Biological Inventory Report

Clear River Energy Center
Burrillville, Rhode Island

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EXECUTIVE SUMMARY

A biological inventory was conducted at the proposed site of the Clear River Energy Center (CREC) in western Burrillville, Rhode Island during the spring and early summer of 2017. The purpose of the inventory was to collect additional requested site-specific data related to the animal and plant communities present at the proposed project site (study area) and to provide this information to the Rhode Island Department of Environmental Management (RIDEM) and the Rhode Island Energy Facility Siting Board (EFSB) to help inform RIDEM's and the Board's evaluation of the site and potential environmental impacts that may result from the construction and operation of the proposed project. The inventory was conducted by ESS Group, Inc. (ESS) and by specialized sub-consultants for particular taxa. The biological scope of the inventory included terrestrial vertebrates (birds, mammals, amphibians, reptiles), targeted invertebrates (primarily lepidopterans [butterflies, moths, and skippers], odonates [dragonflies and damselflies], and stream benthic macroinvertebrates), and vascular plants. Thirteen (13) distinct field survey programs were conducted as part of this biological inventory, in addition to a bat acoustic survey conducted by ESS in 2015:

- Winter track survey (ESS)
- Remote field camera deployment (ESS)
- Avian point count survey (ESS)
- Anuran call count surveys (ESS)
- Owl broadcast surveys (ESS)
- Small mammal trapping (ESS)
- Pit fall trapping (ESS)
- Cover board monitoring (ESS)
- Amphibian and reptile time-constrained searches (ESS)
- Diurnal insect survey (ESS & Mark J. Mello/Lloyd Center for the Environment)
- Moth survey (Mark J. Mello/Lloyd Center for the Environment)
- Benthic macroinvertebrate sampling (ESS)
- Plant survey (Bryan A. Connolly, Ph.D.)

The biological inventory resulted in the detection of 520 animal and plant species or taxa in the study area. Included in this total were 113 vertebrates (81 birds, 21 mammals, eight amphibians, and three reptiles), 220 invertebrates (147 butterflies and moths, 25 dragonflies and damselflies, and 48 other invertebrates), and 187 plant species. Seventeen (17) state-listed species – including one state-endangered species, four state-threatened species, ten species of concern, and two protected species – as well as 47 Species of Greatest Conservation Need (SGCN) (RIDEM/TNC 2015) were detected in the study area during the course of this inventory. Ten plant species observed in the study area are classified by the Rhode Island Invasive Species Council (RIISC) as invasive species in the state, and one species is classified as a potentially invasive species (RIISC 2001).

Clearing and construction associated with the proposed project will result in the loss of habitat currently used by a variety of animal and plant species. The proposed CREC site is located on private property within a forest patch greater than 500 acres (as designated in the 2015 Rhode Island WAP). Despite the fact that most of these impacts are outside of the RIDEM's wetlands jurisdiction, and as more fully set forth in the pre-filed testimony of Jason Ringler, which is incorporated into this Report by reference, Invenergy has designed this Project so as to minimize impacts to habitat and wildlife as much as reasonably possible, to provide for greatest possible amount of protection of existing habitat.

Specifically, the design proposes improvements of the existing woods road to serve as the facility roadway to avoid wetland and habitat impacts that would otherwise occur due to the development of an entirely new road crossing through wetlands. The design includes retaining walls that will considerably reduce its overall width and impacts by reducing the total width of the roadway infrastructure. In addition, the design proposes six natural bottom, box-type culverts to allow unimpeded flow of water, aquatic habitat connectivity, and access for wildlife movement under the proposed roadway. Each culvert will have a minimum height of approximately four feet and a minimum width of nine feet. The culvert conveying the tributary to Iron Mine Brook, as well as Wildlife Crossing #5 (closest to the CREC facility) will have a minimum height of approximately six feet and a minimum width of 12 feet. The provisions for a natural bottom culvert will accommodate a naturalized stream channel within the culvert while the retaining walls along the length of the roadway will effectively guide wildlife to the proposed natural bottom, three-sided box. Each culvert crossing will include two grate openings to promote light within the interior of the culvert. For large wildlife (i.e. white-tailed deer) that may be discouraged from utilizing the culvert crossings, an at-grade ramp is proposed along the midpoint of the roadway.

During construction, several measures will be implemented to minimize impacts to the environment. These include the use of the existing woods road, installation of soil erosion and sediment controls, supervision and inspection of construction activities within resource areas by an environmental monitor, and minimization of impacted areas. The environmental monitor will oversee construction activities including the installation and maintenance of soil erosion and sediment controls, on a routine basis to ensure compliance with all federal, state, and local permit commitments. Time of year restrictions to avoid tree clearing during the June-July timeframe is proposed. Invenergy reaffirms its willingness to work with RIDEM to revisit the proposed time of year restrictions to minimize site impacts.

Following the completion of construction, restoration efforts including final grading and installation of permanent soil erosion control devices and restoration of temporarily impacted areas will be completed.

A Compensatory Wetland Mitigation Plan following the New England District Compensatory Mitigation Guidance in cooperation with resource agencies will be developed. Based on an inventory of parcels of conservation interest developed by RIDEM as well as a GIS overlay of elements in the Rhode Island Conservation Opportunities and local Assessors Maps, Invenergy has generated a confidential comprehensive list of parcels potentially suitable for preservation. Invenergy is currently investigating the willingness of current land owners to sell their property. Once completed, Invenergy intends to work with RIDEM and the United States Army Corps of Engineers (USACE) to determine which parcel(s) appear best suited to offset project-related wetland and other impacts. It is anticipated the Compensatory Wetland Mitigation Plan will include a description of project impacts, objectives, mitigation site selection procedures, site protection information, and monitoring standards in addition to all required graphics and information. It is anticipated that the final mitigation package will primarily consist of land preservation and possibly some restoration should a viable project be identified.

1.0 INTRODUCTION

ESS Group, Inc. (ESS) has prepared this biological inventory report on behalf of Invenergy, LLC for the proposed Clear River Energy Center (CREC) project in Burrillville, Rhode Island. A biological inventory of the study area was conducted by ESS and by specialized subconsultants for particular taxa for the purpose of gathering site-specific data on the faunal and floral communities present at the project site. These data were collected to supplement the scientific literature, mapping data review, and prior incidental observations which were included in the original application of the *Clear River Energy Center – Rhode Island Energy Facility Siting Board (EFSB) Application* filed on October 28, 2015 and the *Addendum – Wetlands*, dated August 29, 2016, filed with the EFSB on August 30, 2016, and the *Application to Alter Freshwater Wetlands - Clear River Energy Center and Burrillville Interconnection Project*, dated April 2017, filed with the Rhode Island Department of Environment Management (RIDEM) on April 26, 2017 and with the EFSB. ESS was supported by Mark J. Mello of the Lloyd Center for the Environment and Bryan A. Connolly, Ph.D., who completed lepidopteran and plant surveys, respectively.

The field programs listed below which comprise this biological inventory have been designed to provide RIDEM with requested site-specific data regarding the faunal and flora communities of the site. An outline of the proposed survey plan and general methodologies was provided to RIDEM for comment on April 3, 2017; RIDEM responded with a comment letter dated June 13, 2017. While RIDEM's response was received after most survey programs had been initiated, the methodologies used during this biological inventory largely conformed to the recommendations that RIDEM summarized in their June 13, 2017 letter.

The field program associated with this biological inventory was conducted from late March 2017 to mid-July 2017. The following thirteen survey programs were conducted as part of this biological inventory:

- Winter track survey (ESS)
- Remote field camera deployment (ESS)
- Avian point count survey (ESS)
- Anuran call count surveys (ESS)
- Owl broadcast surveys (ESS)
- Small mammal trapping (ESS)
- Pit fall trapping (ESS)
- Cover board monitoring (ESS)
- Amphibian and reptile time-constrained searches (ESS)
- Diurnal insect survey (ESS & Mark J. Mello/Lloyd Center for the Environment)
- Moth survey (Mark J. Mello/Lloyd Center for the Environment)
- Benthic macroinvertebrate sampling (ESS)
- Plant survey (Bryan A. Connolly, Ph.D.)

In addition, a bat acoustic survey was conducted by ESS at the study area between July 31, 2015 and August 9, 2015, prior to the implementation of this broader biological inventory. The bat acoustic survey summary report is included as Appendix B.

The goal of this inventory was to provide a comprehensive assessment of the faunal and floral communities present within the study area. The specific field survey methodologies and the seasonal timing of the surveys were chosen to attempt to maximize the number of animal and plant species documented at the site. In our view, this approach has served to provide a more accurate representation of the inventory.

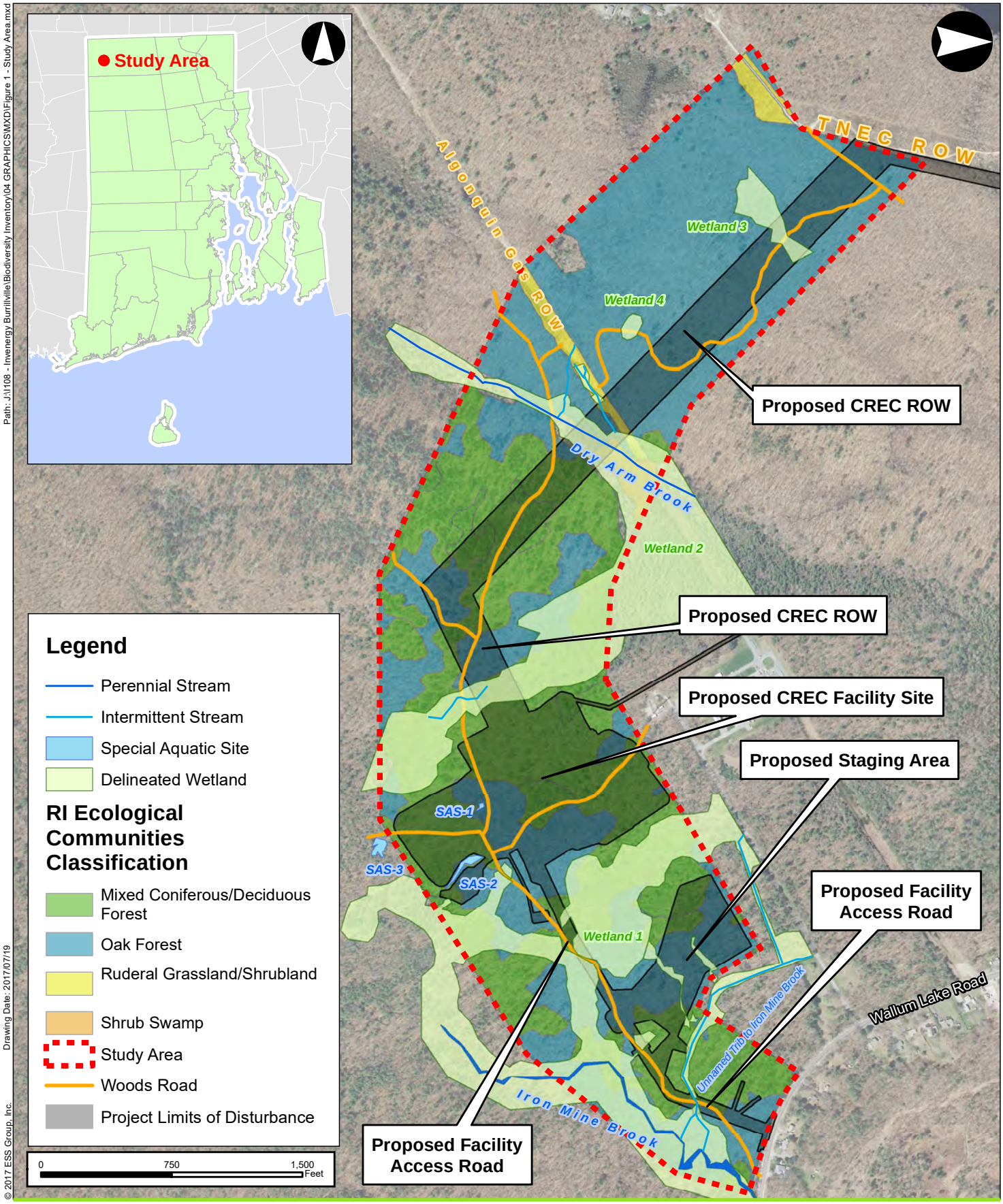
This biological inventory report provides a summary of the study area (Section 2.0), the methodologies (Section 3.0) and results (Section 4.0) for each of the survey programs listed above, a discussion of the faunal and floral communities present in the study area (Section 5.0), and a concluding summary (Section 6.0).

2.0 STUDY AREA

The study area, as defined for the purposes of this biological inventory, is an approximately 81-hectare (200-acre) forested tract generally located between Wallum Lake Road and the existing Narragansett Electric Company (TNEC) overhead electrical transmission line right-of-way (ROW), in western Burrillville, Rhode Island (approximate coordinates: lat. 41.9636, long. -71.7547) (Figure 1). The study area includes: 1) the proposed CREC facility site, 2) the proposed facility access road, 3) the proposed construction laydown area, 4) the approximate alignment of the proposed CREC ROW, and 5) the existing Algonquin Gas Transmission Line ROW (Algonquin ROW).

The study area is located to the southwest of Wallum Lake Road (State Route 100) and to the northeast of Jackson Schoolhouse Road, borders George Washington State Park to the north, and is approximately 1.5 miles southeast of Buck Hill Management Area. A woods road bisects the study area in both a generally north-south and east-west direction. The eastern end of the woods road is located at the intersection with Wallum Lake Road, the western end at the existing Algonquin ROW, and the northern end at the existing Algonquin Gas Compressor Station.

The study area is part of a relatively large forested block in northwestern Rhode Island, and contains a mix of forested upland and wetland habitats with moderate to dense understory vegetation. According to the Rhode Island Ecological Communities Classification (Enser *et al.* 2011), the primary vegetative community types present within the study area are mixed deciduous/coniferous forest, oak forest, and forested swamp. The study area is located within the Clear River sub-basin (HUC 12), part of the larger Lower Blackstone River watershed (HUC 10). The eastern portion of the study area drains in a generally northwest to southeast direction toward Iron Mine Brook, while the western portion of the study area drains toward a broad wetland containing Dry Arm Brook, which flows generally in a northern direction. Both watercourses ultimately flow east under Wallum Lake Road and into Wilson Reservoir. With the exception of tributaries to these two primary watercourses, no other surface water bodies exist within the study area. The elevation of the study area ranges from approximately 530 to 660 feet above sea level (North American Vertical Datum 1988).



Clear River Energy Center Biological Inventory
Burrillville, Rhode Island

1 inch = 750 feet

Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

Study Area

Figure 1

3.0 METHODOLOGY

The following methodologies were used for the field programs which comprise this biological inventory. All field surveys undertaken as part of this biological inventory were conducted by or coordinated by ESS wildlife biologists.

To provide an equal sampling effort in each of the three primary vegetative community types within the study area, the boundaries of these habitats were approximated in a Geographic Information System (GIS) (ArcMap v. 10.3, © ESRI 2016) by supplementing the publicly-available geospatial habitat data of the Rhode Island Ecological Communities Classification (RIECC) (Enser 2011) with a site-specific wetland field delineation conducted by ESS in 2014 and 2015 and general field observations of the study area. In general, the habitat boundaries of the RIECC were used without major alterations; the largest changes were 1) the "forested swamp" community type was expanded based on the results of the wetland field delineation and RIDEM Edge Verification (№:15-0239), and 2) the "tree plantation" community type was reclassified as "mixed deciduous/coniferous forest" based on field observations of the study area. Where possible, photographic vouchers were taken to document each species.

3.1 Winter Track Survey

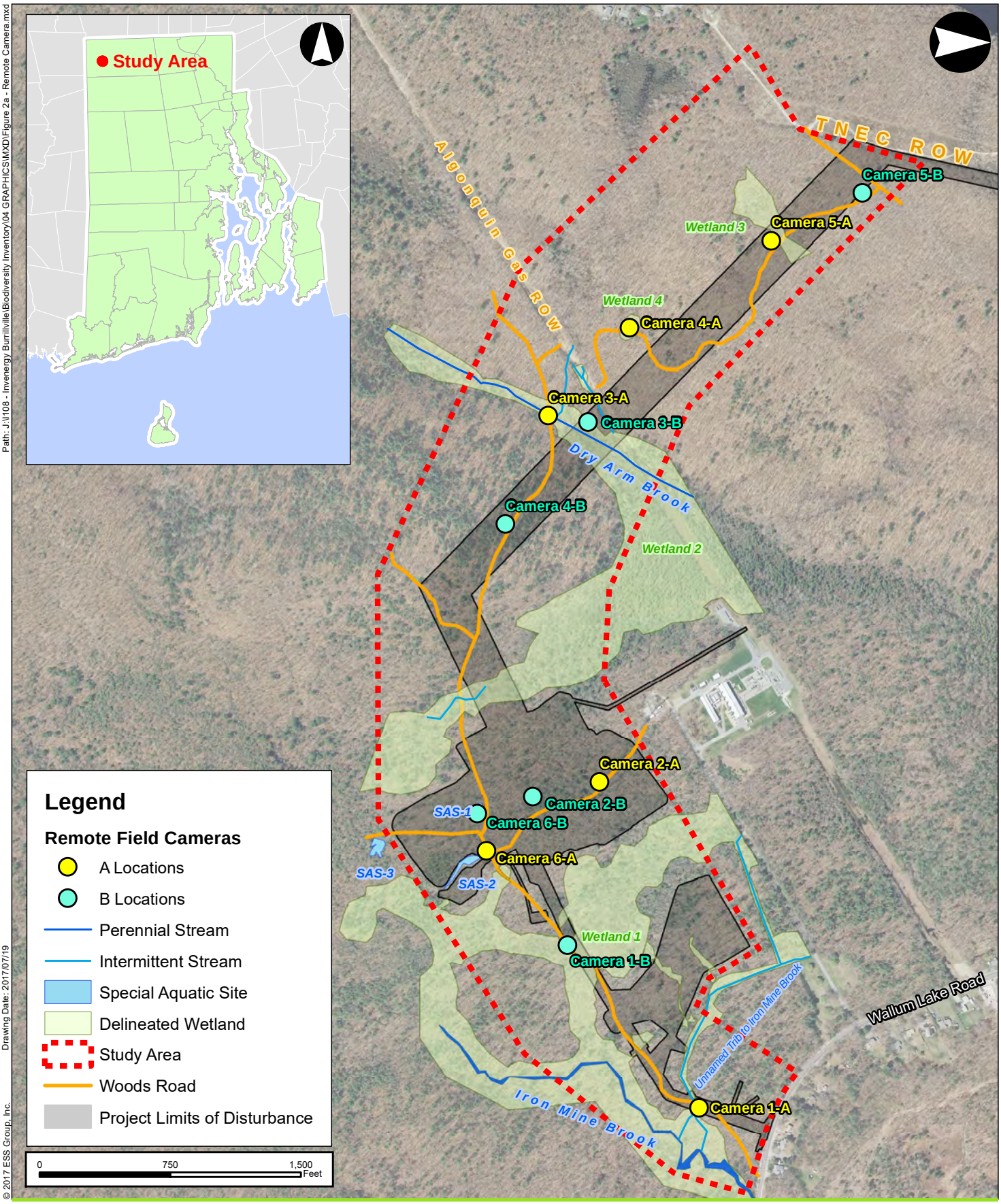
Methods for the winter track survey were adopted from D'Eon *et al.* (2006) and Halfpenny *et al.* (1995). An observer walked the existing woods roads and the Algonquin ROW through the study area searching for animal tracks and other sign following a snowfall event. When tracks or other sign were observed, the location was recorded, the feature was identified to the lowest taxonomic level possible, and photographic documentation was collected.

3.2 Remote Field Cameras

Six remote field cameras (Browning® Strike Force HD Model BTC-5HD) were deployed throughout the study area from April 3, 2017 to July 6, 2017. The cameras were re-located from their initial locations to new locations approximately halfway through the study period, on May 18, 2017, in order to sample a larger portion of the study area. The first and second locations of the cameras are shown on Figure 2. In general, the locations for camera deployment were chosen based on proximity to features that could attract wildlife, such as streams, stone walls, and game trails, as well as the results of the winter track survey.

Typical placement of remote field cameras in the study area. April 3, 2017.

Cameras were set to capture a three-image burst with a one-minute trigger interval. Cameras were strapped to a tree approximately 0.5 to 1 meter (1.6 to 3.3 feet) above the ground and were locked around the tree. Cameras were checked biweekly to ensure that they were functioning properly and that their field of view was unobstructed, to change batteries and memory cards, and refresh scent lures. The field of view of each camera was scent-marked. When cameras were set at their initial locations, a general carnivore scent lure (Caven's "Gusto" long distance call lure, Minnesota Trapline Products, Inc.)



Path: J:\l108 - Invenergy Burrillville\Biodiversity Inventory\04 GRAPHICS\MXD\Figure 2a - Remote Camera.mxd

Drawing Date: 2017/07/19

Clear River Energy Center Biological Inventory
Burrillville, Rhode Island

Remote Field Camera Locations

1 inch = 750 feet

Figure 2

Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

was used. Setting the scent lure was accomplished by dipping a twig into the scent and smearing it on nearby woody vegetation approximately one meter above the ground, then pushing the unscented end of the twig into the ground in the field of view of the camera. After moving cameras to their new locations, a variety of scent lures and other olfactory attractants were used, including Caven's "Gusto" long distance call lure, Caven's "Feline Fix" bobcat gland lure (Minnesota Trapline Products, Inc.), fish oil, peanut butter, and canned tuna.

All photographs were reviewed to determine whether they contained images of wildlife (mammals, birds, reptiles, and amphibians). All wildlife species captured in photographs were identified to the lowest taxonomic level possible, which was typically to the species level. The number of individual detections for each species or taxon was enumerated for each camera location.

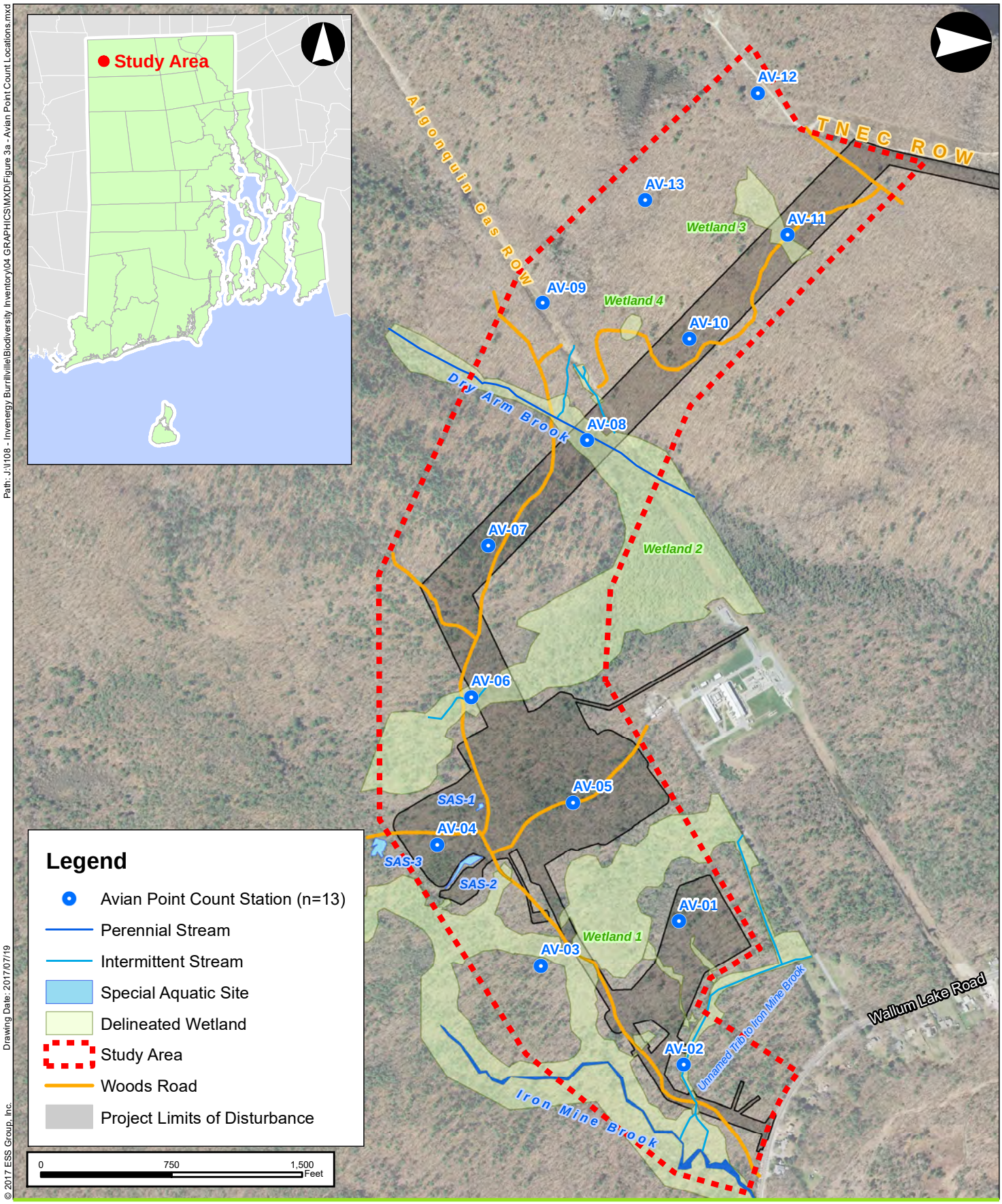
3.3 Avian Point Count Survey

Field Surveys

Prior to conducting field surveys, avian point count stations were established in GIS. To avoid detecting individuals at multiple stations, stations were spaced at least 250 meters (820 feet) apart (Ralph *et al.* 1993). Stations were located to provide the maximum possible number of stations within the study area and to provide the greatest possible coverage of the study area without overlap of the 250-meter station buffers. Figure 3 shows the locations of avian point count stations (n=13). The survey station locations were uploaded to a sub-meter accurate Trimble Geo7x GPS receiver which was used to locate survey stations in the field. Station locations were marked in the field by tying a length of blue flagging tape labelled with the station ID to woody vegetation at the station location.

One complete avian point count survey of the study area was conducted each week starting May 3, 2017 through June 21, 2017. Surveys were timed to coincide with the highest land bird species diversity and abundance during spring migration, as well as the early breeding season. The order in which stations were visited was reversed in alternating survey nights to avoid time bias of results.

Avian point counts followed the methods of Ralph *et al.* (1993). In all cases, surveys were initiated within one hour of sunrise and were completed by 10:00 am. Surveys were conducted on mild weather days characterized by a lack of precipitation or fog, light wind speeds, and seasonable temperatures. At each survey station, an observer recorded all avian species detected both visually and aurally for a five-minute period beginning immediately upon arrival at the station. The observer distinguished between individuals located less than and greater than 50 meters (164 feet) from the station and between those detected within the first three minutes of the survey and those detected during the final two minutes. When age and sex information for individuals could be observed, this data was also recorded. Individuals observed flying over the station during the survey and those flushed from the vicinity of the station before or after the survey were recorded separately, as were other individuals observed incidentally while transiting from one station to the next. The following environmental metadata was also recorded at each survey station: air temperature, wind speed, estimated cloud cover, current precipitation, and ambient noise level. The following index used in the North American Amphibian Monitoring Program protocol was used to categorize ambient noise levels: 0 = no appreciable effect (i.e. owl calling); 1 = slightly affecting sampling (distant traffic, dog barking, one car passing); 2 = moderately affecting sampling (distant traffic, 2-5 cars passing), 3 = seriously affecting sampling (continuous traffic nearby, 6-10 cars passing), 4 = profoundly affecting sampling (continuous traffic passing, construction noise).



Path: J:\J108 - Invenergy Burrillville\Biodiversity Inventory\04 GRAPHICS\MXD\Figure 3a - Avian Point Count Locations.mxd

Drawing Date: 2017/07/19

Clear River Energy Center Biological Inventory
Burrillville, Rhode Island

1 inch = 750 feet

Avian Point Count Stations

Figure 3

Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

Determination of Breeding Status

The Rhode Island Bird Atlas 2.0 (RIDEM/URI, undated) was adapted to determine the breeding status of species detected in the study area. The Rhode Island Bird Atlas 2.0 classifies avian observations into three categories with respect to the breeding status of the individual observed: possible, probable, and confirmed. An avian observation classified as a "possible" consists of observing a species once in appropriate breeding habitat and after the "safe date" for that species in Rhode Island. The safe date is defined by the Rhode Island Bird Atlas 2.0 as the date on which most migrants of a given species have departed the state, and hence most individuals remaining in the state are potential breeding birds. Additional observations of breeding activity (including observation of a pair in suitable habitat after the species safe date, singing or other territorial behavior on at least two days separated by at least one week, courtship or copulation, etc.) indicate a "probable" breeding observation. Directly observing active nests or nest-attending behavior, recently fledged young, distraction displays, or other similar observations would indicate a "confirmed" breeding bird.

No specific or systematic effort was made during this inventory to conduct nest searches or observe other behaviors that would indicate a confirmed breeder; however, these events were recorded when observed. The avian point count surveys described above were expected to be sufficient for 1) characterizing the avian community within the study area and 2) collecting enough information to assign each species a breeding code of at least "probable," based largely on detections of singing males in appropriate habitat during consecutive surveys.

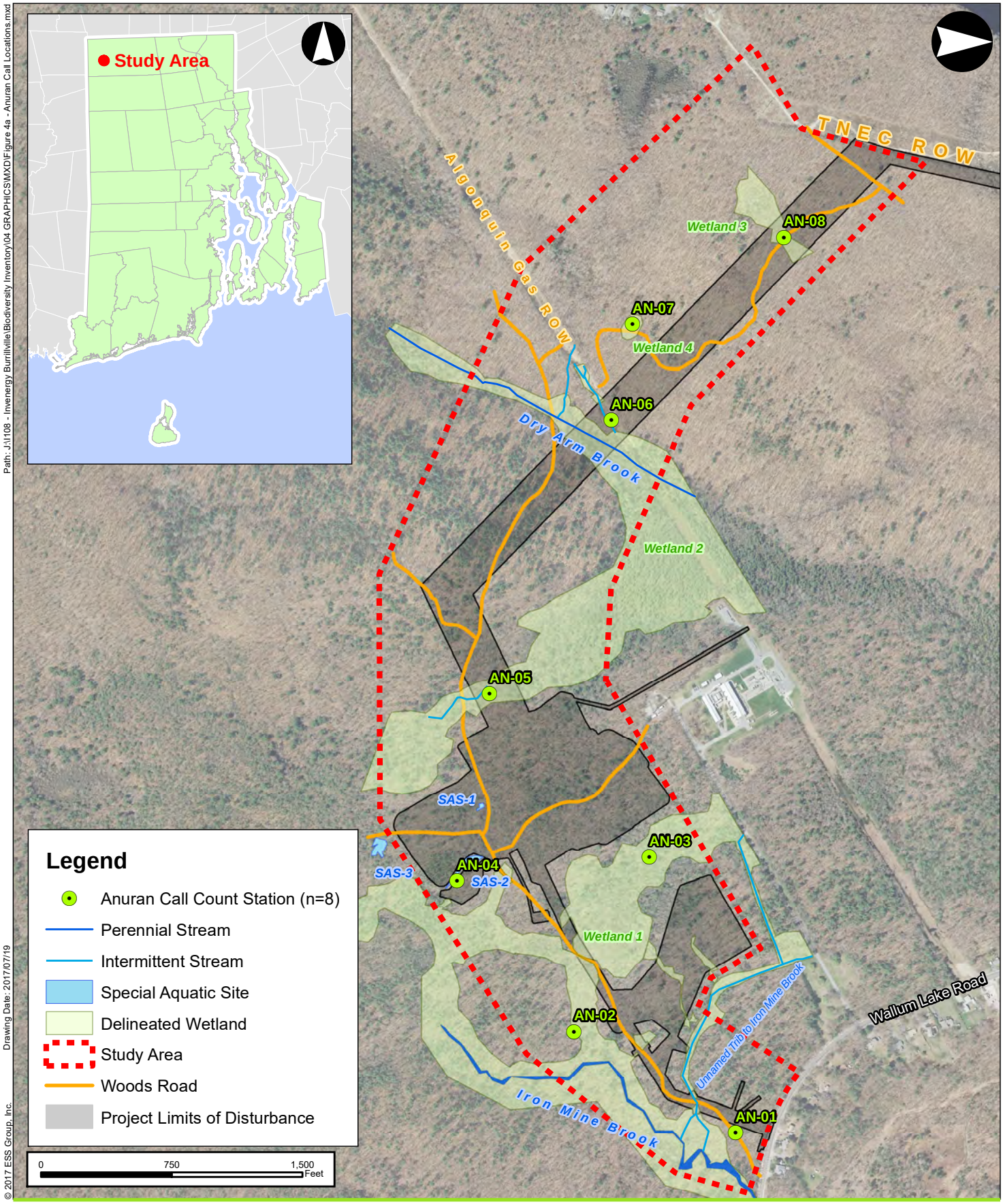
3.4 Anuran Call Count Survey

Prior to conducting field surveys, anuran call count survey stations were established in GIS. To avoid detecting individuals at multiple stations, stations were spaced at least 173 meters (570 feet) apart. Stations were located to provide the maximum number of stations within the study area and to provide the greatest possible coverage of the study area without overlap of the 330-meter station buffers. Figure 4 shows the locations of anuran call count survey stations (n=8).

The survey station locations were uploaded to a sub-meter accurate Trimble© Geo 7X GPS receiver which was used to locate survey stations in the field. Station locations were marked in the field by tying a length of pink flagging tape labelled with the station ID to woody vegetation at the station location.

Anuran call count survey methods were adapted from Paton *et al.* (2003) and the North American Amphibian Monitoring Program (NAAMP). Anuran call count surveys were conducted once every two weeks, beginning the first week of April and ending the last week of June. Surveys began approximately 30 minutes after sunset and typically ended prior to midnight. No minimum air temperature threshold was used to determine whether the survey would be conducted on a given night. The order in which stations were visited was reversed in alternating survey nights to avoid time bias of results.

An observer monitored anuran calling activity for a five minute period at each survey station. For each anuran species, the observer recorded the maximum calling index within five 1-minute intervals. The calling index included four categories: 0 = none heard calling; 1 = individuals detected, calls not overlapping; 2 = individual calls distinguishable, but calls overlapping; 3 = individuals too numerous to count, chorus is constant and overlapping. The following environmental abiotic data was also collected at each station at the beginning of the survey: air temperature, wind speed, estimated cloud cover, days since the last rainfall, current precipitation, and ambient noise level. The following index used in the North



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Drawing Date: 2017/07/19

Clear River Energy Center Biological Inventory
Burrillville, Rhode Island

1 inch = 750 feet

Anuran Call Count Stations

Figure 4

Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

appreciable effect (i.e. owl calling); 1 = slightly affecting sampling (distant traffic, dog barking, one car passing); 2 = moderately affecting sampling (distant traffic, 2-5 cars passing), 3 = seriously affecting sampling (continuous traffic nearby, 6-10 cars passing), 4 = profoundly affecting sampling (continuous traffic passing, construction noise).

3.5 Owl Broadcast Survey

Owl broadcast surveys were conducted on five nights when anuran call count surveys were also conducted. Survey stations for owl broadcast surveys were co-located with those used for anuran call count surveys (see Section 3.4 and Figure 4). At each station, the owl broadcast survey was initiated following the completion of the anuran call count survey for that station to avoid biasing the results of the anuran survey. Typically, the first owl broadcast survey within a given night began approximately 30 minutes after sunset and the last survey was completed by midnight. The order in which stations were visited was reversed in alternating survey nights to avoid time bias of results.

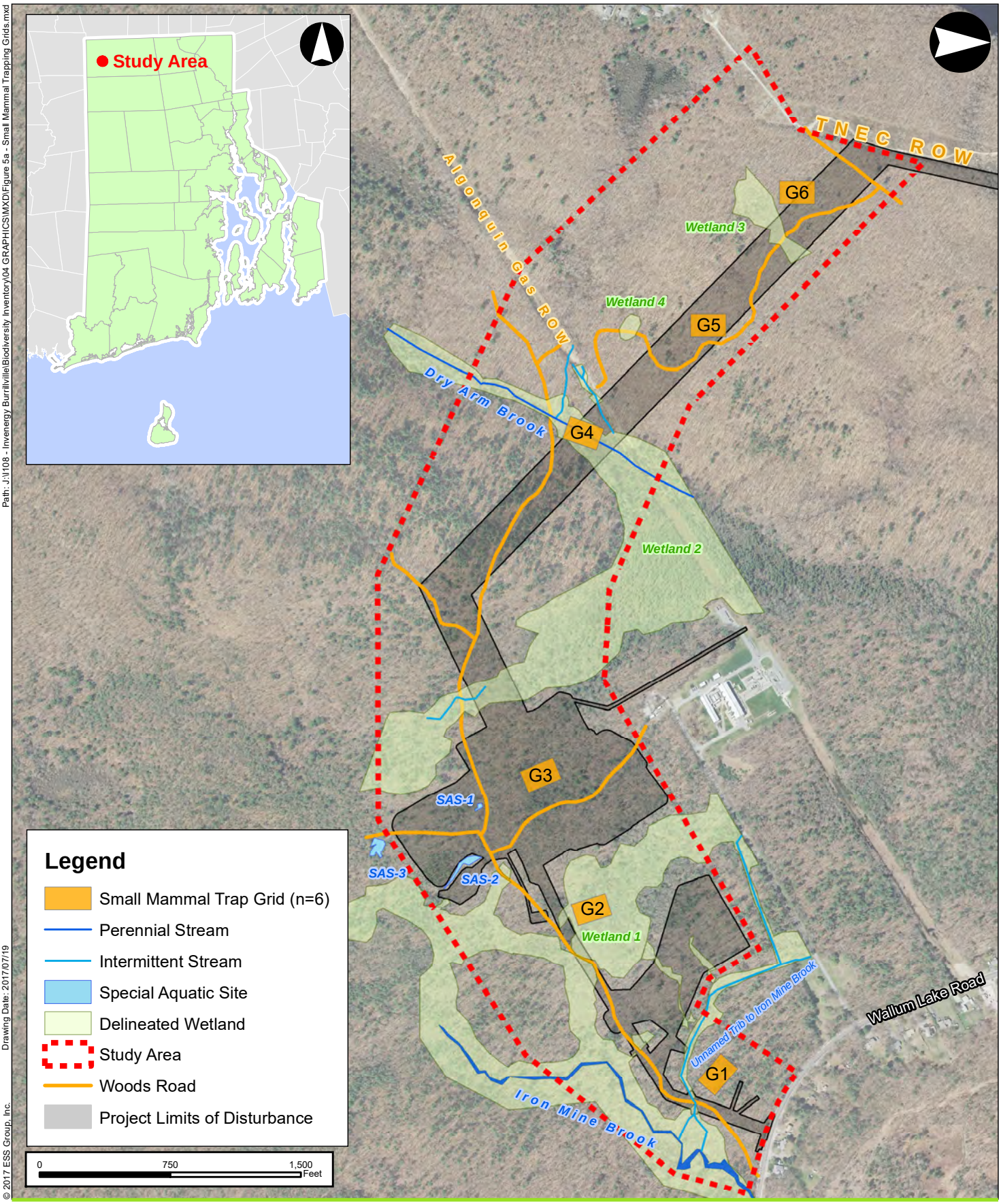
Owl broadcast surveys were completed following an adaptation of the methods given in Takats *et al.* (2001). At each survey station, the observer completed an initial two-minute silent listening period during which any owl species heard calling were recorded, followed by a broadcast survey targeting the following species: eastern screech-owl (*Megascops asio*), barred owl (*Strix varia*), and great horned owl (*Bubo virginianus*). The broadcast survey did not include other forest-dwelling owl species such as northern saw-whet owl (*Aegolius acadicus*) or long-eared owl (*Asio otus*) because the survey period (April to June) was outside of the time of year when these species typically occur in southern New England (eBird [ebird.org] has no records of long-eared owl in Rhode Island or surrounding areas of Massachusetts and Connecticut during the period of April to June over the past 10 years, and only three records of northern saw-whet owl during this same period).

The broadcast surveys were always conducted by first playing a series of calls of eastern screech-owl, followed by a period of silence, a series of barred owl calls, another period of silence, and finally a series of great horned owl calls, followed by a final period of silence. Calls were broadcast in this order to avoid discouraging vocalizations by the smaller eastern screech-owl after playing calls of the larger barred and great horned owls. Each broadcast period lasted for two minutes, and each subsequent period of silent listening lasted for an additional two minutes or until an owl call was heard, for a total maximum survey time of 14 minutes. The approximate distance and direction of any owls heard was recorded. Surveys were not conducted during inclement weather, and environmental variables were recorded at each station prior to the broadcast as described in Section 3.4.

3.6 Small Mammal Trapping

Small mammal trapping and handling was conducted in accordance with the guidelines established in the Animal Welfare Act and Sikes *et al.* (2011) to ensure the welfare of captured individuals and to prevent hantavirus exposure. Trapping was conducted under a valid Scientific Collector's Permit issued by the RIDEM Division of Fish and Wildlife (DFW) (permit no. 2017-15-W) (Appendix C).

Two small mammal trapping grids were established in each of the three primarily habitat types within the study area (mixed deciduous/coniferous forest, oak forest, and forested swamp), for a total of six trapping grids (Figure 5).



Path: J:\J108 - Invenergy Burrillville\Biodiversity Inventory\04 GRAPHICS\MXD\Figure 5a - Small Mammal Trapping Grids.mxd

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Clear River Energy Center Biological Inventory
Burrillville, Rhode Island

1 inch = 750 feet

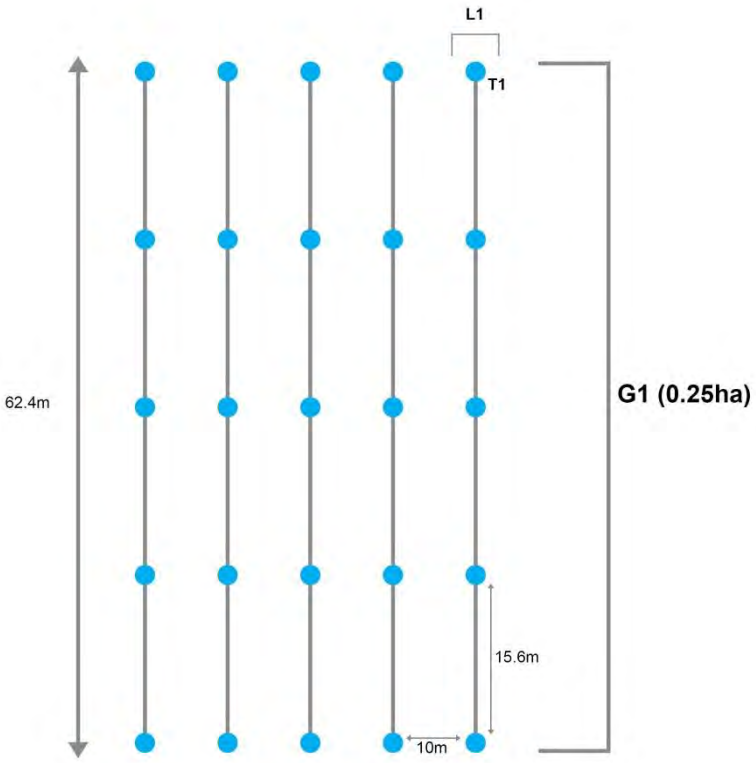
Small Mammal Trapping Grids

Figure 5

Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

Each trapping grid consisted of five parallel 62.4-meter (204.7-foot) transects spaced 10 meters (32.8 feet) apart, for a total trapping grid area of 2,500 square meters, or 0.25 hectares (0.62 acres) (Figure 6). One aluminum live box trap (dimensions 7.6 x 8.9 x 22.9 centimeters [3.0 x 3.5 x 9.0 inches]) (H. B. Sherman Traps, Inc.) was placed every 15.6 meters (51.2 feet) along each of the five 62.4-meter transects, for a total of 25 traps per trapping grid and a total of 150 traps in the study area. The four corners of each trapping grid were recorded using a sub-meter accurate Trimble© Geo 7X GPS receiver and marked by tying a length of orange flagging tape to woody vegetation. All traps were baited using a mixture of rolled oats, black oil sunflower seed, and anise seed.

Figure 6. Small Mammal Trapping Grid Detail

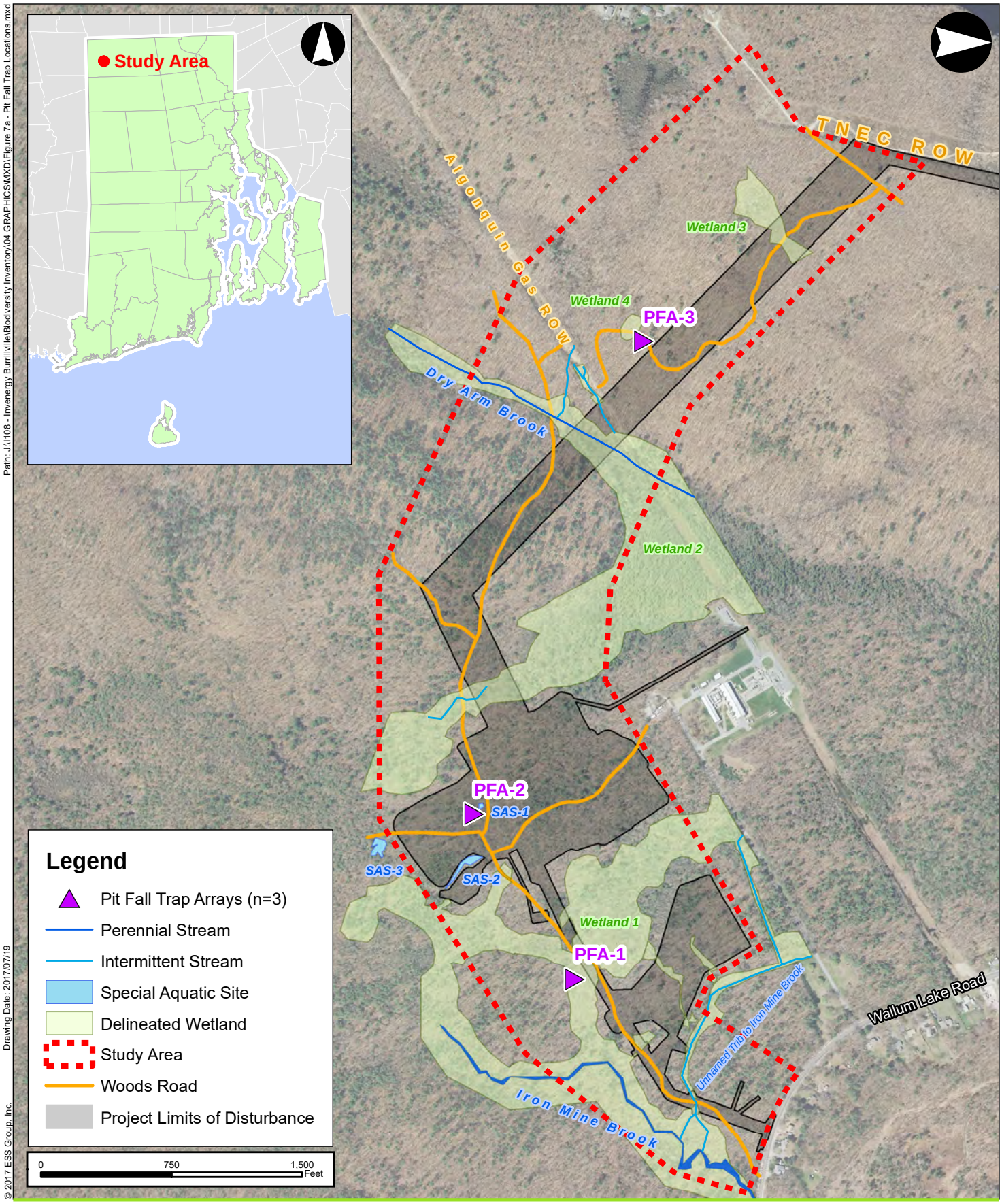


Traps were checked once daily in the morning to process and release any individuals captured during the previous night. All captured individuals were identified to species and standard morphometric data were collected (total length, tail length, right ear length, right hind foot length, and mass). Gender of captured individuals was also recorded. A water-soluble white paint was applied to the tails of captured individuals to act as a temporary marker; this allowed for the determination of a recapture rate. Individuals found deceased in traps were processed as described above and retained for donation to the Harvard Museum of Comparative Zoology, Cambridge, Massachusetts.

3.7 Pit Fall Trapping

Trapping was conducted under a valid Scientific Collector's Permit issued by the RIDEM DFW (permit no. 2017-15-W) (Appendix C).

One pit fall trap array was established in each of the three primarily habitat types within the study area (mixed deciduous/coniferous forest, oak forest, and forested swamp), for a total of three arrays (Figure 7). The arrays were established within or in the vicinity of forested swamp habitats or special aquatic sites (SAS) (vernal pools) where evidence of amphibian breeding was observed.



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Burrillville, Rhode Island

1 inch = 750 feet

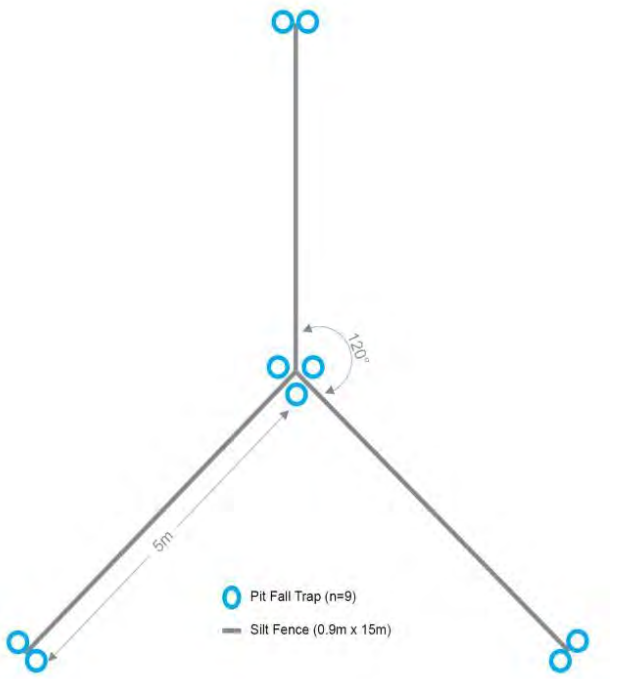
Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

Pit Fall Trap Arrays

Figure 7

The design of the pit fall arrays was adapted from Corn and Bury (1990). Arrays consisted of three 5-meter (16.4-foot) segments of 0.9-meter (3.0-foot) tall silt fence diverging at approximately 120° from a central point. The silt fence was trenched approximately 5 centimeters (2.0 inches) into the ground. One pit fall trap was installed on both sides of each arm of the silt fence, at the far ends and at the central point, for a total of 9 traps per array (Figure 8). Pit fall traps were #10 metal cans (approximately 18 centimeters [7.1 inches] tall and 16 centimeters [6.3 inches] in diameter); a hole was drilled in the bottom of each trap to facilitate drainage. Traps were buried along the silt fence and flush with the ground surface. Lids or funnels for the pit fall traps were not used.

Figure 8. Pit Fall Trap Array Detail



The central point of each array was recorded using a sub-meter accurate Trimble© Geo 7X GPS receiver and marked by tying a length of orange flagging tape to woody vegetation.

Traps were checked once daily in the morning to process and release any individuals captured during the previous night. All captured individuals were identified to species and standard morphometric data were collected. For mammals, the following morphometric data were collected: total length, tail length, right ear length, right hind foot length, and mass. For amphibians, total length and snout-vent length were measured. Gender of captured individuals was also recorded.

PFA-2 adjacent to SAS 1. April 13, 2017.

Individuals found deceased in traps were processed as described above and retained for donation to a museum collection.

3.8 Cover Board Monitoring

Cover boards were deployed at the study area to monitor for the presence of fossorial species such as mole salamanders and certain snake species. Plywood boards measuring 1.2 meters by 1.2 meters (4 feet by 4 feet) were used as cover boards. Three cover boards were deployed in the study area and were co-located with pit fall array locations (Figure 7). Cover boards were deployed at the site on May 1, 2017, and were checked weekly during the monitoring period. During each cover board check, an observer lifted the cover board and visually inspected the ground underneath for the presence of target species. The species and number observed using the cover boards were recorded during each cover board check.

3.9 Amphibian and Reptile Time-Constrained Searches

Time-constrained searches for documenting the presence of amphibian and reptile species were conducted in the study area generally following the methods of Corn and Bury (1990). To complete the time-constrained searches, an observer followed a meandering, non-intersecting path through the study area and visually searched for individual amphibians and reptiles. When habitat features such as coarse woody debris or rocks within streams were encountered, these were examined for the presence of amphibians and reptiles. All individuals encountered were identified to species. The total time allotted for each time-constrained search was 180 minutes (3 hours).

Time-constrained searches are useful for providing presence-absence data for species, but are not suitable for determining population size or other demographic analyses (Corn and Bury 1990). Since the path followed during each time-constrained survey was non-intersecting, it was assumed that all individuals detected were being encountered for the first time within each survey; however this assumption could not be extended between surveys. Therefore, a simple running tally of the number of individuals of each species encountered during each survey was compiled.

3.10 Diurnal Insect Survey

Odonate Survey

A dedicated odonate meander survey was conducted on July 3, 2017. Odonate observations were also completed on an opportunistic basis while onsite for other biological survey work.

Surveys targeted adult odonates and were conducted during daylight hours within five areas. Three of the five areas were streams, including Iron Mine Brook, an unnamed tributary to Iron Mine Brook, and Dry Arm Brook. The other two areas were the existing woods roads and the Algonquin ROW, which represent small and large areas of open habitat, respectively. Survey transects through each area generally ranged from 100 to 500 meters (328 to 1,640 feet), depending on the extent of the habitat onsite. The survey included each of the three primary vegetative communities present in the study area, as well as the Algonquin ROW.

Odonates were directly observed or captured with a sweep net and identified in the field. Captured individuals were released following identification.

Lepidopteran and Tiger Beetle Survey

Meandering day time surveys were conducted within the study area along the existing woods roads and the existing Algonquin ROW for butterflies, day-flying moths, and tiger beetles. The survey route travelled through the three primary habitat types present within the study area: mixed deciduous/coniferous forest, oak forest, and forested wetland. All butterfly, day-flying moth, and tiger beetle species were identified and counted. A full list of all butterfly, day-flying moth, and tiger beetle species encountered was developed following field surveys.

Please see Appendix D for additional details regarding the lepidopteran and tiger beetle survey.

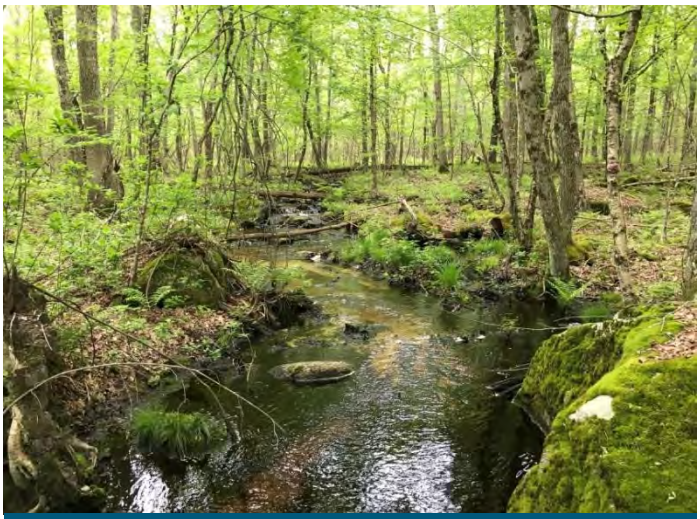
3.11 Nocturnal Moth Survey

Light trap surveys were conducted to characterize the moth community within the study area. Three locations within the study area were selected to provide the most diverse picture of habitat use by moth species (Figure 9). During each trap night, a portable light trap charged with ethyl acetate was set at each of the three locations prior to dusk and was retrieved the following morning. All macrolepidoptera present within the traps were identified to the lowest taxonomic level possible (in nearly all cases to the species level), and enumerated.

