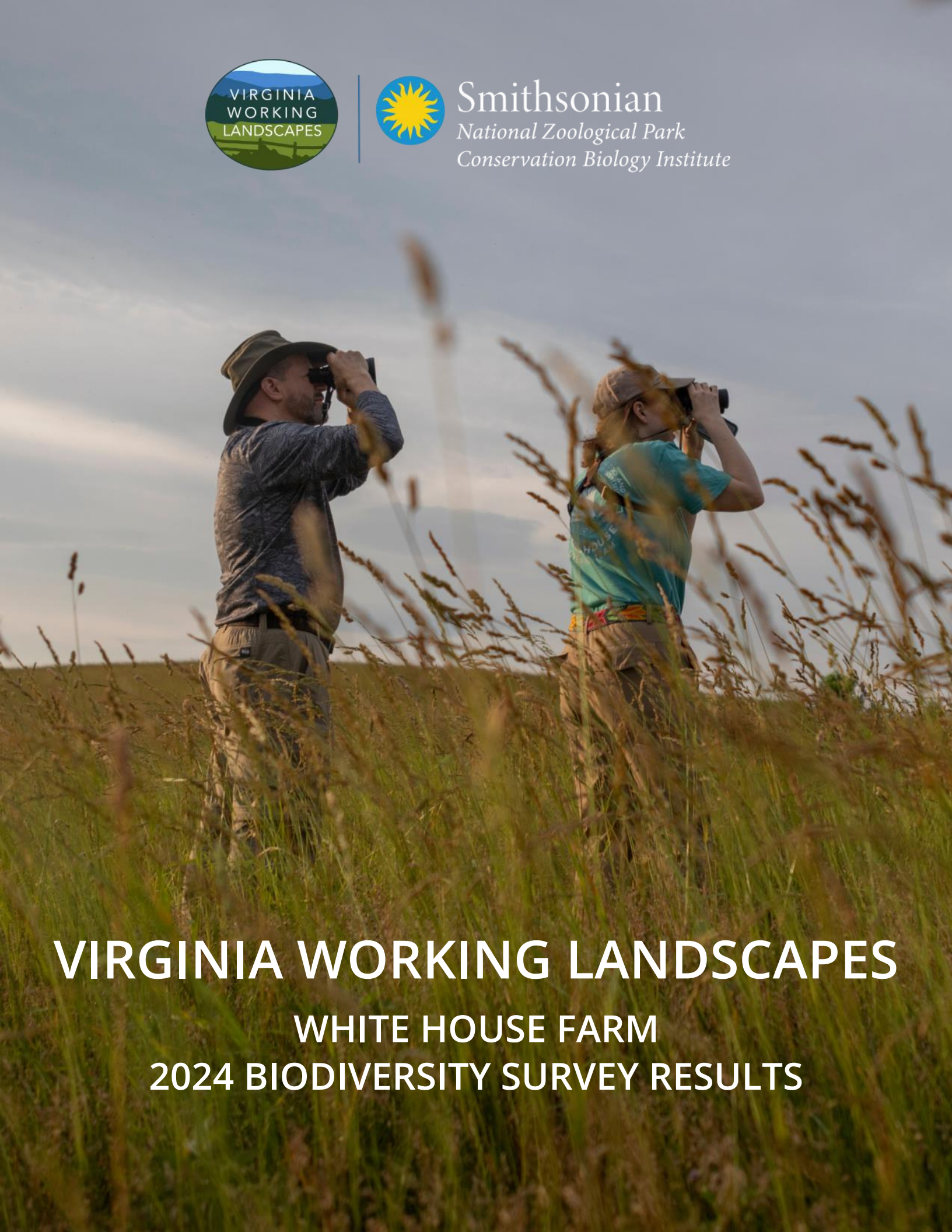


VIRGINIA WORKING LANDSCAPES

WHITE HOUSE FARM
2024 BIODIVERSITY SURVEY RESULTS

Introduction

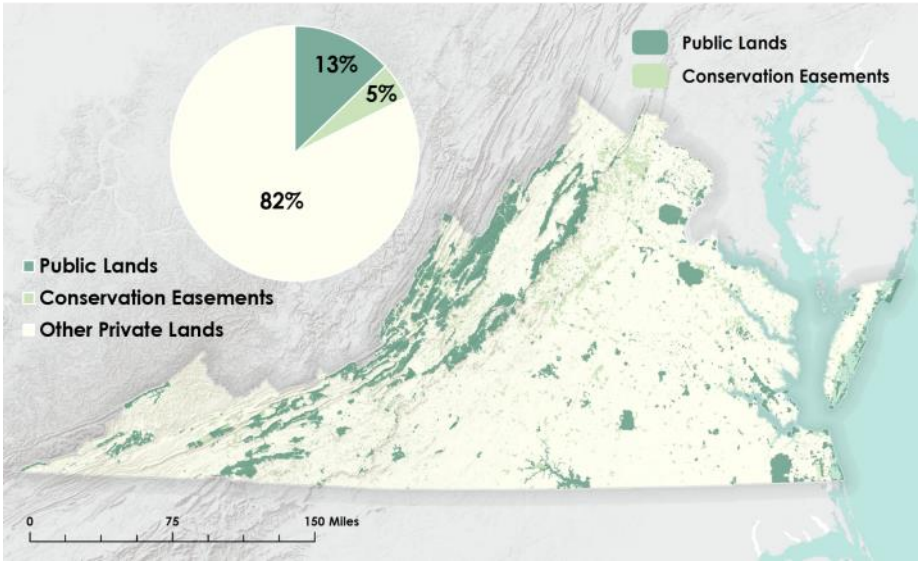
"Land conservation is truly an area where individuals can make a difference —in fact, where individuals are critical. What America will look like a hundred years from now is being decided day-by-day, parcel-by-parcel, by landowners like you."

