



South Ripley
SOLAR PROJECT

ConnectGen Chautauqua County LLC

South Ripley Solar Project

Matter No. 21-00750

900-2.12 Exhibit 11

Terrestrial Ecology

TABLE OF CONTENTS

EXHIBIT 11 TERRESTRIAL ECOLOGY 1

(a) Identification and Description of Plant Communities..... 1

(1) Significant Natural Communities and Rare Plants..... 1

(2) Plant Community Descriptions 3

(b) Impact to Plant Communities 5

(c) Measures to Avoid or Mitigate Plant Community Impacts..... 9

(d) Species List 13

(e) Impacts to Vegetation, Wildlife, Wildlife Habitats, and Wildlife Travel Corridors..... 13

(1) Construction-Related Impacts to Wildlife and Wildlife Habitats 14

(2) Operation-Related Impacts to Wildlife and Wildlife Habitats 16

(f) Measures to Avoid or Mitigate Impacts to Wildlife and Wildlife Habitats..... 20

REFERENCES 21

LIST OF TABLES

Table 11-1. Estimated Temporary and Permanent Impacts to Plant Communities..... 8

LIST OF FIGURES

Figure 11-1 Plant Communities

LIST OF APPENDICES

Appendix 11-A Agency Correspondence

Appendix 11-B Rare Plant Survey Report

Appendix 11-C Tall Ironweed Literature Review

Appendix 11-D Plant and Wildlife Species Lists.

Appendix 11-E Iterative Facility Layout Design Matrix

EXHIBIT 11 TERRESTRIAL ECOLOGY

(a) Identification and Description of Plant Communities

The Facility Site encompasses approximately 3,382 acres in Chautauqua County and is largely comprised of rural agricultural and forested lands. Plant communities within the Facility Site and within 100 feet of proposed disturbance were classified into specific community descriptions provided in *Ecological Communities of New York State* (Edinger et al., 2014). Environmental Design & Research, Landscape Architecture, Engineering, and Environmental Services, D.P.C (EDR) classified and mapped each plant community using a combination of desktop review of recent (2019) aerial imagery, publicly available datasets for land cover and soil, and data collected during on-site ecological field surveys conducted in 2020 and 2021 (e.g., wetland delineations and avian surveys).

Figures 11-1 illustrates the plant communities within the Facility Site. Table 11-1 in Section (b) provides the total acreage for each plant community identified within the Facility Site, as well as the anticipated temporary and permanent impacts to each community.

(1) Significant Natural Communities and Rare Plants

The Applicant coordinated with state and federal agencies to determine the presence of special status plant communities in the vicinity of the Facility Site. The Official Species List provided by the U.S. Fish and Wildlife Service (USFWS) via the Information for Planning and Consultation (IPaC) system, pursuant to Section 7 of the Endangered Species Act (Appendix 11-A), did not identify any federally-listed plants or rare communities in the vicinity of the proposed Facility.

The New York Natural Heritage Program (NYNHP) maintains data on state-listed rare, threatened, and endangered plant and animal species, as well as significant ecological communities. Site-specific requests for documented occurrences were submitted to NYNHP. The NYNHP response received on September 15, 2019 (Appendix 11-A) identified records of two significant natural communities and the potential presence of a state-endangered plant species within the Facility Site:

Confined River community;
Hemlock-Northern Hardwood Forest community,
Tall ironweed (*Vernonia gigantea*).

The Applicant also coordinated with the NYSDEC to obtain additional information on state-listed species potentially occurring within the vicinity of the Facility. On November 6, 2019, the NYSDEC provided a confidential summary document and map displaying the NYNHP-documented locations of the significant natural communities, including

the Confined River and Hemlock-Northern Hardwood communities previously identified in the NYNHP response letter, as well as state-listed rare, threatened, or endangered wildlife species. An additional NYSDEC map (dated September 3, 2019) was received on March 20, 2020, which included the previously identified State-listed species and ecological communities as well as surface waters and wetlands, cultural, visual, recreational, and social resources within the vicinity of the Facility. This map also included general locations of an unspecified State-listed plant species. The threatened and endangered species and ecological community areas identified on this map appear to correspond with records previously identified on the November 2019 NYNHP map. Please see Exhibit 12 for a detailed discussion on the rare, threatened, and endangered wildlife within the vicinity of the Facility.

Following consultation with the NYSDEC, EDR conducted a targeted rare plant survey between August 1 and September 15, 2020, to locate any populations of rare plants that may occur within the Facility Site. This survey period is recommended by the NYNHP for tall ironweed, as it includes tall ironweed's flowering period which represents the time of year when this species most readily identifiable (Young, 2020). The surveys were conducted on foot, using meandering routes to thoroughly cover areas of potentially suitable habitat. Tall ironweed was positively identified within the Facility Site in open fields that appear to be either actively hayed, but uncut at the time of the survey, or recently fallowed. Results of the targeted rare plant survey are presented in detail in Appendix 11-B. Exhibit 11(b)(1) below provides a discussion of potential impacts to tall ironweed associated with Facility construction and operation.

As defined by Edinger et al. (2014), a Confined River community is an “aquatic community of relatively large, fast flowing sections of streams with a moderate to gentle gradient”. The NYNHP noted in their response letter dated May 21, 2020, that this Confined River community is associated with Twentymile Creek and represents a moderately large occurrence in very good condition with high species diversity. Within the Facility Site, Twentymile Creek is located in a moderate-sized landscape of working forests. Please see Exhibit 13 for further description of Twentymile Creek and potential impacts related to construction and operation of the Facility.

The NYNHP letter also noted the Hemlock-Northern Hardwood Forest community to be a “moderate-sized occurrence in a mature state with small patches of putative old growth and excellent plant species diversity” and is located within a moderate-sized and intact forested landscape (NYNHP, 2019). This community is defined by Edinger et al. (2014) as “a mixed forest that typically occurs on middle to lower slopes of ravines, on cool, mid-elevation slopes, and on moist, well-drained sites at the margins of swamps”. Dominant species within this community include eastern hemlock, sugar maple, red maple, yellow birch, red oak (*Quercus rubra*), American beech, white ash, white oak (*Quercus alba*), and white pine.

(2) Plant Community Descriptions

Common plant communities and dominant vegetation within the Facility Site are defined by Edinger's *Ecological Communities of New York State*. Table 11-1 shows plant communities present on the Facility Site, which are further described below. Detailed descriptions of wetland community types encountered during on-site reconnaissance and wetland delineations are provided in Exhibit 14 and Appendix 14-A (Wetland and Stream Delineation Report).