Please see Appendix D for additional details regarding the nocturnal moth survey.

3.12 Benthic Macroinvertebrate Sampling

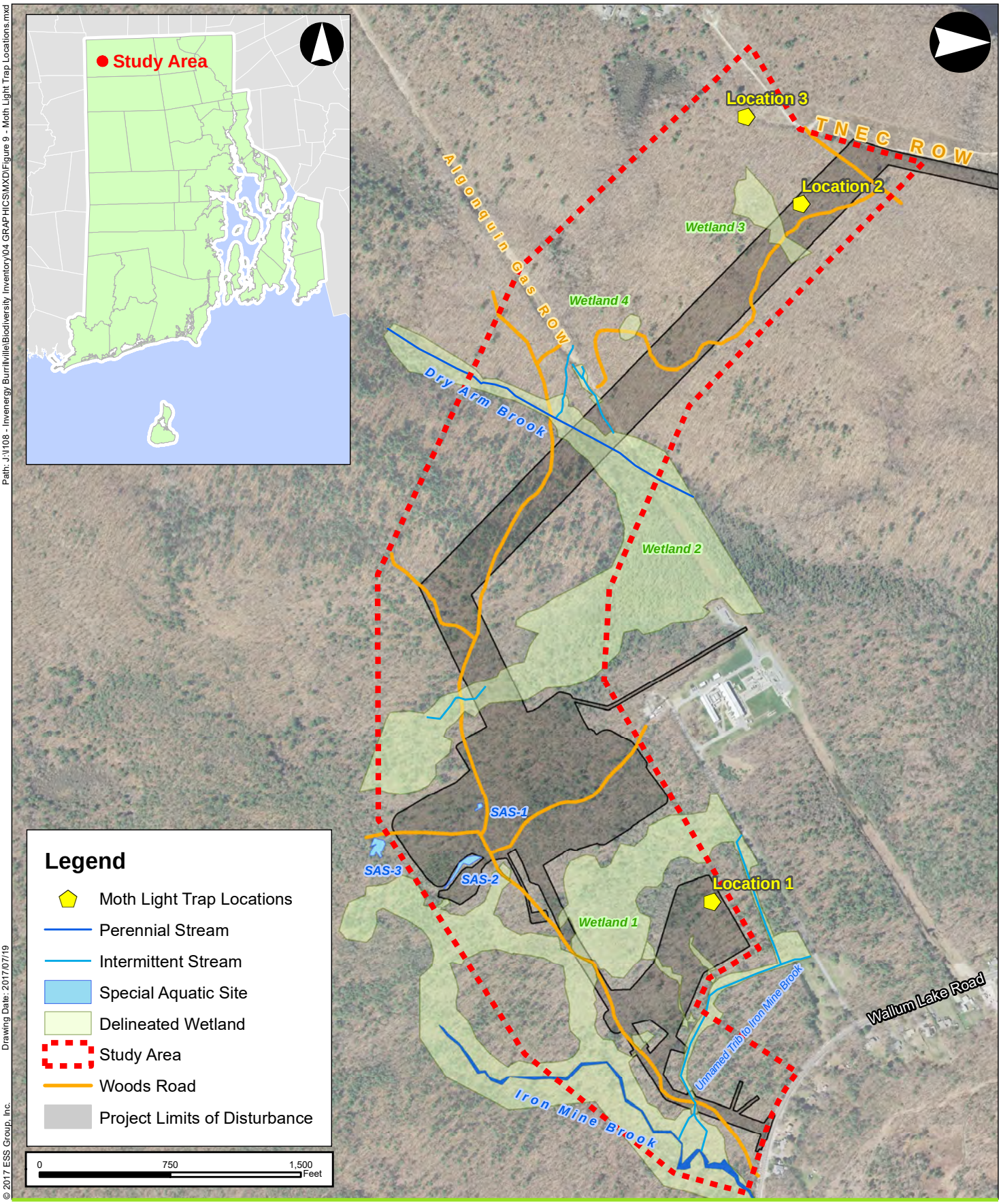
Benthic macroinvertebrates were sampled at two perennial streams (Iron Mine Brook and Dry Arm Brook) and one intermittent stream (unnamed tributary to Iron Mine Brook) on May 24, 2017, using methods adapted from United States Environmental Protection Agency (EPA) protocols (Barbour *et al.* 1999). A single habitat sampling approach was used in order to standardize assessments between streams. Sampling was conducted to supplement benthic macroinvertebrate sampling conducted at the site in 2015.



Iron Mine Brook. May 24, 2017.

A representative 100-meter (328-foot) reach of each stream within the study area was selected for sampling. Key in-stream and riparian corridor attributes were noted before disruption of stream sediments. Macroinvertebrate sampling proceeded from downstream to upstream, for a total active sampling time of 3 minutes. Sampling was confined to riffle areas, and lasted no longer than 30 seconds at any one net location. Material was collected by picking up and lightly rubbing the surface of cobbles, rubbing and/or rocking boulders and exposed bedrock, and gently disturbing gravel substrates upstream of a D-frame kick-net. Large debris was rinsed to remove macroinvertebrates and discarded. Sample material was removed to labeled containers and preserved in ≥70% ethanol. Following invertebrate sampling, an EPA “Habitat Assessment Field Data Sheet” (Appendix E) was completed to characterize the stream reach and surrounding habitat.

Benthic samples were processed by freshwater macroinvertebrate taxonomists. All sample material was carefully rinsed in a 500-micron (µm) mesh sieve to remove fine sediment without damaging delicate organisms. Subsamples of this material were selected using a random number table and processed individually using a dissecting microscope. The subsampling procedure was repeated until at least 100 organisms were sorted from each sample, and the sorted fraction was recorded. Organisms were then enumerated and identified to the lowest practicable taxonomic level by freshwater macroinvertebrate taxonomists, usually to genus/species. Midges and oligochaete worms were mounted on slides following protocols detailed in Epler (2001) and observed using a compound microscope; all other organisms were examined using a dissecting microscope.



Clear River Energy Center Biological Inventory
Burrillville, Rhode Island

Moth Light Trap Locations

1 inch = 750 feet

Figure 9

Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

3.13 Plant Survey

A vascular plant survey was conducted to characterize the floristic community within the study area. A list of targeted rare plant species previously known from the general vicinity was used to guide habitat surveys. Aerial photographs of the site were used to locate likely habitats for these species, and these areas were visually surveyed for these plant species. In addition, a visual meander survey of the study area as a whole was conducted by walking the study area and identifying all vascular plant species observed. Meander surveys are ideal for maximizing vascular plant diversity because they allow for thorough survey of small microhabitats such as stream banks, wetlands, and rock ledges, which could be missed in a fixed plot or grid sampling methodology. Any rare species observed were photographed, and the location of the encounter was recording using a GPS.

Please see Appendix F for additional details regarding the plant survey.

4.0 RESULTS

4.1 Winter Track Survey

A winter track survey was conducted at the study area on March 17, 2017 from approximately 09:30 to 14:30. Snow depth within the study area at the time of the survey was approximately 23 centimeters (9 inches). Five mammal species and one bird species were detected during the winter track survey, in addition to one small rodent species (Rodentia) which could not be positively identified to a lower taxonomic level. The following species were detected during the winter track survey (n=6 species): eastern gray squirrel (*Sciurus carolinensis*), coyote (*Canis latrans*), fisher (*Martes pennanti*), bobcat (*Lynx rufus*), white-tailed deer (*Odocoileus virginianus*), and ruffed grouse (*Bonasa umbellus*).

*Bobcat (*Lynx rufus*) tracks along the woods road (brightness and contrast of the photograph have been altered to improve visibility). March 17, 2017.*

White-tailed deer tracks were observed both travelling along the woods road and crossing it perpendicularly, while carnivore (coyote, fisher, and bobcat) tracks were primarily observed following the woods road. Ruffed grouse tracks were observed only in the Algonquin ROW.

4.2 Remote Field Cameras

The six remote field cameras were deployed for 94 nights, for a total of 564 camera-nights. The cameras captured a total of 290 individual detections of 15 species, including 12 mammal species and three bird species.

The most frequently-detected species were white-tailed deer, eastern gray squirrel, northern raccoon (*Procyon lotor*), and wild turkey (*Meleagris gallopavo*), with 79, 62, 51, and 37 detections, respectively. By contrast, four species – Virginia opossum (*Didelphis virginiana*), mouse sp. (Rodentia), bobcat, and turkey vulture (*Cathartes aura*) – were detected by the remote field cameras only once.

With 80 individual detections, camera location 6-A had the highest number of detections, and had nearly double the number of detections as the next highest camera location (Figure 2). This can likely be attributed to the location of this camera near a four-way intersection of the existing woods road which was frequently travelled by white-tailed deer, wild turkey, and various meso-carnivores. Camera location 3-A, by contrast, had the lowest number of detections (n=0) (Figure 2). The mean number of detections per camera location was 24.2 with a standard deviation of 21.9.

Table 4.2-1 provides a summary of the remote field camera results.

Table 4.2-1. Summary of Remote Field Camera Results

Common Name	Scientific Name	Number of Detections												Total Detections by Species
		Camera 1		Camera 2		Camera 3		Camera 4		Camera 5		Camera 6		
		A	B	A	B	A	B	A	B	A	B	A	B	
Virginia opossum	*Didelphis virginiana*	-	-	-	-	-	-	-	-	-	-	-	1	1
Southern flying squirrel	*Glaucomys volans*	-	-	2	-	-	-	-	-	-	-	1	-	3
Mouse sp.	Rodentia	1	-	-	-	-	-	-	-	-	-	-	-	1
Eastern gray squirrel	*Sciurus carolinensis*	35	6	13	1	-	-	-	-	-	7	-	-	62
Red squirrel	*Tamiasciurus hudsonicus*	-	-	-	-	-	-	-	2	-	-	-	-	2
Coyote	*Canis latrans*	3	-	2	4	-	-	-	2	-	1	7	-	19
Gray fox	*Urocyon cinereoargenteus*	-	-	1	-	-	-	-	-	-	1	3	-	5
Red fox	*Vulpes vulpes*	-	-	1	-	-	-	-	-	-	-	6	-	7
Northern raccoon	*Procyon lotor*	-	-	1	5	-	1	-	7	3	1	8	25	51
Fisher	*Martes pennanti*	-	-	4	-	-	-	-	1	1	9	1	1	17
Bobcat	*Lynx rufus*	-	-	-	1	-	-	-	-	-	-	-	-	1
White-tailed deer	*Odocoileus virginianus*	3	-	10	6	-	11	11	4	4	3	24	3	79
Wild turkey	*Meleagris gallopavo*	2	-	4	-	-	1	-	-	2	-	28	-	37
Turkey vulture	*Cathartes aura*	-	-	-	-	-	-	-	-	-	-	1	-	1
Barred owl	*Strix varia*	-	-	-	-	-	-	1	-	-	-	1	2	4
Total Detections by Camera Site		44	6	38	17	0	13	12	16	10	22	80	32	290

A representative photograph of each species detected by the remote field cameras is provided below.

*White-tailed deer (*Odocoileus virginianus*) photographed by Camera 6-A on April 22, 2017. At least seven deer are present in this photograph.*

*Barred owl (*Strix varia*) photographed by Camera 6-B on June 6, 2017.*

*Coyote (*Canis latrans*) photographed by Camera 6-A on April 9, 2017.*

*Red fox (*Vulpes vulpes*) photographed by Camera 2-A on April 11, 2017.*

*Fisher (*Martes pennanti*) photographed by Camera 2-A on April 17, 2017.*

*Gray fox (*Urocyon cinereoargenteus*) photographed by Camera 2-A on April 26, 2017.*

*Southern flying squirrel (*Glaucomys volans*) photographed by Camera 2-A on April 17, 2017.*

*Turkey vulture (*Carthartes aura*) photographed by Camera 6-A on April 17, 2017.*

*Wild turkey (*Meleagris gallopavo*) photographed by Camera 6-A on April 18, 2017.*

*Eastern gray squirrel (*Sciurus carolinensis*) photographed by Camera 1-A on April 16, 2017.*

Mouse species photographed by Camera 1-A on April 14, 2017.

*Northern raccoon (*Procyon lotor*) photographed by Camera 6-A on April 11, 2017.*

*Bobcat (*Lynx rufus*) photographed by Camera 2-B on June 22, 2017.*

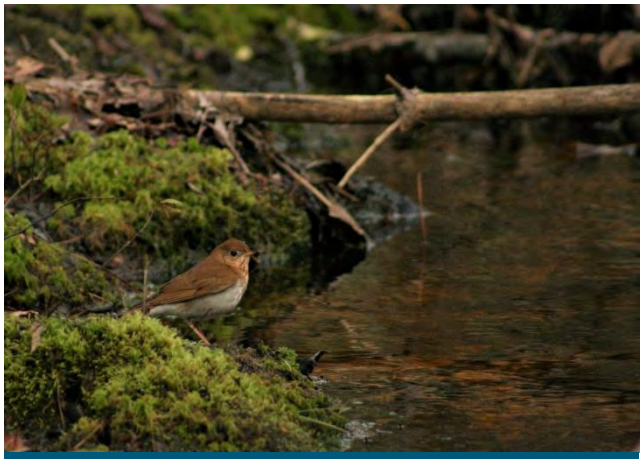
*Virginia opossum (*Didelphis virginiana*) photographed by Camera 6-B on June 17, 2017.*

*Red squirrel (*Tamiasciurus hudsonicus*) photographed by Camera 4-B on June 15, 2017.*

4.3 Avian Point Count Survey

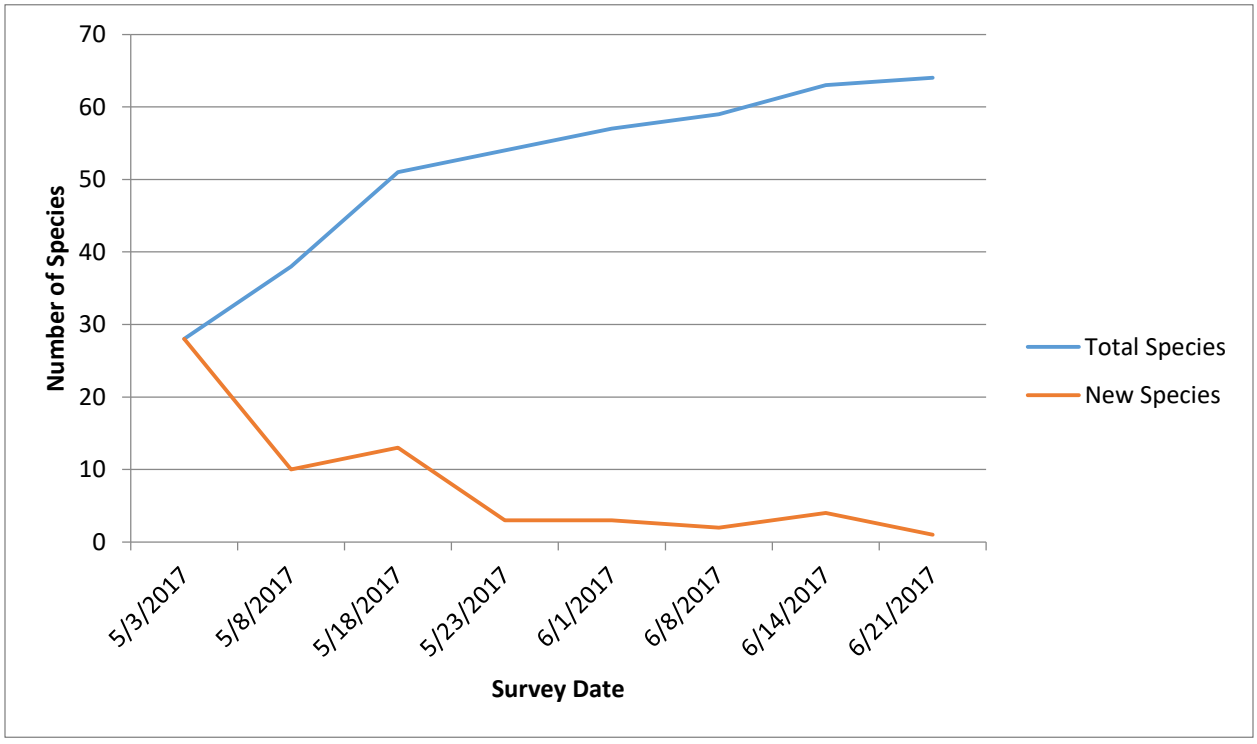
Avian point count surveys were conducted in the study area on the following dates in 2017 (n=8): May 3, May 8, May 18, May 23, June 1, June 8, June 14, and June 21. A total of 64 avian species were documented in the study area during the point count surveys, comprising 1,431 individual detections. The average number of species detected in the study area per survey was 33.6 with a standard deviation of 3.9. The total number of species detected per survey ranged from a low of 28 species on May 3 to a high of 38 species on May 18 and June 14.

Figure 10 displays the total number of species and number of new species detected in the study area across the eight surveys.



*Veery (*Catharus fuscescens*) observed along the unnamed tributary to Iron Mine Brook. May 11, 2017.*

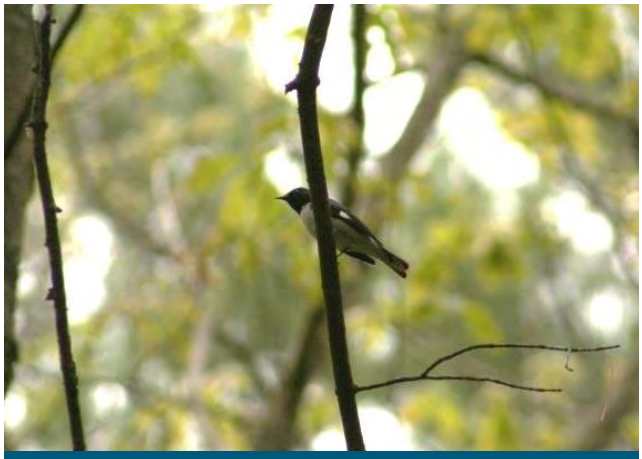
Figure 10. Total Number of Avian Species and Number of New Species Detected Over Time



In addition to the 64 avian species detected in the study area during the avian point count surveys, an additional 17 avian species were detected within the study area during the course of other surveys (winter track survey, remote field cameras, and owl broadcast survey) and incidentally. A full list of the 81 avian species observed within the study area is provided in Appendix A.

Results by Species

As stated above, the avian point count surveys resulted in 1,431 individual detections representing 64 avian species. The most frequently detected species was ovenbird (*Seiurus aurocapillus*), which was detected 272 times and accounted for 19.0% of all detections. The next most frequently detected species were black-capped chickadee (*Poecile atricapillus*) with 130 detections (9.1% of total detections), black-and-white warbler (*Mniotilta varia*) with 109 detections (7.6% of total detections), and tufted titmouse (*Baeolophus bicolor*) with 101 detections (7.1% of total detections). By contrast, nine species were detected only once during the avian point count surveys: Baltimore oriole (*Icterus galbula*), barn swallow (*Hirundo rustica*), cerulean warbler (*Setophaga cerulea*), common raven (*Corvus corax*), least flycatcher (*Empidonax minimus*), red-winged blackbird (*Agelaius phoeniceus*), ruby-throated hummingbird (*Archilochus colubris*), song sparrow (*Melospiza melodia*), and Wilson's warbler (*Wilsonia pusilla*). Twelve of the 64 species were detected during all eight surveys: black-and-white warbler, black-capped chickadee, black-throated blue warbler (*Setophaga caerulescens*), blue jay (*Cyanocitta cristata*), eastern towhee (*Pipilo erythrophthalmus*), gray catbird (*Dumetella carolinensis*), hermit thrush (*Catharus guttatus*), ovenbird, pine warbler (*Dendroica pinus*), prairie warbler (*Setophaga discolor*), scarlet tanager (*Piranga olivacea*), and tufted titmouse.



*Black-throated blue warbler (*Setophaga caerulescens*) observed in the study area. May 23, 2017.*

Table 4.3-1 provides a summary of each of the 64 avian species detected during the eight point count surveys.

Table 4.3-1. Avian Point Count Survey Species Summary Statistics

Common Name	Scientific Name	Detections Across Eight Surveys					
		No. Detections	Percent of Total	Mean Detections per Survey	Standard Deviation	Maximum	Minimum
American crow	*Corvus brachyrhynchos*	21	1.5	2.6	1.7	2	0
American goldfinch	*Spinus tristis*	18	1.3	2.3	2.7	8	0
American robin	*Turdus migratorius*	6	0.4	0.8	1.4	4	0
Baltimore oriole	*Icterus galbula*	1	0.1	0.1	0.4	1	0
Barn swallow	*Hirundo rustica*	1	0.1	0.1	0.4	1	0
Black-and-white warbler	*Mniotilta varia*	109	7.6	13.6	4.2	21	7
Black-billed cuckoo	*Coccyzus erythropthalmus*	7	0.5	0.9	1.1	3	0

Common Name	Scientific Name	Detections Across Eight Surveys					
		No. Detections	Percent of Total	Mean Detections per Survey	Standard Deviation	Maximum	Minimum
Blackburnian warbler	*Setophaga fusca*	2	0.1	0.25	0.5	1	0
Black-capped chickadee	*Parus atricapillus*	130	9.1	16.3	5.8	28	10
Blackpoll warbler	*Setophaga striata*	7	0.5	0.9	1.8	5	0
Black-throated blue warbler	*Setophaga caerulescens*	64	4.5	8	1.2	10	7
Black-throated green warbler	*Dendroica virens*	9	0.6	1.1	1	3	0
Blue jay	*Cyanocitta cristata*	67	4.7	8.4	5.6	19	2
Blue-gray gnatcatcher	*Polioptila caerulea*	4	0.3	0.5	0.9	2	0
Broad-winged hawk	*Buteo platypterus*	8	0.6	1	0.9	2	0
Brown creeper	*Certhia americana*	16	1.1	2	1.7	5	0
Brown-headed cowbird	*Molothrus ater*	3	0.2	0.4	0.7	2	0
Canada goose	*Branta canadensis*	12	0.8	1.5	3	8	0
Canada warbler	*Wilsonia canadensis*	3	0.2	0.4	0.5	1	0
Cedar waxwing	*Bombycilla cedrorum*	11	0.8	1.4	1.9	4	0
Cerulean warbler	*Setophaga cerulea*	1	0.1	0.1	0.4	1	0
Chestnut-sided warbler	*Setophaga pensylvanica*	4	0.3	0.5	0.8	2	0
Chipping sparrow	*Spizella passerina*	3	0.2	0.4	0.7	2	0
Common raven	*Corvus corax*	1	0.1	0.1	0.4	1	0
Common yellowthroat	*Geothlypis trichas*	6	0.4	0.8	1.2	3	0
Downy woodpecker	*Picoides pubescens*	6	0.4	0.8	0.7	2	0
Eastern phoebe	*Sayornis phoebe*	6	0.4	0.8	0.9	2	0
Eastern towhee	*Pipilo erythrophthalmus*	57	4	7.1	3.6	13	1
Eastern wood-pewee	*Contopus virens*	20	1.4	2.5	2.4	5	0
Field sparrow	*Spizella pusilla*	6	0.4	0.8	0.7	2	0

Common Name	Scientific Name	Detections Across Eight Surveys					
		No. Detections	Percent of Total	Mean Detections per Survey	Standard Deviation	Maximum	Minimum
Gray catbird	*Dumetella carolinensis*	18	1.3	2.3	0.9	4	1
Great crested flycatcher	*Myiarchus crinita*	22	1.5	2.8	2	6	0
Hairy woodpecker	*Picoides villosus*	4	0.3	0.5	0.5	1	0
Hermit thrush	*Catharus guttatus*	21	1.5	2.6	1.2	5	1
Hooded warbler	*Setophaga citrina*	2	0.1	0.25	0.7	2	0
Indigo bunting	*Passerina cyanea*	5	0.3	0.6	0.5	1	0
Least flycatcher	*Empidonax minimus*	1	0.1	0.1	0.4	1	0
Mallard	*Anas platyrhynchos*	4	0.3	0.5	0.9	2	0
Mourning dove	*Zenaida macroura*	20	1.4	2.5	2.1	4	0
Northern cardinal	*Cardinalis cardinalis*	18	1.3	2.3	2.9	9	0
Northern flicker	*Colaptes auratus*	5	0.3	0.6	0.7	2	0
Northern parula	*Setophaga americana*	6	0.4	0.8	1.8	5	0
Northern waterthrush	*Seiurus novaboracensis*	17	1.2	2.1	1.6	5	0
Ovenbird	*Seiurus aurocapillus*	272	19	34	6.1	44	27
Pileated woodpecker	*Hylatomus pileatus*	3	0.2	0.4	0.5	1	0
Pine warbler	*Dendroica pinus*	49	3.4	6.1	2.2	9	4
Prairie warbler	*Setophaga discolor*	19	1.3	2.4	0.5	3	2
Red-bellied woodpecker	*Melanerpes carolinus*	5	0.3	0.6	1.1	3	0
Red-eyed vireo	*Vireo olivaceous*	74	5.2	9.3	5.2	16	0
Red-winged blackbird	*Agelaius phoeniceus*	1	0.1	0.1	0.4	1	0
Rose-breasted grosbeak	*Pheucticus ludovicianus*	8	0.6	1	1.2	3	0
Ruby-throated hummingbird	*Archilochus colubris*	1	0.1	0.1	0.4	1	0
Scarlet tanager	*Piranga olivacea*	47	3.3	5.9	2.8	11	2

Common Name	Scientific Name	Detections Across Eight Surveys					
		No. Detections	Percent of Total	Mean Detections per Survey	Standard Deviation	Maximum	Minimum
Song sparrow	*Melospiza melodia*	1	0.1	0.1	0.4	1	0
Tufted titmouse	*Baeolophus bicolor*	101	7.1	12.6	6.3	23	2
Veery	*Catharus fuscescens*	53	3.7	6.6	4.6	13	0
Warbling vireo	*Vireo gilvus*	3	0.2	0.4	1.1	3	0
White-breasted nuthatch	*Sitta carolinensis*	9	0.6	1.1	1.4	4	0
Wilson's warbler	*Wilsonia pusilla*	1	0.1	0.1	0.4	1	0
Wood thrush	*Hylocichla mustelina*	4	0.3	0.5	1.1	3	0
Worm-eating warbler	*Helmitheros vermivorum*	3	0.2	0.4	0.5	1	0
Yellow warbler	*Setophaga petechia*	2	0.1	0.3	0.5	1	0
Yellow-billed cuckoo	*Coccyzus americanus*	21	1.5	2.6	2.3	5	0
Yellow-rumped warbler	*Setophaga coronata*	2	0.1	0.3	0.7	2	0

Table 4.3-2 provides the number of individuals of each avian species detected during each of the eight point count surveys.

Table 4.3-2. Summary of Avian Point Count Survey Results by Species and Date

Common Name	Scientific Name	Total Detections Across Thirteen Survey Stations							
		5/3/17	5/8/17	5/18/17	5/23/17	6/1/17	6/8/17	6/14/17	6/21/17
American crow	*Corvus brachyrhynchos*	1	2	2	5	3	0	4	4
American goldfinch	*Spinus tristis*	8	4	0	2	0	0	2	2
American robin	*Turdus migratorius*	4	1	0	0	0	0	1	0
Baltimore oriole	*Icterus galbula*	0	0	0	0	0	0	1	0
Barn swallow	*Hirundo rustica*	0	0	0	0	0	1	0	0
Black-and-white warbler	*Mniotilta varia*	21	12	14	7	16	16	12	11
Black-billed cuckoo	*Coccyzus erythropthalmus*	0	0	3	1	2	0	0	1
Blackburnian warbler	*Setophaga fusca*	0	0	0	0	0	0	1	1

Common Name	Scientific Name	Total Detections Across Thirteen Survey Stations							
		5/3/17	5/8/17	5/18/17	5/23/17	6/1/17	6/8/17	6/14/17	6/21/17
Black-capped chickadee	*Parus atricapillus*	17	11	16	12	28	19	10	17
Blackpoll warbler	*Setophaga striata*	0	0	5	0	2	0	0	0
Black-throated blue warbler	*Setophaga caerulescens*	10	8	7	7	9	9	7	7
Black-throated green warbler	*Dendroica virens*	0	1	3	0	2	1	1	1
Blue jay	*Cyanocitta cristata*	8	19	9	10	2	5	12	2
Blue-gray gnatcatcher	*Polioptila caerulea*	0	2	0	2	0	0	0	0
Broad-winged hawk	*Buteo platypterus*	0	0	2	1	1	2	0	2
Brown creeper	*Certhia americana*	5	3	1	0	0	2	3	2
Brown-headed cowbird	*Molothrus ater*	0	0	0	0	2	1	0	0
Canada goose	*Branta canadensis*	8	0	0	4	0	0	0	0
Canada warbler	*Wilsonia canadensis*	0	0	0	1	0	0	1	1
Cedar waxwing	*Bombycilla cedrorum*	0	0	0	4	4	3	0	0
Cerulean warbler	*Setophaga cerulea*	0	0	0	0	0	0	0	1
Chestnut-sided warbler	*Setophaga pensylvanica*	0	0	1	0	0	2	0	1
Chipping sparrow	*Spizella passerina*	0	0	0	0	0	1	2	0
Common raven	*Corvus corax*	1	0	0	0	0	0	0	0
Common yellowthroat	*Geothlypis trichas*	0	0	3	0	0	0	1	2
Downy woodpecker	*Picoides pubescens*	1	0	1	1	2	0	1	0
Eastern phoebe	*Sayornis phoebe*	0	0	1	2	1	0	0	2
Eastern towhee	*Pipilo erythrophthalmus*	9	13	7	9	4	8	6	1
Eastern wood-pewee	*Contopus virens*	0	0	1	0	5	4	5	5
Field sparrow	*Spizella pusilla*	1	0	2	1	0	1	1	0
Gray catbird	*Dumetella carolinensis*	3	2	1	4	2	2	2	2

Common Name	Scientific Name	Total Detections Across Thirteen Survey Stations							
		5/3/17	5/8/17	5/18/17	5/23/17	6/1/17	6/8/17	6/14/17	6/21/17
Great crested flycatcher	*Myiarchus crinita*	0	1	2	2	6	3	3	5
Hairy woodpecker	*Picoides villosus*	0	1	0	1	1	0	0	1
Hermit thrush	*Catharus guttatus*	1	3	2	3	2	2	3	5
Hooded warbler	*Setophaga citrina*	0	0	2	0	0	0	0	0
Indigo bunting	*Passerina cyanea*	0	1	1	0	1	1	1	0
Least flycatcher	*Empidonax minimus*	0	0	1	0	0	0	0	0
Mallard	*Anas platyrhynchos*	0	0	2	0	2	0	0	0
Mourning dove	*Zenaida macroura*	4	1	0	4	6	2	3	0
Northern cardinal	*Cardinalis cardinalis*	9	2	0	1	1	0	3	2
Northern flicker	*Colaptes auratus*	0	1	1	2	0	0	1	0
Northern parula	*Setophaga americana*	1	0	5	0	0	0	0	0
Northern waterthrush	*Seiurus novaboracensis*	1	0	5	3	3	1	2	2
Ovenbird	*Seiurus aurocapillus*	42	44	35	33	27	32	28	31
Pileated woodpecker	*Hylatomus pileatus*	0	0	1	1	1	0	0	0
Pine warbler	*Dendroica pinus*	9	4	4	5	9	5	5	8
Prairie warbler	*Setophaga discolor*	3	3	2	2	2	2	2	3
Red-bellied woodpecker	*Melanerpes carolinus*	3	0	0	0	1	1	0	0
Red-eyed vireo	*Vireo olivaceous*	0	3	9	16	11	11	12	12
Red-winged blackbird	*Agelaius phoeniceus*	1	0	0	0	0	0	0	0
Rose-breasted grosbeak	*Pheucticus ludovicianus*	2	3	1	0	0	2	0	0
Ruby-throated hummingbird	*Archilochus colubris*	0	0	0	0	1	0	0	0
Scarlet tanager	*Piranga olivacea*	2	8	11	6	4	7	4	5
Song sparrow	*Melospiza melodia*	0	0	0	0	0	0	1	0

Common Name	Scientific Name	Total Detections Across Thirteen Survey Stations							
		5/3/17	5/8/17	5/18/17	5/23/17	6/1/17	6/8/17	6/14/17	6/21/17
Tufted titmouse	*Baeolophus bicolor*	2	9	23	11	17	16	13	10
Veery	*Catharus fuscescens*	0	2	3	6	10	13	10	9
Warbling vireo	*Vireo gilvus*	0	3	0	0	0	0	0	0
White-breasted nuthatch	*Sitta carolinensis*	0	1	0	4	1	1	2	0
Wilson's warbler	*Wilsonia pusilla*	0	0	1	0	0	0	0	0
Wood thrush	*Hylocichla mustelina*	1	0	3	0	0	0	0	0
Worm-eating warbler	*Helmitheros vermivorum*	0	0	0	0	1	0	1	1
Yellow warbler	*Setophaga petechia*	0	0	0	1	0	0	0	1
Yellow-billed cuckoo	*Coccyzus americanus*	0	0	5	0	3	3	5	5
Yellow-rumped warbler	*Setophaga coronata*	0	0	0	0	0	0	2	0

Results by Station

The total number of species detected at each of the thirteen survey stations ranged from a high of 31 to a low of 19 (range = 12 species). Survey stations AV-12, AV-04, and AV-01 had the highest number of species detections across all eight survey dates, with 31, 30, and 29 species respectively, while stations AV-10, AV-11, and AV-13 had the lowest number of species detections, with 20, 19, and 19 species respectively (Figure 3).

*Ovenbird (*Seiurus aurocapilla*) observed in the study area. June 30, 2017.*

Among the thirteen survey stations, station AV-12 had the highest average and maximum number of species detections during the study period. We attribute this result to the fact that unlike all other stations (with the exception of AV-09), the survey area (125-m [410-foot] diameter circle) associated with AV-12 included two different habitat types – forest and shrubland. Shrubland species such as prairie warbler, field sparrow (*Spizella pusilla*), and indigo bunting (*Passerina cyanea*) were regularly detected at AV-12, as were forest-nesting species such as scarlet tanager, ovenbird, and yellow-billed cuckoo (*Coccyzus americanus*). In addition, because station AV-12 was located in an open habitat that lacked a forest canopy, individuals flying over the station were easier to detect than at forested stations.

Table 4.3-3 provides summary statistics for each of the thirteen survey stations across the eight survey dates.

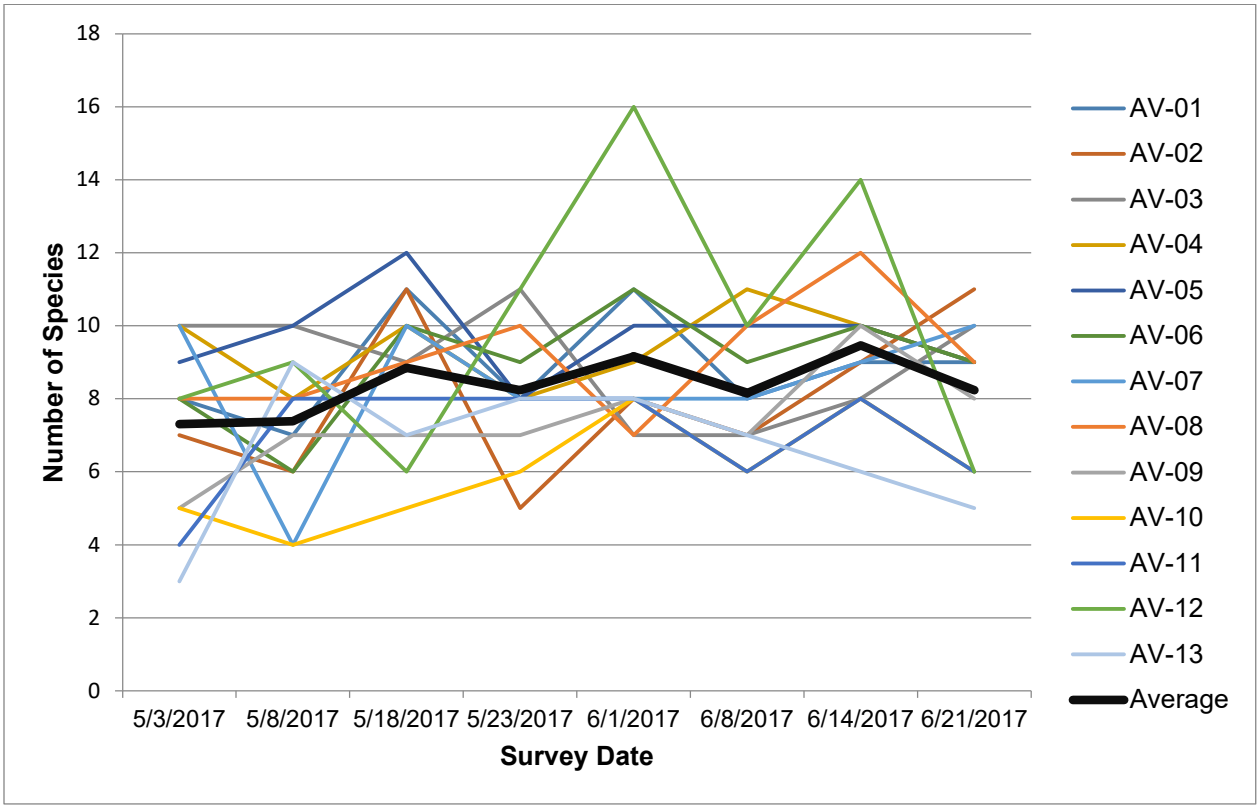
Table 4.3-3. Avian Point Count Survey Station Summary Statistics

Station	Number of Species Detections Across Eight Survey Dates				
	Total	Mean	Standard Deviation	Maximum	Minimum
AV-01	29	8.9	1.5	11	7
AV-02	25	8.0	2.2	11	5
AV-03	22	9.0	1.5	11	7
AV-04	30	9.4	1.1	11	8
AV-05	27	9.8	1.2	12	8
AV-06	25	9.0	1.5	11	6
AV-07	24	8.4	2.0	10	4
AV-08	24	9.1	1.6	12	7
AV-09	25	7.4	1.4	10	5
AV-10	20	6.0	1.4	8	4
AV-11	19	7.0	1.5	8	4
AV-12	31	10.0	3.6	16	6
AV-13	19	6.6	1.9	9	3

The number of species detected at each survey station remained relatively constant over time, and ranged from a low of 7.3 species on May 3 to a high of 9.5 species on June 14 (range = 2.2 species), though most stations showed a minor positive trend in the number of species detected from the first survey on May 3 to the final survey on June 21.

Figure 11 displays the number of species detected at each survey station on each survey date, along with the average number of species detected across all thirteen stations on each survey date.

Figure 11. Number of Avian Species Detected at Each Survey Station over Time



Breeding Birds

Each of the 64 avian species detected during the point count surveys as well as the 17 additional species detected in the study area were assigned a breeding code based on observations (or lack thereof) of evidence of breeding at the site. Three species – black-and-white warbler, ovenbird, and red-eyed vireo (*Vireo olivaceous*) – were assigned a breeding status of "confirmed" based on observations of distraction displays, adults attending young, and/or occupied nests. Forty-three (43) species were assigned a breeding status of "probable" based on observations of territorial behavior (primarily singing) on at least two occasions, at least one week apart, and on observations of pairs in suitable habitat. Fourteen (14) species were assigned a breeding code of "possible" based on observations of an individual singing once in suitable habitat on or after the safe date, but without further evidence of breeding. Twenty-one (21) species were not assigned a breeding status, primarily because individuals of that species were only observed flying over the study area or that individuals were only observed in the study area prior to the safe date.

*Broad-winged hawk (*Buteo platypterus*) observed in the study area. June 30, 2017.*

Table 4.3-4. Breeding Status of Avian Species in the Study Area

Common Name	Scientific Name	Safe Date[1]	Breeding Code[2]	Notes
American crow	*Corvus brachyrhynchos*	March 25	Probable - P, T	
American goldfinch	*Spinus tristis*	June 1	Probable - P, T	
American kestrel	*Falco sparverius*	May 10	Possible - X	Single individual detected in the Algonquin ROW.
American redstart	*Setophaga ruticilla*	June 1	N/A	Not detected on or after safe date.
American robin	*Turdus migratorius*	May 1	Probable - P, T	
Baltimore oriole	*Icterus galbula*	May 25	Possible - X	
Barn swallow	*Hirundo rustica*	May 25	N/A	Single individual detected flying over study area.
Barred owl	*Strix varia*	April 1	Possible	Observed on three occasions after safe date by remote cameras.
Black-and-white warbler	*Mniotilta varia*	May 25	Confirmed - DD	
Black-billed cuckoo	*Coccyzus erythropthalmus*	June 5	Probable - T	
Blackburnian warbler	*Setophaga fusca*	May 25	Probable - T	
Black-capped chickadee	*Parus atricapillus*	April 1	Probable - P, T	
Blackpoll warbler	*Setophaga striata*	N/A	N/A	All individuals detected assumed to be migrants.
Black-throated blue warbler	*Setophaga caerulescens*	May 25	Probable - P, T	
Black-throated green warbler	*Dendroica virens*	May 25	Probable - T	
Blue jay	*Cyanocitta cristata*	May 1	Probable - T	
Blue-gray gnatcatcher	*Polioptila caerulea*	May 15	Possible - X	
Blue-headed vireo	*Vireo solitarius*	May 15	N/A	Not detected on or after safe date.
Blue-winged warbler	*Vermivora cyanoptera*	May 20	Probable - T	Detected in Algonquin ROW.
Broad-winged hawk	*Buteo platypterus*	May 15	Probable - T	
Brown creeper	*Certhia americana*	May 20	Probable - T	
Brown-headed cowbird	*Molothrus ater*	May 1	Probable - T	Detected in existing TNEC ROW only.
Canada goose	*Branta canadensis*	April 15	N/A	Individuals detected flying over study area.
Canada warbler	*Wilsonia canadensis*	June 5	Probable - T	
Cedar waxwing	*Bombycilla cedrorum*	June 10	Probable - T	
Cerulean warbler	*Setophaga cerulea*	June 1	Possible - X	
Chestnut-sided warbler	*Setophaga pensylvanica*	May 25	Probable - T	
Chipping sparrow	*Spizella passerina*	May 1	Probable - T	

Common Name	Scientific Name	Safe Date[1]	Breeding Code[2]	Notes
Common grackle	*Quiscalus quiscula*	May 5	N/A	Not detected on or after safe date.
Common raven	*Corvus corax*	March 20	Possible - X	
Common yellowthroat	*Geothlypis trichas*	June 1	Probable - P, T	
Cooper's hawk	*Accipiter cooperii*	May 5	Possible - X	Observed on one occasion after the safe date.
Dark-eyed junco	*Junco hyemalis*	May 1	N/A	Not detected on or after safe date.
Downy woodpecker	*Picoides pubescens*	May 1	Probable - T	
Eastern bluebird	*Sialia sialis*	May 1	Probable - T	Observed in Algonquin ROW.
Eastern phoebe	*Sayornis phoebe*	May 1	Probable - T	
Eastern screech-owl	*Megascops asio*	April 1	Possible - X	Detected on one occasion after safe date.
Eastern towhee	*Pipilo erythrophthalmus*	May 1	Probable - P, T	
Eastern wood-pewee	*Contopus virens*	June 5	Probable - T	
Field sparrow	*Spizella pusilla*	May 1	Probable - T	Detected in existing TNEC ROW only.
Gray catbird	*Dumetella carolinensis*	May 20	Probable - P, T	
Great blue heron	*Ardea herodias*	May 1	N/A	Single individual detected flying over the study area.
Great crested flycatcher	*Myiarchus crinita*	May 25	Probable - P, T	
Hairy woodpecker	*Picoides villosus*	April 25	Probable - T	
Hermit thrush	*Catharus guttatus*	May 10	Probable - P, T	
Hooded warbler	*Setophaga citrina*	June 1	N/A	Not detected on or after safe date.
Indigo bunting	*Passerina cyanea*	May 25	Probable - T	Detected in existing TNEC ROW only.
Least flycatcher	*Empidonax minimus*	May 25	N/A	Not detected on or after safe date.
Mallard	*Anas platyrhynchos*	May 1	N/A	Individuals detected flying over study area.
Mourning dove	*Zenaida macroura*	April 1	Probable - T	
Northern cardinal	*Cardinalis cardinalis*	April 15	Probable - P, T	
Northern flicker	*Colaptes auratus*	May 25	Possible - X	
Northern parula	*Setophaga americana*	June 1	N/A	Not detected on or after safe date.
Northern waterthrush	*Seiurus novaboracensis*	May 20	Probable - T	
Ovenbird	*Seiurus aurocapillus*	May 20	Confirmed - DD, AY	
Philadelphia vireo	*Vireo philadelphicus*	N/A	N/A	All individuals detected assumed to be migrants.

Common Name	Scientific Name	Safe Date[1]	Breeding Code[2]	Notes
Pileated woodpecker	*Hylatomus pileatus*	April 1	Probable - T	
Pine warbler	*Dendroica pinus*	May 1	Probable - T	
Prairie warbler	*Setophaga discolor*	May 25	Probable - T	Detected in existing TNEC ROW only.
Red-bellied woodpecker	*Melanerpes carolinus*	April 15	Probable - T	
Red-eyed vireo	*Vireo olivaceous*	June 1	Confirmed - ON	
Red-tailed hawk	*Buteo jamaicensis*	April 15	N/A	Single individual detected flying over study area.
Red-winged blackbird	*Agelaius phoeniceus*	May 1	N/A	Single individual detected flying over study area.
Rose-breasted grosbeak	*Pheucticus ludovicianus*	May 25	Possible - X	
Ruby-throated hummingbird	*Archilochus colubris*	June 1	Possible - X	
Ruffed grouse	*Bonasa umbellus*	April 1	N/A	Not detected on or after safe date.
Scarlet tanager	*Piranga olivacea*	May 25	Probable - P, T	
Song sparrow	*Melospiza melodia*	May 1	Possible - X	Detected in existing Algonquin ROW only.
Tufted titmouse	*Baeolophus bicolor*	April 5	Probable - T	
Turkey vulture	*Cathartes aura*	May 10	N/A	Individuals detected flying over study area.
Veery	*Catharus fuscescens*	May 25	Probable - T	
Warbling vireo	*Vireo gilvus*	May 15	N/A	Not detected on or after safe date.
White-breasted nuthatch	*Sitta carolinensis*	April 25	Probable - T	
White-throated sparrow	*Zonotrichia albicollis*	May 20	N/A	Not detected on or after safe date.
Wild turkey	*Meleagris gallopavo*	April 1	Probable	Detected on multiple occasions after safe date, however no specific evidence of breeding was observed.
Wilson's warbler	*Wilsonia pusilla*	N/A	N/A	One individual detected, assumed to be migrant.
Wood thrush	*Hylocichla mustelina*	May 25	N/A	Not detected on or after safe date.
Worm-eating warbler	*Helmitheros vermivorum*	May 20	Probable - T	
Yellow warbler	*Setophaga petechia*	May 25	Possible - X	
Yellow-billed cuckoo	*Coccyzus americanus*	June 5	Probable - T	
Yellow-rumped warbler	*Setophaga coronata*	May 25	Possible - X	

[1] Source: Rhode Island Bird Atlas 2.0

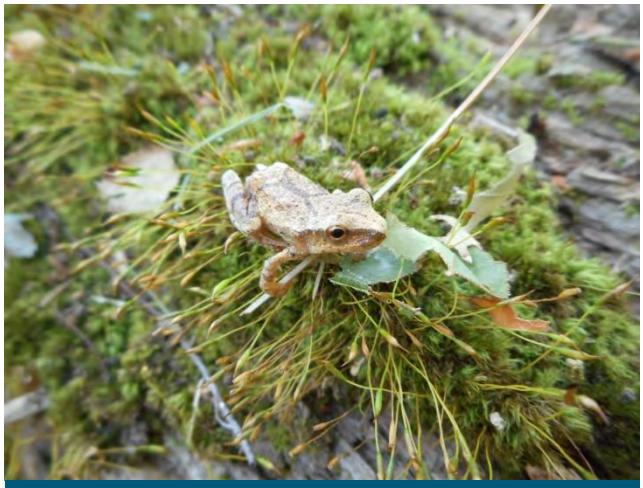
[2] Source: Rhode Island Bird Atlas 2.0

Possible (PO):
X - Bird observed singing once in suitable habitat within the safe dates, but no other indication of breeding noted.
Probable (PR):
P - Pair observed in suitable habitat during their breeding season.
T - Song or other behavioral evidence of territory establishment on at least two days, a week or more apart.
C - Courtship behavior or copulation (not used for waterfowl, shorebirds, and diurnal raptors).
N - Bird visiting probable nest site.
A - Agitated behavior or anxiety calls from adults suggesting probable nest or young nearby.
B - Nest building by wrens or woodpeckers.

Confirmed (CO):
NB - Nest building by all species except wrens and woodpeckers.
DD - Distraction display or injury feigning.
UN - Used nest location. Careful consideration necessary.
FL - Recently fledged young or downy young of galliforms, shorebirds, or waterfowl.
ON - Occupied nest. Adults entering or leaving nest site in circumstances indicating occupied nest.
AY - Attending young. Adult carrying fecal sac or food for young.
NE - Nest with eggs or adult sitting on nest.
NY - Nest with young or downy young of waterfowl, quail, waders, etc.

4.4 Anuran Call Count Survey

Anuran call count surveys were conducted in the study area on the following nights in 2017 (n=6): April 3, April 18, May 1, May 18, June 1, and June 15. Four anuran species were detected in the study area during anuran call count surveys: American toad (*Bufo americanus*), spring peeper (*Pseudacris crucifer*), gray treefrog (*Hyla versicolor*), and wood frog (*Rana sylvatica*); however, two of these – spring peeper and gray treefrog – accounted for the majority of call detections. American toad was only detected during the April 18 survey at one station, and wood frog was only detected during the April 3 survey at four stations. Spring peepers were detected during all surveys except for the final survey on June 15, and gray treefrogs were detected during the final three surveys on May 18, June 1, and June 15.



*Spring peeper (*Pseudacris crucifer*) observed in the study area. June 14, 2017.*

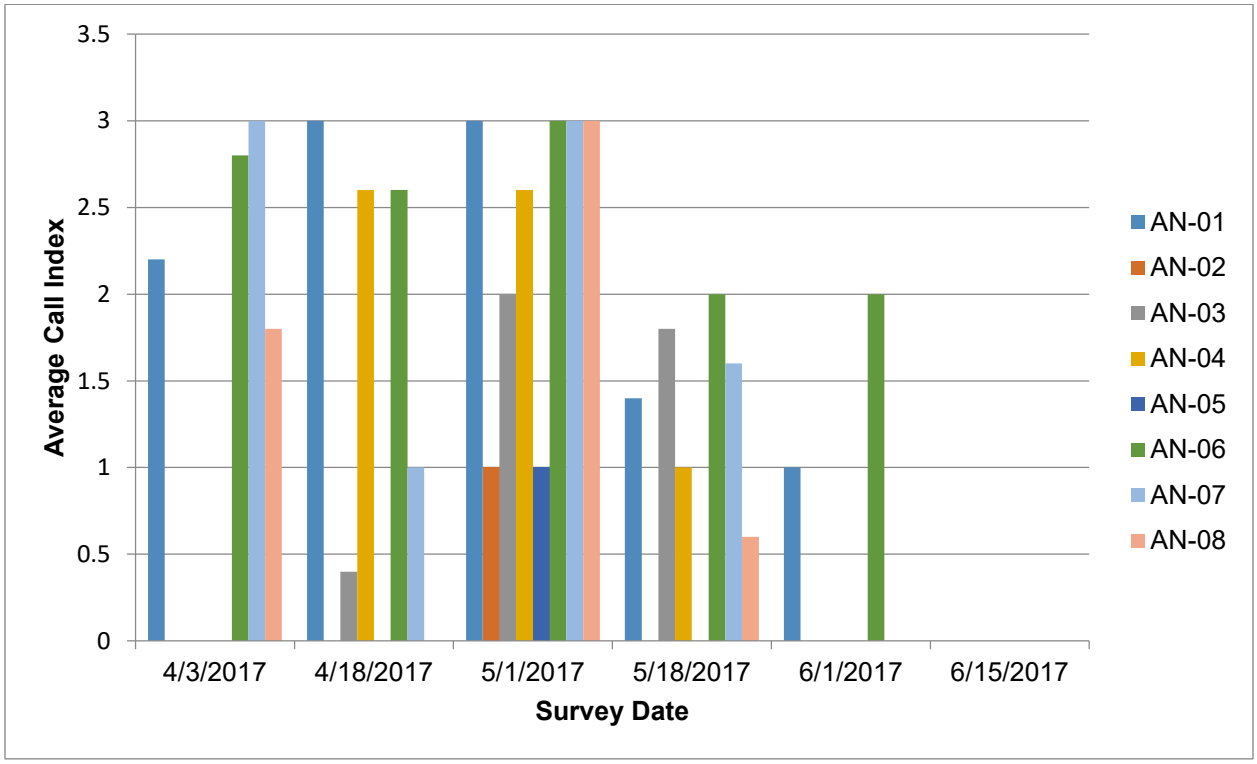
Table 4.4-1 presents a summary of the anuran call count survey results.

Table 4.4-1. Summary of Anuran Call Count Survey Results

Common Name	Scientific Name	Mean (+/- 1 SD) Call Index across Eight Survey Stations (range 0-3)					
		4/3/2017	4/18/2017	5/1/2017	5/18/2017	6/1/2017	6/15/2017
American toad	*Bufo americanus*	-	0.1 (0.4)	-	-	-	-
Fowler's toad	*Bufo fowleri*	-	-	-	-	-	-
Gray treefrog	*Hyla versicolor*	-	-	-	1.6 (1.3)	1.6 (1.4)	0.4 (0.7)
Spring peeper	*Pseudacris crucifer*	1.2 (1.4)	1.2 (1.3)	2.3 (0.9)	1.1 (0.8)	0.4 (0.7)	-
Bullfrog	*Rana catesbeiana*	-	-	-	-	-	-
Green frog	*Rana clamitans*	-	-	-	-	-	-
Pickerel frog	*Rana palustris*	-	-	-	-	-	-
Northern leopard frog	*Rana pipiens*	-	-	-	-	-	-
Wood frog	*Rana sylvatica*	0.08 (0.1)	-	-	-	-	-
Eastern Spadefoot	*Scaphiopus holbrookii*	-	-	-	-	-	-

Spring peepers were the most abundant and widespread anuran species detected during the call count surveys and had the highest average call index across survey stations and survey dates. Spring peepers were also the only anuran species to be detected at all eight survey stations. During the call count survey conducted on May 1, 2017, which represented the height of calling activity of this species in the study area, spring peepers were detected at all eight survey stations. Figure 12 displays the temporal and spatial variation in spring peeper call index results within the study area.

Figure 12. Temporal and Spatial Variation in Spring Peeper Call Index Results



4.5 Owl Broadcast Survey

Owl broadcast surveys were conducted in the study area on the following nights in 2017 (n=5): April 3, April 18, May 18, June 1, and June 15. The surveys resulted in two owl detections: one barred owl was detected at survey station AN-03 on May 18, 2017, and one eastern screech-owl was detected at survey station AN-08 on June 15, 2017. Table 4.5-1 provides a summary of the owl broadcast survey results.

Table 4.5-1. Summary of Owl Broadcast Survey Results

Common Name	Scientific Name	Number of Detections					Total Detections by Species
		4/3/2017	4/18/2017	5/18/2017	6/1/2017	6/15/2017	
Eastern screech-owl	*Megascops asio*	-	-	-	-	1	1
Barred owl	*Strix varia*	-	-	1	-	-	1
Great horned owl	*Bubo virginianus*	-	-	-	-	-	0
Total Detections by Date		0	0	1	0	1	2

4.6 Small Mammal Trapping

Small mammal trapping was conducted from April 17 to 21 (four nights) and from May 1 to 5 (four nights), 2017, for a total of approximately 1,200 trap-nights. This effort produced a total of 250 small mammal captures representing seven species. Of the 250 total captures, 75 were recaptures, for a recapture rate of 30%. The catch-per-unit-effort (i.e., number of individuals captured per trap-night) is calculated at 20.8% using the following equation given in Nelson Jr. and Clark (1973):

CE = A * 100/TU, where

*CE = catch/effort, A = number of individuals captured, P = number of trapping intervals, I = length of trapping interval, N = number of traps, and TU = P * I * N.*

*White-footed mouse (*Peromyscus leucopus*) captured in grid G1. This species was the most frequently captured small mammal. April 18, 2017.*

White-footed mouse (*Peromyscus leucopus*) was by far the most frequently captured species, accounting for 76% of all captures. By contrast, four of the seven species were captured fewer than four times each. The six trapping grids had a relatively even number of captures, ranging from a high of 55 captures in grid G3 to a low of 22 captures in grid G6. The average number of captures per grid was 41.7 with a standard deviation of 11.7.