—Conservation Options: A Landowner's Guide

Virginia Working Landscapes (VWL), a program of the Smithsonian's National Zoo and Conservation Biology Institute in Front Royal, VA, promotes the conservation of native biodiversity and sustainable land-use through scientific research, education, and community engagement. VWL was formed in 2010 to bridge Smithsonian science with deep-rooted local expertise to collectively study, inform, facilitate, and inspire conservation management on working landscapes. This includes critical research on one of our nation's most threatened habitats — grasslands.

According to the International Union for Conservation of Nature (IUCN), grasslands are "the most endangered, the most altered, and the least protected biome on the planet." Today, the loss and fragmentation of grassland habitat has led to the sharp decline of many specialized plants and animals. Each year, VWL partners with scientists, graduate students, interns, landowners, and volunteer community scientists to organize and conduct our foundational grassland biodiversity surveys on private lands throughout the region. The information we learn from these surveys provides vital insights on how to optimize opportunities for biodiversity conservation in these understudied ecosystems. The more we learn, the more we identify remaining questions and conduct focal research projects that address critical gaps in knowledge. To do so, we can harness the expertise of other Smithsonian units, as well as local partners like NGOs, academic institutions, land trusts, state agencies, and landowners to help develop and facilitate research across the region.

Why is this research important? Humans receive many tangible and intangible benefits from the natural world — carbon sequestration for clean air, pollination services for future crop security, or the spiritual benefits of walking through a wildflower meadow. Among countless other examples, these services are intricately dependent upon a biodiverse ecosystem. Given that most land in Virginia is privately-owned, understanding how private properties are managed is critical for informing best practices that can improve the livelihoods of people and the species we share the landscape with.



The overwhelming majority of land in Virginia is held in private hands, with more than 90% of grasslands now privately-owned. Therefore, you and other landowners are collectively stewarding the majority of Virginia's natural resources.

Thank YOU for participating in our 2024 Grassland Biodiversity Survey Program!

The 2024 Grassland Biodiversity Surveys by the Numbers:

25 Properties surveyed

10 Counties represented

71 Bird species observed

327 Plant species observed

1,735 Volunteer hours contributed

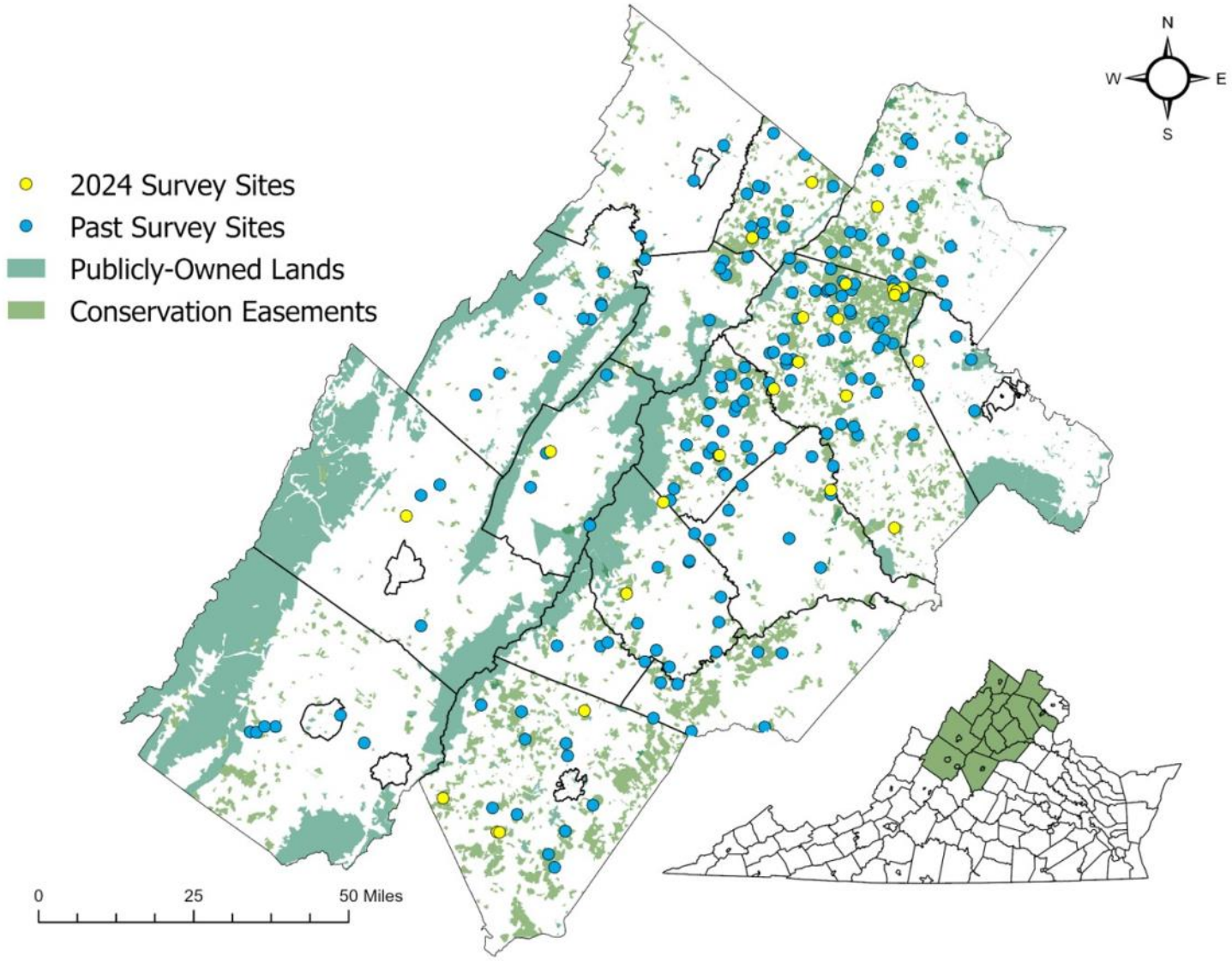


Figure 1. *Overview map showing locations of VWL's 2024 Grassland Biodiversity Surveys.*

Virginia Working Landscapes currently conducts surveys in the following Virginia counties:

- Albemarle
- Augusta
- Clarke
- Culpeper
- Fauquier
- Frederick
- Greene
- Loudoun
- Madison
- Orange
- Page
- Prince William
- Rappahannock
- Rockingham
- Shenandoah
- Warren

Breeding Bird Survey Methods

The breeding bird survey quantifies grassland bird diversity and abundance in fields during the breeding season. Many native birds rely on grasslands throughout the year, but not all birds use all types of fields. This survey requires 10+ acre fields that ideally remain unmanaged from May 15th to June 30th. We survey birds using 10-minute point counts, wherein we record each bird seen or heard within 100 m of the survey point. A survey site typically has three points that are placed at least 100 m from the forest edge and at least 200 m from each other. VWL surveyors conduct three rounds of point counts over the course of the survey season to better understand how the avian community utilizes the surrounding habitat throughout the active breeding season.

Plant Survey Methods

The grassland plant surveys measure plant species composition of each survey site, which can provide insight into habitat quality and the impact of land-use on plant communities. This survey requires 10+ acre fields and is most effective when plants are allowed to reach maturity and management actions such as mowing, grazing, or burning can be delayed until surveys are completed. To determine plant species occurrence and diversity, surveyors assess plots along a linear transect starting at the designated survey points. Species are identified within seven 1-m^2 plots arranged along each transect. Each site is visited twice, once in the spring and once in the summer.

Soil Survey Methods

Soil composition is useful for understanding soil health and its correlation with plant communities. In addition, it can offer valuable insights to landowners, aiding them in enhancing management practices. A total of eight samples are taken at each survey point and mixed together to provide an average measure of soil. Results represent the soil composition (i.e. organic matter, phosphorus, potassium, calcium, magnesium, pH, acidity, and cation exchange capacity) within 100 m of the survey points. Samples are analyzed by Waypoint Analytical.

Photo by Nick Garnhart

SUMMARY RESULTS FOR YOUR PROPERTY

On your property, we performed breeding bird surveys, plant surveys, and soil surveys.

Figure 2. *Overview map showing location of surveys conducted on your property.*

BREEDING BIRD SURVEY RESULTS

Table 1. 2024 Breeding Bird Survey Results. Species are listed in rank of order of occurrence, out of a maximum occurrence of **9**. Incidental observations (birds observed before or after the survey, or outside the survey area) are indicated with a "*" in the Occurrence column.

Common Name	Scientific Name	Target Species*	Species of Continental or Regional Concern**	Virginia Wildlife Action Plan***	Occurrence
Field Sparrow	*Spizella pusilla*	shrubland	Listed	Tier 4	8
Indigo Bunting	*Passerina cyanea*	shrubland	Listed		7
Red-winged Blackbird	*Agelaius phoeniceus*	shrubland	Listed		7
American Goldfinch	*Spinus tristis*				4
Eastern Meadowlark	*Sturnella magna*	grassland	Listed	Tier 4	4
Grasshopper Sparrow	*Ammodramus savannarum*	grassland	Listed	Tier 4	4
Red-eyed Vireo	*Vireo olivaceus*				4
Northern Cardinal	*Cardinalis cardinalis*				3
Northern Mockingbird	*Mimus polyglottos*				3
Orchard Oriole	*Icterus spurius*				3
American Crow	*Corvus brachyrhynchos*				2
American Kestrel	*Falco sparverius*	grassland			2
Blackpoll Warbler	*Setophaga striata*		Listed		2
Eastern Kingbird	*Tyrannus tyrannus*	grassland		Tier 4	2
Song Sparrow	*Melospiza melodia*				2
American Robin	*Turdus migratorius*				1
Barn Swallow	*Hirundo rustica*			Tier 3	1
Brown-headed	*Molothrus ater*		Listed		1
Blue Jay	*Cyanocitta cristata*				1

* VWL target species are those identified by SCBI researchers as dependent on grassland/shrubland habitats
** Information on species of continental or regional conservation concern obtained from the 2024 Partners in Flight Watch List
*** Information on species of greatest conservation need obtained from the 2015 Virginia Wildlife Action Plan

BREEDING BIRD SURVEY RESULTS

Table 1. 2024 Breeding Bird Survey Results. Species are listed in rank of order of occurrence, out of a maximum occurrence of **9**. Incidental observations (birds observed before or after the survey, or outside the survey area) are indicated with a "*" in the Occurrence column.

