.6, Task 1 and Appendix A.

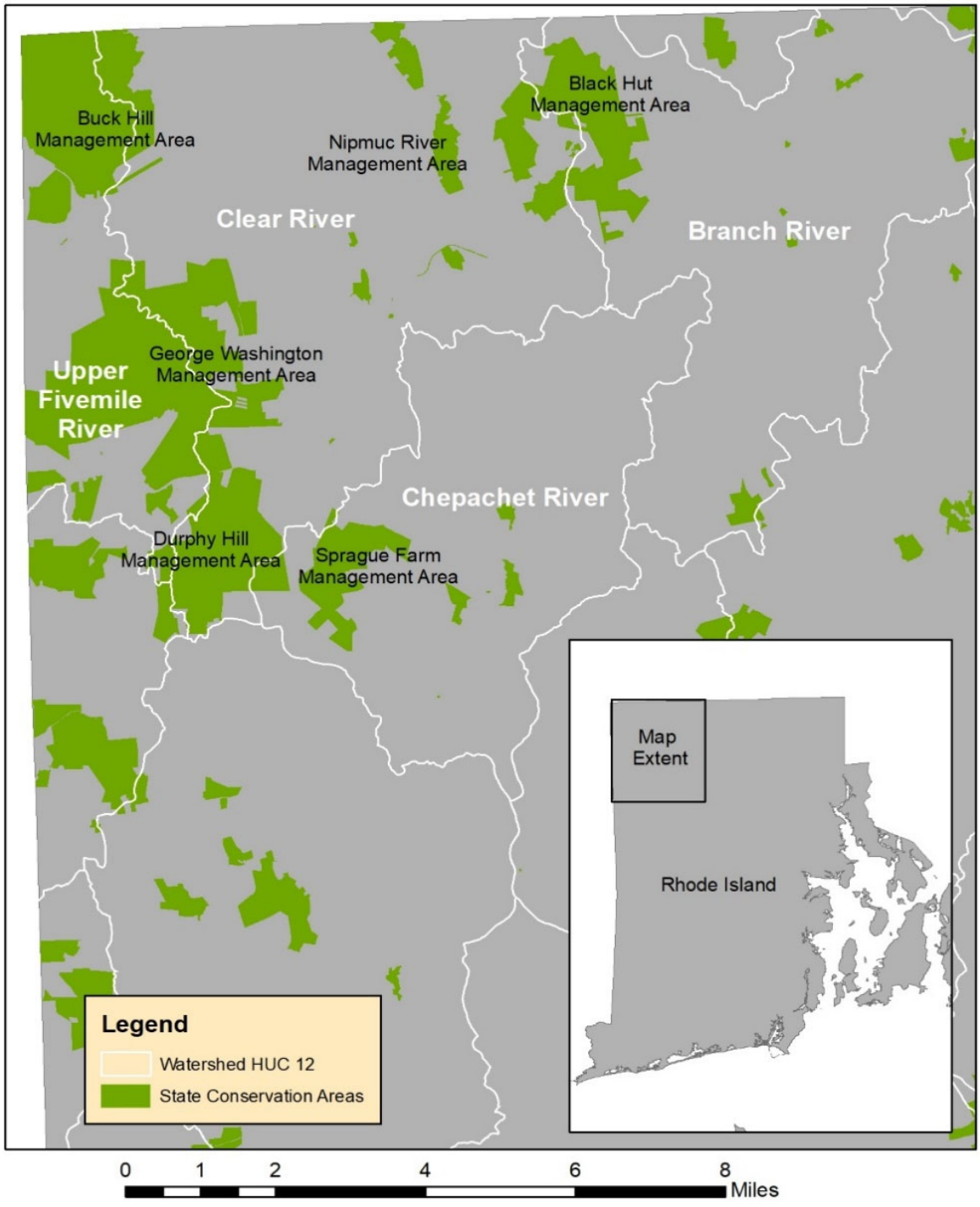

Figure 1. State management areas within which mapped PVPs will be surveyed for this Project. Areas within the Upper Fivemile River and Clear River watersheds are primary survey areas. Areas within the Chepachet River and Branch River watersheds will be surveyed if time allows. Areas within unlabeled watersheds will not be surveyed as part of this project.