Active Agricultural Land

Active agricultural lands represent approximately 30% (1,029 acres) of all lands within the Facility Site. The primary agricultural crops are field crops (21%) and pastureland (9%), with row crops accounting for approximately 1% of the Facility Site. Some fields were observed to be recently fallowed. Edinger et al (2014) defines field crops as "alfalfa, wheat, timothy, and oats. This community includes hayfields that are rotated to pasture." Pastureland is defined by Edinger et. al (2014) as "agricultural land permanently maintained (or recently abandoned) as pasture area for livestock". Row crops would include corn, potatoes, and soybeans (Edinger et. al, 2014). According to the USDA, fallow fields, also known as idle cropland, include lands that are in cover crops and/or soil-improvement crops and lands that may not be harvested or used in a given year due to physical and/or economic reasons (USDA, 2019).

As described above, tall ironweed, a state-threatened plant was observed in active and recently fallowed hayfields in the Facility Site. In addition, in some locations emergent wetlands were observed within small portions of agricultural lands. Emergent wetlands observed on-site were characterized by the dominance of erect, rooted herbaceous wetland plants and evidence of persistent inundation or saturation.

Successional Fields

Successional old fields comprise approximately 5% (160 acres) of the Facility Site and primarily occur along roadsides and adjacent to active agricultural fields. As defined by Edinger et al. (2014), a successional old field is a meadow dominated by forbs and grasses that occurs on sites that have been cleared and plowed for farming and/or development and then abandoned. This includes fields that are mowed at infrequent intervals (typically less than once per year), which promotes the reproduction of characteristic successional old field species, such as goldenrods (*Solidago* spp.), bluegrasses (*Poa pratensis*, *P. compressa*), timothy (*Phleum pratense*), quackgrass (*Elymus repens*), smooth brome (*Bromus inermis*), New England aster (*Symphotrichum novae-angliae*), wild strawberry (*Fragaria virginiana*), Queen Anne's lace (*Daucus carota*), and several other upland grasses and forbs. In one instance, tall ironweed, a state-threatened plant, was observed in a successional field.

Forestland

Forestland makes up a large area of the Facility Site (55%) and includes a variety of deciduous, coniferous, and mixed forest communities. Specific forest types identified at the Facility Site include successional northern hardwoods, beech-maple mesic forest, hemlock-northern hardwood forest, and pine plantation communities. These forests occur throughout the Facility Site on hilltops, hillsides, and in woodlots interspersed among agricultural fields. Common tree species observed within the Facility Site include:

American beech (*Fagus grandifolia*), yellow birch (*Betula alleghaniensis*), sugar maple (*Acer saccharum*), black cherry (*Prunus serotina*), red maple (*Acer rubrum*), white ash (*Fraxinus americana*), and green ash (*F. pennsylvanica*). Common species in the beech-maple mesic forest include sugar maple, American beech, white ash, hop hornbeam (*Ostrya virginiana*), and red maple. Hemlock-northern hardwood forests within the Facility Site typically included eastern hemlock (*Tsuga canadensis*), sugar maple, American beech, white ash, red maple, and yellow birch. The understory of forested communities in the Facility Site is typically comprised of saplings of the species listed above, as well as dogwoods (*Cornus* spp.), multiflora rose (*Rosa multiflora*), Morrow's honeysuckle (*Lonicera morrowii*), wild grapes (*Vitis* spp.), sedges (*Carex* spp.), various ferns, and other woody and herbaceous plants. Pine plantations include stands of pines planted for the cultivation and harvest of timber products, or to provide wildlife habitat, soil erosion control, windbreaks, or landscaping (Edinger et al., 2014). Common species planted within the Facility Site include white pine (*Pinus strobus*), red pine (*Pinus resinosa*), and scotch pine (*Pinus sylvestris*).

In some locations, forested wetlands were observed within portions of the forested communities. Forested wetland communities in the Facility Site were observed to be dominated by yellow birch, green ash, and red maple in the overstory. Common shrub and sapling species in these wetlands included pussy willow (*Salix discolor*), gray dogwood (*Cornus racemosa*), and green ash. Herbaceous species in the forested wetlands include spotted jewelweed (*Impatiens capensis*), sensitive fern (*Onoclea sensibilis*), creeping Jenny (*Lysimachia nummularia*), forget-me-not (*Myosotis scorpioides*), cinnamon fern (*Osmundastrum cinnamomeum*), smooth goldenrod (*Solidago gigantea*), and American golden-saxifrage (*Chrysosplenium americanum*). For additional discussion on wetlands, see Exhibit 14.

Successional Shrubland

Successional shrubland occurs throughout the Facility Site (6%) on sites that have been previously cleared for farming, logging, development, or otherwise disturbed. Species observed within this community include dogwoods, wild grape, and nannyberry (*Viburnum lentago*). Other species typically found in this community include raspberries (*Rubus* spp.), choke-cherry (*Prunus virginiana*), staghorn sumac (*Rhus typhina*), and invasive shrubs such as multiflora rose, autumn olive (*Elaeagnus umbellata*), and bush honeysuckles (*Lonicera* spp.).

Scrub-shrub wetlands were occasionally observed within this ecological community type, as further discussed in Exhibit 14.

Disturbed/Developed

Disturbed/developed land makes up approximately 3% of the site and consists of a combination of several "cultural communities" as defined by Edinger et. al. (2014). Disturbed/developed land occurs throughout the Facility Site, and is characterized by the presence of buildings, paved and unpaved roads, lawns, or transmission line rights-of-way. Vegetation in these areas is generally either lacking or highly managed (e.g., mowed lawns or routinely maintained rights-of-way). Volunteer vegetation that naturally reestablishes in these areas is generally sparse, and typically comprised of successional, often non-native, herbaceous species such as bull thistle (*Cirsium vulgare*), curly dock (*Rumex crispus*), spotted knapweed (*Centaurea maculosa*), and various upland grasses.

Open Waters and Shallow Emergent Marshes

Open water features are present at the Facility Site and include streams, ponds, farm ponds, and open water wetlands. Approximately 0.6% of the site (19 acres) can be described as open water.

Approximately 0.7% of the site (23 acres) are identified as shallow emergent marshes. Shallow emergent marshes within the Facility Site include marsh meadow communities that are permanently saturated and seasonally flooded, with water depths ranging from 6 inches to 3.3 feet during flood stages. Dominant species within the Facility Site include cattails (*Typha latifolia*, *T. angustifolia*, *T. x glauca*) and sedges (*Carex* spp.).