Common Name	Scientific Name	Target Species*	Species of Continental or Regional Concern**	Virginia Wildlife Action Plan***	Occurrence
Brown Thrasher	*Toxostoma rufum*	grassland		Tier 4	1
Carolina Chickadee	*Poecile carolinensis*				1
Cedar Waxwing	*Bombycilla cedrorum*				1
Fish Crow	*Corvus ossifragus*				1
Great Crested	*Myiarchus crinitus*				1
Mourning Dove	*Zenaida macroura*				1
Red-shouldered Hawk	*Buteo lineatus*				1
Tree Swallow	*Tachycineta bicolor*				1
Warbling Vireo	*Vireo gilvus*				1
Yellow-billed Cuckoo	*Coccyzus americanus*	shrubland	Listed	Tier 3	1
Bald Eagle	*Haliaeetus*				*
Blue Gray Gnatcatcher	*Polioptila caerulea*				*
Chipping Sparrow	*Spizella passerina*				*
Chimney Swift	*Chaetura pelagica*		Listed	Tier 4	*
Common Grackle	*Quiscalus quiscula*		Listed		*
Common Yellowthroat	*Geothlypis trichas*	shrubland			*
Downy Woodpecker	*Picoides pubescens*				*

* VWL target species are those identified by SCBI researchers as dependent on grassland/shrubland habitats
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BREEDING BIRD SURVEY RESULTS

Table 1. 2024 Breeding Bird Survey Results. Species are listed in rank of order of occurrence, out of a maximum occurrence of **9**. Incidental observations (birds observed before or after the survey, or outside the survey area) are indicated with a "*" in the Occurrence column.

Common Name	Scientific Name	Target Species*	Species of Continental or Regional Concern**	Virginia Wildlife Action Plan***	Occurrence
Eastern Bluebird	*Sialia sialis*	shrubland			*
Eastern Phoebe	*Sayornis phoebe*				*
Eastern Wood-Pewee	*Contopus virens*		Listed	Tier 4	*
Gray Catbird	*Dumetella carolinensis*			Tier 4	*
Killdeer	*Charadrius vociferus*				*
Osprey	*Pandion haliaetus*				*
Pileated Woodpecker	*Dryocopus pileatus*				*
Red-bellied	*Melanerpes carolinus*				*
Tufted Titmouse	*Baeolophus bicolor*				*
White-breasted	*Sitta carolinensis*				*
Yellow-breasted Chat	*Icteria virens*	shrubland	Listed	Tier 4	*

* VWL target species are those identified by SCBI researchers as dependent on grassland/shrubland habitats
** Information on species of continental or regional conservation concern obtained from the 2024 Partners in Flight Watch List
*** Information on species of greatest conservation need obtained from the 2015 Virginia Wildlife Action Plan

GRASSLAND PLANT SURVEY RESULTS

Table 2. 2024 Plant Survey Results at **Point A**. Species are listed in rank order of occurrence out of a maximum occurrence of **14**. Plants are identified to species, unless otherwise noted.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Kentucky Bluegrass	*Poa pratensis*	introduced	G	14
Tall Fescue	*Schedonorus arundinaceus*	introduced	G	14
Carolina Horsenettle	*Solanum carolinense var. carolinense*	native	F	13
Japanese Clover	*Kummerowia striata*	introduced	F	8
Orchardgrass	*Dactylis glomerata*	introduced	G	6
Yellow Foxtail	*Setaria pumila ssp. pumila*	introduced	G	6
Narrowleaf Plantain	*Plantago lanceolata*	introduced	F	4
Annual Ragweed	*Ambrosia artemisiifolia*	native	F	2
Copperleaf	*Acalypha*	native	F	2
Longleaf Groundcherry	*Physalis longifolia*	native	F	2
Sedge	*Carex*	native	G	2
Blackseed Plantain	*Plantago rugelii*	native	F	1
Chicory	*Cichorium intybus*	introduced	F	1
Common Persimmon	*Diospyros virginiana*	native	W	1
Crowngrass	*Paspalum*	uncertain	G	1
Eastern Daisy Fleabane	*Erigeron annuus*	native	F	1
Field Clover	*Trifolium campestre*	introduced	F	1
Korean Clover	*Kummerowia stipulacea*	introduced	F	1

* Plants are characterized native, introduced, or invasive via the USDA plant database
** Plants are characterized by their major growth form as graminoid (G), forb (F), or woody (W) (plants.usda.gov).