Table 4.6-1 summarizes the results of the small mammal trapping.

Table 4.6-1. Summary of Small Mammal Trapping Results

Common Name	Scientific Name	Number of Captures						Total Captures by Species
		G1	G2	G3	G4	G5	G6	
White-footed mouse	*Peromyscus leucopus*	40	35	35	28	34	17	**189**
Southern red-backed vole	*Synaptomys cooperi*	5	10	13	8	1	2	**39**
House mouse	*Mus musculus*	-	3	7	2	-	3	**15**
Eastern chipmunk	*Tamias striatus*	2	-	-	-	1	-	**3**
Southern flying squirrel	*Glaucomys volans*	1	-	-	-	1	-	**2**
Northern short-tailed shrew	*Blarina brevicauda*	-	1	-	-	-	-	**1**
Woodland jumping mouse	*Napaeozapus insignis*	-	-	-	1	-	-	**1**
Total Captures by Trapping Grid		**48**	**49**	**55**	**39**	**37**	**22**	**250**

Table 4.6-2 summarizes the morphometric data collected from captured small mammals.

Table 4.6-2. Summary of Small Mammal Morphometric Data

Common Name	Scientific Name	Mean Weight (g) + SD	Mean Left Hind Foot Length (mm) + SD	Mean Tail Length (mm) + SD	Males	Females
Northern short-tailed shrew	*Blarina brevicauda*	95	16	27	1	0
Southern flying squirrel	*Glaucomys volans*	Not measured				
House mouse	*Mus musculus*	10.2 + 2.3	18.9 + 1.0	62.5 + 8.1	5	9
Woodland jumping mouse	*Napaeozapus insignis*	13	28	135	1	0
White-footed mouse	*Peromyscus leucopus*	24.1 + 3.9	20.1 + 1.1	78.8 + 7.5	90	77
Southern red-backed vole	*Synaptomys cooperi*	24.1 + 4.9	17.6 + 1.8	41.1 + 4.2	19	19
Eastern chipmunk	*Tamias striatus*	Not measured				

4.7 Pit Fall Trapping

Pit fall trapping was conducted from April 17 to 21 (four nights) and from May 1 to 5 (four nights), 2017, for a total of 216 trap-nights. A total of eight individuals were captured, representing three amphibian species and two mammal species. The catch-per-unit-effort (i.e., number of individuals captured per trap-night) is calculated at 3.70% using the following equation given in Nelson Jr. and Clark (1973):

CE = A * 100/TU, where

*CE = catch/effort, A = number of individuals captured, P = number of trapping intervals, I = length of trapping interval, N = number of traps, and TU = P * I * N.*

Table 4.7-1 below summarizes the results of the pit fall trapping conducted in the study area.

Table 4.7-1. Summary of Pit Fall Trapping Results

Common Name	Scientific Name	Number of Captures		
		PFA-1	PFA-2	PFA-3
American toad	*Bufo americanus*	-	2	-
Red-backed salamander	*Plethodon cinereus*	1	-	-
Spotted salamander	*Ambystoma maculatum*	-	3	-
Northern short-tailed shrew	*Blarina brevicauda*	-	1	-
Masked shrew	*Sorex cinereus*	-	-	1

Due to the relatively small number of individuals captured, it is not possible to perform meaningful statistical analysis of morphometric data collected during pit fall trapping. PFA-2 was the most productive of the pit fall trap arrays, accounting for 75% of all captures and 83.3% of all amphibian captures. It is assumed this is due to the fact that PFA-2 was the only one of the three arrays located immediately adjacent to one of the special aquatic sites (SAS) in the study area. At PFA-2, amphibians were captured both on the outer (facing away from the SAS) and inner (facing toward the SAS) sides of the array; this movement into and out of the SAS suggests American toad activity at this SAS and supports previously-observed evidence of spotted salamander breeding activity here.

*Spotted salamander (*Ambystoma maculatum*) captured in PFA-2. April 20, 2017.*

4.8 Cover Board Monitoring

Cover boards were deployed at the site on May 5, 2017 and recovered on July 6, 2017 (62 days). Cover board checks were conducted in the study area on the following dates in 2017 (n=9): May 8, May 18, May 23, June 1, June 8, June 14, June 21, June 30, and July 5. Cover board CB-3 was illicitly removed from the site prior to the first cover board check; therefore, only two cover boards were monitored during the survey period.

Cover board monitoring resulted in the detection of one salamander species and two rodent species. Red-backed salamander (*Plethodon cinereus*) was the most frequently-detected species, and accounted for over half of all detections. The mean number of detections per date was 2.2, with a standard deviation of 1.7, and ranged from a high of 5 individuals on June 1 to a low of no detections on both June 14 and June 30.

Table 4.8-1 provides a summary of the cover board monitoring results.

Table 4.8-1. Summary of Cover Board Monitoring Results

Common Name	Scientific Name	Number of Detections																		Total Detections by Species
		5/8/17		5/18/17		5/23/17		6/1/17		6/8/17		6/14/17		6/21/17		6/30/17		7/6/17		
		1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	
Red-backed salamander	*Plethodon cinereus*	-	1	-	2	-	4	-	3	1	-	-	-	-	-	-	-	-	-	11
Southern red-backed vole	*Synaptomys cooperi*	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-	2	-	6
House Mouse	*Mus musculus*	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
Total Detections by Date		1		2		4		5		3		0		3		0		2		20

4.9 Amphibian and Reptile Time-Constrained Searches

Reptile and amphibian time-constrained searches were conducted in the study area on the following dates in 2017 (n=10): May 3, May 8, May 18, May 23, June 1, June 8, June 14, June 21, June 30, and July 6. The time-constrained searches resulted in 115 individual detections of eight species, including four species of frogs, one toad, one salamander species, one snake species, and one turtle species. The most frequently-detected species were green frog (*Rana clamitans*), American toad, wood frog, and red-backed salamander, with 29, 27, 24, and 16 detections, respectively. By contrast, the least-frequently detected species were eastern box turtle (*Terrapene carolina*) and spring peeper, with two and one detections, respectively. The mean number of detections across the ten search dates was 11.5 with a standard deviation of 6.6. The number of individual detections ranged from a high of 22 individuals on July 6 to a low of four individuals on June 21.

*Eastern box turtle (*Terrapene carolina*) observed on the woods road near SAS-2. May 18, 2017.*

Table 4.9-1 provides a summary of the reptile and amphibian time-constrained search results.

Table 4.9-1. Summary of Amphibian and Reptile Time-Constrained Search Results

Common Name	Scientific Name	Number of Detections										Total Detections by Species
		5/3/17	5/8/17	5/18/17	5/23/17	6/1/17	6/8/17	6/14/17	6/21/17	6/30/17	7/6/17	
American toad	*Bufo americanus*	-	-	9	-	3	-	5	1	4	5	27
Spring peeper	*Pseudacris crucifer*	-	-	-	-	-	-	1	-	-	-	1
Green frog	*Rana clamitans*	-	-	4	2	3	6	3	1	5	5	29
Pickerel frog	*Rana palustris*	-	-	-	-	2	2	2	-	3	-	9
Wood frog	*Rana sylvatica*	1	-	-	1	-	1	3	-	6	12	24
Red-backed salamander	*Plethodon cinereus*	4	5	-	2	-	2	-	-	3	-	16
Eastern garter snake	*Thamnophis sirtalis*	2	-	2	-	-	1	-	2	-	-	7
Eastern box turtle	*Terrapene carolina*	-	-	1	1	-	-	-	-	-	-	2
Total Detections by Date		7	5	16	6	8	12	14	4	21	22	115

In addition to the eight reptile and amphibian species detected in the study area during the time-constrained searches, an additional three reptile and amphibian species were observed within the study area during this inventory, either during other taxa-specific surveys (anuran call count surveys and pit fall trapping) or incidentally. A full list of the 11 reptile and amphibian species observed within the study area is provided in Appendix A.

4.10 Diurnal Insect Survey

Odonate Survey

An odonate survey was conducted in the study area on July 3, 2017. The survey resulted in the detection of 18 species of odonates, of which 12 were detected within forested habitats and 12 were detected along the Algonquin ROW. In addition to the 18 species detected in the study area during the odonate survey, an additional seven odonate species were observed incidentally within the study area during this inventory. A full list of the 25 odonate species observed within the study area is provided in Appendix A.

*Fragile forktail (*Ischnura posita*) observed along the unnamed tributary to Iron Mine Brook. July 3, 2017.*

Table 4.10-1 summarizes the results of the odonate survey.

Table 4.10-1. Summary of Odonate Survey Results

Common Name	Scientific Name	Iron Mine Brook	Unnamed Trib. to Iron Mine Brook	Dry Arm Brook	Woods Road	Algonquin Gas ROW
Ebony jewelwing	*Calopteryx maculata*	•	•	•		
Aurora damsel	*Chromagrion conditum*	•				•
Skimming bluet	*Enallagma geminatum*				•	
Fragile forktail	*Ischnura posita*		•			•
Sphagnum sprite	*Nehalennia gracilis*				•	•
Harlequin darner	*Gomphaeschna furcillata*		•		•	
Common green darner	*Anax junius*				•	•
Unicorn clubtail	*Arigomphus villosipes*					•
Arrowhead spiketail	*Cordulegaster obliqua*	•	•		•	
Blue dasher	*Pachydiplax longipennis*					•
Eastern pondhawk	*Erythemis simplicicollis*	•			•	•
Spangled skimmer	*Libellula cyanea*					•
Slaty skimmer	*Libellula incesta*				•	
Common whitetail	*Plathemis lydia*					•
Widow skimmer	*Libellula luctuosa*				•	•
Painted skimmer	*Libellula semifasciata*					•
Calico pennant	*Celithemis elisa*		•			
Dot-tailed whiteface	*Leucorrhinia intacta*					•

Lepidopteran and Tiger Beetle Survey

Lepidopteran and tiger beetle surveys were conducted in the study area on the following dates in 2017 (n=4): June 3, June 4, July 8, and July 9. Twelve individual detections of six butterfly species were observed in the study area during these surveys. No diurnal moths or tiger beetles were detected during the surveys.

In addition to the six butterfly species observed during these surveys, an additional nine butterfly species, one skipper species, one diurnal moth species, and one tiger beetle species were observed incidentally in the study area during this

Red-spotted purple (Limenitis arthemis) *observed on the Algonquin ROW. June 8, 2017.*

inventory. A full list of the diurnal lepidopterans and tiger beetles observed in the study area is provided in Appendix A.

Table 4.10-2 summarizes the results of the diurnal lepidopteran and tiger beetle surveys.

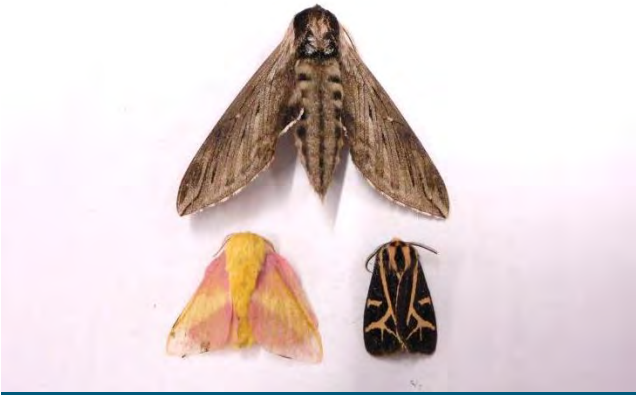
Table 4.10-2. Summary of Lepidopteran and Tiger Beetle Survey Results

Common Name	Scientific Name	No. Individual Detections				Total Detections by Species
		6/3/2017	6/4/2017	7/8/2017	7/9/2017	
Eastern tiger swallowtail	*Papilio glaucus*		1			1
Spicebush swallowtail	*Papilio troilus*	2	1			3
Great spangled fritillary	*Speyeria cybele*				4	4
American lady	*Vanessa virginiensis*				1	1
Red admiral	*Vanessa atalanta*			1	1	2
Little wood satyr	*Mephisto cymela*	1				1
Total Detections by Date		3	2	1	6	12

Please see Appendix D for additional detail regarding the lepidopteran and tiger beetle survey.

4.11 Nocturnal Moth Survey

Nocturnal light-trapping for moths was conducted in the study area on the following nights in 2017 (n=2): June 3/4 and July 8/9. The surveys resulted in 3,551 individual detections of macro-moths representing 128 species. Three species – forest tent caterpillar moth (*Malacosoma disstria*), gypsy moth (*Lymantria dispar*), and common idia (*Idia aemula*) – together accounted for 72% of all detections, with 986, 839, and 732 individual detections respectively.



*Northern apple sphinx (*Sphinx poecila*) (top), rosy maple moth (*Dryocampa rubicunda*) (bottom left), and figured tiger moth (*Grammia figurata*) (bottom right). Captured during June 3/4 light trap survey.*

The June survey resulted in the detection of 527 individuals (14.8% of total detections) and 81 species (63.3% of species detected in the study area), while the July survey resulted in the detection of 3,024 individuals (85.2% of total detections) and 56 species (43.8% of species detected in the study area). An equipment malfunction resulted in no detections from the light trap at Location 2 during the July survey. Including detections from both surveys, Location 1 resulted in 1,081 individuals (30.4% of total detections) and 70 species (54.7% of species), Location 2 in 152 individuals (4.3% of total detections) and 48 species (37.5% of species), and Location 3 in 2,318 individuals (65.3% of total detections) and 97 species (78.8% of species).

Table 4.11-1 provides a summary of the nocturnal moth survey results.

Table 4.11-1. Summary of Nocturnal Moth Survey Results

Common Name	Scientific Name	June 3			July 8			Total Detections by Species
		1	2	3	1	2	3	
Lesser Maple Spanworm Moth	*Speranza pustularia*						4	4
Common Angle	*Macaria aemulataria*	1		1				2
Red-headed Inchworm	*Macaria bisignata*			1				1
White Pine Angle	*Macaria pinistrobata*	1	1					2
Hemlock Angle	*Macaria fissinotata*	2						2
Large Purplish Gray	*Iridopsis vellivolata*	1						1
Pale-winged Gray	*Iridopsis ephyraria*				5		1	6
Small Engrailed	*Ectropis crepuscularia*				2			2
Porcelain Gray	*Protoboarmia porcelaria*	9	5	16			1	31
Tulip-Tree Beauty	*Epimecis hortaria*		1					1
Canadian melanolophia	*Melanolophia canadaria*	2	2	2				6
Powder Moth	*Eufidonia notataria*	1						1
One-Spotted Variant	*Hypagyrtis unipunctata*	1	9	4	1			15
Common Lytrosis	*Lytrosis unitaria*				2		1	3
Saw Wing	*Euchlaena serrata*						2	2
Scrub Euchlaena	*Euchlaena madusaria*			2				2
Ochre Euchlaena	*Euchlaena marginaria*		1					1
Morrison's Pero	*Pero morrisonaria*	1	1	3				5
Oak Beauty	*Phaeoura quernaria*			1				1
Pale Beauty	*Campaea perlata*	4	3					7
Pale Homochlodes	*Homochlodes fritillaria*			1				1
A Geometrid Moth	*Gueneria similaria*	1	2	3				6
Angled Metarranthis	*Metarranthis angularia*		1	2				3
Common Metarranthis	*Metarranthis hypochraria*		2					2
Lemon Plagodis	*Plagodis serinaria*	1	1	1				3
Hollow-spotted Plagodis	*Plagodis alcoolaria*		1	4				5
Straw Besma	*Besma endropiaria*	2		3				5
Oak Besma	*Besma quercivoraria*	7	7	5				19
Hemlock Looper	*Lambdina fiscellaria*		3					3
Yellow-headed Looper	*Lambdina pellucidaria*		1					1
Curve-lined Looper	*Lambdina fervidaria*	3	3	2				8
Confused Eusarca	*Eusarca confusaria*				1			1
White Slant-line	*Tetracis cachexiata*	12	1	3				16
Snowy Geometer	*Eugonobapta nivosaria*				4			4
Curved-Toothed Geometer	*Eutrapela clemataria*	1						1
Red-fronted Emerald	*Nemoria rubrifrontaria*		1	1				2
Pistachio Emerald	*Hethemia pistasciaria*	1						1
Sweetfern Geometer	*Cyclophora pendulinaria*	1	3	6			1	11
Large Lace-border	*Scopula limboundata*				3		2	5
White-ribboned Carpet	*Mesoleuca ruficilliata*			1				1

Common Name	Scientific Name	June 3			July 8			Total Detections by Species
		1	2	3	1	2	3	
Gem	*Orthonama obstipata*						1	1
Powdered Bigwing	*Lobophora nivigerata*		1	1				2
Pug sp.	*Eupithecia sp.*	4	2					6
Forest Tent Caterpillar Moth	*Malacosoma disstria*				207		779	986
Eastern Tent Caterpillar Moth	*Malacosoma americana*				1			1
Rosy maple moth	*Dryocampa rubicunda*	1	1	2				4
Poecila sphinx	*Sphinx poecilla*		1	4				5
Northern pine sphinx	*Lapara bombycoides*						1	1
Blinded sphinx	*Paonias excaecata*				1			1
Georgian Prominent	*Hyperaeschra georgica*	1	2					3
Common Gluphisia	*Gluphisia septentrionis*		1	1				2
Drexel's Datana	*Datana drexelii*				2		3	5
Contracted Datana	*Datana contracta*						1	1
White-dotted Prominent	*Nadata gibbosa*	6	1	5			2	14
Angulose Prominent	*Peridea angulosa*	2					2	4
Chocolate Prominent	*Peridea ferruginea*		2	2				4
Oblique Heterocampa	*Heterocampa obliqua*						1	1
White-blotched Heterocampa	*Heterocampa umbrata*		1	2				3
Saddled Prominent	*Heterocampa guttivitta*	2						2
Wavy-lined Heterocampa	*Heterocampa biundata*	4	1	1				6
Gypsy Moth	*Lymantria dispar*				470		369	839
White-marked Tussock Moth	*Orgyia leucostigma*						1	1
Painted Lichen Moth	*Hypoprepia fucosa*						4	4
Figured Tiger Moth	*Grammia figurata*		1	4				5
Nais Tiger Moth	*Apantesis nais*			1				1
Tawny Holomelina	*Virbia opella*				35		15	50
Agreeable Tiger Moth	*Spilosoma congrua*	15	10	8	1		1	35
Pink-Legged Tiger Moth	*Spilosoma latipennis*			1				1
Banded Tussock Moth	*Halysidota tessellaris*						1	1
American Idia Moth	*Idia americalis*			1	2		7	10
Common Idia Moth	*Idia aemula*				53		679	732
Rotund Idia Moth	*Idia rotundalis*				106		64	170
Forbes' Idia	*Idia forbesii*				9		11	20
Orange-spotted Idia	*Idia diminuendis*				5		29	34
Smoky Idia	*Idia scobialis*						1	1
Glossy Black Idia Moth	*Idia lubricalis*						1	1
Lettered Zanclognatha	*Zanclognatha lituralis*				3			3
Complex Fan-foot	*Zanclognatha protumnusalis*				1		1	2

Common Name	Scientific Name	June 3			July 8			Total Detections by Species
		1	2	3	1	2	3	
Early Zanclognatha Moth	*Zanclognatha cruralis*				1			1
Yellowish Zanclognatha	*Zanclognatha jacchusalis*				16		24	40
Morbid Owlet Moth	*Chytolita morbidalis*	7	7	9				23
Black-banded Owlet Moth	*Phalaenostola larentioides*						1	1
Bent-winged Owlet Moth	*Bleptina caradrinalis*				3		27	30
Dotted Renia	*Renia salusalis*						4	4
Yellow-spotted Renia Moth	*Renia flavipunctalis*						1	1
Sober Renia Moth	*Renia sobrialis*						2	2
Dark-spotted Palthis Moth	*Palthis angulalis*			2				2
Decorated Owlet	*Redectis vitrea*				2			2
Decorated Owlet	*Pangrapta decoralis*		1	1				2
Baltimore Bomolocha Moth	*Hypena baltimoralis*	3	1	3				7
Dead-wood Borer Moth	*Scolecocampa liburna*						1	1
Wet Sand Savannah Moth	*Gabara subnivosella*						1	1
Broken Lined Hypenodes Moth	*Hypenodes fractilinea*	1	3	12				16
Praeclara Underwing	*Catocala praeclara*						1	1
Figure-seven Moth	*Drasteria grandirena*			1				1
Clover Looper Moth	*Caenurgina crassiuscula*						1	1
False Underwing	*Allotria elonympha*		1					1
Horrid Zale	*Zale horrida*	1		1				2
Feeble Grass Moth	*Amolita fessa*				1			1
Confused Meganola	*Meganola minuscula*	2		1				3
Sweet Pepperbush Nola Moth	*Nola clethrae*	5	7	3				15
Eyed Baileya	*Baileya ophthalmica*			1				1
Curved Halter Moth	*Capis curvata*				1			1
Small Bird-dropping Moth	*Ponometia erastrioides*			1				1
Eastern Panthea	*Panthea furcilla*	1		1	1			3
Ovate Dagger Moth	*Acronicta ovata*				2		2	4
Retarded Dagger Moth	*Acronicta retardata*		1	1				2
Afflicted Dagger Moth	*Acronicta afflicta*	1		2				3
The Green Marvel	*Agriopodes fallax*			1				1
Cadbury's Lichen Moth	*Comachara cadburyi*	1						1
White-dotted Groundling	*Condica videns*			1				1
Pink-shaded Fern Moth	*Callopistria mollissima*				1			1
Pink-barred Pseudeustrotia	*Pseudeustrotia carneola*	1						1
Pale-winged Midget	*Elaphria alapallida*	8	17	23				48
Grateful Midget	*Elaphria grata*		1					1
Miranda Moth	*Proxenus miranda*			1				1
Slow Poke	*Athetis tarda*	6	12	19				37
Cloaked Marvel	*Chytonix palliatricula*	1	2		1		4	8
Otter Arches	*Spiramater lutra*		1	3				4

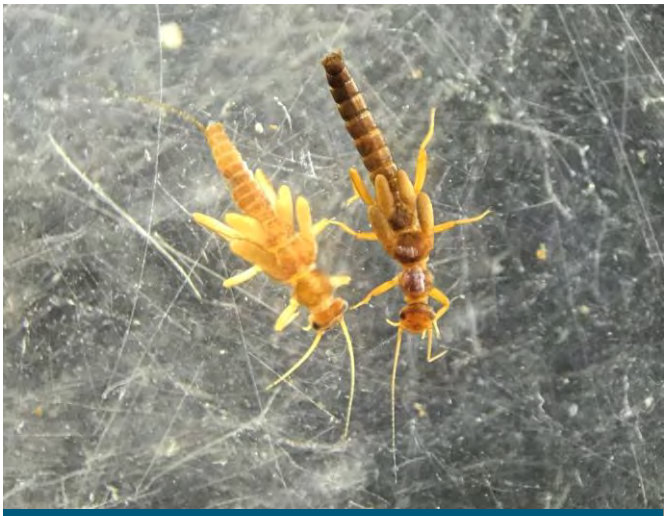
Common Name	Scientific Name	June 3			July 8			Total Detections by Species
		1	2	3	1	2	3	
Rosewing	*Sideridis rosea*			3				3
Wheat Head Armyworm Moth	*Dargida diffusa*			1				1
Southern Scurfy Quaker Moth	*Homorthodes lindseyi*		2					2
Ruddy Quaker	*Protorthodes oviduca*			1				1
Sheathed Quaker	*Ulolonche culea*	5	20	43				68
Modest Quaker	*Ulolonche modesta*		1	11				12
Cynical Quaker	*Orthodes cynica*	2	2	2				6
Disparaged Arches	*Orthodes detracta*				6		17	23
Leafy Dart	*Lycophotia phyllophora*						3	3
Total Detections by Date		527			3024			3551

In addition to the 128 moth species detected during the nocturnal light-trapping, an additional three species, including one diurnal moth species, were detected incidentally in the study area during the course of this biological inventory. A full list of the moth species detected in the study area is provided in Appendix A.

Please see Appendix D for additional details regarding the nocturnal moth survey.

4.12 Benthic Macroinvertebrate Sampling

Benthic macroinvertebrate sampling was conducted on May 24, 2017 at Dry Arm Brook, Iron Mine Brook, and an unnamed tributary to Iron Mine Brook. Thirty-eight taxa of beetles, non-biting midges, black flies, caddisflies, stoneflies, worms, true bugs, damselflies, fish flies, and isopods were identified in samples from the three streams. Taxa richness was greatest at Iron Mine Brook (27 taxa), intermediate at Dry Arm Brook (18 taxa), and lowest at the unnamed tributary to Iron Mine brook (13 taxa). Notable and/or abundant species included the caddisflies *Homoplectra* sp., *Diplectrona* sp., and *Lepidostoma* sp., the stoneflies *Amphinemura* sp. and *Leuctra* sp., *Simulium* sp. black flies, and various non-biting midges (Chironomidae).



Stonefly nymphs (left Nemoura sp.*, right* Leuctra sp.*) collected in Unnamed Tributary of Iron Mine Brook. June 24, 2017.*

Table 4.12-1 provides a summary of benthic macroinvertebrate sampling results.

Table 4.12-1. Summary of Benthic Macroinvertebrate Sampling Results

Scientific Name*	Dry Arm Brook	Iron Mine Brook	Unnamed Tributary of Iron Mine Brook
Coleoptera (Beetles)			
Agabus sp.	•	•	•
Hydroporus sp./Hygrotus sp.	•	•	•
Elmidae sp. 1		•	
Elmidae sp. 2		•	
Collembola (Springtails)			
Bourletiella sp.		•	
Crustacea (Isopod)			
Caecidotea sp.	•		
Diptera (Flies)			
Unidentified Chironomidae (pupae)	•	•	
Corynoneura sp.		•	•
Unidentified Orthocladiinae	•	•	•
Orthocladius annectens		•	
Psectrocladius sp.	•	•	•
Unidentified Tanypodinae		•	
Unidentified Tanysarsini	•		
Tanytarsus sp.		•	
Thienemanniella sp.			•
Thienemannimyia sp.	•		
Tokunagaia sp.		•	
Prosimulium sp.	•	•	
Unidentified Simulidae (pupae)	•		
Simulium sp.	•	•	•
Simulium sp. (pupae)		•	•
Unidentified Tabanidae		•	
Hemiptera (True bugs)			
Trichocorixa sp.	•		
Trepobates sp.		•	
Megaloptera (Fishfly)			
Nigronia sp.		•	
Odonata (Damselfly)			
Calopteryx sp.		•	
Oligochaetea (Worms)			
Lumbriculidae	•	•	•
Naididae	•		
Tubificidae with hair chaetae		•	
Plecoptera (Stoneflies)			
Amphinemura sp.	•	•	•
Leuctra sp.	•	•	•
Nemoura sp.		•	•
Unidentified Plecoptera			•

Scientific Name*	Dry Arm Brook	Iron Mine Brook	Unnamed Tributary of Iron Mine Brook
Trichoptera (Caddisflies)			
Diplectrona sp.		•	
Homoplectra sp.	•		
Lepidostoma sp.	•	•	
Hydatophylax sp.		•	
Rhyacophila sp.	•	•	

*Unless otherwise indicated, insects observed were larvae/nymphs

4.13 Plant Survey

Vascular plant surveys were conducted in the study area on the following dates in 2017 (n=2): May 24 and July 3. The May survey resulted in the detection of 125 vascular plant species, and 40 additional species were detected during the July survey, for a total of 165 vascular plants detected in the study area. Of these, ten species are classified by the Rhode Island Invasive Species Council (RIISC) as invasive species in Rhode Island, and one is classified as a potentially invasive species (RIISC 2001), as indicated in Table 4.13-1.

*Painted trillium (*Trillium undulatum*) observed in the study area. May 23, 2017.*

In addition to the 165 plant species detected in the study area during the plant surveys, an additional 22 species were detected incidentally in the study area. A full list of the 187 plant species detected in the study area is provided in Appendix A.

Please see Appendix F for additional details regarding the plant survey.

Table 4.13-1 below summarizes the results of the vascular plant surveys.

Table 4.13-1. Summary of Vascular Plant Survey Results

Common Name	Scientific Name
Common three-seeded-Mercury	*Acalypha rhomboidea*
Norway maple*	*Acer platanoides**
Red maple	*Acer rubrum*
Garlic mustard*	*Alliaria petiolata**
Speckled alder	*Alnus incana*
Common ragweed	*Ambrosia artemisiifolia*
Shadbush	*Amelanchier sp.*
American hog-peanut	*Amphicarpaea bracteata*
Wood anemone	*Anemone quinquefolia*
Sweet vernalgrass	*Anthoxanthum odoratum*
Indian hemp	*Apocynum cannabinum*

Common Name	Scientific Name
Wild sarsaparilla	*Aralia nudicaulis*
Jack-in-the-pulpit	*Arisaema triphyllum*
Purple chokeberry	*Aronia floribunda*
Black chokeberry	*Aronia melanocarpa*
Lady fern	*Athyrium filix-femina*
Japanese barberry*	*Berberis thunbergii**
Yellow birch	*Betula alleghaniensis*
Black birch	*Betula lenta*
Gray birch	*Betula populifolia*
Tall beggar-ticks	*Bidens vulgata*
Wild calla	*Calla palustris*
Button sedge	*Carex bullata*
Fringed sedge	*Carex crinita*
White-edge sedge	*Carex debilis*
Northern long sedge	*Carex folliculata*
Greater bladder sedge	*Carex intumescens*
Sallow sedge	*Carex lurida*
Pennsylvania sedge	*Carex pennsylvanica*
Broad-leaved sedge	*Carex platyphylla*
Swan's sedge	*Carex swanii*
Shagbark hickory	*Carya ovata*
American chestnut	*Castanea dentata*
Asiatic bittersweet*	*Celastrus orbiculatus**
Mouse-ear chickweed	*Cerastium fontanum*
Atlantic white cedar	*Chamaecyparis thyoides*
Spotted wintergreen	*Chimaphila maculata*
Broad-leaved enchanter's-nightshade	*Circaea canadensis*
Sweet-pepperbush	*Clethra alnifolia*
Sweet-fern	*Comptonia peregrina*
Three-leaved goldthread	*Coptis trifolia*
Hawthorn	*Crataegus sp.*
Pink lady's-slipper	*Cypripedium acaule*
Orchard grass	*Dactylis glomerata*
Poverty grass	*Danthonia spicata*
Wild carrot*	*Daucus carota**
Hay-scented fern	*Dennstaedtia punctilobula*
Wavy hair-grass	*Deschampsia flexuosa flexuosa*
Deptford pink	*Dianthus armeria*
Deer-tongue grass	*Dichanthelium clandestinum*
Spatulate-leaved sundew	*Drosera intermedia*

Common Name	Scientific Name
Round-leaved sundew	*Drosera rotundifolia*
Spinulose wood fern	*Dryopteris carthusiana*
Three-way sedge	*Dulichium arundinaceum*
Broad-leaved helleborine	*Epipactis helleborine*
Field horsetail	*Equisetum arvense*
American burnweed	*Erechtites hieraciifolius*
Annual fleabane	*Erigeron annuus*
Philadelphia fleabane	*Erigeron philadelphicus*
Boneset	*Eupatorium perfoliatum*
American beech	*Fagus grandifolia*
Glossy buckthorn*	*Frangula alnus**
Wintergreen	*Gaultheria procumbens*
Black huckleberry	*Gaylussacia baccata*
Blue huckleberry	*Gaylussacia frondosa*
Fowl manna grass	*Glyceria striata*
Witch-hazel	*Hamamelis virginiana*
Bluet	*Houstonia caerulea*
American marsh-pennywort	*Hydrocotyle americana*
Common winterberry	*Ilex verticillata*
Yellow iris*	*Iris pseudacorus**
Dudley's rush	*Juncus dudleyi*
Common soft rush	*Juncus effusus*
Path rush	*Juncus tenuis*
Sheep Laurel	*Kalmia angustifolia*
Mountain laurel	*Kalmia latifolia*
Ox-eye daisy	*Leucanthemum vulgare*
Spicebush	*Lindera benzoin*
Tuliptree	*Liriodendron tulipifera*
Indian-tobacco	*Lobelia inflata*
Morrow's honeysuckle*	*Lonicera morrowii**
Square-pod water-primrose	*Ludwigia alternifolia*
Common wood rush	*Luzula multiflora*
Northern bog-clubmoss	*Lycopodiella inundata*
Water-horehound	*Lycopus sp.*
Maleberry	*Lyonia ligustrina*
Starflower	*Lysimachia (Trientalis) borealis*
Whorled yellow-loosestrife	*Lysimachia quadrifolia*
Swamp candles	*Lysimachia terrestris*
False Solomon's-seal	*Maianthemum (Smilacina) racemosum*
Canada-mayflower	*Maianthemum canadense*

Common Name	Scientific Name
Crab apple	*Malus sp.*
Indian cucumber root	*Medeola virginiana*
Cow-wheat	*Melampyrum lineare*
Japanese stiltgrass**	*Microstegium vimineum***
Partridge-berry	*Mitchella repens*
Three-leaved rattlesnake-root	*Nabalus trifoliolatus*
Black-gum	*Nyssa sylvatica*
Worled aster	*Oclemena (Aster) acuminata*
Sensitive fern	*Onoclea sensibilis*
One-flowered broom-rape	*Orobanche uniflora*
Interrupted fern	*Osmunda claytoniana*
Royal fern	*Osmunda regalis*
Cinnamon fern	*Osmundastrum (Osmunda) cinnamomeum*
Common yellow wood sorrel	*Oxalis stricta*
Dwarf ginseng	*Panax trifolius*
New York Fern	*Parathelypteris (Thelypteris) noveboracensis*
Virginia-creeper	*Parthenocissus quinquefolia*
Green arrow-arum	*Peltandra virginica*
Oriental lady's-thumb smartweed	*Persicaria longiseta*
Arrow-leaved tearthumb	*Persicaria sagittata*
Reed canary grass	*Phalaris arundinacea*
White pine	*Pinus strobus*
Common plantain	*Plantago major*
Rose pogonia	*Pogonia ophioglossoides*
Gaywings	*Polygala paucifolia*
Rock polypody	*Polypodium virginianum*
Eastern cottonwood	*Populus deltoides*
Bigtooth aspen	*Populus grandidentata*
Quaking aspen	*Populus tremuloides*
Norwegian cinquefoil	*Potentilla norvegica*
Common cinquefoil	*Potentilla simplex*
Heal-all	*Prunella vulgaris*
Black cherry	*Prunus serotina*
Bracken fern	*Pteridium aquilinum*
White oak	*Quercus alba*
Scarlet oak	*Quercus coccinea*
Chestnut oak	*Quercus montana*
Northern red oak	*Quercus rubra*
Clammy azalea	*Rhododendron viscosum*
Azalea sp.	*Rhododendron sp.*

Common Name	Scientific Name
Brownish beaksedge	*Rhynchospora capitellata*
Multiflora rose*	*Rosa multiflora**
Common blackberry	*Rubus allegheniensis*
Northern dewberry	*Rubus flagellaris*
Wine raspberry*	*Rubus phoenicolasius**
Sassafras	*Sassafras albidum*
Little bluestem	*Schizachyrium scoparium*
Glaucous-leaved greenbriar	*Smilax glauca*
Greenbrier	*Smilax rotundifolia*
Wrinkle-leaved goldenrod	*Solidago rugosa*
European mountain-ash	*Sorbus aucuparia*
White meadowsweet	*Spiraea alba*
Steeplebush	*Spiraea tomentosa*
Heart-leaved American-aster	*Symphyotrichum cordifolium*
Skunk-cabbage	*Symplocarpus foetidus*
Marsh fern	*Thelypteris palustris*
Poison-ivy	*Toxicodendron radicans*
White clover	*Trifolium repens*
Painted trillium	*Trillium undulatum*
Eastern hemlock	*Tsuga canadensis*
Sessile-leaved bellwort	*Uvularia sessilifolia*
Low bush blueberry	*Vaccinium angustifolium*
Highbush blueberry	*Vaccinium corymbosum*
Large cranberry	*Vaccinium macrocarpon*
Hillside blueberry	*Vaccinium pallidum*
Common speedwell	*Veronica officinalis*
Arrowwood	*Viburnum dentatum*
Wild raisin	*Viburnum cassinoides*
Woolly blue violet	*Viola sororia*
Lance-leaved violet	*Viola lanceolata*
Arrowhead violet	*Viola sagittata*
Fox grape	*Vitis labrusca*
Yellow-eyed grass	*Xyris sp.*

* Identified as an invasive species by the Rhode Island Invasive Species Council
** Identified as a potentially invasive species by the Rhode Island Invasive Species Council

5.0 DISCUSSION

5.1 Species of Conservation Concern

State-listed Species

The *Rare Native Animals of Rhode Island* (RINHS 2006) lists the federally- and state-listed native animal species that occur or have occurred in the state. This list includes 56 species of birds, five species of terrestrial mammals, three species of amphibians, nine species of terrestrial and freshwater reptiles, three species of fish, 11 species of beetles, 32 species of butterflies and moths, and 16 species of dragonflies and damselflies. Of these, ten bird species, one mammal species, two reptile species, and one dragonfly species were detected in the study area.

*Arrowhead spiketail (*Cordulegaster obliqua*) observed along the unnamed tributary to Iron Mine Brook. July 3, 2017.*

The *Rhode Island Rare Plants* list (RINHS 2016) lists the 414 federally- and state-listed native plant species that occur or have occurred in the state. Of these, three species was detected in the study area.

Figure 13 displays the approximate locations of state-listed species detections in the study area.

No federally-listed animal or plant species were detected in the study area during the course of this inventory.

Table 5.1-1 below lists the state-listed animal and plant species detected in the study area during this inventory.

Preparers note: Table 5.1-1 and Figure 13 contain sensitive location information for state-listed species and are not for public release.

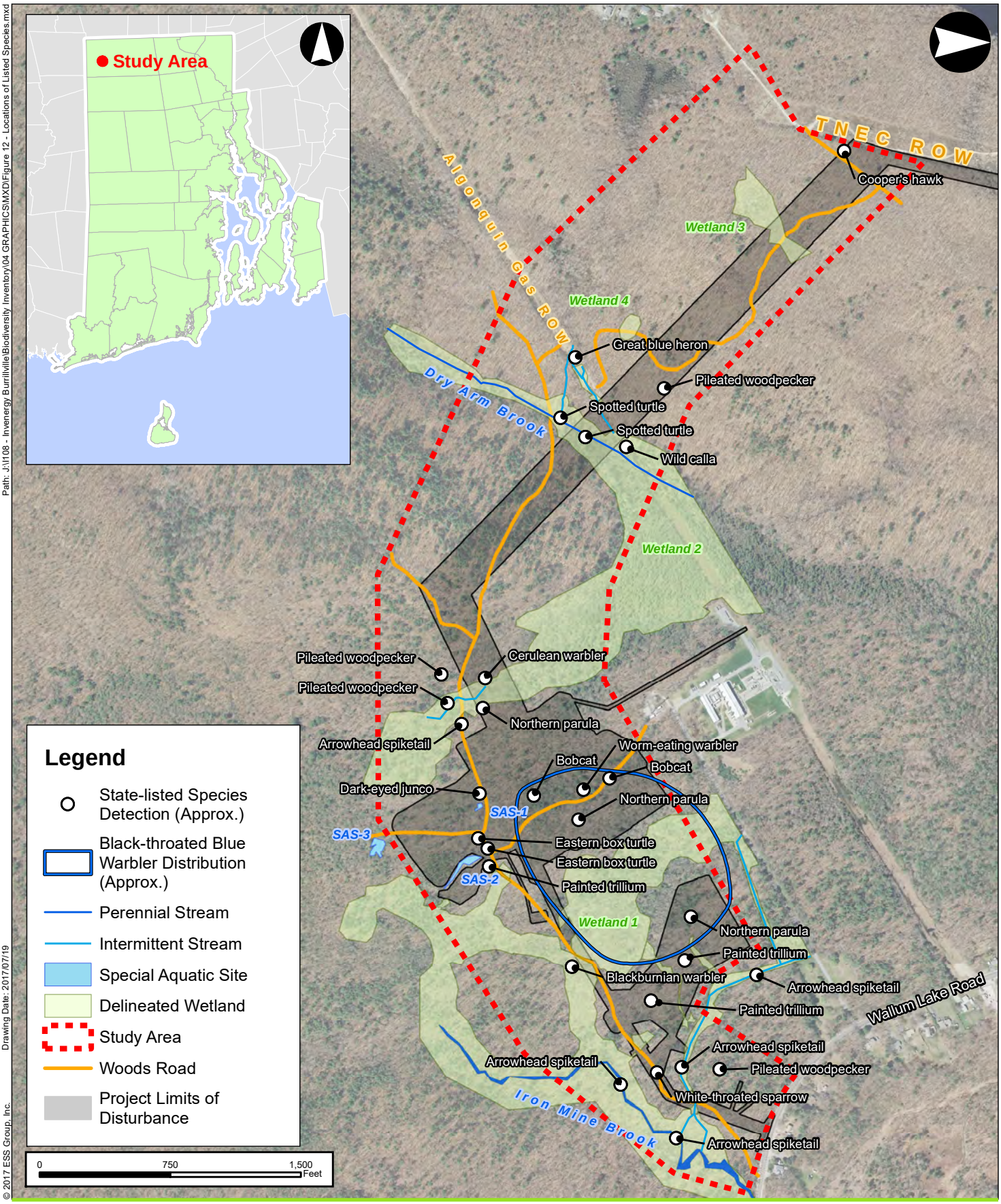
Table 5.1-1. State-listed Species Detected in the Study Area

Taxon	Common Name	Scientific Name	State Status[1]	State Rank[2]	Mode of Detection	Location within Study Area
Bird	Cerulean warbler	*Setophaga cerulea*	SE	S1B, S2N	Auditory	East arm of Wetland 2
Bird	Northern parula	*Setophaga americana*	ST	S1B, S1N	Auditory	Various locations between the east arm of Wetland 2 and the unnamed tributary to Iron Mine Brook
Bird	Blackburnian warbler	*Setophaga fusca*	ST	S1B, S1N	Auditory	Near the center of Wetland 1 just south of the existing woods road
Bird	Black-throated blue warbler	*Setophaga caerulescens*	ST	S1B, S3N	Direct visual, auditory	Between the east arm of Wetland 2 and the unnamed tributary to Iron Mine Brook, north of the woods road
Bird	Great blue heron	*Ardea herodias*	C		Direct visual	Observed flying over site only
Bird	Cooper's	*Accipiter*	C		Direct	Between avian point count

Taxon	Common Name	Scientific Name	State Status[1]	State Rank[2]	Mode of Detection	Location within Study Area
	hawk	*cooperii*			visual	stations AV-11 and AV-12
Bird	Pileated woodpecker	*Hylatomus pileatus*	C	S1B, S1N	Direct visual, auditory	East arm of Wetland 2, along proposed CREC ROW north of the existing Algonquin ROW, and at the unnamed tributary to Iron Mine Brook north of the existing woods road
Bird	Worm-eating warbler	*Helmitheros vermivorum*	C		Auditory	Avian point count station AV-05
Bird	White-throated sparrow	*Zonotrichia albicollis*	C		Auditory	Not observed on or after species safe date
Bird	Dark-eyed junco	*Junco hyemalis*	C		Direct visual, auditory	Not observed on or after species safe date
Mammal	Bobcat	*Lynx rufus*	ST	SU	Remote camera	Along and just west of the existing woods road between Wetlands 1 and 2
Reptile	Eastern box turtle	*Terrapene carolina*	P	S4	Direct visual	Near the four-way intersection of the existing woods road between Wetlands 1 and 2
Reptile	Spotted turtle	*Clemmys guttata*	P	S5	Direct visual	Dry Arm Brook and the west arm of Wetland 2
Dragonfly	Arrowhead spiketail	*Cordulegaster obliqua*	C	SNR	Direct visual	Along Iron Mine Brook, the unnamed tributary to Iron Mine Brook, and the east arm of Wetland 2
Vascular plant	Wild calla	*Calla palustris*	C		Direct visual	Algonquin ROW
Vascular plant	White-edge sedge	*Carex debilis*	C		Direct visual	Forested wetlands, specific location undocumented
Vascular plant	Painted trillium	*Trillium undulatum*	C		Direct visual	Just south of the existing woods road to the east of SAS-2

[1]**State Status designations:** SE - State Endangered; ST - State Threatened; C - Concern; P - Protected; SH - State Historic (note: bird status based on breeding populations in Rhode Island).

[2]**State Rank designations:** SX - Presumed Extirpated; SH - Possibly Extirpated; S1 - Critically Imperiled; S2 - Imperiled; S3 - Vulnerable; S4 - Apparently Secure; S5 - Secure; SNR - Unranked; SU - Unrankable; SE - Exotic; SA - Accidental; SZ - Zero Occurrences. Breeding Status Qualifiers: SB - Breeding; SN - Nonbreeding. Other Qualifiers: ? - Inexact or Uncertain.



Clear River Energy Center Biological Inventory
Burrillville, Rhode Island

1 inch = 750 feet

Source: 1) ESRI, Orthos, 2016 2) ESS, GPS Data, 2017

Locations of State-listed Species Detections in the Study Area

Figure 13

Species of Greatest Conservation Need

The Rhode Island Wildlife Action Plan (WAP) (RIDEM/TNC 2015) lists the 454 animal species in the state that are classified as Species of Greatest Conservation Need (SGCN). The classification of species as SGCN considers the species population status and trends; the number, immediacy, extent, and/or reversibility of known threats; and the relative importance of habitat within the state compared to habitat outside of the state. The Rhode Island list of SGCN includes 123 bird species, 21 mammal species, 10 amphibian species, 13 reptile species, 45 fish species, 35 beetle species, 93 butterfly and moth species, and 23 dragonfly and damselfly species, as well as various other invertebrate taxa. The WAP also identifies 64 plant species as SGCN. Of these, 33 bird species, three mammal species, two reptile species, three amphibian species, two butterfly and moth species, two dragonfly species, one beetle species, and one plant species were detected within the study area during this inventory.

*Spotted turtle (*Clemmys guttata*) observed in the west arm of Wetland 2. April 20, 2017.*

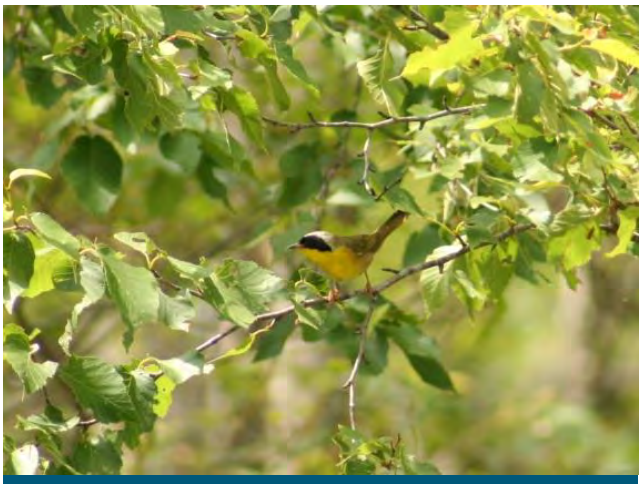
Table 5.1-2 below lists the SGCN detected in the study area during this inventory.

Table 5.1-2. Species of Greatest Conservation Need Detected in the Study Area

Common Name	Scientific Name	Mode of Detection
Birds (n=33)		
Ruffed grouse	*Bonasa umbellus*	Tracks
Yellow-billed cuckoo	*Coccyzus americanus*	Direct visual, auditory
Black-billed cuckoo	*Coccyzus erythropthalmus*	Auditory
Hairy woodpecker	*Picoides villosus*	Direct visual, auditory
Northern flicker	*Colaptes auratus*	Direct visual, auditory
Pileated woodpecker	*Hylatomus pileatus*	Direct visual, auditory
American kestrel	*Falco sparverius*	Direct visual
Least flycatcher	*Empidonax minimus*	Auditory
Great crested flycatcher	*Myiarchus crinita*	Direct visual, auditory
Blue-headed vireo	*Vireo solitarius*	Direct visual, auditory
Eastern bluebird	*Sialia sialis*	Direct visual, auditory
Veery	*Catharus fuscescens*	Direct visual, auditory
Wood thrush	*Hylocichla mustelina*	Direct visual, auditory
Gray catbird	*Dumetella carolinensis*	Direct visual, auditory
Northern waterthrush	*Seiurus novaboracensis*	Direct visual, auditory
Blue-winged warbler	*Vermivora cyanoptera*	Auditory
Black-and-white warbler	*Mniotilta varia*	Direct visual, auditory
Hooded warbler	*Setophaga citrina*	Auditory
American redstart	*Setophaga ruticilla*	Direct visual
Cerulean warbler	*Setophaga cerulea*	Auditory

Common Name	Scientific Name	Mode of Detection
Northern parula	*Setophaga americana*	Auditory
Blackburnian warbler	*Setophaga fusca*	Auditory
Chestnut-sided warbler	*Setophaga pensylvanica*	Auditory
Blackpoll warbler	*Setophaga striata*	Direct visual, auditory
Black-throated blue warbler	*Setophaga caerulescens*	Direct visual, auditory
Yellow-rumped warbler	*Setophaga coronata*	Direct visual, auditory
Prairie warbler	*Setophaga discolor*	Direct visual, auditory
Canada warbler	*Wilsonia canadensis*	Direct visual, auditory
Eastern towhee	*Pipilo erythrophthalmus*	Direct visual, auditory
Field sparrow	*Spizella pusilla*	Direct visual, auditory
Scarlet tanager	*Piranga olivacea*	Direct visual, auditory
Rose-breasted grosbeak	*Pheucticus ludovicianus*	Direct visual, auditory
Indigo bunting	*Passerina cyanea*	Direct visual, auditory
Mammals (n=3)		
Bobcat	*Lynx rufus*	Tracks, remote camera
Big brown bat	*Eptesicus fuscus*	Acoustic survey
Hoary bat	*Lasiurus cinereus*	Acoustic survey
Reptiles (n=2)		
Eastern box turtle	*Terrapene carolina*	Direct visual
Spotted turtle	*Clemmys guttata*	Direct visual
Amphibians (n=3)		
Northern spring peeper	*Pseudacris crucifer*	Direct visual, auditory
Wood frog	*Rana sylvatica*	Direct visual, auditory
Spotted salamander	*Ambystoma maculatum*	Trapping
Butterflies and Moths (n=2)		
Scrub Euchlaena	*Euchlaena madusaria*	Light trapping
Contracted Datana	*Datana contracta*	Light trapping
Dragonflies and Damselflies (n=2)		
Delta-spotted spiketail	*Cordulegaster diastatops*	Direct visual
Arrowhead spiketail	*Cordulegaster obliqua*	Direct visual
Beetles (n=1)		
Predaceous diving beetle	*Cybister fimbriolatus*	Direct visual
Plants (n=1)		
White-edge sedge	*Carex debilis*	Direct visual

5.2 Avian Community



*Common yellowthroat (*Geothlypis trichas*) observed in the study area. June 30, 2017.*

According to the *Birds of Rhode Island* checklist (RINHS, as adapted from August *et al.* 2001), 321 bird species regularly occur in the state, of which 81 (25.2%) were detected in the study area. However, many avian groups such as waterfowl, seabirds, shorebirds, waders, rails, grebes, and loons would not be expected to occur at the site due to the lack of appropriate habitat for these taxa. Of the 321 bird species that regularly occur in the state, 183 species are landbirds (defined here as any member of the following Orders: Galliformes, Columbiformes, Cuculiformes, Caprimulgiformes, Apodiformes, Accipitriformes, Strigiformes, Piciformes, Falconiformes, Psittaciformes, and Passeriformes). Of these, 78 species (42.6%) were detected in the study area during this inventory. However, several landbird species inhabit open areas such as shrublands, fields, marshes, and beaches, which are generally absent from the study area. Of the 183 landbird species in the state, approximately 88 inhabit forested areas (DeGraaf and Rudis 1986). Of the approximately 88 species of forest-dwelling bird species in Rhode Island, 58 species (66%) were observed in the study area during this inventory.

Table 5.2-1. Summary of Avian Species Detections in the Study Area

Avian Order	Number of Species in Rhode Island	Number of Species Detected in the Study Area	Percent of Species Detected in the Study Area
Anseriformes (Ducks, geese, and swans)	35	2	5.7
Galliformes (Upland game birds)	4	2	50.0
Podicipediformes (Grebes)	4	0	0.0
Columbiformes (Pigeons and doves)	2	1	50.0
Cuculiformes (Cuckoos)	2	2	100.0
Caprimulgiformes (Nightjars)	2	0	0.0
Apodiformes (Swifts and hummingbirds)	2	1	50.0
Gruiformes (Rails, coots, and cranes)	7	0	0.0
Charadiiformes (Shorebirds, gulls, terns, aucks)	66	0	0.0
Gaviiformes (Loons)	3	0	0.0
Procellariifomes (Shearwaters and petrels)	7	0	0.0
Suliformes (Gannets and cormorants)	3	0	0.0
Pelecaniformes (Herons and egrets)	12	1	8.3
Accipitriformes (Vulture, hawks, and eagles)	13	4	30.8
Strigiformes (Owls)	8	2	25.0

Avian Order	Number of Species in Rhode Island	Number of Species Detected in the Study Area	Percent of Species Detected in the Study Area
Coraciiformes (Kingfishers)	1	0	0.0
Piciformes (Woodpeckers)	7	5	71.4
Falconiformes (Falcons)	3	1	33.3
Psittaciformes (Parrots)	1	0	0.0
Passeriformes (Perching birds)	139	60	43.2
Totals	321	81	25.2

A full list of the avian species detected in the study area is provided in Appendix A.

5.3 Mammal Community

According to the *Mammals of Rhode Island* checklist (RINHS, as adapted from August *et al.* 2001), 51 species of wild, terrestrial mammals occur in the state. Of these, 21 species (41.2%) were documented in the study area during this inventory. Table 5.3-1 provides a summary of the mammal species observations at the site.

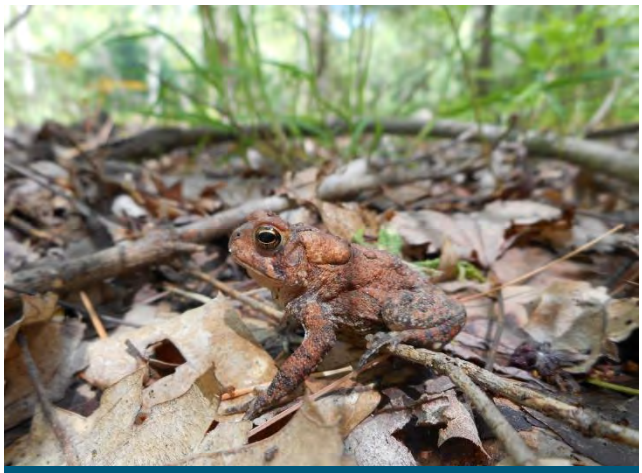
Table 5.3-1. Summary of Mammal Species Detections in the Study Area

Mammal Order	Number of Species in Rhode Island	Number of Species Detected in the Study Area	Percent of Species Detected in the Study Area
Didelphimorphia (Virginia opossum)	1	1	100
Lagomorpha (Rabbits and hares)	3	1	33.3
Rodentia (Mice, voles, squirrels, beaver, etc.)	18	8	44.4
Carnivora (Foxes, coyote, bears, raccoon, weasels, cats)	13	6	46.2
Eulipotyphla (Shrews and moles)	7	2	28.6
Chiroptera (Bats)	7	2	28.6
Artiodactyla (Moose and deer)	2	1	50.0
Totals	51	21	41.2

A full list of the mammal species detected in the study area is provided in Appendix A.