(b) Impact to Plant Communities

Throughout the siting and layout design of the Facility, numerous efforts to avoid and minimize impacts to plant communities were implemented, including locating collection lines along existing and proposed access roads and avoidance of tree clearing to the maximum extent practicable (see Section [c] for more information on impact avoidance and minimization). However, construction and operation of the Facility will result in impacts to plant communities. To estimate impacts to ecological communities, the Applicant has developed the following potential impact classifications, all of which are presented on Figure 11-1:

- Limit of Construction Activity: Encompasses the anticipated outer bounds of where construction may occur for the Facility, including any necessary vegetation clearing. This boundary includes defined work corridors along Facility components, security fencing, and proposed planting modules, and incorporates areas where construction vehicles and/or personnel may need extra room to construct the Facility (i.e., laydown yards). The Limit of Construction Activity (LOCA) is presented in the Site Plan Drawings in Appendix 5-A, Figures 3-

1 and 3-10, and with mapping of plant communities in Figure 11-1. Temporary and permanent plant community impacts included within the LOCA total 1,267 acres (37% of the Facility Site).

- Limit of Impervious Surfaces: Represents all areas that will host built components of the Facility. The Limit of Impervious Surfaces (LOIS) includes areas where the collection substation and point of interconnection (POI), battery energy storage system (BESS), inverters and transformers, access roads, and overhead collection line poles will be located. These areas will be cleared of all vegetation, graded, and grubbed prior to installation, where applicable. The LOIS represents long-term loss of existing plant communities and totals 43 acres (1% of the Facility Site).
- Limit of Vegetation Management: Represents all areas which will have maintained vegetation for the life of the Facility and represents long-term habitat conversion. This area is generally inclusive of the LOIS, all areas below and surrounding PV arrays within the fence line, areas adjacent to access roads outside the fence line where road edges will be mowed/maintained, areas adjacent to the collection substation and POI switchyard, visual screening plantings, and areas maintained for stormwater purposes. The Limit of Vegetation Management (LOVM) does not include areas that will be allowed to naturally succeed back to a vegetated state after construction is complete. This area totals 1,213 acres, or 36% of the Facility Site.

Within the LOCA, existing vegetation will be cleared or mowed to an appropriate height prior to installation of Facility components. The use of machinery to install Facility components within the LOCA may also result in temporary soil impacts, further described in Exhibit 10. Land surface within the LOIS will be replaced with built facilities while vegetation within the LOVM will be maintained and managed for the life of the Facility. Areas within the LOCA but outside of the LOVM (54 acres, 2% of the Facility Site) represent temporary disturbance only. All temporarily disturbed areas will be restored to pre-construction contours and re-seeded and plant communities will be allowed to regenerate naturally following construction.

A total of 521 acres of forestland will be cleared for construction of the Facility. Forest clearing impacts can be characterized as one of three types: permanent loss, forest conversion, and natural regeneration. In areas subject to permanent loss, cleared forests within the LOIS will be replaced with Facility components (e.g., access roads, collection substation and POI, and BESS). The second type of impact is forest conversion within LOVM, where cleared forestland will be maintained by the Applicant as successional communities for the life of the Facility (e.g., areas below surrounding PV arrays, areas within collection line rights-of-way). Both of these types of long-term forest impacts are accounted for in the LOVM and will collectively impact 483 acres (approximately 26% of all forestland within the Facility Site). The third type of impact is natural regeneration, where habitat will be temporarily disturbed by clearing and grading activities during construction but will not be subject to long-term vegetation maintenance during Facility

operation. Instead, vegetation in these areas will be allowed to naturally grow back to a forested community type following construction. Cleared forestland that will be allowed to regenerate naturally comprises 14 acres (1% of the forestland within the Facility Site).

During operation, areas within the LOVM will be mowed and cleared as necessary to facilitate Project operations. The Facility will include approximately 4.5 miles of overhead collection lines with associated cleared ROWs. The LOVM has accounted for a 75-foot corridor in which vegetation will be maintained, similar to other utility line ROWs in the Facility Site. The areas below PV arrays (approximately 833 acres) and surrounding areas will be mowed periodically and maintained as open grasslands. The partial shading of the areas underneath PV modules may result in very minor changes to these communities as soil temperatures are expected to decrease and species recruitment will favor more shade-tolerant plants, similar to ecological succession in communities with shrub or forest cover. The seed mix chosen for post-construction restoration in these areas will be selected with potential shading in mind. Detailed vegetation management information, including specific practices regarding plant species, control measures, re-vegetation goals, and inspections, will be outlined in the Applicant's Vegetation Management Plan in accordance with 94-c pre-construction compliance filings.

Common Plant Communities

It is anticipated that Facility construction and operation will result in impacts to 58% of agricultural lands (primarily used as field crops and pasture) within the Facility Site. In addition, 28% of forested communities within the Facility Site are anticipated to be impacted.

A total of up to approximately 54 acres of plant communities (2% of the Facility Site) will experience only temporary disturbance during Facility construction and be subject to post-construction restoration. Native plant communities will then be able to regenerate naturally without being subject to routine maintenance associated with the Facility. Of the temporarily disturbed plant communities, approximately 38 acres of temporary disturbance include forestland; however, because regrowth of a forest canopy takes many years, this type of impact is considered permanent in forested communities. In addition, approximately 1,213 acres (36% of the Facility Site) will be maintained as an early successional community for the life of the Facility, largely in areas underneath PV arrays; 49% of areas maintained in this manner within the LOVM are in agricultural areas and 40% are in forested communities.

Temporary and permanent impacts to plant communities will not result in the extirpation or significant reduction of any natural ecological community type, or in the significant reduction of any cultural community type (e.g., agricultural land, disturbed/developed) within the Facility Site. At the end of the Facility lifespan, Facility components will be decommissioned, and the land restored, as described in Exhibit 23 of this Application. Following completion of

decommissioning and restoration, lands within the Facility Site are generally expected to return to pre-construction conditions. Methods to avoid or mitigate impact to plant communities are described in Section (c) below.

Facility-related impacts to vegetation were calculated using the LOCA, LOVM, and LOIS described above, and are presented in Table 11-1 below. These impact calculations were generated based on the actual proposed locations of components as identified in the Site Plan Drawings (Appendix 5-A).

Table 11-1. Estimated Temporary and Permanent Impacts to Plant Communities

Plant Community Type	Acres within Facility Site	%	Total Impacts in LOCA (acres)	%	Habitat Conversion in LOVM (acres) ²	%	Permanent Loss in LOIS (acres)	%
Active Field Crops	709	21	468	37%	463	38	14	32
Row Crops	27	1	8	1%	7	1	0	1
Pastureland	293	9	122	10%	119	10	7	15
Beech-maple Mesic Forest	1109	33	350	28%	323	27	9	22
Successional Northern Hardwoods	164	5	62	5%	57	5	2	5
Hemlock-Northern Hardwood Forest ³	549	16	102	8%	96	8	1	3
Pine Plantation	22	1	8	1%	7	1	0	1
Successional Shrubland	193	6	66	5%	64	5	4	10
Successional Old Field	160	5	70	6%	68	6	2	6
Shallow Emergent Marsh	23	1	0	0%	0	0	0	0
Open Water	19	1	0	0%	0	0	0	0
Developed/Disturbed	114	3	11	1%	10	1	2	4
TOTAL	3,380	100	1,267	37%	1,213	100	43	100
Subtotal, forest ⁴	1,844	55	521	41%	483	40	14	32
Subtotal, ag land ⁵	1,029	30	598	47%	588	49	21	48

¹ Impacts that will occur only during construction. Temporarily impacted areas will be restored following construction and will be allowed to revegetate naturally (i.e., will not be further disturbed during Facility operation). This type of impact is considered a permanent impact in forested communities because regrowth of a forest canopy takes many years.