2.5 Quality Control Requirements (EPA QA/R-5 B5)

Quality control conforms to the 2022 VP Verification QAPP.

2.9 Data Acquisition Requirements (Non-Direct Measurements) (EPA QA/R-5 B9)

Geospatial data from RIGIS (available: www.rigis.org) was used for site selection and will be used to locate PVPs produced under the 2024 PVP Mapping QAPP. RIGIS data represent the best landscape data currently available for Rhode Island, meet FGDC mapping standards, and are widely utilized by State, Federal, and local scientists conducting geospatial analysis in the State of RI.

Literature Cited

Kutcher, T.E. and Parent, J., 2023. Testing Vernal Pool Mapping and Verification Methods in Rhode Island, Draft 2. Prepared for the Rhode Island Department of Environmental Management, Providence, RI. 32pp plus appendices.

RIDEM 2022. Rhode Island Freshwater Wetlands Monitoring and Assessment Program: Mapping and Verification of Vernal Pools, Quality Assurance Project Plan. Prepared for the US Environmental Protection Agency, Region 1. 18pp plus appendices.

RIDEM 2024. Rhode Island Freshwater Wetlands Monitoring and Assessment Program: Mapping of Potential Vernal Pools in Rhode Island Using a LiDAR Model and Photointerpretation, Pilot 2, Quality Assurance Project Plan for Secondary Data. Prepared for the US Environmental Protection Agency, Region 1. 15pp plus appendices.

Appendix A

Revised Field Data Sheet Vernal Pool Information 2024

DATA	VERNAL POOL INFORMATION	Site ID:	Date: (mm/dd/yyyy)

1. GENERAL REQUIRED

Feature Location (decimal degrees)	Observer Contact Information	AQUATIC DEPRESSION PRESENT?
Latitude:	Name:	☐ YES Complete entire form
Longitude:	Email:	☐ NO Complete Section 1 only
Area	**PVP Source**	**Other Feature Type**
Watershed:	☐ Mapped feature	☐ Natural feature
Town:	☐ Feature found in the field	☐ Developed feature
Landowner:	Project:	Describe:
Property:		

WEATHER CONDITIONS				
Days since last rain or snow event:	☐ Sunny	☐ Rain Light	☐ Snow Light	☐ Other:
	☐ Partly Cloudy	☐ Rain Intermittent	☐ Snow Intermittent	
	☐ Cloudy	☐ Rain Heavy	☐ Snow Heavy	

2. BIOLOGICAL INDICATORS

REQUIRED

EGG MASSES OBSERVED ☐ Yes ☐ No

EGG MASS COUNT

	Number Observed	Estimated	Counted
☐ Wood Frog		☐	☐
☐ Spotted Salamander		☐	☐
☐ Other:		☐	☐

FAIRY SHRIMP OBSERVED ☐ Yes ☐ No

AMPHIBIANS OBSERVED ☐ Yes ☐ No

	Adult	Juvenile		Adult	Juvenile
Wood Frog			**Spotted Salamander**		
Eastern Spadefoot Toad**			**Marbled Salamander**		

Other Amphibian Species Observed:					
	Spring Peeper			American Toad	
	Gray Tree-Frog			Fowlers Toad	
	Green Frog			Four Toed Salamander	
	American Bullfrog			Red-Spotted Newt	
	Northern Leopard Frog			*Unidentified Frog/Toad	
	Pickerel Frog			*Unidentified Salamander	

Tadpoles less than 2" long ☐ Yes ☐ No

Other Vernal Pool Species Observed:

☐ Turtles	☐ Amphibious Snails	☐ Dragonfly nymph	☐ Predaceous diving beetle
☐ Snakes	☐ Fingernail Clams	☐ Damselfly nymph	☐ Whirlagig beetle
☐ Leeches	☐ Caddisfly Larvae	☐ Water scorpion	☐ Other:

**Presence of Eastern Spadefoot Toad may require further verification of wetland hydrology

3. FEATURE CHARACTERISTICS

REQUIRED

ORIGIN ☐ Natural ☐ Human-made Naturalized* ☐ Human-made NOT Naturalized

SETTING ☐ **Isolated in upland** ☐ **Within larger wetland** ☐ **Partly within larger wetland**

WETLAND TYPES

☐ Open Pool	☐ Marsh	
☐ Shrub Swamp	☐ Forested Swamp	
☐ Bog	☐ Other:	

H-M TYPE

☐ Stormwater Ditch	☐ Lined or Ornamental Pool
☐ Stormwater Pond	☐ Quarry
☐ Farm Pond	☐ Other:

FEATURE CHARACTERISTICS

Yes	No	
☐	☐	Distinct open basin present?
☐	☐	Surface water present?**
☐	☐	Dominated by mounds or tussocks?
☐	☐	Dead Trees present?
☐	☐	Sphagnum present?

HYDROPERIOD INDICATORS

Yes	No	
☐	☐	Fish presence observed
☐	☐	Fish presence known
☐	☐	Permanently flooded vegetation observed***
☐	☐	Directly connected to permanent water body
☐	☐	Permanently flooded hydrology known

☐ **None Apply, Likely Seasonal**

*Contains hydrophytic vegetation **During breeding season ***Nuphar variegata, Potamogeton natans*

DATA | **VERNAL POOL INFORMATION** | Site ID: | Date: (mm/dd/yyyy)

4. POOL CHARACTERISTICS

REQUIRED **POOL BOTTOM:** ☐ Firm ☐ Mucky

Dominant Substrate (select 1 (or 2*)): ☐ Peat ☐ Gravel ☐ Bedrock ☐ Mud ☐ Cobbles ☐ *Leaf Litter ☐ Sand ☐ Other: ____

WATER LEVEL: ☐ Full ☐ Dry ☐ More than 50% ☐ Less than 50%

WATER QUALITY: ☐ Clear ☐ Tea-Colored ☐ Oily ☐ Algae Green ☐ Other: ____

CANOPY COVER:

Vegetation In Pool:	None	1-10%	10-30%	30-60%	> 60%
Tree Stems	☐	☐	☐	☐	☐
Shrubs	☐	☐	☐	☐	☐
Emergent	☐	☐	☐	☐	☐
Floating	☐	☐	☐	☐	☐

INLET OR OUTLET PRESENT

	Yes	No
Inlet	☐	☐
Outlet	☐	☐

Is Water Flowing?

Inlet	☐	☐
Outlet	☐	☐

POOL DIMENSIONS

		Measure	Estimate
Depth	ft.	☐	☐
Width	ft.	☐	☐
Length	ft.	☐	☐

5. LANDSCAPE CHARACTERISTICS

REQUIRED **SURROUNDING HABITAT** (check all within 300 feet)

☐ Forested Wetland	☐ Forested Upland	☐ Field/Grassland
☐ Open Wetland	☐ Deciduous	☐ Deciduous	☐ Residential
☐ Emergent	☐ Coniferous	☐ Coniferous	☐ Commercial
☐ Scrub-Shrub	☐ Mixed	☐ Mixed	☐ Highway/Road

Distance to Nearest:

		Estimated	Measured
Road	ft.	☐	☐
Building	ft.	☐	☐
Mowed or Landscaped Feature	ft.	☐	☐

Road Type Nearby: ☐ 4-Lane Paved ☐ 2-Lane Paved ☐ Dirt Road

6. HUMAN ACTIVITY AND STRESSORS

SUPPLEMENTARY — *Check all stressors types/subtypes observed: Indicate proximity to pool where appropriate*