5.4 Amphibian Community

According to the *Herptiles of Rhode Island* checklist (RINHS, as adapted from August *et al.* 2001), 18 species of amphibians occur in the state, including ten species of frogs and toads and eight species of salamanders and newts. Of these, eight species (44.4%) were documented in the study area during this biological inventory, including six species of frogs and toads and two species of salamander. At least one amphibian species, bullfrog (*Rana catesbeiana*), would not be expected to occur in the study area due to the lack of appropriate habitat for this species. Salamanders and newts were likely an underrepresented taxon in this inventory due to difficulties in detecting fossorial or aquatic species.



*American toad (*Bufo americanus*) observed near SAS-1 on May 17, 2017.*

Table 5.4-1 provides a summary of the amphibian species observations at the site.

Table 5.4-1. Summary of Amphibian Species Detections in the Study Area

Amphibian Order	Number of Species in Rhode Island	Number of Species Detected in the Study Area	Percent of Species Detected in the Study Area
Anura (Frogs and toads)	10	6	60.0
Urodela (Salamanders and newts)	8	2	25.0
Totals	18	8	44.4

A full list of the amphibian species detected in the study area is provided in Appendix A.

5.5 Reptile Community

*Eastern garter snake (*Thamnophis sauritus*) observed in the west arm of Wetland 2. May 3, 2017.*

According to the *Herptiles of Rhode Island* checklist (RINHS, as adapted from August *et al.* 2001), 19 species of native freshwater and terrestrial reptiles occur in the state, including 13 species of snakes and six species of turtles. Of these, three species (15.8%) were documented in the study area during this biological inventory. However, three of the six native freshwater turtle species – common snapping turtle (*Chelydra serpentina*), eastern painted turtle (*Chrysemys picta picta*), and common musk turtle (*Sternotherus odoratus*) – would not be expected to occur in the study area due to the lack of appropriate habitat for these species (DeGraaf and Rudis 1986). Additionally, one snake species, timber rattlesnake (*Crotalus horridus*), is classified as "state historical" by the *Rare Native Animals of Rhode Island* list (RINHS 2006). Snakes were likely an underrepresented taxon in this inventory due to difficulties in detecting this group, which includes many secretive and fossorial species.

Table 5.5-1 provides a summary of the reptile species observations at the site.

Table 5.5-1. Summary of Reptile Species Detections in the Study Area

Reptile Order	Number of Species in Rhode Island	Number of Species Detected in the Study Area	Percent of Species Detected in the Study Area
Squamata (Snakes)	13	1	7.7
Testudines (Turtles)	6	2	33.3
Totals	19	3	15.8

A full list of the reptile species detected in the study area is provided in Appendix A.

5.6 Terrestrial Invertebrate Community

*Little wood-satyr (*Megisto cymela*) observed in the study area. July 3, 2017.*

A total of 181 terrestrial invertebrates were detected in the study area, including 147 lepidopterans (butterflies, moths, and skippers), 25 odonates (dragonflies and damselflies), and nine other terrestrial arthropods. According to the *Checklist of Rhode Island Butterflies* (Pavulaan and Gregg 2007), 103 species of butterflies and skippers regularly occur in Rhode Island. Of these, 16 species were detected in the study area; however, several species would not be expected to occur at the site due to the lack of appropriate habitat, while other species may not have been detected due to the timing of the surveys. To our knowledge, no publicly-available lists of moths, odonates, or other taxa of terrestrial invertebrates currently exist for the State of Rhode Island. The *Field Guide to the Dragonflies and Damselflies of Massachusetts* (Nikula *et al.* 2003) states that 166 species of odonates have been recorded in that state; since Rhode Island is geographically smaller and contains fewer ecoregions (Griffith *et al.* 2009), it is reasonable to presume that the number of odonate species regularly occurring in Rhode Island is somewhat less than the Massachusetts total.

5.7 Benthic Macroinvertebrate Community

*Hydropsychidae caddisfly larvae (*Diplectrona sp.*) collected in Iron Mine Brook. May 24, 2017.*

Benthic sample analysis indicates that all three streams examined (Dry Arm Brook, Iron Mine Brook, and the unnamed tributary to Iron Mine brook) appear to support a benthic macroinvertebrate community typical of warm headwater streams. Some of the most commonly observed species were the stoneflies *Amphinemura* sp. and *Leuctra* sp., which occur in a wide range of stream habitats (Steward and Stark 1993). Other taxa observed during macroinvertebrate sampling include the isopod crustacean *Caecidotea sp.*, black flies (Simuliidae), riffle beetles (Elmidae), and numerous species of non-biting midge larvae (Chironomidae). These species are known to occur in a wide variety of flowing and ponded habitats. Some of the taxa encountered are also considered indicators of intermittent flow conditions. For instance, *Homoplectra sp.*, a species of caddisfly that specializes in intermittent spring seep habitats (Wiggins 1996), was observed in Dry Arm Brook.

5.8 Plant Community

The results of the vascular plant survey indicate that the proposed CREC facility site and the portion of the proposed CREC ROW south of the existing Algonquin ROW is an acidic woodland dominated by oak (*Quercus*) and hickory (*Carya*), with red maple (*Acer rubrum*) and white pine (*Pinus strobus*) components. The shrub layer is primarily composed of mountain laurel (*Kalmia latifolia*), witch hazel (*Hamamelis virginiana*), and sweet pepperbush (*Clethra alnifolia*), while the understory is largely composed of woodland species such as starflower (*Trientalis borealis*), wild sarsaparilla (*Aralia nudicaulis*), hay-scented fern (*Dennstaedtia punctilobula*), New York fern (*Thelypteris noveboracensis*), Indian cucumber-root (*Medeola virginiana*), and interrupted fern (*Osmunda claytoniana*). A few painted trilliums (*Trillium undulatum*), a state-listed species, were found in this area adjacent to the existing woods road.

*Pink lady's slipper (*Cypripedium acaule*) observed in the study area. June 2, 2017*

The proposed staging area is a mature red maple, red oak (*Quercus rubra*), and white pine dominated forest, with a shrub layer composed primarily of sweet pepperbush, witch hazel, highbush blueberry (*Vaccinium corymbosum*), and mountain laurel. The understory layer in this area is composed of species such as starflower, New York fern, Indian cucumber-root, and goldthread (*Coptis trifolia*). A few painted trilliums were detected in this area.

The proposed CREC ROW north of the existing Algonquin ROW is a younger forest dominated by black birch (*Betula lenta*), with an understory comprised largely of huckleberry (*Gaylussacia*) and chestnut oak (*Quercus montana*).

Invasive plant species are generally sparse throughout the study area and are largely located along the existing woods road, with the highest concentration at the four-way intersection of the woods road at the proposed CREC facility site.

For additional information, please see Appendix F.

6.0 CONCLUSION

*Six-spotted tiger beetle (*Cicindela sexguttata*) observed in the study area. June 2, 2017.*

A biological inventory was conducted at the site of the proposed Clear River Energy Center during the spring and early summer of 2017 to collect site-specific information regarding the faunal and flora community of the proposed project area. Thirteen distinct field survey programs were completed as part of this inventory which resulted in the detection of 520 animal and plant species in the study area, including 113 vertebrates (81 birds, 21 mammals, eight amphibians, and three reptiles), 220 invertebrates (147 butterflies and moths, 25 dragonflies and damselflies, and 48 other invertebrates), and 187 plants. Seventeen (17) state-listed species – including one state-endangered species, four state-threatened species, ten species of concern, and two protected species – as well as 47 Species of Greatest Conservation Need (SGCN) (RIDEM/TNC 2015) were detected in the study area during the course of this inventory.

Clearing and construction associated with the proposed project will result in the loss of habitat currently used by a variety of animal and plant species. The proposed CREC site is located on private property within a forest patch greater than 500 acres (as designated in the 2015 Rhode Island WAP). Despite the fact that most of these impacts are outside of the RIDEM's wetlands jurisdiction, and as more fully set forth in the pre-filed testimony of Jason Ringler, which is incorporated into this Report by reference, Invenergy has designed this Project so as to minimize impacts to habitat and wildlife as much as reasonably possible, to provide for greatest possible amount of protection of existing habitat.

Specifically, the design proposes improvements of the existing woods road to serve as the facility roadway to avoid wetland and habitat impacts that would otherwise occur due to the development of an entirely new road crossing through wetlands. The design includes retaining walls that will considerably reduce its overall width and impacts by reducing the total width of the roadway infrastructure. In addition, the design proposes six natural bottom, box-type culverts to allow unimpeded flow of water, aquatic habitat connectivity, and access for wildlife movement under the proposed roadway. Each culvert will have a minimum height of approximately four feet and a minimum width of nine feet. The culvert conveying the tributary to Iron Mine Brook, as well as Wildlife Crossing #5 (closest to the CREC facility) will have a minimum height of approximately six feet and a minimum width of 12 feet. The provisions for a natural bottom culvert will accommodate a naturalized stream channel within the culvert while the retaining walls along the length of the roadway will effectively guide wildlife to the proposed natural bottom, three-sided box. Each culvert crossing will include two grate openings to promote light within the interior of the culvert. For large wildlife (i.e. white-tailed deer) that may be discouraged from utilizing the culvert crossings, an at-grade ramp is proposed along the midpoint of the roadway.

During construction, several measures will be implemented to minimize impacts to the environment. These include the use of the existing woods road, installation of soil erosion and sediment controls, supervision and inspection of construction activities within resource areas by an environmental monitor,

and minimization of impacted areas. The environmental monitor will oversee construction activities including the installation and maintenance of soil erosion and sediment controls, on a routine basis to ensure compliance with all federal, state, and local permit commitments. Time of year restrictions to avoid tree clearing during the June-July timeframe is proposed. Invenergy reaffirms its willingness to work with RIDEM to revisit the proposed time of year restrictions to minimize site impacts.

Following the completion of construction, restoration efforts including final grading and installation of permanent soil erosion control devices and restoration of temporarily impacted areas will be completed.

A Compensatory Wetland Mitigation Plan following the New England District Compensatory Mitigation Guidance in cooperation with resource agencies will be developed. Based on an inventory of parcels of conservation interest developed by RIDEM as well as a GIS overlay of elements in the Rhode Island Conservation Opportunities and local Assessors Maps, Invenergy has generated a confidential comprehensive list of parcels potentially suitable for preservation. Invenergy is currently investigating the willingness of current land owners to sell their property. Once completed, Invenergy intends to work with RIDEM and the United States Army Corps of Engineers (USACE) to determine which parcel(s) appear best suited to offset project-related wetland and other impacts. It is anticipated the Compensatory Wetland Mitigation Plan will include a description of project impacts, objectives, mitigation site selection procedures, site protection information, and monitoring standards in addition to all required graphics and information. It is anticipated that the final mitigation package will primarily consist of land preservation and possibly some restoration should a viable project be identified.

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Appendix A

List of Species Detected in the Study Area

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Birds (n=81)							
Canada goose	*Branta canadensis*				•		Direct visual, auditory
Mallard	*Anas platyrhynchos*				•	•	Direct visual
Ruffed grouse	*Bonasa umbellus*		S5B, S5N	•	•	•	Tracks
Wild turkey	*Meleagris gallopavo*				•	•	Direct visual, remote camera, tracks
Mourning dove	*Zenaida macroura*				•	•	Direct visual, auditory
Yellow-billed cuckoo	*Coccyzus americanus*		S5B, S5N	•	•		Direct visual, auditory
Black-billed cuckoo	*Coccyzus erythropthalmus*		S5B, S5N	•	•		Auditory
Ruby-throated hummingbird	*Archilochus colubris*				•	•	Direct visual
Great blue heron	*Ardea herodias*	C				•	Direct visual
Turkey vulture	*Cathartes aura*					•	Direct visual, remote camera
Cooper's hawk	*Accipiter cooperii*	C				•	Direct visual
Broad-winged hawk	*Buteo platypterus*				•	•	Direct visual, auditory
Red-tailed hawk	*Buteo jamaicensis*					•	Direct visual
Eastern screech-owl	*Megascops asio*				•		Auditory
Barred owl	*Strix varia*				•	•	Remote camera, auditory
Red-bellied woodpecker	*Melanerpes carolinus*				•	•	Direct visual
Downy woodpecker	*Picoides pubescens*				•	•	Direct visual, auditory
Hairy woodpecker	*Picoides villosus*		S4B, S4N	•	•	•	Direct visual, auditory
Northern flicker	*Colaptes auratus*		S5B, S5N	•	•	•	Direct visual, auditory
Pileated woodpecker	*Hylatomus pileatus*	C	S1B, S1N	•	•	•	Direct visual, auditory
American kestrel	*Falco sparverius*		S4B, SZN	•		•	Direct visual
Eastern wood-pewee	*Contopus virens*				•	•	Auditory
Least flycatcher	*Empidonax minimus*		S3B, SZN	•	•		Auditory
Eastern phoebe	*Sayornis phoebe*				•	•	Direct visual, auditory

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Great crested flycatcher	*Myiarchus crinita*		S5B, SZN	•	•	•	Direct visual, auditory
Blue-headed vireo	*Vireo solitarius*		S3B, SZN	•		•	Direct visual, auditory
Warbling vireo	*Vireo gilvus*				•		Auditory
Philadelphia vireo	*Vireo philadelphicus*					•	Direct visual
Red-eyed vireo	*Vireo olivaceous*				•	•	Direct visual, auditory
Blue jay	*Cyanocitta cristata*				•	•	Direct visual, auditory
American crow	*Corvus brachyrhynchos*				•	•	Direct visual, auditory
Common raven	*Corvus corax*				•	•	Direct visual, auditory
Barn swallow	*Hirundo rustica*				•		Direct visual
Black-capped chickadee	*Parus atricapillus*				•	•	Direct visual, auditory
Tufted titmouse	*Baeolophus bicolor*				•	•	Direct visual, auditory
White-breasted nuthatch	*Sitta carolinensis*				•	•	Direct visual, auditory
Brown creeper	*Certhia americana*				•	•	Direct visual, auditory
Blue-gray gnatcatcher	*Polioptila caerulea*				•	•	Direct visual, auditory
Eastern bluebird	*Sialia sialis*		S3B	•		•	Direct visual, auditory
Veery	*Catharus fuscescens*		S5B	•	•	•	Direct visual, auditory
Hermit thrush	*Catharus guttatus*				•	•	Direct visual, auditory
Wood thrush	*Hylocichla mustelina*		S5B, SZN	•	•	•	Direct visual, auditory
American robin	*Turdus migratorius*				•	•	Direct visual, auditory
Gray catbird	*Dumetella carolinensis*		S5B	•	•	•	Direct visual, auditory
Cedar waxwing	*Bombycilla cedrorum*				•		Auditory
American goldfinch	*Spinus tristis*				•	•	Direct visual, auditory
Ovenbird	*Seiurus aurocapillus*				•	•	Direct visual, auditory
Worm-eating warbler	*Helmitheros vermivorum*	C			•		Auditory
Northern waterthrush	*Seiurus novaboracensis*		S4B, SZN	•	•	•	Direct visual, auditory
Blue-winged warbler	*Vermivora cyanoptera*		S5B, SZN	•		•	Auditory

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Black-and-white warbler	*Mniotilta varia*		S5B, SZN	•	•	•	Direct visual, auditory
Common yellowthroat	*Geothlypis trichas*				•	•	Direct visual, auditory
Hooded warbler	*Setophaga citrina*		S3B, SZN	•	•		Auditory
American redstart	*Setophaga ruticilla*		S5B	•		•	Direct visual
Cerulean warbler	*Setophaga cerulea*	SE	S1B, S2N	•	•		Auditory
Northern parula	*Setophaga americana*	ST	S1B, S1N	•	•	•	Auditory
Blackburnian warbler	*Setophaga fusca*	ST	S1B, S1N	•	•	•	Auditory
Yellow warbler	*Setophaga petechia*				•	•	Auditory
Chestnut-sided warbler	*Setophaga pensylvanica*		S5B, SZN	•	•		Auditory
Blackpoll warbler	*Setophaga striata*		SNA	•	•	•	Direct visual, auditory
Black-throated blue warbler	*Setophaga caerulescens*	ST	S1B, S3N	•	•	•	Direct visual, auditory
Pine warbler	*Dendroica pinus*				•	•	Direct visual, auditory
Yellow-rumped warbler	*Setophaga coronata*		S2B, SZN	•	•	•	Direct visual, auditory
Prairie warbler	*Setophaga discolor*		S5B, SZN	•	•	•	Direct visual, auditory
Black-throated green warbler	*Dendroica virens*				•	•	Direct visual, auditory
Canada warbler	*Wilsonia canadensis*		S4B, SZN	•	•	•	Direct visual, auditory
Wilson's warbler	*Wilsonia pusilla*				•		Auditory
Eastern towhee	*Pipilo erythrophthalmus*		S5B, SZN	•	•	•	Direct visual, auditory
Chipping sparrow	*Spizella passerina*				•	•	Direct visual, auditory
Field sparrow	*Spizella pusilla*		S4B, SZN	•	•	•	Direct visual, auditory
Song sparrow	*Melospiza melodia*				•	•	Direct visual
White-throated sparrow	*Zonotrichia albicollis*	C				•	Auditory
Dark-eyed junco	*Junco hyemalis*	C				•	Direct visual, auditory
Scarlet tanager	*Piranga olivacea*		S5B, SZN	•	•	•	Direct visual, auditory
Northern cardinal	*Cardinalis cardinalis*				•	•	Direct visual, auditory
Rose-breasted grosbeak	*Pheucticus ludovicianus*		S4B, SZN	•	•	•	Direct visual, auditory

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Indigo bunting	*Passerina cyanea*		S4B, SZN	•	•	•	Direct visual, auditory
Red-winged blackbird	*Agelaius phoeniceus*				•	•	Auditory
Common grackle	*Quiscalus quiscula*					•	Auditory
Brown-headed cowbird	*Molothrus ater*				•		Direct visual, auditory
Baltimore oriole	*Icterus galbula*				•		Direct visual, auditory
Mammals (n=21)							
Virginia opossum	*Didelphis virginiana*				•		Remote camera
Eastern cottontail	*Sylvilagus floridanus*					•	Sign
Woodland jumping mouse	*Napaeozapus insignis*				•		Trapping
Southern red-backed vole	*Clethrionomys gapperi*				•		Trapping
House mouse	*Mus musculus*				•		Trapping
White-footed mouse	*Peromyscus leucopus*				•	•	Trapping, direct visual
Southern flying squirrel	*Glaucomys volans*				•	•	Trapping, remote camera
Eastern gray squirrel	*Sciurus carolinensis*				•	•	Direct visual, remote camera
Eastern chipmunk	*Tamias striatus*				•	•	Direct visual, trapping
Red squirrel	*Tamiasciurus hudsonicus*				•	•	Direct visual, remote camera
Coyote	*Canis latrans*				•	•	Tracks, sign, remote camera
Gray fox	*Urocyon cinereoargenteus*				•		Remote camera
Red fox	*Vulpes vulpes*				•		Remote camera
Northern raccoon	*Procyon lotor*				•	•	Tracks, remote camera, direct visual
Fisher	*Martes pennanti*				•		Tracks, remote camera
Bobcat	*Lynx rufus*	ST	SU	•	•		Tracks, remote camera
Northern short-tailed shrew	*Blarina brevicauda*				•		Trapping
Masked shrew	*Sorex cinererus*				•		Trapping

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Big brown bat	*Eptesicus fuscus*		S5	•	•		Acoustic survey
Hoary bat	*Lasiurus cinereus*		S1	•	•		Acoustic survey
White-tailed deer	*Odocoileus virginianus*				•	•	Tracks, sign, remote camera, direct visual
Reptiles (n=3)							
Eastern box turtle	*Terrapene carolina*	P	S4	•	•	•	Direct visual
Spotted turtle	*Clemmys guttata*	P	S5	•		•	Direct visual
Eastern garter snake	*Thamnophis sirtalis*				•	•	Direct visual
Amphibians (n=8)							
American toad	*Bufo americanus*				•	•	Direct visual, auditory
Gray treefrog	*Hyla versicolor*				•	•	Auditory
Northern spring peeper	*Pseudacris crucifer*			•	•	•	Direct visual, auditory
Green frog	*Rana clamitans*					•	Direct visual
Pickerel frog	*Rana palustris*					•	Direct visual, auditory
Wood frog	*Rana sylvatica*		S5	•	•	•	Direct visual, auditory
Northern red-backed salamander	*Plethodon cinereus*				•	•	Direct visual, trapping
Spotted salamander	*Ambystoma maculatum*		S4	•	•		Trapping
Buttlerflies, Moths, and Skippers (n=147)							
Eastern tiger swallowtail	*Papilio glaucus*				•	•	Direct visual
Spicebush swallowtail	*Papilio troilus*				•	•	Direct visual
Black swallowtail	*Papilio polyxenes*					•	Direct visual
Cabbage white	*Pieris rapae*					•	Direct visual
Clouded sulfur	*Colias philodice*					•	Direct visual
American copper	*Lycaena phlaeas*					•	Direct visual
Gray hairstreak	*Strymon melinus*					•	Direct visual
Spring azure	*Celastrina ladon*					•	Direct visual
Great spangled fritillary	*Speyeria cybele*				•		Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Pearl crescent	*Phyciodes tharos*					•	Direct visual
Red admiral	*Vanessa atalanta*				•	•	Direct visual
American lady	*Vanessa virginiensis*				•		Direct visual
Painted lady	*Vanessa cardui*					•	Direct visual
Red-spotted purple	*Limenitis arthemis*					•	Direct visual
Little wood-satyr	*Megisto cymela*				•	•	Direct visual
Least skipper	*Ancyloxypha numitor*					•	Direct visual
Plume Moth	*Pterophoridae*					•	Direct visual
Lesser Maple Spanworm Moth	*Speranza pustularia*				•		Light trap survey
Common Angle	*Macaria aemulataria*				•		Light trap survey
Red-headed Inchworm	*Macaria bisignata*				•		Light trap survey
White Pine Angle	*Macaria pinistrobata*				•		Light trap survey
Hemlock Angle	*Macaria fissinotata*				•		Light trap survey
Large Purplish Gray	*Iridopsis vellivolata*				•		Light trap survey
Pale-winged Gray	*Iridopsis ephyraria*				•		Light trap survey
Small Engrailed	*Ectropis crepuscularia*				•		Light trap survey
Porcelain Gray	*Protoboarmia porcelaria*				•		Light trap survey
Tulip-Tree Beauty	*Epimecis hortaria*				•		Light trap survey
Canadian melanolophia	*Melanolophia canadaria*				•		Light trap survey
Powder Moth	*Eufidonia notataria*				•		Light trap survey
One-Spotted Variant	*Hypagyrtis unipunctata*				•		Light trap survey
Common Lytrosis	*Lytrosis unitaria*				•		Light trap survey
Saw Wing	*Euchlaena serrata*				•		Light trap survey
Scrub Euchlaena	*Euchlaena madusaria*		SNR	•	•		Light trap survey
Ochre Euchlaena	*Euchlaena marginaria*				•		Light trap survey
Morrison's Pero	*Pero morrisonaria*				•		Light trap survey

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Oak Beauty	*Phaeoura quernaria*				•		Light trap survey
Pale Beauty	*Campaea perlata*				•	•	Light trap survey, direct visual
Pale Homochlodes	*Homochlodes fritillaria*				•		Light trap survey
A Geometrid Moth	*Gueneria similaria*				•		Light trap survey
Angled Metarranthis	*Metarranthis angularia*				•		Light trap survey
Common Metarranthis	*Metarranthis hypochraria*				•		Light trap survey
Lemon Plagodis	*Plagodis serinaria*				•		Light trap survey
Hollow-spotted Plagodis	*Plagodis alcoolaria*				•		Light trap survey
Straw Besma	*Besma endropiaria*				•		Light trap survey
Oak Besma	*Besma quercivoraria*				•		Light trap survey
Hemlock Looper	*Lambdina fiscellaria*				•		Light trap survey
Yellow-headed Looper	*Lambdina pellucidaria*				•		Light trap survey
Curve-lined Looper	*Lambdina fervidaria*				•		Light trap survey
Confused Eusarca	*Eusarca confusaria*				•		Light trap survey
White Slant-line	*Tetracis cachexiata*				•		Light trap survey
Snowy Geometer	*Eugonobapta nivosaria*				•		Light trap survey
Curved-Toothed Geometer	*Eutrapela clemataria*				•		Light trap survey
Red-fronted Emerald	*Nemoria rubrifrontaria*				•		Light trap survey
Pistachio Emerald	*Hethemia pistasciaria*				•		Light trap survey
Sweetfern Geometer	*Cyclophora pendulinaria*				•		Light trap survey
Large Lace-border	*Scopula limboundata*				•		Light trap survey
White-ribboned Carpet	*Mesoleuca ruficilliata*				•		Light trap survey
Gem	*Orthonama obstipata*				•		Light trap survey
Powdered Bigwing	*Lobophora nivigerata*				•		Light trap survey
Pug sp.	*Eupithecia sp.*				•		Light trap survey
Forest Tent Caterpillar Moth	*Malacosoma disstria*				•		Light trap survey

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Eastern Tent Caterpillar Moth	*Malacosoma americana*				•		Light trap survey
Rosy maple moth	*Dryocampa rubicunda*				•		Light trap survey
Poecila sphinx	*Sphinx poecilla*				•		Light trap survey
Northern pine sphinx	*Lapara bombycoides*				•		Light trap survey
Blinded sphinx	*Paonias excaecata*				•		Light trap survey
Clearwing sphinx	*Hemaris sp.*					•	Direct visual
Georgian Prominent	*Hyperaeschra georgica*				•		Light trap survey
Common Gluphisia	*Gluphisia septentrionis*				•		Light trap survey
Drexel's Datana	*Datana drexelii*				•		Light trap survey
Contracted Datana	*Datana contracta*		SNR	•	•		Light trap survey
White-dotted Prominent	*Nadata gibbosa*				•		Light trap survey
Angulose Prominent	*Peridea angulosa*				•		Light trap survey
Chocolate Prominent	*Peridea ferruginea*				•		Light trap survey
Oblique Heterocampa	*Heterocampa obliqua*				•		Light trap survey
White-blotched Heterocampa	*Heterocampa umbrata*				•		Light trap survey
Saddled Prominent	*Heterocampa guttivitta*				•		Light trap survey
Wavy-lined Heterocampa	*Heterocampa biundata*				•		Light trap survey
Gypsy Moth	*Lymantria dispar*				•		Light trap survey
White-marked Tussock Moth	*Orgyia leucostigma*				•		Light trap survey
Painted Lichen Moth	*Hypoprepia fucosa*				•		Light trap survey
Figured Tiger Moth	*Grammia figurata*				•		Light trap survey
Nais Tiger Moth	*Apantesis nais*				•		Light trap survey
Tawny Holomelina	*Virbia opella*				•		Light trap survey
Agreeable Tiger Moth	*Spilosoma congrua*				•		Light trap survey
Pink-Legged Tiger Moth	*Spilosoma latipennis*				•		Light trap survey
Banded Tussock Moth	*Halysidota tessellaris*				•		Light trap survey

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
American Idia Moth	*Idia americalis*				•		Light trap survey
Common Idia Moth	*Idia aemula*				•		Light trap survey
Rotund Idia Moth	*Idia rotundalis*				•		Light trap survey
Forbes' Idia	*Idia forbesii*				•		Light trap survey
Orange-spotted Idia	*Idia diminuendis*				•		Light trap survey
Smoky Idia	*Idia scobialis*				•		Light trap survey
Glossy Black Idia Moth	*Idia lubricalis*				•		Light trap survey
Lettered Zanclognatha	*Zanclognatha lituralis*				•		Light trap survey
Complex Fan-foot	*Zanclognatha protumnusalis*				•		Light trap survey
Early Zanclognatha Moth	*Zanclognatha cruralis*				•		Light trap survey
Yellowish Zanclognatha	*Zanclognatha jacchusalis*				•		Light trap survey
Morbid Owlet Moth	*Chytolita morbidalis*				•		Light trap survey
Black-banded Owlet Moth	*Phalaenostola larentioides*				•		Light trap survey
Bent-winged Owlet Moth	*Bleptina caradrinalis*				•		Light trap survey
Dotted Renia	*Renia salusalis*				•		Light trap survey
Yellow-spotted Renia Moth	*Renia flavipunctalis*				•		Light trap survey
Sober Renia Moth	*Renia sobrialis*				•		Light trap survey
Dark-spotted Palthis Moth	*Palthis angulalis*				•		Light trap survey
Decorated Owlet	*Redectis vitrea*				•		Light trap survey
Decorated Owlet	*Pangrapta decoralis*				•		Light trap survey
Baltimore Bomolocha Moth	*Hypena baltimoralis*				•		Light trap survey
Dead-wood Borer Moth	*Scolecocampa liburna*				•		Light trap survey
Wet Sand Savannah Moth	*Gabara subnivosella*				•		Light trap survey
Broken Lined Hypenodes Moth	*Hypenodes fractilinea*				•		Light trap survey
Praeclara Underwing	*Catocala praeclara*				•		Light trap survey
Figure-seven Moth	*Drasteria grandirena*				•		Light trap survey

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Clover Looper Moth	*Caenurgina crassiuscula*				•		Light trap survey
False Underwing	*Allotria elonympha*				•		Light trap survey
Horrid Zale	*Zale horrida*				•		Light trap survey
Feeble Grass Moth	*Amolita fessa*				•		Light trap survey
Maple Looper Moth	*Parallelia bistriaris*					•	Direct visual
Confused Meganola	*Meganola minuscula*				•		Light trap survey
Sweet Pepperbush Nola Moth	*Nola clethrae*				•		Light trap survey
Eyed Baileya	*Baileya ophthalmica*				•		Light trap survey
Curved Halter Moth	*Capis curvata*				•		Light trap survey
Small Bird-dropping Moth	*Ponometia erastrioides*				•		Light trap survey
Eastern Panthea	*Panthea furcilla*				•		Light trap survey
Ovate Dagger Moth	*Acronicta ovata*				•		Light trap survey
Retarded Dagger Moth	*Acronicta retardata*				•		Light trap survey
Afflicted Dagger Moth	*Acronicta afflicta*				•		Light trap survey
The Green Marvel	*Agriopodes fallax*				•		Light trap survey
Cadbury's Lichen Moth	*Comachara cadburyi*				•		Light trap survey
White-dotted Groundling	*Condica videns*				•		Light trap survey
Pink-shaded Fern Moth	*Callopistria mollissima*				•		Light trap survey
Pink-barred Pseudeustrotia	*Pseudeustrotia carneola*				•		Light trap survey
Pale-winged Midget	*Elaphria alapallida*				•		Light trap survey
Grateful Midget	*Elaphria grata*				•		Light trap survey
Miranda Moth	*Proxenus miranda*				•		Light trap survey
Slow Poke	*Athetis tarda*				•		Light trap survey
Cloaked Marvel	*Chytonix palliatricula*				•		Light trap survey
Otter Arches	*Spiramater lutra*				•		Light trap survey
Rosewing	*Sideridis rosea*				•		Light trap survey

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Wheat Head Armyworm Moth	*Dargida diffusa*				•		Light trap survey
Southern Scurfy Quaker Moth	*Homorthodes lindseyi*				•		Light trap survey
Ruddy Quaker	*Protorthodes oviduca*				•		Light trap survey
Sheathed Quaker	*Ulolonche culea*				•		Light trap survey
Modest Quaker	*Ulolonche modesta*				•		Light trap survey
Cynical Quaker	*Orthodes cynica*				•		Light trap survey
Disparaged Arches	*Orthodes detracta*				•		Light trap survey
Leafy Dart	*Lycophotia phyllophora*				•		Light trap survey
Dragonflies and Damselflies (n=25)							
Ebony jewelwing	*Calopteryx maculata*				•	•	Direct visual
Aurora damsel	*Chromagrion conditum*				•	•	Direct visual
Skimming bluet	*Enallagma geminatum*				•		Direct visual
Eastern red damsel	*Amphiagrion saucium*					•	Direct visual
Fragile forktail	*Ischnura posita*				•	•	Direct visual
Sphagnum sprite	*Nehalennia gracilis*				•		Direct visual
Harlequin darner	*Gomphaeschna furcillata*				•	•	Direct visual
Common green darner	*Anax junius*				•		Direct visual
Unicorn clubtail	*Arigomphus villosipes*				•	•	Direct visual
Delta-spotted spiketail	*Cordulegaster diastatops*			•		•	Direct visual
Arrowhead spiketail	*Cordulegaster obliqua*	C		•	•		Direct visual
Emerald sp.	*Dorocordulia sp.*					•	Direct visual
Common baskettail	*Epitheca cynosura*					•	Direct visual
Blue dasher	*Pachydiplax longipennis*				•		Direct visual
Eastern pondhawk	*Erythemis simplicicollis*				•		Direct visual
Spangled skimmer	*Libellula cyanea*				•	•	Direct visual
Slaty skimmer	*Libellula incesta*				•		Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
White corporal	*Ladona exusta*					•	Direct visual
Common whitetail	*Plathemis lydia*				•	•	Direct visual
Twelve-spotted skimmer	*Libellula pulchella*					•	Direct visual
Widow skimmer	*Libellula luctuosa*				•	•	Direct visual
Painted skimmer	*Libellula semifasciata*				•	•	Direct visual
Calico pennant	*Celithemis elisa*				•	•	Direct visual
Meadowhawk sp.	*Sympetrum sp.*					•	Direct visual
Dot-tailed whiteface	*Leucorrhinia intacta*				•	•	Direct visual
Other Invertebrates (n=48)							
Mason bee	*Osmia sp.*					•	Direct visual
Wasp	*Vespidae*					•	Direct visual
Six-spotted tiger beetle	*Cicindela sexguttata*					•	Direct visual
Firefly sp.	*Lampyridae*					•	Direct visual
Predaceous diving beetle	*Cybister fimbriolatus*			•		•	Direct visual
Predaceous diving beetle	*Agabus sp.*				•		Benthos sampling
Predaceous diving beetle	*Hydroporus sp./Hygrotus sp.*				•		Benthos sampling
Riffle beetle	*Elmidae sp. 1*				•		Benthos sampling
Riffle beetle	*Elmidae sp. 2*				•		Benthos sampling
Garden springtail	*Bourletiella sp.*				•		Benthos sampling
Freshwater isopod	*Caecidotea sp.*				•		Benthos sampling
Non-biting midge	*Chironomidae*				•		Benthos sampling
Non-biting midge	*Corynoneura sp.*				•		Benthos sampling
Non-biting midge	*Orthocladiinae*				•		Benthos sampling
Non-biting midge	*Orthocladius annectens*				•		Benthos sampling
Non-biting midge	*Psectrocladius sp.*				•		Benthos sampling
Non-biting midge	*Tanypodinae*				•		Benthos sampling

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Non-biting midge	*Tanysarsini*				•		Benthos sampling
Non-biting midge	*Tanytarsus sp.*				•		Benthos sampling
Non-biting midge	*Thienemanniella sp.*				•		Benthos sampling
Non-biting midge	*Thienemannimyia sp.*				•		Benthos sampling
Non-biting midge	*Tokunagaia sp.*				•		Benthos sampling
Black fly	*Prosimulium sp.*				•		Benthos sampling
Black fly	*Simulidae*				•		Benthos sampling
Black fly	*Simulium sp.*				•		Benthos sampling
Black fly	*Simulium sp*				•		Benthos sampling
Horsefly	*Tabanidae*				•		Benthos sampling
Crane fly	*Tipulidae*					•	Direct visual
Robber fly	*Asilidae*					•	Direct visual
Water boatman	*Trichocorixa sp.*				•		Benthos sampling
Water strider	*Trepobates sp.*				•		Benthos sampling
Dark fishfly	*Nigronia sp.*				•	•	Benthos sampling
Jewelwing damselfly	*Calopteryx sp.*				•		Benthos sampling
Freshwater oligochaete	*Lumbriculidae*				•		Benthos sampling
Freshwater oligochaete	*Naididae*				•		Benthos sampling
Freshwater oligochaete	*Tubificidae*				•		Benthos sampling
Stonefly	*Amphinemura sp.*				•		Benthos sampling
Stonefly	*Leuctra sp.*				•		Benthos sampling
Stonefly	*Nemoura sp.*				•		Benthos sampling
Stonefly	*Plecoptera*				•		Benthos sampling
Caddisfly	*Diplectrona sp.*				•		Benthos sampling
Caddisfly	*Homoplectra sp.*				•		Benthos sampling
Caddisfly	*Lepidostoma sp.*				•		Benthos sampling

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Caddisfly	*Hydatophylax sp.*				•		Benthos sampling
Caddisfly	*Rhyacophila sp.*				•		Benthos sampling
American giant millipede	*Narceus americanus*					•	Direct visual
Deer tick	*Ixodes scapularis*					•	Direct visual
American dog tick	*Dermacentor variabilis*					•	Direct visual
Plants (n=187)							
Common three-seeded-Mercury	*Acalypha rhomboidea*				•		Direct visual
Norway maple	*Acer platanoides*				•		Direct visual
Red maple	*Acer rubrum*				•	•	Direct visual
Snakeroot	*Ageratina altissima*					•	Direct visual
Garlic mustard	*Alliaria petiolata*				•		Direct visual
Speckled alder	*Alnus incana*				•		Direct visual
Common ragweed	*Ambrosia artemisiifolia*				•		Direct visual
Shadbush	*Amelanchier sp.*				•		Direct visual
American hog-peanut	*Amphicarpaea bracteata*				•		Direct visual
Wood anemone	*Anemone quinquefolia*				•		Direct visual
Sweet vernalgrass	*Anthoxanthum odoratum*				•		Direct visual
Indian hemp	*Apocynum cannabinum*				•		Direct visual
Wild sarsaparilla	*Aralia nudicaulis*				•		Direct visual
Jack-in-the-pulpit	*Arisaema triphyllum*				•		Direct visual
Red chokeberry	*Aronia arbutifolia*					•	Direct visual
Purple chokeberry	*Aronia floribunda*				•		Direct visual
Black chokeberry	*Aronia melanocarpa*				•		Direct visual
Oat-grass	*Arrhenatherum elatius*					•	Direct visual
Lady fern	*Athyrium filix-femina*				•		Direct visual
Japanese barberry	*Berberis thunbergii*				•	•	Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Yellow birch	*Betula alleghaniensis*				•	•	Direct visual
Black birch	*Betula lenta*				•	•	Direct visual
Gray birch	*Betula populifolia*				•	•	Direct visual
Tall beggar-ticks	*Bidens vulgata*				•	•	Direct visual
Woodgrass	*Brachyelytrum erectum*					•	Direct visual
Wild calla	*Calla palustris*	C			•		Direct visual
Button sedge	*Carex bullata*				•		Direct visual
Fringed sedge	*Carex crinita*				•	•	Direct visual
White-edge sedge	*Carex debilis*	C		•	•		Direct visual
Northern long sedge	*Carex folliculata*				•		Direct visual
Greater bladder sedge	*Carex intumescens*				•		Direct visual
Sallow sedge	*Carex lurida*				•	•	Direct visual
Pennslyvania sedge	*Carex pennsylvanica*				•	•	Direct visual
Broad-leaved sedge	*Carex platyphylla*				•		Direct visual
Broom sedge	*Carex scoparia*					•	Direct visual
Tussock sedge	*Carex stricta*					•	Direct visual
Swan's sedge	*Carex swanii*				•		Direct visual
Shagbark hickory	*Carya ovata*				•		Direct visual
American chestnut	*Castanea dentata*				•	•	Direct visual
Asiatic bittersweet	*Celastrus orbiculatus*				•		Direct visual
Mouse-ear chickweed	*Cerastium fontanum*				•		Direct visual
Atlantic white cedar	*Chamaecyparis thyoides*				•		Direct visual
Spotted wintergreen	*Chimaphila maculata*				•		Direct visual
Broad-leaved enchanter's-nightshade	*Circaea canadensis*				•		Direct visual
Sweet-pepperbush	*Clethra alnifolia*				•	•	Direct visual
Sweet-fern	*Comptonia peregrina*				•		Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Three-leaved goldthread	*Coptis trifolia*				•	•	Direct visual
Silky dogwood	*Cornus amomum*					•	Direct visual
Hawthorn	*Crataegus sp.*				•		Direct visual
Pink lady's-slipper	*Cypripedium acaule*				•	•	Direct visual
Orchard grass	*Dactylis glomerata*				•		Direct visual
Poverty grass	*Danthonia spicata*				•		Direct visual
Wild carrot	*Daucus carota*				•		Direct visual
Hay-scented fern	*Dennstaedtia punctilobula*				•	•	Direct visual
Wavy hair-grass	*Deschampsia flexuosa flexuosa*				•		Direct visual
Deptford pink	*Dianthus armeria*				•		Direct visual
Deer-tongue grass	*Dichanthelium clandestinum*				•	•	Direct visual
Spatulate-leaved sundew	*Drosera intermedia*				•		Direct visual
Round-leaved sundew	*Drosera rotundifolia*				•	•	Direct visual
Spinulose wood fern	*Dryopteris carthusiana*				•	•	Direct visual
Three-way sedge	*Dulichium arundinaceum*				•		Direct visual
Broad-leaved helleborine	*Epipactis helleborine*				•		Direct visual
Field horsetail	*Equisetum arvense*				•		Direct visual
American burnweed	*Erechtites hieraciifolius*				•		Direct visual
Annual fleabane	*Erigeron annuus*				•		Direct visual
Philadelphia fleabane	*Erigeron philadelphicus*				•		Direct visual
Boneset	*Eupatorium perfoliatum*				•		Direct visual
American beech	*Fagus grandifolia*				•		Direct visual
Glossy buckthorn	*Frangula alnus*				•		Direct visual
Green ash	*Fraxinus pennsylvanica*					•	Direct visual
Wintergreen	*Gaultheria procumbens*				•		Direct visual
Black huckleberry	*Gaylussacia baccata*				•		Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Blue huckleberry	*Gaylussacia frondosa*				•	•	Direct visual
Fowl manna grass	*Glyceria striata*				•		Direct visual
Witch-hazel	*Hamamelis virginiana*				•	•	Direct visual
Bluet	*Houstonia caerulea*				•		Direct visual
American marsh-pennywort	*Hydrocotyle americana*				•		Direct visual
Common winterberry	*Ilex verticillata*				•	•	Direct visual
Yellow iris	*Iris pseudacorus*				•		Direct visual
Canadian rush	*Juncus candensis*					•	Direct visual
Dudley's rush	*Juncus dudleyi*				•		Direct visual
Common soft rush	*Juncus effusus*				•	•	Direct visual
Path rush	*Juncus tenuis*				•	•	Direct visual
Sheep Laurel	*Kalmia angustifolia*				•	•	Direct visual
Mountain laurel	*Kalmia latifolia*				•	•	Direct visual
Ox-eye daisy	*Leucanthemum vulgare*				•		Direct visual
Spicebush	*Lindera benzoin*				•		Direct visual
Tuliptree	*Liriodendron tulipifera*				•		Direct visual
Indian-tobacco	*Lobelia inflata*				•		Direct visual
Morrow's honeysuckle	*Lonicera morrowii*				•		Direct visual
Square-pod water-primrose	*Ludwigia alternifolia*				•		Direct visual
Common wood rush	*Luzula multiflora*				•		Direct visual
Northern bog-clubmoss	*Lycopodiella inundata*				•		Direct visual
Water-horehound	*Lycopus sp.*				•	•	Direct visual
Maleberry	*Lyonia ligustrina*				•	•	Direct visual
Starflower	*Lysimachia (Trientalis) borealis*				•		Direct visual
Whorled yellow-loosestrife	*Lysimachia quadrifolia*				•		Direct visual
Swamp candles	*Lysimachia terrestris*				•	•	Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
False Solomon's-seal	*Maianthemum (Smilacina) racemosum*				•		Direct visual
Canada-mayflower	*Maianthemum canadense*				•	•	Direct visual
Crab apple	*Malus sp.*				•		Direct visual
Indian cucumber root	*Medeola virginiana*				•		Direct visual
Cow-wheat	*Melampyrum lineare*				•		Direct visual
Japanese stiltgrass	*Microstegium vimineum*				•		Direct visual
Partridge-berry	*Mitchella repens*				•	•	Direct visual
Three-leaved rattlesnake-root	*Nabalus trifoliolatus*				•		Direct visual
Black-gum	*Nyssa sylvatica*				•	•	Direct visual
Worled aster	*Oclemena (Aster) acuminata*				•		Direct visual
Sensitive fern	*Onoclea sensibilis*				•	•	Direct visual
One-flowered broom-rape	*Orobanche uniflora*				•		Direct visual
Interrupted fern	*Osmunda claytoniana*				•		Direct visual
Royal fern	*Osmunda regalis*				•	•	Direct visual
Cinnamon fern	*Osmundastrum (Osmunda) cinnamomeum*				•	•	Direct visual
Hop hornbeam	*Ostrya virginiana*					•	Direct visual
Common yellow wood sorrel	*Oxalis stricta*				•		Direct visual
Dwarf ginseng	*Panax trifolius*				•		Direct visual
New York Fern	*Parathelypteris (Thelypteris) noveboracensis*				•		Direct visual
Virginia-creeper	*Parthenocissus quinquefolia*				•	•	Direct visual
Green arrow-arum	*Peltandra virginica*				•		Direct visual
Oriental lady's-thumb smartweed	*Persicaria longiseta*				•		Direct visual
Arrow-leaved tearthumb	*Persicaria sagittata*				•		Direct visual
Reed canary grass	*Phalaris arundinacea*				•		Direct visual
White pine	*Pinus strobus*				•	•	Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Common plantain	*Plantago major*				•		Direct visual
Rose pogonia	*Pogonia ophioglossoides*				•	•	Direct visual
Gaywings	*Polygala paucifolia*				•		Direct visual
Rock polypody	*Polypodium virginianum*				•		Direct visual
Haircap moss	*Polystricum spp.*					•	Direct visual
Eastern cottonwood	*Populus deltoides*				•		Direct visual
Bigtooth aspen	*Populus grandidentata*				•	•	Direct visual
Quaking aspen	*Populus tremuloides*				•		Direct visual
Norwegian cinquefoil	*Potentilla norvegica*				•		Direct visual
Common cinquefoil	*Potentilla simplex*				•		Direct visual
Heal-all	*Prunella vulgaris*				•		Direct visual
Black cherry	*Prunus serotina*				•	•	Direct visual
Bracken fern	*Pteridium aquilinum*				•	•	Direct visual
White oak	*Quercus alba*				•	•	Direct visual
Scarlet oak	*Quercus coccinea*				•	•	Direct visual
Chestnut oak	*Quercus montana*				•		Direct visual
Northern red oak	*Quercus rubra*				•	•	Direct visual
Black oak	*Quercus velutina*					•	Direct visual
Clammy azalea	*Rhododendron viscosum*				•	•	Direct visual
Azalea sp.	*Rhododendron sp.*				•		Direct visual
Brownish beaksedge	*Rhynchospora capitellata*				•		Direct visual
Multiflora rose	*Rosa multiflora*				•	•	Direct visual
Common blackberry	*Rubus allegheniensis*				•		Direct visual
Northern dewberry	*Rubus flagellaris*				•	•	Direct visual
Swamp dewberry	*Rubus hispidus*					•	Direct visual
Wine raspberry	*Rubus phoenicolasius*				•		Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Pussy willow	*Salix discolor*					•	Direct visual
Sassafras	*Sassafras albidum*				•	•	Direct visual
Little bluestem	*Schizachyrium scoparium*				•		Direct visual
Woolgrass	*Scirpus cyperinus*					•	Direct visual
Narrow-leaved blue-eyed grass	*Sisyrinchium angustifolium*					•	Direct visual
Glaucous-leaved greenbriar	*Smilax glauca*				•		Direct visual
Greenbrier	*Smilax rotundifolia*				•	•	Direct visual
Canada goldenrod	*Solidago canadensis*					•	Direct visual
Wrinkle-leaved goldenrod	*Solidago rugosa*				•	•	Direct visual
European mountain-ash	*Sorbus aucuparia*				•		Direct visual
Sphagnum moss	*Sphagnum spp.*					•	Direct visual
White meadowsweet	*Spiraea alba*				•		Direct visual
Meadowsweet	*Spiraea latifolia*					•	Direct visual
Steeplebush	*Spiraea tomentosa*				•	•	Direct visual
Heart-leaved American-aster	*Symphyotrichum cordifolium*				•		Direct visual
New England aster	*Symphyotrichum novae-angliae*					•	Direct visual
Skunk-cabbage	*Symplocarpus foetidus*				•	•	Direct visual
Marsh fern	*Thelypteris palustris*				•	•	Direct visual
Poison-ivy	*Toxicodendron radicans*				•	•	Direct visual
Marsh St. John's wort	*Triadenum viginicum*					•	Direct visual
Starflower	*Trientalis borealis*					•	Direct visual
White clover	*Trifolium repens*				•		Direct visual
Painted trillium	*Trillium undulatum*	C			•	•	Direct visual
Eastern hemlock	*Tsuga canadensis*				•	•	Direct visual
American elm	*Ulmus americana*					•	Direct visual
Sessile-leaved bellwort	*Uvularia sessilifolia*				•	•	Direct visual

Common Name	Scientific Name	State Status[1]	State Rank[2]	SGCN[3]	Detected During Taxa-Specific Survey[4]	Detected Incidentially[5]	Mode of Detection
Low bush blueberry	*Vaccinium angustifolium*				•	•	Direct visual
Highbush blueberry	*Vaccinium corymbosum*				•	•	Direct visual
Large cranberry	*Vaccinium macrocarpon*				•		Direct visual
Hillside blueberry	*Vaccinium pallidum*				•		Direct visual
Common speedwell	*Veronica officinalis*				•		Direct visual
Wild raisin	*Viburnum cassinoides*				•	•	Direct visual
Arrowwood	*Viburnum dentatum*				•		Direct visual
Woolly blue violet	*Viola sororia*				•		Direct visual
Lance-leaved violet	*Viola lanceolata*				•		Direct visual
Arrowhead violet	*Viola sagittata*				•		Direct visual
Fox grape	*Vitis labrusca*				•	•	Direct visual
Yellow-eyed grass	*Xyris sp.*				•		Direct visual

[1]**State Status designations:** SE - State Endangered; ST - State Threatened; C - Concern; P - Protected; SH - State Historic (note: bird status based on breeding populations in Rhode Island).

[2]**State Rank designations:** SX - Presumed Extirpated; SH - Possibly Extirpated; S1 - Critically Imperiled; S2 - Imperiled; S3 - Vulnerable; S4 - Apparently Secure; S5 - Secure; SNR - Unranked; SU - Unrankable; SE - Exotic; SA - Accidental; SZ - Zero Occurences. Breeding Status Qualifiers: SB - Breeding; SN - Nonbreeding. Other Qualifiers: ? - Inexact or Uncertain.

[3]**SGCN:** Species of Greatest Conservation Need as identified in the Rhode Island Wildlife Action Plan, 2015.

[4]Indicates whether a particular species was detected during in the study area during survey designed to detect that taxa. For example, Yellow Warbler detected during avian point count survey would be a positive response. Yellow Warbler detected incidentially during the course of other surveys or field work in the study area would be a negative response.

[5]Indicates whether a particular species was detected incidentially in the study area during the course of surveys or other field work not specifically designed to detect that taxa.

Appendix B

Bat Acoustic Report

Bat Acoustic Report

Clear River Energy Center
Burrillville, Rhode Island

PREPARED FOR

Invenergy Thermal Development LLC
One South Wacker Drive, Suite 1900
Chicago, Illinois 60606

PREPARED BY

ESS Group, Inc.
10 Hemingway Drive, 2nd Floor
East Providence, Rhode Island 02915

Project No. I108-007.03
December 14, 2015

www.essgroup.com

BAT ACOUSTIC REPORT
Clear River Energy Center

Burrillville, Rhode Island

Prepared For:

Invenergy Thermal Development LLC
One South Wacker Drive, Suite 1900
Chicago, Illinois 60606

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10 Hemingway Drive, 2nd Floor
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December 14, 2015

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APPENDICES

1.0 INTRODUCTION

Invenergy Thermal Development LLC (Invenergy) is requesting approval from the Rhode Energy Facility Siting Board (RIEFSB) to construct and operate the Clear River Energy Center, a combined-cycle electric generating facility (the Project or the Facility) to be located at the Spectra Energy Algonquin Compressor Station site on Wallum Lake Road (State Route 100) in Burrillville, Rhode Island. The Project will provide many benefits to the region including reduced air emissions and improved air quality, lower regional energy costs, employment for skilled local workers during construction and operation, as well as direct economic benefits to the Town of Burrillville and to local businesses.

The Facility will consist of two advanced class gas turbines operated in a combined-cycle configuration with supplementary fired heat recovery steam generators (HRSGs) and steam turbines for the generation of electrical power. Each combustion turbine, steam turbine, and generator will be connected via a common shaft (single shaft). Each gas turbine will fire natural gas as a primary fuel and ultra-low sulfur diesel (ULSD) fuel as a backup fuel for limited periods when the natural gas supply is unavailable. The natural gas supply for the Facility will be provided by the adjacent Spectra Energy Algonquin Compressor Station. There will be a pair of one-million gallon storage tanks on site for the storage of ULSD, which will be delivered to the Facility by truck.

The Site is located in a forested, predominantly rural area. The Facility will be constructed just south of the existing compressor station, The Algonquin Gas Compressor Station, which is surrounded by dense vegetation. One road, Algonquin Lane, leads to the Site. Algonquin Lane is approximately 0.2 miles long and intersects with Wallum Lake Road. The closest residents are approximately 0.10 miles north of the North-Northeast corner of the property line.

The Facility is currently in a preliminary phase so the construction footprint and associated tree clearing is not known at this time. For general planning purposes, the limits of work are anticipated to be contained within the 0.28 square kilometer approximate total area to be cleared identified on Figure 1. In addition to the approximately 0.23 square kilometer area associated with the Facility footprint and construction staging areas, the approximate total area to be cleared also includes: 1) a 0.2 kilometer corridor for a new site access road, 2) a 1.3 kilometer long overhead transmission corridor, and 3) a 0.3 kilometer new gas line corridor (a portion of which was recently cleared for an expansion of the adjacent gas line compressor station operated by Spectra Energy).

The Project Area falls within the range of the federally threatened Northern Long-eared Bat (NLEB) (*Myotis septentrionalis*) which is protected under the Endangered Species Act of 1973 under the Interim 4(d) Rule. Portions of the proposed tree clearing for the Project also provide suitable habitat for the NLEB, therefore an acoustic presence/absence survey was conducted by ESS Group, Inc. (ESS) under the 2015 Range-wide Summer Survey Guidelines (USFWS Guidelines) (USFWS, 2015b). This report presents the findings of the survey.

Clear River Energy Center
Burrillville, Rhode Island

1 inch = 1,000 feet

Source: 1) ESRI, Imagery, 2014
2) RIGIS, Roads, 2013

Project Locus

Figure 1

2.0 HABITAT ASSESSMENT

Suitable summer habitat for NLEB includes a wide variety of forested/wooded habitats, adjacent and interspersed non-forested habitats (i.e. emergent wetlands, adjacent edges of agricultural fields, old fields and pastures), forests and woodlots containing potential roosts (live trees and/or snags ≥3 dbh with exfoliating bark, cracks, crevices, and/or cavities), and other wooded areas with variable amounts of canopy closure (USFWS, 2015b).

During the winter season, the NLEB retreat to their hibernaculum. It is at their hibernaculum where the NLEB have the highest risk of contracting the disease White Nose Syndrome (WNS), which is attributed to the decline of the species. Although WNS has not been confirmed in Rhode Island, there are two known hibernacula for bats in Rhode Island. However, no northern long-eared bats have been observed at either site (*Federal Register*, 2015). There is also limited summer data available for the State; however, there were six summer records of northern long-eared bats from 2011 mist-net surveys in Washington County (Brown, 2011, unpublished data).