² Areas that will be cleared during Facility construction and maintained as early successional communities for the life of the Facility.

³ NYNHP-designated Significant Natural Community

⁴ Forest communities include beech-maple mesic, hemlock northern hardwoods, pine plantation, and successional northern hardwoods.

⁵ Agricultural communities include active hay fields, active row crops, and pasturelands.

Rare Plants and Significant Natural Communities

As described above, tall ironweed was positively identified on several of the actively hayed or recently fallowed fields within the Facility Site, totaling an estimated 6,475 plants covering an area of approximately 38 acres (1% of the Facility Site), with the majority of the plant identifications (99%) on one parcel. The Applicant considered the results of the rare plant survey during the iterative process of Facility layout design. However, the fields where tall ironweed plants have been identified are integral to the siting of PV arrays and other Facility components (e.g., access roads and collection lines) and are crucial to meeting the proposed generating capacity of the Facility. Therefore, the Facility as proposed

will result in unavoidable direct and indirect impacts to tall ironweed. Potential tall ironweed impacts are anticipated to include the damage or destruction of plants during construction activities and the potential inhibition of plant growth associated with shading by the installed panels. Of the 38 acres of tall ironweed plants identified within the Facility Site, approximately 34 acres (89%) will occur within the LOCA. In addition, vegetation management practices would continue within panel areas to control the height of any remaining tall ironweed plants located within the LOVM¹; however, such vegetation management practices align with the current land use on the parcels (annual haying with no protected or conservation areas designated for tall ironweed), which still results in the growth of tall ironweed plants within the actively hayed areas. Plants located along public roadways and parcel boundary fence lines will also fall within the roadway and property line setback zones in which solar modules will not be sited.

As stated in Table 11-1, construction and operation of the Facility is anticipated to impact approximately 101 acres of Hemlock-Northern Hardwood Forest within the Facility Site. According to available NYNHP spatial data (New York State Office of Information Technology Services, 2021), this area represents only 7% of the 1,430 total acres of Hemlock-Northern Hardwood Forest community associated with Twentymile Creek. Furthermore, according to the NYNHP dataset, Hemlock-Northern Hardwood Forest communities extend across more than 130,000 acres throughout 20 counties of New York State, including nearly 3,500 acres in Chautauqua County alone. Therefore, construction and operation of the Facility Site is not anticipated to result in significant adverse impacts to this natural community. In addition, Facility components have been sited to avoid the riparian corridor of Twentymile Creek, a Confined River community, to the maximum extent practicable. One overhead collection line crossing of the Confined River Community is proposed for the Facility. Poles supporting the overhead line will be installed on either side of the crossing, at least 50 feet from the edge of the stream corridor. Minor tree and vegetation clearing will be required to prepare the right-of-way; however, stumps will be removed only at the discrete pole locations such that no surface disturbance is required between the pole locations. Therefore, construction and operation of the Facility is not anticipated to impact the Confined River Community associated with Twentymile Creek.

(c) Measures to Avoid or Mitigate Plant Community Impacts

Common Plant Communities

Initial efforts associated with avoiding impacts to vegetation were associated with site planning and iterative layout design. The Applicant first coordinated with landowners of participating parcels to identify areas to avoid or limit development activities due to valuable forest or agricultural land. These areas were defined as Landowner-Imposed Development Restriction Area and were applied to consideration of the Facility's developable area (see Figure 15-4). Where feasible, PV arrays have been preferentially sited in agricultural fields approved by the landowner, to minimize

¹ The mature height of tall ironweed plants ranges from 7 to 10 feet which could cause detrimental shading on solar panels and potentially reduce the generating capacity of the Facility.

impacts to natural communities and avoid high quality wetland communities associated with wetland resources mapped by the NYSDEC or with high-quality forested wetlands. A large number of PV racks, and associated Facility capacity (approximately 15 MW), were removed from the Facility's design during the iterative design process in order to reduce the extent of tree clearing and wetland impacts. Please see Appendix 11-E for a description of the iterative steps of Facility layout design and the impacts avoided or mitigated by changes in design and loss of solar capacity. Ultimately, after 14 design iterations, tree clearing was determined to be required for the Facility to reach its target capacity (required for commercial viability) while avoiding and minimizing impacts to other sensitive resources (e.g., valuable active agricultural land, wetlands and streams, potential archaeological sites, and visually sensitive resources), reduce grading of high-slope areas, and reduce noise impacts. The final Facility Design reduced the width of the Limits of Construction Activity in certain areas to minimize adjacent clearing and further reduce plant community impacts, where feasible.

The remaining common plant communities within the Facility Site will be protected from disturbance during construction by flagging the limits of construction activity and restricting any activity outside these limits and implementing environmental monitoring during construction and operation of the Facility. Tree and vegetation clearing will be conducted in accordance with the Uniform Standards and Conditions outlined in Section 900-6(m)(7)-(9). As previously discussed in Section (a) above, all plant communities identified within the Facility Site are common to New York State. Except in active agricultural fields, native species will be allowed to revegetate all temporarily disturbed areas. Following construction activities, temporarily disturbed areas will be seeded (and stabilized with mulch and/or straw, if necessary) to reestablish vegetative cover in these areas. In natural regeneration areas (i.e., within the LOCA outside of the LOVM), limited grading and grubbing will occur during construction. The Applicant will only remove stumps where necessary for construction, will limit the use of herbicides through selective application to prevent invasive species (for instance, herbicide use may be necessary beneath the overhead collection line), and will not remove trees as part of routine vegetation management during Facility operation, although trimming of branches may be required to reduce shading of PV arrays. Following post-construction restoration and stabilization of soils, ecological succession will restore the forested condition of temporarily disturbed forested areas.

In accordance with Section 900-10.2(e)(4) of the 94-c regulations, the Applicant will prepare and implement a Vegetation Management Plan to provide details on the integrated vegetation management techniques and practices that have been tailored to the Facility Site. This plan will be submitted to ORES under separate cover as a pre-construction compliance filing.

