



**AMPHIBIAN RESEARCH AND MONITORING INITIATIVE**  
**Northeast Region**

**VERNAL POOL AMPHIBIAN MONITORING PROTOCOL 2004**  
**Adaptive Cluster Sampling Approach**

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**INTRODUCTION**

The status and trends of populations of vernal pool-associated amphibians in the northeastern United States is poorly understood at the landscape scale. To date, there is no coherent integration of a probabilistic statistical method to provide inference on the status of populations of wood frogs and spotted salamanders. Although research conducted from 2001-2003 at four National Parks and 14 National Wildlife Refuges in the northeastern United States provided information on wood frog and spotted salamander population sizes at a small number of pools, data on the occupancy of available breeding habitat at Park- and Refuge-wide scales needs to be evaluated. Here, we apply a proportion of area occupied (PAO) approach with a modeling framework (PRESENCE, MacKenzie *et al.* 2002) to estimate the amphibian occupancy of vernal pool habitat at seven National Parks (Acadia National Park, Cape Cod National Seashore, Chesapeake and Ohio Canal National Historical Park, Delaware Water Gap National Recreation Area, Gettysburg National Historical Park, Rock Creek National Park, Shenandoah National Park), 10 National Wildlife Refuges (Canaan Valley, Eastern Massachusetts, Erie, Great Swamp, Iroquois, Lake Umbagog, Moosehorn, Patuxent, Rachel Carson, Wallkill River), and one State Park (Canaan Valley State Park) in the northeastern United States. We will evaluate the relationship of pool occupancy to habitat covariates and provide data that will be useful in managing vernal pool habitats for the conservation of amphibians in these Parks and Refuges. In addition, these data will be incorporated into the PAO dataset within the USGS Amphibian Research and Monitoring Initiative (ARMI), a national monitoring program to assess the status of amphibian populations across the United States.

Specifically, the research collected following the protocol described herein will generate data that can be used for the following objectives:

- determine the distribution of available vernal pool habitat in selected northeastern National Parks and National Wildlife Refuges.
- determine if the proportion of vernal pools occupied by wood frogs and spotted salamanders is:

- a) increasing, decreasing or staying the same over time.
- b) related to surrounding land use, road density or distance to nearest road, and proximity to or density of other potential breeding sites.
- c) related to water quality variables, hydroperiod, or climatic conditions.
- identify priority areas within individual Parks and Refuges for amphibian habitat management.
- evaluate the roles of Parks and Refuges as important areas for vernal pool-associated wildlife.
- provide information to the public about the role of Parks and Refuges in the conservation of amphibians.

#### ADAPTIVE CLUSTER SAMPLING PROTOCOL

At Parks and Refuges where the distribution of vernal pools is not known, we will apply an adaptive cluster sampling (ACS) approach with an initial selection of systematic samples, which will ensure a spatially representative sample from within the Park or Refuge (Unit). Adaptive cluster sampling is a probabilistic method designed for sampling items of interest that exhibit spatial clustering (Thompson 1991). Vernal pools exhibit a clustered distribution in the landscape (Brooks et al. 1998, Burne 2001), and thus sampling using an adaptive cluster framework allows more precise estimates of population parameters where traditional methods, such as stratification, are insufficient. We will use this method to develop an understanding of the distribution of vernal pool habitats at the individual Unit level. We will also monitor breeding sites with repeated surveys to satisfy the assumptions of the PRESENCE model and to determine the proportion of available vernal pool habitat that is actively used by amphibians for breeding (MacKenzie et al. 2002).

Three options exist to determine the presence of vernal pools: 1) conducting ground-truthing surveys, 2) evaluating high quality color-infrared aerial photos, or 3) evaluating local geology, topography and soils. Aerial photographic interpretation and information from mapped physiographic features are less reliable than ground-truthing surveys. We will provide a set of systematic points (GPS coordinates) to sample. At each point, a 50 m transect will be marked with a meter tape and surveyed along a northern compass bearing. At the end of this transect, the observer will walk back along this meter tape, surveying for vernal pools along the way. Once the observer returns to the start point, they will survey a 50 m transect along an eastern bearing, then turn and survey a 50 m transect along a northern bearing, and finally complete a fourth 50 m transect along a western bearing, at which point the observer will arrive at the end of the meter tape laid out along the first transect, and will have completed the sample of a 50 m x 50 m plot. If a pool is located in the first (primary) plot sampled, four adjacent (secondary) plots are added to the sample, adjacent to each side of the primary plot (see data sheet example). Groups of adjacent plots are added as pools are found, creating a 'network' of plots that detail the locations of clusters of vernal pools within your Unit. We will use the data from these samples to calculate an unbiased estimate of the number of vernal pools on the landscape, using formulas from Thompson (1991).

A systematic sample frame will be located within each Unit boundary, using the Minnesota DNR Random Sampling Tools extension for ArcView GIS (Loesch 2002). Points will be located 500 m apart, and the total number of sampling points will vary depending on the Unit area. Systematic points will be divided randomly into groups of 20 sampling points. The second set of 20 points will not be sampled until all points in the first sample set have been visited. This will ensure good spatial coverage within the Unit boundary. If a point is located in an area that 1) can not be sampled (i.e., it is located in the middle of a parking lot, large marshland, etc.) or 2) you have intimate knowledge of the area surrounding the point, and know with certainty that

there are no vernal pools there, you must still complete a data sheet for this point, indicating in the "NOTES" section the reasons that you did not have to sample this point. We will still require you to send these datasheets to us, as we will use this information in our estimation of vernal pool density.

#### LITERATURE CITED

- Brooks, R. T., J. Stone and P. Lyons. 1998. An inventory of seasonal forest ponds on the Quabbin Reservoir watershed, Massachusetts. *Northeastern Naturalist* **5**: 219-230.
- Burne, M. R. 2001. Massachusetts aerial photo survey of potential vernal pools. Natural Heritage and Endangered Species Program, Massachusetts Department of Fisheries and Wildlife, Westborough, MA.
- Loesch, T. N. 2002. DNR random sample generator. ver. 1.1, ArcView extension. Minnesota DNR. Created 21 March 2002, accessed 9 January 2004.
- MacKenzie, D. I., J. D. Nichols, G. B. Lachman, S. Droege, J. A. Royle and C. A. Langtimm. 2002. Estimating site occupancy rates when detection probabilities are less than one. *Ecology* **83**: 2248-2255.
- Thompson, S. K. 1991. Adaptive cluster sampling: designs with primary and secondary units. *Biometrics* **47**: 1103-1115.

#### DETAILED FIELD METHODS:

- 1) Navigate to each point using your Garmin GPS III+ Personal Navigator (or other approved GPS handheld device). As you navigate, keep an eye on the estimated position error (EPE), and know that you may not get to the exact point. For example, as part of its navigation feature, your GPS tells you how much further you must travel to reach the intended point, but it may never display "0 meters remaining" due to the position error. As you navigate, be sure that the number of meters continues to go down, but if it goes up and you are within the 'error range' of the point (e.g., if your EPE reads +/- 5 m, and your meters remaining doesn't seem to go lower than 10 meters, you can safely stop navigating, and start your plot survey. The exact point matters less than the fact that we are getting good spatial coverage of your Park or Refuge. [Remember that if a point falls in an area that cannot be sampled (see above) or you know with certainty that there are no pools at that point, you must still complete and return a data sheet; record in the "NOTES" section the reasons that you did not sample the plot (see above). Also return a data sheet with explanation in "NOTES" section if no pools are found **after** completing your first survey plot.] Once the point is located, take a photo facing NE into the plot and record information about the weather and habitat surrounding the point [sky code, wind code, previous day precipitation, and land cover within 50 m of start point (%forest, agriculture/meadow/pasture, developed: residential urban/suburban/industrial, road)] as indicated on the datasheet.
- 2) To lay out the primary plot, sight a northern bearing and walk 50 m, **counting paces** and laying a meter tape to mark the western boundary of the plot. Walk back along the tape, counting paces again and searching on either side for a vernal pool, paying particular attention to the inside of the plot. You should be able to see about 20-25 meters to each side, though this will vary with terrain, vegetation, and observer differences.
- 3) Map any vernal pools located, label them alphabetically (A, B, C, etc.) on the data sheet in relation to the transect (i.e. distance from plot edge), and record a GPS



point from the center of the pool. Record the distance from the transect on the data sheet. Take a photo of each pool and record photo number in the table on the data sheet. For each pool, record length at maximum, width at maximum and maximum depth. If the pool is less than 14 m<sup>2</sup> or greater than 3,000 m<sup>2</sup>, do not record additional data. The pool must be isolated, without permanent inflow or outflow (see also the "definition of vernal pool" below). If the pool meets these criteria, record an estimate of the percent cover of submerged aquatic vegetation and percent cover of emergent vegetation on the data sheet (see Variable Definitions below). The amount of vegetation in a pool can affect the ability of observers to detect vernal pools and egg masses in the pools. Other factors, such as heavy cloud cover or turbid water, can also affect the ability to detect egg masses. If visibility was impaired, record this in the "Notes" section of the data sheet along with the letter label for each affected pool.

- 4) Using a plastic beaker, collect a sample of water at the edge of the pool (in a location where the beaker can be fully submerged, and near where egg masses are located, if possible). Use your pH probe to measure the pH and record on the data sheet. Also, record water temperature within a meter of the pool, holding the thermometer 10 cm underwater.
- 5) Estimate the distance to forest and the distance to road, and record on data sheet.
- 6) Search the pool for and count all egg masses of wood frogs (*Rana sylvatica*) and spotted salamanders (*Ambystoma maculatum*). Regardless of the whether or not egg masses for either species are found upon the first visit, the pool **must** be revisited at least once more during the sampling window. This will increase the likelihood that you will detect both wood frog and spotted salamander egg masses if they are present. If no egg masses are found after the second visit, then the pool must be revisited, as feasible, until both species are observed or the sampling window (see below) expires. To facilitate locating and identifying pools to be revisited, we recommend that you flag the vernal pool site (using a wire flag or flagging tape), writing the sampling point number and pool letter code on the flag with a Sharpie pen. Record repeat visit data on the REPEAT VISIT DATA SHEET 2004.
- 7) Do not stray further away from the viewable area outside the plot (~25 m from the plot edge) to investigate potential vernal pools until after the entire cluster sample is complete. Note any potentially distant pools on your plot map, recording them as incidental pools (see below), and investigate them after you have completed surveying the adjacent plots according to the adaptive cluster sampling protocol.
- 8) Return to and finish the transect, searching for and recording vernal pools as in #3-6 above.
- 9) Once you reach the beginning point, sight an eastern transect, and pace 50 m along this transect, visually searching for vernal pools, and repeating the procedure in #3-6. This is the southern boundary of the plot.
- 10) Turn and pace 50 m along a northern bearing, visually searching for vernal pools, repeating the procedure in #3-6 above. This is the eastern boundary of the plot.
- 11) Turn and pace 50 m along a western bearing, searching for and recording vernal pools as in #3-6 above. This is the northern boundary. At the end of this transect, you should reach the end of the meter tape marking the western boundary. You have thus completed the sample of a 50 m x 50 m plot. The actual area sampled will vary based on the topography and density of vegetation, but we estimate that the total area sampled for each plot will be approximately 75 m<sup>2</sup>. We will use this



information in our calculations to estimate density of vernal pools in each Unit in the northeastern region.

- 12) If no pools were located in the primary (1<sup>o</sup>) plot, indicate this in the "NOTES" section of the datasheet, and move on to the next sample point. .
- 13) If a pool was located while surveying along any of the 50 m transects, you must sample additional (secondary) plots adjacent (N, S, E, and W) to the primary plot boundaries. Map vernal pool locations (if any additional pools are found) on the data sheet for secondary plots surrounding the primary plot, and continue to label these **vernal pools** alphabetically (e.g., if A and B pools were located in the primary lot, continue labeling adjacent plot pools with C, D, E...AA,BB,CC, etc.). Number the secondary **plots** sequentially (2, 3, 4, etc.) so they can be linked to each vernal pool on the data sheet. Similarly, if vernal pools are located within the secondary plots, you must sample adjacent (tertiary) plots, and so on (see example data sheet and Powerpoint graphic). These additional plots should be drawn and labeled (continuing with 5, 6, 7, etc.) on the data sheet, and vernal pool locations should be mapped within these plots and data recorded on the data sheet (see example data sheet). Only sample adjacent plots surrounding a plot in which a vernal pool was located. There is no limit to the number of additional plots that can be sampled in this manner. As long as additional vernal pools are located in adjacent plots, continue to sample adjacent plots. This will create a 'network' of vernal pool locations, and will identify areas of importance for amphibian breeding. If a pool is first observed outside the 50 m<sup>2</sup> plot currently being surveyed, enter the pool on the data sheet as being in an adjacent plot, but draw an arrow from the pool to the current plot from which it was discovered (see Powerpoint graphic example).
- 14) Sample as many points as possible during the first 2-3 weeks of the sampling window, and use the last week of the sampling window to concentrate on revisiting vernal pools. Wood frogs should be depositing egg masses during the first part of the sampling window, and spotted salamander egg masses should be present during the latter. However, wood frog egg masses may be hatched and less detectable by the latter portion of the sampling window. Therefore, if you encounter a pool that has no species present, it is a good idea to revisit such a pool at least twice, early in the sampling window, in order to detect the presence of wood frog egg masses.
- 15) Keep originals and return clean and legible xeroxed copies of the ACS VERNAL POOL DATA SHEETS to Dr. Robin Jung (see address above) at the end of the field season and no later than 15 July 2004.

#### Incidental vernal pools

- 1) While traveling to and between sample points, you may locate vernal pools "incidentally," i.e. without sampling as above (see definition of a vernal pool in this protocol). These pools are important for the PAO estimation, but, because the probability that they are located in the landscape cannot be easily calculated (their inclusion probability), we cannot include them in the estimation of vernal pool density. Observers should not spend much effort 'searching' for incidental pools along the way to sample points.
- 2) The INCIDENTAL VERNAL POOL DATA SHEET 2004 should be used to record information about any vernal pools located on the way to or between sampling sample points. Use a new section of the data sheet for each day, recording the nearest point (or the point you were traveling towards when you located the

- incidental vernal pool). Number the new pool as "I-*n*" where *n* is a number you assign to the incidental vernal pool (1, 2, 3, etc.).
- 3) It is important that a GPS point be taken at every vernal pool that is found.
  - 4) Record habitat covariates (pool max. width, max. length, max. depth, % vegetation in the pool, land use(s) surrounding vernal pool), and estimate the number of egg masses of *R. sylvatica* and *A. maculatum* as indicated on the data sheet. Be sure to survey the pool at least twice during your sampling window (see below).
  - 5) Keep originals and return clean, legible xeroxed copies of the INCIDENTAL VERNAL POOL DATA SHEETS to Dr. Robin Jung (see address above) at the end of the field season and no later than **15 July 2004**.

#### DEFINITION OF VERNAL POOL:

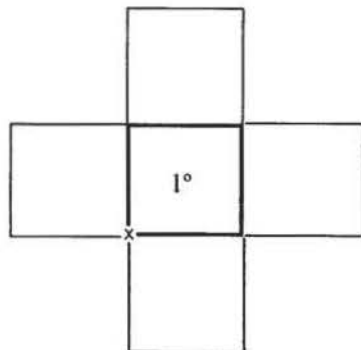
For this study, a **vernal pool** is defined as: **A contained depression, with no surface inflow or outflow except at times of high water (such as snow melt or intense, prolonged rain), and with a total surface area between 14 m<sup>2</sup> and 3,000 m<sup>2</sup>.** In this definition, roadside ditches, pools formed in skid trails, or other man-made or man-altered depressions can be included in the sample.

**SAMPLING WINDOW** (note: sampling windows provided here are estimates based on previous years; the actual time frame in which you will sample will depend upon this year's particular climate, and may be adjusted as needed.)

Park/Refuge Name	State	Sampling Time Frame
Gettysburg, Erie	PA	22 Mar – 3 May
Patuxent	MD	21 Feb – 4 April
Acadia, Rachel Carson, Moosehorn, Lake Umbagog	ME, NH	4 April – 23 May
Cape Cod, E. Massachusetts	MA	21 Mar – 2 May
Delaware Water Gap, Great Swamp, Wallkill River, Iroquois	NJ, NY	21 Mar – 2 May
Rock Creek, C&O Canal	D.C., MD	19 Mar – 30 April
Shenandoah, Canaan Valley	VA, WV	7 Mar – 18 April

## GENERAL SAMPLING OUTLINE

- 1) Visit sampling points provided to you. Finish the first set of 20 points before sampling the second set of points.
- 2) Search a 50 m<sup>2</sup> area for vernal pools
- 3) If a vernal pool is located, sample four (4) additional 50 m<sup>2</sup> areas adjacent to the original sample plot in the following layout. The bold line indicates the initial (primary) 50 m<sup>2</sup> plot, with the X designating the sample point that was provided to you:



- 4) Record information about the habitat surrounding the vernal pool, as well as information about the pool itself on the ACS VERNAL POOL DATA SHEET 2004.
- 5) Count the number of egg masses of wood frogs (*R. sylvatica*) and spotted salamanders (*A. maculatum*) in each pool.
- 6) Continue to survey the pool, no fewer than two (2) times during the sampling window.
- 7) Record information about vernal pools located while traveling to and between points on the INCIDENTAL VERNAL POOL 2004 data sheets. Survey these pools for egg masses of both focal species, and return to survey pools at least twice during the sampling window.
- 8) We are hoping to find a minimum of 20 vernal pools per Park/Refuge, but continue to search sets of points for vernal pools even after you locate 20 vernal pools. Be sure to visit all located pools at least twice during your sampling window. This will aid in our estimation of Park- /Refuge- specific occupancy.
- 9) Any questions, call or email Evan Grant 301.497.5842 (evan\_grant@usgs.gov), Robin Jung 301.497.5875 (robin\_jung@usgs.gov), or Priya Nanjappa 301.497.5811 (priya\_nanjappa@usgs.gov).

## EQUIPMENT NEEDED

Set of sample points

GPS unit

Two (2) 50-m tapes

meter stick

Thermometer

pH probe/meter

plastic water sample beaker (container)

Camera

Wire flags or Flagging Tape

Sharpie

Data sheets:

ACS VERNAL POOL DATA SHEET 2004

INCIDENTAL VERNAL POOL DATA SHEET 2004

REPEAT VISIT DATA SHEET: ACS VERNAL POOL 2004



**VARIABLE DEFINITIONS (explanations of all variables on data sheets):**

**ACS VERNAL POOL DATA SHEET 2004**

**Point # (X):** given number of random sample point to which you navigate to conduct your 50 m<sup>2</sup> plot. This relative location of this point to your sample plots is marked in the plot map on the datasheet with an "X"

**GPS N/W:** given GPS coordinates associated with the point to which you navigate to conduct your 50 m<sup>2</sup> plot.

**Sky code** (see back of data sheet for explanations): record sky code.

**Wind code** (see back of data sheet for explanations): record wind code.

**Previous day Precipitation?:** was there substantial ( $\geq 1$  cm) precipitation the day prior to the survey (this information is useful for determining the likelihood of amphibian migration to breeding pools).