GRASSLAND PLANT SURVEY RESULTS

Table 2. 2024 Plant Survey Results at **Point A**. Species are listed in rank order of occurrence out of a maximum occurrence of **14**. Plants are identified to species, unless otherwise noted.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Poverty Rush	*Juncus tenuis*	native	G	1
Purpletop Tridens	*Tridens flavus*	native	G	1
Sweet Vernalgrass	*Anthoxanthum odoratum*	introduced	G	1
Timothy	*Phleum pratense*	invasive	G	1
White Clover	*Trifolium repens*	introduced	F	1
Woodsorrel	*Oxalis*	native	F	1

* Plants are characterized native, introduced, or invasive via the USDA plant database
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GRASSLAND PLANT SURVEY RESULTS

Table 3. 2024 Plant Survey Results at **Point B**. Species are listed in rank order of occurrence out of a maximum occurrence of **14**. Plants are identified to species, unless otherwise noted.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Kentucky Bluegrass	*Poa pratensis*	introduced	G	14
Wingstem	*Verbesina alternifolia*	native	F	8
Woodsorrel	*Oxalis*	native	F	8
Yellow Crownbeard	*Verbesina occidentalis*	native	F	8
Cutleaf Teasel	*Dipsacus laciniatus*	introduced	F	7
Annual Ragweed	*Ambrosia artemisiifolia*	native	F	5
Common Mullein	*Verbascum thapsus*	introduced	F	5
Marsh Bristlegrass	*Setaria parviflora*	native	G	5
Sericea Lespedeza	*Lespedeza cuneata*	invasive	F	4
Spiny Plumeless Thistle	*Carduus acanthoides*	introduced	F	4
White Campion	*Silene latifolia*	introduced	F	4
Common Viper's Bugloss	*Echium vulgare*	introduced	F	3
Sedge	*Carex*	native	G	3
Blackeyed Susan	*Rudbeckia hirta*	native	F	2
Common Milkweed	*Asclepias syriaca*	native	F	2
Lambsquarters	*Chenopodium album*	introduced	F	2
Spotted Knapweed	*Centaurea stoebe ssp. micranthos*	invasive	F	2
Vetch	*Vicia*	uncertain	F	2
White Clover	*Trifolium repens*	introduced	F	2
Bermudagrass	*Cynodon dactylon*	introduced	G	1
Canada Goldenrod	*Solidago altissima*	native	F	1
Carolina Horsenettle	*Solanum carolinense var. carolinense*	native	F	1
Clammy Groundcherry	*Physalis heterophylla*	native	F	1
Goldenrod	*Solidago*	native	F	1
Indiangrass	*Sorghastrum nutans*	native	G	1
Japanese Hop	*Humulus japonicus*	native	F	1
Little Bluestem	*Schizachyrium scoparium var. scoparium*	native	G	1

* Plants are characterized native, introduced, or invasive via the USDA plant database
** Plants are characterized by their major growth form as graminoid (G), forb (F), or woody (W) (plants.usda.gov).

GRASSLAND PLANT SURVEY RESULTS

Table 3. 2024 Plant Survey Results at **Point B**. Species are listed in rank order of occurrence out of a maximum occurrence of **14**. Plants are identified to species, unless otherwise noted.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Milkweed	*Asclepias*	native	F	1
Nimblewill	*Muhlenbergia schreberi*	native	G	1
Nodding Plumeless Thistle	*Carduus nutans*	introduced	F	1
Pinnate Prairie Coneflower	*Ratibida pinnata*	introduced	F	1
Plumless Thistle	*Carduus*	introduced	F	1
Sideoats Grama	*Bouteloua curtipendula*	native	G	1
Ticktrefoil	*Desmodium*	native	F	1
Yellow Sweetclover	*Melilotus officinalis*	introduced	F	1

* Plants are characterized native, introduced, or invasive via the USDA plant database
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GRASSLAND PLANT SURVEY RESULTS

Table 4. 2024 Plant Survey Results at **Point C**. Species are listed in rank order of occurrence out of a maximum occurrence of **14**. Plants are identified to species, unless otherwise noted.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Tall Fescue	*Schedonorus arundinaceus*	introduced	G	13
Kentucky Bluegrass	*Poa pratensis*	introduced	G	12
Lambsquarters	*Chenopodium album*	introduced	F	8
White Campion	*Silene latifolia*	introduced	F	8
Woodsorrel	*Oxalis*	native	F	8
Canada Germander	*Teucrium canadense*	native	F	7
Herb Of The Cross	*Verbena officinalis*	introduced	F	7
Yellow Crownbeard	*Verbesina occidentalis*	native	F	7
Wingstem	*Verbesina alternifolia*	native	F	5
Crownvetch	*Securigera varia*	invasive	F	4
Field Brome	*Bromus japonicus*	introduced	G	4
Common Mullein	*Verbascum thapsus*	introduced	F	3
Marsh Bristlegrass	*Setaria parviflora*	native	G	3
Great Yellow Woodsorrel	*Oxalis grandis*	native	F	2
Indiangrass	*Sorghastrum nutans*	native	G	2
Japanese Hop	*Humulus japonicus*	native	F	2
Johnsongrass	*Sorghum halepense*	invasive	G	2
Scouringrush Horsetail	*Equisetum hyemale*	native	F	2
White Vervain	*Verbena urticifolia*	native	F	2
Annual Ragweed	*Ambrosia artemisiifolia*	native	F	1
Carolina Horsenettle	*Solanum carolinense var. carolinense*	native	F	1

* Plants are characterized native, introduced, or invasive via the USDA plant database
** Plants are characterized by their major growth form as graminoid (G), forb (F), or woody (W) (plants.usda.gov).