To protect adjacent undisturbed vegetation and other ecological resources, a comprehensive sediment and erosion control plan will be developed and implemented prior to Facility construction (see the Stormwater Pollution Prevention

Plan [SWPPP] in Appendix 13-B). Other mitigation measures to avoid or minimize impacts to vegetation include educating the construction workforce on respecting and adhering to the physical boundaries of restricted areas, employing best management practices during construction, and maintaining a clean work area within the designated construction sites. An independent environmental monitor will conduct inspections of all areas requiring environmental compliance during construction activities, with an emphasis on those activities that are occurring within sensitive areas.

Rare Plants

As previously noted, results of the Rare Plant Survey were considered in the siting of the Facility Layout; however, tall ironweed fields were identified as critical development area for the siting of PV arrays to meet the Facility's capacity targets and therefore could not be completely avoided. During the iterative design process, the Applicant removed a proposed stormwater management area that would have otherwise resulted in additional impacts to the tall ironweed population within the setback buffer adjacent to the roadway, a high population area for the tall ironweed plant. The Applicant also chose to keep and maintain the existing vegetative screening at this location rather than installing new visual screening planting modules, in effect reducing the potential for direct effects to individual tall ironweed plants.

To determine tall ironweed compatibility with solar development, EDR conducted a literature review to develop an understanding of the propagation and management of this plant (see Appendix 11-C.). Recent vegetation management research indicates that tall ironweed has a high regrowth potential in response to common treatment practices and is likely to withstand some level of site disturbance from livestock grazing and mowing (Johnson & Zimmer, 2020; Tolson, 2012). This is supported by the fact that the tall ironweed plants identified within the Facility Site were found in fields that have experienced recurring disturbance related to hay production and cultivation, which includes the cutting, drying, raking, and baling of all vegetation within fields. Tall ironweed has also been shown to be capable of successful transplantation and/or propagation (Hawke, 2020; Urbatsch, 1973).

The land management activities summarized above (see Appendix 11-C for more detail) are similar to the operational activities that are proposed for these fields as part of the South Ripley Solar Project, which includes vegetation management and overland vehicular travel for ongoing inspection and maintenance activities. The vegetation management regime associated with underground collection line areas and setback buffer areas also provide an opportunity to manage for existing or new populations of tall ironweed, while solar panel areas will be monitored to determine if appropriate vegetation management can allow for the growth of tall ironweed at suitable heights may also be suitable for occupation of the species if vegetation is managed to a compatible height. Given the density of occurrence of tall ironweed on several fields within the Facility Site, it appears that the species is prevalent within the existing seedbank, which suggests the species could continue to propagate if significant ground disturbance to the existing seedbank is minimized, and vegetation management activities similar to the existing hay production activities

are implemented during operation. Therefore, the Applicant will implement the following impact avoidance, minimization, and mitigation measures:

Avoid and Minimize Direct Disturbance During Construction:

- Tall ironweed occurrence locations will be identified as environmentally sensitive areas on final construction plans. The Facility will be designed to minimize ground disturbance (e.g., construction grading) in these locations, where feasible.
- If ground disturbance in environmentally sensitive areas cannot be avoided (e.g., construction grading or underground collection installation), topsoil will be segregated and replaced during recontouring or post-installation restoration to preserve the tall ironweed in the existing seedbank and facilitate the potential for future propagation of the species in appropriate locations.
- An on-site Environmental Monitor (EM) will oversee construction activities and adherence to best management practices in environmentally sensitive areas during construction. The EM will monitor construction activities in environmentally sensitive areas to ensure ground disturbance is limited to the minimum amount necessary and topsoil is appropriately segregated and respread, in accordance with the final construction plans. In accordance with Section 900-10.2(e)(6), the Applicant will submit an Environmental Monitoring Plan detailing the companies, qualifications, and responsibilities of the EM(s).

Avoid, Minimize, and Mitigate Direct and Indirect Disturbance During Operations:

- The Vegetation Management Plan, to be prepared as a pre-construction compliance filing in accordance with Section 900-10.2(e)(4) of the 94-c regulations, will identify Tall Ironweed Target Management Areas, where vegetation management activities will consist of practices supporting the continued propagation and management of tall ironweed along with other pollinator friendly plants, as a component of the vegetation community.
- Vegetation management activities in fields with tall ironweed will prohibit the broadcast application of herbicides and will incorporate regular mowing when tall ironweed plants are observed to be approximately 2 feet tall. Tall ironweed response to vegetation management activities will be monitored and treatments may be modified through adaptive management, as needed.
- The Facility will identify perimeter screen planting sites, where tall ironweed populations do not currently exist, for inclusion in Tall Ironweed Target Management Areas.
- Following construction, the Applicant will implement monitoring of the presence and growth of existing tall ironweed stands within PV panel arrays, as well as those established by seeding or transplanting in perimeter screen planting areas and other temporarily disturbed areas on site. The specifics of tall ironweed monitoring will be set forth in the Vegetation Management Plan.

Based on the above measures to avoid and minimize direct soil disturbance during construction, and the approach to manage the site for propagation of tall ironweed during the operational period, operation of the Facility is anticipated to allow for long-term persistence of tall ironweed within the Facility Site.

(d) Species List

A Plant Species List and a Wildlife Species List are included in Appendix 11-D. Vascular plant species at the Facility Site were identified during various field studies (e.g., rare plant survey, and wetland delineations) and through incidental observations. A total of 321 native and non-native plant species were identified during these field surveys. The Wildlife Species List identifies an additional 374 native and non-native species that may occur within the Facility Site at some time during the year, including various small mammals, reptiles, amphibians, and birds. It is also based on site-specific field survey results, such as the Winter Raptor Survey, Breeding Bird Survey, and wetland delineations, as well as assessments of habitat availability and existing publicly available data, including NYNHP, USFWS, NYSDEC staff, NatureServe Explorer, American Society of Mammalogists, NYS Amphibian and Reptile Atlas Project, Hawk Migration Association of America, United States Geological Survey Breeding Bird Atlas, Cornell Laboratory of Ornithology eBird, Audubon Christmas Bird Count, local birding organizations, and Atlas of Inland Fishes of New York.

(e) Impacts to Vegetation, Wildlife, Wildlife Habitats, and Wildlife Travel Corridors

As discussed above in Section (b) and shown in Figure 11-1, temporary and permanent impacts to plant communities will occur in 598 acres of agricultural lands, 521 acres of forestland, 70 acres of successional old fields, 66 acres of successional shrubland, 11 acres of developed or disturbed lands and 0.1 acre of open water wetlands. With the exception of developed and disturbed lands, these plant community types provide considerable habitat value for a variety of wildlife species.