HYDROLOGY INFLUENCES

- ☐ **Storm Drainage System**
  - ☐ In pool
  - ☐ Near Pool
- ☐ **Partial/Complete Drainage**
  - ☐ Ditching in pool
  - ☐ Ditching near pool
- ☐ **NONE PRESENT**
- ☐ **Sedimentation**
  - ☐ Siltation in Pool
  - ☐ Sand/Gravel in Pool
  - ☐ Sand/Gravel near Pool
- ☐ **Filling** ☐ In pool ☐ Near Pool
- ☐ **Riprap** ☐ In pool ☐ Near Pool
- ☐ **Impoundment**
  - ☐ Culvert restricted/blocked
  - ☐ Dam (Human-Constructed)
  - ☐ Dam (Beaver-Constructed)
- ☐ **Stream Channelization**
- ☐ **Excavation (removal of soil)**
- ☐ **Other** ____

PLANT COMMUNITY STRESSORS

- ☐ **Invasives Present**
  - ☐ Phragmites
  - ☐ Purple Loosestrife
  - ☐ Other: ____
- ☐ **NONE PRESENT**
- ☐ **Vegetation Removal**

	In Pool	Near Pool
Cutting	☐	☐
Mowing	☐	☐
Burning	☐	☐
Grazing	☐	☐
Logging	☐	☐
Stumping	☐	☐

- ☐ **Other:** ____

HABITAT STRESSORS

- ☐ **Dumping**
  - ☐ Old Tires
  - ☐ Tree Stumps
  - ☐ Cans/Bottles
  - ☐ Trash
  - ☐ Yard Waste
  - ☐ Demolition Debris
  - ☐ Abandoned Vehicles
  - ☐ Discarded Appliances
  - ☐ Other: ____
- ☐ **NONE PRESENT**
- ☐ **Audiovisual Disturbance**

	Visible From Pool		Audible From Pool		
	Yes	No	Yes	No	N/A
Roads	☐	☐	☐	☐	☐
Trails	☐	☐	☐	☐	☐
Railroad	☐	☐	☐	☐	☐
Residence(s)	☐	☐	☐	☐	☐
Commercial/ Industrial Feature	☐	☐	☐	☐	☐

Appendix B. Instructions for Filling Out the Field Data Sheet (2024)

Site ID and **Date** on which the site visit occurred should be filled out on the top of both pages of the data sheet and any supplementary notes pages. Site ID will be provided in advance.

⇨ If an unmapped feature is assessed use NEW as the Site ID. The field data sheet is divided into six sections. Each section is marked either **REQUIRED** (sections 1 through 5) or **SUPPLEMENTARY** (section 6).

⇨ **REQUIRED** sections must be filled out completely.

⇨ **SUPPLEMENTARY** sections should be completed as time allows.

> **IMPORTANT**: Pay extra attention to the fields in the shaded boxes as they are **KEY ASSESSMENT DATA**. Feature status cannot be determined based on any individual field, and the **KEY ASSESSMENT DATA** fields must **ALL** be completed in order to determine whether the feature is a vernal pool.

Section 1: General - REQUIRED

- The boxes labeled **Observer Contact Information, Town,** and **Landowner** can be filled out in advance of the arrival at the site. Leave the **Landowner** field blank if unknown.

> **Please make sure to fill out the contact information field so that we can contact you if we need clarification about data recorded.**

- **LOCATION OF FEATURE**: Record the **Latitude** and **Longitude** of the feature in **decimal degrees**. Ideally the GPS position will be recorded at the center of the feature, but this may not be practical in all circumstances.
- **AQUATIC DEPRESSION PRESENT**: The purpose of this section is to confirm that there is a feature to be assessed and if not, to confirm the reason why the assessment was not completed.

⇨ If upon arrival at the site, there is no feature to be assessed, (e.g. the surface has been paved over, a shadow was mistaken for a pool, etc.), check **NO AQUATIC DEPRESSION PRESENT**. Indicate what kind of feature is present by checking **Natural Feature, Developed Feature**, or **Other** (fill-in).
STOP. There is no need to complete the remainder of the form.

⇨ In most cases, there will be a feature to assess. Check **YES** to **AQUATIC DEPRESSION PRESENT** and continue to complete the entire form. During drought years, other wetland indicators may be needed to establish the presence of an aquatic depression.