GRASSLAND PLANT SURVEY RESULTS

Table 4. 2024 Plant Survey Results at **Point C**. Species are listed in rank order of occurrence out of a maximum occurrence of **14**. Plants are identified to species, unless otherwise noted.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Cutleaf Teasel	*Dipsacus laciniatus*	introduced	F	1
Eastern Poison Ivy	*Toxicodendron radicans*	native	W	1
Groundcherry	*Physalis*	native	F	1
Tall Oatgrass	*Arrhenatherum elatius*	introduced	G	1
Ticktrefoil	*Desmodium*	native	F	1
White Clover	*Trifolium repens*	introduced	F	1
Yellow Sweetclover	*Melilotus officinalis*	introduced	F	1

* Plants are characterized native, introduced, or invasive via the USDA plant database
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GRASSLAND PLANT SURVEY RESULTS

Table 5. 2024 Plant Survey Results at **Point D** Species are listed in rank order of occurrence out of a maximum occurrence of **7**. Plants are identified to species, unless otherwise noted.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Bermudagrass	*Cynodon dactylon*	introduced	G	6
Kentucky Bluegrass	*Poa pratensis*	introduced	G	6
Tall Fescue	*Schedonorus arundinaceus*	introduced	G	6
Bladder Campion	*Silene vulgaris*	introduced	F	4
Narrowleaf Plantain	*Plantago lanceolata*	introduced	F	3
Chicory	*Cichorium intybus*	introduced	F	2
Orchardgrass	*Dactylis glomerata*	introduced	G	2
Quackgrass	*Elymus repens*	introduced	G	2
Sedge	*Carex*	native	G	2
Carolina Horsenettle	*Solanum carolinense var. carolinense*	native	F	1
Nimblewill	*Muhlenbergia schreberi*	native	G	1
Rescuegrass	*Bromus catharticus*	introduced	G	1
White Clover	*Trifolium repens*	introduced	F	1

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GRASSLAND PLANT SURVEY RESULTS

Table 6. 2024 Plant Survey Results for **Incidentals**. Plants are identified to species, unless otherwise noted. Incidental observations (plants observed outside the survey area) are indicated with an "*" in the Occurrence column.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Annual Ragweed	*Ambrosia artemisiifolia*	native	F	*
Big Bluestem	*Andropogon gerardii*	native	G	*
Blackberry	*Rubus*	uncertain	W	*
Blackeyed Susan	*Rudbeckia hirta*	native	F	*
Bluestem	*Andropogon*	native	G	*
Boxelder	*Acer negundo*	native	W	*
Brome	*Bromus*	uncertain	G	*
Callery Pear	*Pyrus calleryana*	invasive	W	*
Canadian Horseweed	*Conyza canadensis*	native	F	*
Clammy Groundcherry	*Physalis heterophylla*	native	F	*
Common Evening Primrose	*Oenothera biennis*	native	F	*
Common Milkweed	*Asclepias syriaca*	native	F	*
Common Mullein	*Verbascum thapsus*	introduced	F	*
Common Pokeweed	*Phytolacca americana var.*	native	F	*
Common Velvetgrass	*Holcus lanatus*	introduced	G	*
Common Viper's Bugloss	*Echium vulgare*	introduced	F	*
Coralberry	*Symphoricarpos orbiculatus*	uncertain	W	*
Crowngrass	*Paspalum*	uncertain	G	*
Crownvetch	*Securigera varia*	invasive	F	*
Curly Dock	*Rumex crispus*	introduced	F	*

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GRASSLAND PLANT SURVEY RESULTS

Table 6. 2024 Plant Survey Results for **Incidentals**. Plants are identified to species, unless otherwise noted. Incidental observations (plants observed outside the survey area) are indicated with an "*" in the Occurrence column.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Cutleaf Teasel	*Dipsacus laciniatus*	introduced	F	*
Dandelion	*Taraxacum*	introduced	F	*
Deertongue	*Dichanthelium clandestinum*	native	G	*
Eastern Gamagrass	*Tripsacum dactyloides var. dactyloides*	native	G	*
Flatsedge	*Cyperus*	uncertain	G	*
Green Comet Milkweed	*Asclepias viridiflora*	native	F	*
Hairy Leafcup	*Smallanthus uvedalius*	native	F	*
Honeylocust	*Gleditsia triacanthos*	uncertain	W	*
Indiangrass	*Sorghastrum nutans*	native	G	*
Indianhemp	*Apocynum cannabinum*	native	F	*
Ironweed	*Vernonia*	native	F	*
Japanese Honeysuckle	*Lonicera japonica*	invasive	W	*
Japanese Hop	*Humulus japonicus*	native	F	*
Joe Pye Weed	*Eutrochium*	native	F	*
Johnsongrass	*Sorghum halepense*	invasive	G	*
Lambsquarters	*Chenopodium album*	introduced	F	*
Lesser Burdock	*Arctium minus*	introduced	F	*
Pale Indian-Plantain	*Arnoglossum atriplicifolium*	native	F	*
Partridge Pea	*Chamaecrista fasciculata var. fasciculata*	native	F	*
Poison Hemlock	*Conium maculatum*	introduced	F	*
Purpletop Tridens	*Tridens flavus*	native	G	*
Queen Anne's Lace	*Daucus carota*	introduced	F	*
Red Clover	*Trifolium pratense*	introduced	F	*