Agricultural lands generally provide limited or seasonal habitat for wildlife based on the regular modification by human activities, such as tilling, planting, cultivating or mowing. Depending on the extent and frequency of site disturbance, hay and pasture fields can provide habitat for foraging and breeding activities for a variety of migratory species, grassland birds, and small mammal species.

Forests provide important breeding, migratory stop-over, and wintering habitat for a wide variety of species. Research has demonstrated that larger forest tracks typically support more species than smaller forest stands. The amount of forest cover, size of individual forest patches, forest type, and linkages to other patches in a landscape determine their ability to support wildlife species which depend on them, including area-sensitive and edge intolerant species. This is particularly true for mammals and forest birds that require extensive forests (Environment Canada, 2004). Core forest

blocks (i.e., patches of forest greater than 100 acres) are present within the Facility Site; however, many larger patches of forest often exhibit some ongoing disturbance due to private logging, recreational use, and cattle activity in some areas. Primarily, private logging is a common land use in forested areas across the Facility Site. Through direct consultations with landowners since 2018 and the result of the Agricultural Land Use Survey of participating landowners, nine participating landowners identified timber has a current or future use. These parcels comprise 30% of the Facility Site, including approximately 36% of the Facility Site's forestland and approximately 53% of the proposed 521 acres for forest clearing) undergoing active timber harvesting or indicating that the land would be harvested in the future.

As previously stated, the Applicant compiled a list of wildlife species, including federally and state-listed species, as well as Species of Greatest Conservation Need (SGCN) and Species of Greatest Conservation Need – High Priority (SGCN-HP), that were identified as potentially occurring in the Facility Site based on site-specific correspondence, review of publicly available database queries, and direct observations made on-site. In addition, per Section 900-1.3(g)(1) of the 94-c regulations, a Wildlife Site Characterization (WSC) Report was developed to provide a detailed summary of bird, bat, and other wildlife species at the Facility Site and surrounding area. The WSC Report is appended to this Application in Appendix 12-A and was provided to ORES on October 2, 2020. ORES concluded in a Determination of Occupied Habitat letter dated April 19, 2021 (Appendix 12-D) that no occupied habitat for state-listed grassland bird species, bald eagles, or northern long-eared bats exists within the Facility Site. Additional discussion regarding impacts to state or federally listed threatened or endangered species, or species of concern, are discussed in Exhibit 12.

Maintained early successional areas under PV arrays are expected to provide considerable habitat value for many wildlife species including pollinators and other invertebrates, small mammals, reptiles, amphibians, and many avian species that utilize old field/grassland habitat. Converting these areas out of active agricultural use or forestland could also provide a benefit to these species by providing a more dense, diverse ground cover than that found in areas used for agricultural production. The construction and operation of the Facility may result in habitat loss or species displacement within the Facility Site. However, there is abundant availability of habitats similar to those of the Facility within the nearby vicinity, therefore the Project is not anticipated to result in landscape or population level effects. Construction and operation will not result in the extirpation, significant reduction, of plant communities or wildlife habitat. Therefore, impacts to wildlife are expected to be minimal and insignificant.

(1) Construction-Related Impacts to Wildlife and Wildlife Habitats

Construction-related impacts to wildlife are anticipated to be limited to incidental injury and mortality due to construction activity and vehicular movement, habitat disturbance and loss associated with clearing and earth-

moving activities, and displacement of wildlife due to increased noise and human activities. Each of these potential impacts is described below.

Incidental Injury or Mortality

Direct impacts from construction may include incidental injury or mortality due to construction activities, such as clearing of vegetation, grading, excavation activities, driving of vehicles and equipment, as well as construction crew foot traffic. Vehicle-related mortality may increase temporarily due to the increased traffic during construction and operation. However, potential mortality is expected to be low as equipment used in solar energy facility construction generally moves at slow rates or is stationary for long periods (e.g., earth moving equipment, pile driving equipment). In addition, much of the land within the Facility Site is currently used for the active production of field crops, pastureland, or recently left fallow. Such areas may provide food and cover for wildlife species; however, they are routinely subject to disturbance-related farming activities (e.g., plowing, mowing, pesticide application) that are similar to the operational activities that will occur at the Facility. Incidental injury and mortality will likely be limited to juvenile and sedentary/slow-moving species that are unable to move out of the area being disturbed by construction, such as small mammals, ground-nesting bird eggs and hatchlings, reptiles, amphibians, and invertebrates. The highest risk of direct mortality to grassland-nesting birds from construction is the potential destruction of a nest during initial vegetation clearing/site preparation. More mobile species and mature individuals should be able to vacate areas being disturbed by construction.

For the majority of the wildlife species potentially present, overall populations are stable and any adverse impacts would be localized and not significant. For instance, impacts to species nesting in active farm fields should not differ greatly from impacts from normal plowing, seeding, and mowing of these fields for farming purposes. Thus, any direct impacts associated with disturbance and displacement from construction areas would be a temporary impact and individuals would be able to return to disturbed areas following completion of construction activities.

Habitat Disturbance and Loss Due to Clearing and Earth-moving Activities

It is anticipated that approximately 598 acres of agricultural land (hay field, pastureland, and row cropland), 521 acres of forestland, 66 acres of successional shrubland, and 70 acres of successional old field habitat will be directly impacted by construction-related disturbance. On a landscape scale, an abundance of these habitats occurs within the Facility Site, in nearby areas, and in the broader region. Of the total impacts, 9 acres of agricultural land, 3 acres of successional shrubland, and 2 acres of successional old field will be temporarily disturbed during construction and allowed to return to their previous condition following completion of construction activities. As the Facility Site is surrounded by similar habitats within the disturbance areas and the majority of the wildlife species that may be impacted by the Facility currently have stable populations within New York State and

the region, any indirect impacts are not anticipated to be significant. The indirect impacts would be short-term in duration and various wildlife species would be expected to return to the temporarily disturbed areas following construction.

In some PV array areas, and in areas associated with access road installation, grading will occur, and existing vegetation will be cleared or mowed to an appropriate height prior to installation of the arrays. Vegetation will also be cleared and maintained around the collection substation, security fence, overhead collection lines, and planting modules. These areas within the LOVM will be maintained as an early successional grassland community for the life of the Facility and are expected to provide considerable habitat value for many wildlife species including pollinators and other invertebrates, small mammals, reptiles and amphibians, and avian species. A total of approximately 588 acres of agricultural land, 483 acres of forestland, 64 acres of successional shrubland, and 68 acres of successional old field will be impacted during construction and then maintained around and under built Facility components during operation.

Changes in vegetation could influence the behavior of wildlife species by changing the quality of habitat for foraging, nesting, or roosting, although significant adverse impacts on wildlife are not expected. As indicated above, the early successional communities to be managed within the LOVM can provide habitat for a variety of wildlife species.