Based on the current project design and associated limit of tree clearing it was estimated that a maximum of 0.28 square kilometers of forested habitat will be cleared for the Project. ESS scientists Craig Wood (Professional Wetland Scientist/Principal Ecologist; University of Connecticut, B.S. Natural Resource Conservation 1983; University of Rhode Island, M.S. Natural Resources Science, 1986), Matt Robertson (Scientist IV, University of Connecticut, B.S. Biology and Ecology, 2007), and Alex Patterson (Environmental Scientist II, University of Rhode Island, B.S. Wildlife Conservation and Biology 2009) assessed GIS data and conducted field habitat assessments to determine if portions of the Project Area include suitable summer habitat for the NLEB. Even though only portions of the Site include suitable habitat, for this survey the entire limit of tree clearing was conservatively assumed to be suitable habitat due to the patchy spacing of suitable habitat. Based on the size of linear and non-linear portions of the Project Area it was determined that four bat detector locations would be necessary to adequately assess the Project Area based on USFWS Guidelines. These locations are identified in Figure 1.

Habitat evaluations and forms were completed for the Project Area at each bat detector location (Appendix A). Each site was chosen based on site characteristics similar to those suitable for NLEB, and with a low enough tree density and cover to minimize interference with the bat detectors. Considerations were also taken to avoid choosing sites near trails on the property that are well used by mountain bikers, motorcycles, and four-wheel drive vehicles to avoid potential bat disturbance/avoidance, detector interference from engines, and tampering with equipment.

3.0 ACOUSTIC SURVEY

Prior to conducting the acoustic surveys, several attempts were made to consult with USFWS and RIDEM in regards to any changes or updates in USFWS or local survey protocols. ESS left messages with USFWS and RIDEM beginning on June 26, 2015. On July 1, 2015, Charlie Brown from RIDEM confirmed that USFWS Guidelines are acceptable for RIDEM and asked to be copied on the USFWS report. On August 7, 2015, Robyn Niver from USFWS confirmed Susi von Oettingen as their primary contact for this project. Due to the need to complete surveys before mid-August, per USFWS Guidelines, ESS conducted the survey prior to any USFWS response. However, a conservative approach was taken to ensure that an adequate survey was undertaken.

3.1 Weather

Weather conditions can play a major role on the activity of bats as well as the ability of the bat detectors to detect them. Therefore, weather was monitored each survey night to ensure ESS had the highest probability of detecting bats. Based on USFWS Guidelines there are three important weather factors to monitor:

- Temperatures that fall below 50°F (10°C) during the first five hours of the survey period;
- Precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently during the first five hours of the survey period; and
- Sustained wind speeds greater than nine miles/hour (four meters/second; three on Beaufort scale) during the first five hours of the survey period.

Weather observations were downloaded from the nearest National Weather Service (NWS) station located at the Providence Airport in Warwick, Rhode Island and from a personal weather station posted to Weather Underground located at the Burrillville Emergency Management Agency (EMA) in Burrillville, Rhode Island (Appendix B). Weather conditions were similar between the two stations with the major difference being wind speed. This is likely due to the proximity of the NWS station to the coast, whereas the (EMA) station is located further inland.

During the course of the survey, weather conditions, according to the NWS, showed one survey night where there were sustained winds over nine mph during the first five hours of the survey. This occurred on August 3, 2015; however, weather conditions at the EMA station recorded lower wind speeds closer to the Project Area. Taking a conservative approach, an additional survey night was added to this round of surveys to account for the high wind speeds on August 3, 2015.

3.2 Equipment and Setup

To collect high frequency bat calls during the survey, Titley Scientific Anabat SD2 Bat Detectors were connected to Anabat stainless steel microphones. The microphones were connected to Anabat car mounts, which in turn were connected to SD2 units housed in waterproof boxes (Figure 2 & 3). To protect the microphones from potential rain events, a 45˚ PVC elbow the same size as the microphone was secured to the Anabat car mount. Each microphone was aimed with the open end of the PVC elbow in the direction to be monitored, as described in the USFWS guidelines.

Figure 2 – SD2 Housing

Figure 3 – Microphone Setup

At each site the microphones were placed approximately two meters high on a tree and a laser rangefinder was used to ensure that there was no vegetation down the center line of the Zone of Detection (ZOD) within 10 meters, and that only minimal vegetation occurred on the outside of the ZOD. A densitometer was used to determine tree cover.

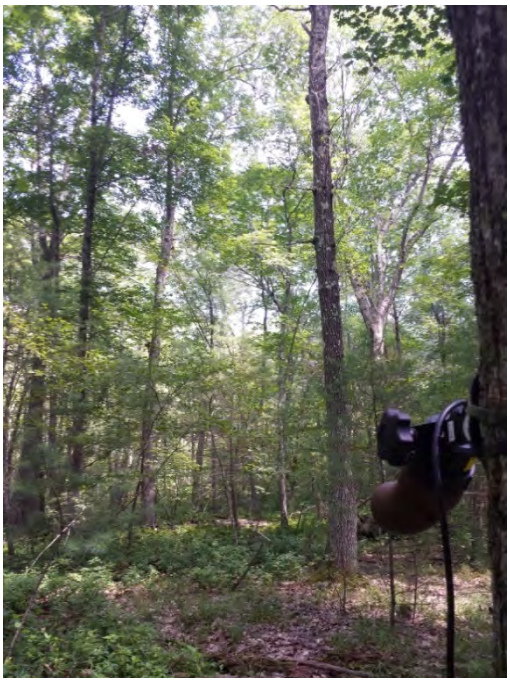
The SD2 detectors were set to record between 18:30 and 06:40 the following morning, approximately 1.5 hours before and after sunset and sunrise each day. All recorders were set to the manufacturer recommended settings in accordance with USFWS guidelines. Sensitivity was set to 5, audio division was set to 16, and data division was set to 8.

To ensure proper functioning of each detector and to determine the ZOD, the equipment was tested during deployment and recovery through the generation of static electricity. This testing was documented with video footage which will be maintained with the audio files.

3.3 Site Details

An aerial photograph of the Project Area is provided in Figure 1. Photographs of the detector deployment locations are provided on the following page.

Bat-1: Deployed 7/31/2015 – 8/4/2015
Located in forested wetland habitat adjacent to a perennial steam bed.



Bat-2: Deployed 7/31/2015 – 8/4/2015
Located in forested wetland habitat.

Bat-3: Deployed 8/4/2015 – 8/9/2015
Located in upland mixed forest at the edge of a forested wetland.

Bat-4: Deployed 8/4/2015 – 8/9/2015
Located in in forested wetland adjacent to perennial stream and <0.2 kilometers from intermittent stream.

4.0 RESULTS

The data collected was screened using AnalookW (v3.8s) to check for any high frequency calls (>35kHz). Because high frequency calls were identified, the data were run through Bat Call Identification (BCID) (v2.6a) to identify the species of the calls. The results of the BCID analysis identified a single potential NLEB detection at the Bat-3 location and therefore it was necessary to have the calls vetted by Dave Yates and Caroline Byrne, qualified bat biologists (see Appendix C for qualifications) approved by Susy von Oettingen of USFWS (pers. comm. September 8, 2015).

The results of the BCID detection resulted in 337 calls identified (Appendix D); whereas the visual analysis of the calls resulted in 355 bat calls (Appendix E). Both the BCID software and visual analysis of the calls agree that the highest number of calls identified are Big Brown Bat (*Eptesicus fuscus*). Visual analysis of the potential NLEB call reclassified the call as an approach phase call of another species. These further analyses of the results concluded that the NLEB was not present on the Site, and given the conservative measures taken during the survey, it is unlikely that NLEB regularly utilize the Project Area.

The above results are further verified by a bat study conducted for the Algonquin Incremental Market (AIM) Project in 2014. This study included 2 detector nights for a linear project adjacent to the Clear River Energy Center proposed site. The AIM study identified the same species as this study and confirmed no NLEB presence. Based on the findings of the two studies, NLEB are unlikely residents of the project area, and therefore no mitigation measures for this protected species will be necessary during the tree clearing, construction, and/or operation of the Project.

5.0 REFERENCES

Brown, C. 2011. Unpublished data from USFWS Region 3 data request regarding status of 7 cave bats species (November 10, 2011).

Federal Register. 2015. Endangered and Threatened Wildlife and Plants; Threatened Species Status for the Northern Long-Eared Bat With 4(d) Rule; Final Rule and Interim Rule. April 2, 2015. 50 CFR Part 17, pp. 17974-18033. Internet website: http://www.gpo.gov/fdsys/pkg/FR-2015-04-02/pdf/2015-07069.pdf. Accessed October 5, 2015.

[USFWS] U.S. Fish and Wildlife Service. 2015a. Northern Long-eared Bat (*Myotis septentrionalis*). Accessed October 3, 2015 at: http://www.fws.gov/midwest/endangered/mammals/nleb/

[USFWS] U.S. Fish and Wildlife Service. 2015b. 2015 Range-wide Indiana Bat Summer Survey Guidelines. Accessed October 5, 2015 at: http://www.fws.gov/midwest/endangered/mammals/nleb/

Appendix A

NLEB Summer Habitat Assessment Forms

NORTHERN LONG-EARED BAT HABITAT ASSESSMENT DATASHEET

Project Name: Invenergy Clear River Energy Center

Date: 9/25/2015

Township/Range/Section: Burrillville, RI

Lat Long/UTM/ Zone: See Figure 1 in Bat Acoustic Report

Surveyor: Craig Wood, Matt Robertson, Alex Patterson

Brief Project Description

Installation and construction of a clean gas-fired power station.

Project Area

	Total Acres	Forest Acres	Open Acres
Project	0.28	0.28	NA

	Completely cleared	Partially cleared (will leave trees)	Preserve acres- no clearing
Proposed Tree Removal (ac)	0.28	0	0

Vegetation Cover Types

Pre-Project	Post-Project
The site contains a mix of forested upland and wetland habitats; according to the Rhode Island Ecological Communities Classification (Enser et al. 2011) the primary vegetative community types present at the site are: oak forest, mixed deciduous/coniferous forest, tree plantation, forested swamp, and shrub swamp.	Land within the footprint of the generation facility will be converted to impervious surfaces. Within the overhead transmission line ROW, forested areas will be cleared and maintained as meadows and/or shrubland. Existing forest will also be cleared within the construction lay-down area. This area will be replanted following completion of construction.

Landscape within 5 mile radius

Flight corridors to other forested areas?

Site is located within a large patch of contiguous forest. Habitat connectivity with adjacent forested areas is high.

Describe Adjacent Properties (e.g. forested, grassland, commercial or residencial development, water sources)

Site is bordered by similar forested habitats in all directions. Low-density residential development is present to the east and west of the site. Overhead transmission line ROW is located to the northwest.

Proximity to Public Land

What is the distance (mi.) from the project area to forested public lands (e.g., national or state forests, national or state parks, conservation areas, wildlife management areas)?

Approx. 0.2 mi from Pulaski State Forest (RIDEM), approx. 0.2 mi from George Washington WMA (RIDEM), approx. 1.3 mi from Buck Hill WMA (RIDEM), approx. 2.2 mi from Quaddick State Forest (CTDEEP).

PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): BAT-1

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
	0	0	1	
Pools/Ponds (# and size)	0	Open and accessible to bats?		No open water present in the vicinity of this plot. Plot is located within a forested wetland. A perennial stream bed runs through the plot.
		Yes		
Wetlands (approx. ac.)	Permanent	Seasonal		
	1	0		

Forest Resources at Sample Site

Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
	6	4	5	
Dominant Species of Mature Trees	Quercus rubra, Acer rubrum, Betula lenta, Acer saccharum			
% Trees w/ Exfoliating Bark	0	0	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	2	5	7	
No. of Suitable Snags		2		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR NLEB? Yes

Additional Comments: Site located in eastern portion of Wetland 1 adjacent to Iron Mine Brook. Other species within the plot include Pinus strobus, Quercus alba, Clethra alnifolia, and Hamamelis virginiana.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): BAT-2

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
	0	0	0	
Pools/Ponds (# and size)	0	Open and accessible to bats?		No open water present in the vicinity of this plot. Plot is located within a forested wetland.
		N/A		
Wetlands (approx. ac.)	Permanent	Seasonal		
	1	0		

Forest Resources at Sample Site

Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
	6	5	4	
Dominant Species of Mature Trees	Acer rubrum, Quercus alba, Quercus rubra, Pinus strobus			
% Trees w/ Exfoliating Bark	0	0	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	10	6	7	
No. of Suitable Snags		5		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR NLEB? Yes

Additional Comments: Site located within western portion of Wetland 1 in a slight clearing. Other features included some woody debris on the ground. Basal area of the 30' diameter plot was 1,300 sq ft. Other species within the plot include Sassafras albidum, Kalmia latifolia, Vaccinium corymbosum, Vaccinium angustifolium, and Hamamelis virginiana.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

PHASE 1 SUMMER HABITAT ASSESSMENTS

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): BAT-3

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral	Intermittent	Perennial	Describe existing condition of water sources:
	0	0	0	
Pools/Ponds (# and size)	0	Open and accessible to bats?		Site is located in an upland mixed forest at the edge of a forested wetland. No surface water features nearby.
		N/A		
Wetlands (approx. ac.)	Permanent	Seasonal		
	1	0		

Forest Resources at Sample Site

Closure/Density	Canopy (> 50')	Midstory (20-50')	Understory (<20')	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
	6	5	4	
Dominant Species of Mature Trees	Quercus rubra, Quercus alba, Quercus velutina, Betula lenta.			
% Trees w/ Exfoliating Bark	0	0	0	
Size Composition of Live Trees (%)	Small (3-8 in)	Med (9-15 in)	Large (>15 in)	
	12	5	4	
No. of Suitable Snags		5		

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR NLEB? Yes

Additional Comments: Site located in a forested upland adjacent to the western edge of the eastern arm of Wetland 2. Other features included woody debris on the ground. Basal area of the 30' diameter plot was 900 sq ft. Other species within the plot include Sassafras albidum, Pinus strobus, Acer rubrum, Kalmia latifolia, Hamamelis virginiana, Nyssa sylvatica, and Castanea dentata.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Use additional sheets to assess discrete habitat types at multiple sites in a project area

Include a map depicting locations of sample sites if assessing discrete habitats at multiple sites in a project area
A single sheet can be used for multiple sample sites if habitat is the same

Sample Site Description

Sample Site No.(s): BAT-4

Water Resources at Sample Site

Stream Type (# and length)	Ephemeral: 0	Intermittent: 1 >0.3 mi	Perennial: 1 >0.8 mi	Describe existing condition of water sources: Plot is adjacent to perennial stream and <0.1 mi from intermittent stream. Plot is located within a forested wetland.
Pools/Ponds (# and size)	0	Open and accessible to bats? Yes		
Wetlands (approx. ac.)	Permanent: 1	Seasonal: 0		

Forest Resources at Sample Site

Closure/Density	Canopy (> 50'): 4	Midstory (20-50'): 6	Understory (<20'): 3	1=1-10%, 2=11-20%, 3=21-40%, 4=41-60%, 5=61-80%, 6=81-100%
Dominant Species of Mature Trees	Acer rubrum, Betula lenta, Betula alleghaniensis, Pinus strobus			
% Trees w/ Exfoliating Bark	5	0	0	
Size Composition of Live Trees (%)	Small (3-8 in): 10	Med (9-15 in): 2	Large (>15 in): 7	
No. of Suitable Snags	5			

Standing dead trees with exfoliating bark, cracks, crevices, or hollows. Snags without these characteristics are not considered suitable.

IS THE HABITAT SUITABLE FOR NLEB? Yes

Additional Comments: Site located within western arm of Wetland 2, between gas line ROW, perennial stream, and trailing rock pile. Other features include exposed boulders and fallen woody debris. Basal area of 30' diameter plot was 800 sq ft. Other species observed within the plot include Prunus serotina, Ostrya virginiana, Quercus velutina, Fraxinus americana, Hamamelis virginiana, and Ilex glabra.

Attach aerial photo of project site with all forested areas labeled and a general description of the habitat

Photographic Documentation: habitat shots at edge and interior from multiple locations; understory/midstory/canopy; examples of potential suitable snags and live trees; water sources

Appendix B

Survey Weather Information

Hourly Weather Data - Providence, RI - National Weather Service - Staion KPVD*

Date	*Time (EDT)*	*Temp.*	*Dew Point*	*Humidity*	*Pressure*	*Wind Dir*	*Wind Speed*	*Gust*	*Precip*	*Events*	*Conditions*
31-Jul-15	12:10 AM	75.0 °F	72.0 °F	90%	29.81 in	West	5.8 mph	-	N/A		Overcast
31-Jul-15	12:51 AM	73.9 °F	72.0 °F	93%	29.81 in	SSW	4.6 mph	-	N/A		Mostly Cloudy
31-Jul-15	1:51 AM	73.9 °F	72.0 °F	93%	29.81 in	WSW	6.9 mph	-	N/A		Overcast
31-Jul-15	2:51 AM	73.0 °F	71.1 °F	93%	29.80 in	West	6.9 mph	-	N/A		Partly Cloudy
31-Jul-15	3:51 AM	73.0 °F	71.1 °F	93%	29.79 in	WSW	4.6 mph	-	N/A		Scattered Clouds
31-Jul-15	4:51 AM	72.0 °F	70.0 °F	93%	29.80 in	West	5.8 mph	-	N/A		Scattered Clouds
31-Jul-15	5:51 AM	71.1 °F	69.1 °F	93%	29.81 in	West	8.1 mph	-	N/A		Partly Cloudy
31-Jul-15	6:51 AM	73.0 °F	69.1 °F	87%	29.82 in	West	9.2 mph	-	N/A		Partly Cloudy
31-Jul-15	7:51 AM	75.0 °F	68.0 °F	79%	29.84 in	West	9.2 mph	-	N/A		Partly Cloudy
31-Jul-15	8:51 AM	78.1 °F	66.0 °F	66%	29.83 in	West	10.4 mph	-	N/A		Partly Cloudy
31-Jul-15	9:51 AM	81.0 °F	66.0 °F	60%	29.83 in	West	9.2 mph	-	N/A		Partly Cloudy
31-Jul-15	10:51 AM	82.9 °F	63.0 °F	51%	29.83 in	West	9.2 mph	-	N/A		Partly Cloudy
31-Jul-15	11:51 AM	84.9 °F	60.1 °F	43%	29.83 in	West	13.8 mph	18.4 mph	N/A		Partly Cloudy
31-Jul-15	12:51 PM	86.0 °F	57.0 °F	37%	29.81 in	West	15.0 mph	23.0 mph	N/A		Partly Cloudy
31-Jul-15	1:51 PM	87.1 °F	57.9 °F	37%	29.80 in	WSW	11.5 mph	25.3 mph	N/A		Scattered Clouds
31-Jul-15	2:51 PM	87.1 °F	57.9 °F	37%	29.78 in	West	16.1 mph	21.9 mph	N/A		Partly Cloudy
31-Jul-15	3:51 PM	88.0 °F	57.0 °F	35%	29.78 in	WSW	12.7 mph	-	N/A		Partly Cloudy
31-Jul-15	4:51 PM	87.1 °F	55.0 °F	33%	29.77 in	WNW	11.5 mph	-	N/A		Partly Cloudy
31-Jul-15	5:51 PM	86.0 °F	55.0 °F	35%	29.77 in	WNW	9.2 mph	-	N/A		Partly Cloudy
31-Jul-15	6:51 PM	84.9 °F	55.9 °F	37%	29.77 in	WNW	9.2 mph	-	N/A		Partly Cloudy
31-Jul-15	7:51 PM	82.0 °F	57.0 °F	42%	29.78 in	WNW	6.9 mph	-	N/A		Partly Cloudy
31-Jul-15	9:51 PM	75.0 °F	59.0 °F	57%	29.81 in	WNW	3.5 mph	-	N/A		Clear
31-Jul-15	10:51 PM	70.0 °F	61.0 °F	73%	29.82 in	SSW	3.5 mph	-	N/A		Clear
31-Jul-15	11:51 PM	70.0 °F	61.0 °F	73%	29.83 in	West	4.6 mph	-	N/A		Clear
1-Aug-15	12:51 AM	68.0 °F	62.1 °F	81%	29.82 in	West	5.8 mph	-	N/A		Clear
1-Aug-15	1:51 AM	66.9 °F	61.0 °F	81%	29.81 in	Calm	Calm	-	N/A		Clear
1-Aug-15	2:51 AM	66.9 °F	61.0 °F	81%	29.79 in	West	3.5 mph	-	N/A		Clear
1-Aug-15	3:51 AM	66.0 °F	60.1 °F	81%	29.78 in	Calm	Calm	-	N/A		Clear
1-Aug-15	4:51 AM	64.9 °F	61.0 °F	87%	29.77 in	Calm	Calm	-	N/A		Clear
1-Aug-15	5:51 AM	66.0 °F	60.1 °F	81%	29.77 in	Calm	Calm	-	N/A		Scattered Clouds
1-Aug-15	6:51 AM	71.1 °F	63.0 °F	75%	29.77 in	WSW	6.9 mph	-	N/A		Scattered Clouds
1-Aug-15	7:51 AM	73.9 °F	62.1 °F	66%	29.77 in	WSW	9.2 mph	-	N/A		Scattered Clouds
1-Aug-15	8:51 AM	80.1 °F	64.0 °F	58%	29.77 in	West	11.5 mph	-	N/A		Partly Cloudy
1-Aug-15	9:51 AM	84.0 °F	64.9 °F	53%	29.77 in	WSW	6.9 mph	-	N/A		Partly Cloudy
1-Aug-15	10:51 AM	86.0 °F	63.0 °F	46%	29.77 in	West	12.7 mph	-	N/A		Scattered Clouds

Date	*Time (EDT)*	*Temp.*	*Dew Point*	*Humidity*	*Pressure*	*Wind Dir*	*Wind Speed*	*Gust*	*Precip*	*Events*	*Conditions*
1-Aug-15	11:51 AM	87.1 °F	61.0 °F	41%	29.76 in	WSW	10.4 mph	17.3 mph	N/A		Mostly Cloudy
1-Aug-15	12:51 PM	89.1 °F	59.0 °F	36%	29.75 in	SSW	18.4 mph	24.2 mph	N/A		Mostly Cloudy
1-Aug-15	1:47 PM	82.4 °F	62.6 °F	51%	29.75 in	NW	12.7 mph	-	N/A		Overcast
1-Aug-15	1:51 PM	82.9 °F	62.1 °F	49%	29.75 in	WNW	11.5 mph	17.3 mph	N/A		Mostly Cloudy
1-Aug-15	2:51 PM	88.0 °F	61.0 °F	40%	29.73 in	SW	17.3 mph	23.0 mph	N/A		Scattered Clouds
1-Aug-15	3:51 PM	89.1 °F	57.9 °F	35%	29.72 in	WSW	18.4 mph	26.5 mph	N/A		Scattered Clouds
1-Aug-15	4:51 PM	86.0 °F	57.9 °F	38%	29.73 in	West	13.8 mph	21.9 mph	N/A		Mostly Cloudy
1-Aug-15	5:21 PM	84.0 °F	60.1 °F	44%	29.74 in	WNW	13.8 mph	-	0.00 in	Rain	Light Rain
1-Aug-15	5:51 PM	82.0 °F	59.0 °F	45%	29.75 in	West	11.5 mph	-	0.00 in	Rain	Light Rain
1-Aug-15	6:51 PM	79.0 °F	61.0 °F	54%	29.76 in	West	5.8 mph	-	0.00 in		Mostly Cloudy
1-Aug-15	7:51 PM	78.1 °F	61.0 °F	56%	29.78 in	WSW	4.6 mph	-	N/A		Mostly Cloudy
1-Aug-15	8:51 PM	75.9 °F	62.1 °F	62%	29.80 in	WSW	4.6 mph	-	N/A		Mostly Cloudy
1-Aug-15	9:51 PM	72.0 °F	64.0 °F	76%	29.82 in	Calm	Calm	-	N/A		Partly Cloudy
1-Aug-15	10:51 PM	70.0 °F	63.0 °F	78%	29.82 in	WSW	5.8 mph	-	N/A		Partly Cloudy
1-Aug-15	11:51 PM	71.1 °F	63.0 °F	75%	29.83 in	West	6.9 mph	-	N/A		Mostly Cloudy
2-Aug-15	12:51 AM	71.1 °F	62.1 °F	73%	29.83 in	West	3.5 mph	-	N/A		Clear
2-Aug-15	1:51 AM	69.1 °F	63.0 °F	81%	29.84 in	WNW	5.8 mph	-	N/A		Clear
2-Aug-15	2:51 AM	68.0 °F	62.1 °F	81%	29.85 in	WNW	6.9 mph	-	N/A		Clear
2-Aug-15	3:51 AM	66.9 °F	60.1 °F	79%	29.85 in	West	3.5 mph	-	N/A		Clear
2-Aug-15	4:51 AM	64.9 °F	60.1 °F	84%	29.86 in	West	3.5 mph	-	N/A		Clear
2-Aug-15	5:51 AM	64.0 °F	59.0 °F	84%	29.87 in	West	5.8 mph	-	N/A		Clear
2-Aug-15	6:51 AM	64.9 °F	57.9 °F	78%	29.89 in	WSW	5.8 mph	-	N/A		Clear
2-Aug-15	7:51 AM	70.0 °F	57.0 °F	63%	29.91 in	WSW	4.6 mph	-	N/A		Clear
2-Aug-15	8:51 AM	75.0 °F	57.0 °F	53%	29.92 in	WNW	5.8 mph	-	N/A		Clear
2-Aug-15	9:51 AM	79.0 °F	55.0 °F	44%	29.92 in	West	5.8 mph	-	N/A		Clear
2-Aug-15	10:51 AM	82.0 °F	55.0 °F	39%	29.92 in	WSW	5.8 mph	-	N/A		Clear
2-Aug-15	11:51 AM	82.9 °F	54.0 °F	37%	29.93 in	West	8.1 mph	17.3 mph	N/A		Partly Cloudy
2-Aug-15	12:51 PM	84.9 °F	53.1 °F	33%	29.91 in	SW	16.1 mph	20.7 mph	N/A		Partly Cloudy
2-Aug-15	1:51 PM	86.0 °F	55.0 °F	35%	29.91 in	WSW	12.7 mph	21.9 mph	N/A		Scattered Clouds
2-Aug-15	2:51 PM	88.0 °F	55.0 °F	32%	29.89 in	WSW	10.4 mph	18.4 mph	N/A		Partly Cloudy
2-Aug-15	3:51 PM	87.1 °F	54.0 °F	32%	29.89 in	WSW	15.0 mph	-	N/A		Partly Cloudy
2-Aug-15	4:51 PM	84.9 °F	55.9 °F	37%	29.89 in	SSW	15.0 mph	-	N/A		Partly Cloudy
2-Aug-15	5:51 PM	82.9 °F	55.9 °F	39%	29.90 in	SSW	15.0 mph	21.9 mph	N/A		Partly Cloudy
2-Aug-15	6:51 PM	80.1 °F	59.0 °F	48%	29.89 in	SSW	10.4 mph	-	N/A		Partly Cloudy
2-Aug-15	7:51 PM	75.9 °F	59.0 °F	56%	29.89 in	SSW	9.2 mph	-	N/A		Partly Cloudy
2-Aug-15	8:51 PM	73.0 °F	61.0 °F	66%	29.91 in	SSW	6.9 mph	-	N/A		Partly Cloudy

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Wind Dir	Wind Speed	Gust	Precip	Events	Conditions
2-Aug-15	9:51 PM	72.0 °F	64.9 °F	78%	29.92 in	SSW	6.9 mph	-	N/A		Clear
2-Aug-15	10:51 PM	71.1 °F	66.9 °F	87%	29.90 in	South	9.2 mph	-	N/A		Partly Cloudy
2-Aug-15	11:51 PM	70.0 °F	66.9 °F	90%	29.89 in	South	5.8 mph	-	N/A		Clear
3-Aug-15	12:51 AM	70.0 °F	68.0 °F	93%	29.88 in	SSE	6.9 mph	-	N/A		Clear
3-Aug-15	1:51 AM	69.1 °F	66.9 °F	93%	29.87 in	South	3.5 mph	-	N/A		Clear
3-Aug-15	2:51 AM	69.1 °F	66.9 °F	93%	29.86 in	SSE	4.6 mph	-	N/A		Clear
3-Aug-15	3:51 AM	68.0 °F	66.9 °F	96%	29.86 in	South	3.5 mph	-	N/A		Clear
3-Aug-15	4:21 AM	69.1 °F	68.0 °F	96%	29.87 in	South	6.9 mph	-	N/A		Partly Cloudy
3-Aug-15	4:51 AM	70.0 °F	68.0 °F	93%	29.86 in	South	8.1 mph	-	N/A		Scattered Clouds
3-Aug-15	5:51 AM	68.0 °F	66.9 °F	96%	29.87 in	Calm	Calm	-	N/A		Scattered Clouds
3-Aug-15	6:51 AM	71.1 °F	69.1 °F	93%	29.87 in	South	4.6 mph	-	N/A		Scattered Clouds
3-Aug-15	7:51 AM	75.0 °F	69.1 °F	82%	29.87 in	Variable	5.8 mph	-	N/A		Partly Cloudy
3-Aug-15	8:51 AM	79.0 °F	66.0 °F	64%	29.87 in	SW	9.2 mph	-	N/A		Partly Cloudy
3-Aug-15	9:51 AM	82.0 °F	66.0 °F	58%	29.87 in	South	12.7 mph	-	N/A		Partly Cloudy
3-Aug-15	10:51 AM	84.0 °F	64.9 °F	53%	29.86 in	SSW	16.1 mph	19.6 mph	N/A		Partly Cloudy
3-Aug-15	11:51 AM	87.1 °F	62.1 °F	43%	29.86 in	SSW	16.1 mph	25.3 mph	N/A		Scattered Clouds
3-Aug-15	12:51 PM	88.0 °F	57.9 °F	36%	29.84 in	SSW	15.0 mph	-	N/A		Scattered Clouds
3-Aug-15	1:51 PM	88.0 °F	57.9 °F	36%	29.83 in	South	13.8 mph	21.9 mph	N/A		Scattered Clouds
3-Aug-15	2:51 PM	87.1 °F	64.9 °F	48%	29.81 in	South	16.1 mph	27.6 mph	N/A		Scattered Clouds
3-Aug-15	3:51 PM	87.1 °F	62.1 °F	43%	29.81 in	South	18.4 mph	26.5 mph	N/A		Partly Cloudy
3-Aug-15	4:51 PM	84.9 °F	60.1 °F	43%	29.80 in	SSW	19.6 mph	-	N/A		Partly Cloudy
3-Aug-15	5:51 PM	82.9 °F	62.1 °F	49%	29.80 in	SSW	12.7 mph	25.3 mph	N/A		Partly Cloudy
3-Aug-15	6:51 PM	80.1 °F	64.9 °F	60%	29.80 in	SSW	13.8 mph	-	N/A		Mostly Cloudy
3-Aug-15	7:51 PM	77.0 °F	68.0 °F	74%	29.81 in	SSW	12.7 mph	-	N/A		Mostly Cloudy
3-Aug-15	8:51 PM	75.9 °F	69.1 °F	79%	29.82 in	SW	12.7 mph	-	N/A		Scattered Clouds
3-Aug-15	9:51 PM	75.9 °F	70.0 °F	82%	29.83 in	SSW	10.4 mph	-	N/A		Scattered Clouds
3-Aug-15	10:51 PM	75.0 °F	71.1 °F	87%	29.83 in	SSW	12.7 mph	19.6 mph	N/A		Scattered Clouds
3-Aug-15	11:51 PM	75.9 °F	71.1 °F	85%	29.83 in	SSW	10.4 mph	-	N/A		Scattered Clouds
4-Aug-15	12:51 AM	75.9 °F	71.1 °F	85%	29.83 in	SW	9.2 mph	-	N/A		Partly Cloudy
4-Aug-15	1:51 AM	75.9 °F	71.1 °F	85%	29.83 in	SW	9.2 mph	-	N/A		Clear
4-Aug-15	2:51 AM	75.9 °F	71.1 °F	85%	29.83 in	SW	6.9 mph	-	N/A		Partly Cloudy
4-Aug-15	3:51 AM	75.0 °F	72.0 °F	90%	29.83 in	SW	9.2 mph	-	N/A		Clear
4-Aug-15	4:51 AM	75.0 °F	72.0 °F	90%	29.84 in	SW	5.8 mph	-	N/A		Partly Cloudy
4-Aug-15	5:51 AM	75.0 °F	72.0 °F	90%	29.82 in	SSW	4.6 mph	-	N/A		Mostly Cloudy
4-Aug-15	6:11 AM	75.9 °F	73.0 °F	91%	29.81 in	Calm	Calm	-	N/A	Thunderstorm	Overcast
4-Aug-15	6:34 AM	63.0 °F	61.0 °F	93%	29.85 in	WNW	31.1 mph	59.8 mph	0.57 in	Rain , Thunderstorm	Heavy Thunderstorms and Rain

Date	*Time (EDT)*	*Temp.*	*Dew Point*	*Humidity*	*Pressure*	*Wind Dir*	*Wind Speed*	*Gust*	*Precip*	*Events*	*Conditions*
4-Aug-15	6:43 AM	64.9 °F	63.0 °F	93%	29.84 in	West	19.6 mph	33.4 mph	0.91 in	Rain , Thunderstorm	Heavy Thunderstorms and Rain
4-Aug-15	6:51 AM	66.0 °F	64.9 °F	96%	29.84 in	SSW	8.1 mph	-	1.06 in	Rain , Thunderstorm	Thunderstorms and Rain
4-Aug-15	6:55 AM	66.0 °F	64.9 °F	96%	29.83 in	SSW	8.1 mph	-	0.01 in	Rain , Thunderstorm	Light Thunderstorms and Rain
4-Aug-15	7:24 AM	66.0 °F	66.0 °F	100%	29.87 in	SE	4.6 mph	-	0.02 in	Thunderstorm	Partly Cloudy
4-Aug-15	7:31 AM	66.9 °F	66.9 °F	100%	29.87 in	SSE	4.6 mph	-	0.02 in		Partly Cloudy
4-Aug-15	7:51 AM	68.0 °F	66.9 °F	96%	29.86 in	Calm	Calm	-	0.02 in		Clear
4-Aug-15	8:51 AM	72.0 °F	66.9 °F	84%	29.87 in	SSW	4.6 mph	-	N/A		Clear
4-Aug-15	9:51 AM	75.9 °F	69.1 °F	79%	29.87 in	SSW	9.2 mph	-	N/A		Clear
4-Aug-15	10:51 AM	79.0 °F	69.1 °F	72%	29.86 in	South	9.2 mph	-	N/A		Clear
4-Aug-15	11:51 AM	82.0 °F	68.0 °F	62%	29.86 in	South	10.4 mph	-	N/A		Partly Cloudy
4-Aug-15	12:51 PM	84.0 °F	66.9 °F	56%	29.84 in	SSW	11.5 mph	-	N/A		Clear
4-Aug-15	1:51 PM	84.9 °F	66.0 °F	53%	29.83 in	SW	15.0 mph	-	N/A		Clear
4-Aug-15	2:51 PM	86.0 °F	66.0 °F	51%	29.81 in	SW	17.3 mph	24.2 mph	N/A		Partly Cloudy
4-Aug-15	3:51 PM	86.0 °F	66.9 °F	53%	29.81 in	SSW	16.1 mph	27.6 mph	N/A		Clear
4-Aug-15	4:51 PM	86.0 °F	66.0 °F	51%	29.81 in	SW	16.1 mph	24.2 mph	N/A		Clear
4-Aug-15	5:51 PM	86.0 °F	66.9 °F	53%	29.82 in	SW	10.4 mph	-	N/A		Clear
4-Aug-15	6:51 PM	82.9 °F	69.1 °F	63%	29.83 in	South	8.1 mph	-	N/A		Clear
4-Aug-15	7:51 PM	79.0 °F	60.1 °F	52%	29.85 in	NNW	6.9 mph	-	N/A		Scattered Clouds
4-Aug-15	8:51 PM	78.1 °F	63.0 °F	60%	29.87 in	Calm	Calm	-	N/A		Clear
4-Aug-15	9:51 PM	75.9 °F	63.0 °F	64%	29.88 in	WNW	4.6 mph	-	N/A		Clear
4-Aug-15	10:51 PM	73.9 °F	64.0 °F	71%	29.90 in	West	5.8 mph	-	N/A		Mostly Cloudy
4-Aug-15	11:51 PM	72.0 °F	64.0 °F	76%	29.90 in	WNW	5.8 mph	-	N/A		Clear
5-Aug-15	12:51 AM	71.1 °F	64.0 °F	78%	29.90 in	West	4.6 mph	-	N/A		Clear
5-Aug-15	1:51 AM	69.1 °F	63.0 °F	81%	29.90 in	West	5.8 mph	-	N/A		Clear
5-Aug-15	2:51 AM	68.0 °F	62.1 °F	81%	29.90 in	WSW	4.6 mph	-	N/A		Clear
5-Aug-15	3:51 AM	66.9 °F	62.1 °F	84%	29.91 in	West	3.5 mph	-	N/A		Clear
5-Aug-15	4:51 AM	64.9 °F	61.0 °F	87%	29.90 in	Calm	Calm	-	N/A		Clear
5-Aug-15	5:51 AM	64.9 °F	61.0 °F	87%	29.88 in	Calm	Calm	-	N/A		Clear
5-Aug-15	6:51 AM	66.9 °F	61.0 °F	81%	29.89 in	Calm	Calm	-	N/A		Clear
5-Aug-15	7:51 AM	69.1 °F	63.0 °F	81%	29.90 in	South	4.6 mph	-	N/A		Clear
5-Aug-15	8:51 AM	73.9 °F	62.1 °F	66%	29.89 in	SSW	4.6 mph	-	N/A		Clear
5-Aug-15	9:51 AM	80.1 °F	59.0 °F	48%	29.88 in	WNW	9.2 mph	-	N/A		Clear
5-Aug-15	10:51 AM	82.0 °F	57.9 °F	44%	29.88 in	WSW	11.5 mph	-	N/A		Clear
5-Aug-15	11:51 AM	82.9 °F	57.9 °F	42%	29.86 in	West	10.4 mph	-	N/A		Clear
5-Aug-15	12:51 PM	84.0 °F	59.0 °F	43%	29.85 in	West	12.7 mph	18.4 mph	N/A		Clear
5-Aug-15	1:51 PM	84.9 °F	57.9 °F	40%	29.83 in	WNW	11.5 mph	18.4 mph	N/A		Clear

Date	*Time (EDT)*	*Temp.*	*Dew Point*	*Humidity*	*Pressure*	*Wind Dir*	*Wind Speed*	*Gust*	*Precip*	*Events*	*Conditions*
5-Aug-15	2:51 PM	84.9 °F	57.9 °F	40%	29.83 in	West	12.7 mph	-	N/A		Clear
5-Aug-15	3:51 PM	84.9 °F	59.0 °F	41%	29.82 in	NW	11.5 mph	-	N/A		Partly Cloudy
5-Aug-15	4:51 PM	82.9 °F	55.9 °F	39%	29.82 in	WNW	10.4 mph	-	N/A		Mostly Cloudy
5-Aug-15	5:51 PM	82.9 °F	55.0 °F	38%	29.82 in	West	10.4 mph	-	N/A		Partly Cloudy
5-Aug-15	6:51 PM	80.1 °F	55.9 °F	43%	29.83 in	WNW	12.7 mph	-	N/A		Partly Cloudy
5-Aug-15	7:51 PM	78.1 °F	55.0 °F	45%	29.84 in	WNW	6.9 mph	-	N/A		Clear
5-Aug-15	8:51 PM	75.0 °F	57.0 °F	53%	29.86 in	WNW	6.9 mph	-	N/A		Clear
5-Aug-15	9:51 PM	73.0 °F	55.0 °F	53%	29.88 in	WNW	6.9 mph	-	N/A		Clear
5-Aug-15	10:51 PM	72.0 °F	55.0 °F	55%	29.90 in	WNW	10.4 mph	-	N/A		Clear
5-Aug-15	11:51 PM	70.0 °F	52.0 °F	53%	29.91 in	WNW	8.1 mph	-	N/A		Clear
6-Aug-15	12:51 AM	68.0 °F	51.1 °F	55%	29.91 in	WNW	9.2 mph	-	N/A		Clear
6-Aug-15	1:51 AM	66.9 °F	51.1 °F	57%	29.91 in	West	4.6 mph	-	N/A		Clear
6-Aug-15	2:51 AM	64.9 °F	52.0 °F	63%	29.91 in	WSW	6.9 mph	-	N/A		Clear
6-Aug-15	3:51 AM	64.0 °F	51.1 °F	63%	29.90 in	Calm	Calm	-	N/A		Clear
6-Aug-15	4:51 AM	63.0 °F	52.0 °F	67%	29.91 in	West	5.8 mph	-	N/A		Clear
6-Aug-15	5:51 AM	60.1 °F	52.0 °F	75%	29.91 in	WSW	4.6 mph	-	N/A		Clear
6-Aug-15	6:51 AM	64.0 °F	52.0 °F	65%	29.92 in	WNW	4.6 mph	-	N/A		Clear
6-Aug-15	7:51 AM	68.0 °F	53.1 °F	59%	29.94 in	WNW	8.1 mph	-	N/A		Clear
6-Aug-15	8:51 AM	72.0 °F	54.0 °F	53%	29.94 in	WNW	6.9 mph	-	N/A		Clear
6-Aug-15	9:51 AM	73.9 °F	54.0 °F	50%	29.94 in	Variable	5.8 mph	-	N/A		Clear
6-Aug-15	10:51 AM	-	-	N/A%	29.93 in	Variable	6.9 mph	-	N/A		Clear
6-Aug-15	11:51 AM	77.0 °F	54.0 °F	45%	29.93 in	West	13.8 mph	-	N/A		Clear
6-Aug-15	12:51 PM	79.0 °F	54.0 °F	42%	29.92 in	North	-	-	N/A		Partly Cloudy
6-Aug-15	1:51 PM	81.0 °F	51.1 °F	35%	29.92 in	NW	11.5 mph	16.1 mph	N/A		Mostly Cloudy
6-Aug-15	2:51 PM	80.1 °F	51.1 °F	36%	29.91 in	WNW	13.8 mph	20.7 mph	N/A		Mostly Cloudy
6-Aug-15	3:51 PM	79.0 °F	52.0 °F	39%	29.91 in	NW	11.5 mph	-	N/A		Mostly Cloudy
6-Aug-15	4:51 PM	77.0 °F	53.1 °F	43%	29.91 in	West	10.4 mph	-	N/A		Mostly Cloudy
6-Aug-15	5:51 PM	75.9 °F	54.0 °F	46%	29.90 in	West	9.2 mph	-	N/A		Mostly Cloudy
6-Aug-15	6:51 PM	75.0 °F	55.0 °F	50%	29.90 in	West	6.9 mph	-	N/A		Mostly Cloudy
6-Aug-15	7:51 PM	73.0 °F	55.9 °F	55%	29.90 in	West	5.8 mph	-	N/A		Mostly Cloudy
6-Aug-15	8:51 PM	71.1 °F	57.9 °F	63%	29.91 in	West	5.8 mph	-	N/A		Mostly Cloudy
6-Aug-15	9:51 PM	69.1 °F	59.0 °F	70%	29.93 in	West	5.8 mph	-	N/A		Scattered Clouds
6-Aug-15	10:51 PM	66.9 °F	59.0 °F	76%	29.93 in	West	3.5 mph	-	N/A		Mostly Cloudy
6-Aug-15	11:51 PM	66.9 °F	57.9 °F	73%	29.94 in	West	5.8 mph	-	N/A		Mostly Cloudy
7-Aug-15	12:51 AM	66.0 °F	57.9 °F	75%	29.93 in	WNW	3.5 mph	-	N/A		Clear
7-Aug-15	1:51 AM	64.9 °F	57.9 °F	78%	29.93 in	West	3.5 mph	-	N/A		Partly Cloudy

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Wind Dir	Wind Speed	Gust	Precip	Events	Conditions
7-Aug-15	2:51 AM	66.0 °F	57.0 °F	73%	29.91 in	North	5.8 mph	-	N/A		Clear
7-Aug-15	3:51 AM	64.9 °F	55.9 °F	73%	29.91 in	North	6.9 mph	-	N/A		Clear
7-Aug-15	4:51 AM	64.0 °F	55.0 °F	73%	29.92 in	NNW	3.5 mph	-	N/A		Clear
7-Aug-15	5:51 AM	63.0 °F	55.0 °F	75%	29.94 in	North	5.8 mph	-	N/A		Partly Cloudy
7-Aug-15	6:51 AM	64.9 °F	55.9 °F	73%	29.95 in	North	4.6 mph	-	N/A		Partly Cloudy
7-Aug-15	7:51 AM	69.1 °F	55.9 °F	63%	29.95 in	NNE	6.9 mph	-	N/A		Scattered Clouds
7-Aug-15	8:51 AM	72.0 °F	55.9 °F	57%	29.96 in	NE	10.4 mph	-	N/A		Mostly Cloudy
7-Aug-15	9:51 AM	75.9 °F	57.0 °F	52%	29.95 in	NE	8.1 mph	-	N/A		Mostly Cloudy
7-Aug-15	10:51 AM	75.9 °F	55.9 °F	50%	29.96 in	Variable	4.6 mph	-	N/A		Scattered Clouds
7-Aug-15	11:51 AM	78.1 °F	55.9 °F	46%	29.94 in	East	9.2 mph	-	N/A		Scattered Clouds
7-Aug-15	12:51 PM	79.0 °F	55.0 °F	44%	29.93 in	ESE	9.2 mph	-	N/A		Mostly Cloudy
7-Aug-15	1:51 PM	80.1 °F	54.0 °F	40%	29.92 in	Variable	4.6 mph	-	N/A		Mostly Cloudy
7-Aug-15	2:51 PM	80.1 °F	54.0 °F	40%	29.91 in	ESE	6.9 mph	-	N/A		Overcast
7-Aug-15	3:51 PM	79.0 °F	54.0 °F	42%	29.91 in	Variable	5.8 mph	-	N/A		Mostly Cloudy
7-Aug-15	4:51 PM	78.1 °F	57.0 °F	48%	29.91 in	SE	8.1 mph	-	N/A		Mostly Cloudy
7-Aug-15	5:51 PM	77.0 °F	57.0 °F	50%	29.91 in	ENE	9.2 mph	-	N/A		Mostly Cloudy
7-Aug-15	6:51 PM	75.0 °F	55.0 °F	50%	29.92 in	ENE	10.4 mph	-	N/A		Mostly Cloudy
7-Aug-15	7:51 PM	72.0 °F	55.9 °F	57%	29.93 in	ENE	8.1 mph	-	N/A		Mostly Cloudy
7-Aug-15	8:51 PM	69.1 °F	57.0 °F	65%	29.94 in	NE	6.9 mph	-	N/A		Mostly Cloudy
7-Aug-15	9:51 PM	66.9 °F	57.0 °F	70%	29.95 in	NE	8.1 mph	-	N/A		Scattered Clouds
7-Aug-15	10:51 PM	64.9 °F	59.0 °F	81%	29.95 in	NNE	5.8 mph	-	N/A		Scattered Clouds
7-Aug-15	11:51 PM	64.0 °F	60.1 °F	87%	29.95 in	North	5.8 mph	-	N/A		Scattered Clouds
8-Aug-15	12:51 AM	64.0 °F	60.1 °F	87%	29.94 in	NNE	5.8 mph	-	N/A		Clear
8-Aug-15	1:51 AM	63.0 °F	57.9 °F	84%	29.94 in	NNW	6.9 mph	-	N/A		Clear
8-Aug-15	2:51 AM	62.1 °F	57.0 °F	84%	29.94 in	North	5.8 mph	-	N/A		Clear
8-Aug-15	3:51 AM	62.1 °F	57.9 °F	86%	29.94 in	NNW	5.8 mph	-	N/A		Clear
8-Aug-15	4:51 AM	61.0 °F	57.0 °F	87%	29.95 in	North	6.9 mph	-	N/A		Clear
8-Aug-15	5:51 AM	61.0 °F	55.9 °F	83%	29.97 in	NNW	5.8 mph	-	N/A		Clear
8-Aug-15	6:51 AM	62.1 °F	55.9 °F	80%	29.99 in	North	8.1 mph	-	N/A		Clear
8-Aug-15	7:51 AM	66.9 °F	55.0 °F	66%	29.99 in	North	9.2 mph	-	N/A		Partly Cloudy
8-Aug-15	8:51 AM	70.0 °F	55.0 °F	59%	29.99 in	NNE	10.4 mph	-	N/A		Scattered Clouds
8-Aug-15	9:51 AM	73.9 °F	55.0 °F	52%	29.99 in	NNE	12.7 mph	-	N/A		Scattered Clouds
8-Aug-15	10:51 AM	77.0 °F	55.9 °F	48%	29.99 in	ENE	12.7 mph	-	N/A		Mostly Cloudy
8-Aug-15	11:51 AM	78.1 °F	55.0 °F	45%	29.99 in	NE	11.5 mph	17.3 mph	N/A		Mostly Cloudy
8-Aug-15	12:51 PM	79.0 °F	54.0 °F	42%	29.99 in	NE	10.4 mph	17.3 mph	N/A		Mostly Cloudy
8-Aug-15	1:51 PM	80.1 °F	53.1 °F	39%	29.98 in	NE	11.5 mph	18.4 mph	N/A		Mostly Cloudy

Date	Time (EDT)	Temp.	Dew Point	Humidity	Pressure	Wind Dir	Wind Speed	Gust	Precip	Events	Conditions
8-Aug-15	2:51 PM	80.1 °F	54.0 °F	40%	29.98 in	ENE	10.4 mph	-	N/A		Mostly Cloudy
8-Aug-15	3:51 PM	78.1 °F	54.0 °F	43%	29.98 in	NE	6.9 mph	-	N/A		Mostly Cloudy
8-Aug-15	4:51 PM	78.1 °F	53.1 °F	42%	29.97 in	East	5.8 mph	-	N/A		Overcast
8-Aug-15	5:51 PM	77.0 °F	54.0 °F	45%	29.97 in	ENE	11.5 mph	-	N/A		Overcast
8-Aug-15	6:51 PM	73.9 °F	52.0 °F	46%	29.98 in	East	10.4 mph	-	N/A		Mostly Cloudy
8-Aug-15	7:51 PM	72.0 °F	52.0 °F	49%	29.98 in	East	6.9 mph	-	N/A		Overcast
8-Aug-15	8:51 PM	71.1 °F	53.1 °F	53%	30.00 in	ENE	5.8 mph	-	N/A		Mostly Cloudy
8-Aug-15	9:51 PM	68.0 °F	54.0 °F	61%	30.01 in	NE	4.6 mph	-	N/A		Mostly Cloudy
8-Aug-15	10:51 PM	66.9 °F	55.0 °F	66%	30.01 in	NNE	4.6 mph	-	N/A		Mostly Cloudy
8-Aug-15	11:51 PM	64.9 °F	55.9 °F	73%	30.01 in	NNE	3.5 mph	-	N/A		Overcast
9-Aug-15	12:51 AM	64.9 °F	57.9 °F	78%	30.01 in	NNE	4.6 mph	-	N/A		Clear
9-Aug-15	1:51 AM	64.0 °F	57.0 °F	78%	30.00 in	NNE	5.8 mph	-	N/A		Clear
9-Aug-15	2:51 AM	64.0 °F	57.9 °F	80%	29.99 in	North	6.9 mph	-	N/A		Clear
9-Aug-15	3:51 AM	62.1 °F	57.0 °F	84%	29.99 in	North	5.8 mph	-	N/A		Clear
9-Aug-15	4:51 AM	62.1 °F	57.0 °F	84%	29.98 in	North	6.9 mph	-	N/A		Clear
9-Aug-15	5:51 AM	62.1 °F	57.0 °F	84%	29.98 in	North	9.2 mph	-	N/A		Partly Cloudy
9-Aug-15	6:51 AM	63.0 °F	57.0 °F	81%	29.99 in	North	10.4 mph	-	N/A		Scattered Clouds
9-Aug-15	7:51 AM	66.0 °F	55.9 °F	70%	30.00 in	NNE	10.4 mph	23.0 mph	N/A		Mostly Cloudy
9-Aug-15	8:51 AM	69.1 °F	57.0 °F	65%	30.01 in	NNE	12.7 mph	-	N/A		Scattered Clouds
9-Aug-15	9:51 AM	69.1 °F	60.1 °F	73%	30.01 in	NNE	13.8 mph	-	N/A		Mostly Cloudy
9-Aug-15	10:51 AM	69.1 °F	61.0 °F	75%	30.02 in	NNE	17.3 mph	24.2 mph	N/A		Overcast
9-Aug-15	11:51 AM	71.1 °F	62.1 °F	73%	30.01 in	NNE	15.0 mph	23.0 mph	0.00 in		Mostly Cloudy
9-Aug-15	12:51 PM	71.1 °F	60.1 °F	68%	30.01 in	NE	17.3 mph	24.2 mph	N/A		Overcast
9-Aug-15	1:51 PM	73.9 °F	60.1 °F	62%	30.03 in	NE	16.1 mph	24.2 mph	N/A		Mostly Cloudy
9-Aug-15	2:51 PM	75.0 °F	57.9 °F	55%	30.02 in	NNE	17.3 mph	24.2 mph	N/A		Mostly Cloudy
9-Aug-15	3:51 PM	75.0 °F	57.9 °F	55%	30.02 in	NNE	18.4 mph	25.3 mph	N/A		Partly Cloudy
9-Aug-15	4:51 PM	73.9 °F	57.9 °F	57%	30.03 in	NNE	17.3 mph	-	N/A		Partly Cloudy
9-Aug-15	5:51 PM	73.0 °F	57.9 °F	59%	30.02 in	NE	17.3 mph	-	N/A		Partly Cloudy
9-Aug-15	6:51 PM	71.1 °F	55.9 °F	59%	30.03 in	NNE	13.8 mph	-	N/A		Partly Cloudy
9-Aug-15	7:51 PM	66.9 °F	55.9 °F	68%	30.05 in	NE	8.1 mph	-	N/A		Partly Cloudy
9-Aug-15	8:51 PM	66.0 °F	55.9 °F	70%	30.06 in	ENE	5.8 mph	-	N/A		Partly Cloudy
9-Aug-15	9:51 PM	64.0 °F	55.9 °F	75%	30.06 in	ENE	4.6 mph	-	N/A		Clear
9-Aug-15	10:51 PM	63.0 °F	55.9 °F	78%	30.05 in	NE	3.5 mph	-	N/A		Clear
9-Aug-15	11:51 PM	62.1 °F	55.9 °F	80%	30.05 in	West	3.5 mph	-	N/A		Clear
10-Aug-15	12:51 AM	60.1 °F	55.9 °F	86%	30.06 in	WNW	4.6 mph	-	N/A		Clear
10-Aug-15	1:51 AM	59.0 °F	55.9 °F	90%	30.06 in	West	4.6 mph	-	N/A		Clear

Date	*Time (EDT)*	*Temp.*	*Dew Point*	*Humidity*	*Pressure*	*Wind Dir*	*Wind Speed*	*Gust*	*Precip*	*Events*	*Conditions*
10-Aug-15	2:51 AM	60.1 °F	55.9 °F	86%	30.05 in	Calm	Calm	-	N/A		Clear
10-Aug-15	3:51 AM	59.0 °F	55.9 °F	90%	30.05 in	Calm	Calm	-	N/A		Clear
10-Aug-15	4:51 AM	57.9 °F	55.0 °F	90%	30.06 in	Calm	Calm	-	N/A		Clear
10-Aug-15	5:51 AM	57.9 °F	55.0 °F	90%	30.07 in	West	5.8 mph	-	N/A		Partly Cloudy
10-Aug-15	6:51 AM	61.0 °F	55.9 °F	83%	30.07 in	WSW	3.5 mph	-	N/A		Scattered Clouds
10-Aug-15	7:51 AM	66.0 °F	55.9 °F	70%	30.08 in	West	6.9 mph	-	N/A		Mostly Cloudy
10-Aug-15	8:51 AM	70.0 °F	57.9 °F	65%	30.08 in	Variable	3.5 mph	-	N/A		Mostly Cloudy
10-Aug-15	9:51 AM	73.9 °F	57.0 °F	55%	30.08 in	SSW	4.6 mph	-	N/A		Mostly Cloudy
10-Aug-15	10:51 AM	75.9 °F	57.0 °F	52%	30.07 in	Variable	5.8 mph	-	N/A		Mostly Cloudy
10-Aug-15	11:51 AM	77.0 °F	60.1 °F	56%	30.06 in	SSE	9.2 mph	-	N/A		Mostly Cloudy
10-Aug-15	12:51 PM	77.0 °F	59.0 °F	54%	30.05 in	SE	17.3 mph	-	N/A		Mostly Cloudy
10-Aug-15	1:51 PM	77.0 °F	59.0 °F	54%	30.04 in	SSE	18.4 mph	-	N/A		Mostly Cloudy
10-Aug-15	2:51 PM	78.1 °F	60.1 °F	54%	30.04 in	SSE	17.3 mph	-	N/A		Mostly Cloudy
10-Aug-15	3:51 PM	79.0 °F	59.0 °F	50%	30.04 in	South	12.7 mph	-	N/A		Scattered Clouds
10-Aug-15	4:51 PM	77.0 °F	57.9 °F	52%	30.04 in	SSW	12.7 mph	20.7 mph	N/A		Partly Cloudy
10-Aug-15	5:51 PM	75.9 °F	60.1 °F	58%	30.03 in	South	13.8 mph	-	N/A		Partly Cloudy
10-Aug-15	6:51 PM	73.0 °F	60.1 °F	64%	30.03 in	South	12.7 mph	-	N/A		Scattered Clouds
10-Aug-15	7:51 PM	70.0 °F	59.0 °F	68%	30.03 in	South	9.2 mph	-	N/A		Mostly Cloudy
10-Aug-15	8:51 PM	69.1 °F	61.0 °F	75%	30.04 in	South	8.1 mph	-	N/A		Mostly Cloudy
10-Aug-15	9:51 PM	66.9 °F	62.1 °F	84%	30.05 in	SSW	6.9 mph	-	N/A		Mostly Cloudy
10-Aug-15	10:51 PM	66.9 °F	63.0 °F	87%	30.04 in	South	6.9 mph	-	N/A		Mostly Cloudy
10-Aug-15	11:51 PM	68.0 °F	64.0 °F	87%	30.03 in	South	9.2 mph	-	N/A		Overcast

Yellow Highlight - indicates weather conditions less than ideal for bat surveys (i.e. sustained winds during the first 5 hours of survey, precipitation during the first 5 hours of survey, temperatures below 50˚F).