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GRASSLAND PLANT SURVEY RESULTS

Table 6. 2024 Plant Survey Results for **Incidentals**. Plants are identified to species, unless otherwise noted. Incidental observations (plants observed outside the survey area) are indicated with an "*" in the Occurrence column.

Common Name	Scientific Name	Native Status*	Growth Form**	Occurrence
Redtop	*Agrostis gigantea*	introduced	G	*
Royal Paulownia	*Paulownia tomentosa*	invasive	W	*
Scouringrush Horsetail	*Equisetum hyemale*	native	F	*
Senna	*Senna*	uncertain	F	*
Sericea Lespedeza	*Lespedeza cuneata*	invasive	F	*
Smooth Brome	*Bromus inermis*	introduced	G	*
Spiny Plumeless Thistle	*Carduus acanthoides*	introduced	F	*
St. Anthony's Turnip	*Ranunculus bulbosus*	introduced	F	*
Sumac	*Rhus*	native	W	*
Sunflower	*Helianthus*	uncertain	F	*
Tall Fescue	*Schedonorus arundinaceus*	introduced	G	*
Ticktrefoil	*Desmodium*	native	F	*
Violet	*Viola*	uncertain	F	*
Virginia Creeper	*Parthenocissus quinquefolia*	native	W	*
White Campion	*Silene latifolia*	introduced	F	*
White Sweetclover	*Melilotus albus*	introduced	F	*
Wild Bergamot	*Monarda fistulosa*	native	F	*
Woodsorrel	*Oxalis*	native	F	*
Yellow Crownbeard	*Verbesina occidentalis*	native	F	*
Yellow Sweetclover	*Melilotus officinalis*	introduced	F	*

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SOIL SURVEY RESULTS

Table 7. 2024 Soil Survey Results. Soil samples were processed by Waypoint Analytical, using the Mehlich-3 test. Ratings of very low (VL), low (L), medium (M), high/optimum (O), or very high (VH) provide a general guideline for the adequacy of nutrient levels for field crops. Parts per million (ppm) can be converted to pounds per acre (lbs/ac) by multiplying by two.

Point	Organic Matter			pH	CEC	P		K			Mg			Ca			H
	Percent	Rating	ENR		meq/100g	ppm	Rating	ppm	Rating	% Sat	ppm	Rating	% Sat	ppm	Rating	% Sat	% Sat
A	2.7	M	94	6.6	7	18	L	99	M	3.6	148	O	17.6	1022	O	73	5.7
B	5.3	O	144	5.9	8.7	25	L	93	M	2.7	146	M	14	1151	M	66.1	17.2
C	2.9	M	97	6.4	7.6	26	L	87	L	2.9	138	O	15.1	1111	O	73.1	9.2

Organic Matter (OM)**:** Amount (percent) of decaying plant and animal material in the soil. The Estimated Nitrogen Release (ENR) is the amount of nitrogen (lbs/ac) that can be released from OM via bacterial activity or other means. The percent OM and ENR may be influenced by seasonal variation in weather or by soil physical conditions.

pH: A measure of soil acidity or alkalinity. A pH of 7.0 is neutral, lower pH is acidic, and higher is alkaline. Rule of thumb suggests a desirable pH for mineral soils is 6-7, and 5-5.5 for organic soils.

Cation Exchange Capacity (CEC): A measure of the soil's ability to hold nutrients (such as Ca, Mg, K, or H) in terms of milliequivalents per 100 grams of soil. Clay minerals and organic matter present in the soil affect CEC; it can range from <5 to 35 meq/100g for agricultural soils; CEC = % *OM* * (*Soil pH* - 4.5)

Phosphorous (P): Amount of P available to the plant, measured in parts per million (ppm). Levels between 15-31 ppm are adequate for most crops. Excessively high levels can decrease the availability of other nutrients to plants.

Potassium (K): Plant-available potassium (parts per million). Generally higher levels of potassium are needed on soils high in clay and organic matter. On finer textured soils, potassium loss can occur through fixation.

Magnesium (Mg): Plant-available magnesium (parts per million). Soil type, drainage, liming and cropping practices affect Mg levels. Mg saturations >20% can adversely affect soil structure, infiltration, and aerification.

Calcium (Ca): Plant-available calcium (parts per million). In addition to the factors mentioned for Mg, soil pH can also affect Ca levels. Ca saturations >85% may indicate calcareous or gypsiferous soil.

Percent Cation Saturation (% Sat): Proportion (percent) of the CEC occupied by a given cation (i.e., an ion with a positive charge, such as calcium, magnesium or potassium).