**Land Cover:** within a 50 m radius of start point, estimate the % of each land cover type. These values should add to 100%. Check whether the majority of the forest is hardwood or softwood.

**Photo number of primary plot:** take a photo of the primary plot, standing at the origin and facing NE into the plot. Record the photo number in the "Notes" section.

**TABLE**

**Plot:** number of sample plot (according to mapped plot locations drawn by the observer). Plots should be numbered consecutively as they are added to the sample.

**Pool:** letter of pool discovered while surveying the sample plots. The letters should correspond with mapped locations of vernal pools drawn by the observer.

**Photo:** record a photo number for each vernal pool discovered.

**Latitude/Longitude:** record the latitude and longitude from the center of the pool using your GPS unit. Be sure that your GPS units are in meters, the position format is "dd mm ss.ss," and the map datum is set to NAD83. Important!

**EPE (m):** estimated position error, usually displayed on a GPS device as +/- X meters. Important!

**Distance from transect (m):** perpendicular distance from the transect to the vernal pool, in meters. Measure with a meter tape.

**Water temp:** record water temperature within a meter of the edge of the pool, holding the thermometer at least 10 cm underwater.

**pH:** collect water sample in your beaker/sampling container from an area near egg masses and where the container can be fully submerged, if possible, and use your pH probe/meter to record pH.

**Pool max width (m):** width of pool at maximum point.

**Pool max length (m):** length of pool at maximum point.

**Pool max depth (cm):** depth of pool at deepest point.

**%Aq. Veg (SAV / emerg):** estimate the percent cover of submerged (SAV) and emergent aquatic vegetation (include duckweed cover with emergent vegetation) and record as SAV "/" emergent (e.g., for 30% SAV, 25% emergent, 15% duckweed record on the data sheet as "30 / 40").

**Distance to forest:** estimate the nearest distance to forest. Be sure to record the value in meters (m).

**Distance to road:** estimate the nearest distance to a road. Be sure to record the value in meters (m).

**Road type** (see back of data sheet for explanations): record the road type.

**Road traffic** (see back of data sheet for explanations): record the road traffic at night.

**Pool permanency** (see back of data sheet for explanations): record the permanency of the pool, to the best of your knowledge.

**Pool type:** (see back of data sheet for explanations): record the pool type, to the best of your knowledge.

**# RSYL masses:** count and record the number of wood frog (*Rana sylvatica*) egg masses detected in the pool.

**# AMAC masses:** count and record the number of spotted salamander (*Ambystoma maculatum*) egg masses detected in the pool.

**INCIDENTAL VERNAL POOL DATA SHEET 2004**

(Most data are recorded according to the variable definitions above)

**Nearest Point:** record the nearest sample point to the incidental pool, or describe how you encountered the pool in the NOTES section under each record (i.e. "while traveling from point 31 to point 56").

**Incidental pool number:** label incidental pools with "I-*n*", where *n* is a sequential number (as opposed to the vernal pools located in the plot surveys, which are labeled with a letter; e.g., I-4).

**Photo:** see above

**Latitude/Longitude:** see above

**EPE:** see above

**Water temp:** see above

**pH:** see above

**Sky:** see above

**Wind:** see above

**Pool max width:** see above

**Pool max length:** see above

**Pool max depth:** see above

**% veg in pool:** see above.

**Dist. To For. (m):** see above, variable "Distance to forest"

**% For.:** estimated percent of the area surrounding the pool that is occupied by forest (within 75 meters of the pool).

**% Ag.:** estimated percent of the area surrounding the pool that is occupied by agriculture, pasture, or meadow (within 75 m of the pool).

**% Developed:** estimated percent of the area surrounding the pool that is occupied by residential, urban, mining, or industrial land use (within 75 m of the pool).

**% Road/right-of-way:** estimated percent of the area surrounding the pool that is occupied by road or powerline right-of-way (within 75 m of the pool).

**Dist. to Road:** see above, variable "Distance to Road".

**Road type:** see above

**Road traffic:** see above

**Pool permanency:** see above

**Pool type:** see above

**#RSYL masses:** see above

**#AMAC masses:** see above



**REPEAT VISIT DATA SHEET: ACS VERNAL POOLS 2004**

(Most data are recorded according to the variable definitions above)

**Date:** record the date each time you revisit a pool.

**Point:** record the nearest point (the "point #" from the ACS VERNAL POOL DATA SHEET 2004, or the "Nearest Point" from the INCIDENTAL VERNAL POOL DATA SHEET 2004).

**Plot:** If the pool was first located while sampling a plot, record the plot number. If it was an incidental pool, leave this field blank.

**Pool:** record the pool letter or number here.

**Photo:** take a photo each time you visit the pool, record the photo number here.

**Latitude/longitude:** see above

**EPE:** see above

**Water temp:** record water temperature within a meter of the edge of the pool, holding the thermometer at least 10 cm underwater.

**Prev. day precip?:** enter Y for yes or N for no previous day precipitation (see description above for "ACS VERNAL POOL SAMPLING DATA SHEET 2004").

**Sky:** see above

**Wind:** see above

**pH:** see above

**Pool max width:** see above

**Pool max length:** see above

**Pool max depth:** see above

**% Veg. in pool:** see above.

**Pool permanency:** see above

**Pool type:** see above

**#RSYL masses:** see above

**#AMAC masses:** see above

# ACS Vernal Pool Data Sheet 2004

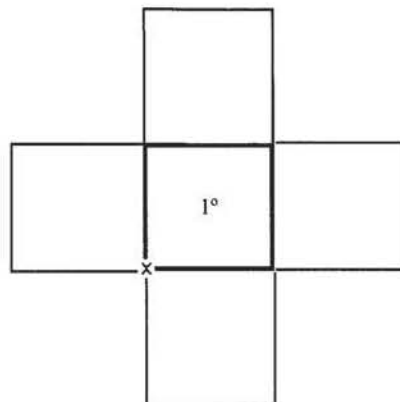
Date (dd month) \_\_\_\_\_ Unit (park or refuge name) \_\_\_\_\_  
 Observers (full names) \_\_\_\_\_  
 Point # \_\_\_\_\_ GPS (dd mm ss.ss) N \_\_\_\_\_ W \_\_\_\_\_  
 Sky code\* \_\_\_\_\_ Wind code\* \_\_\_\_\_  
 Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

\_\_\_\_ %Forest (check appropriate type)  
     \_\_\_\_ Hardwood (>75% deciduous)  
     \_\_\_\_ Softwood (<75% deciduous)  
 \_\_\_\_ %Agriculture/meadow/pasture  
 \_\_\_\_ %Residential: urban/suburban  
 \_\_\_\_ %Road; description (road type\* \_\_\_\_\_ traffic at night\* \_\_\_\_\_)

Notes (record incidental species observations on reverse):

Photo number of primary plot:



Plot	Pool	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Dist. from Transect	Water temp. (°C)	pH	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg. (SAV / emerg)	Dist. to Forest (m)	Dist. to Road (m)	Road Type*	Road Traffic*	Pool Perman- ency*	Pool Type*	# RSYL Masses	# AMAC Masses
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\*= see back for definitions and codes for table

**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
1	Clear or few clouds (< 20% of sky)
2	Partly cloudy or variable (20-50% of sky)
3	Cloudy or overcast (> 50% of sky)
4	Fog
5	Mist
6	Showers or light rain
7	Heavy rain
8	Sleet/Hail
9	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code	mph	Indicators of Wind Speed
0	< 1	calm, smoke rises vertically
1	2-3	light air movement, smoke drifts
2	4-7	light breeze, wind felt on face, leaves rustle
3	8-12	gentle breeze, leaves/twigs in constant motion, raises dust
4	13-18	moderate breeze, small branches move
5	19-24	fresh breeze, small trees begin to sway
6	25-31	strong breeze, large branches move
7+	> 31	strong winds

**ROAD TYPE:**

**P** = Paved **G** = Gravel **D** = Dirt

**ROAD TRAFFIC** (at night):

**N** = Road used only by Park/Refuge personnel **L** = Light Traffic (< 10 cars) **H** = Heavy Traffic ( $\geq$  10 cars)

**POOL PERMANENCY:**

**T** = temporary (dries annually) **S** = semipermanent (sometimes dries) **P** = permanent (never dries) **U** = unknown duration

**POOL TYPE:**

**N** Natural (e.g., oxbow, vernal pool)

**B** Beaver-created

**A**( ) Artificial/Human-Altered (pick best description below):

**A(B)** borrow/gravel pit **A(D)** roadside ditch **A(P)** farm pond **A(I)** impoundment **A(O)** other: \_\_\_\_\_

**U** Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only Visual only, Handled)	Sperma- tophores (Y/N)	# Egg Masses	Tadpoles/ Larvae (Y/N)	# Juveniles	# Adults

**CHORUS CODE:**

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.



# INCIDENTAL VERNAL POOL DATA SHEET 2004

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) \_\_\_\_\_

Observers (full names) \_\_\_\_\_

Previous day precipitation? [ ] YES [ ] NO

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Nearest Point	Incidental Pool # (1-n)	photo	Latitude (DDMMSS SS)	Longitude (DDMMSS SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
I -													/												

Notes:

I -													/												
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Notes:

\* see back for definitions and codes for table

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) \_\_\_\_\_

Observers (full names) \_\_\_\_\_

Previous day precipitation? [ ] YES [ ] NO

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Nearest Point	Incidental Pool # (1-n)	photo	Latitude (DDMMSS SS)	Longitude (DDMMSS SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
I -													/												

Notes:

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Notes:

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Notes:

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Notes:

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Notes:

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Notes:

\* see back for definitions and codes for table

**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
1	Clear or few clouds (< 20% of sky)
2	Partly cloudy or variable (20-50% of sky)
3	Cloudy or overcast (> 50% of sky)
4	Fog
5	Mist
6	Showers or light rain
7	Heavy rain
8	Sleet/Hail
9	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code	mph	Indicators of Wind Speed
0	< 1	calm, smoke rises vertically
1	2-3	light air movement, smoke drifts
2	4-7	light breeze, wind felt on face, leaves rustle
3	8-12	gentle breeze, leaves/twigs in constant motion, raises dust
4	13-18	moderate breeze, small branches move
5	19-24	fresh breeze, small trees begin to sway
6	25-31	strong breeze, large branches move
7+	> 31	strong winds

### POOL PERMANENCY:

**T** = temporary (dries annually) **S** = semipermanent (sometimes dries) **P** = permanent (never dries) **U** = unknown duration

### POOL TYPE:

**N** Natural (e.g., oxbow, vernal pool)

**B** Beaver-created

**A( )** Artificial/Human-Altered (pick best description below):

**A(B)** borrow/gravel pit **A(D)** roadside ditch **A(P)** farm pond **A(I)** impoundment **A(O)** other: \_\_\_\_\_

**U** Unknown

### INCIDENTAL SPECIES OBSERVATIONS:

Pool	Species	Chorus Code	ID method (Auditory only, Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults

### CHORUS CODE:

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.

## REPEAT VISIT DATA SHEET: ACS VERNAL POOLS 2004

Unit (Park or Refuge name): \_\_\_\_\_

Observers (full names): \_\_\_\_\_

[illegible]

\*= see back for definitions and codes for table

Notes:



**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
1	Clear or few clouds (< 20% of sky)
2	partly cloudy or variable (20-50% of sky)
3	Cloudy or overcast (> 50% of sky)
4	Fog
5	Mist
6	Showers or light rain
7	Heavy rain
8	Sleet/Hail
9	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code	mph	Indicators of Wind Speed
0	< 1	calm, smoke rises vertically
1	2-3	light air movement, smoke drifts
2	4-7	light breeze, wind felt on face, leaves rustle
3	8-12	gentle breeze, leaves/twigs in constant motion, raises dust
4	13-18	moderate breeze, small branches move
5	19-24	fresh breeze, small trees begin to sway
6	25-31	strong breeze, large branches move
7+	> 31	strong winds

**ROAD TYPE:**

**P** = Paved **G** = Gravel **D** = Dirt

**ROAD TRAFFIC (at night):**

**N** = Road used only by Park/Refuge personnel **L** = Light Traffic (< 10 cars) **H** = Heavy Traffic (≥ 10 cars)

**POOL PERMANENCY:**

**T** = temporary (dries annually) **S** = semipermanent (sometimes dries) **P** = permanent (never dries) **U** = unknown duration

**POOL TYPE:**

**N** Natural (e.g., oxbow, vernal pool)

**B** Beaver-created

**A( )** Artificial/Human-Altered (pick best description below):

**A(B)** borrow/gravel pit **A(D)** roadside ditch **A(P)** farm pond **A(I)** impoundment **A(O)** other: \_\_\_\_\_

**U** Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only, Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults

**CHORUS CODE:**

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.

## ACS Vernal Pool Data Sheet 2004

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) **Wallkill River NWR**

Observers (full names) **Ken Witkowski**

Point #	GPS (dd mm ss.ss) N	W
---------	---------------------	---

Sky code\* \_\_\_\_\_ Wind code\* \_\_\_\_\_

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (&gt;75% deciduous)

Softwood (&lt;75% deciduous)

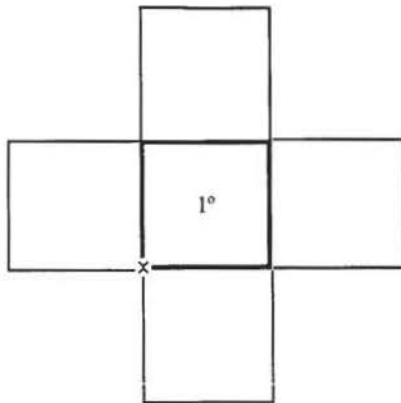
%Agriculture/meadow/pasture

%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

Photo number of primary plot:

[illegible]

\*= see back for definitions and codes for table

**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

**Code Sky Condition**

0	Clear or few clouds (< 20% of sky)
1	Partly cloudy or variable (20-50% of sky)
2	Cloudy or overcast (> 50% of sky)
3	Fog
4	Mist
5	Showers or light rain
6	Heavy rain
7	Sleet/Hail
8	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

**Code mph Indicators of Wind Speed**

0	< 1	calm, smoke rises vertically
1	2-3	light air movement, smoke drifts
2	4-7	light breeze, wind felt on face, leaves rustle
3	8-12	gentle breeze, leaves/twigs in constant motion, raises dust
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5	19-24	fresh breeze, small trees begin to sway
6	25-31	strong breeze, large branches move
7+	> 31	strong winds

**ROAD TYPE:**

**P** = Paved **G** = Gravel **D** = Dirt

**ROAD TRAFFIC** (at night):

**N** = Road used only by Park/Refuge personnel **L** = Light Traffic (< 10 cars) **H** = Heavy Traffic ( $\geq$  10 cars)

**POOL PERMANENCY:**

**T** = temporary (dries annually) **S** = semipermanent (sometimes dries) **P** = permanent (never dries) **U** = unknown duration

**POOL TYPE:**

**N** Natural (e.g., oxbow, vernal pool)

**B** Beaver-created

**A( )** Artificial/Human-Altered (pick best description below):

**A(B)** borrow/gravel pit **A(D)** roadside ditch **A(P)** farm pond **A(I)** impoundment **A(O)** other: \_\_\_\_\_

**U** Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only Visual only, Handled)	Sperma- tophores (Y/N)	# Egg Masses	Tadpoles/ Larvae (Y/N)	# Juveniles	# Adults

**CHORUS CODE:**

**Code Description**

0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.

# 05 WALLKILL RIVER LONG TERM MONITORING POOLS

	PoolName	Pool Record Type	Lat	Long
+	wrnwrla E	ACS	41:12:25.5	-074:35:20.3
x	wrnwrlb E	ACS	41:12:28.3	-074:35:18.3
x	wrnwrlc E	ACS	41:12:29.7	-074:35:12.8
x	wrnwrl5a checked	ACS	41:16:52.53	-074:34:07.04
	wrnwr47a E	ACS	41:16:02.8	-074:32:60.4
	wrnwr47b O	ACS	41:16:02.2	-074:32:40.3
	wrnwr47c O	ACS	41:16:03.7	-074:32:38.7
	wrnwr47d O	ACS	41:16:06.2	-074:32:37.6
	wrnwr47e O	ACS	41:16:05.0	-074:32:39.4
	wrnwr45a E	ACS	41:17:13.2	-074:32:68.5
	wrnwrl9A E	ACS	41:12:27.5	-074:34:15.0
x	wrnwr32A O	ACS	41:14:57.5	-74:33:23.3
x	wrnwr32B O	ACS	41:14:58.5	-74:33:23.6
x	wrnwr32C O	ACS	41:14:57.7	-74:33:23.3
x	wrnwr3A O	ACS	41:11:59.19	-74:34:50.72
x	wrnwr26A O	ACS	41:13:38.2	-74:33:45.68
	wrnwr41 I-1 F	INCIDENTAL	41:14:66.2	-074:32:93.7
	wrnwr41 I-2 E	INCIDENTAL	41:14:68.8	-074:32:90.6
	wrnwr4 I-2 E	INCIDENTAL	41:11:60.3	-074:35:11.0
x	wrnwr27 I-1 O	INCIDENTAL	41:12:33.3	-74:33:49.2
	wrnwr34 I-1 E	INCIDENTAL	41:14:19.6	-074:33:15.9
x	wrnwr31 I-1 O	INCIDENTAL	41:15:16.8	-74:33:35.7
x	wrnwr27 I-2 O	INCIDENTAL	41:12:52.4	-74:33:48.2
	wrnwr28 I-1 E	INCIDENTAL	41:12:86.0	-074:33:71.1
x	wrnwr31 I-2 O	INCIDENTAL	41:15:14.6	-74:33:34.2
	wrnwr4 I-1 E	INCIDENTAL	41:11:50.4	-074:35:01.2