Displacement of Wildlife

Some wildlife displacement may occur due to increased noise and human activity associated with Facility construction. The significance of this impact will vary by species and the seasonal timing of construction activities. As mentioned previously, nearly half of land proposed to host Facility components is subject to frequent mechanical disturbance associated with farming and logging activities as well as the presence of vehicle traffic on county roads within the Facility Site. Consequently, it is anticipated that many of the wildlife species within the Facility Site are accustomed to disturbances such as those that will occur during Facility construction. Any direct impacts associated with sensory disturbance and displacement from construction areas would be a temporary impact and it is expected that individuals would return to temporarily disturbed areas following completion of construction activities. Outside of localized displacement due to construction disturbance in the immediate vicinity of Facility components, no significant displacement impacts on wildlife species are anticipated during construction.

(2) Operation-Related Impacts to Wildlife and Wildlife Habitats

Operation-related impacts to wildlife include direct habitat loss and disturbance/displacement of wildlife due to the presence of PV arrays and security fencing.

Habitat Loss and Fragmentation

A total of 43 acres of wildlife habitat will be converted to impervious surfaces for the life of the Facility. This habitat loss represents only approximately 1% of the 3,382-acre Facility Site and will primarily occur in active agricultural lands (field cropland and pastureland). The area underneath the PV arrays, and surrounding the collection substation, fence line, and planting modules (1,213 acres [36% of the Facility Site]) will be maintained as early successional habitat for the life of the Facility, the majority of which is currently active agricultural land. This early successional habitat is expected to provide considerable habitat value for many wildlife species, including pollinators and other invertebrates, small mammals, reptiles and amphibians, and many avian species.

In addition to successional old fields, the agricultural fields within the Facility Site (field cropland and pastureland) may provide functional grassland habitat for a variety of wildlife species. Combined, these communities account for a total of 660 acres of grassland habitat within the LOCA. A number of grassland birds, including the bobolink, Eastern meadowlark, grasshopper sparrow, and northern harrier, rely upon grassland habitats for breeding and foraging activities. Nearly 98% of the grasslands to be disturbed within the LOCA (approximately 649 acres) will be maintained as early successional fields for the life of the Facility, which represents no major change in habitat composition. Still, there is potential that certain wildlife species that require large uninterrupted open fields, such as grassland raptors, may no longer use these areas. However, grassland habitats are prevalent in Chautauqua County, and the Facility would only represent a small percentage potential loss of habitat in the County.

Forestland is the second most abundant community type in the LOCA, at 41% (521 acres), trailing only agricultural lands (47% of the LOCA). Of the 521 total acres of tree clearing, approximately 14 acres of forestland will be converted permanent impervious surfaces. In addition, an estimated 483 acres of forestland will be converted to early successional fields within the LOVM. Forest clearing or conversion will reduce available habitat and could result in impacts to forest avian species, which are sensitive to edge effects and habitat fragmentation. A number of species, such as the broad-winged hawk, black-throated blue warbler, ovenbird, scarlet tanager, and wood thrush would experience a loss of habitat. In addition, forest loss and fragmentation could result in adverse impacts to bat species based upon each species' ecology (e.g., preferred prey, foraging areas, roosting needs, and flight morphology). Suitable roosting areas for some species may be lost as a result of Facility construction; however, the creation of open areas and forest edge may benefit some species (such as little brown bat and big brown bat) by increasing foraging opportunities.

Publicly available data from the National Landcover Dataset (USGS, 2019) indicate that forestlands are prevalent throughout Chautauqua County with Core Forest Blocks comprising nearly 374,000 acres within the County.

Permanent forest clearing represents only 26% of all forested lands in the Facility Site, and less than 1% of core forest blocks within the County, so forest losses are small relative to habitat availability. The areas that will have some forest clearing have similar forested habitat nearby. Since the amount of habitat fragmentation will be low and there will not be a landscape-level change in habitat, the impacts to wildlife species from forest fragmentation are expected to be limited. In addition, the habitat conversion is expected to provide an increase in habitat for early-successional species.

Habitat will be impacted, and the overall acreage will be reduced, within the Facility Site. However, given the abundance of existing communities on the adjacent/nearby landscape, habitat loss/conversion resulting from Facility operation is not considered significant. Operation of the Facility will not result in additional habitat loss beyond areas disturbed by construction.

Disturbance/Displacement of Wildlife

Habitat alteration and disturbance resulting from Facility operation may render some areas within the Facility Site unsuitable or less suitable for nesting, foraging, roosting, or other wildlife use. The Facility is sited in an agricultural and forested landscape that is subject to frequent disturbances associated with farming activities such as tilling, plowing, pesticide application, mowing/harvesting, livestock grazing, and logging operations.

Given that the area underneath the PV arrays will be maintained as early successional habitat for the life of the Facility, it is expected that more generalist grassland avian species will successfully utilize these areas. However, approximately 521 acres of tree clearing will be required. The presence of PV arrays in existing grassland and forestland within the Facility Site will likely render these habitats unsuitable for certain species that would otherwise utilize these areas for foraging, roosting, and breeding habitat. This may be particularly the case for grassland avian species that generally require large, open grassland areas or for forest avian species that generally require large stands of intact, undisturbed forests for foraging activities and establishing breeding territories. However, significant adverse impacts to grassland and forestland species are not anticipated as these habitats are common in the region and the Applicant will implement avoidance, minimization, and mitigation measures as presented in Section (f) below.

Impacts to Wildlife Travel Corridors and Concentration Areas

The Applicant conducted research presented in the Wildlife Site Characterization Report (Appendix 12-A) to determine the presence of documented wildlife travel/migration corridors or concentration areas within or adjacent to the proposed Facility. The Facility is located within the Atlantic Flyway, one of four north/south corridors delineated by USFWS for the management of migratory birds. In addition, the northern portion of the Facility Site

overlaps the Ripley Hawk Watch, an Audubon Important Bird Area (IBA), known as a major spring hawk concentration area and an important migration corridor. There are no other wildlife concentration areas within the Facility Site; however, other wildlife concentration areas are present in the vicinity. These include the Chautauqua Gorge State Forest (3.1 miles northeast of the Facility Site), the Mount Pleasant State Forest (4.2 miles east of the Facility Site), Whalen Memorial State Forest (7.1 miles southeast of the Facility Site), North Harmony State Forest (7.6 miles southeast of the Facility Site), and Alder Bottom Wildlife Management Area (5.2 miles southeast of the Facility Site). Figure 4 of the Wildlife Site Characterization Report (Appendix 12-A) shows the distribution of resources which contribute to wildlife travel corridors and concentration areas.