- **Weather Conditions**: Choose the box which best describes the current conditions at the time of the site visit. **NOTE: Assessments conducted in rain or snow conditions are discouraged, due to limited visibility of egg masses within the pool.**

Section 2: Observed Biological Indicators- REQUIRED

KEY ASSESSMENT INFORMATION: All four shaded boxes in this section (**Egg Masses Observed, Amphibians Observed, Tadpoles less than 2" long,** and **Fairy Shrimp**) MUST be checked **YES** or **NO**.

- **EGG MASSES OBSERVED**: Thoroughly examine the entire feature for amphibian egg masses. Be sure to check in and around any potential attachment sites (dead branches lying in the pool). Make sure to carefully wade in as deep as possible to check for egg masses located away from the pool edge.

⇨ If no egg masses are observed, check **NO** in the **Egg Masses Observed** box and continue to the next section.

⇨ **Egg Masses Observed**: If any egg masses are present, check the box labeled **Yes** and indicate whether the egg masses observed are **Wood Frog** eggs, **Spotted Salamander** Eggs, or check **Other** and fill in the box to indicate another amphibian species.

⇨ If the species cannot be identified, check **Other** and write "*Unknown*". Please include a picture if possible.

⇨ Record the number of egg masses observed separately for each species in the box labeled **How Many?** Indicate if the number of egg masses recorded is **Estimated** or **Counted**.

- **AMPHIBIANS OBSERVED**: The presence of any adult or juvenile (including tadpoles or salamander larvae) should be recorded. Indicate if any amphibians were observed by checking **YES** or **NO** even if the species cannot be identified.

⇨ If the species can be identified, check the box(es) labeled **Adult** or **Juvenile** next to the corresponding species.

⇨ If uncertain or unable to identify the species, use the boxes for ***Unidentified Frog/Toad*** and ***Unidentified Salamander***.

⇨ NOTE: Audible amphibian calls should be recorded as observations of adult amphibians.

⇨ **TADPOLES LESS THAN 2" LONG**: If there are tadpoles present, note their size and indicate whether any are less than two inches long by checking **YES**. If none are smaller than two inches, check the box labeled **NO**.

- **FAIRY SHRIMP OBSERVED:** Use a dip net (if available) to look for fairy shrimp in the pool. Record the presence of any Fairy Shrimp by checking **YES** or **NO** in the Fairy Shrimp box.
- **OTHER VERNAL POOL SPECIES OBSERVED**: Check the appropriate box(es) for any other vernal pool species observed.

⇨ The species listed are known to utilize vernal pools, however this list is not inclusive. If another species associated with vernal pools is observed, check the box marked **OTHER** and fill in the *Species Name*.

⇨ If the species cannot be identified, check **Other** and write "*Unknown*". Please include a picture if possible.

Section 3: Feature Characteristics – Required

KEY ASSESSMENT INFORMATION: There are four key assessment fields in this section: **Origin, Setting, Wetland Type, and Human-Made Type.**

- **ORIGIN**: Record the origin of the feature being assessed. Most of the features being assessed will be naturally occurring, however some features may have been the result of human actions. Features that were originally the result of human activity may have become naturalized over time (development of hydrophytic vegetation.

⇨ Any feature containing hydrophytic vegetation should be recorded as either **Natural** or **Human-Made Naturalized**.

⇨ If the feature does not contain hydrophytic vegetation it should be recorded as **Natural** or **Human-Made NOT Naturalized**.

⇨ If uncertain about the origin, check the box labeled **Natural**.

- **SETTING**: An isolated vernal pool is one that is the dominant feature in an upland setting, that may be fringed by a generally smaller area of vegetated wetland. It is not connected to rivers or streams or other surface waters.
- **WETLAND TYPE OR HUMAN-MADE TYPE:** Select the option which best describes the type of feature being assessed. Check one box only.

⇨ Choices for features with a natural origin are: **Bog, Marsh, Shrub Swamp, Forested Swamp** and **Depression in Upland**.

⇨ Choices for features with a human-made origin are: **Stormwater Ditch, Stormwater Pond, Farm Pond, Lined or Ornamental Pool,** and **Quarry**.