KUPUPI E INCIDENTAL 41:19:83.1 -074:58:49.0 DD

input as dec. degrees

DDM 41°12'25.5"  
DDM 41°12.255'  
\* Wrong altogether

DMS  
DMS  
DMS  
DMS

DMS  
DMS  
DMS  
DMS  
DMS

finished ACS

DMS

DMS

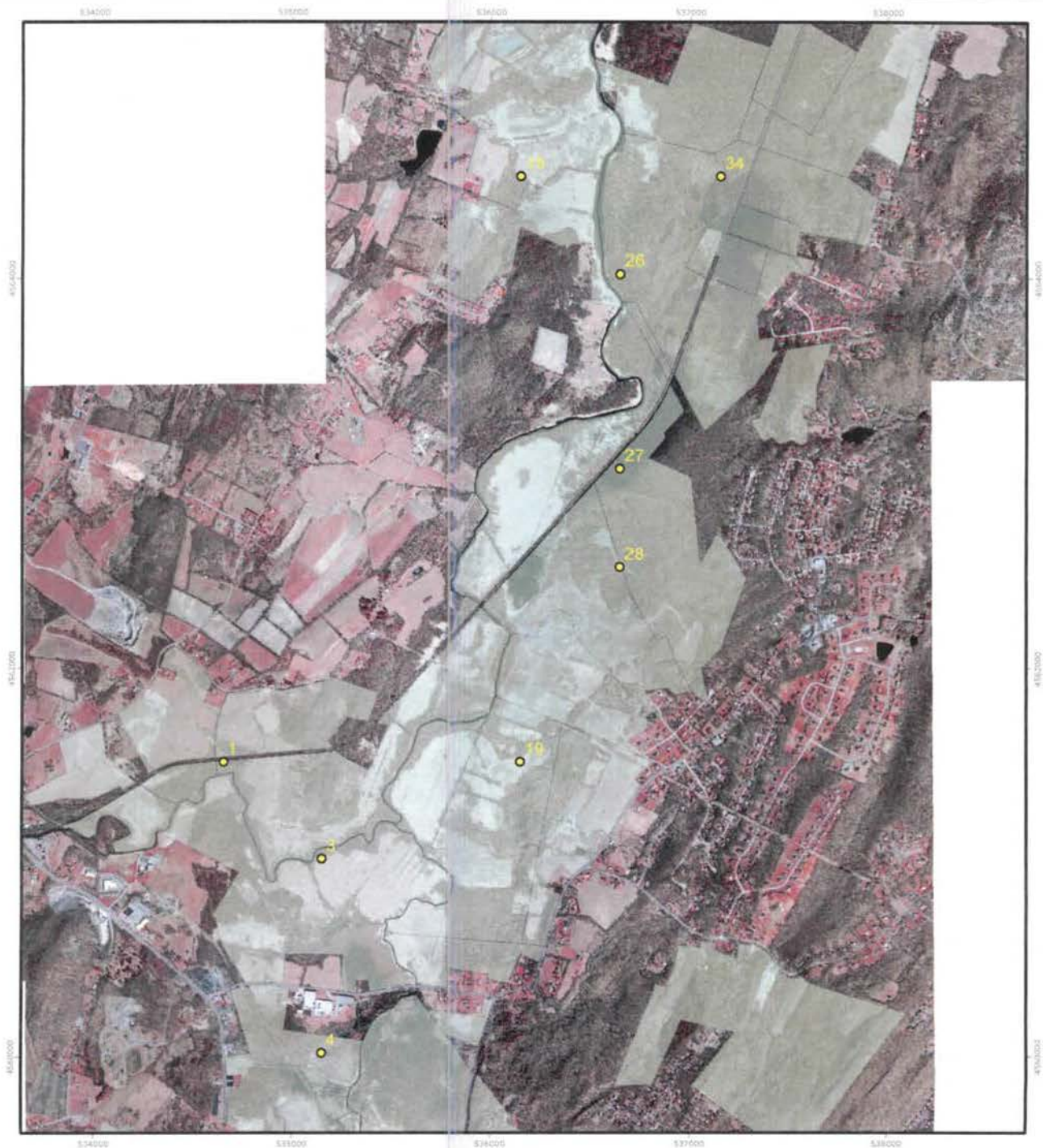
DMS

$$12.255' \frac{1 \text{ min}}{60 \text{ SEC}} \times \frac{1 \text{ min}}{60 \text{ SEC}}$$





**U.S. FISH & WILDLIFE SERVICE**  
**Vernal Pool Amphibians - Long Term Monitoring Points**



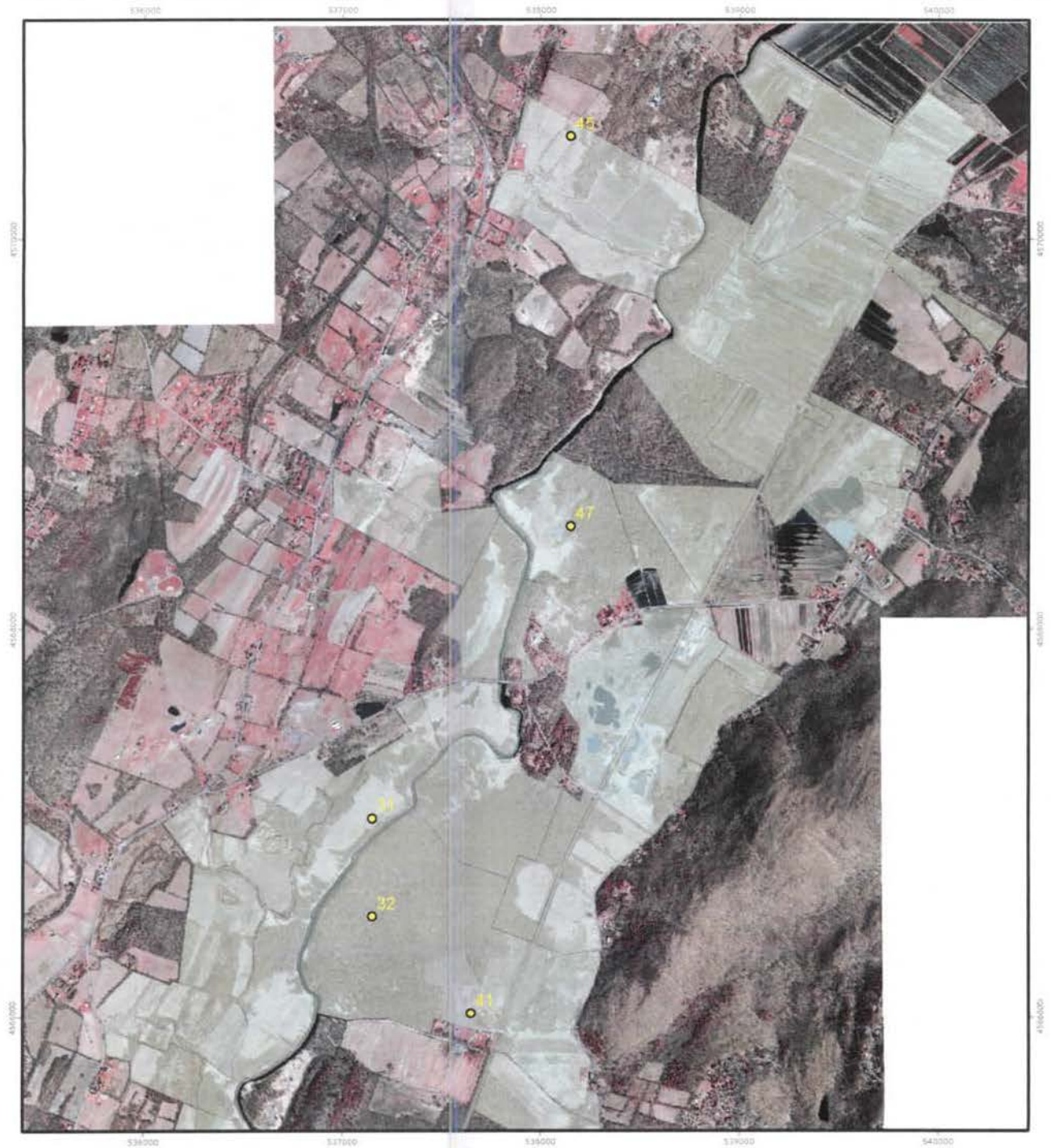
Map Projection: NAD\_1983\_UTM\_Zone\_18N  
Graticule Units: degrees, minutes, seconds  
Map Grid Unit: Meter  
C:\G\I S Walkill River\WLR\Amphibian Research\Vernal Pool Monitoring.mxd 4/21/2006



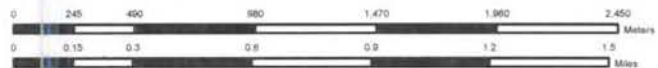




**U.S. FISH & WILDLIFE SERVICE**  
**Vernal Pool Amphibians - Long Term Monitoring Points**



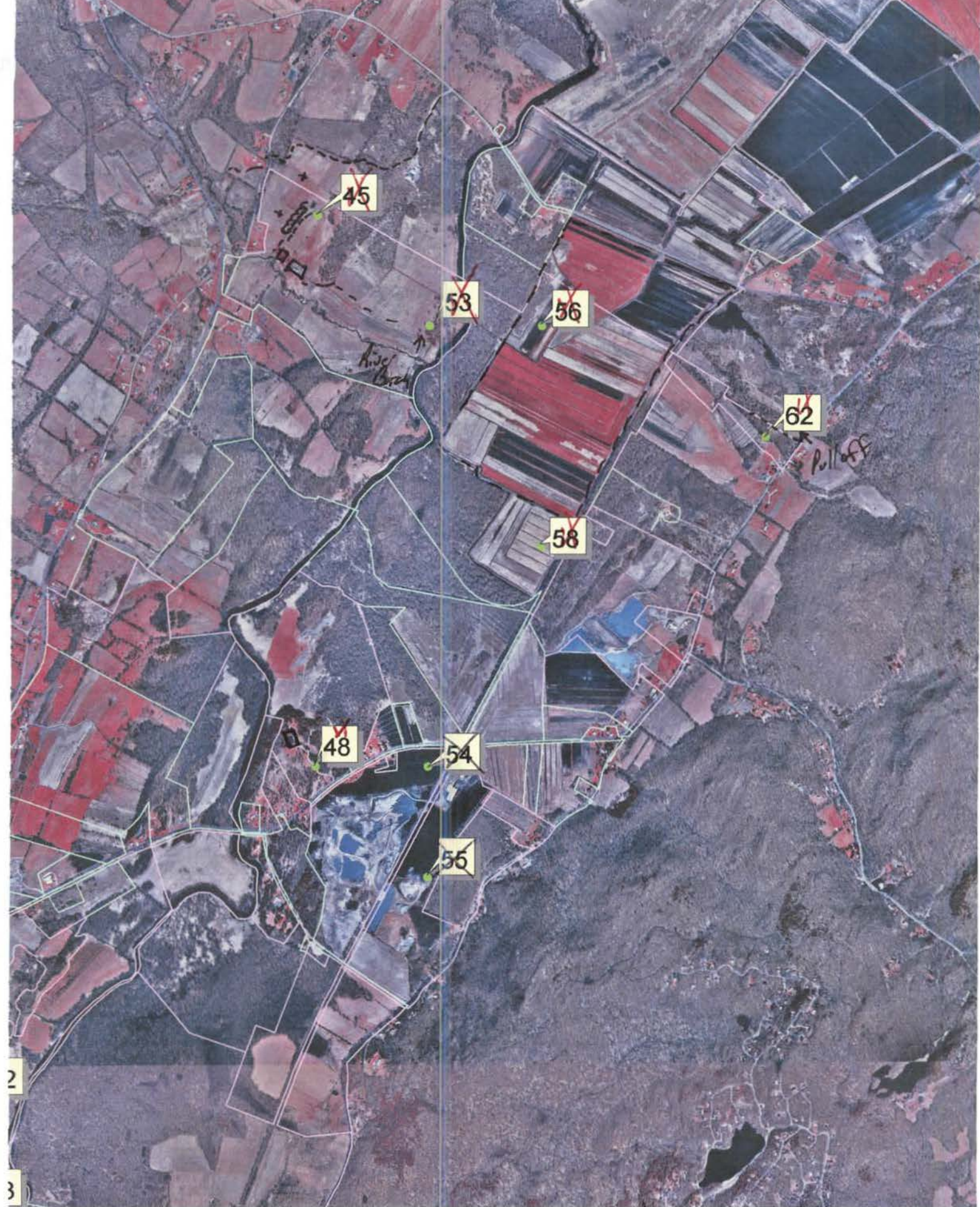
Map Projection: NAD\_1983\_UTM\_Zone\_18N  
Graticule Units: degrees, minutes, seconds  
Map Grid Unit: Meter  
C:\G\I S Walkill River\WLK Amphibian Research\Vernal Pool Monitoring.mxd 4/21/2006



1:30,694







Adaptive Cluster Sampling (SRS-group #1)





(SIS - group #1)





(SIS - group #1)





~~59~~

Liberty Loop  
Parking

~~60~~

~~36~~

~~47~~

~~61~~

Parking  
Charles

119 Owens Station

Bassett's Bridge

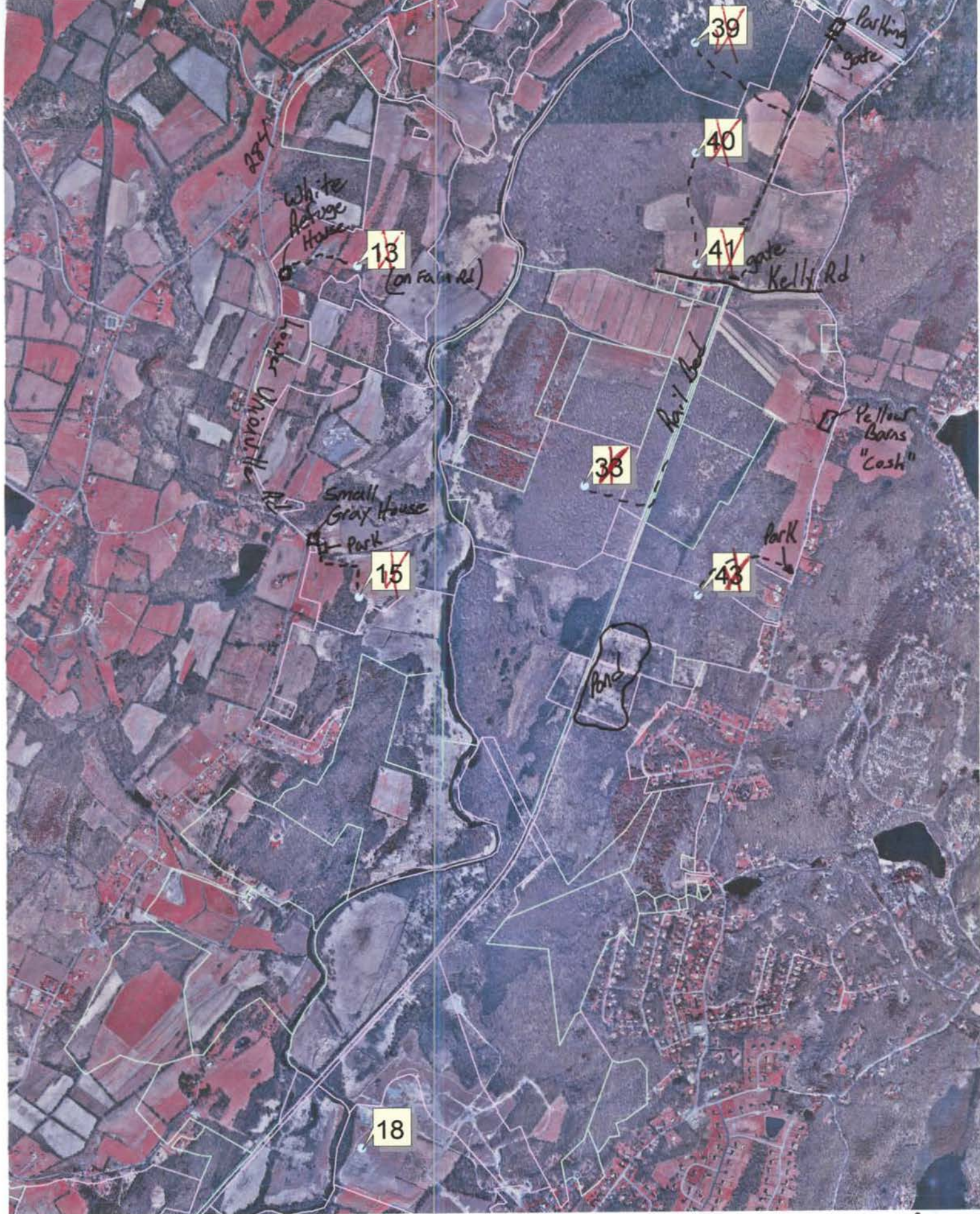
~~39~~

Parking  
gate

~~40~~

119/60













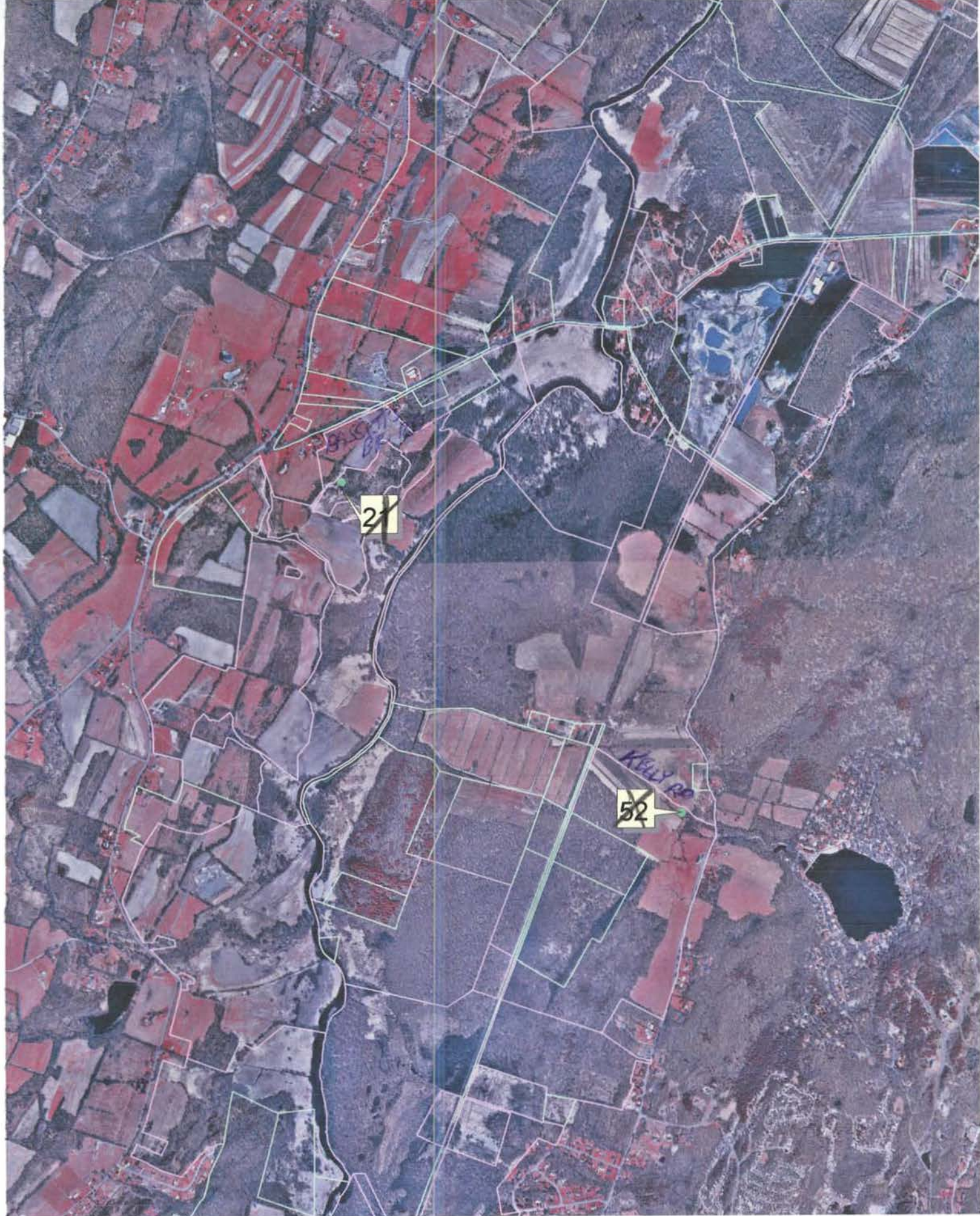












SRS Group #4

P. 1 of 1



**Wallkill River National Wildlife Refuge  
2004 Vernal Pool Study**

**Observers:**

Kevin Holcomb, Wildlife Biologist  
Ken Witkowski, Volunteer/Contractor

**Focal Vernal Pools:**

<u>Name</u>	<u>UTM (Zone 18)</u>	<u>Survey Dates</u>
Scenic Lakes Rd. (North #1)	0535757e 4559545n	3/29, 4/8, 4/22
Wood Duck Nature Trail #2	0534953e 4558216n	3/29, 4/8, 4/22

**Other Notes:**

Please call Kevin Holcomb, Wildlife Biologist at (973) 702-7266 or e-mail [kevin\\_holcomb@fws.gov](mailto:kevin_holcomb@fws.gov) for questions.