*Source:
US Dept of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
1325 East West Highway
Silver Spring, MD 20910
Page Author: NWS Internet Services Team
Providence, Theodore Francis Green State Airport, RI
(KPVD) 41.72249N 71.43247W

Hourly Weather Data - Personal Weather Station EMA Burrillville, RI KRIHARRI2

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
31-Jul	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:02 AM	71.8 °F	70.6 °F	96 %	West	0 mph	0 mph	29.81 in	0 in	0 in
12:42 AM	70.8 °F	69.9 °F	97 %	NNW	0 mph	0 mph	29.81 in	0 in	0 in
1:22 AM	70.5 °F	69.6 °F	97 %	North	0 mph	1 mph	29.81 in	0 in	0 in
2:07 AM	69.9 °F	69 °F	97 %	ENE	0 mph	0 mph	29.8 in	0 in	0 in
2:47 AM	69.3 °F	68.4 °F	97 %	ENE	0 mph	0 mph	29.8 in	0 in	0 in
3:32 AM	68.8 °F	67.9 °F	97 %	ENE	0 mph	0 mph	29.79 in	0 in	0 in
4:12 AM	68.5 °F	67.9 °F	98 %	ENE	0 mph	0 mph	29.79 in	0 in	0 in
4:52 AM	67.8 °F	66.9 °F	97 %	ENE	0 mph	0 mph	29.79 in	0 in	0 in
5:32 AM	67 °F	66.4 °F	98 %	ENE	0 mph	0 mph	29.8 in	0 in	0 in
6:12 AM	66.7 °F	66.1 °F	98 %	ENE	0 mph	0 mph	29.81 in	0 in	0 in
6:52 AM	67.7 °F	67.1 °F	98 %	ENE	0 mph	0 mph	29.82 in	0 in	0 in
7:32 AM	69.9 °F	68.7 °F	96 %	SSW	0 mph	1 mph	29.83 in	0 in	0 in
8:12 AM	72.9 °F	68.5 °F	86 %	SW	1 mph	3 mph	29.83 in	0 in	0 in
8:52 AM	74.9 °F	67.9 °F	79 %	SW	1 mph	2 mph	29.83 in	0 in	0 in
9:32 AM	76.8 °F	67.9 °F	74 %	ENE	1 mph	6 mph	29.83 in	0 in	0 in
10:12 AM	79 °F	67.1 °F	67 %	ESE	5 mph	5 mph	29.82 in	0 in	0 in
10:52 AM	80.8 °F	65.6 °F	60 %	South	1 mph	8 mph	29.83 in	0 in	0 in
11:32 AM	82.9 °F	63.5 °F	52 %	WNW	2 mph	8 mph	29.82 in	0 in	0 in
12:12 PM	83.2 °F	63.2 °F	51 %	SW	3 mph	9 mph	29.81 in	0 in	0 in
12:52 PM	83.9 °F	62.1 °F	48 %	ESE	2 mph	13 mph	29.8 in	0 in	0 in
1:32 PM	84.9 °F	62.4 °F	47 %	North	3 mph	7 mph	29.79 in	0 in	0 in
2:12 PM	84.8 °F	59.2 °F	42 %	WSW	2 mph	12 mph	29.78 in	0 in	0 in
2:52 PM	85.2 °F	58.8 °F	41 %	WSW	2 mph	12 mph	29.78 in	0 in	0 in
3:32 PM	86.1 °F	58.2 °F	39 %	WSW	4 mph	10 mph	29.77 in	0 in	0 in
4:12 PM	85.6 °F	57.1 °F	38 %	SW	3 mph	8 mph	29.77 in	0 in	0 in
4:57 PM	84.9 °F	57.2 °F	39 %	West	2 mph	6 mph	29.77 in	0 in	0 in
5:37 PM	85.6 °F	59.2 °F	41 %	NNE	3 mph	5 mph	29.77 in	0 in	0 in
6:17 PM	82.8 °F	58 °F	43 %	NNW	5 mph	5 mph	29.77 in	0 in	0 in
6:57 PM	79.7 °F	58.3 °F	48 %	ESE	0 mph	2 mph	29.78 in	0 in	0 in
7:37 PM	75.2 °F	60.8 °F	61 %	ESE	0 mph	1 mph	29.78 in	0 in	0 in
8:17 PM	71.2 °F	61.7 °F	72 %	ESE	0 mph	0 mph	29.79 in	0 in	0 in
8:57 PM	67.8 °F	61 °F	79 %	ESE	0 mph	0 mph	29.8 in	0 in	0 in
9:37 PM	65.4 °F	61.1 °F	86 %	South	0 mph	0 mph	29.81 in	0 in	0 in
10:17 PM	63.3 °F	60.3 °F	90 %	South	0 mph	0 mph	29.82 in	0 in	0 in
10:57 PM	61.9 °F	59.9 °F	93 %	South	0 mph	0 mph	29.81 in	0 in	0 in
11:37 PM	61.6 °F	59.9 °F	94 %	South	0 mph	0 mph	29.82 in	0 in	0 in
1-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:17 AM	60.8 °F	59.4 °F	95 %	South	0 mph	0 mph	29.82 in	0 in	0 in
12:57 AM	60.4 °F	58.7 °F	94 %	SW	0 mph	0 mph	29.82 in	0 in	0 in
1:37 AM	59.7 °F	58.3 °F	95 %	SW	0 mph	0 mph	29.81 in	0 in	0 in
2:18 AM	59 °F	57.6 °F	95 %	SW	0 mph	0 mph	29.79 in	0 in	0 in
2:58 AM	58.5 °F	57.4 °F	96 %	SW	0 mph	0 mph	29.78 in	0 in	0 in
3:38 AM	58.1 °F	57 °F	96 %	SW	0 mph	0 mph	29.77 in	0 in	0 in
4:18 AM	58 °F	57.2 °F	97 %	SW	0 mph	0 mph	29.76 in	0 in	0 in
4:58 AM	58 °F	57.2 °F	97 %	SW	0 mph	0 mph	29.76 in	0 in	0 in
5:38 AM	58.3 °F	57.2 °F	96 %	SW	0 mph	0 mph	29.76 in	0 in	0 in
6:18 AM	59.3 °F	57.9 °F	95 %	SW	0 mph	0 mph	29.76 in	0 in	0 in
6:58 AM	61.6 °F	59.9 °F	94 %	SW	0 mph	0 mph	29.77 in	0 in	0 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
7:39 AM	70.4 °F	64.3 °F	81 %	SW	0 mph	0 mph	29.76 in	0 in	0 in
8:19 AM	73.9 °F	64.3 °F	72 %	East	0 mph	5 mph	29.77 in	0 in	0 in
8:59 AM	76.8 °F	63.7 °F	64 %	East	0 mph	3 mph	29.77 in	0 in	0 in
9:39 AM	79.6 °F	65 °F	61 %	SW	1 mph	5 mph	29.77 in	0 in	0 in
10:19 AM	81 °F	64.8 °F	58 %	West	0 mph	5 mph	29.77 in	0 in	0 in
10:59 AM	82.5 °F	65.2 °F	56 %	West	1 mph	6 mph	29.76 in	0 in	0 in
11:39 AM	84.3 °F	64.8 °F	52 %	SW	3 mph	6 mph	29.76 in	0 in	0 in
12:19 PM	84.8 °F	65.2 °F	52 %	SW	3 mph	8 mph	29.76 in	0 in	0 in
12:59 PM	84.6 °F	63.3 °F	49 %	SSE	1 mph	10 mph	29.76 in	0 in	0 in
1:39 PM	84.5 °F	64.4 °F	51 %	SSE	2 mph	8 mph	29.75 in	0 in	0 in
2:19 PM	85.6 °F	63.1 °F	47 %	SW	0 mph	8 mph	29.73 in	0 in	0 in
2:59 PM	86.6 °F	61.4 °F	43 %	WNW	0 mph	8 mph	29.73 in	0 in	0 in
3:39 PM	86.3 °F	59.8 °F	41 %	NNW	6 mph	12 mph	29.72 in	0 in	0 in
4:19 PM	80.1 °F	60.9 °F	52 %	NW	1 mph	15 mph	29.75 in	0 in	0 in
4:59 PM	81.2 °F	61.4 °F	51 %	NNW	3 mph	14 mph	29.74 in	0 in	0 in
5:39 PM	80.8 °F	59.9 °F	49 %	NW	2 mph	4 mph	29.74 in	0 in	0 in
6:19 PM	79.5 °F	60.3 °F	52 %	North	0 mph	3 mph	29.75 in	0 in	0 in
6:59 PM	78 °F	61 °F	56 %	WSW	1 mph	3 mph	29.76 in	0 in	0 in
7:39 PM	75.6 °F	63 °F	65 %	South	0 mph	0 mph	29.77 in	0 in	0 in
8:24 PM	70.8 °F	62.9 °F	76 %	South	0 mph	0 mph	29.79 in	0 in	0 in
9:04 PM	68.6 °F	63.2 °F	83 %	South	0 mph	0 mph	29.8 in	0 in	0 in
9:44 PM	66.4 °F	62.4 °F	87 %	South	0 mph	0 mph	29.81 in	0 in	0 in
10:24 PM	65.9 °F	62.6 °F	89 %	South	0 mph	0 mph	29.82 in	0 in	0 in
11:04 PM	65 °F	62.3 °F	91 %	WSW	0 mph	0 mph	29.83 in	0 in	0 in
11:45 PM	64.1 °F	61.7 °F	92 %	WSW	0 mph	0 mph	29.84 in	0 in	0 in
2-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:25 AM	63.3 °F	61.5 °F	94 %	WSW	0 mph	0 mph	29.84 in	0 in	0 in
1:05 AM	62.1 °F	60.4 °F	94 %	WNW	0 mph	1 mph	29.84 in	0 in	0 in
1:45 AM	61.3 °F	59.9 °F	95 %	West	0 mph	1 mph	29.85 in	0 in	0 in
2:25 AM	60.9 °F	59.2 °F	94 %	West	0 mph	1 mph	29.85 in	0 in	0 in
3:05 AM	60 °F	58.9 °F	96 %	West	0 mph	0 mph	29.85 in	0 in	0 in
3:45 AM	59.4 °F	58.3 °F	96 %	West	0 mph	1 mph	29.85 in	0 in	0 in
4:25 AM	58.3 °F	56.9 °F	95 %	West	0 mph	1 mph	29.85 in	0 in	0 in
5:05 AM	57.3 °F	56.2 °F	96 %	West	0 mph	1 mph	29.85 in	0 in	0 in
5:45 AM	57.3 °F	55.9 °F	95 %	West	0 mph	1 mph	29.86 in	0 in	0 in
6:26 AM	57.6 °F	56.2 °F	95 %	West	0 mph	1 mph	29.87 in	0 in	0 in
7:06 AM	59.9 °F	57.9 °F	93 %	West	0 mph	0 mph	29.89 in	0 in	0 in
7:46 AM	68 °F	60.5 °F	77 %	WSW	0 mph	1 mph	29.9 in	0 in	0 in
8:26 AM	71.1 °F	60 °F	68 %	SW	0 mph	2 mph	29.9 in	0 in	0 in
9:06 AM	74.9 °F	59.1 °F	58 %	WSW	3 mph	4 mph	29.91 in	0 in	0 in
9:46 AM	77.6 °F	58.6 °F	52 %	SSW	1 mph	4 mph	29.91 in	0 in	0 in
10:26 AM	78.1 °F	57.4 °F	49 %	WSW	2 mph	9 mph	29.91 in	0 in	0 in
11:06 AM	80.7 °F	59.2 °F	48 %	SSW	1 mph	5 mph	29.92 in	0 in	0 in
11:46 AM	81.5 °F	56.2 °F	42 %	WSW	1 mph	8 mph	29.92 in	0 in	0 in
12:26 PM	83 °F	56.2 °F	40 %	SW	4 mph	7 mph	29.91 in	0 in	0 in
1:06 PM	83 °F	57.5 °F	42 %	SW	5 mph	10 mph	29.91 in	0 in	0 in
1:46 PM	83.2 °F	57.1 °F	41 %	ESE	1 mph	12 mph	29.9 in	0 in	0 in
2:26 PM	84.3 °F	57.3 °F	40 %	WNW	3 mph	7 mph	29.89 in	0 in	0 in
3:06 PM	84.7 °F	57 °F	39 %	SW	4 mph	11 mph	29.88 in	0 in	0 in
3:46 PM	85.3 °F	56.8 °F	38 %	NW	4 mph	8 mph	29.89 in	0 in	0 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
4:26 PM	84.7 °F	59.1 °F	42 %	SSW	1 mph	7 mph	29.89 in	0 in	0 in
5:06 PM	82.6 °F	57.8 °F	43 %	SSW	2 mph	10 mph	29.89 in	0 in	0 in
5:46 PM	81.7 °F	59.5 °F	47 %	West	1 mph	6 mph	29.89 in	0 in	0 in
6:26 PM	80.5 °F	60.7 °F	51 %	SW	1 mph	5 mph	29.88 in	0 in	0 in
7:06 PM	78.1 °F	61.1 °F	56 %	WSW	2 mph	6 mph	29.87 in	0 in	0 in
7:46 PM	75.3 °F	60.5 °F	60 %	West	1 mph	2 mph	29.88 in	0 in	0 in
8:26 PM	72.5 °F	60.9 °F	67 %	SW	0 mph	1 mph	29.89 in	0 in	0 in
9:06 PM	71.1 °F	61.2 °F	71 %	WSW	0 mph	3 mph	29.91 in	0 in	0 in
10:22 PM	68.2 °F	62.1 °F	81 %	WSW	0 mph	1 mph	29.89 in	0 in	0 in
11:02 PM	67.2 °F	63.2 °F	87 %	SW	0 mph	1 mph	29.87 in	0 in	0 in
11:42 PM	68.3 °F	65.3 °F	90 %	SW	0 mph	8 mph	29.88 in	0 in	0 in
3-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:22 AM	68.2 °F	65.2 °F	90 %	WSW	0 mph	5 mph	29.88 in	0 in	0 in
1:02 AM	67.8 °F	64.8 °F	90 %	SW	0 mph	2 mph	29.87 in	0 in	0 in
1:42 AM	66.6 °F	64.5 °F	93 %	SW	0 mph	1 mph	29.86 in	0 in	0 in
2:22 AM	66.6 °F	64.8 °F	94 %	WSW	0 mph	2 mph	29.85 in	0 in	0 in
3:02 AM	65.8 °F	63.7 °F	93 %	WSW	0 mph	1 mph	29.85 in	0 in	0 in
3:42 AM	64.5 °F	63 °F	95 %	WSW	0 mph	0 mph	29.85 in	0 in	0 in
4:22 AM	63.9 °F	62.7 °F	96 %	WSW	0 mph	0 mph	29.84 in	0 in	0 in
5:07 AM	63.9 °F	62.7 °F	96 %	WSW	0 mph	1 mph	29.85 in	0 in	0 in
5:47 AM	63.4 °F	62.2 °F	96 %	NW	0 mph	0 mph	29.85 in	0 in	0 in
6:27 AM	64.7 °F	63.8 °F	97 %	NW	0 mph	1 mph	29.85 in	0 in	0 in
7:07 AM	67.1 °F	65.9 °F	96 %	WNW	0 mph	4 mph	29.85 in	0 in	0 in
7:47 AM	71.7 °F	68 °F	88 %	WSW	1 mph	2 mph	29.86 in	0 in	0 in
8:27 AM	74.7 °F	67 °F	77 %	West	3 mph	5 mph	29.86 in	0 in	0 in
9:07 AM	78 °F	66.6 °F	68 %	West	1 mph	4 mph	29.85 in	0 in	0 in
9:47 AM	80.6 °F	65.4 °F	60 %	WSW	3 mph	7 mph	29.85 in	0 in	0 in
10:27 AM	83.1 °F	66.3 °F	57 %	NNW	3 mph	5 mph	29.85 in	0 in	0 in
11:07 AM	83.4 °F	65.5 °F	55 %	South	2 mph	11 mph	29.84 in	0 in	0 in
11:47 AM	84.6 °F	67.7 °F	57 %	West	1 mph	11 mph	29.84 in	0 in	0 in
12:27 PM	84.8 °F	65.8 °F	53 %	SSW	0 mph	12 mph	29.83 in	0 in	0 in
1:07 PM	87.2 °F	63.9 °F	46 %	SE	1 mph	9 mph	29.82 in	0 in	0 in
1:47 PM	86.8 °F	64.2 °F	47 %	WSW	2 mph	12 mph	29.81 in	0 in	0 in
2:27 PM	86.9 °F	61.7 °F	43 %	North	7 mph	14 mph	29.79 in	0 in	0 in
3:07 PM	88.2 °F	62.2 °F	42 %	SSW	1 mph	7 mph	29.79 in	0 in	0 in
3:47 PM	87.9 °F	62.6 °F	43 %	SW	3 mph	8 mph	29.77 in	0 in	0 in
4:27 PM	85.9 °F	65.1 °F	50 %	SW	2 mph	12 mph	29.78 in	0 in	0 in
5:07 PM	84.8 °F	63.5 °F	49 %	WNW	4 mph	13 mph	29.77 in	0 in	0 in
5:47 PM	82.8 °F	63.4 °F	52 %	NNE	2 mph	15 mph	29.77 in	0 in	0 in
6:27 PM	80.7 °F	65.5 °F	60 %	SW	5 mph	10 mph	29.77 in	0 in	0 in
7:07 PM	78.3 °F	65.6 °F	65 %	SSW	3 mph	8 mph	29.77 in	0 in	0 in
7:47 PM	76.6 °F	66.5 °F	71 %	SSW	0 mph	8 mph	29.78 in	0 in	0 in
8:27 PM	75.4 °F	67.3 °F	76 %	WSW	2 mph	7 mph	29.8 in	0 in	0 in
9:07 PM	74.5 °F	67.9 °F	80 %	WSW	4 mph	4 mph	29.8 in	0 in	0 in
9:47 PM	74.1 °F	68.3 °F	82 %	West	0 mph	8 mph	29.81 in	0 in	0 in
10:27 PM	73.9 °F	68.8 °F	84 %	SW	0 mph	7 mph	29.82 in	0 in	0 in
11:07 PM	73.3 °F	68.5 °F	85 %	WSW	0 mph	6 mph	29.81 in	0 in	0 in
11:47 PM	72.7 °F	68.9 °F	88 %	WSW	3 mph	8 mph	29.81 in	0 in	0 in
3-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:02 AM	68.2 °F	65.2 °F	90 %	SW	0 mph	4 mph	29.87 in	0 in	0 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
12:37 AM	68.1 °F	65.1 °F	90 %	WSW	0 mph	4 mph	29.87 in	0 in	0 in
1:12 AM	67.5 °F	64.8 °F	91 %	SW	0 mph	1 mph	29.87 in	0 in	0 in
1:47 AM	66.5 °F	64.4 °F	93 %	SW	0 mph	1 mph	29.86 in	0 in	0 in
2:22 AM	66.6 °F	64.8 °F	94 %	WSW	0 mph	2 mph	29.85 in	0 in	0 in
2:57 AM	66.3 °F	64.2 °F	93 %	WSW	0 mph	1 mph	29.85 in	0 in	0 in
3:32 AM	64.6 °F	63.1 °F	95 %	WSW	0 mph	0 mph	29.85 in	0 in	0 in
4:07 AM	64.1 °F	62.9 °F	96 %	WSW	0 mph	0 mph	29.85 in	0 in	0 in
4:47 AM	63.7 °F	62.5 °F	96 %	WSW	0 mph	1 mph	29.84 in	0 in	0 in
5:22 AM	63.6 °F	62.4 °F	96 %	WSW	0 mph	1 mph	29.85 in	0 in	0 in
5:57 AM	63.5 °F	62.6 °F	97 %	North	0 mph	1 mph	29.85 in	0 in	0 in
6:32 AM	65.2 °F	64.3 °F	97 %	WSW	3 mph	3 mph	29.86 in	0 in	0 in
7:07 AM	67.1 °F	65.9 °F	96 %	WNW	0 mph	4 mph	29.85 in	0 in	0 in
7:42 AM	71.4 °F	67.7 °F	88 %	SW	1 mph	1 mph	29.86 in	0 in	0 in
8:17 AM	73.9 °F	67 °F	79 %	SW	1 mph	6 mph	29.86 in	0 in	0 in
8:52 AM	76.8 °F	66.7 °F	71 %	ENE	0 mph	9 mph	29.86 in	0 in	0 in
9:27 AM	79.2 °F	65.5 °F	63 %	SW	2 mph	9 mph	29.85 in	0 in	0 in
10:02 AM	81.5 °F	65.8 °F	59 %	SSW	0 mph	5 mph	29.85 in	0 in	0 in
10:37 AM	82.9 °F	65.1 °F	55 %	WSW	2 mph	7 mph	29.85 in	0 in	0 in
11:12 AM	83.4 °F	65 °F	54 %	WSW	3 mph	11 mph	29.84 in	0 in	0 in
11:47 AM	84.6 °F	67.7 °F	57 %	West	1 mph	11 mph	29.84 in	0 in	0 in
12:22 PM	84.4 °F	64.9 °F	52 %	SW	1 mph	12 mph	29.83 in	0 in	0 in
12:57 PM	86.4 °F	63.8 °F	47 %	SE	2 mph	11 mph	29.82 in	0 in	0 in
1:32 PM	86.3 °F	62.5 °F	45 %	SW	5 mph	13 mph	29.82 in	0 in	0 in
2:07 PM	86.4 °F	62.5 °F	45 %	SSW	0 mph	12 mph	29.8 in	0 in	0 in
2:42 PM	87.9 °F	62.6 °F	43 %	SSE	4 mph	7 mph	29.79 in	0 in	0 in
3:17 PM	88 °F	61.3 °F	41 %	SSW	3 mph	10 mph	29.78 in	0 in	0 in
3:52 PM	88.1 °F	62.8 °F	43 %	WNW	1 mph	8 mph	29.77 in	0 in	0 in
4:27 PM	85.9 °F	65.1 °F	50 %	SW	2 mph	12 mph	29.78 in	0 in	0 in
5:02 PM	84.6 °F	64.5 °F	51 %	NE	3 mph	13 mph	29.77 in	0 in	0 in
5:37 PM	84.2 °F	63 °F	49 %	SW	10 mph	11 mph	29.78 in	0 in	0 in
6:12 PM	81.7 °F	64.5 °F	56 %	SW	4 mph	9 mph	29.77 in	0 in	0 in
6:47 PM	79.4 °F	65.2 °F	62 %	WSW	2 mph	9 mph	29.77 in	0 in	0 in
7:22 PM	77.6 °F	65.8 °F	67 %	SW	2 mph	10 mph	29.77 in	0 in	0 in
7:57 PM	76.2 °F	66.9 °F	73 %	ESE	2 mph	4 mph	29.78 in	0 in	0 in
8:32 PM	75.3 °F	67.2 °F	76 %	West	2 mph	6 mph	29.8 in	0 in	0 in
9:07 PM	74.5 °F	67.9 °F	80 %	WSW	4 mph	4 mph	29.8 in	0 in	0 in
9:42 PM	74.1 °F	68.3 °F	82 %	WSW	4 mph	8 mph	29.81 in	0 in	0 in
10:17 PM	73.9 °F	68.4 °F	83 %	SW	4 mph	8 mph	29.81 in	0 in	0 in
10:52 PM	73.6 °F	68.8 °F	85 %	WSW	1 mph	6 mph	29.81 in	0 in	0 in
11:27 PM	73.1 °F	69 °F	87 %	SW	2 mph	5 mph	29.82 in	0 in	0 in
4-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:02 AM	72.5 °F	69.1 °F	89 %	North	0 mph	4 mph	29.81 in	0 in	0 in
12:37 AM	72.2 °F	69.4 °F	91 %	West	0 mph	4 mph	29.81 in	0 in	0 in
1:12 AM	72.4 °F	69.9 °F	92 %	SSE	0 mph	5 mph	29.81 in	0 in	0 in
1:47 AM	72.5 °F	70 °F	92 %	East	0 mph	6 mph	29.82 in	0 in	0 in
2:22 AM	72.8 °F	70.3 °F	92 %	West	0 mph	4 mph	29.82 in	0 in	0 in
2:57 AM	73.4 °F	70.6 °F	91 %	SW	0 mph	5 mph	29.82 in	0 in	0 in
3:32 AM	72.3 °F	70.2 °F	93 %	East	0 mph	1 mph	29.82 in	0 in	0 in
4:07 AM	72.1 °F	70 °F	93 %	NNW	0 mph	1 mph	29.82 in	0 in	0 in
4:42 AM	72.7 °F	70.2 °F	92 %	SSW	1 mph	7 mph	29.83 in	0.13 in	0.13 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
5:17 AM	69.7 °F	67.9 °F	94 %	SSE	0 mph	0 mph	29.83 in	0.19 in	0.19 in
5:52 AM	69.5 °F	68.3 °F	96 %	NE	0 mph	1 mph	29.83 in	0.1 in	0.25 in
6:27 AM	69.9 °F	69 °F	97 %	WSW	0 mph	2 mph	29.84 in	0.12 in	0.31 in
7:02 AM	69.3 °F	67.8 °F	95 %	WNW	1 mph	4 mph	29.8 in	0.04 in	0.33 in
7:37 AM	67.9 °F	66.4 °F	95 %	WNW	0 mph	4 mph	29.85 in	0 in	0.33 in
8:12 AM	67.9 °F	66.4 °F	95 %	SW	0 mph	3 mph	29.84 in	0 in	0.33 in
8:47 AM	72.8 °F	69.7 °F	90 %	SW	0 mph	2 mph	29.84 in	0 in	0.33 in
9:22 AM	76 °F	71.8 °F	87 %	SSW	0 mph	3 mph	29.85 in	0 in	0.33 in
9:57 AM	76.1 °F	70.6 °F	83 %	WNW	3 mph	6 mph	29.85 in	0 in	0.33 in
10:32 AM	78.5 °F	72.2 °F	81 %	NW	1 mph	7 mph	29.84 in	0 in	0.33 in
11:07 AM	80.3 °F	69.2 °F	69 %	SW	2 mph	5 mph	29.84 in	0 in	0.33 in
11:42 AM	82 °F	68.6 °F	64 %	West	3 mph	7 mph	29.83 in	0 in	0.33 in
12:17 PM	82.2 °F	69.3 °F	65 %	WSW	1 mph	9 mph	29.83 in	0 in	0.33 in
12:52 PM	83.9 °F	68.5 °F	60 %	SW	4 mph	9 mph	29.83 in	0 in	0.33 in
1:27 PM	84.3 °F	69.4 °F	61 %	SSW	2 mph	8 mph	29.81 in	0 in	0.33 in
2:02 PM	84.8 °F	68.9 °F	59 %	SW	0 mph	8 mph	29.8 in	0 in	0.33 in
2:37 PM	85.8 °F	66.7 °F	53 %	WSW	1 mph	10 mph	29.79 in	0 in	0.33 in
3:12 PM	85.6 °F	66.5 °F	53 %	WSW	7 mph	14 mph	29.78 in	0 in	0.33 in
3:47 PM	85.6 °F	68.1 °F	56 %	South	1 mph	12 mph	29.79 in	0 in	0.33 in
4:22 PM	85.7 °F	67.7 °F	55 %	WNW	3 mph	9 mph	29.79 in	0 in	0.33 in
4:57 PM	78.7 °F	64.1 °F	61 %	SE	1 mph	9 mph	29.8 in	0 in	0.33 in
5:32 PM	75.7 °F	63.5 °F	66 %	East	0 mph	3 mph	29.82 in	0 in	0.33 in
6:07 PM	74.6 °F	65.4 °F	73 %	East	1 mph	2 mph	29.83 in	0 in	0.33 in
6:42 PM	72.1 °F	67.3 °F	85 %	East	0 mph	0 mph	29.83 in	0 in	0.33 in
7:22 PM	71.8 °F	68.4 °F	89 %	SSW	0 mph	0 mph	29.84 in	0 in	0.33 in
7:57 PM	70.6 °F	68.2 °F	92 %	NW	0 mph	0 mph	29.84 in	0 in	0.33 in
8:32 PM	69.9 °F	67.8 °F	93 %	South	0 mph	0 mph	29.86 in	0.04 in	0.37 in
9:08 PM	68.6 °F	67.1 °F	95 %	NW	0 mph	0 mph	29.88 in	0.04 in	0.37 in
9:43 PM	68 °F	66.8 °F	96 %	NW	0 mph	0 mph	29.89 in	0 in	0.37 in
10:19 PM	67.1 °F	65.9 °F	96 %	WNW	0 mph	0 mph	29.89 in	0 in	0.37 in
10:54 PM	66.4 °F	65.2 °F	96 %	WNW	0 mph	0 mph	29.9 in	0 in	0.37 in
11:29 PM	65.4 °F	64.2 °F	96 %	WNW	0 mph	0 mph	29.9 in	0 in	0.37 in
5-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:04 AM	64.4 °F	63.5 °F	97 %	WNW	0 mph	0 mph	29.89 in	0 in	0 in
12:39 AM	63.6 °F	62.7 °F	97 %	WNW	0 mph	0 mph	29.9 in	0 in	0 in
1:14 AM	63.5 °F	62.6 °F	97 %	WNW	0 mph	0 mph	29.9 in	0 in	0 in
1:49 AM	62.6 °F	61.7 °F	97 %	WNW	0 mph	0 mph	29.9 in	0 in	0 in
2:24 AM	62.1 °F	61.2 °F	97 %	WNW	0 mph	0 mph	29.9 in	0 in	0 in
2:59 AM	61.8 °F	60.9 °F	97 %	WNW	0 mph	0 mph	29.9 in	0 in	0 in
3:34 AM	61.2 °F	60.3 °F	97 %	WNW	0 mph	0 mph	29.9 in	0 in	0 in
4:09 AM	60.6 °F	59.7 °F	97 %	WNW	0 mph	0 mph	29.89 in	0 in	0 in
4:44 AM	60.1 °F	59.2 °F	97 %	WNW	0 mph	0 mph	29.89 in	0 in	0 in
5:24 AM	59 °F	58.2 °F	97 %	WNW	0 mph	0 mph	29.89 in	0.01 in	0.01 in
5:59 AM	58.8 °F	58.2 °F	98 %	WNW	0 mph	0 mph	29.88 in	0 in	0.01 in
6:34 AM	58.7 °F	58.1 °F	98 %	West	0 mph	0 mph	29.89 in	0 in	0.01 in
7:09 AM	59.8 °F	59.2 °F	98 %	West	0 mph	0 mph	29.89 in	0 in	0.01 in
7:44 AM	64.7 °F	63.8 °F	97 %	North	0 mph	1 mph	29.89 in	0 in	0.01 in
8:19 AM	70 °F	66.3 °F	88 %	NNW	0 mph	1 mph	29.89 in	0 in	0.01 in
8:54 AM	73.6 °F	67.4 °F	81 %	SW	0 mph	1 mph	29.89 in	0 in	0.01 in
9:29 AM	75.4 °F	65.3 °F	71 %	SSW	0 mph	2 mph	29.88 in	0 in	0.01 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
10:04 AM	76.2 °F	62.2 °F	62 %	NE	0 mph	7 mph	29.88 in	0 in	0.01 in
10:39 AM	79 °F	63.9 °F	60 %	WNW	1 mph	5 mph	29.88 in	0 in	0.01 in
11:14 AM	78.5 °F	61.5 °F	56 %	NW	2 mph	7 mph	29.87 in	0 in	0.01 in
11:49 AM	77.5 °F	61.1 °F	57 %	SSW	3 mph	8 mph	29.87 in	0 in	0.01 in
12:24 PM	79.2 °F	60.6 °F	53 %	WSW	10 mph	11 mph	29.86 in	0 in	0.01 in
12:59 PM	81.3 °F	59.7 °F	48 %	WSW	4 mph	7 mph	29.85 in	0 in	0.01 in
1:34 PM	79.9 °F	59.6 °F	50 %	SSE	1 mph	5 mph	29.84 in	0 in	0.01 in
2:09 PM	82.4 °F	60.7 °F	48 %	SE	4 mph	10 mph	29.83 in	0 in	0.01 in
2:44 PM	83.6 °F	60.6 °F	46 %	WNW	6 mph	11 mph	29.83 in	0 in	0.01 in
3:19 PM	82.5 °F	60.2 °F	47 %	North	4 mph	12 mph	29.82 in	0 in	0.01 in
3:54 PM	82 °F	58.6 °F	45 %	NE	0 mph	10 mph	29.82 in	0 in	0.01 in
4:29 PM	80.3 °F	57 °F	45 %	SW	2 mph	6 mph	29.82 in	0 in	0.01 in
5:04 PM	81.2 °F	57.8 °F	45 %	West	1 mph	5 mph	29.82 in	0 in	0.01 in
5:44 PM	80.6 °F	56 °F	43 %	WSW	1 mph	7 mph	29.82 in	0 in	0.01 in
6:19 PM	78.9 °F	58.1 °F	49 %	NW	0 mph	8 mph	29.83 in	0 in	0.01 in
6:54 PM	77.3 °F	59.4 °F	54 %	East	1 mph	5 mph	29.84 in	0 in	0.01 in
7:29 PM	74.8 °F	59.5 °F	59 %	WSW	2 mph	2 mph	29.84 in	0 in	0.01 in
8:04 PM	73.3 °F	57.1 °F	57 %	WNW	0 mph	2 mph	29.85 in	0 in	0.01 in
8:39 PM	70.2 °F	57.4 °F	64 %	ENE	0 mph	0 mph	29.86 in	0 in	0.01 in
9:14 PM	66.7 °F	57 °F	71 %	ENE	0 mph	0 mph	29.88 in	0 in	0.01 in
9:50 PM	64.2 °F	56.8 °F	77 %	ENE	0 mph	0 mph	29.89 in	0 in	0.01 in
10:25 PM	62.7 °F	56.1 °F	79 %	NNE	0 mph	2 mph	29.89 in	0 in	0.01 in
11:00 PM	61.9 °F	55.7 °F	80 %	ENE	0 mph	0 mph	29.9 in	0 in	0.01 in
11:35 PM	61.2 °F	55 °F	80 %	NE	0 mph	1 mph	29.9 in	0 in	0.01 in
6-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:10 AM	60.4 °F	54.2 °F	80 %	ENE	0 mph	0 mph	29.91 in	0 in	0 in
12:45 AM	59.5 °F	54 °F	82 %	ENE	0 mph	0 mph	29.91 in	0 in	0 in
1:20 AM	59.2 °F	53.7 °F	82 %	North	0 mph	0 mph	29.91 in	0 in	0 in
1:55 AM	58.1 °F	53.9 °F	86 %	SW	0 mph	0 mph	29.91 in	0 in	0 in
2:30 AM	58 °F	53.8 °F	86 %	WNW	0 mph	1 mph	29.91 in	0 in	0 in
3:05 AM	57.4 °F	52.9 °F	85 %	WSW	0 mph	1 mph	29.91 in	0 in	0 in
3:40 AM	56.7 °F	52.9 °F	87 %	WSW	0 mph	0 mph	29.91 in	0 in	0 in
4:15 AM	55.5 °F	52.3 °F	89 %	WSW	0 mph	0 mph	29.9 in	0 in	0 in
4:50 AM	54.9 °F	52 °F	90 %	WSW	0 mph	1 mph	29.91 in	0 in	0 in
5:25 AM	54.1 °F	51.5 °F	91 %	NW	2 mph	2 mph	29.92 in	0 in	0 in
6:00 AM	53.6 °F	51.3 °F	92 %	NW	0 mph	0 mph	29.92 in	0 in	0 in
6:35 AM	53.4 °F	51.7 °F	94 %	WNW	0 mph	0 mph	29.92 in	0 in	0 in
7:10 AM	56 °F	53.4 °F	91 %	WNW	0 mph	1 mph	29.92 in	0 in	0 in
7:45 AM	62.9 °F	55.9 °F	78 %	SW	0 mph	2 mph	29.93 in	0 in	0 in
8:21 AM	66.4 °F	56.3 °F	70 %	SW	3 mph	5 mph	29.94 in	0 in	0 in
8:56 AM	68.2 °F	56.8 °F	67 %	SW	0 mph	6 mph	29.94 in	0 in	0 in
9:31 AM	70.7 °F	57.5 °F	63 %	WSW	1 mph	5 mph	29.94 in	0 in	0 in
10:06 AM	72.4 °F	57.3 °F	59 %	West	3 mph	6 mph	29.94 in	0 in	0 in
10:41 AM	74.8 °F	56 °F	52 %	WSW	6 mph	8 mph	29.94 in	0 in	0 in
11:16 AM	76 °F	55.5 °F	49 %	SSW	2 mph	6 mph	29.93 in	0 in	0 in
11:56 AM	77.4 °F	54.4 °F	45 %	SW	2 mph	8 mph	29.92 in	0 in	0 in
12:31 PM	78.4 °F	56.5 °F	47 %	NNW	2 mph	8 mph	29.92 in	0 in	0 in
1:03 PM	77.2 °F	55.4 °F	47 %	ESE	0 mph	8 mph	29.92 in	0 in	0 in
1:35 PM	80.2 °F	54.4 °F	41 %	WSW	5 mph	10 mph	29.92 in	0 in	0 in
2:10 PM	80.6 °F	54.7 °F	41 %	ENE	2 mph	7 mph	29.91 in	0 in	0 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
2:45 PM	78.1 °F	54.4 °F	44 %	NW	2 mph	8 mph	29.91 in	0 in	0 in
3:17 PM	77.9 °F	54.2 °F	44 %	West	1 mph	7 mph	29.91 in	0 in	0 in
3:52 PM	77.4 °F	55.6 °F	47 %	SW	4 mph	7 mph	29.91 in	0 in	0 in
4:27 PM	77 °F	56.4 °F	49 %	ENE	1 mph	4 mph	29.9 in	0 in	0 in
5:07 PM	76.8 °F	57.3 °F	51 %	East	2 mph	5 mph	29.9 in	0 in	0 in
5:42 PM	75.6 °F	56.2 °F	51 %	SW	0 mph	5 mph	29.9 in	0 in	0 in
6:17 PM	74.8 °F	56.5 °F	53 %	SW	3 mph	6 mph	29.9 in	0 in	0 in
6:52 PM	73.4 °F	57.2 °F	57 %	SW	0 mph	1 mph	29.9 in	0 in	0 in
7:32 PM	70.5 °F	59.4 °F	68 %	West	0 mph	0 mph	29.9 in	0 in	0 in
8:10 PM	67.5 °F	59.3 °F	75 %	West	0 mph	0 mph	29.91 in	0 in	0 in
8:45 PM	65.3 °F	59.3 °F	81 %	West	0 mph	0 mph	29.91 in	0 in	0 in
9:20 PM	63.8 °F	59.2 °F	85 %	West	0 mph	0 mph	29.92 in	0 in	0 in
9:55 PM	62.5 °F	58.9 °F	88 %	West	0 mph	0 mph	29.93 in	0 in	0 in
10:30 PM	61.6 °F	58.6 °F	90 %	West	0 mph	0 mph	29.93 in	0 in	0 in
11:10 PM	60.8 °F	58.2 °F	91 %	West	0 mph	0 mph	29.93 in	0 in	0 in
11:45 PM	59.8 °F	57.8 °F	93 %	West	0 mph	0 mph	29.93 in	0 in	0 in
7-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:20 AM	59.7 °F	57.7 °F	93 %	West	0 mph	0 mph	29.94 in	0 in	0 in
12:55 AM	58.8 °F	56.8 °F	93 %	West	0 mph	0 mph	29.93 in	0 in	0 in
1:30 AM	58.7 °F	57 °F	94 %	West	0 mph	0 mph	29.93 in	0 in	0 in
2:05 AM	58.1 °F	56.4 °F	94 %	WSW	0 mph	0 mph	29.93 in	0 in	0 in
2:40 AM	57.6 °F	55.9 °F	94 %	WSW	0 mph	0 mph	29.92 in	0 in	0 in
3:15 AM	56.4 °F	55 °F	95 %	WSW	0 mph	0 mph	29.92 in	0 in	0 in
3:50 AM	55.5 °F	54.4 °F	96 %	WSW	0 mph	0 mph	29.92 in	0 in	0 in
4:25 AM	54.5 °F	53.1 °F	95 %	WSW	0 mph	0 mph	29.92 in	0 in	0 in
5:00 AM	53.9 °F	52.8 °F	96 %	WSW	0 mph	0 mph	29.93 in	0 in	0 in
5:35 AM	53.4 °F	52.6 °F	97 %	WSW	0 mph	0 mph	29.94 in	0 in	0 in
6:15 AM	53 °F	52.2 °F	97 %	WSW	0 mph	0 mph	29.95 in	0 in	0 in
6:50 AM	53.4 °F	52.6 °F	97 %	WSW	0 mph	0 mph	29.96 in	0 in	0 in
7:25 AM	57 °F	56.2 °F	97 %	WSW	0 mph	0 mph	29.96 in	0 in	0 in
8:00 AM	63.2 °F	58.3 °F	84 %	WSW	0 mph	0 mph	29.96 in	0 in	0 in
8:35 AM	67.2 °F	58.2 °F	73 %	East	1 mph	5 mph	29.96 in	0 in	0 in
9:10 AM	69.6 °F	59.4 °F	70 %	NNE	2 mph	4 mph	29.96 in	0 in	0 in
9:45 AM	71.1 °F	59.6 °F	67 %	ENE	1 mph	8 mph	29.96 in	0 in	0 in
10:20 AM	72.5 °F	57.4 °F	59 %	ENE	2 mph	6 mph	29.96 in	0 in	0 in
10:55 AM	74.6 °F	58.8 °F	58 %	ENE	1 mph	6 mph	29.96 in	0 in	0 in
11:30 AM	77 °F	58 °F	52 %	East	3 mph	4 mph	29.96 in	0 in	0 in
12:05 PM	77.4 °F	57.3 °F	50 %	NNW	1 mph	6 mph	29.94 in	0 in	0 in
12:41 PM	79.5 °F	55 °F	43 %	NW	4 mph	6 mph	29.94 in	0 in	0 in
1:16 PM	76.8 °F	54.5 °F	46 %	East	0 mph	3 mph	29.93 in	0 in	0 in
1:51 PM	77.7 °F	55.9 °F	47 %	WNW	1 mph	4 mph	29.92 in	0 in	0 in
2:26 PM	80.9 °F	56.3 °F	43 %	NW	4 mph	5 mph	29.92 in	0 in	0 in
3:01 PM	78.1 °F	56.8 °F	48 %	East	2 mph	2 mph	29.92 in	0 in	0 in
3:36 PM	80.5 °F	57.2 °F	45 %	WSW	1 mph	4 mph	29.91 in	0 in	0 in
4:11 PM	79.7 °F	53.2 °F	40 %	North	1 mph	6 mph	29.91 in	0 in	0 in
4:46 PM	79.5 °F	54.4 °F	42 %	North	3 mph	5 mph	29.91 in	0 in	0 in
5:21 PM	81.4 °F	56.1 °F	42 %	ENE	1 mph	3 mph	29.91 in	0 in	0 in
5:56 PM	77.4 °F	58.9 °F	53 %	NW	1 mph	5 mph	29.9 in	0 in	0 in
6:36 PM	74.4 °F	60.1 °F	61 %	East	0 mph	6 mph	29.92 in	0 in	0 in
7:10 PM	72.7 °F	59.8 °F	64 %	NE	0 mph	1 mph	29.92 in	0 in	0 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
7:50 PM	69.9 °F	58.4 °F	67 %	ENE	0 mph	4 mph	29.93 in	0 in	0 in
8:25 PM	67.2 °F	57.9 °F	72 %	ENE	0 mph	1 mph	29.94 in	0 in	0 in
9:00 PM	64.9 °F	57.5 °F	77 %	ENE	0 mph	0 mph	29.95 in	0 in	0 in
9:35 PM	62.6 °F	57 °F	82 %	ENE	0 mph	0 mph	29.95 in	0 in	0 in
10:10 PM	60.9 °F	56.4 °F	85 %	ENE	0 mph	0 mph	29.95 in	0 in	0 in
10:45 PM	59.6 °F	55.7 °F	87 %	ENE	0 mph	0 mph	29.95 in	0 in	0 in
11:20 PM	58.6 °F	55.7 °F	90 %	ENE	0 mph	0 mph	29.95 in	0 in	0 in
11:55 PM	57.8 °F	55.5 °F	92 %	ENE	0 mph	0 mph	29.96 in	0 in	0 in
8-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:30 AM	57 °F	55 °F	93 %	North	0 mph	1 mph	29.96 in	0 in	0 in
1:06 AM	56.2 °F	54.5 °F	94 %	North	0 mph	0 mph	29.95 in	0 in	0 in
1:40 AM	55.7 °F	54 °F	94 %	North	0 mph	0 mph	29.95 in	0 in	0 in
2:16 AM	54.5 °F	53.1 °F	95 %	North	0 mph	0 mph	29.94 in	0 in	0 in
2:50 AM	54.3 °F	53.2 °F	96 %	North	0 mph	0 mph	29.94 in	0 in	0 in
3:25 AM	53.6 °F	52.5 °F	96 %	North	0 mph	0 mph	29.95 in	0 in	0 in
4:01 AM	53 °F	51.9 °F	96 %	North	0 mph	0 mph	29.95 in	0 in	0 in
4:35 AM	52.4 °F	51.3 °F	96 %	North	0 mph	0 mph	29.95 in	0 in	0 in
5:10 AM	51.8 °F	50.7 °F	96 %	NE	0 mph	0 mph	29.96 in	0 in	0 in
5:45 AM	51.4 °F	50.3 °F	96 %	NE	0 mph	0 mph	29.98 in	0 in	0 in
6:20 AM	51.6 °F	50.8 °F	97 %	NE	0 mph	0 mph	29.99 in	0 in	0 in
7:00 AM	52.6 °F	51.8 °F	97 %	NE	0 mph	0 mph	30 in	0 in	0 in
7:35 AM	57.1 °F	56 °F	96 %	NE	0 mph	0 mph	30 in	0 in	0 in
8:10 AM	63.8 °F	58.2 °F	82 %	ENE	0 mph	2 mph	30 in	0 in	0 in
8:45 AM	66.4 °F	58.6 °F	76 %	NNE	3 mph	5 mph	30 in	0 in	0 in
9:20 AM	69.1 °F	58.9 °F	70 %	East	1 mph	4 mph	30 in	0 in	0 in
9:55 AM	71.5 °F	58.2 °F	63 %	East	0 mph	6 mph	30 in	0 in	0 in
10:30 AM	73.7 °F	58 °F	58 %	SE	1 mph	5 mph	29.99 in	0 in	0 in
11:05 AM	74.5 °F	57.8 °F	56 %	NNW	4 mph	6 mph	29.99 in	0 in	0 in
11:40 AM	76.9 °F	58.5 °F	53 %	East	5 mph	5 mph	30 in	0 in	0 in
12:15 PM	75.9 °F	57 °F	52 %	ENE	3 mph	6 mph	30 in	0 in	0 in
12:50 PM	75.9 °F	57 °F	52 %	SE	1 mph	7 mph	30 in	0 in	0 in
1:25 PM	77.2 °F	56 °F	48 %	ENE	3 mph	8 mph	29.99 in	0 in	0 in
2:00 PM	77.4 °F	56.7 °F	49 %	ENE	1 mph	7 mph	29.99 in	0 in	0 in
2:35 PM	77.6 °F	56.9 °F	49 %	ENE	1 mph	8 mph	29.99 in	0 in	0 in
3:10 PM	78.3 °F	56.4 °F	47 %	East	3 mph	7 mph	29.99 in	0 in	0 in
3:45 PM	78.4 °F	55.9 °F	46 %	West	0 mph	6 mph	29.98 in	0 in	0 in
4:20 PM	77.1 °F	55.9 °F	48 %	East	0 mph	5 mph	29.98 in	0 in	0 in
4:55 PM	78.6 °F	56.1 °F	46 %	ENE	2 mph	3 mph	29.98 in	0 in	0 in
5:30 PM	78.4 °F	57.1 °F	48 %	ENE	1 mph	4 mph	29.98 in	0 in	0 in
6:05 PM	76.3 °F	56.8 °F	51 %	ENE	0 mph	5 mph	29.98 in	0 in	0 in
6:40 PM	74.3 °F	59 °F	59 %	ENE	0 mph	1 mph	29.98 in	0 in	0 in
7:15 PM	71.8 °F	59 °F	64 %	East	0 mph	3 mph	29.98 in	0 in	0 in
7:59 PM	69.2 °F	59 °F	70 %	ENE	1 mph	1 mph	29.98 in	0 in	0 in
8:34 PM	66.8 °F	56.7 °F	70 %	ENE	0 mph	0 mph	29.99 in	0 in	0 in
9:09 PM	64.9 °F	56 °F	73 %	ENE	0 mph	0 mph	30.01 in	0 in	0 in
9-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
10:48 AM	68.7 °F	60.5 °F	75 %	NE	5 mph	7 mph	30.03 in	0 in	0 in
11:23 AM	69.7 °F	61 °F	74 %	ENE	6 mph	12 mph	30.03 in	0 in	0 in
11:58 AM	69.2 °F	61.3 °F	76 %	ENE	3 mph	11 mph	30.03 in	0 in	0 in
12:33 PM	71.3 °F	61.4 °F	71 %	ENE	2 mph	11 mph	30.02 in	0 in	0 in

Date/Time	*Temperature*	*Dew Point*	*Humidity*	*Wind*	*Speed*	*Gust*	*Pressure*	*Precip. Rate.*	*Precip. Accum.*
1:08 PM	72.7 °F	61.5 °F	68 %	ENE	5 mph	9 mph	30.03 in	0 in	0 in
1:43 PM	71.4 °F	61.5 °F	71 %	ENE	2 mph	9 mph	30.03 in	0 in	0 in
2:18 PM	71.3 °F	61 °F	70 %	ENE	4 mph	11 mph	30.03 in	0 in	0 in
2:53 PM	72.4 °F	60.8 °F	67 %	ENE	4 mph	14 mph	30.03 in	0 in	0 in
3:28 PM	73.3 °F	60.8 °F	65 %	East	1 mph	11 mph	30.02 in	0 in	0 in
4:03 PM	72.8 °F	59 °F	62 %	ENE	2 mph	13 mph	30.03 in	0 in	0 in
4:38 PM	74 °F	59.7 °F	61 %	East	2 mph	13 mph	30.03 in	0 in	0 in
5:13 PM	74 °F	59.2 °F	60 %	SSE	2 mph	8 mph	30.03 in	0 in	0 in
5:47 PM	73.9 °F	58.2 °F	58 %	WNW	0 mph	6 mph	30.03 in	0 in	0 in
6:22 PM	71.7 °F	58 °F	62 %	NNE	0 mph	6 mph	30.02 in	0 in	0 in
6:57 PM	70.2 °F	59.1 °F	68 %	ENE	3 mph	5 mph	30.03 in	0 in	0 in
7:32 PM	67.9 °F	58.9 °F	73 %	East	0 mph	3 mph	30.04 in	0 in	0 in
8:07 PM	64.6 °F	58.3 °F	80 %	ENE	0 mph	0 mph	30.04 in	0 in	0 in
8:42 PM	62 °F	57.4 °F	85 %	ENE	0 mph	0 mph	30.05 in	0 in	0 in
9:17 PM	60 °F	56.7 °F	89 %	ENE	0 mph	0 mph	30.06 in	0 in	0 in
9:57 PM	58.5 °F	55.9 °F	91 %	ENE	0 mph	0 mph	30.06 in	0 in	0 in
10:32 PM	57.2 °F	55.5 °F	94 %	ENE	0 mph	0 mph	30.06 in	0 in	0 in
11:07 PM	56.7 °F	55.3 °F	95 %	ENE	0 mph	1 mph	30.06 in	0 in	0 in
11:42 PM	56.1 °F	54.7 °F	95 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
10-Aug	Temperature	Dew Point	Humidity	Wind	Speed	Gust	Pressure	Precip. Rate.	Precip. Accum.
12:17 AM	55.8 °F	54.4 °F	95 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
12:52 AM	55.1 °F	53.7 °F	95 %	WSW	0 mph	0 mph	30.07 in	0 in	0 in
1:27 AM	54.5 °F	53.1 °F	95 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
2:02 AM	53.8 °F	52.4 °F	95 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
2:38 AM	53.2 °F	52.1 °F	96 %	WSW	0 mph	0 mph	30.05 in	0 in	0 in
3:13 AM	52.9 °F	51.8 °F	96 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
3:47 AM	52.8 °F	51.7 °F	96 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
4:22 AM	53 °F	51.9 °F	96 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
4:58 AM	52.7 °F	51.6 °F	96 %	WSW	0 mph	0 mph	30.06 in	0 in	0 in
5:33 AM	51.9 °F	51.1 °F	97 %	WSW	0 mph	0 mph	30.07 in	0 in	0 in
6:07 AM	51.9 °F	51.1 °F	97 %	WSW	0 mph	0 mph	30.07 in	0 in	0 in
6:42 AM	52.7 °F	51.9 °F	97 %	WSW	0 mph	0 mph	30.07 in	0 in	0 in
7:17 AM	55.4 °F	54.6 °F	97 %	WSW	0 mph	0 mph	30.08 in	0 in	0 in
7:52 AM	61.3 °F	58.3 °F	90 %	WSW	0 mph	0 mph	30.08 in	0 in	0 in
8:27 AM	66 °F	58.9 °F	78 %	WSW	1 mph	7 mph	30.08 in	0 in	0 in

Yellow Highlight - indicates weather conditions less than ideal for bat surveys (i.e. sustained winds during the first 5 hours of survey,precipitation during the first 5 hours of survey, temperatures below 50˚F).