⇨ If the feature type is not listed, check **Other** and fill in *Feature Type Description*. Please include a picture if possible.

- **HYDROPERIOD INDICATORS:** Carefully read through the list of hydroperiod indicators and select **YES** or **NO** for each one.

⇨ If none of the listed indicators apply, check the box for **None apply, likely seasonal**

- **Other Feature Characteristics**: Carefully read through the list and select YES or NO for each one.

Section 4: Pool Characteristics – REQUIRED

KEY ASSESSMENT INFORMATION: There are six key assessment fields in this section: **Pool Bottom, Water Level, Water Quality, Canopy Cover, Inlet or Outlet Present and Pool Dimensions**

- **POOL BOTTOM:** When wading into the pool, pay attention to the substrate beneath your feet. Record whether the bottom is **Firm** or **Mucky** (your feet sink in and movement is challenging).
  - ⇨ Indicate whether the **Dominant Pool Substrate** is **Peat, Mud, Sand, Gravel, Cobbles, Bedrock, Leaf Litter**, or **Other.**
  - **Water Level**: Look for evidence of the maximum line of flooding (e.g. staining on tree trunks surrounding the pool) and indicate whether the current water level is **Full**, **More than 50%** full, **Less than 50%** full, or **Dry.**
  - **Water Quality:** Check the box that best describes the color and clarity of any surface water in the pool (**Clear, Oily, Tea-Colored, Algae Green** or **Other**).
  - ⇨ If none of the descriptors listed are appropriate, check the box marked **Other** and fill in a description.
  - ⇨ If there is no surface water present, check **Other** and write in "*Dry Pool*".
- **CANOPY COVER:** Use the cover classes to estimate the percent canopy cover over the pool. If spring leaf-out has not yet occurred, make an estimate based on live tree branches which over hang the pool. Cover classes available are: **None, 1 to 10%, 10 to 30%, 30 to 60%**, and **Greater than 60%.**
  - ⇨ If the canopy appears to cover approximate half the pool area check the **30-60%** box.
- **Vegetation in Pool**: Estimate percent cover of living **Tree Stems, Shrubs, Emergent** and **Floating Vegetation** rooted in the pool if possible according to the given cover classes.
  - ⇨ Shrub cover includes the entire shrub, not just the stem.
- **INLET OR OUTLET PRESENT.** Please indicate whether there is evidence of an **Inlet** to or an **Outlet** from the pool. Early spring is the wettest time of the year so any channel running to or from the pool is likely to have water in it at this time of year if ever. Please check whether either the inlet or outlet currently has **Water Flowing** in it, by checking the box marked yes or no.
- **POOL DIMENSIONS.** If time allows, measurements may be taken for feature Depth, Width, and Length. Please indicate whether dimensions entered are measured (such as by tape or pacing) or estimated. When measuring depth, be aware that pools may be very deep in early spring and care should be taken when wading into the pool.

Section 5: Landscape Characteristics – REQUIRED

- **Surrounding Habitat**: Indicate the habitat types surrounding and within 300 feet of the pool by checking all boxes which apply: Open Wetland, Forested Wetland, Forested Upland, Field/Grassland, Residential, Commercial, and/or Highway/Road.

⇨ If the type of forested wetland (deciduous, coniferous, or mixed), open wetland (emergent or scrub-shrub), or forested upland (deciduous, coniferous, or mixed) can be identified, please check the appropriate subcategory box(es).

- Distance to Nearest: Where appropriate, estimate or measure the distances to the nearest Road, Building or Mowed or Landscaped Feature. Do not approach any building or lawn for which you do not have access permission.

⇨ Complete the checkbox for **Road Type Nearby**: 4-Lane Paved; 2-Lane Paved; or Dirt.

Section 6: Human Activity and Stressors – Supplementary Information

> **IMPORTANT:** Section 6 is considered supplementary information and should be completed as time allows, but is not critical for confirmation of the feature's status.