Impacts to the Atlantic Flyway and Ripley Hawk Watch IBA are not anticipated from Facility construction or operation. The Atlantic Flyway extends across the eastern continental U.S. and overlays several developed and industrial areas. The Ripley Hawk Watch IBA occurs along the Portage Escarpment, south of the Lake Erie shoreline, and covers approximately 43,500 acres of land throughout Chautauqua County, including several developed or industrial areas. The Wildlife Site Characterization Report (Appendix 12-A) presents more information regarding the wildlife travel corridors and concentration areas in the vicinity of the Facility, and Exhibit 3 presents a cumulative analysis of potential renewable energy development impacts to land use within 5-miles of the Facility.

The Facility is also not anticipated to have adverse impacts to regional migration corridors. Smaller scale travel corridors that are not used for migration but are used for local movement between resource patches likely exist within the Facility Site. These include deer trails, areas between wetlands and uplands that reptiles and amphibians cross in order to access breeding grounds, and forests that mammals may travel through while foraging.

As previously noted, construction and operation of the Facility will impact 598 acres of active agricultural land, 521 acres of forestland, 70 acres of successional old field, and 66 acres of successional shrubland habitats. The majority of this land will be maintained as early successional fields which may provide valuable habitat and movement corridors for a number of wildlife species such as small mammals and grassland birds. However, the presence of security fencing may exclude larger mammals (e.g., white-tailed deer) from utilizing this habitat. Nevertheless, the existing habitats within the Facility Site are largely common throughout Chautauqua County and wildlife travel corridors will continue to be available outside of Facility security fencing.

(f) Measures to Avoid or Mitigate Impacts to Wildlife and Wildlife Habitats

Avoidance and minimization of impacts related to construction and operation of the Facility were accomplished through careful site design (e.g., utilizing existing roads or previously disturbed corridors, avoiding sensitive habitat such as wetlands and riparian corridors, and minimizing disturbance to the extent practicable), adherence to designated construction limits, and implementation of an approved sediment and erosion control plan and Stormwater Pollution Prevention Plan (SWPPP, see Exhibit 13 for more information regarding the SWPPP). Fence lines in close proximity to the PV arrays in the initial design were re-routed to allow more space for wildlife to traverse between arrays. Cleared forestland at the periphery of some PV panel arrays and access roads, and outside of security fencing, will be allowed to regenerate in areas that are not required for Facility maintenance, which will provide habitat for early successional species over the short term and will eventually support forest species in the long term. In areas of natural regeneration, grubbing and grading will be limited to the minimum required to properly install Facility components.

Although ORES has determined there to be no occupied habitat for northern long-eared bats or bald eagles within the Facility Site, the Applicant plans to adhere to tree clearing limitations outlined in the Uniform Standards and Conditions (i.e., Section 900-6.4(o)(4)(iii)(c) and 900-6.4(o)(6)(i) and (iii)). Please refer to Exhibit 12 for more detail on threatened and endangered species in the Facility Site. Significant adverse impacts to grassland-nesting bird species are not anticipated; however, the Applicant plans to conduct initial vegetation clearing for construction outside of the breeding season (May to July) to the extent practicable.

Furthermore, during construction and operation activities, the Applicant will set speed limits on access roads to ensure safe and efficient traffic flow, thus minimizing risk of wildlife injury or mortality due to traffic collision. The Applicant will hire an Environmental Monitor to conduct regular inspections of construction and operation activities, ensuring that sensitive habitats are flagged and avoided, and recording observations of any threatened and endangered species.

REFERENCES

- Audubon. 2020. Important Bird Areas: Ripley Hawk Watch. Available at: <https://www.audubon.org/important-birdareas/ripley-hawk-watch>. (Accessed November 2020).
- Edinger, G.J., D.J. Evans, S. Gebauer, T.G. Howard, DM. Hunt, and A.M. Olivero (editors). 2014. *Ecological Communities of New York State*. Second Edition: A Revised and Expanded Edition of Carol Reschke's *Ecological Communities of New York State* (1990). New York Natural Heritage Program, New York State Department of Environmental Conservation, Albany, NY.
- Hawke, Richard G. 2020. *Plant Evaluation Notes: A Comparative Evaluation of Ironweeds (Vernonia spp.)*. Chicago Botanic Garden, Issue 45, 2020. Available at: https://www.chicagobotanic.org/sites/default/files/pdf/plantevaluation/no45_vernonia.pdf. (Accessed November 2020).
- Johnson, Bill. Marcelo Zimmer. 2020. *The Ironweeds*. Purdue University Plant and Pest Diagnostic Laboratory. Available at: <https://ag.purdue.edu/btny/ppdl/Pages/POTW2020/POTW10052020.aspx>. (Accessed November 2020).
- New York State Office of Information Technology Services (NYSITS) NYS GIS Clearinghouse. 2021. *Natural Heritage Community Occurrences – NYNHP*. Available at: <http://gis.ny.gov/gisdata/inventories/details.cfm?DSID=1241> (Accessed June 2021).
- New York Natural Heritage Program (NYNHP). 2019. Online Conservation Guide for Hemlock-northern hardwood forest. Available from: <https://guides.nynhp.org/hemlock-northern-hardwood-forest/>. Accessed June 8, 2021.
- NYNHP. 2021. Online Conservation Guide for Confined River. Available from: <https://guides.nynhp.org/confined-river/>. Accessed June 8, 2021.
- Tolson, Joshua Allen. 2012. *The Effect of Integrated Weed Management Strategies on Weed Populations and Biomass, Pasture Productivity, Economic Returns, and Forage Quality With and Without Grazing*. Theses and Dissertations – Plant and Soil Sciences, 4, University of Kentucky. Available at: https://uknowledge.uky.edu/cgi/viewcontent.cgi?article=1003&context=pss_etds. (Accessed November 2020).
- Urbatsch, Lowell. 1973. *A Study of Ecotypes In Vernonia Gigantea Gigantea (Compositae)*. Transactions of the Nebraska Academy of Sciences and Affiliated Societies, 393. Available at: <https://digitalcommons.unl.edu/tnas/393>. (Accessed November 2020).
- U.S. Department of Agriculture (USDA). 2019. *Major Land Uses – Glossary*. Economic Research Service, Washington, D.C. Available at: <https://www.ers.usda.gov/data-products/major-land-uses/glossary/> (Accessed January 2021).
- USDA. 2021. *Cropland Data Layer – National Download*. National Agricultural Statistics Service. Available at: https://www.nass.usda.gov/Research_and_Science/Cropland/Release/ (May February 2021).
- United States Geological Survey (USGS). 2019. National Land Cover Database (NLCD) 2016. Available at: <https://www.mrlc.gov/viewer/>
- Young, S.M. 2019. *New York Rare Plant Status Lists*. New York Natural Heritage Program. Albany, New York. March 2019.