Source:
Weather Underground

Burrillville, RI > 41.968 -71.669 > 397 ft
EMA Burrillville, RI KRIHARRI2
Hardware: WeatherWISE WS1080
Software: Cumulus v1.9.4

Appendix C

Qualitative Analysis Qualifications

DAVID YATES

10 Roadking Alley
Limington, ME 04049
(207) 491-4707

EDUCATION:

Bachelor of Science, Wildlife Biology and Management
Unity College, Unity, ME
Graduated May 1999

M.Sc., Conservation Biology
Antioch University New England
Graduated May 2006

SKILLS:

- Proficient in animal tagging and release methods
- Ability to identify bats of N. and C. America and QIBS by USFWS and PA State
- HERO training
- Collected and prepared blood samples for contaminant analyses.
- Current DEA drug license
- Analyzed water quality of ponds, rivers and streams
- Experience using tranquilizers/sedatives
- B3 and HUET certificates for low level flights
- HAZWOPR training
- Trained in CPR and First Aid

EXPERIENCE:

Biodiversity Research Institute – *Research Biologist/Mammal Director,* Gorham, ME January 1998 -present

- Qualified Indiana Bat Surveyor (QIBS) for the state of PA and USFWS
- Principle Investigator for Acadia National Park bat survey and tracking study
- Project Manager and conducted bat surveys for US Navy in VA, NJ and Maine
- Project Manager for Pipeline acoustic surveys in NY and CT
- Principle Investigator for Bat study examining PAH's in WY Oil and Gas Fields
- Lead Biologist Indiana bat surveys for Gas fracking and pipelines in PA
- Project Manager/Lead Biologist for Maine IF&W Eco-region Surveys for bats for 5 years
- Project Manager/Lead Biologists for bat mercury studies at superfund sites from VA to Maine involving U.S.F.&W.S.
- Project Manager/Lead Biologist at 4 U.S. Fish and Wildlife NRDAR sites for bats and furbearers
- Project Manager bat surveys at multiple National Wildlife Refuges in the northeast
- Prepared Webinar on acoustics for USFWS region 5 biologists
- Telemetry Coordinator Gulf Oil Spill Project for USFWS NRDAR bird injury assessment
- Developed Scope of Work for USFWS NRDAR Gulf Oil Spill bird injury assessment
- Coordinated aerial and ground tracking of more than 400 birds using multiple airplanes and satellite technology
- Principle Investigator for FPL Maine Hydro. Beaver, muskrat, otter, and mink telemetry study
- Principle Investigator Biologist for live trapping mink and otter study in Maine for state DEP (Master's thesis)
- Project Manager/Lead Biologist for live trapping mink and otter study in Massachusetts for EPA and other superfund studies
- Project Manager for Maine IF&W Ecoregion for three areas in Maine, birds and small mammals
- Project Manager for common loon monitoring in northern and western Maine
- Project Manager/Lead Biologist for National Park Service survey of small and large mammals of Appalachian Trail in Maine
- Winter large carnivore tracking surveys for NPS and private landowner
- Administered schedule III drugs for mink and otter study (Ketemine & Metetomidine)
- DEA Schedule II-III license
- Researched recent trends of mercury and lead contaminants in the North American piscivorous bird's mammals.
- Captured, banded and gathered mercury and lead level data in piscivorous birds.
- Entered banding data into database for Biodiversity Research Institute data analysis.
- Compiled banding data into official banding schedules for U.S. Fish & Wildlife Services.
- Supervised banding of Common Loons, Eagles, Kingfishers and various other species.
- Surveyed reservoirs and lakes for Common Loons, Kingfishers and other piscivorous birds.
- Presented Mammal, Bat and Common Loon slide show to various organizations for educational purposes
- Wrote reports for Loon productivity on Reservoirs for state and private agencies.
- Proposed, designed and organized a mink and otter study for Maine Department of Environmental Protection.

Publications and Reports:

Karouna-Renier, N. K., White, C., Perkins, C. R., Schmerfeld, J. J., & Yates, D. (2014). Assessment of mitochondrial DNA damage in little brown bats (Myotis lucifugus) collected near a mercury-contaminated river. Ecotoxicology, 23(8), 1419-1429.

Yates, David E., Evan M. Adams, Sofia E. Angelo, David C. Evers, John Schmerfeld, Marianne S. Moore, Thomas H. Kunz et al. Mercury in bats from the northeastern United States. Ecotoxicology 23, no. 1 (2014): 45-55.

Nam, D.-H., Yates, D., Ardapple, P., Evers, D. C., Schmerfeld, J., & Basu, N. 2012. Elevated mercury exposure and neurochemical alterations in little brown bats (Myotis lucifugus) from a site with historical mercury contamination. Ecotoxicology, 12(4), 1094–1101

Yates, D., K. Taylor, and C. Niven. 2008. Effects of Water Levels on Muskrat (Ondatra zibethicus) Populations within the West Grand Lake Project, Maine. Report BRI 2008-25 submitted to BIA and OA System Corporation, Amarillo, Texas. BioDiversity Research Institute, Gorham, Maine.

Wada, H., D. Yates, D. Evers, R. Taylor, W. Hopkins. 2010. Tissue mercury concentrations and adrenocortical responses of female big brown bats (Eptesicus fuscus) near a contaminated river. Ecotox. 19:7 1277-84.

Yates, D., S. Angelo, T. Divoll and D.C. Evers, 2009. Assessment of mercury exposure to bats at Onondaga Lake, New York. Report BRI 2010-11 submitted to U.S. Fish and Wildlife Service, Cortland, NY. BioDiversity Research Institute, Gorham, Maine, 44 pp.

T. Divoll, D. Yates, D.C. Evers, 2008. Pilot assessment of mercury exposure to bats at Onondaga Lake, New York. Report BRI 2009-10 submitted to U.S. Fish and Wildlife Service, Cortland, NY. BioDiversity Research Institute, Gorham, Maine, 44 pp.

Yates, D., S.E. Angelo, M.W. Goodale and D.C. Evers. 2011. Bat Mercury Study Examining Footprint Area and Downstream: South River, Virginia - 2009. Report BRI 2009-10 submitted to DuPont Corporate Remediation Group, Newark, Delaware and the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME. 57pp.

Yates, D., M. Moore, T. Kunz, and D.C. Evers 2008. Pilot assessment of methlymercury availability to bats on the South River, Virginia - 2008. Report BRI 2009-16 submitted to DuPont Corporate Remediation Group, Newark, Delaware and the U.S. Fish Wildl. Serv., Gloucester, Virginia.BioDiversity Research Institute, Gorham, ME. 47pp.

Yates, D., D.C. Evers, and D. Meattey. 2008. Pilot assessment of methlymercury availability to muskrat and shrews on the South Fork River, Virginia - 2008. Report BRI 2009-21 submitted to the U.S. Fish Wildl. Serv., Gloucester,Virginia.BioDiversity Research Institute, Gorham, ME.

Yates, D., W. Goodale, M. Holden, and D. Evers. 2008. Home ranges size in relation to water level fluctuations in river otter, muskrat, mink and beaver on Brassua Lake and surrounding waterbodies. Report BRI 2008-18 submitted to FPL Energy Maine Hydro. BioDiversity Research Institute, Gorham, Maine.

Yates, D. and D.C. Evers. 2007-6. Small Mammals and Bat Inventory of the Appalachian Trail in Maine-2006. Report BRI 2007-6 submitted to the Maine Natural Areas Program and NPS. BioDiversity Research Institute, Gorham, ME.

Yates, D., H. Wada , M. Moore, B. Hopkins, T. Kunz, and D.C. Evers 2007. Pilot assessment of methlymercury availability to bats on the South River, Virginia - 2007. Report BRI 2008-08 submitted to DuPont Corporate Remediation Group, Newark, Delaware and the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME. 42pp.

Yates, D., D.C. Evers, and L. Savoy. 2004. Developing a mercury exposure profile for mink and river otter in Maine. Report BRI 2004-09 submitted to Maine Department of Environmental Protection and Maine Inland Fisheries and Wildlife. BioDiversity Research Institute, Gorham, Maine.

Yates, D. E., D.T. Mayack, K. Munney, D.C. Evers, A. Major, T. Kaur, and R.J. Taylor. 2005. Mercury levels in mink (*Mustela vison*) and river otter *(Lontra canadensis*) from northeastern North America. Ecotoxicology 14:263-274.

Yates and D.C. Evers. 2007. Pilot assessment of methlymercury availability to furbearers on the North Fork of the Holston River, Virginia - 2005. Report BRI 2007-10 submitted to the U.S. Fish Wildl. Serv., Gloucester, Virginia. BioDiversity Research Institute, Gorham, ME.

Yates, D., and D.C. Evers. 2006. Assessment of bats for mercury contamination on the North Fork of the Holston River, VA- 2005. Report BRI 2006-9. BioDiversity Research Institute, Gorham, ME.

Yates, D.E. and D. Evers. 2005. An overall assessment of the loon population at Lake Umbagog National Wildlife Refuge: Investigations into individual-specific demographics and assessment of individual and population health. Report BRI 2004-13 BioDiversity Research Institute, Gorham, Maine. 17pp.

Yates, D., D.C. Evers, and W. Goodale. 2006. Monitoring of breeding Common Loons: West Branch of the Penobscot River area - 2005. Report BRI 2006-05. BioDiversity Research Institute, Gorham, ME. pp.30

Yates, D., D.C. Evers, W. Goodale, and W. MacCabe. 2005. Monitoring of breeding Common Loons: West Branch of the Penobscot River area - 2004. Report BRI 2005-10. BioDiversity Research Institute, Gorham, ME. 27 pp.

Yates, D., L. Savoy, D. Evers, C. DeSorbo, W. Goodale, L. Attix, A. Paul, C. Niven, E. Saxson, and M. Nelson. 2005. Documentation of the reproductive success of the Common Loon on selected lakes in the Rangeley Lakes and Eagle Lake Regions in 2004. Report BRI 2005-06 submitted to the New England Forestry Foundation. BioDiversity Research Institute, Gorham, ME. 60p.

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EDUCATION AND CERTIFICATIONS

2015 M.S. Student in Biology, Indiana State University
Advisor: Dr. J. O'Keefe

2010 B.S. in Environmental Science, Binghamton University

PROFESSIONAL POSITIONS

Present Masters Student
Indiana State University, Indiana

- Leading a long term summer Indiana bat monitoring project
  - Logistics: Hiring and organizing employees, gear organization and purchasing, securing field housing planning daily, monthly and yearly work activities
  - Long term monitoring of local bat populations : Mist netting long term netting sites with a minimum of 12 per month, radio telemetry and transmitter attachment in order to track foraging bats and locate day roosts, spotlight checks and emergence count to monitor roost use
  - Vegetation surveys
  - Report preparation: Prepared biweekly and annual reports of study results
- Thesis research: Describing the social behavior of Indiana bats *Myotis sodalis* at day roost sites.
  - Deployed Pettersson D500X and night vision video to record social behavior at maternity roosts
  - Developed ethogram detailing visual and acoustic behaviors
  - Coded video for behaviors and analyzed acoustic behaviors in Raven Pro
- Public outreach
- Environmental consulting

2012 Field Technician
Indiana State University, Tennessee, North Carolina

- Duties continued from 2010 field season. New duties included: Use of the basic functions of ArcGIS software. The use of Wildlife Acoustics SM2 detectors and call analysis with SonoBat Software. Setup and deployment of Lotek SRX-DL Radio Receivers

2011 Biological Intern

US Fish and Wildlife Service, Sussex, NJ

- Oversaw all aspects of bat research at 3 regional refuges. Duties included organizing interns and volunteers capturing bats using mistnets, identifying and handling of eastern bats. Radio telemetry to locate roosts. Emergence counts. Acoustic surveys mobile and stationary. Decontamination of field gear. Data entry with Microsoft Access and Excel.
- Paticipated in water and wading bird surveys and banding, turtle capture and telemetry including wood and bog turtles, and invasive plant control.
- Preformed public outreach events

2011 Quality Control and Inventory Management

Refrigerated Transport Electronics, McGraw, NY

- Duties included inspection for functionality, proper recording and aesthetic appearance of units. Responsible for quality control inspection of electronic assemblies.
- Inventory management responsibilities included the maintenance of 4000 plus parts of electronic component type inventory and stock area.
- Duties included kit assembly for delivery to population vendor, inspection of incoming parts and record keeping. Records were kept with DBA/Evo Software.
- Spanish translation and customer service.
- Data entry for all tasks included daily use of Microsoft Access, Excel and Word.

2010 Field Technician: GS-4

US Forest Service, Tennessee, North Carolina

- Duties continued from 2009 field season, with added responsibility of co-lead technician. New duties included: organizing field and netting teams and planning field tasks. Implementation of standardized vegetation surveys in plot and transect form. With use of Trimble GPS units, Terra Sync and Pathfinder software.
- Data entry with Microsoft Access and Excel.

2009 Field Technician: GS-4

US Forest Service/Clemson University, Tennessee, North Carolina

- Duties included capturing bats using mistnets, identifying and handling 11 species of eastern bats including target species Indiana Bat (*Myotis sodalis*) and Northern Long Eared Bat (*Myotis septentrionalis*). Used radio telemetry to track bats and locate roost trees in steep mountainous terrain.
- Identified and measured eastern trees in plots around roost trees.
- Used GPS, topographic map, and compass to navigate in the field and to identify bat locations via triangulation.
- Drove 4WD F250 vehicle on gravel/dirt roads.
- Recorded and analyzed bat calls with the Anabat system.
- Worked 10+ hours per day for 7-8 days at a time. Lived in dormitory style housing with a 4 person crew for 2 months.

2007, 2008 National Park Service Park Guide: interpretation GS-4
Ozark National Scenic Riverways, Van Buren, MO

- Duties included giving cave tours and evening programs to visitors. Collecting fees and organizing deposits. Aiding visitors at the visitors' center and around the park. River supervision by canoe to ensure the safety of our visitors and to provide interpretation of the natural surroundings. Maintained and repaired lighting equipment used on the cave tours.

VOLUNTEER POSITIONS

2008-2010 Binghamton University Nature Preserve Vestal, NY
Led environmental and historical based tours through preserve on campus, for local schools and visitors.

2008-2010 Lime Hollow Nature Center Cortland, NY
Created and delivered educational programs, with environmental basis for children and adults. Specific interests and contributions include nature photography and youth based education programming and the fabrication and introduction of bat houses.

RESEARCH GRANTS

2013 Graduate Research Grant. Acoustic and Observable Behavior at Indiana Bat Day Roost sites. $1,800
2014 Indiana Academy of Sciences. Describing the social behavior of Indiana bats *Myotis sodalis* at day roost sites. $2184.95
2014 Indiana Space Grant Consortium. INSCG Masters Fellowship. $6000

REPRESENATIVE CONFERENCE /RESEARCH PRESENTATIONS

2010 Byrne, C.M., D.A. Horvath, J.M. O'Keefe. Roost communication at Indiana bat day roost sites. 20th Colloquium on Conservation of Mammals in the Southeastern United States: Asheville, NC.
2013 Byrne, C.M., O'Keefe, J.M., and Walters, B.L. Acoustic and observable behaviors at Indiana bat day roost sites. International Bat Research Conference: San Jose, Costa Rica.
2014 Byrne, C.M., and O'Keefe, J.M., Describing the social behaviors at Indiana bat day roost sites. Animal Behavior Society Annual Meeting: Princeton, New Jersey.
2014 Byrne, C.M., and O'Keefe, J.M., Describing the social behaviors at Indiana bat day roost sites. North American Society for Bat Research Annual Meeting: Albany, New York.
Awarded: Titley Scientific Award for presentation quality

UNDERGRADUATE STUDENT MENTORING

Krystina Cobb, James H. Cox III, and Seth Wiram

SKILLS AND QUALIFICATIONS

Acoustics

- Equipment: Anabat II and SD2, Petterson D240X and D500X, Binary Acoustics Technology AR125, and Wildlife Acoustics SM2
- Software: AnaLookW, AnaPocket, SonoBat, Echoclass and Raven Pro

Other

- R and Microsoft Office
- Rabies vaccination
- Federal Indiana bat sub-permittee
  - Personal application to be submitted by February 2015 along with Qualified Indiana Bat Surveryor paperwork

WORKSHOPS AND CERTIFCATIONS

2014 Raven Pro Sound Analysis Workshop
2013 Automatic Identification Software Workshop
2011 Acoustic Techniques Workshop

PROFESSIONAL SOCIETY MEMBERSHIPS

Midwest Bat Working Group
Bat Conservation International
Northeast Bat Working Group
Indiana Academy of Sciences
Southeast Bat Diversity Network
Animal Behavior Society
North American Society for Bat Research

REFERENCES

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Southern Research Station
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E-mail: sloeb@clemson.edu

Appendix D

Bat Call Identification Results

BCID Version 2.6a

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FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P7312022.!	EPFU	85.2941	LOW	97.0588	34	0.624124	20150731
P7312024.!	EPFU	95.082	LOW	98.3607	61	0.666717	20150731
P7312024.!	EPFU	83.3333	LOW	91.6667	24	0.451668	20150731
P7312025.(	EPFU	96.1538	LOW	100	26	0.781578	20150731
P7312030.!	EPFU	100	LOW	100	15	0.580898	20150731
P7312031.!	EPFU	100	LOW	100	6	0.257557	20150731
P7312051.!	EPFU	84.6154	LOW	94.8718	39	0.681748	20150731
P7312051.!	EPFU	94.8718	LOW	100	39	0.777853	20150731
P7312051.!	EPFU	100	LOW	100	6	0.866327	20150731
P7312052.#	EPFU	87.5	LOW	93.75	32	0.723791	20150731
P7312052.!	EPFU	89.4737	LOW	94.7368	38	0.791282	20150731
P7312053.!	EPFU	100	LOW	100	12	0.698627	20150731
P7312053.!	EPFU	81.8182	LOW	90.9091	22	0.396087	20150731
P7312054.!	EPFU	76.1905	LOW	85.7143	21	0.485823	20150731
P7312054.#	EPFU	85.7143	LOW	95.2381	21	0.663739	20150731
P7312055.!	EPFU	89.4737	LOW	100	19	0.619877	20150731
P7312056.#	EPFU	81.25	LOW	87.5	16	0.509395	20150731
P7312056.!	EPFU	77.7778	LOW	100	18	0.666848	20150731
P7312057.!	EPFU	87.5	LOW	87.5	24	0.560002	20150731
P7312100.#	EPFU	69.5652	LOW	91.3043	23	0.496664	20150731
P7312101.#	EPFU	73.913	LOW	82.6087	23	0.39454	20150731
P7312106.!	EPFU	84.2105	LOW	89.4737	19	0.576626	20150731
P7312108.#	EPFU	68.4211	LOW	73.6842	19	0.281542	20150731
P7312109.#	EPFU	84.2105	LOW	84.2105	19	0.357818	20150731
P7312110.!	EPFU	68.1818	LOW	72.7273	22	0.318634	20150731
P7312111.!	EPFU	68	LOW	80	25	0.279478	20150731
P7312112.(	EPFU	84	LOW	84	25	0.300233	20150731
P7312112.!	EPFU	94.1176	LOW	94.1176	17	0.696098	20150731
P7312113.!	EPFU	80	LOW	85	20	0.430271	20150731
P7312113.#	EPFU	70	LOW	75	20	0.342208	20150731
P7312114.!	EPFU	86.9565	LOW	86.9565	23	0.430511	20150731
P7312114.!	EPFU	80	LOW	80	15	0.516096	20150731
P7312115.(	EPFU	85.7143	LOW	85.7143	7	0.274098	20150731
P7312115.!	EPFU	82.6087	LOW	86.9565	23	0.52326	20150731
P7312116.(	EPFU	86.3636	LOW	90.9091	22	0.582946	20150731
P7312117.(	EPFU	96.7742	LOW	96.7742	31	0.447062	20150731
P7312117.!	EPFU	100	LOW	100	8	0.595197	20150731
P7312117.!	EPFU	90.9091	LOW	90.9091	22	0.471846	20150731
P7312119.(	EPFU	87.5	LOW	87.5	32	0.582233	20150731
P7312119.!	EPFU	71.4286	LOW	85.7143	7	0.158191	20150731
P7312119.#	EPFU	90	LOW	90	20	0.568356	20150731
P7312120.!	EPFU	75	LOW	75	20	0.3988	20150731
P7312120.!	EPFU	87.5	LOW	100	8	0.398216	20150731

P7312126..	EPFU	80.9524	LOW	80.9524	21	0.44772	20150731
P7312126.!	EPFU	81.8182	LOW	81.8182	22	0.56025	20150731
P7312127..	EPFU	82.6087	LOW	82.6087	23	0.375563	20150731
P7312127.!	EPFU	82.6087	LOW	86.9565	23	0.423428	20150731
P7312128..	EPFU	90.9091	LOW	95.4545	22	0.606585	20150731
P7312139..	EPFU	81.8182	LOW	95.4545	22	0.449318	20150731
P7312139.(	EPFU	100	LOW	100	20	0.817593	20150731
P7312140..	EPFU	95	LOW	95	20	0.692103	20150731
P7312140.!	EPFU	81.8182	LOW	86.3636	22	0.557716	20150731
P7312141..	EPFU	88.8889	LOW	88.8889	18	0.61605	20150731
P7312142.(	EPFU	73.3333	LOW	86.6667	15	0.384657	20150731
P7312142..	EPFU	88.8889	LOW	94.4444	18	0.71232	20150731
P7312143.(	EPFU	90.4762	LOW	90.4762	21	0.52153	20150731
P7312143.(	EPFU	91.3043	LOW	95.6522	23	0.593317	20150731
P7312144..	EPFU	90	LOW	90	20	0.61876	20150731
P7312145.(	EPFU	78.2609	LOW	91.3043	23	0.50732	20150731
P7312145.(	EPFU	76.9231	LOW	92.3077	13	0.482032	20150731
P7312146..	EPFU	95.2381	LOW	95.2381	21	0.456952	20150731
P7312147.(	EPFU	72.2222	LOW	77.7778	18	0.39989	20150731
P7312147..	EPFU	84.6154	LOW	84.6154	13	0.640285	20150731
P7312147.(	EPFU	83.3333	LOW	83.3333	6	0.251611	20150731
P7312148..	EPFU	78.5714	LOW	78.5714	14	0.488423	20150731
P7312148..	EPFU	100	LOW	100	6	0.464179	20150731
P7312148.!	EPFU	76.4706	LOW	76.4706	17	0.316899	20150731
P7312149..	EPFU	73.6842	LOW	78.9474	19	0.363332	20150731
P7312150..	EPFU	90.9091	LOW	100	22	0.751687	20150731
P7312201..	EPFU	80.9524	LOW	80.9524	21	0.511699	20150731
P7312201.(	EPFU	87.5	LOW	87.5	16	0.583861	20150731
P7312208..	EPFU	46.6667	LOW	46.6667	15	0.18408	20150731
P8010113.!	LABO	80	MID	90	10	0.316199	20150731
P8010438.(	EPFU	90.4762	LOW	90.4762	21	0.597605	20150731
P8010438..	EPFU	89.7959	LOW	93.8776	49	0.590909	20150731
P8010438.(	EPFU	75.6098	LOW	78.0488	41	0.514596	20150731
P8010456..	EPFU	76.4706	LOW	82.3529	17	0.168047	20150731

IDENTIFICATION SUMMARY

ID	EPFU	LABO	LOW	MID	Total
N	76	1	76	1	77
%	98.7013	1.2987	98.7013	1.2987	
MLE (p)	0.000001	0.003057			

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	19	0	0	0	0	0	0	0

9:00 PM	50	0	0	0	0	0	0	0
10:00 PM	3	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	1	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	4	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	76	0	1	0	0	0	0	0

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FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P8012016.2	EPFU	86.9565	LOW	100	23	0.571067	20150801
P8012016.3	EPFU	100	LOW	100	8	0.464959	20150801
P8012029.3	EPFU	72.7273	LOW	81.8182	11	0.516237	20150801
P8012029.5	EPFU	100	LOW	100	23	0.0824	20150801
P8012030.3	EPFU	100	LOW	100	24	0.240435	20150801
P8012033.2	EPFU	93.75	LOW	100	16	0.331129	20150801
P8012034.5	EPFU	93.1034	LOW	96.5517	29	0.711864	20150801
P8012035.0	EPFU	89.2857	LOW	92.8571	28	0.163145	20150801
P8012052.0	EPFU	78.2609	LOW	95.6522	23	0.546176	20150801
P8012052.4	EPFU	87.5	LOW	87.5	24	0.497979	20150801
P8012053.3	EPFU	76	LOW	84	25	0.517487	20150801
P8012053.4	EPFU	80.9524	LOW	85.7143	21	0.528147	20150801
P8012054.3	EPFU	84	LOW	92	25	0.563678	20150801
P8012055.0	EPFU	82.6087	LOW	95.6522	23	0.649597	20150801
P8012055.4	EPFU	77.2727	LOW	90.9091	22	0.487857	20150801
P8012056.3	EPFU	81.8182	LOW	90.9091	22	0.426042	20150801
P8012056.4	EPFU	80	LOW	88	25	0.509276	20150801
P8012057.2	EPFU	75	LOW	87.5	8	0.334163	20150801
P8012057.4	EPFU	90.9091	LOW	90.9091	22	0.403681	20150801
P8012058.2	EPFU	86.9565	LOW	86.9565	23	0.415352	20150801
P8012058.5	EPFU	87.5	LOW	87.5	16	0.584941	20150801
P8012059.0	EPFU	100	LOW	100	8	0.876511	20150801
P8012059.5	EPFU	80.9524	LOW	85.7143	21	0.560203	20150801
P8012100.2	EPFU	71.4286	LOW	80.9524	21	0.405901	20150801
P8012100.5	EPFU	68.1818	LOW	72.7273	22	0.406455	20150801
P8012101.2	EPFU	79.1667	LOW	79.1667	24	0.356409	20150801
P8012103.5	EPFU	95.2381	LOW	95.2381	21	0.748508	20150801
P8012104.2	EPFU	100	LOW	100	17	0.79545	20150801
P8012105.0	EPFU	73.913	LOW	82.6087	23	0.414241	20150801

P8012105..	EPFU	91.6667	LOW	91.6667	12	0.346952	20150801
P8012106.!	EPFU	90.4762	LOW	90.4762	21	0.572877	20150801
P8012107..	EPFU	92	LOW	92	25	0.548128	20150801
P8012108.(	EPFU	81.8182	LOW	86.3636	22	0.57	20150801
P8012108.4	EPFU	84.6154	LOW	84.6154	26	0.323401	20150801
P8012108.!	EPFU	95.4545	LOW	95.4545	22	0.635776	20150801
P8012109..	EPFU	90.9091	LOW	95.4545	22	0.722469	20150801
P8012110.(	EPFU	73.6842	LOW	84.2105	19	0.423229	20150801
P8012110..	EPFU	78.2609	LOW	82.6087	23	0.442181	20150801
P8012111..	EPFU	76.1905	LOW	76.1905	21	0.371471	20150801
P8012111.4	EPFU	64.7059	LOW	64.7059	17	0.284703	20150801
P8012112..	EPFU	84.2105	LOW	84.2105	19	0.307704	20150801
P8012112.!	EPFU	66.6667	LOW	73.3333	15	0.419051	20150801
P8012113..	EPFU	68.1818	LOW	77.2727	22	0.312001	20150801
P8012113.!	EPFU	90.9091	LOW	95.4545	22	0.673503	20150801
P8012114..	EPFU	100	LOW	100	20	0.75653	20150801
P8012115.(	EPFU	75	LOW	81.25	16	0.367554	20150801
P8012115.4	EPFU	75	LOW	75	20	0.36865	20150801
P8012116..	EPFU	86.9565	LOW	91.3043	23	0.614954	20150801
P8012116.4	EPFU	77.7778	LOW	83.3333	18	0.423737	20150801
P8012117.(	EPFU	95.2381	LOW	95.2381	21	0.488089	20150801
P8012117..	EPFU	90	LOW	90	20	0.620391	20150801
P8012118..	EPFU	70	LOW	80	20	0.249994	20150801
P8012118.4	EPFU	79.1667	LOW	83.3333	24	0.372985	20150801
P8012119..	EPFU	78.2609	LOW	82.6087	23	0.298589	20150801
P8012119.!	EPFU	89.4737	LOW	94.7368	19	0.587721	20150801
P8012120.4	EPFU	85	LOW	90	20	0.431448	20150801
P8012122.(	EPFU	71.4286	LOW	71.4286	14	0.360719	20150801
P8012122..	EPFU	88.8889	LOW	88.8889	9	0.287522	20150801
P8012123.(	EPFU	79.1667	LOW	79.1667	24	0.428632	20150801
P8012123.4	EPFU	68.1818	LOW	72.7273	22	0.301972	20150801
P8012124..	EPFU	85	LOW	85	20	0.531899	20150801
P8012124.4	EPFU	81.8182	LOW	81.8182	22	0.405583	20150801
P8012125..	EPFU	85.7143	LOW	85.7143	21	0.429795	20150801
P8012126..	EPFU	78.9474	LOW	78.9474	19	0.425759	20150801
P8012128..	EPFU	73.3333	LOW	73.3333	15	0.220597	20150801
P8012129..	EPFU	75	LOW	75	16	0.233511	20150801
P8012129.4	EPFU	89.4737	LOW	89.4737	19	0.430332	20150801
P8012130..	EPFU	90.9091	LOW	95.4545	22	0.639517	20150801
P8012130.!	EPFU	77.2727	LOW	81.8182	22	0.326095	20150801
P8012131..	EPFU	94.1176	LOW	94.1176	17	0.45485	20150801
P8012132.(	EPFU	80	LOW	80	15	0.370472	20150801
P8012132..	EPFU	77.2727	LOW	77.2727	22	0.313324	20150801
P8012133..	EPFU	90.4762	LOW	90.4762	21	0.346629	20150801
P8012133.4	EPFU	63.6364	LOW	72.7273	22	0.135638	20150801
P8012134.4	EPFU	85	LOW	90	20	0.361167	20150801
P8012135..	EPFU	85	LOW	85	20	0.415134	20150801

P8012136.4	EPFU	61.1111	LOW	61.1111	18	0.153725	20150801
P8012138.0	EPFU	80.9524	LOW	80.9524	21	0.240074	20150801
P8012138.5	EPFU	83.3333	LOW	88.8889	18	0.338229	20150801
P8012141.3	EPFU	66.6667	LOW	66.6667	18	0.233714	20150801
P8012141.5	EPFU	70	LOW	75	20	0.310308	20150801
P8012145.3	EPFU	84.2105	LOW	84.2105	19	0.475405	20150801
P8012145.5	EPFU	78.9474	LOW	78.9474	19	0.48173	20150801
P8012146.3	EPFU	83.3333	LOW	83.3333	24	0.400711	20150801
P8012147.0	EPFU	81.8182	LOW	81.8182	22	0.508659	20150801
P8012147.3	EPFU	84.2105	LOW	84.2105	19	0.54845	20150801
P8012148.3	EPFU	90	LOW	95	20	0.628313	20150801
P8012148.4	EPFU	83.3333	LOW	88.8889	18	0.563587	20150801
P8012149.0	EPFU	93.3333	LOW	93.3333	15	0.759239	20150801
P8012149.3	EPFU	91.3043	LOW	95.6522	23	0.657083	20150801
P8012149.5	EPFU	76.9231	LOW	76.9231	13	0.4809	20150801
P8012150.3	EPFU	72.7273	LOW	72.7273	22	0.373597	20150801
P8012150.5	EPFU	80.9524	LOW	90.4762	21	0.496525	20150801
P8012151.3	EPFU	82.6087	LOW	82.6087	23	0.398522	20150801
P8012152.3	EPFU	66.6667	LOW	66.6667	18	0.264115	20150801
P8012152.4	UNKN		UNKN		9		20150801
P8012153.0	EPFU	86.6667	LOW	86.6667	15	0.542909	20150801
P8012157.4	EPFU	52.9412	LOW	58.8235	17	0.187255	20150801
P8012203.3	EPFU	73.0769	LOW	80.7692	26	0.395565	20150801
P8012204.3	EPFU	88.2353	LOW	88.2353	17	0.534714	20150801
P8012205.5	EPFU	61.1111	LOW	61.1111	18	0.203366	20150801
P8012209.3	EPFU	62.5	LOW	62.5	16	0.281966	20150801
P8012216.3	EPFU	82.6087	LOW	91.3043	23	0.624848	20150801
P8012216.5	EPFU	100	LOW	100	6	0.889442	20150801

IDENTIFICATION SUMMARY

ID	EPFU	UNKN	LOW	UNKN	Total
N	103	1	103	1	104
%	99.0385	0.961538	99.0385	0.961538	
MLE (p)	0.000001				

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU	UNKN
6:00 PM	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0
8:00 PM	23	0	0	0	0	0	0	0	0
9:00 PM	74	0	0	0	0	0	0	0	1
10:00 PM	6	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0

3:00 AM	0	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0	0
TOTALS	103	0	0	0	0	0	0	0	1

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150804\Bat1\20150802\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P8022012.!	EPFU	100	LOW	100	9	0.742636	20150802
P8022021.(	EPFU	83.871	LOW	96.7742	31	0.623675	20150802
P8022021.:	EPFU	91.6667	LOW	100	12	0.618544	20150802
P8022045.4	EPFU	84.6154	LOW	92.3077	26	0.545309	20150802
P8022046.:	EPFU	86.9565	LOW	95.6522	23	0.716304	20150802
P8022046.!	EPFU	81.8182	LOW	90.9091	22	0.639703	20150802
P8022047.(	EPFU	60	LOW	80	5	0.352636	20150802
P8022047.:	EPFU	80	LOW	90	20	0.407459	20150802
P8022048.:	EPFU	69.5652	LOW	95.6522	23	0.594287	20150802
P8022049.(	EPFU	84	LOW	92	25	0.557871	20150802
P8022049.:	EPFU	91.3043	LOW	95.6522	23	0.571507	20150802
P8022050.:	EPFU	84	LOW	96	25	0.501277	20150802
P8022050.4	EPFU	86.2069	LOW	96.5517	29	0.715964	20150802
P8022050.!	EPFU	87.5	LOW	100	8	0.689888	20150802
P8022051.:	EPFU	100	LOW	100	14	0.766806	20150802
P8022051.:	EPFU	93.75	LOW	96.875	32	0.815376	20150802
P8022051.4	EPFU	100	LOW	100	9	0.732394	20150802
P8022052.:	EPFU	95	LOW	95	20	0.648899	20150802
P8022052.4	EPFU	91.6667	LOW	91.6667	24	0.370033	20150802
P8022052.!	EPFU	88.2353	LOW	94.1176	17	0.720789	20150802
P8022053.4	EPFU	84	LOW	88	25	0.504135	20150802
P8022054.:	EPFU	63.6364	LOW	90.9091	22	0.377237	20150802
P8022054.4	EPFU	85.7143	LOW	85.7143	28	0.407413	20150802
P8022055.(	EPFU	73.913	LOW	86.9565	23	0.499061	20150802
P8022055.4	EPFU	80.7692	LOW	92.3077	26	0.598386	20150802
P8022056.:	EPFU	85.7143	LOW	92.8571	28	0.577109	20150802
P8022056.4	EPFU	86.6667	LOW	100	15	0.722399	20150802
P8022056.!	EPFU	90.9091	LOW	90.9091	11	0.670796	20150802
P8022057.:	EPFU	72.4138	LOW	93.1034	29	0.421736	20150802
P8022057.!	EPFU	91.3043	LOW	95.6522	23	0.514299	20150802
P8022058.:	EPFU	90.9091	LOW	100	22	0.635094	20150802
P8022058.4	EPFU	83.3333	LOW	100	6	0.5488	20150802
P8022059.:	EPFU	70.5882	LOW	94.1176	17	0.26413	20150802
P8022059.4	EPFU	91.3043	LOW	91.3043	23	0.662776	20150802
P8022100.:	EPFU	94.1176	LOW	94.1176	17	0.459977	20150802

P8022100..	EPFU	87.5	LOW	100	8	0.702517	20150802
P8022100..	EPFU	81.8182	LOW	95.4545	22	0.553244	20150802
P8022119..	EPFU	95.8333	LOW	100	24	0.700842	20150802
P8022201..	EPFU	50	LOW	50	18	0.144931	20150802
P8022208..	EPFU	81.25	LOW	87.5	16	0.507812	20150802
P8022213..	EPFU	75	LOW	75	12	0.347148	20150802
P8022214..	EPFU	73.6842	LOW	84.2105	19	0.397772	20150802
P8022220..	EPFU	88.2353	LOW	100	17	0.463567	20150802
P8022221..	EPFU	77.7778	LOW	83.3333	18	0.435689	20150802
P8022225..	EPFU	70	LOW	75	20	0.305478	20150802
P8022233..	UNKN		UNKN		8		20150802
P8022233..	EPFU	80	LOW	80	20	0.376061	20150802
P8022234..	EPFU	88.8889	LOW	88.8889	18	0.517124	20150802
P8022234..	EPFU	78.9474	LOW	78.9474	19	0.409066	20150802
P8022235..	EPFU	94.7368	LOW	100	19	0.589327	20150802
P8022235..	EPFU	83.3333	LOW	88.8889	18	0.458353	20150802
P8022236..	EPFU	82.3529	LOW	82.3529	17	0.317228	20150802
P8022240..	EPFU	82.3529	LOW	82.3529	17	0.315038	20150802
P8022252..	EPFU	83.3333	LOW	87.5	24	0.518994	20150802
P8022252..	EPFU	89.4737	LOW	94.7368	19	0.657952	20150802
P8022253..	EPFU	69.2308	LOW	69.2308	13	0.353069	20150802
P8022253..	EPFU	83.3333	LOW	100	6	0.411118	20150802
P8022301..	EPFU	100	LOW	100	6	0.859218	20150802
P8022301..	EPFU	100	LOW	100	12	0.51376	20150802
P8022302..	EPFU	83.3333	LOW	83.3333	6	0.279032	20150802
P8022314..	EPFU	78.2609	LOW	82.6087	23	0.526107	20150802
P8022315..	EPFU	80	LOW	90	20	0.567188	20150802
P8022323..	EPFU	93.3333	LOW	95.5556	45	0.536863	20150802
P8030012..	EPFU	80	LOW	80	20	0.554347	20150802
P8030012..	EPFU	75	LOW	87.5	24	0.521378	20150802
P8030013..	EPFU	77.2727	LOW	95.4545	22	0.443634	20150802
P8030014..	EPFU	92	LOW	92	25	0.607505	20150802
P8030014..	EPFU	94.4444	LOW	100	18	0.806654	20150802
P8030024..	EPFU	91.3043	LOW	100	23	0.692776	20150802
P8030025..	EPFU	95	LOW	100	20	0.68395	20150802
P8030040..	EPFU	100	LOW	100	10	0.440987	20150802
P8030051..	EPFU	87.5	LOW	87.5	8	0.639854	20150802
P8030054..	EPFU	80	LOW	100	20	0.637689	20150802
P8030101..	EPFU	90.9091	LOW	100	22	0.791177	20150802
P8030102..	EPFU	86.3636	LOW	95.4545	22	0.713345	20150802
P8030105..	EPFU	85	LOW	85	20	0.567369	20150802
P8030117..	EPFU	87.5	LOW	87.5	24	0.475836	20150802
P8030118..	EPFU	72.7273	LOW	86.3636	22	0.411374	20150802
P8030118..	EPFU	87.5	LOW	100	16	0.641489	20150802
P8030119..	EPFU	87.5	LOW	93.75	16	0.675152	20150802
P8030120..	EPFU	84.2105	LOW	84.2105	19	0.459658	20150802
P8030121..	EPFU	90	LOW	100	20	0.643347	20150802

P8030122..	EPFU	88	LOW	92	25	0.477339	20150802
P8030124..	EPFU	91.3043	LOW	95.6522	23	0.553791	20150802
P8030126..	EPFU	78.9474	LOW	94.7368	19	0.581415	20150802
P8030134..	EPFU	88.8889	LOW	92.5926	27	0.482946	20150802
P8030135..	EPFU	88	LOW	100	25	0.667661	20150802
P8030135..	EPFU	76	LOW	88	25	0.532428	20150802
P8030136..	EPFU	77.2727	LOW	81.8182	22	0.433404	20150802
P8030137..	EPFU	78.9474	LOW	89.4737	19	0.558404	20150802
P8030139..	EPFU	90.4762	LOW	95.2381	21	0.753398	20150802
P8030433..	EPFU	92.8571	LOW	100	14	0.70887	20150802
P8030440..	EPFU	100	LOW	100	16	0.064441	20150802
P8030441..	EPFU	100	LOW	100	21	0.520134	20150802
P8030441..	EPFU	90	LOW	100	10	0.352282	20150802
P8030445..	EPFU	72.7273	LOW	81.8182	11	0.331061	20150802

IDENTIFICATION SUMMARY

ID	EPFU	UNKN	LOW	UNKN	Total
N	95	1	95	1	96
%	98.9583	1.04167	98.9583	1.04167	
MLE (p)	0.000001				

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU	UNKN
6:00 PM	0	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0	0
8:00 PM	34	0	0	0	0	0	0	0	0
9:00 PM	4	0	0	0	0	0	0	0	0
10:00 PM	18	0	0	0	0	0	0	0	1
11:00 PM	6	0	0	0	0	0	0	0	0
12:00 AM	10	0	0	0	0	0	0	0	0
1:00 AM	18	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0	0
4:00 AM	5	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0	0
TOTALS	95	0	0	0	0	0	0	0	1

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FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P8032017..	EPFU	91.4286	LOW	97.1429	35	0.238287	20150803
P8032018..	EPFU	66.6667	LOW	66.6667	6	0.138339	20150803

P8032129.4	EPFU	73.6842	LOW	78.9474	19	0.395092	20150803
P8032133.1	EPFU	70.5882	LOW	70.5882	17	0.011023	20150803
P8032159.3	EPFU	92.3077	LOW	92.3077	13	0.443588	20150803
P8032218.0	EPFU	88.8889	LOW	88.8889	9	0.501016	20150803
P8032229.0	EPFU	100	LOW	100	6	0.796307	20150803
P8032356.0	EPFU	92	LOW	96	25	0.509991	20150803
P8040004.3	EPFU	76	LOW	80	25	0.233454	20150803
P8040004.3	EPFU	100	LOW	100	13	0.36	20150803
P8040007.4	EPFU	91.6667	LOW	91.6667	12	0.401888	20150803
P8040036.0	EPFU	83.3333	LOW	91.6667	12	0.080115	20150803
P8040036.3	EPFU	82.3529	LOW	94.1176	17	0.647676	20150803
P8040043.4	EPFU	100	LOW	100	16	0.900692	20150803
P8040116.4	EPFU	100	LOW	100	11	0.278605	20150803
P8040145.1	EPFU	91.6667	LOW	91.6667	24	0.37729	20150803
P8040146.3	EPFU	100	LOW	100	27	0.725699	20150803
P8040153.3	EPFU	84.6154	LOW	84.6154	13	0.382891	20150803
P8040153.1	EPFU	77.4194	LOW	77.4194	31	0.3775	20150803
P8040214.4	EPFU	80	LOW	85	20	0.576495	20150803
P8040215.3	EPFU	78.2609	LOW	86.9565	23	0.477209	20150803
P8040216.3	EPFU	82.3529	LOW	88.2353	17	0.60494	20150803
P8040218.4	EPFU	75	LOW	83.3333	24	0.481712	20150803
P8040228.4	EPFU	85.7143	LOW	85.7143	21	0.532917	20150803
P8040501.0	EPFU	100	LOW	100	10	0.763371	20150803
P8040511.3	EPFU	84.6154	LOW	84.6154	13	0.546164	20150803
P8040511.4	EPFU	95	LOW	95	20	0.639474	20150803
P8040512.3	EPFU	76	LOW	84	25	0.344834	20150803
P8040512.3	EPFU	85.7143	LOW	88.5714	35	0.596045	20150803
P8040512.1	EPFU	85.7143	LOW	85.7143	7	0.588754	20150803
P8040513.3	EPFU	76	LOW	84	25	0.429088	20150803

IDENTIFICATION SUMMARY

ID	EPFU	LOW	Total
N	31	31	31
%	100	100	
MLE (p)	0.000001		

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	2	0	0	0	0	0	0	0
9:00 PM	3	0	0	0	0	0	0	0
10:00 PM	2	0	0	0	0	0	0	0
11:00 PM	1	0	0	0	0	0	0	0
12:00 AM	6	0	0	0	0	0	0	0
1:00 AM	5	0	0	0	0	0	0	0

2:00 AM	5	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	7	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	31	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150804\Bat1\20150804\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150804\Bat2\20150731\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150804\Bat2\20150801\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P8012153.:	EPFU	52.381	LOW	57.1429	21	0.185398	20150801
P8012252.(	EPFU	86.6667	LOW	93.3333	30	0.648251	20150801
P8012253.(	EPFU	80	LOW	80	10	0.468458	20150801

IDENTIFICATION SUMMARY

ID	EPFU	LOW	Total
N	3	3	3
%	100	100	
MLE (p)	0.000016		

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	1	0	0	0	0	0	0	0
10:00 PM	2	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0

12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	3	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150804\Bat2\20150802\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P8022126.!	EPFU	83.3333	LOW	100	6	0.193002	20150802
P8022313.!	EPFU	42.4242	LOW	48.4848	33	0.064854	20150802
P8022313.!	EPFU	87.8049	LOW	95.122	41	0.579091	20150802
P8022313.!	EPFU	61.5385	LOW	65.3846	26	0.318601	20150802
P8022314.(	EPFU	60	LOW	74.2857	35	0.303868	20150802
P8022314.!	EPFU	86.8421	LOW	92.1053	38	0.495977	20150802
P8022314.(	EPFU	64.2857	LOW	64.2857	28	0.098967	20150802
P8022314.!	EPFU	80	LOW	80	35	0.356689	20150802
P8022315.!	EPFU	64.2857	LOW	71.4286	14	0.085111	20150802
P8022315.!	EPFU	61.1111	LOW	72.2222	18	0.25432	20150802
P8022315.(	EPFU	63.8889	LOW	83.3333	36	0.322145	20150802
P8022315.!	EPFU	78.2609	LOW	82.6087	23	0.426354	20150802
P8030511.!	EPFU	76.1905	LOW	90.4762	21	0.391107	20150802
P8030532.!	EPFU	100	LOW	100	5	0.348034	20150802

IDENTIFICATION SUMMARY

ID	EPFU	LOW	Total
N	14	14	14
%	100	100	
MLE (p)	0.000001		

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	1	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	11	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0

2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	2	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	14	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150804\Bat2\20150803\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P8032021.!	EPFU	50	LOW	50	6	0.034543	20150803
P8032346.(	EPFU	100	LOW	100	5	0.165476	20150803
P8040355.:	EPFU	48.6486	LOW	48.6486	37	0.14228	20150803
P8040355.!	EPFU	54.5455	LOW	54.5455	11	0.057816	20150803
P8040356.(	EPFU	56.25	LOW	56.25	16	0.223577	20150803
P8040356.4	EPFU	77.2727	LOW	81.8182	22	0.24826	20150803
P8040357.:	EPFU	61.5385	LOW	69.2308	13	0.253115	20150803
P8040510.:	EPFU	71.0526	LOW	73.6842	38	0.140927	20150803
P8040510.!	EPFU	77.7778	LOW	77.7778	9	0.121205	20150803
P8040528.(	EPFU	93.3333	LOW	100	15	0.532262	20150803
P8040538.:	EPFU	70	LOW	70	10	0.313164	20150803

IDENTIFICATION SUMMARY

ID	EPFU	LOW	Total
N	11	11	11
%	100	100	
MLE (p)	0.000001		

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	1	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	1	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	5	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	4	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0

7:00 AM	0	0	0	0	0	0	0	0
TOTALS	11	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150804\Bat2\20150804\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat3\20150804\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER
P8042048..	MYSE	80	MYOTIS	80	5	0.612244	20150804

IDENTIFICATION SUMMARY

ID	MYSE	MYOTIS	Total
N	1	1	1
%	100	100	
MLE (p)	0.999999		

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	1	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	1	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat3\20150805\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0

7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat3\20150806\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat3\20150807\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat3\20150808\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0

TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat3\20150809\

FILENAME SPECIES SP PERCEN GROUP GR PERCEN TOTAL PUL DISC PROB FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat4\20150804\

FILENAME SPECIES SP PERCEN GROUP GR PERCEN TOTAL PUL DISC PROB FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat4\20150806\

FILENAME	SPECIES	SP PERCEN	GROUP	GR PERCEN	TOTAL PUL	DISC PROB	FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs
\i108-000
FILENAME SPECIES SP PERCEN GROUP GR PERCEN TOTAL PUL DISC PROB FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU
6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

\\dc1\jobs\i108-000 invenergy combined cycle - ri\07 technical\ecological assessments\bats\invenergy bat field data\attributed data\20150810\Bat4\20150809\
FILENAME SPECIES SP PERCEN GROUP GR PERCEN TOTAL PUL DISC PROB FOLDER

IDENTIFICATION SUMMARY

ID	Total
N	0
%	
MLE (p)	

HOURLY BREAKDOWN

TIME	EPFU	LANO	LABO	LACI	MYLU	MYSE	MYSO	PESU

6:00 PM	0	0	0	0	0	0	0	0
7:00 PM	0	0	0	0	0	0	0	0
8:00 PM	0	0	0	0	0	0	0	0
9:00 PM	0	0	0	0	0	0	0	0
10:00 PM	0	0	0	0	0	0	0	0
11:00 PM	0	0	0	0	0	0	0	0
12:00 AM	0	0	0	0	0	0	0	0
1:00 AM	0	0	0	0	0	0	0	0
2:00 AM	0	0	0	0	0	0	0	0
3:00 AM	0	0	0	0	0	0	0	0
4:00 AM	0	0	0	0	0	0	0	0
5:00 AM	0	0	0	0	0	0	0	0
6:00 AM	0	0	0	0	0	0	0	0
7:00 AM	0	0	0	0	0	0	0	0
TOTALS	0	0	0	0	0	0	0	0

ALL FOLDERS SUMMARY

ID	EPFU	LABO	MYSE	UNKN		LOW	MID	MYOTIS	UNKN	Total
N	333	1	1	2		333	1	1	2	337
%	98.8131	0.296736	0.296736	0.593472		98.8131	0.296736	0.296736	0.593472	
MLE (p)	0.000001	0.01246	0.000001							

Appendix E

Qualitative Analysis Results

SUBJECT: ACOUSTIC DATA VISUAL INSPECTION RESULTS
DATE: SEPTEMBER 21, 2015

METHODS

We visually examined all files provided, using AnalookW version 3.7w. We compiled and summarized the results from auto-classification and visual inspection using the AnalookW Count Labels Tool. The Count Labels Tool output text file was imported into Microsoft Excel 2010 (Table 1). We also summarized the results by night (Table 2 and 3). Based on the level of information provided in a call file, a file could be classified as a bat within a frequency range (30 or 40 kHz), a tie between two species (*Eptesicus fuscus* and *Lasionycteris noctivagans* i.e. EPFU/LANO), or down to species.

RESULTS

Overall, 355 bat calls were identified with visual analysis (Table 2) compared to the 337 calls identified by BCID auto-classification (Table 3). Both classification types agreed that no bat calls were recorded at detector site Bat4. All other sites showed differences between the two classification types (Table 1). Auto-classification identified calls from three species including *E. fuscus, Lasiurus borealis* (LABO), and *Myotis septentrionalis* (MYSE). Based on visual inspection of calls, *E. fuscus* comprised the vast majority of recorded files followed by in descending order EPFU/LANO, 30K, 40K, and *Lasiurus cinereus* (LACI). Auto-classification identified one call as *M. septentrionalis* at the Bat3 site and one *L. borealis* at the Bat1 site. Visual inspection reclassified both calls. We identified the *M. septentrionalis* call as approach phase calls of another species. The *L. borealis* call was not identified due to multiple bats calling simultaneously in the file.

Table 1: Comparison of auto-classification and visual inspection results

	EPFU		EPFU or LANO		LABO		LACI		MYSE		Unknown		Noise	
Site	EPFU-bcid	EPFU-vi	EPFULANO-bcid	EPFULANO-vi	LABO-bcid	LABO-vi	LACI-bcid	LACI-vi	MYSE-bcid	MYSE-vi	UNKN-bcid	UNKWN-vi	Noise-bcid	Noise-vi
Bat1	305	266	NA	28	1						2	18	136	132
Bat2	28	20	NA	6				1				15	339	325
Bat3			NA						1			1	255	255
Bat4			NA										28	28
Total	333	**286**	**NA**	**34**	**1**	**0**	**0**	**1**	**1**	**0**	**2**	**34**	**758**	**740**

–bcid = results generated from auto-classfication, -vi = results generated from visual inspection, UNKN-vi includes classifications 30kHz and 40kHz, EPFULANO-bcid category is labeled with NA meaning not applicable as this was not a category used by BCID auto-classification

Table 2: Results from visual inspection of auto-classified calls.

Site/night	30kHz	40kHz	EPFU	LACI	EPFU/LANO	NOISE	Grand Total
Bat1	**17**	**1**	**266**		**28**	**132**	**444**
20150731	5	1	66		5	2	79
20150801	5		92		9	2	108
20150802	5		85		7	15	112
20150803	2		23		7	109	141
20150804						4	4
Bat2	**15**		**20**	**1**	**6**	**325**	**367**
20150731	2					10	12
20150801			2			6	8
20150802	5		11	1	2	25	44
20150803	8		7		4	282	301
20150804						2	2
Bat3	**1**					**255**	**256**
20150804	1					24	25
20150805						3	3
20150806						8	8
20150807						210	210
20150808						7	7
20150809						3	3
Bat4						**28**	**28**
20150804						21	21
20150806						2	2
20150808						3	3
20150809						2	2
Grand Total	***33***	***1***	***286***	***1***	***34***	***740***	***1095***

Table 3: Results from auto-classification

Site/night	EPFU-bcid	LABO-bcid	MYSE-bcid	UNKN-bcid	Noise	Grand Total
Bat1	**305**	**1**		**2**	**136**	**443**
20150731	76	1			1	78
20150801	103			1	5	108
20150802	95			1	16	112
20150803	31				110	141
20150804					4	4
Bat2	**28**				**339**	**367**
20150731					12	12
20150801	3				5	8
20150802	15				29	44
20150803	10				291	301
20150804					2	2
Bat3			**1**		**255**	**256**
20150804			1		24	25
20150805					3	3
20150806					8	8
20150807					210	210
20150808					7	7
20150809					3	3
Bat4					**28**	**28**
20150804					21	21
20150806					2	2
20150808					3	3
20150809					2	2
Grand Total	***333***	***1***	***1***	***2***	***758***	***1094***

Appendix C

Collection Permits

Rhode Island
Department of Environmental Management

DIVISION OF FISH AND WILDLIFE
277 Great Neck Rd
West Kingston, RI 02892

401 789-0281
FAX 401 783-7490

SCIENTIFIC COLLECTOR'S PERMIT

PERMIT #: 2017-15-W

Permit Type: □ Type 1 □ Type 2 ■ Type 3 □ Type 4

APPLICANT INFORMATION

Name: Alexander Patterson Occupation: Consultant

Education* (Degree, Institution): Bachelor of Science, Univ. of RI

Home Address: 10 Hemingway Drive, 2nd Floor

City: East Providence State: RI Zip Code: 02915

Phone #: 401-330-1233 Email: apatterson@essgroup.com

Business Name: ESS Group, Inc.

Principal Officer/Title: Mike Feinblatt, Vice President

Business Address: 10 Hemingway Drive, 2nd Floor

City: East Providence State: RI Zip Code: 02915

Bus. Phone #: 401-330-1233 Bus. Email: apatterson@essgroup.com

TYPE I, II, or III PERMITS—PERMITTED ACTIVITIES

1. Species to be collected:

Woodland jumping mouse (*Napaeozapus insignis*)
Meadow jumping mouse (*Zapus hudsonius*)
Meadow vole (*Microtus pennsylvanicus*)
Woodland vole (*Microtus pinetorum*)
White-footed mouse (*Peromyscus leucopus)*
Northern short-tailed shrew (*Blarina brevicauda)*
Masked shrew (*Sorex cinereus*)
Smoky shrew (*Sorex fumeus)*
Spotted salamander (*Ambystoma maculatum*)
Northern dusky salamander (*Desmognathus f. fuscus*)

Northern two-lined salamander (*Eurycea b. bislineata*)
Four-toed salamander (*Hemidactylium scutatum*)
Northern red-backed salamander (*Plethodon cinereus*)

2. Sub-legal sized individuals authorized? YES □ or NO ■

3. Number of each species authorized to be collected: Indeterminate number of each species collected. Collection size will be dependent trapping success.