**Wallkill River National Wildlife Refuge  
2004 Vernal Pool Study**

**Observers:**

Kevin Holcomb, Wildlife Biologist

Ken Witkowski, Volunteer/Contractor

**Wood Duck Nature Trail #2 Vernal Pool Data**

<u>Name</u>	<u>UTM (Zone 18)</u>	<u>Survey Dates</u>
Wood Duck Nature Trail #2	0534953e 4558216n	3/29, 4/8, 4/22

*Lat 41° 10' 28.3"*  
*Long 74° 34' 59.6"*

<u>Wood Duck Nature Trail #2 Vernal Pool</u>	<u>WF</u>	<u>SS</u>
29-Mar	0	9
8-Apr	0	19
22-Apr	0	7

# FOCAL VERNAL POOL LOCATION AND HABITAT DATA SHEET

UNIT: Wallkill River NWR

VERNAL POOL NAME: Wood Duck Nature Trail #2

OBSERVER: Kevin Holcomb DATE (DD MONTH): 29 March 2004

## DETAILED DIRECTIONS TO SITE:

Tract #91 South end of Wood Duck Nature Trail, East  
Side of trail / South of field entrance

LATITUDE (DDMMSS.SS): 41°10'28.3" LONGITUDE (DDMMSS.SS): 74°34'59.6" EPE: +/- 5 m

POOL MAX. LENGTH: 26.6 m POOL MAX. WIDTH: 5.1 m POOL MAX. DEPTH: 26 cm

POOL PERMANENCY: ☐ temporary (dries annually) ☒ semipermanent (sometimes dries) ☐ permanent (never dries)

POND TYPE (Check either Natural, Beaver-created, Artificial/Man-made, or Unknown):

☐ Natural (e.g., oxbow, vernal pool)

☐ Beaver-created

☒ Artificial/Man-Made - If pool is artificial/man-made, pick best description below:

☐ borrow/gravel pit ☐ roadside ditch ☐ farm pond ☐ impoundment ☒ other: Side of former Rd. Used as nature trail

☐ Unknown

SITE TYPE: ☐ upland-isolated (not part of larger wetland)

☒ bottomland-isolated (part of a river or lake floodplain)

☐ wetland complex (associated with a larger wetland complex)

FISH PRESENT: ☒ No ☐ Yes If Yes, list Species: \_\_\_\_\_

DISTANCE TO FOREST FROM WATER'S EDGE: 0 m

DISTANCE TO NEAREST ROAD: Rt. 23 415 m

ROAD TYPE: ☒ PAVED ☐ GRAVEL ☐ DIRT

ROAD CONDITIONS AT NIGHT: ☐ Refuge/Park use only ☐ Light Traffic (< 10 cars) ☒ Heavy Traffic (≥ 10 cars)

FOR THE FOLLOWING, RANK the amount of pond area in which each type occurs

(does not need to sum to 100%): 0 = 0%, 1 = 1-10%, 2 = 11-25%, 3 = 26-50%, 4 = 51-75%, 5 = 76-100%

AQUATIC SUBSTRATE: Leaf Litter 5 Sticks/Logs 4

AQUATIC VEGETATION: SAV 2 Emergent \_\_\_\_\_ Shrub 4 Tree 4

**LAND USE/COVER AROUND VERNAL POOL:**

Estimate % of each of the land use/cover categories within 50 m of pool. Estimates should total 100%:

20 % Woodland/Forest

- ☒ Hardwood (> 75% deciduous)  
☐ Softwood (> 75% evergreen)  
☐ Mixed Hardwood/Softwood (< 75% each)

If % woodland/forest is entered, record if canopy cover over the vernal pool is heavy or moderate:

- ☒ Heavy (> 50% canopy cover of trees/shrubs > 6 ft. tall)
- ☐ Moderate (< 50% canopy cover of trees/shrubs < 6 ft. tall)

29 % Agriculture/Fields/Meadow/Pasture

\_\_\_\_\_% Developed: Residential/Urban/Suburban/Mining/Industrial

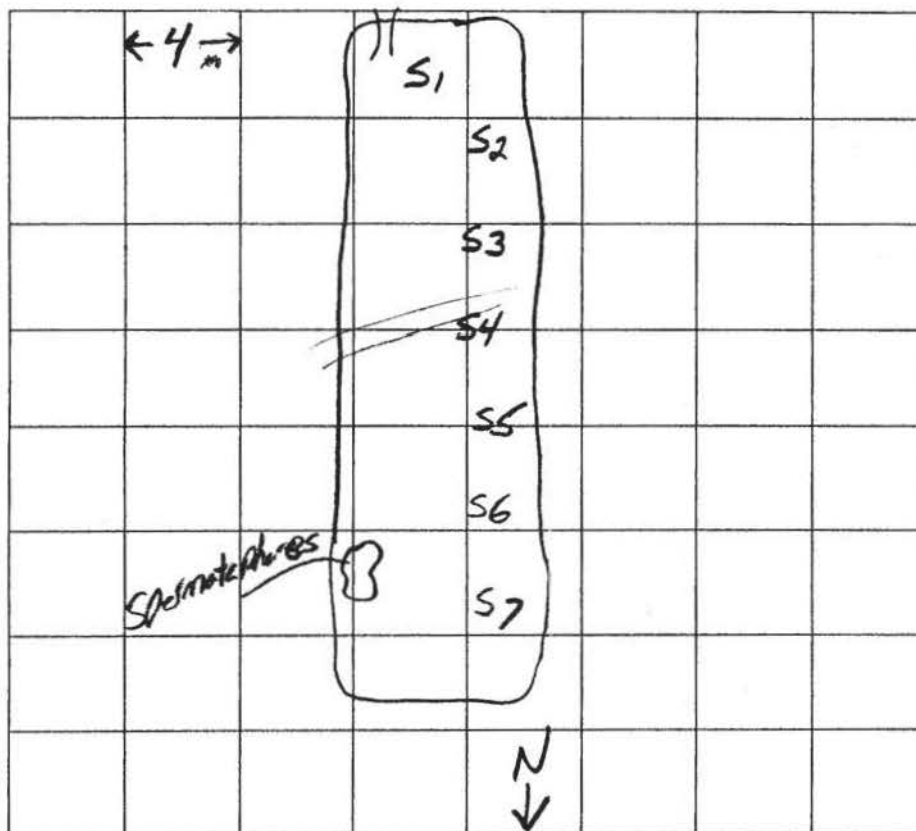
\_\_\_\_\_% Road/Right-of-Way

1 % Other: Nature trail (former rail-road bed)

**NOTES:**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

# FOCAL VERNAL POOL EGG MASS COUNT DATA SHEET 2004



UNIT (Refuge/Park):

Wallkill River NWR

VERNAL POOL NAME:

Wood Duck Nature Trail #2

DATE (DDMonth):

29 March 2004

TIME BEGIN: 1510

TIME END: 1540

GRID SPACING IS 4 m

INDICATE North ON MAP

OBSERVER 1 (full name)

Kevin Holcomb

OBSERVER 2 (full name)

Ken Witkowski

INDICATE WITH LINE

## WHEN OBSERVERS SWITCH

Species	# Egg Masses		Species	# Egg Masses		Species	# Egg Masses	
	OBS 1	OBS 2		OBS 1	OBS 2		OBS 1	OBS 2
Switch								
S1		1						
S2	1							
S3	1							
S4	1							
S5	1							
S6	1							
S7	3							

UNIT (Refuge/Park): Wallkill River NWRVERNAL POOL NAME: Wood Duck Nature Trail #2Date (DD Month): 29 March 2004 Sky Code: 0 Wind Code: 3 Previous Day Precipitation? ☐ YES ☒ NOWater Temp.: 13 ☒ °C ☐ °F Water pH: 7.07Pool Max. Length: 26.6 m Pool Max. Width: 5.1 mPool Max Depth: 26 cm

## Along Max Length

Depth	<u>23</u>	<u>23</u>	<u>20</u>	<u>19</u>
at linear distance	<u>1</u>	<u>2</u>	<u>24</u>	<u>25</u>

## Along Max Width

Depth	<u>21</u>	<u>26</u>	<u>34</u>	<u>24</u>
at linear distance	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>

Is Visibility Impaired During Egg Mass Counts? ☒ YES ☐ NO

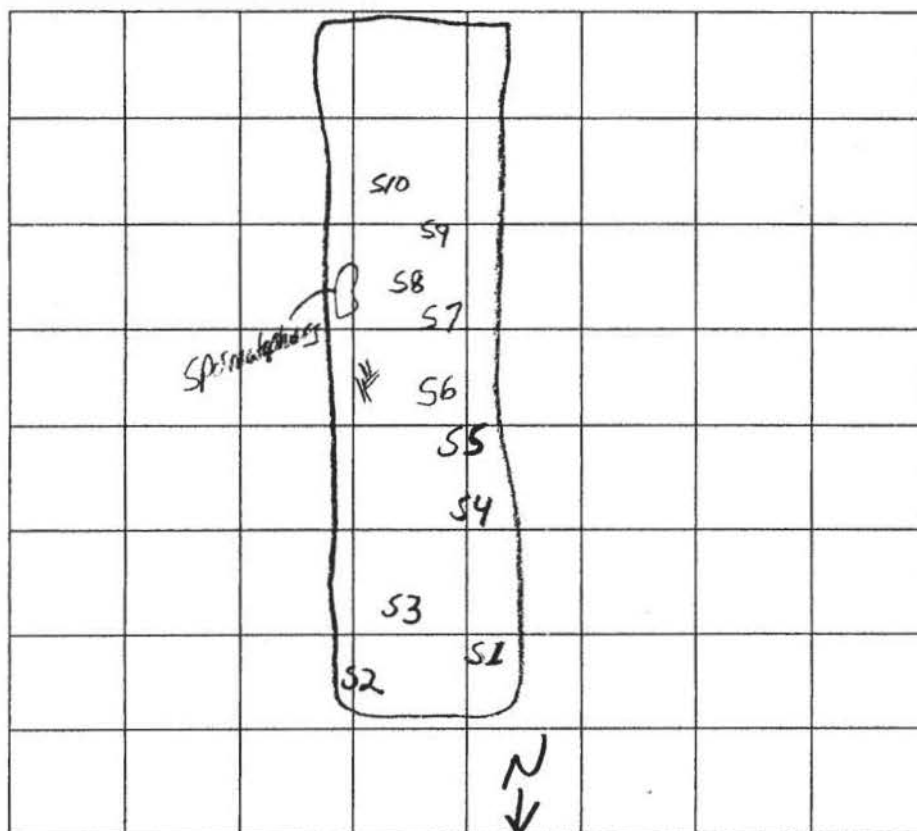
## OTHER AMPHIBIANS, REPTILES, INVERTEBRATES, ETC.:

SPECIES	Chorus Code	# Mated Pairs	Spermatophores	# Egg Masses	Tadpoles/Larvae	# Juveniles	# Adults
<u>RSYL</u>							<u>3</u>
<u>AMAC</u>			<u>31</u>				

NOTES: Water Strider  
Freshwater Snail

CHORUS CODE	DESCRIPTION
<u>0</u>	No amphibians calling
<u>1</u>	Individuals can be counted, calls not overlapping. Record number of individuals calling after code separated by hyphen (e.g., 1-3)
<u>2</u>	Calls overlap, but individuals are distinguishable. Record number of individuals calling after code separated by hyphen (e.g., 2-6)
<u>3</u>	Full chorus, calls continuous and overlapping. Can not distinguish individuals.

# FOCAL VERNAL POOL EGG MASS COUNT DATA SHEET 2004



UNIT (Refuge/Park):

Wallkill River NWR

VERNAL POOL NAME:

Wood Duck Nature Trail #2

DATE (DDMonth):

8 April 2004

TIME BEGIN: 1025

TIME END: 1055

GRID SPACING IS 4 m  
INDICATE North ON MAP

OBSERVER 1 (full name)

Kevin Holcomb

OBSERVER 2 (full name)

Ken Witkowski

INDICATE WITH LINE

## WHEN OBSERVERS SWITCH

Species	# Egg Masses		Species	# Egg Masses		Species	# Egg Masses	
	OBS 1	OBS 2		OBS 1	OBS 2		OBS 1	OBS 2
<u>S1</u>	<u>4</u>							
<u>S2</u>		<u>2</u>						
<u>S3</u>	<u>1</u>							
<u>S4</u>	<u>1</u>							
<u>S5</u>	<u>2</u>							
<hr/>								
<u>S6</u>	<u>4</u>							
<u>S7</u>	<u>2</u>							
<u>S8</u>	<u>1</u>							
<u>S9</u>	<u>1</u>							
<u>S10</u>	<u>1</u>							



UNIT (Refuge/Park): Wallkill River NWRVERNAL POOL NAME: Wood Duck Nature Trail #2Date (DD Month): 8 April 2004 Sky Code: 1 Wind Code: 2 Previous Day Precipitation? ☐ YES ☒ NOWater Temp.: 7 ☒ °C ☐ °F Water pH: 7.07Pool Max. Length: 26.6 m Pool Max. Width: 5.1 mPool Max Depth: 42 cm

Along Max Length

Depth				
at linear distance				

Along Max Width

Depth				
at linear distance				

Is Visibility Impaired During Egg Mass Counts? ☒ YES ☐ NO

## OTHER AMPHIBIANS, REPTILES, INVERTEBRATES, ETC.:

SPECIES	Chorus Code	# Mated Pairs	Spermatophores	# Egg Masses	Tadpoles/Larvae	# Juveniles	# Adults
<i>R. catesbeiana</i>							1
AMAC			30				
<i>R. clamitans</i>							1

NOTES: Water Striders  
Snails

CHORUS CODE	DESCRIPTION
0	No amphibians calling
1	Individuals can be counted, calls not overlapping. Record number of individuals calling after code separated by hyphen (e.g., 1-3)
2	Calls overlap, but individuals are distinguishable. Record number of individuals calling after code separated by hyphen (e.g., 2-6)
3	Full chorus, calls continuous and overlapping. Can not distinguish individuals.

A hand-drawn diagram on a grid background. It features a vertical rectangle divided into four horizontal sections. The sections are labeled from top to bottom: S5, S4, S3, and S2. A north arrow is located to the right of the rectangle, pointing upwards.

**INDICATE WITH LINE**

[illegible]

UNIT (Refuge/Park): Wallkill River NWRVERNAL POOL NAME: Wood Duck Native Trail #2Date (DD Month): 22 April 2004 Sky Code: 1 Wind Code: 1 Previous Day Precipitation? ☐ YES ☒ NOWater Temp.: 14 ☒ °C ☐ °F Water pH: 7.07Pool Max. Length: 26.8 m Pool Max. Width: 5.3 mPool Max Depth: 49 cm

## Along Max Length

Depth				
at linear distance				

## Along Max Width

Depth				
at linear distance				

Is Visibility Impaired During Egg Mass Counts? ☒ YES ☐ NO

## OTHER AMPHIBIANS, REPTILES, INVERTEBRATES, ETC.:

SPECIES	Chorus Code	# Mated Pairs	Spermatophores	# Egg Masses	Tadpoles/Larvae	# Juveniles	# Adults
<i>R. clamitans</i>	H1						2

## NOTES:

CHORUS CODE	DESCRIPTION
0	No amphibians calling
1	Individuals can be counted, calls not overlapping. Record number of individuals calling after code separated by hyphen (e.g., 1-3)
2	Calls overlap, but individuals are distinguishable. Record number of individuals calling after code separated by hyphen (e.g., 2-6)
3	Full chorus, calls continuous and overlapping. Can not distinguish individuals.