- **Please check all stressor types and subtypes observed. Be sure to indicate whether the stressor was observed in OR near the pool where appropriate.**

Hydrologic Influences

- **Hydrologic Influences**: If any hydrologic influences or evidence of hydrologic influences in observed check the applicable box(es). Check the applicable boxes indicating the presence of any of the following hydrology influences: Storm Drainage Systems, Partial/Complete Drainage, Sedimentation, Filling, Rip-Rap, Impoundment, Stream Channelization, and /or Excavation. Where appropriate, check the descriptive subtypes and information about location of the stressor. If uncertain about the subtypes, these boxes can be left blank.

⇨ **Storm Drainage System, Partial/Complete Drainage, Sedimentation, Filling** and/or **Rip-Rap**: Record the location of the activity by checking the box for **In Pool** and/or **Near Pool**.

⇨ **Sedimentation**: Indicate if **Siltation** and/or **Sand/Gravel** deposit are present.

⇨ **Impoundment**: Indicate whether there is a **Blocked/Restricted Culvert** and/or a dam (distinguish between a **Human-Constructed Dam** or a **Beaver-Constructed Dam**). present.

- If any other evidence of hydrologic manipulation is observed, check the box labeled **Other** and fill in a *description of the hydrologic influence* observed.
- If hydrologic influences or evidence of manipulation is not observed check the box labeled **NONE PRESENT.**

Plant Community Stressors

- **Plant Community Stressors**: The most common plant community stressors are invasive species and removal of vegetation. If either of those are observed in the vicinity of the pool check the appropriate box. If unfamiliar with invasive plant species, do not fill out the section on Invasive species.
- **Invasives Present**: If any invasive plant species are observed, check the box.
  - ⇨ If the species present is **Phragmites** and/or **Purple Loosestrife**, check the corresponding box(es).
  - ⇨ If another species is present, check the third box and fill in the ***Species Name***. If uncertain of the species name, write in *"Unidentified."*
  - ⇨ NOTE: Please include a picture of any invasive species recorded that is not Phragmites or Purple Loosestrife.
- **Vegetation Removal**: If there is evidence that **Vegetation Removal** has occurred recently, check the box.
  - ⇨ Check all applicable additional boxes to record the method and location of the removal activity. While it is unusual for vegetation removal to be occurring within the feature itself, if observed check the box labeled **In Pool**. Otherwise check the box labeled **Near Pool** for the appropriate removal activity (**Cutting, Mowing, Burning, Grazing, Logging**, and/or **Stumping**).
- If any other evidence of plant community stressors is observed, check the box labeled **Other** and fill in a *description of the plant stressor* observed.
- If plant community stressors are not observed check the box labeled **NONE PRESENT**.

Habitat Stressors

- Dumping: Record any observations of dumping and check all appropriate boxes to describe the type found near the feature.
  - ⇨ Fill in the box for any other dumping observed and describe the type.
- Audiovisual Disturbances: Indicate if any of the listed developed features can be seen or heard from the pool. This is not a measure of proximity, but considers other variables such as vegetation density as a sound or visual barrier between the pool and the feature.
- Check the applicable boxes if other Audiovisual habitat stressors are nearby (**Roads, Trails, Railroads, Residences, and/or Commercial or Industrial Feature**). If these disturbances are close enough to be visible or audible from the pool feature, check the appropriate box.

List of Photos – Optional Information

- If you have taken any photos for documentation, a chronological list must be included.
  - For each photo, indicate the time, location if possible and subject matter. Be as specific/detailed as appropriate.
- Refer to the tip sheet for tips on photographing amphibians.
- Refer to the following information for DEM protocol for photography. Instructions on providing digital copies will be provided along with your site assignments.

Instructions for Photographs (DEM Standard Operating Procedure)

5.1. CAMERA AND FIELD NOTES

5.1.1. Verify that the date and time on the camera is accurate.

5.1.2. Activate the visible date and time option such that the recorded image will be imprinted with the date and time of the photo.

5.1.3. Select appropriate resolution quality. The higher the resolution the fewer the images that can be recorded for a given media.

5.1.4. Descriptive documentation should be recorded in sequentially numbered field notes immediately after the images are collected for specific photograph detail recall.

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