4. Specific collecting location(s): Burrillville, Rhode Island

5. Collecting technique(s): Sherman live traps and pit fall array

6. Housing location of collection: No specimens will be retained.

7. Period for housing: No specimens will be retained.

8. Final disposition of collected organisms: All specimens with be released, deceased individuals to be donated to Harvard MCZ

9. Federal permit #: N/A

10. Vessel information: No vessel required.

11. Sub-permittees (List will include subpermittees' names, positions, addresses, phone numbers and affiliations): Jason Ringler, Senior Scientist, ESS Group, Inc. 10 Hemingway Drive, 2nd Floor, E. Providence, RI 02915, 401-330-1234

PERMIT PROVISIONS

- This permit expires on December 31 of each year unless an earlier date is specified on the permit. An annual report of specimens collected must be filed with the Division of Fish & Wildlife within thirty (30) days of the expiration date of the permit. Failure to provide report may result in the revocation of permit and /or denial of future permits.
- The permittee and all sub-permittees must have a copy of this permit in their possession at all times while conducting approved activities.
- No animals taken under the provisions of a Collector's permit shall be sold, offered for sale, traded or bartered.
- The capture, handling, or possession of any endangered species, which means any animal so declared by the United States secretaries of the interior or commerce under the provisions of the Federal Endangered Species Conservation Act or any animal so declared by the Director of the Rhode Island Department of Environmental Management pursuant to Chapter 34 of Title 42 of the Rhode Island General Laws of 1956, as amended, unless specifically approved by this permit and applicable federal requirements, is prohibited.
- Permit applications requesting the capture, handling, or possession of migratory birds must be accompanied by the applicant's current federal banding or migratory bird permit.
- The DEM Wildlife and Law Enforcement Divisions and local police departments must be provided with written notice of at least forty eight (48) hours prior to specific times during which deer removals are to be initiated.
- Issuance of a permit does not exempt the permittee from compliance with the provisions of any other local, state, or federal statues, regulations or ordinances unless explicitly exempted from such restrictions pursuant to this permit.
- Any collecting gear left untended, must have identification on it indicating your name and permit #.

Approved By:

Deputy Chief of Wildlife — 3/30/17 Date

Rhode Island
Department of Environmental Management

DIVISION OF FISH AND WILDLIFE
277 Great Neck Rd
West Kingston, RI 02892

401 789-0281
FAX 401 783-7490

SCIENTIFIC COLLECTOR'S PERMIT

PERMIT #: 2017-36-W

Permit Type: ✓ Type 1 □ Type 2 □ Type 3 □ Type 4

APPLICANT INFORMATION

Name: Alexander Patterson Occupation: Consultant

Home Address: 10 Hemingway Drive 2nd Floor, East Providence, RI 02915

Phone #: 401-330-1233 Home Email: apatterson@essgroup.com

Business Name: ESS Group, Inc.

Principal Officer/Title: Mike Feinblatt, Vice President

Business Address: 10 Hemingway Drive 2nd Floor East Providence, RI 02915

Bus. Phone #: 401-330-1233 Bus. Email: apatterson@essgroup.com

TYPE I, II, or III PERMITS—PERMITTED ACTIVITIES

1. Species to be collected:
2. Sub-legal sized individuals authorized? YES □ or NO ✓
3. Number of each species authorized to be collected: Dependant on trap success.
4. Specific collecting location(s): Burrillville, RI
5. Collecting technique(s): Sherman live traps and pit fall array
6. Housing location of collection: N/A
7. Period for housing: N/A.
8. Final disposition of collected organisms: All specimens will be released; deceased individuals to be donated to Harvard MCZ.
9. Federal permit #: N/A

Jason Ringler, Senior Scientist, Mark Mello, Research Director

PERMIT PROVISIONS

- This permit expires on December 31 of each year unless an earlier date is specified on the permit. An annual report of specimens collected must be filed with the Division of Fish & Wildlife within thirty (30) days of the expiration date of the permit. Failure to provide report may result in the revocation of permit and /or denial of future permits.
- The permittee and all sub-permittees must have a copy of this permit in their possession at all times while conducting approved activities.
- No animals taken under the provisions of a Collector's permit shall be sold, offered for sale, traded or bartered.
- The capture, handling, or possession of any endangered species, which means any animal so declared by the United States secretaries of the interior or commerce under the provisions of the Federal Endangered Species Conservation Act or any animal so declared by the Director of the Rhode Island Department of Environmental Management pursuant to Chapter 34 of Title 42 of the Rhode Island General Laws of 1956, as amended, unless specifically approved by this permit and applicable federal requirements, is prohibited.
- Permit applications requesting the capture, handling, or possession of migratory birds must be accompanied by the applicant's current federal banding or migratory bird permit.
- Permittees must possess a valid Rhode Island firearms hunting license, if using firearms while collecting or taking animals under the authority of a Collector's permit. The use of firearms is subject to all state and local restrictions unless explicitly exempted from such restrictions pursuant to this permit.
- Deer removals may only be conducted between September 1 and March 31 using approved equipment and procedures.
- The DEM Wildlife and Law Enforcement Divisions and local police departments must be provided with written notice of at least forty eight (48) hours prior to specific times during which deer removals are to be initiated.
- Issuance of a permit does not exempt the permittee from compliance with the provisions of any other local, state, or federal statues, regulations or ordinances unless explicitly exempted from such restrictions pursuant to this permit.
- Any collecting gear left untended, must have identification on it indicating your name and permit #.
- If collecting molluscan shellfish from any marine waters designated as polluted, you MUST notify the Division of Enforcement by phone (401-222-3070) indicating the exact date, time and place you plan to sample.
- If collecting prohibited or research shark species, you MUST submit a report for each individual shark to DFW within thirty (30) days stating species ID, length, weight, date and location (lat/long) of collection, and gear used. Annual reports are due by Dec. 31 of each year for the lifespan of the individuals taken for display indicating updated length and weight measurements.

Approved By:

Deputy Chief of Wildlife — 6/5/17 Date

Appendix D

Lloyd Center Report

Survey of insects focusing on Lepidoptera at Algonquin site in Burrillville, Rhode Island

Mark J. Mello
Research Director
LLOYD CENTER FOR THE ENVIRONMENT
430 Potomska Road
Dartmouth, MA 02748
508-990-0505 x22
markmello@lloydcenter.org
www.lloydcenter.org

Report to:

ESS Group, Inc.
10 Hemingway Drive, 2nd Floor
East Providence, RI 02915

Lloyd Center Report # 2017-1

INTRODUCTION

This survey involved a two-night light trap insect survey focusing on moths in three habitat types at the proposed Clear River Energy Center (CREC) in Burrillville, Rhode Island. Daytime surveys for butterflies were also conducted. The resultant two field trips, separated by one month provides a snapshot of the Lepidopteran diversity at the proposed project site.

METHODS

Light trap survey.

Two light trap surveys were conducted: one the night of June 3/4 and the other on July 8/9, 2017. During the initial survey the project boundaries and habitat types were reviewed. Subsequently, three stations for light trap operation were selected that would provide the most diverse picture of habitat use by moth species on the project site (Figure 1).

Station 1 (Figure 2) was located upon a boulder overlooking a red maple (*Acer rubrum*) swamp with the predominant understory vegetation being coastal sweet-pepperbush (*Clethra alnifolia*) and mountain American-laurel (*Kalmia latifolia*). Scattered birch (*Betula* sp.), eastern white pine (*Pinus strobus*) and red oak (*Quercus rubra*) were also in the canopy.

Station 2 (Figure 3) was located within a red maple-dominated upland with an ericaceous understory. Red oak and white oak (*Quercus alba*) were also scattered within the canopy.

Station 3 (Figure 4) was located on the dry upland ridge dominated by oaks with an ericaceous understory. Birch, red maple and sassafras (*Sassafras albidum*) were also within the canopy, and other understory vegetation included witch hazel (*Hamamelis virginiana*), sheep American-laurel (*Kalmia angustifolia*), and bracken fern (*Pteridium aquililum*).

Portable light traps charged with ethyl acetate were set each night prior to dusk and retrieved the following morning. All macrolepidoptera present within the traps were identified and counted, and any species listed in “Rare Native Animals of Rhode Island” are discussed in detail. Moth nomenclature has gone through several revisions in the last decade. In general, name and catalog numbers for the Geometridae through Sphingidae follow the Hodges 1983 Checklist of the moths of North America north of Mexico. The Noctuoidea (Notodontidae through Noctuidae) follow the Lafontaine & Schmidt, 2010 Annotated List of Noctuoidea of North America North of Mexico, with subsequent published updates or new species. Plant names follow Haines 2011 “Flora Novae Angliae: A Manual for the Identification of Native and Naturalized Higher Vascular Plants of New England”.

Day time Surveys.

During both days of trap set-up and retrieval, visual searches were conducted for butterflies, day-flying moths, and tiger beetles. The transect route(s) followed established trails through the three habitat types mentioned above. All species observed within these taxa were identified and any rare species counted.

RESULTS

Light trap survey.

A two-night total of 3,551 macro-moths representing 128 species were documented (Table 1). The three most dominant species were the forest tent caterpillar moth, *Malacosoma disstria* (986 individuals), the gypsy moth, *Lymantria dispar* (839 individuals) and the common idia, *Idia aemula* (732 individuals). Thus 72% of the moths collected were of these three

species. The project area was largely defoliated in 2016, as was much of Rhode Island. Although gypsy moths were the major cause, at least at this site forest tent caterpillar also must have contributed to the defoliation as well. Both these species' larvae feed upon a wide variety of deciduous trees. The common idia is within the subfamily, Herminiinae, of which a total of 1079 individuals were documented. The larvae in the subfamily are mostly detritus, dead leaves, and leaf litter feeders, and as such, are not considered "pests" despite their abundance, but are part of the decomposer community that are abundant in forested habitats that usually have a deep layer of leaf litter.
No species listed in "Rare Native Animals of Rhode Island were encountered.

Daytime survey.

Six species of butterflies were encountered, which were:

Papilio glaucus – 1 Eastern Tiger Swallowtail. June 4 trail at eastern corner of the property adjacent to Buck Hill Road.

Papilio troilus - 3 Spicebush Swallowtails. June 3 and June 4 along trail bisecting the property east of the power station.

Speyeria cybele - 4 Great Spangled Fritillaries. July 9 adjacent to Station 3 and along poweline cut adjacent to woodland.

Vanessa virginiensis – 1 American Lady. July 9 adjacent to Station 3

Vanessa atalanta – 2 Red Admirals. One each July 8 and July 9 near Station 3

Mephisto cymela – 1 Little Wood Satyr. June 3 along trail bisecting the property east of the power station.

All six species are common and widely distributed throughout Rhode Island. No tiger beetles or diurnal moth species were detected during this survey.

DISCUSSION

Although no species listed in "Rare Native Animals of Rhode Island were encountered, one moth species that was caught at Station 3 on June 3/4, *Euchlaena madusaria* (Geometridae) is listed as Special Concern in the Massachusetts Endangered Species Act (MESA). This species is a sandplain/barrens species whose larvae feed on scrub oak and/or blueberry. It is likely that the adjacent powerline cut contains suitable habitat for this species. The single individual, *Grammia figurata* (Arctiinae) documented at Station 3 is a sandplain species that may have originated from the powerline cut.

All other moth species that were documented are common, widespread species, particularly in forested habitats. Large silkworm moths (Saturniidae) and Sphinx moths (Sphingidae) were nearly absent, a trend seen throughout mainland southern New England.

Figure 1. Site location and trap stations.

Figure 2. Station 1, red maple swamp with sweet pepperbush and mountain laurel understory.

Figure 3. Red maple upland with ericaceous understory.

Figure 4. Station 3, oak woodland with ericaceous understory.

Table 1. list of macrolepidoptera documented by light trap at Algonquin site during 2017.

Station 1 = red maple swamp Station 2 = red maple upland with ericaceous understory

Station 3 = oak woodland with ericaceous understory

* trap malfunction on July 8 ** June 3 only

		month	June			July			Station subtotals			Total
		day	3	3	3	8	8	8				
		station	1	2	3	1	2*	3	1	2**	3	
Zookeys #	MONA #	method	uv	uv	uv	uv	uv	uv				
		GEOMETRIDAE										
		Ennominae										
	6273	Speranza pustularia						4			4	4
	6326	Macaria aemulataria	1		1				1		1	2
	6342	Macaria bisignata			1						1	1
	6347	Macaria pinistrobata	1	1					1	1		2
	6348	Macaria fissinotata	2						2			2
	6582	Iridopsis vellivolata	1						1			1
	6583	Iridopsis ephyraria				5		1	5		1	6
	6597	Ectropis crepuscularia				2			2			2
	6598	Protoboarmia porcelaria	9	5	16			1	9	5	17	31
	6599	Epimecis hortaria		1						1		1
	6620	Melanolophia canadaria	2	2	2				2	2	2	6
	6638	Eufidonia notataria	1						1			1
	6654	Hypagyrtis unipunctata	1	9	4	1			2	9	4	15
	6720	Lytrosis unitaria				2		1	2		1	3
	6724	Euchlaena serrata						2			2	2
	6731	Euchlaena madusaria			2						2	2
	6734	Euchlaena marginaria		1						1		1
	6755	Pero morrisonaria	1	1	3				1	1	3	5
	6763	Phaeoura quernaria			1						1	1
	6796	Campaea perlata	4	3					4	3		7
	6812	Homochlodes fritillaria			1						1	1
	6815	Gueneria similaria	1	2	3				1	2	3	6
	6823	Metarranthis angularia		1	2					1	2	3
	6826	Metarranthis hypochraria		2						2		2
	6840	Plagodis serinaria	1	1	1				1	1	1	3
	6844	Plagodis alcoolaria		1	4					1	4	5
	6884	Besma endropiaria	2		3				2		3	5
	6885	Besma quercivoraria	7	7	5				7	7	5	19
	6888	Lambdina fiscellaria		3						3		3
	6892	Lambdina pellucidaria		1						1		1
	6894	Lambdina fervidaria	3	3	2				3	3	2	8
	6941	Eusarca confusaria				1			1			1
	6964	Tetracis cachexiata	12	1	3				12	1	3	16
	6965	Eugonobapta nivosaria				4			4			4
	6966	Eutrapela clemataria	1						1			1
		Geometrinae										
	7047	Nemoria rubrifrontaria		1	1					1	1	2
	7084	Hethemia pistasciaria	1						1			1
		Sterrhinae										
	7139	Cyclophora pendulinaria	1	3	6			1	1	3	7	11
	7159	Scopula limboundata				3		2	3		2	5
		Larentiinae										
	7307	Mesoleuca ruficilliata			1						1	1
	7414	Orthonama obstipata						1			1	1
	7640	Lobophora nivigerata		1	1					1	1	2
		Eupithecia sp.	4	2					4	2		6

		LASIOCAMPIDAE										
	7698	Malacosoma disstria				207		779	207		779	986
	7701	Malacosoma americana				1			1			1
		SATURNIIDAE										
	7715	Dryocampa rubicunda	1	1	2				1	1	2	4
		SPHINGIDAE										
	7810.1	Sphinx poecilla		1	4					1	4	5
	7817	Lapara bombycoides						1			1	1
	7824	Paonias excaecata				1			1			1
		NOTODONTIDAE										
930010	7917	Hyperaeschra georgica	1	2					1	2		3
930019	7931	Gluphisia septentrionis		1	1					1	1	2
930035	7904	Datana drexelii				2		3	2		3	5
930037	7906	Datana contracta						1			1	1
930046	7915	Nadata gibbosa	6	1	5			2	6	1	7	14
930049	7920	Peridea angulosa	2					2	2		2	4
930050	7921	Peridea ferruginea		2	2					2	2	4
930075	7983	Heterocampa obliqua						1			1	1
930082	7990	Heterocampa umbrata		1	2					1	2	3
930086	7994	Heterocampa guttivitta	2						2			2
930087	7995	Heterocampa biundata	4	1	1				4	1	1	6
		EREBIDAE										
		Lymantriinae										
930141	8318	Lymantria dispar				470		369	470		369	839
930168	8316	Orgyia leucostigma						1			1	1
		Arctiinae										
930205	8090	Hypoprepia fucosa						4			4	4
920253		Grammia figurata		1	4					1	4	5
930280	8171	Apantesis nais			1						1	1
930297	8118	Virbia opella				35		15	35		15	50
930309	8134	Spilosoma congrua	15	10	8	1		1	16	10	9	35
930311	8133	Spilosoma latipennis			1						1	1
930360	8203	Halysidota tessellaris						1			1	1
		Herminiinae										
930469	8322	Idia americalis			1	2		7	2		8	10
930471	8323	Idia aemula				53		679	53		679	732
930474	8326	Idia rotundalis				106		64	106		64	170
930475	8327	Idia forbesii				9		11	9		11	20
930477	8329	Idia diminuendis				5		29	5		29	34
930478	8330	Idia scobialis						1			1	1
930482	8334	Idia lubricalis						1			1	1
930489	8340	Zanclognatha lituralis				3			3			3
930496	8349	Zanclognatha protumnusalis				1		1	1		1	2
930498	8351	Zanclognatha cruralis				1			1			1
930500	8353	Zanclognatha jacchusalis				16		24	16		24	40
930502	8355	Chytolita morbidalis	7	7	9				7	7	9	23
930514	8364	Phalaenostola larentioides						1			1	1
930520	8370	Bleptina caradrinalis				3		27	3		27	30
930529	8378	Renia salusalis						4			4	4
930536	8384.1	Renia flavipunctalis						1			1	1
930539	8387	Renia sobrialis						2			2	2
930551	8397	Palthis angulalis			2						2	2
930555	8401	Redectis vitrea				2			2			2
		Pangraptinae										
930559	8490	Pangrapta decoralis		1	1					1	1	2
		Hypeninae										
930562	8442	Hypena baltimoralis	3	1	3				3	1	3	7

		Scolecocampinae										
930637	8514	Scolecocampa liburna						1			1	1
930643	8522	Gabara subnivosella						1			1	1
		Hypenodinae										
930662	8421	Hypenodes fractilinea	1	3	12				1	3	12	16
		Erebinae										
930847	8865	Catocala praeclara						1			1	1
930915	8641	Drasteria grandirena			1						1	1
930923	8738	Caenurgina crassiuscula						1			1	1
930962	8721	Allotria elonympha		1						1		1
931053	8717	Zale horrida	1		1				1		1	2
931060	9818	Amolita fessa				1			1			1
		NOLIDAE										
931121	8983	Meganola minuscula	2		1				2		1	3
931139	8996	Nola clethrae	5	7	3				5	7	3	15
931149	8970	Baileya ophthalmica			1						1	1
		NOCTUIDAE										
		Eustrotinae										
931297	9059	Capis curvata				1			1			1
		Acontinae										
931319	9095	Ponometia erastrioides			1						1	1
		Pantheinae										
931396	9182	Panthea furcilla	1		1	1			2		1	3
		Acronictinae										
931463	9243	Acronicta ovata				2		2	2		2	4
931470	9251	Acronicta retardata		1	1					1	1	2
931471	9254	Acronicta afflicta	1		2				1		2	3
931494	9281	Agriopodes fallax			1						1	1
931499	8104	Comachara cadburyi	1						1			1
		Condicinae										
931989	9690	Condica videns			1						1	1
		Eriopinae										
932192	9631	Callopistria mollissima				1			1			1
		Noctuinae										
932205	9053	Pseudeustrotia carneola	1						1			1
932234	9681.1	Elaphria alapallida	8	17	23				8	17	23	48
932238	9684	Elaphria grata		1						1		1
932266	9647	Proxenus miranda			1						1	1
932269	9650	Athetis tarda	6	12	19				6	12	19	37
932713	9556	Chytonix palliatricula	1	2		1		4	2	2	4	8
932883	10301	Spiramater lutra		1	3					1	3	4
932906	10265	Sideridis rosea			3						3	3
932928	10431	Dargida diffusa			1						1	1
933089	10532.1	Homorthodes lindseyi		2						2		2
933113	10563	Protorthodes oviduca			1						1	1
933118	10567	Ulolonche culea	5	20	43				5	20	43	68
933120	10569	Ulolonche modesta		1	11					1	11	12
933138	10587	Orthodes cynica	2	2	2				2	2	2	6
933146	10288	Orthodes detracta				6		17	6		17	23
933547	11010	Lycophotia phyllophora						3			3	3
		total number individuals	132	152	243	949	0	2075	1081	152	2318	3551
		Total # species	42	48	59	32	0	43	70	48	97	128
		month	June			July			Station			
		day	3	3	3	8	8	8	subtotals			Total
		station	1	2	3	1	2*	3	1	2**	3	

Appendix E

Stream Habitat Assessment Data Sheets

HABITAT ASSESSMENT FIELD DATA SHEET

SARIS NO. _____ RIVER BASIN _____

RIVER MILE _____ ECOREGION REFERENCE SITE _____

DATE 5/24/17 INVESTIGATOR AP, AC

DESCRIBE SITE LOCATION IRON MINE BROOK

Comments:

Riffle/Run Prevalent Streams are those in moderate to high-gradient landscapes that sustain water velocities of approximately 30 cm/sec or greater. Natural streams have substrates primarily composed of coarse sediment particles (i.e., gravel or larger) or frequent coarse particulate aggregations along stream reaches.

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)	A mix of snags, submerged logs, undercut banks, rubble, or other stable habitat in greater than 50% of the sample area	30-50% of area with a mix of stable habitat; adequate habitat for maintenance of populations.	10-30% of area with a mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% of area with a mix of stable habitat; lack of habitat is obvious; substrate unstable or lacking.
17				
SCORE	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Epifaunal Substrate	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble. (Boulders prevalent in headwater streams).	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or bedrock prevalent; some cobble present.	Riffles or runs virtually nonexistent; bedrock prevalent; cobble lacking.
17				
SCORE	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
15				
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted.
20				
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
20				
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Frequency of Riffles (or bends) / Velocity-Depth Combinations	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important; All 4 velocity/depth patterns present.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15. Only 3 of 4 velocity/depth patterns present (i.e., slow [<0.3 m/s]-deep [>0.5 m]; slow-shallow; fast-deep; fast-shallow).	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25. Only 2 velocity/depth patterns present; usually lacking deep areas.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25. Dominated by one velocity/depth pattern.
16				
SCORE	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
20				
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 9 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score:

185

Physical Characterization/Water Quality Field Data Sheet

STATION:_____ STREAM NAME:_____ RIVER MILE: _____ DATE:_____

RIVER BASIN:_____ STREAM CLASSIFICATION:_____INVESTIGATORS:_____

DESCRIBE LOCATION:_____

STREAM CHARACTERIZATION

■ Subsystem Classification
___ Tidal
___ Lower Perennial
_X_ Upper Perennial
___ Intermittent

■ Stream Type
___ Coldwater
_X_ Warmwater

RIPARIAN ZONE/INSTREAM FEATURES

■ Predominant Surrounding Land Use
_X_ Forest
___ Field/Pasture
___ Agricultural
___ Residential
___ Commercial
___ Industrial
___ Other
■ Channelized ___Y _X_N
■ Dam Present ___Y _X_N

■ Local Water Erosion
_X_ None
___ Moderate
___ Heavy
■ Local Watershed NPS Pollution
_X_ No evidence
___ Some potential sources
___ Obvious sources
■ High Water Mark ___m
■ Velocity ___m/sec

■ Estimated Stream Width 3 m
■ Estimated Stream Depth
Riffle 0.5 m
Run 0.5 m
Pool 1 m
■ Est. Fish Reach Length___ m
■ Canopy Cover
___ Partly open
___ Partly shaded
_X_ Shaded

SEDIMENT/SUBSTRATE

■ Odors
_X_ Normal
___ Sewage
___ Petroleum
___ Chemical
___ Anaerobic
___ None
___ Other

■ Oils
_X_ Absent
___ Slight
___ Moderate
___ Profuse
___ Relict shells
___ Other

■ Deposits
___ Sludge
___ Sawdust
___ Paper fiber
___ Sand

■ Are the underside of stones not deeply embedded black?
___Y _X_N

INORGANIC SUBSTRATE COMPONENTS			ORGANIC SUBSTRATE COMPONENTS		
Substrate Type	Diameter	Percent Composition in Sampling Area	Substrate Type	Characteristic	Percent Composition in Sampling Area
Bedrock		0%	Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	>256mm (10 in)	10%			
Cobble	64-256mm (2.5-10 in)	20%			
Gravel	2-64mm (0.1-2.5 in)	40%	Muck-mud	black, very fine organic (FPOM)	0
Sand	0.06-2mm (gritty)	30%			
Silt	0.004-0.06mm	0%	Marl	grey, shell fragments	0
Clay	<0.004mm (slick)	0%			

WATER QUALITY

■ Temperature _____
■ Specific Conductance ___
■ Dissolved Oxygen ___
■ pH ___
■ Turbidity

■ Water Odors
_X_ Normal/None
___ Sewage
___ Petroleum
___ Chemical
___ Fish

■ Water Surface Oils
___ Slick
___ Sheen
___ Globs
___ Flecks
_X_ None

■ Turbidity (if not measured)
_X_ Clear
___ Slightly turbid
___ Turbid
___ Opaque
___ Water color

HABITAT ASSESSMENT FIELD DATA SHEET

SARIS NO. _____ RIVER BASIN _____

RIVER MILE _____ ECOREGION REFERENCE SITE _____

DATE 5/24/17 INVESTIGATOR AP. AC

DESCRIBE SITE LOCATION Unnamed trib to Iron Mine Brook

Comments:

Riffle/Run Prevalent Streams are those in moderate to high-gradient landscapes that sustain water velocities of approximately 30 cm/sec or greater. Natural streams have substrates primarily composed of coarse sediment particles (i.e., gravel or larger) or frequent coarse particulate aggregations along stream reaches.

Habitat Parameter	Category			
	Optimal	**Suboptimal**	**Marginal**	**Poor**
1. Instream Cover (Fish)	A mix of snags, submerged logs, undercut banks, rubble, or other stable habitat in greater than 50% of the sample area	30-50% of area with a mix of stable habitat; adequate habitat for maintenance of populations.	10-30% of area with a mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% of area with a mix of stable habitat; lack of habitat is obvious; substrate unstable or lacking.
16				
SCORE	20 19 18 17 (16)	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Epifaunal Substrate	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble. (Boulders prevalent in headwater streams).	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or bedrock prevalent; some cobble present.	Riffles or runs virtually nonexistent; bedrock prevalent; cobble lacking.
10				
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
7				
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted.
20				
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
18				
SCORE	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Frequency of Riffles (or bends) / Velocity-Depth Combinations	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important; All 4 velocity/depth patterns present.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15. Only 3 of 4 velocity/depth patterns present (i.e., slow [<0.3 m/s]-deep [>0.5 m]; slow-shallow; fast-deep; fast-shallow).	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25. Only 2 velocity/depth patterns present; usually lacking deep areas.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25. Dominated by one velocity/depth pattern.
18				
SCORE	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
20				
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score:

169

Physical Characterization/Water Quality Field Data Sheet

STATION:_____ STREAM NAME:_____ RIVER MILE: _____ DATE:_____

RIVER BASIN:_____ STREAM CLASSIFICATION:_____ INVESTIGATORS:_____

DESCRIBE LOCATION:_____

STREAM CHARACTERIZATION

■ Subsystem Classification
___ Tidal
___ Lower Perennial
___ Upper Perennial
X Intermittent

■ Stream Type
___ Coldwater
X Warmwater

RIPARIAN ZONE/INSTREAM FEATURES

■ Predominant Surrounding Land Use
X Forest
___ Field/Pasture
___ Agricultural
___ Residential
___ Commercial
___ Industrial
___ Other
■ Channelized ___Y X N
■ Dam Present ___Y X N

■ Local Water Erosion
X None
___ Moderate
___ Heavy
■ Local Watershed NPS Pollution
X No evidence
___ Some potential sources
___ Obvious sources
■ High Water Mark ___m
■ Velocity ___m/sec

■ Estimated Stream Width 1.5 m
■ Estimated Stream Depth
Riffle 0.3 m
Run 0.3 m
Pool 0.5 m
■ Est. Fish Reach Length___ m
■ Canopy Cover
___ Partly open
___ Partly shaded
X Shaded

SEDIMENT/SUBSTRATE

■ Odors
X Normal
___ Sewage
___ Petroleum
___ Chemical
___ Anaerobic
___ None
___ Other

■ Oils
X Absent
___ Slight
___ Moderate
___ Profuse
___ Relict shells
___ Other

■ Deposits
___ Sludge
___ Sawdust
___ Paper fiber
___ Sand

■ Are the underside of stones not deeply embedded black?
X Y ___N

INORGANIC SUBSTRATE COMPONENTS			ORGANIC SUBSTRATE COMPONENTS		
Substrate Type	Diameter	Percent Composition in Sampling Area	Substrate Type	Characteristic	Percent Composition in Sampling Area
Bedrock		0 %	Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	>256mm (10 in)	5 %			
Cobble	64-256mm (2.5-10 in)	10%			
Gravel	2-64mm (0.1-2.5 in)	40%	Muck-mud	black, very fine organic (FPOM)	0
Sand	0.06-2mm (gritty)	40%			
Silt	0.004-0.06mm	5%	Marl	grey, shell fragments	0
Clay	<0.004mm (slick)	0%			

WATER QUALITY

■ Temperature _____
■ Specific Conductance ___
■ Dissolved Oxygen ___
■ pH ___
■ Turbidity

■ Water Odors
X Normal/None
___ Sewage
___ Petroleum
___ Chemical
___ Fish

■ Water Surface Oils
___ Slick
___ Sheen
___ Globs
___ Flecks
X None

■ Turbidity (if not measured)
X Clear
___ Slightly turbid
___ Turbid
___ Opaque
___ Water color

HABITAT ASSESSMENT FIELD DATA SHEET

SARIS NO. _____ RIVER BASIN _____

RIVER MILE _____ ECOREGION REFERENCE SITE _____

DATE 5/24/17 INVESTIGATOR AP, AC

DESCRIBE SITE LOCATION Dry Arm Brook

Comments:

Riffle/Run Prevalent Streams are those in moderate to high-gradient landscapes that sustain water velocities of approximately 30 cm/sec or greater. Natural streams have substrates primarily composed of coarse sediment particles (i.e., gravel or larger) or frequent coarse particulate aggregations along stream reaches.

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
1. Instream Cover (Fish)	A mix of snags, submerged logs, undercut banks, rubble, or other stable habitat in greater than 50% of the sample area	30-50% of area with a mix of stable habitat; adequate habitat for maintenance of populations.	10-30% of area with a mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% of area with a mix of stable habitat; lack of habitat is obvious; substrate unstable or lacking.
17				
SCORE	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
2. Epifaunal Substrate	Well-developed riffle and run; riffle is as wide as stream and length extends two times the width of stream; abundance of cobble. (Boulders prevalent in headwater streams).	Riffle is as wide as stream but length is less than two times width; abundance of cobble; boulders and gravel common.	Run area may be lacking; riffle not as wide as stream and its length is less than 2 times the stream width; gravel or bedrock prevalent; some cobble present.	Riffles or runs virtually nonexistent; bedrock prevalent; cobble lacking.
18				
SCORE	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
3. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
15				
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	New embankments present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted.
20				
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
18				
SCORE	20 19 (18) 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Frequency of Riffles (or bends) / Velocity-Depth Combinations	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important; All 4 velocity/depth patterns present.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15. Only 3 of 4 velocity/depth patterns present (i.e., slow [<0.3 m/s]-deep [>0.5 m]; slow-shallow; fast-deep; fast-shallow).	Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25. Only 2 velocity/depth patterns present; usually lacking deep areas.	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25. Dominated by one velocity/depth pattern.
17				
SCORE	20 19 18 (17) 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
20				
SCORE	(20) 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Habitat Parameter	Category			
	Optimal	Suboptimal	Marginal	Poor
8. Bank Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
9. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters: little or no riparian vegetation due to human activities.
SCORE 10 (LB)	Left Bank (10) 9	8 7 6	5 4 3	2 1 0
SCORE 10 (RB)	Right Bank (10) 9	8 7 6	5 4 3	2 1 0

Total Score:

185

Physical Characterization/Water Quality Field Data Sheet

STATION:_____ STREAM NAME:_____ RIVER MILE: _____ DATE:_____

RIVER BASIN:_____ STREAM CLASSIFICATION:_____ INVESTIGATORS:_____

DESCRIBE LOCATION:_____

STREAM CHARACTERIZATION

■ Subsystem Classification
___ Tidal
___ Lower Perennial
X Upper Perennial
___ Intermittent

■ Stream Type
___ Coldwater
X Warmwater

RIPARIAN ZONE/INSTREAM FEATURES

■ Predominant Surrounding Land Use
X Forest
___ Field/Pasture
___ Agricultural
___ Residential
___ Commercial
___ Industrial
___ Other
■ Channelized ___Y X N
■ Dam Present ___Y X N

■ Local Water Erosion
X None
___ Moderate
___ Heavy
■ Local Watershed NPS Pollution
X No evidence
___ Some potential sources
___ Obvious sources
■ High Water Mark ___m
■ Velocity ___m/sec

■ Estimated Stream Width 2 m
■ Estimated Stream Depth
Riffle 0.5 m
Run 0.5 m
Pool 0.8 m
■ Est. Fish Reach Length___ m
■ Canopy Cover
___ Partly open
___ Partly shaded
X Shaded

SEDIMENT/SUBSTRATE

■ Odors
X Normal
___ Sewage
___ Petroleum
___ Chemical
___ Anaerobic
___ None
___ Other

■ Oils
X Absent
___ Slight
___ Moderate
___ Profuse
___ Relict shells
___ Other

■ Deposits
___ Sludge
___ Sawdust
___ Paper fiber
___ Sand

■ Are the underside of stones not deeply embedded black?
X Y ___N

INORGANIC SUBSTRATE COMPONENTS			ORGANIC SUBSTRATE COMPONENTS		
Substrate Type	Diameter	Percent Composition in Sampling Area	Substrate Type	Characteristic	Percent Composition in Sampling Area
Bedrock		0	Detritus	sticks, wood, coarse plant materials (CPOM)	10%
Boulder	>256mm (10 in)	20%			
Cobble	64-256mm (2.5-10 in)	10%			
Gravel	2-64mm (0.1-2.5 in)	50%	Muck-mud	black, very fine organic (FPOM)	0
Sand	0.06-2mm (gritty)	20%			
Silt	0.004-0.06mm	0%	Marl	grey, shell fragments	0
Clay	<0.004mm (slick)	0%			

WATER QUALITY

■ Temperature _____
■ Specific Conductance ___
■ Dissolved Oxygen ___
■ pH ___
■ Turbidity

■ Water Odors
X Normal/None
___ Sewage
___ Petroleum
___ Chemical
___ Fish

■ Water Surface Oils
___ Slick
___ Sheen
___ Globs
___ Flecks
X None

■ Turbidity (if not measured)
X Clear
___ Slightly turbid
___ Turbid
___ Opaque
___ Water color

Appendix F

Plant Survey Report

Invenergy Vascular Plant Species Survey Report

Vascular plant species surveys were conducted on 5/24/2017 and 7/3/2017 in Burrville, RI at the proposed Invenergy project site. A list of targeted rare plants from RI DEM of species previously known from the general vicinity was used as a guide to direct habitat surveys, see list below. Aerial photographs were used to locate likely habitats for these species, these areas were visually surveyed for these plants. In addition to the likely habitats of these plants the project footprint, staging area, and proposed new power line corridor were surveyed. A visual meander survey was conducted by walking through each area and identifying all vascular plant species observed. Meander surveys are advantageous to maximizing the vascular plant diversity found because they enable small microhabitats to be thoroughly surveyed that could be missed in a fixed plot or fixed grid sampling methodology. Microclimates and microhabitats such as stream banks, wetlands, rock ledges, and other areas of high plant diversity or likely to support unique species were intensively investigated.

The site is an acidic woodland. The majority of the area is an oak/hickory dominated woodland with red maple and white pine components. The shrub layer is composed mostly of mountain laurel, witch hazel, and sweet pepper bush. The understory is composed of woodland species e.g. starflower, wild sarsaparilla, hay scented fern, New York fern, Indian cucumber root, and interrupted fern. A few painted Trilliums, *Trillium undulatum*, a species of concern for RI were found near the woods road.

The existing right of way and the associated Atlantic white cedar swamp harbors sundews and cranberries. A yellow eyed grass taxon was found in this vicinity during the May survey, it was too early in the season to key it out to species, one species *Xyris montana* is a threaten species in Rhode Island. In the later survey the plants could not be relocated likely because the area had been highly disturbed by ATVs.

The proposed new right of way area of the site is composed of a much younger forest, with black birch dominating, with an under story of huckleberry. The soils of this area are also stonier with chestnut oak becoming a component.

The staging are of the project was a mature red maple, red oak, and white pine forest. The shrub layer was again composed primarily of sweet pepper bush, witch hazel, highbush blueberry, and mountain laurel. The understory is composed of herbaceous species such as starflower, New York fern, Indian cucumber root, and goldenthread. A few additional painted Trilliums, *Trillium undulatum*, a species of concern for RI were found in this area.

Invasive species are generally few throughout the woodland. The existing woods road has invasive species interspersed along its length with a concentration of invasive species at the four way cross roads. The invasive plants species on the site

include Japanese stilt grass, Japanese barberry, Asiatic bittersweet, multiflora rose, yellow iris, and reed canary grass.

The May and July sample dates were intentionally chosen to thoroughly sample the site and to catch plant species with different seasonality. During the second survey on July 3, 2017 40 additional species were recorded. Several sedges and rushes were detected in the later survey because by that time they had developed flowers or fruits.

A total of 125 vascular plant species were observed on 5/24/2017, with an additional 40 seen on 7/3/2017 for a grand total of 165 vascular plant species for the site, see list below. The most significant find was *Trillium undulatum*, Painted Trillium, a species of concern for the state of Rhode Island.

Genus	Species	Common Name
Acer	*rubrum*	Red maple
Acer	*platanoides*	Norway maple
Alliaria	*petiolata*	Garlic mustard
Alnus	*incana*	Speckled alder
Ambrosia	*artemisiifolia*	Common ragweed
Amelanchier	*sp.*	Shadbush
Anemone	*quinquefolia*	Wood anemone
Anthoxanthum	*odoratum*	Sweet vernalgrass
Apocynum	*cannabinum*	Indian hemp
Aralia	*nudicaulis*	Wild sarsaparilla
Arisaema	*triphyllum*	Jack-in-the-pulpit
Aronia	*melanocarpa*	Black chokeberry
Athyrium	*filix-femina*	Lady fern
Berberis	*thunbergii*	Japanese barberry
Betula	*alleghaniensis*	Yellow birch
Betula	*lenta*	Black birch
Betula	*populifolia*	Gray birch
Bidens	*vulgata*	Tall beggar-ticks
Carya	*ovata*	Shagbark hickory
Castanea	*dentata*	American chestnut
Celastrus	*orbiculatus*	Asiatic bittersweet
Cerastium	*fontanum*	Mouse-ear chickweed
Chamaecyparis	*thyoides*	Atlantic white cedar
Chimaphila	*maculata*	Spotted wintergreen
Clethra	*alnifolia*	Sweet-pepperbush
Comptonia	*peregrina*	Sweet-fern
Coptis	*trifolia*	Three-leaved goldthread
Crataegus	*sp.*	Hawthorn
Cypripedium	*acaule*	Pink lady's-slipper
Dactylis	*glomerata*	Orchard grass
Daucus	*carota*	Wild carrot
Dennstaedtia	*punctilobula*	Hay-scented fern
Deschampsia flexuosa	*flexuosa*	Wavy hair-grass
Dichanthelium	*clandestinum*	Deer-tongue grass
Drosera	*rotundifolia*	Round-leaved sundew
Erigeron	*philadelphicus*	Philadelphia fleabane
Eupatorium	*perfoliatum*	Boneset
Fagus	*grandifolia*	American beech
Frangula	*alnus*	Glossy buckthorn
Gaultheria	*procumbens*	Wintergreen
Gaylussacia	*frondosa*	Blue huckleberry
Hamamelis	*virginiana*	Witch-hazel
Houstonia	*caerulea*	Bluet
Hydrocotyle	*americana*	American marsh-pennywort

Ilex	*verticillata*	Common winterberry
Kalmia	*latifolia*	Mountain laurel
Kalmia	*angustifolia*	Sheep Laurel
Leucanthemum	*vulgare*	Ox-eye daisy
Lindera	*benzoin*	Spicebush
Liriodendron	*tulipifera*	Tuliptree
Lobelia	*inflata*	Indian-tobacco
Lonicera	*morrowii*	Morrow's honeysuckle
Ludwigia	*alternifolia*	Square-pod water-primrose
Luzula	*multiflora*	Common wood rush
Lycopus	*sp.*	Water-horehound
Lysimachia	*quadrifolia*	Whorled yellow-loosestrife
Lysimachia	*terrestris*	Swamp candles
Lysimachia (Trientalis)	*borealis*	Starflower
Maianthemum	*canadense*	Canada-mayflower
Maianthemum	*canadense*	Canada-mayflower
Maianthemum (Smilacina)	*racemosum*	False Solomon's-seal
Malus	*sp.*	Crab apple
Medeola	*virginiana*	Indian cucumber root
Melampyrum	*lineare*	Cow-wheat
Microstegium	*vimineum*	Japanese stiltgrass
Mitchella	*repens*	Partridge-berry
Nabalus	*trifoliolatus*	Three-leaved rattlesnake-root
Nyssa	*sylvatica*	Black-gum
Oclemena (Aster)	*acuminata*	Worled aster
Onoclea	*sensibilis*	Sensitive fern
Orobanche	*uniflora*	One-flowered broom-rape
Osmunda	*claytoniana*	Interrupted fern
Osmunda	*regalis*	Royal fern
Osmundastrum (Osmunda)	*cinnamomeum*	Cinnamon fern
Oxalis	*stricta*	Common yellow wood sorrel
Panax	*trifolius*	Dwarf ginseng
Parathelypteris (Thelypteris)	*noveboracensis*	New York Fern
Parthenocissus	*quinquefolia*	Virginia-creeper
Persicaria	*longiseta*	Oriental lady's-thumb smartweed
Persicaria	*sagittata*	Arrow-leaved tearthumb
Pinus	*strobus*	White pine
Plantago	*major*	Common plantain
Polygala	*paucifolia*	Gaywings
Polypodium	*virginianum*	Rock polypody
Populus	*grandidentata*	Big-toothed poplar
Populus	*grandidentata*	Bigtooth aspen
Populus	*tremuloides*	Quaking aspen
Potentilla	*norvegica*	Norwegian cinquefoil
Potentilla	*simplex*	Common cinquefoil

Prunella	*vulgaris*	Heal-all
Prunus	*serotina*	Black cherry
Pteridium	*aquilinum*	Bracken fern
Quercus	*alba*	White oak
Quercus	*coccinea*	Scarlet oak
Quercus	*montana*	Chestnut oak
Quercus	*rubra*	Northern red oak
Rhododendron	*sp.*	Azalea sp.
Rosa	*multiflora*	Multiflora rose
Rubus	*flagellaris*	Northern dewberry
Rubus	*allegheniensis*	Common blackberry
Sassafras	*albidum*	Sassafras
Schizachyrium	*scoparium*	Little bluestem
Smilax	*rotundifolia*	Greenbrier
Solidago	*rugosa*	Wrinkle-leaved goldenrod
Sorbus	*aucuparia*	European mountain-ash
Spiraea	*alba*	White meadowsweet
Spiraea	*tomentosa*	Steeplebush
Symplocarpus	*foetidus*	Skunk-cabbage
Thelypteris	*palustris*	Marsh fern
Toxicodendron	*radicans*	Poison-ivy
Trifolium	*repens*	White clover
Trillium	*undulatum*	Painted trillium
Tsuga	*canadensis*	Eastern hemlock
Uvularia	*sessilifolia*	Sessile-leaved bellwort
Vaccinium	*angustifolium*	Low bush blueberry
Vaccinium	*corymbosum*	Highbush blueberry
Vaccinium	*macrocarpon*	Large cranberry
Vaccinium	*pallidum*	Hillside blueberry
Veronica	*officinalis*	Common speedwell
Viburnum	*cassinoides*	Wild raisin
Viburnum	*dentatum*	Arrowwood
Viola	*lanceolata*	Lance-leaved violet
Viola	*sagittata*	Arrowhead violet
Vitis	*labrusca*	Fox grape
Xyris	*sp.*	Yellow-eyed grass

Additional Species Found July 3, 2017

Acalypha	rhomboidea	common three-seeded-Mercury
Amphicarpaea	bracteata	American hog-peanut
Aronia	floribunda	purple chokeberry
Calla	palustris	wild calla
Carex	bullata	button sedge
Carex	swanii	Swan's sedge

Carex	crinita	fringed sedge
Carex	debilis	white-edge sedge
Carex	folliculata	Northern long sedge
Carex	intumescens	greater bladder sedge
Carex	lurida	sallow sedge
Carex	pensylvanica	Pennsylvania sedge
Carex	platyphylla	broad-leaved sedge
Circaea	canadensis	broad-leaved enchanter's-nightshade
Danthonia	spicata	poverty grass
Dianthus	armeria	Deptford pink
Drosera	intermedia	spatulate-leaved sundew
Dryopteris	carthusiana	spinulose wood fern
Dulichium	arundinaceum	three-way sedge
Epipactis	helleborine	broad-leaved helleborine
Equisetum	arvense	field horsetail
Erechtites	hieraciifolius	American burnweed
Erigeron	annuus	annual fleabane
Gaylussacia	baccata	black huckleberry
Glyceria	striata	fowl manna grass
Iris	pseudacorus	yellow iris
Juncus	tenuis	path rush
Juncus	dudleyi	Dudley's rush
Juncus	effusus	common soft rush
Lycopodiella	inundata	northern bog-clubmoss
Lyonia	ligustrina	maleberry
Peltandra	virginica	green arrow-arum
Phalaris	arundinacea	reed canary grass
Pogonia	ophioglossoides	rose pogonia
Rhododendron	viscosum	clammy azalea
Rhynchospora	capitellata	brownish beaksedge
Rubus	phoenicolasius	wine raspberry
Smilax	glauca	glaucous-leaved greenbriar
Symphyotrichum	cordifolium	heart-leaved American-aster
Viola	sororia	woolly blue violet

Appendix G

Photographic Log

Photograph No.: 1
Barred owl (*Strix varia*), June 6, 2017

Photograph No.: 2
Black-throated blue warbler (*Setophaga caerulescens*), May 23, 2017

Photograph No.: 3
Broad-winged hawk (*Buteo platypterus*), June 30, 2017

Photograph No.: 4
Chipping sparrow (*Spizella passerina*), June 30, 2017

Photograph No.: 5
Common yellowthroat (*Geothlypis trichas*), June 30, 2017

Photograph No.: 6
Eastern towhee (*Pipilo erythrophthalmus*), June 30, 2017

Photograph No.: 7
Gray catbird (*Dumetella carolinensis*), June 30, 2017

Photograph No.: 8
Great crested flycatcher (*Myiarchus crinitus*), June 2, 2017

Photograph No.: 9
Ovenbird (*Seiurus aurocapilla*), June 30, 2017

Photograph No.: 10
Red-eyed vireo (*Vireo olivaceus*), June 2, 2017

Photograph No.: 11
Rose-breasted grosbeak (*Pheucticus ludovicianus*), June 8, 2017

Photograph No.: 12
Scarlet tanager (*Piranga olivacea*), June 8, 2017

Photograph No.: 13
Turkey vulture (*Cathartes aura*), April 17, 2017

Photograph No.: 14
Veery (*Catharus fuscescens*), May 11, 2017

Photograph No.: 15
Wild turkey (*Meleagris gallopavo*), April 18, 2017

Photograph No.: 16
Bobcat (*Lynx rufus*), June 22, 2017

Photograph No.: 17
Coyote (*Canis latrans*), April 9, 2017

Photograph No.: 18
Eastern gray squirrel (*Sciurus carolinensis*), April 16, 2017

Photograph No.: 19
Fisher (*Martes pennanti*), April 17, 2017

Photograph No.: 20
Gray fox (*Urocyon cinereoargenteus*), April 26, 2017

Photograph No.: 21
House mouse (*Mus musculus*), May 4, 2017

Photograph No.: 22
Northern raccoon (*Procyon lotor*), April 11, 2017

Photograph No.: 23
Red fox (*Vulpes vulpes*), April 11, 2017

Photograph No.: 24
Red squirrel (*Tamiasciurus hudsonicus*), June 15, 2017

Photograph No.: 25
Masked shrew (*Sorex cinereus),* May 2, 2017

Photograph No.: 26
Southern flying squirrel (*Glaucomys volans*), April 17, 2017

Photograph No.: 27
Southern red-backed vole (*Myodes gapperi*), April 18, 2017

Photograph No.: 28
Virginia opossum (*Didelphis virginiana*), June 17, 2017

Photograph No.: 29
White-footed mouse (*Peromyscus leucopus*), April 18, 2017

Photograph No.: 30
White-tailed deer (*Odocoileus virginianus*), April 22, 2017

Photograph No.: 31
Eastern box turtle (*Terrapene carolina carolina*), May 18, 2017

Photograph No.: 32
Eastern garter snake (*Thamnophis sirtalis sirtalis*), May 3, 2017

Photograph No.: 33
Spotted turtle (*Clemmys guttata*), April 20, 2017

Photograph No.: 34
American toad (*Anaxyrus americanus*), May 17, 2017

Photograph No.: 35
Green frog (*Lithobates clamitans*), June 2, 2017

Photograph No.: 36
Pickerel frog (*Lithobates palustris*), June 2, 2017

Photograph No.: 37
Red-backed salamander (*Plethodon cinereus*), April 24, 2017

Photograph No.: 38
Spotted salamander (*Ambystoma maculatum*), April 20, 2017

Photograph No.: 39
Spring peeper (*Pseudacris crucifer*), June 15, 2017

Photograph No.: 40
Wood frog (*Lithobates sylvaticus*), May 23, 2017

Photograph No.: 41
American copper (*Lycaena phlaeas*), May 17, 2017

Photograph No.: 42
Little wood-satyr (*Megisto cymela*), July 3, 2017

Photograph No.: 43
Gray hairstreak (*Strymon melinus*), July 6, 2017

Photograph No.: 44
Least skipper (*Ancyloxypha numitor*), July 6, 2017

Photograph No.: 45
Pale beauty (*Campaea perlata*), June 1, 2017

Photograph No.: 46
Pearl crescent (*Phyciodes tharos*), June 2, 2017

Photograph No.: 47
Red-spotted purple (*Limenitis arthemis*), June 8, 2017

Photograph No.: 48
Spicebush swallowtail (*Papilio troilus*), June 2, 2017

Photograph No.: 49
Arrowhead spiketail (*Cordulegaster obliqua*), July 3, 2017

Photograph No.: 50
Aurora damsel (*Chromagrion conditum*), June 8, 2017

Photograph No.: 51
Blue dasher (*Pachydiplax longipennis*), June 30, 2017

Photograph No.: 52
Calico pennant (*Celithemis elisa*), June 21, 2017

Photograph No.: 53
Common baskettail (*Epitheca cynosura*), June 8, 2017

Photograph No.: 54
Common green darner (*Anax junius*), June 21, 2017

Photograph No.: 55
Common whitetail (*Plathemis lydia*), June 8, 2017

Photograph No.: 56
Delta-spotted spiketail (*Cordulegaster diastatops*), June 14, 2017

Photograph No.: 57
Dot-tailed whiteface (*Leucorrhinia intacta*), June 21, 2017

Photograph No.: 58
Eastern pondhawk (*Erythemis simplicicollis*), June 21, 2017

Photograph No.: 59
Eastern red damsel (*Amphiagrion saucium*), June 8, 2017

Photograph No.: 60
Ebony jewelwing (*Calopteryx maculata*), June 14, 2017

Photograph No.: 61
Emerald sp. (*Dorocordulia sp.*), June 21, 2017

Photograph No.: 62
Fragile forktail (*Ischnura posita*), July 3, 2017

Photograph No.: 63
Harlequin darner (*Gomphaeschna furcillata*), June 2, 2017

Photograph No.: 64
Meadowhawk sp. (*Sympetrum sp.*), July 6, 2017

Photograph No.: 65
Painted skimmer (*Libellula semifasciata*), June 2, 2017

Photograph No.: 66
Skimming bluet (*Enallagma geminatum*), July 3, 2017

Photograph No.: 67
Slaty skimmer (*Libellula incesta*), July 3, 2017

Photograph No.: 68
Spangled skimmer (*Libellula cyanea*), June 21, 2017

Photograph No.: 69
Sphagnum sprite (*Nehalennia gracilis*), June 30, 2017

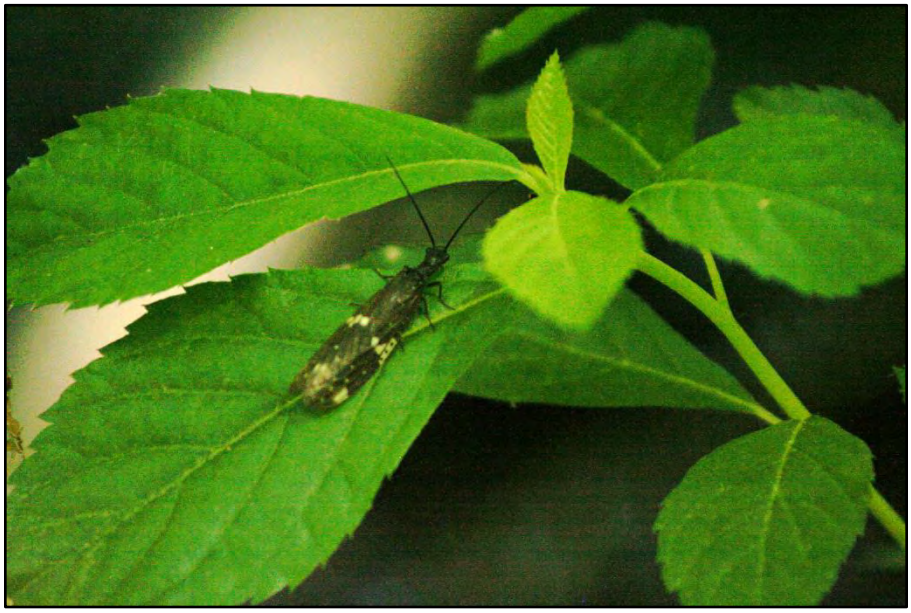
Photograph No.: 70
Twelve-spotted skimmer (*Libellula pulchella*), June 30, 2017

Photograph No.: 71
Unicorn clubtail (*Arigomphus villosipes*), June 30, 2017

Photograph No.: 72
White corporal (*Ladona exusta*), June 14, 2017

Photograph No.: 73
Wasp (*Vespidae*), May 23, 2017

Photograph No.: 74
Robber fly (*Asilidae*), June 14, 2017



Photograph No.: 75
Fishfly (*Nigronia* sp.), June 14, 2017

Photograph No.: 76
Mason bee (*Osmia* sp.), June 21, 2017

Photograph No.: 77
Six-spotted tiger beetle (*Cicindela sexguttata*), June 2, 2017

Photograph No.: 78
Blue flag (*Iris versicolor*), June 14, 2017

Photograph No.: 79
Narrow-leaved blue-eyed grass (*Sisyrinchium angustifolium*), June 1, 2017

Photograph No.: 80
Sheep laurel (*Kalmia angustifolia*), June 21, 2017

Photograph No.: 81
Swamp candles (*Lysimachia terrestris*), July 3, 2017

Photograph No.: 82
Mountain laurel (*Kalmia latifolia*), June 14, 2017

Photograph No.: 83
Painted trillium (*Trillium undulatum*), May 23, 2017

Photograph No.: 84
Pink lady's slipper (*Cypripedium acaule*), June 2, 2017

Photograph No.: 85
Rose pogonia (*Pogonia ophioglossoides*), June 30, 2017

Photograph No.: 86
Round-leaved sundew (*Drosera rotundifolia*), May 23, 2017

Photograph No.: 87
Starflower (*Trientalis borealis*), May 24, 2017