**Wallkill River National Wildlife Refuge  
2004 Vernal Pool Study**

**Observers:**

Kevin Holcomb, Wildlife Biologist

Ken Witkowski, Volunteer/Contractor

**Scenic Lakes Rd. (North #1) Vernal Pool Data**

<u>Name</u>	<u>UTM (Zone 18)</u>	<u>Survey Dates</u>
Scenic Lakes Rd. (North #1)	0535757e 4559545n	3/29, 4/8, 4/22

*Lat 41° 11' 11.23"*  
*Long 74° 35' 25.05"*

Scenic Lakes Rd. (North #1) Vernal Pool	WF	SS
29-Mar	0	4
8-Apr	0	20
22-Apr	2	10

# FOCAL VERNAL POOL LOCATION AND HABITAT DATA SHEET

UNIT: Wallkill River NWR

VERNAL POOL NAME: Scenic Lakes Rd North #1

OBSERVER: Kevin Holcomb DATE (DD MONTH): 29 March 2004

## DETAILED DIRECTIONS TO SITE:

Tract #22 Scenic Lakes Rd Refuge Parking Area #11  
walk north ~ 100 yds

LATITUDE (DDMMSS.SS): 41°11'11.23" LONGITUDE (DDMMSS.SS): 74°35'25.05" EPE: +/- 6.2 m

POOL MAX. LENGTH: 45 m POOL MAX. WIDTH: 20 m POOL MAX. DEPTH: 58 cm

POOL PERMANENCY: ☐ temporary (dries annually) ☒ semipermanent (sometimes dries) ☐ permanent (never dries)

POND TYPE (Check either Natural, Beaver-created, Artificial/Man-made, or Unknown):

☒ Natural (e.g., oxbow, vernal pool)

☐ Beaver-created

☐ Artificial/Man-Made - If pool is artificial/man-made, pick best description below:

☐ borrow/gravel pit ☐ roadside ditch ☐ farm pond ☐ impoundment ☐ other: \_\_\_\_\_

☐ Unknown

SITE TYPE: ☐ upland-isolated (not part of larger wetland)

☒ bottomland-isolated (part of a river or lake floodplain)

☐ wetland complex (associated with a larger wetland complex)

FISH PRESENT: ☒ No ☐ Yes If Yes, list Species: \_\_\_\_\_

DISTANCE TO FOREST FROM WATER'S EDGE: 0 m

DISTANCE TO NEAREST ROAD: 82 m

ROAD TYPE: ☒ PAVED ☐ GRAVEL ☐ DIRT

ROAD CONDITIONS AT NIGHT: ☐ Refuge/Park use only ☒ Light Traffic (< 10 cars) ☐ Heavy Traffic (≥ 10 cars)

FOR THE FOLLOWING, RANK the amount of pond area in which each type occurs

(does not need to sum to 100%): 0 = 0%, 1 = 1-10%, 2 = 11-25%, 3 = 26-50%, 4 = 51-75%, 5 = 76-100%

AQUATIC SUBSTRATE: Leaf Litter 5 Sticks/Logs 4

AQUATIC VEGETATION: SAV 1 Emergent 4 Shrub 2 Tree 2

Phrag



Estimate % of each of the land use/cover categories within 50 m of pool. Estimates should total 100%:

☒ Hardwood (> 75% deciduous)  
☐ Softwood (> 75% evergreen)  
☐ Mixed Hardwood/Softwood (< 75% each)

☒ Heavy (> 50% canopy cover of trees/shrubs > 6 ft. tall)  
☐ Moderate (< 50% canopy cover of trees/shrubs < 6 ft. tall)

% Other: \_\_\_\_\_

**NOTES:**

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

# FOCAL VERNAL POOL EGG MASS COUNT DATA SHEET 2004

**UNIT (Refuge/Park):**

### Wallkill River NWR

**VERNAL POOL NAME:**

Scenic Lakes North #1

**DATE (DDMonth):**

29 March 2004

TIME BEGIN: 1600

TIME END: 1700

GRID SPACING IS 6 m  
INDICATE North ON MAP

**OBSERVER 1 (full name)**

Kevin Holcomb

**OBSERVER 2 (full name)**

Ken Withowski

**INDICATE WITH LINE**

## WHEN OBSERVERS SWITCH

[illegible]

UNIT (Refuge/Park): Wallkill River NWRVERNAL POOL NAME: Seneca Lakes North #1Date (DD Month): 29 March 2004 Sky Code: 0 Wind Code: 3 Previous Day Precipitation? ☐ YES ☒ NOWater Temp.: 58 ☐ °C ☒ °F Water pH: 6.87Pool Max. Length: 45 m Pool Max. Width: 20 mPool Max Depth: 58 cm

Along Max Length

Depth				
at linear distance				

Along Max Width

Depth				
at linear distance				

Is Visibility Impaired During Egg Mass Counts? ☐ YES ☐ NO

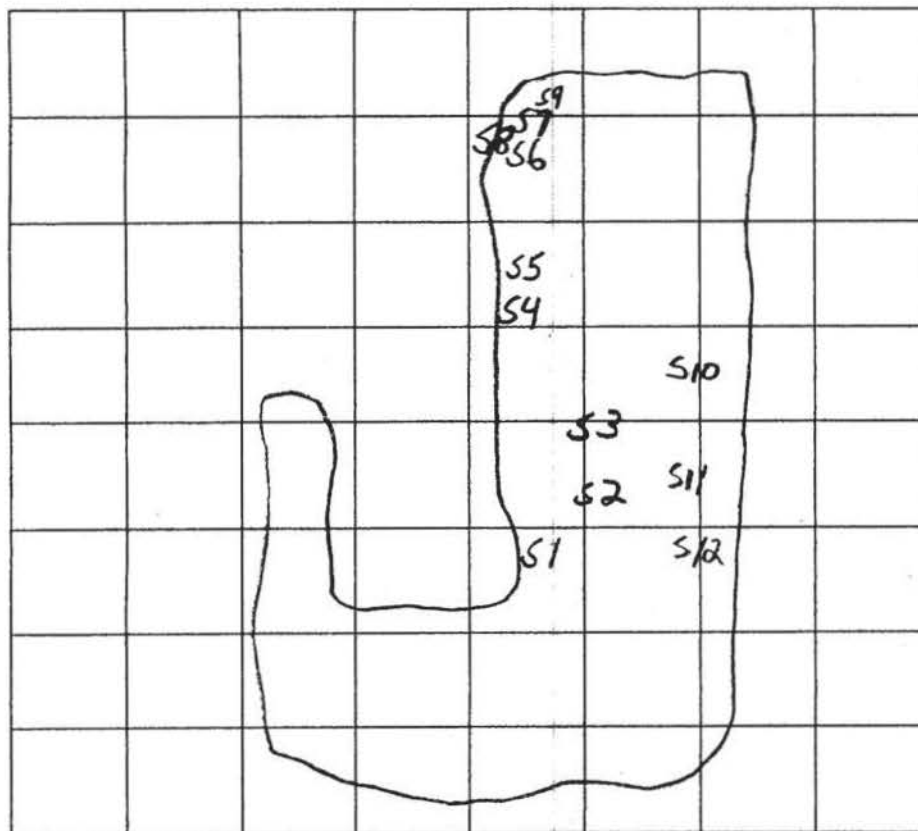
## OTHER AMPHIBIANS, REPTILES, INVERTEBRATES, ETC.:

SPECIES	Chorus Code	# Mated Pairs	Spermatophores	# Egg Masses	Tadpoles/Larvae	# Juveniles	# Adults
<i>H. crucifer</i>	2						
UNKNOWN					///		//
RSYL	2						//
AMAC			8				
<i>C. serpentina</i>							1

## NOTES:

CHORUS CODE	DESCRIPTION
0	No amphibians calling
1	Individuals can be counted, calls not overlapping. Record number of individuals calling after code separated by hyphen (e.g., 1-3)
2	Calls overlap, but individuals are distinguishable. Record number of individuals calling after code separated by hyphen (e.g., 2-6)
3	Full chorus, calls continuous and overlapping. Can not distinguish individuals.

# FOCAL VERNAL POOL EGG MASS COUNT DATA SHEET 2004



UNIT (Refuge/Park):

Wallkill River NWR

VERNAL POOL NAME:

Scenic Lakes North #1

DATE (DDMonth):

8 April 2004

TIME BEGIN: 1115

TIME END: 1210

GRID SPACING IS ~6 m  
INDICATE North ON MAP

OBSERVER 1 (full name)

Kevin Holcomb

OBSERVER 2 (full name)

Ken Witkowski

INDICATE WITH LINE

## WHEN OBSERVERS SWITCH

Species	# Egg Masses		Species	# Egg Masses		Species	# Egg Masses	
	OBS 1	OBS 2		OBS 1	OBS 2		OBS 1	OBS 2
<u>S1</u>		<u>+2</u>	<u>S12</u>		<u>+1</u>			
<u>S2</u>	<u>2</u>		<u>S13</u>	<u>2</u>				
<u>S3</u>	<u>2</u>							
<u>S4</u>	<u>2</u>							
<u>S5</u>	<u>1</u>							
<u>S6</u>	<u>2</u>							
<u>S7</u>	<u>1</u>							
<u>S8</u>		<u>+1</u>						
<u>S9</u>	<u>2</u>							
<hr/>								
<u>S10</u>		<u>+1</u>						
<u>S11</u>		<u>+1</u>						

UNIT (Refuge/Park): Wallkill River NWRVERNAL POOL NAME: Scenic Lakes Rd North #1Date (DD Month): 8 Apr. 1 2004 Sky Code: 1 Wind Code: 2 Previous Day Precipitation? ☐ YES ☒ NOWater Temp.: 8 ☒ °C ☐ °F Water pH: 6.87Pool Max. Length: 45 m Pool Max. Width: 20 mPool Max Depth: 56 cm

## Along Max Length

Depth	<u>12cm</u>	<u>13cm</u>	<u>24cm</u>	<u>21cm</u>
at linear distance	<u>11m</u>	<u>2m</u>	<u>43m</u>	<u>44m</u>

## Along Max Width

Depth	<u>19</u>	<u>28</u>	<u>20</u>	<u>15</u>
at linear distance	<u>1m</u>	<u>2m</u>	<u>18m</u>	<u>19m</u>

Is Visibility Impaired During Egg Mass Counts? ☒ YES ☐ NO

## OTHER AMPHIBIANS, REPTILES, INVERTEBRATES, ETC.:

SPECIES	Chorus Code	# Mated Pairs	Spermatophores	# Egg Masses	Tadpoles/Larvae	# Juveniles	# Adults
<u>GREEN FROG</u>							<u>1</u>
<u>UNKNOWN</u>					<u>100+</u>		<u>1</u>
<u>BULLFROG</u>							<u>1</u>

## NOTES:

CHORUS CODE	DESCRIPTION
<u>0</u>	No amphibians calling
<u>1</u>	Individuals can be counted, calls not overlapping. Record number of individuals calling after code separated by hyphen (e.g., 1-3)
<u>2</u>	Calls overlap, but individuals are distinguishable. Record number of individuals calling after code separated by hyphen (e.g., 2-6)
<u>3</u>	Full chorus, calls continuous and overlapping. Can not distinguish individuals.



# FOCAL VERNAL POOL EGG MASS COUNT DATA SHEET 2004

**UNIT (Refuge/Park):****VERNAL POOL NAME:**

DATE (DDMonth):

TIME BEGIN: 0910

TIME END: 0940

GRID SPACING IS 6 m  
INDICATE North ON MAP

**OBSERVER 1 (full name)**

Kevin Holcomb

**OBSERVER 2 (full name)**

Ken W. Kowski

**INDICATE WITH LINE**

[illegible]

UNIT (Refuge/Park): Wallkill River NWRVERNAL POOL NAME: Scenic Lakes North #1Date (DD Month): 22 Apr. 1 2004 Sky Code: 2 Wind Code: 1 Previous Day Precipitation? ☐ YES ☒ NOWater Temp.: 50 ☐ °C ☒ °F Water pH: 6.87Pool Max. Length: 44 m Pool Max. Width: 19 mPool Max Depth: 45 cm

## Along Max Length

Depth				
at linear distance				

## Along Max Width

Depth				
at linear distance				

Is Visibility Impaired During Egg Mass Counts? ☒ YES ☐ NO

## OTHER AMPHIBIANS, REPTILES, INVERTEBRATES, ETC.:

SPECIES	Chorus Code	# Mated Pairs	Spermatophores	# Egg Masses	Tadpoles/Larvae	# Juveniles	# Adults
<i>R. clamitans</i>							2

## NOTES:

CHORUS CODE	DESCRIPTION
0	No amphibians calling
1	Individuals can be counted, calls not overlapping. Record number of individuals calling after code separated by hyphen (e.g., 1-3)
2	Calls overlap, but individuals are distinguishable. Record number of individuals calling after code separated by hyphen (e.g., 2-6)
3	Full chorus, calls continuous and overlapping. Can not distinguish individuals.



2004 ACS points



ID 45



ID 56



ID 53



ID 45A



103411



109



1010



1023



1022



1024



102



108



1028

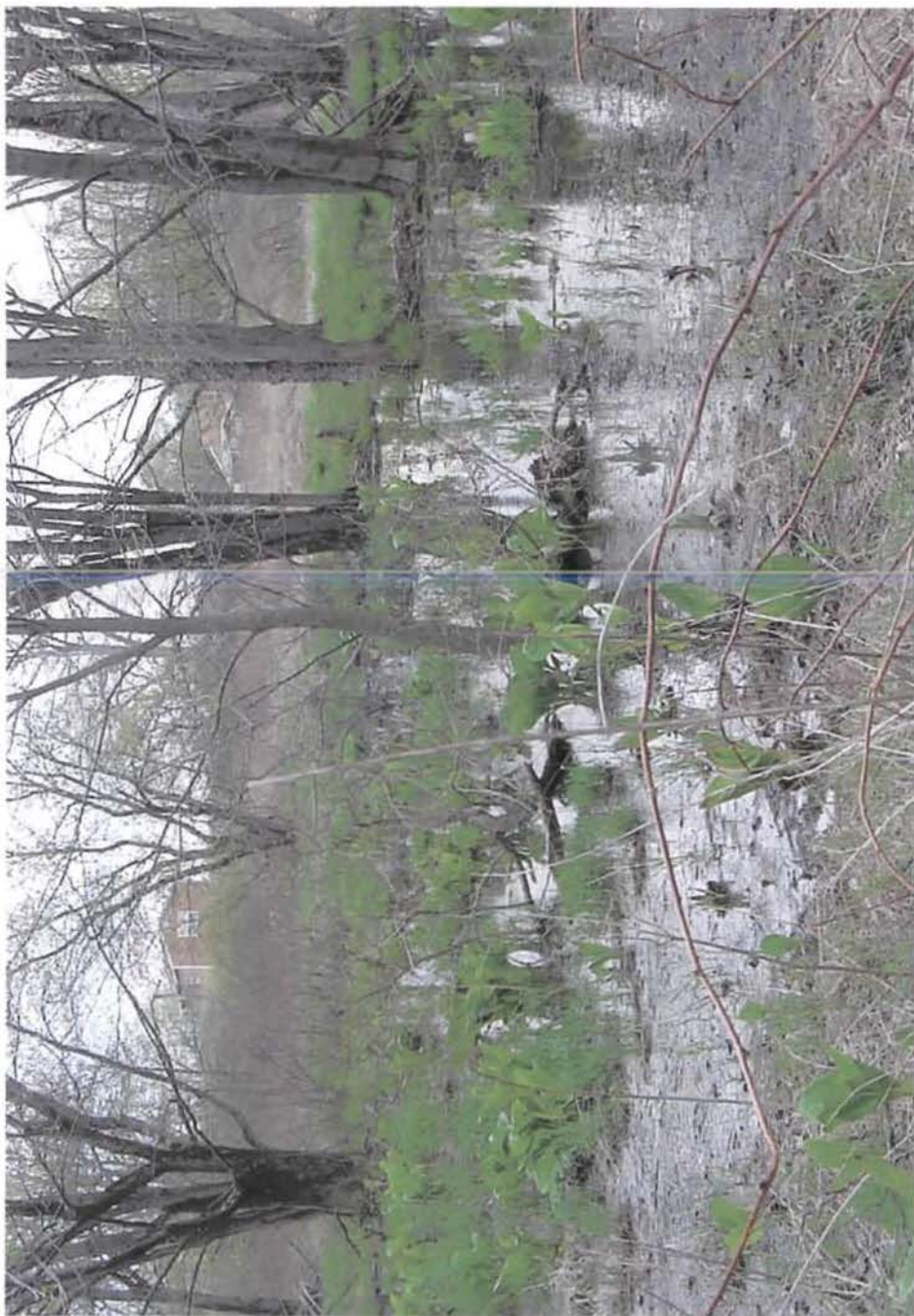




IO 2811







41 I 1



41 I 2





ID58



ID48



ID44



ID30



ID62



47D



47E  
J



2004 ACS points





47 A ✓



47



47C ✓



61



47B



1019



1018



1043



1019A



20



4





10412



1015A



1411



1013



105



1011





1013



1041





36



40



33



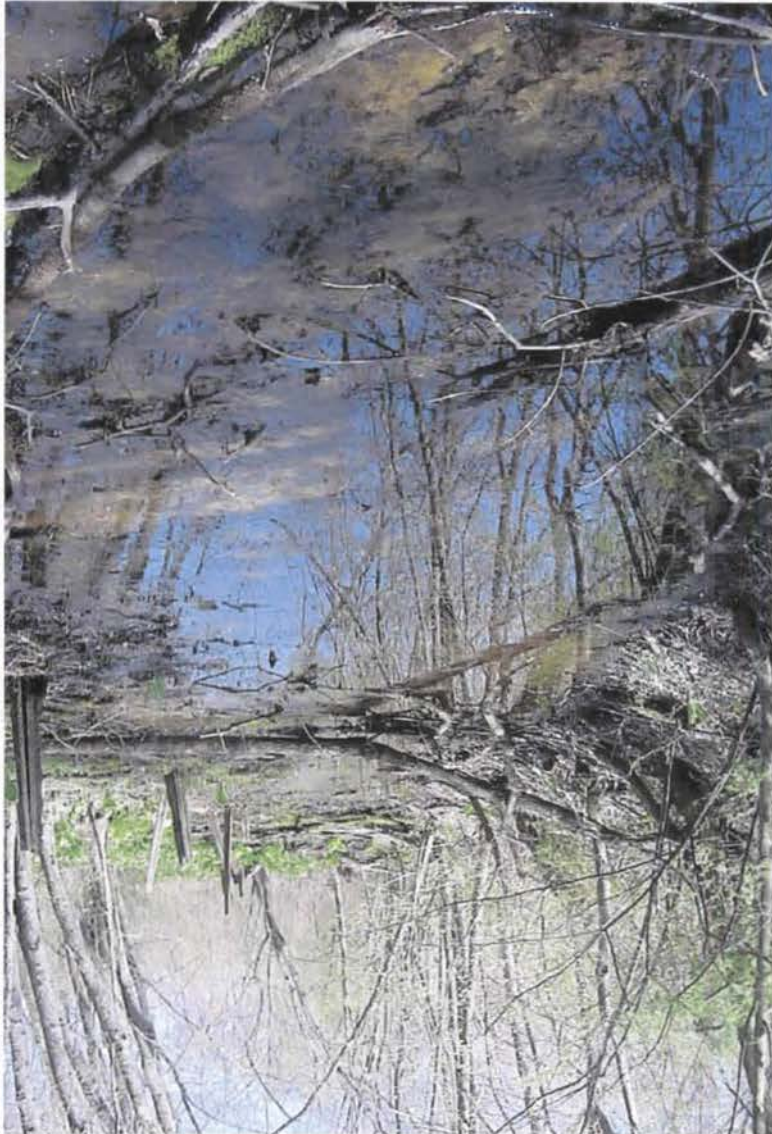
2



1







91



10



**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 02 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 48 GPS (dd mm ss.ss) N 41° 15' 45.68980 W 74 32 40.34724  
 Sky code\* 2 Wind code\* 2  
 Previous day precipitation ( $\geq 1$  cm)? ☒ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

90 %Forest (check appropriate type)

Hardwood (>75% deciduous)

$\bar{X}$  Softwood (<75% deciduous)

10 %Agriculture/meadow/pasture

%Residential: urban/suburban

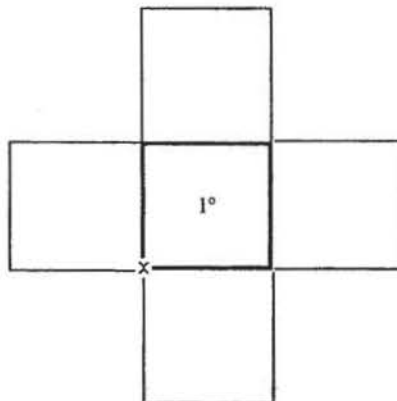
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

NO UP LOCATED

RED CEDAR / SCIRUS

Photo number of primary plot: DISK 1 #2

[illegible]

\*= see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 02 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 30 GPS (dd mm ss.ss) N 41° 12' 15.16172 W 74° 33' 46.21493  
 Sky code\* 2 Wind code\* 4  
 Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (>75% deciduous)

Softwood (<75% deciduous)

100% Agriculture/meadow/pasture

%Residential: urban/suburban

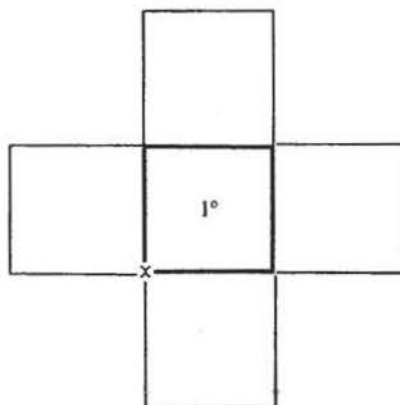
%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

No VP

Grassland Field

Photo number of primary plot: Disk 71

[illegible]

\*= see back for definitions and codes for table



**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 02 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 58 GPS (dd mm ss.ss) N 41° 16 17.94464 W 74° 31.14090  
 Sky code\* 2 Wind code\* 2  
 Previous day precipitation (≥1 cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (&gt;75% deciduous)

Softwood (&lt;75% deciduous)

100% Agriculture/meadow/pasture

%Residential: urban/suburban

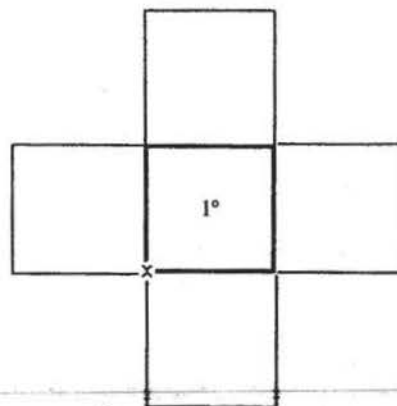
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

NO UP LOCATED

DITCHED AG. FIELD

Photo number of primary plot: 01SK1#3

[illegible]

\*= see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 02 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) Ken Witkowski

Point # 62 GPS (dd mm ss.ss) N 41° 16 33.98/38 W 74° 31 14.04/42

Sky code\* 2 Wind code\* 2

Previous day precipitation ( $\geq 1$  cm)? ☒ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

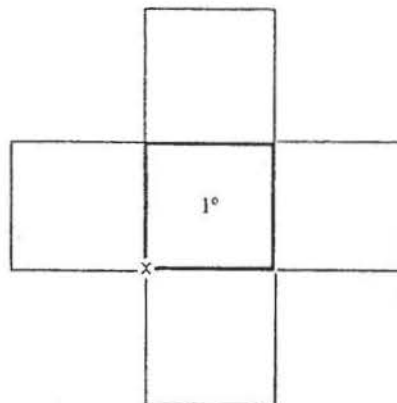
%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

NO VP

Photo number of primary plot: *DISK 1 #4*

[illegible]

\*= see back for definitions and codes for table



**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 06 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 44 GPS (dd mm ss.ss) N 41° 11 26.35519 W 74° 33 03.61044

Sky code\* 0 Wind code\* 5

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

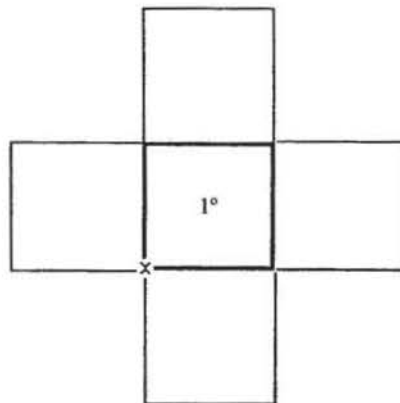
%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

UPLAND FOREST SLOPE NO VP

Photo number of primary plot: *DISK 1 #8*

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 06 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 45 GPS (dd mm ss.ss) N 41° 17 06.75751 W 74° 32 39.78366  
 Sky code\* 0 Wind code\* 5  
 Previous day precipitation ( $\geq 1$  cm)? [ ] YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

10 %Forest (check appropriate type)

\* Hardwood (>75% deciduous)

Softwood (<75% deciduous)

90 %Agriculture/meadow/pasture

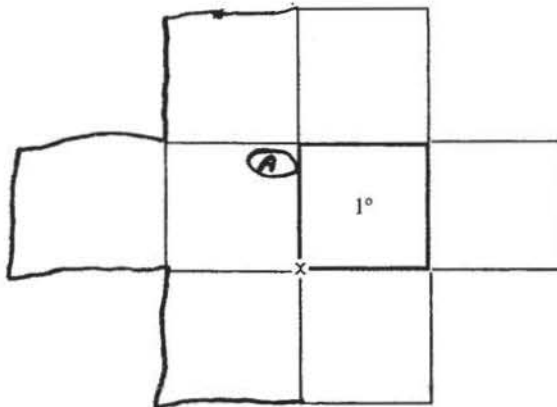
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

GRASSLAND FIELD-WOODED EDGE

Photo number of primary plot:

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 06 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 53 GPS (dd mm ss.ss) N 41°16.50.45837 W 74°32.18.40297  
 Sky code\* 0 Wind code\* 5  
 Previous day precipitation ( $\geq 1$  cm)? [ ] YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

25 %Forest (check appropriate type)

\* Hardwood (>75% deciduous)

Softwood (<75% deciduous)

25 %Agriculture/meadow/pasture

%Residential: urban/suburban

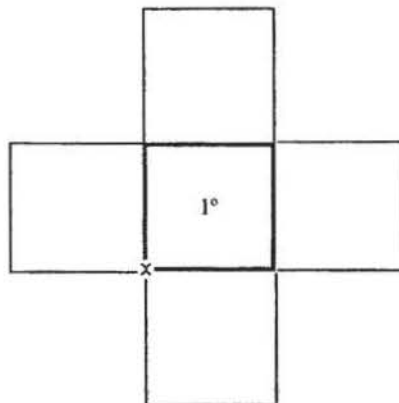
%Road; description (road type*	traffic at night*
100% Road; description (road type*	traffic at night*

Notes (record incidental species observations on reverse):

No up

GRASSLAND FIELD / RIVER BOTTOM  
FLOOD PLAIN

Photo number of primary plot: 015X2 #2

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 54 GPS (dd mm ss.ss) N 41° 15' 48.60422 W 74° 32' 18.85970

Sky code\* \_\_\_\_\_ Wind code\* \_\_\_\_\_

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

%Residential: urban/suburban

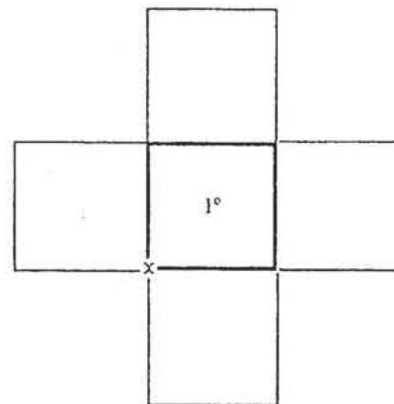
%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

POINT ON PRIVATE PROPERTY

NO SAMPLING

Photo number of primary plot:

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) Wallkill River NWR

Observers (full names) Ken Witkowski

Point # 55 GPS (dd mm ss.ss) N 41° 15' 29.39065 W 74° 32' 18.97382

Sky code\* \_\_\_\_\_ Wind code\* \_\_\_\_\_

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (>75% deciduous)

Softwood (<75% deciduous)

% Agriculture/meadow/pasture

%Residential: urban/suburban

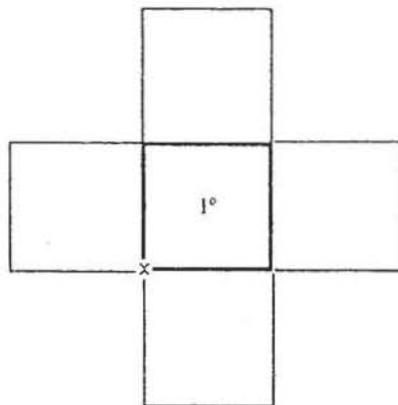
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

POINT ON PRIVATE PROPERTY

NO SAMPLING

Photo number of primary plot:

[illegible]

\* = see back for definitions and codes for table

**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 06 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 56 GPS (dd mm ss.ss) N 41° 16 50.37164 W 74° 31 56.90953

Sky code\* 0 Wind code\* 5

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

25 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

**75 %Agriculture/meadow/pasture**

%Residential: urban/suburban

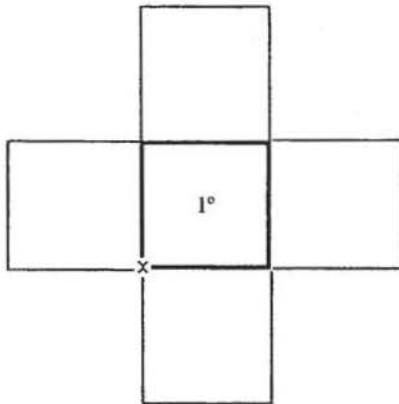
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

DITCHED FIELD - WOODEN EDGE

No VP

Photo number of primary plot: DISK 2 #5

[illegible]

\* = see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 08 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 34 GPS (dd mm ss.ss) N 41° 13 52.36205 W 74° 33 24.08972

Sky code\* 2 Wind code\* 0

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

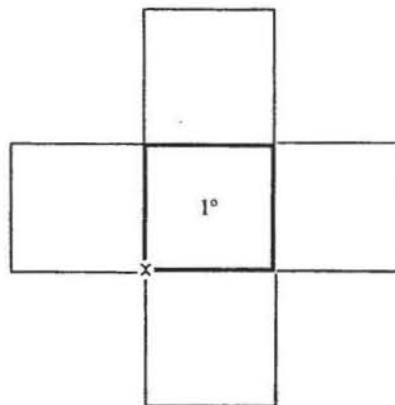
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

UNABLE TO GET TO POINT - EMERGENT  
WETLAND - ENTIRE AREA UNDER WATER

Photo number of primary plot: *NO PHOTO*

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 08 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 9 GPS (dd mm ss.ss) N 41° 11 51.10868 W 74° 34 29.25685  
 Sky code\* 2 Wind code\* 2  
 Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (&gt;75% deciduous)

Softwood (&lt;75% deciduous)

/00 %Agriculture/meadow/pasture

%Residential: urban/suburban

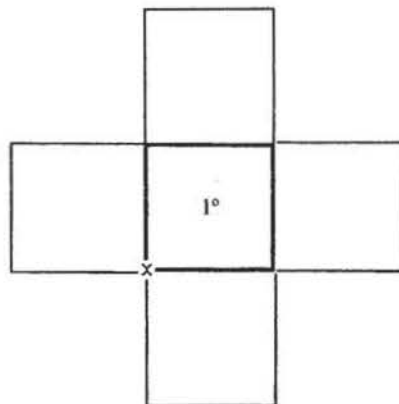
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

TRANSECT IS IN THE RIVER

no VP

Photo number of primary plot: 01843 #2

[illegible]

\* = see back for definitions and codes for table



**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 09 04 Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 42 GPS (dd mm ss.ss) N 41° 14 08.49246 W 74° 33 02.50146  
 Sky code\* 2 Wind code\* 0  
 Previous day precipitation ( $\geq 1$  cm)? [ ] YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

☒ Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

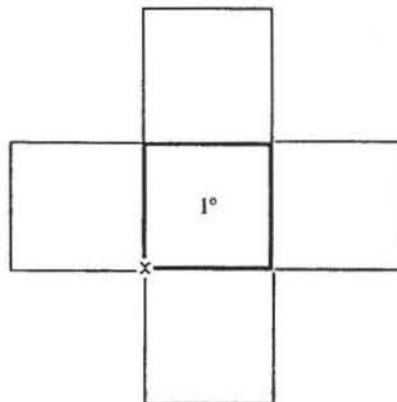
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

UNABLE TO GET TO POINT - EMERGENT  
WETLAND - ENTIRE AREA UNDER WATER

Photo number of primary plot: *No PHOTO*

[illegible]

\*= see back for definitions and codes for table

## 1

Date (dd month) 09 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 24 GPS (dd mm ss.ss) N 41° 14 08.65788 W 74° 33 45.45896  
 Sky code\* 2 Wind code\* 0  
 Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

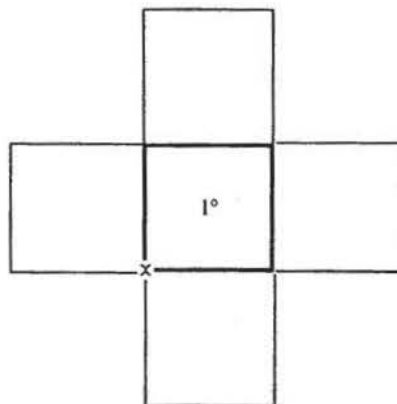
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

NO VP

Photo number of primary plot: DISK 3#6

[illegible]

\* = see back for definitions and codes for table



**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 09 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 25 GPS (dd mm ss.ss) N 41°13 52.44416 W 74°33 45.56704

Sky code\* 2 Wind code\* 2

Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

☒ %Forest (check appropriate type)

☒ Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

**%Residential:** urban/suburban

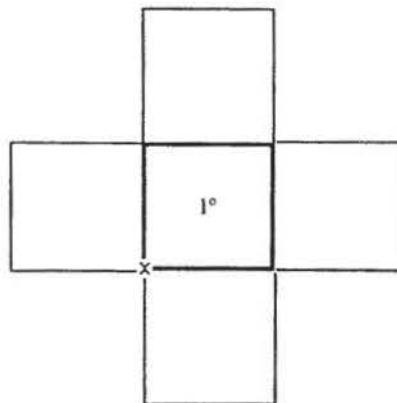
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

No VP

FORESTED FLOOD PLAIN

Photo number of primary plot: *DISK 3 #8*

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 29 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 23 GPS (dd mm ss.ss) N 41° 14 41.08524 W 74° 33 45.24275  
 Sky code\* 2 Wind code\* 2  
 Previous day precipitation ( $\geq 1$  cm)? ☒ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (&gt;75% deciduous)

Softwood (&lt;75% deciduous)

100 % Agriculture/meadow/pasture

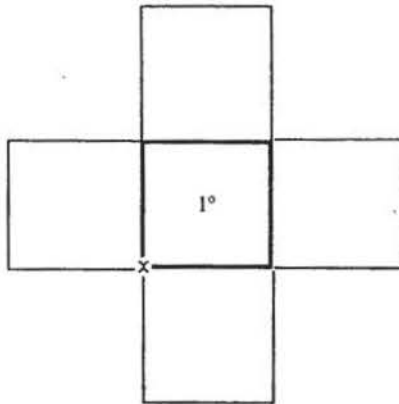
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

GRASSLAND FIELD/FLOODPLAIN  
NO V.P.

Photo number of primary plot: DISK 3 #4

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 09 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 22 GPS (dd mm ss.ss) N 41°14 57.29888 W 74°33 45.13464

Sky code\* 2 Wind code\* 2

Previous day precipitation ( $\geq 1$  cm)? ☒ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

50 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

50% Agriculture/meadow/pasture

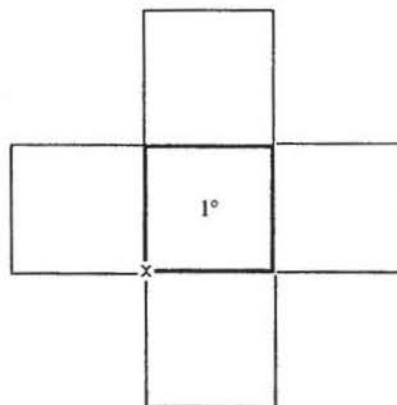
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

NO UP

Photo number of primary plot: *015K 3 #5*

[illegible]

\*= see back for definitions and codes for table

**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 09 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 10 GPS (dd mm ss.ss) N 41° 11' 42.89485 W 71° 34' 29.36179

Sky code\* 1 Wind code\* 2

Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (&gt;75% deciduous)

— Softwood (<75% deciduous)

100 % Agriculture/meadow/pasture

       %Residential: urban/suburban

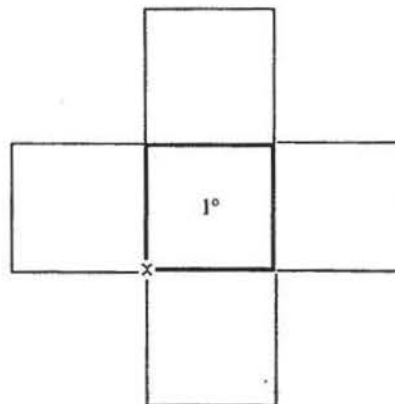
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

FLOOD PLAIN FIELD

no VP

Photo number of primary plot: *DISK 3 #3*

[illegible]

\* = see back for definitions and codes for table



**ACS Vernal Pool Data Sheet 2004**

Date (dd month) 12 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 8 GPS (dd mm ss.ss) N 41°12'15.32250 W 74°34'29.15191  
 Sky code\* 2 Wind code\* 2  
 Previous day precipitation (≥1 cm)? [ ] YES [X] NO

Land Cover (within 50m of start point, estimates should add to 100%)

25 %Forest (check appropriate type)

\* Hardwood (>75% deciduous)

Softwood (<75% deciduous)

25 % Agriculture/meadow/pasture

%Residential: urban/suburban

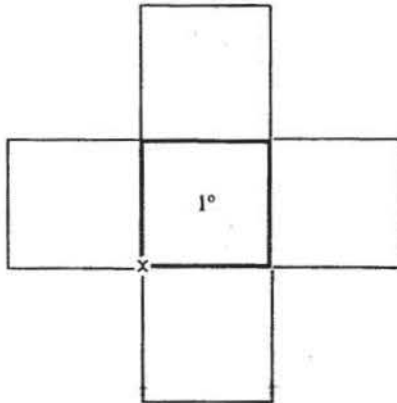
%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

FLOOD PLAIN

NO VP

Photo number of primary plot: 10/54 3 #9

[illegible]

\*= see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 12 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 28 GPS (dd mm ss.ss) N 41° 12 47.58726 W 74° 33 45.99904

Sky code\* 2 Wind code\* 1

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

✓ Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

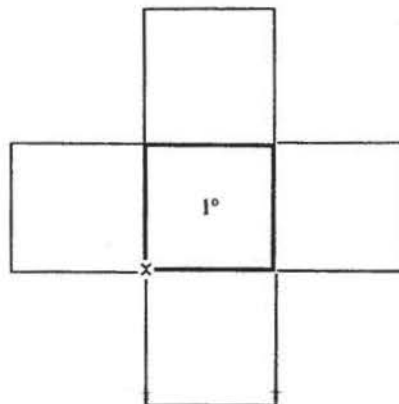
Notes (record incidental species observations on reverse):

WOODLAND

no VP

(INCIDENTAL POOL)

Photo number of primary plot: *DISH 3 #10*

[illegible]

\* = see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 15 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 43 GPS (dd mm ss.ss) N 41° 13 52.2782 W 74° 33 02.61245

Sky code\* 0 Wind code\* 6

Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

☒ %Forest (check appropriate type)

~~X~~ Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

%Residential: urban/suburban

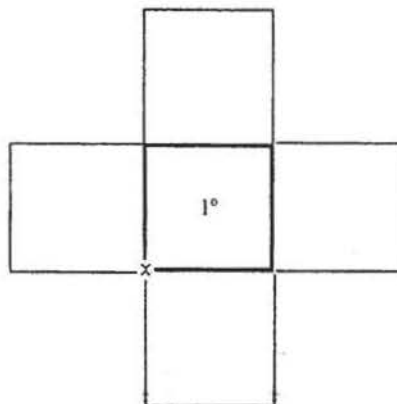
%Road; description (road type*	traffic at night*
--------------------------------	-------------------

Notes (record incidental species observations on reverse):

UPLAND FOREST SLOPE

No VP

Photo number of primary plot: *DISK 5 #3*

[illegible]

\* = see back for definitions and codes for table

EXTENSIVE FORESTED WETLAND

90 %Forest (check appropriate type)  
X Hardwood (>75% deciduous)  
 \_\_\_ Softwood (<75% deciduous)  
10 %Agriculture/meadow/pasture  
 \_\_\_ %Residential: urban/suburban  
 \_\_\_ %Road; description (road type\* traffic at night\*)

FOREST WITH EXTENSIVE WETLANDS  
WITH ISOLATED POOLS

Photo number of primary plot: *DISK 4 # 6*

[illegible]

\* = see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) Wallkill River NWR

Observers (full names) Ken Witkowski

Point # 59 GPS (dd mm ss.ss) N 41° 17 06.49727 W 74° 31 35.29895

Sky code\* \_\_\_\_\_ Wind code\* \_\_\_\_\_

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

— %Residential: urban/suburban

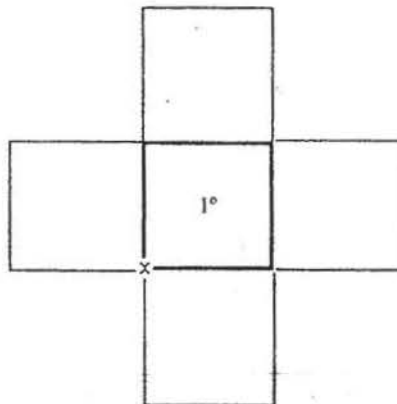
%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

POINT DELETED

LIBERTY MARCH IMPROVEMENT

Photo number of primary plot:

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 60 GPS (dd mm ss.ss) N 41° 16 50.28380 W 74° 31 35.41613

Sky code\* \_\_\_\_\_ Wind code\* \_\_\_\_\_

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☐ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (&gt;75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

— %Residential: urban/suburban

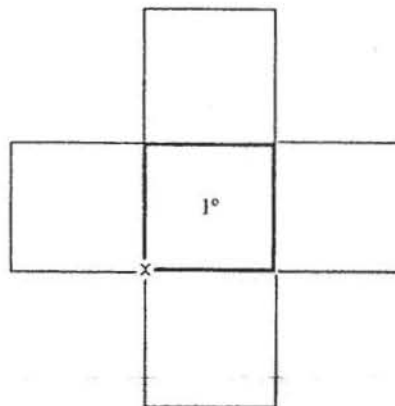
%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

POINT DELETED

LIBERTY MARSH IMPOUNDMENT

Photo number of primary plot:

[illegible]

\* = see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 15 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 61 GPS (dd mm ss.ss) N 41° 16' 01.64330 W 74° 31' 35.72760  
 Sky code\* 0 Wind code\* 5  
 Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (>75% deciduous)

Softwood (<75% deciduous)

00 %Agriculture/meadow/pasture

%Residential: urban/suburban

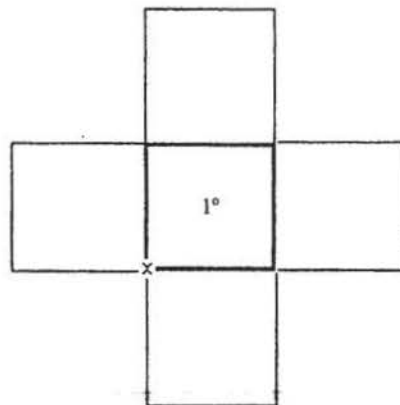
%Road; description (road type\* traffic at night\*

Notes (record incidental species observations on reverse):

STREAM RUNS THROUGH TRANSECT

NO VP

Photo number of primary plot: *DISK 4#5*

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 20 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 4 GPS (dd mm ss.ss) N 41° 11' 26.75969 W 74° 34' 50.93083  
 Sky code\* 0 Wind code\* 1  
 Previous day precipitation (≥1 cm)? [ ] YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (>75% deciduous)

— Softwood (<75% deciduous)

100 % Agriculture/meadow/pasture

%Residential: urban/suburban

%Road; description (road type*	traffic at night*
--------------------------------	-------------------

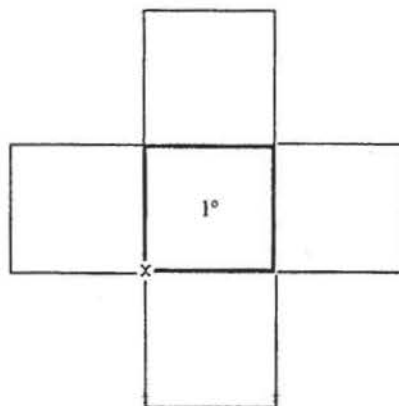
Notes (record incidental species observations on reverse):

no VP

FLOODPLAIN WETLAND

(INCIDENTAL POOLS-2)

Photo number of primary plot: *DISK 5 #10*

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 20 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 5 GPS (dd mm ss.ss) N 41° 11' 10.54583 W 74° 34' 51.03422  
 Sky code\* 0 Wind code\* 1  
 Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

25 %Forest (check appropriate type)

\* Hardwood (>75% deciduous)

Softwood (<75% deciduous)

25 % Agriculture/meadow/pasture

%Residential: urban/suburban

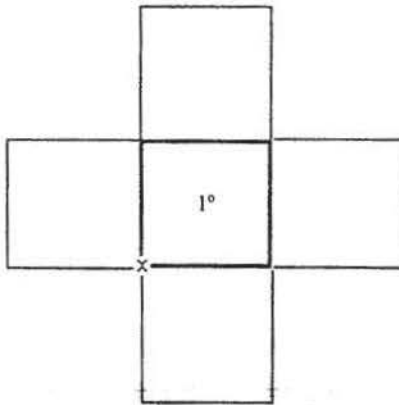
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

NO UP

PART AG. FIELD / PART EMERGENT  
WETLAND

Photo number of primary plot: *DISK 6#1*

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 20 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 11 GPS (dd mm ss.ss) N 41° 11 26.68099 W 74° 34 29.46670  
 Sky code\* 0 Wind code\* 1  
 Previous day precipitation ( $\geq 1$  cm)? [ ] YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

ADD %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

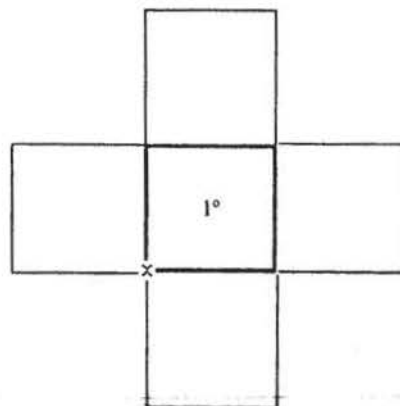
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

NO UP  
FORESTED WETLAND FOR 200M+  
IN EVERY DIRECTION

Photo number of primary plot: *QSK 6 #4*

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 20 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 18 GPS (dd mm ss.ss) N 41° 12 31.45644 W 74° 34 07.57697  
 Sky code\* 0 Wind code\* 2  
 Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

%Forest (check appropriate type)

Hardwood (>75% deciduous)

Softwood (<75% deciduous)

100 % Agriculture/meadow/pasture

%Residential: urban/suburban

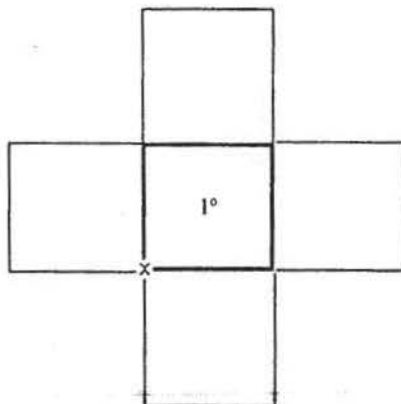
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

No VP

AG. FIELD

Photo number of primary plot: *DISK 5 # 6*

[illegible]

\*= see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 20 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) **Ken Witkowski**

Point # 19 GPS (dd mm ss.ss) N 49° 12' 15.24265 W 74° 34' 07.68338

Sky code\* 0 Wind code\* 2

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

25 %Forest (check appropriate type)

\* Hardwood (>75% deciduous)

Softwood (<75% deciduous)

75% Agriculture/meadow/pasture

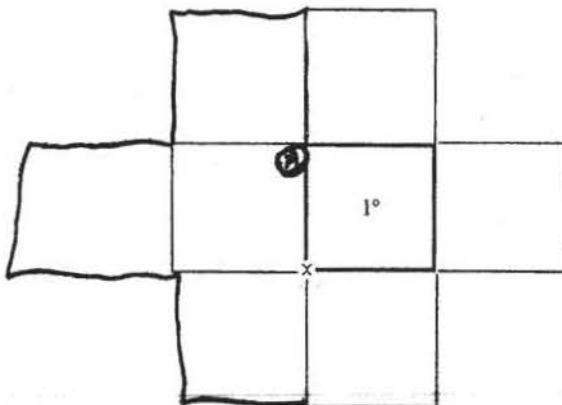
%Residential: urban/suburban

%Road; description (road type*	traffic at night*
--------------------------------	-------------------

Notes (record incidental species observations on reverse):

FIELD/FOREST W/ FLOODPLAIN  
WETLANDS

Photo number of primary plot: *DISK 5 #4*

[illegible]

\* = see back for definitions and codes for table



**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
0	Clear or few clouds (< 20% of sky)
1	Partly cloudy or variable (20-50% of sky)
2	Cloudy or overcast (> 50% of sky)
3	Fog
4	Mist
5	Showers or light rain
6	Heavy rain
7	Sleet/Hail
8	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code mph	Indicators of Wind Speed
0	< 1 calm, smoke rises vertically
1	2-3 light air movement, smoke drifts
2	4-7 light breeze, wind felt on face, leaves rustle
3	8-12 gentle breeze, leaves/twigs in constant motion, raises dust
4	13-18 moderate breeze, small branches move
5	19-24 fresh breeze, small trees begin to sway
6	25-31 strong breeze, large branches move
7+	> 31 strong winds

**ROAD TYPE:**

P = Paved G = Gravel D = Dirt

**ROAD TRAFFIC (at night):**

N = Road used only by Park/Refuge personnel L = Light Traffic (< 10 cars) H = Heavy Traffic (≥ 10 cars)

**POOL PERMANENCY:**

T = temporary (dries annually) S = semipermanent (sometimes dries) P = permanent (never dries) U = unknown duration

**POOL TYPE:**

N Natural (e.g., oxbow, vernal pool)

B Beaver-created

A( ) Artificial/Human-Altered (pick best description below):

A(B) borrow/gravel pit A(D) roadside ditch A(P) farm pond A(I) impoundment A(O) other: \_\_\_\_\_

U Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults
19A	AMERICAN TOAD	1-5	AUDITORY					
19A	SPRING PEEPER	1-1	AUDITORY					

**CHORUS CODE:**

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 20 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 20 GPS (dd mm ss.ss) N 41° 11.59.0886 W 74° 34.07.78184  
 Sky code\* 0 Wind code\* 1  
 Previous day precipitation (≥1 cm)? [ ] YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

~~100~~ %Forest (check appropriate type)

☒ Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

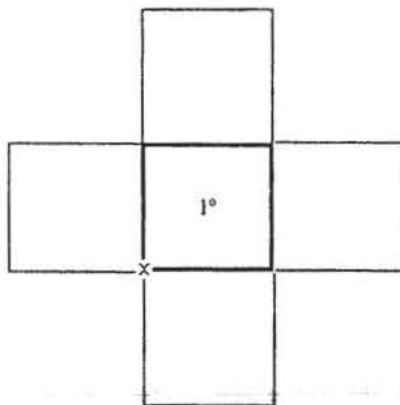
Notes (record incidental species observations on reverse):

NO UP

UPLAND SLOPE W/RUNNING

WATER THRU TRANSECT

Photo number of primary plot: 015K5 #9

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 22 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 13 GPS (dd mm ss.ss) N 41° 19' 41.16628 W 74° 34' 06.72452  
 Sky code\* 1 Wind code\* 1  
 Previous day precipitation (≥1 cm)? [ ] YES [☒] NO

Land Cover (within 50m of start point, estimates should add to 100%)

25 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

25 % Agriculture/meadow/pasture

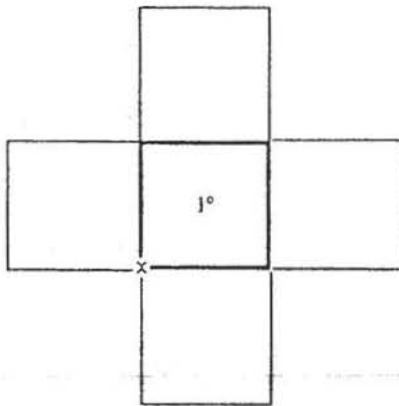
%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

NO VP  
AG. FIELD N/FORESTED EDGE

Photo number of primary plot: DISK 6 #8

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 22 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 15 GPS (dd mm ss.ss) N 41° 13 52.52520 W 74° 34 07.04435  
 Sky code\* 2 Wind code\* 1  
 Previous day precipitation (≥1 cm)? [ ] YES [X] NO

Land Cover (within 50m of start point, estimates should add to 100%)

**50 %** Forest (check appropriate type)

☒ Hardwood (>75% deciduous)

Softwood (<75% deciduous)

**50 % Agriculture/meadow/pasture**

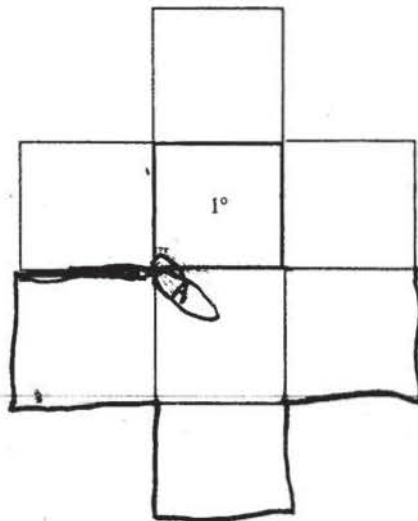
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

WOOD FROG EGGS ALL HATCHING - MOST TADPOLES  
STILL SITTING IN EGG MASSES BUT A  
FEW HUNDREDS WERE FREE SWIMMING.

Photo number of primary plot: *DISK 6 # 5*

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 22 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point# 39 GPS (dd mm ss.ss) N 41° 15' 13.34704 W 74° 33' 02.05715  
 Sky code\* 2 Wind code\* 1  
 Previous day precipitation (≥1 cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

— %Residential: urban/suburban

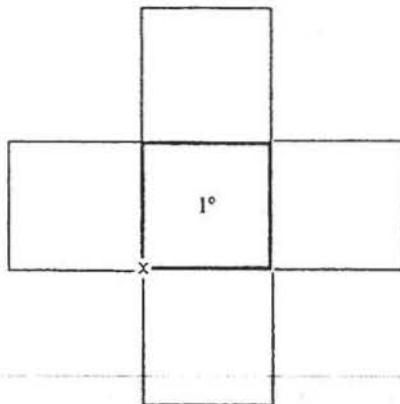
%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

SAME HABITAT AS ID40-EXTENSIVE  
FORESTED WETLAND IN ALL DIRECTIONS

DO NOT GO TO POINT

Photo number of primary plot: *NO PHOTO*

[illegible]

\* = see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 22 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 40 GPS (dd mm ss.ss) N 41° 14 57.13343 W 74° 33 02.16824  
 Sky code\* 2 Wind code\* 1  
 Previous day precipitation (≥1 cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 % Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

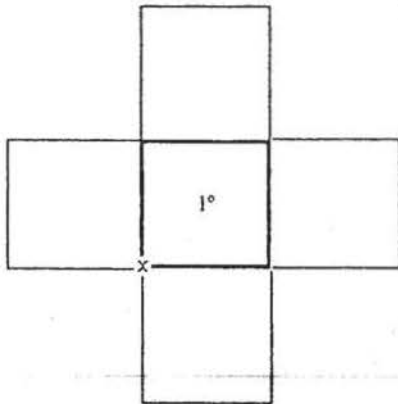
Notes (record incidental species observations on reverse):

NO UP - POINT LOC. IS SLIGHTLY ELEV.

SPOT - MOST OF TRANSECT IS FORESTED

# WETLAND

Photo number of primary plot: DISK 7 # 1

[illegible]

\*= see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 22 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) Ken Witkowski

Point# 41 GPS (dd mm ss.ss) N 41° 14' 40.91978 W 74° 33' 02.27934

Sky code\* 2 Wind code\* 1

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

10 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

90 % Agriculture/meadow/pasture

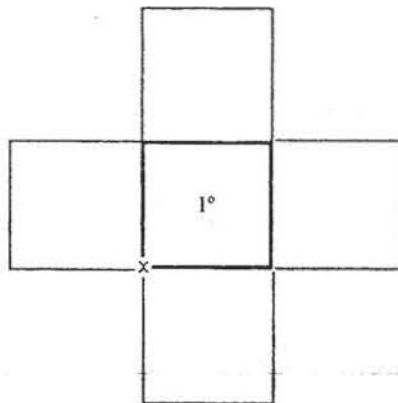
%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

No VP

Photo number of primary plot: 105K6 #10

[illegible]

\*= see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 27 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point# 33 GPS (dd mm ss.ss) N 41° 14 08.57573 W 74° 33 23.98021  
 Sky code\* 1 Wind code\* 1  
 Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

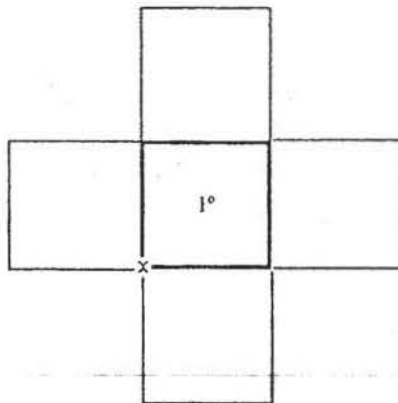
— %Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

no VP

Photo number of primary plot: 01SK 7#3

[illegible]

\* = see back for definitions and codes for table



## ACS Vernal Pool Data Sheet 2004

Date (dd month) 27 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point # 36 GPS (dd mm ss.ss) N 41° 16' 01.18782 W 74° 33' 01.72364  
 Sky code\* 1 Wind code\*       
 Previous day precipitation ( $\geq 1$  cm)? ☒ YES [ ] NO

Land Cover (within 50m of start point, estimates should add to 100%)

100 %Forest (check appropriate type)

\* Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

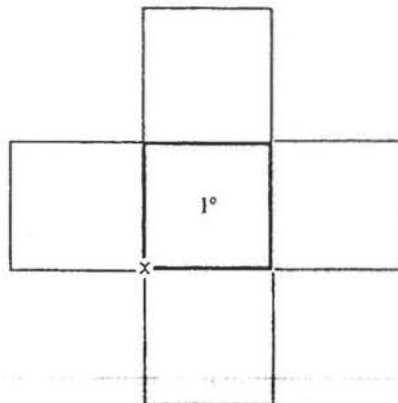
%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

NO VP  
EXTENSIVE FORESTED FLOODPLAIN/  
WETLANDS

Photo number of primary plot: ASK 7#2

[illegible]

\*= see back for definitions and codes for table

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 28 APR Unit (park or refuge name) Wallkill River NWR  
 Observers (full names) Ken Witkowski  
 Point# 1 GPS (dd mm ss.ss) N 41° 12' 15.47881 W 74° 35' 12.08900  
 Sky code\* 0 Wind code\* 6  
 Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

**100** %Forest (check appropriate type)

☒ Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

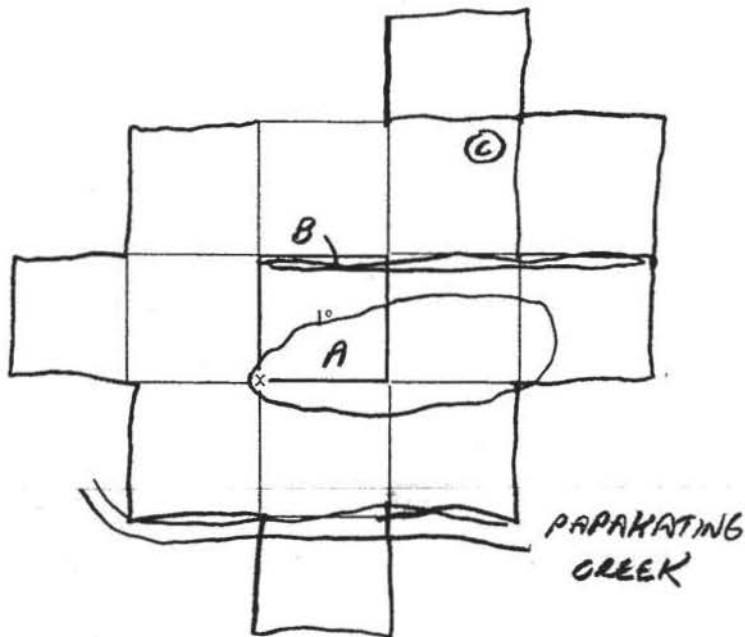
%Residential: urban/suburban

%Road; description (road type\* traffic at night\*)

Notes (record incidental species observations on reverse):

LARGE VP AT POINT

Photo number of primary plot: *PISA 2#7*

[illegible]

\* = see back for definitions and codes for table



**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
0	Clear or few clouds (< 20% of sky)
1	Partly cloudy or variable (20-50% of sky)
2	Cloudy or overcast (> 50% of sky)
3	Fog
4	Mist
5	Showers or light rain
6	Heavy rain
7	Sleet/Hail
8	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code mph	Indicators of Wind Speed
0	< 1 calm, smoke rises vertically
1	2-3 light air movement, smoke drifts
2	4-7 light breeze, wind felt on face, leaves rustle
3	8-12 gentle breeze, leaves/twigs in constant motion, raises dust
4	13-18 moderate breeze, small branches move
5	19-24 fresh breeze, small trees begin to sway
6	25-31 strong breeze, large branches move
7+	> 31 strong winds

**ROAD TYPE:**

P = Paved G = Gravel D = Dirt

**ROAD TRAFFIC (at night):**

N = Road used only by Park/Refuge personnel L = Light Traffic (< 10 cars) H = Heavy Traffic (≥ 10 cars)

**POOL PERMANENCY:**

T = temporary (dries annually) S = semipermanent (sometimes dries) P = permanent (never dries) U = unknown duration

**POOL TYPE:**

N Natural (e.g., oxbow, vernal pool)

B Beaver-created

A( ) Artificial/Human-Altered (pick best description below):

A(B) borrow/gravel pit A(D) roadside ditch A(P) farm pond A(I) impoundment A(O) other: \_\_\_\_\_

U Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults
1A	GREEN FROG							1
1B	" "							<del>1</del> 1
1C	" "							111
1C	UNKNOWN					Y		

**CHORUS CODE:**

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.

## ACS Vernal Pool Data Sheet 2004

Date (dd month) 28 APR Unit (park or refuge name) Wallkill River NWR

Observers (full names) Ken Witkowski

Point # 2 GPS (dd mm ss.ss) N 41° 12' 15.40/20 W 74° 34' 50.62044

Sky code\* 1 Wind code\* 6

Previous day precipitation ( $\geq 1$  cm)? ☐ YES ☒ NO

Land Cover (within 50m of start point, estimates should add to 100%)

106 %Forest (check appropriate type)

X Hardwood (>75% deciduous)

Softwood (<75% deciduous)

%Agriculture/meadow/pasture

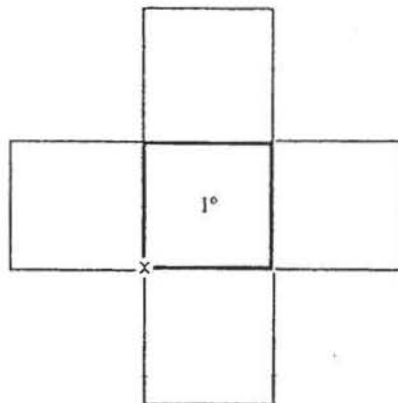
%Residential: urban/suburban

%Road; description (road type\*\_\_\_\_\_ traffic at night\*\_\_\_\_\_)

Notes (record incidental species observations on reverse):

NO UP

Photo number of primary plot: *DISK 2 # 6*

[illegible]

\* = see back for definitions and codes for table





**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
1	Clear or few clouds (< 20% of sky)
2	Partly cloudy or variable (20-50% of sky)
3	Cloudy or overcast (> 50% of sky)
4	Fog
5	Mist
6	Showers or light rain
7	Heavy rain
8	Sleet/Hail
9	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code	mph	Indicators of Wind Speed
0	< 1	calm, smoke rises vertically
1	2-3	light air movement, smoke drifts
2	4-7	light breeze, wind felt on face, leaves rustle
3	8-12	gentle breeze, leaves/twigs in constant motion, raises dust
4	13-18	moderate breeze, small branches move
5	19-24	fresh breeze, small trees begin to sway
6	25-31	strong breeze, large branches move
7+	> 31	strong winds

**POOL PERMANENCY:**

T = temporary (dries annually) S = semipermanent (sometimes dries) P = permanent (never dries) U = unknown duration

**POOL TYPE:**

N Natural (e.g., oxbow, vernal pool)

B Beaver-created

A( ) Artificial/Human-Altered (pick best description below):

A(B) borrow/gravel pit A(D) roadside ditch A(P) farm pond A(I) impoundment A(O) other: \_\_\_\_\_

U Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only, Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults
X12	WOOD FROG							
						P(6000)		

**CHORUS CODE:**

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.



3/8

Observers (full names): KEN NITKOWSKI KEVIN HOLCOMB

\* = see back for definitions and codes for table

Notes:

**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
1	Clear or few clouds (< 20% of sky)
2	Partly cloudy or variable (20-50% of sky)
3	Cloudy or overcast (> 50% of sky)
4	Fog
5	Mist
6	Showers or light rain
7	Heavy rain
8	Sleet/Hail
9	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code	mph	Indicators of Wind Speed
0	< 1	calm, smoke rises vertically
1	2-3	light air movement, smoke drifts
2	4-7	light breeze, wind felt on face, leaves rustle
3	8-12	gentle breeze, leaves/twigs in constant motion, raises dust
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5	19-24	fresh breeze, small trees begin to sway
6	25-31	strong breeze, large branches move
7+	> 31	strong winds

**POOL PERMANENCY:**

T = temporary (dries annually) S = semipermanent (sometimes dries) P = permanent (never dries) U = unknown duration

**POOL TYPE:**

N Natural (e.g., oxbow, vernal pool)

B Beaver-created

A( ) Artificial/Human-Altered (pick best description below):

A(B) borrow/gravel pit A(D) roadside ditch A(P) farm pond A(I) impoundment A(O) other: \_\_\_\_\_

U Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only, Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults
470	AM. TOAD	1-1						

**CHORUS CODE:**

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus, calls continuous and overlapping. Cannot distinguish individuals.



4/I<sub>2</sub>



4/I<sub>1</sub>

578



476



47c



47d



47c





34 I1 revisit



47 a revisit



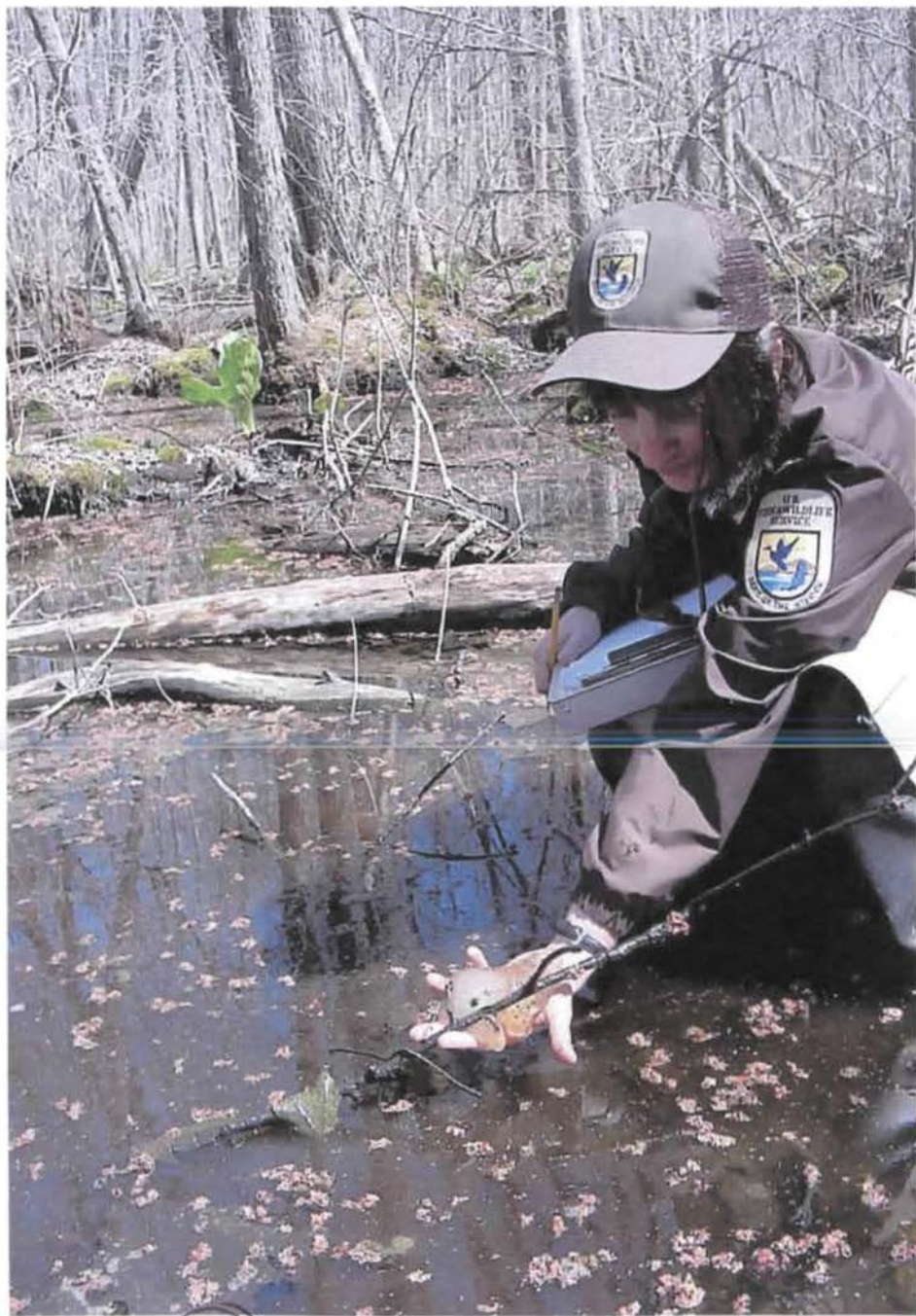


45A Revisit





28 I-1 revst



2/9



## INCIDENTAL VERNAL POOL DATA SHEET 2004

1/6

Date (dd month) 08 APR Unit (park or refuge name) WALLKILL RIVER  
 Observers (full names) KEN WITKOWSKI  
 Previous day precipitation? [ ] YES [X] NO

Notes:

Nearest Point	Incidental Pool # (1-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
34	I-2	3-1	41°14.196	74°33.159	7.5	44	6.34	3	0	1.9	18M	19CM	40/10	0	100				300M	P	L	T	N	-	-

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Notes:

\* see back for definitions and codes for table

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) \_\_\_\_\_  
 Observers (full names) \_\_\_\_\_  
 Previous day precipitation? [ ] YES [ ] NO

Notes:

Nearest Point	Incidental Pool # (1-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
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Notes:

\* see back for definitions and codes for table

## INCIDENTAL VERNAL POOL DATA SHEET 2004

2/6

Date (dd month) 12 APR Unit (park or refuge name) WALLKILL RIVER  
 Observers (full names) ROJ NITKOWSKI  
 Previous day precipitation? [ ] YES [X] NO

Notes:

Nearest Point	Incidental Pool # (I-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
28	I-1	4-1	41° 12.800'	074° 33.711'	28	48	7.06	2	1	25M	150M	14CM	60/20	0	100				300M	P	H	S	N	56	1

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Notes:

\* see back for definitions and codes for table

Notes:

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) \_\_\_\_\_  
 Observers (full names) \_\_\_\_\_  
 Previous day precipitation? [ ] YES [ ] NO

Nearest Point	Incidental Pool # (I-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
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Notes:

\* see back for definitions and codes for table



## INCIDENTAL VERNAL POOL DATA SHEET 2004

Date (dd month) 20 APR Unit (park or refuge name) WALKILL RIVER  
 Observers (full names) KENNETH KOWSKI  
 Previous day precipitation? [ ] YES [X] NO

Notes: \_\_\_\_\_

Nearest Point	Incidental Pool # (I-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Devel-oped	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Perman-ency*	Pool Type*	# RSYL Masses	# AMAC Masses
4	I-1		6-24° 11.504'	074° 35.012'	5.6	17° 6.86	0	1	1	6.2m	36m	40cm	60	0	100				25m	P	H	5	N	-	47

Notes: \_\_\_\_\_

4	I-2		6-34° 11.603'	074° 35.110'	4.6	19° 6.64	0	1	1	13.3m	51m	47cm	40/10	0	100				45m	P	H	5	N	-	-
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Notes: \_\_\_\_\_

\* see back for definitions and codes for table

Notes: \_\_\_\_\_

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) \_\_\_\_\_  
 Observers (full names) \_\_\_\_\_  
 Previous day precipitation? [ ] YES [ ] NO

Nearest Point	Incidental Pool # (I-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Devel-oped	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Perman-ency*	Pool Type*	# RSYL Masses	# AMAC Masses
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Notes: \_\_\_\_\_

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Notes: \_\_\_\_\_

\* see back for definitions and codes for table

**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

Code	Sky Condition
1	Clear or few clouds (< 20% of sky)
2	partly cloudy or variable (20-50% of sky)
3	Cloudy or overcast (> 50% of sky)
4	Fog
5	Mist
6	Showers or light rain
7	Heavy rain
8	Sleet/Hail
9	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code	mph	Indicators of Wind Speed
0	< 1	calm, smoke rises vertically
1	2-3	light air movement, smoke drifts
2	4-7	light breeze, wind felt on face, leaves rustle
3	8-12	gentle breeze, leaves/twigs in constant motion, raises dust
4	13-18	moderate breeze, small branches move
5	19-24	fresh breeze, small trees begin to sway
6	25-31	strong breeze, large branches move
7+	> 31	strong winds

**ROAD TYPE:**

**P** = Paved **G** = Gravel **D** = Dirt

**ROAD TRAFFIC** (at night):

**N** = Road used only by Park/Refuge personnel **L** = Light Traffic (< 10 cars) **H** = Heavy Traffic (≥ 10 cars)

**POOL PERMANENCY:**

**T** = temporary (dries annually) **S** = semipermanent (sometimes dries) **P** = permanent (never dries) **U** = unknown duration

**POOL TYPE:**

**N** Natural (e.g., oxbow, vernal pool)

**B** Beaver-created

**A**( ) Artificial/Human-Altered (pick best description below):

**A(B)** borrow/gravel pit **A(D)** roadside ditch **A(P)** farm pond **A(I)** impoundment **A(O)** other: \_\_\_\_\_

**U** Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only, Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults
7X-2	SPOTTED TURTLE							1

**CHORUS CODE:**

Code	Description
0	No amphibians calling.
1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
2	Calls overlap, but individuals are distinguishable (record number of individuals after the code, separated by hyphen).
3	Full chorus calls continuous and overlapping. Cannot distinguish individuals



## INCIDENTAL VERNAL POOL DATA SHEET 2004

5/6

Date (dd month) 26 APR Unit (park or refuge name) WALLKILL RIVER  
 Observers (full names) KEN WITKOWSKI KEVIN HOLCOMB  
 Previous day precipitation? ☒ YES ☐ NO

Notes: \_\_\_\_\_

Nearest Point	Incidental Pool # (1-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
41	I-1	85	41° 14.662	074° 32.937	7.0	17.8	6.4	2	1	36.5	49M	21cm	180	0	25	70	1	4	20M	P	L	S	N	1	6

Notes: \_\_\_\_\_

41	I-2	86	41° 14.688	074° 32.906	7.0	16°	6.3	2	1	7.6M	100M	35	170	0	70	30	0	9	80M	P	L	S	AO	-	-
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Notes: \_\_\_\_\_

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Notes: \_\_\_\_\_

\* see back for definitions and codes for table

Notes: \_\_\_\_\_

Date (dd month) \_\_\_\_\_ Unit (park or refuge name) \_\_\_\_\_  
 Observers (full names) \_\_\_\_\_  
 Previous day precipitation? ☐ YES ☐ NO

Nearest Point	Incidental Pool # (1-n)	photo	Latitude (DDMMSS.SS)	Longitude (DDMMSS.SS)	EPE (m)	Water Temp (°C)	pH	Sky*	Wind*	Pool max Width (m)	Pool max Length (m)	Pool max Depth (cm)	% Aq. Veg (SAV / emerg)	Dist. to For. (m)	% For.	% Ag	% Developed	% Road/ right-of-way	Dist to Road (m)	Road Type*	Road Traffic*	Pool Permanency*	Pool Type*	# RSYL Masses	# AMAC Masses
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Notes: \_\_\_\_\_

\* see back for definitions and codes for table

**SKY CODE:** Do not conduct surveys if sky codes are 6 or above.

4/6

Code	Sky Condition
1	Clear or few clouds (< 20% of sky)
2	partly cloudy or variable (20-50% of sky)
3	Cloudy or overcast (> 50% of sky)
4	Fog
5	Mist
6	Showers or light rain
7	Heavy rain
8	Sleet/Hail
9	Snow

**WIND CODE:** Do not conduct surveys if wind codes are 6 or above.

Code	mph	Indicators of Wind Speed
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U Unknown

**INCIDENTAL SPECIES OBSERVATIONS:**

Pool	Species	Chorus Code	ID method (Auditory only, Visual only, Handled)	Spermatophores (Y/N)	# Egg Masses	Tadpoles/Larvae (Y/N)	# Juveniles	# Adults
4152	WOOD FROG					Y		
4152	N. SPRING PEPPER	2						
4152	UNKNOWN					Y		

**CHORUS CODE:**

Code	Description
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1	Individuals can be counted, calls not overlapping (record number of individuals after the code, separated by hyphen).
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3	Full chorus: calls continuous and overlapping. Cannot distinguish individuals