Information about soil parameters from: Waypoint Analytical*; Information about soil suitability from*: Magdoff, F, & Van Es, H. 2010. "Building soils for better crops". 3rd Ed. Sustainable Agriculture Network; *Information about soil balancing from:* Chaganti, VN., Culman, SW. 2017. Historical perspective of soil balancing theory and identifying knowledge gaps: A review. Crops and Soils.)

Understanding Your Biodiversity Study Results

While we hope these reports provide valuable insights to landowners, there are a few considerations to keep in mind. Our reports present a snapshot of species observed at each property during the survey period. As such, you may note that some species regularly observed on your property are absent from these lists. This discrepancy arises because our surveys focus exclusively on grassland habitats, reflecting species occurrence within that specific environment rather than providing an exhaustive list for the entire property.

In general, our surveys are focused on identifying flora and fauna at specific times and in specific places. Bird surveys aim to inventory birds during a 6-week period of active breeding. Species present in the area during other times of year — such as winter or migration — may not be documented by our breeding season surveys. Surveyors are instructed to abide by time and space limitations during their surveys; they count birds within a strict 10-minute time window and a 100-meter search radius, and they document plants within 1 x 1 meter plots. Species detected outside a search area or a time frame are not counted.

Although it limits the total numbers of species on an annual list, this study design standardizes search effort and enables meaningful comparisons among properties. Finally, surveyors have the option to spend additional time collecting “incidental” observations to enrich their experience and to provide landowners with broader species lists. If surveyors put in the additional effort to record incidentals on your property, they have been included in your species lists as “incidentals.”

To learn more about your soil, conducting in-depth tests through labs such as the Cornell Soil Health Laboratory can help provide further insight on active carbon, soil respiration, and predicted available water capacity.

We encourage you to examine your survey results and consider how your current land management practices impact the biodiversity found on your landscape. The following pages and the VWL website offer more information on best management practices.

Your Land, Your Impact

Birds

Grassland and shrubland bird populations are rapidly declining due to agricultural intensification, habitat loss/fragmentation, pesticide use, and climate change. These species heavily rely on working landscapes (i.e. hayfields, pasture) throughout the year and their survival depends on the decisions made by landowners. There are many actions landowners can take to support grassland and shrubland bird conservation efforts, and apps such as Merlin Bird ID and eBird can help you continue learning about species that utilize habitat on your property.

Plants

Virginia's native plants, such as warm season grasses and forbs, share an evolutionary history with our local wildlife, support declining pollinator communities, and have deep roots that are superior at carbon sequestration - tapping into the water table during droughts and depositing more organic matter into soils. Landowners can use apps like iNaturalist and Flora of Virginia to identify plants on their property to determine if they're native or non-native. Some non-native plants are considered invasive species and should be removed when possible. Replacing them with native species can create more climate-resilient habitat and improve ecosystem function. It's important to leave these plants standing throughout fall and winter to provide critical habitat for overwintering wildlife species and to promote plant population expansion through self-seeding.

Soil

Understanding soil health is a crucial, yet often overlooked, element in supporting the conservation of native biodiversity and overall ecosystem function. Healthy soil plays a key role in regulating water, cycling nutrients, filtering pollutants, and supporting both animal and plant life. Building healthy soil is also critical for sustaining a productive working landscape. Management practices such as reduced tillage farming, cover cropping, and minimizing soil disturbance can help limit soil erosion and increase water infiltration.

Landowner Resources for Supporting Native Biodiversity

Virginia Working Landscapes has developed numerous resources for landowners who want to learn more about managing habitat to support the conservation of native biodiversity in Virginia and beyond. Several quick-reference guides are currently available to download, including resources for field management guidance, native plant recommendations, species identification guides, and lists of local conservation partners and technical assistance providers. To view these resources and more, visit our Resources Web Page and check back often to see what's new!

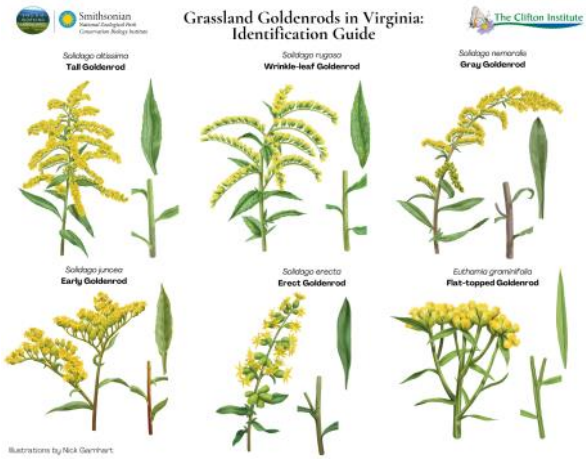
Nest-Box Guide for Virginia's Cavity-Nesting Birds

Best Management Practices (BMPs) for Grassland Birds

Recommended Species for Meadow Plantings Guide

Thistles in Virginia: Identification Guide

Raise the Blade



Grassland Goldenrods in Virginia: Identification Guide

Partners, Contacts, & Services

Grassland Biodiversity surveys, ecological research, site visits, and community outreach & engagement:
Virginia Working Landscapes (vaworkinglandscapes.org)*

Financial incentives program for protecting grassland bird habitat, nest boxes, and BMPs:
Virginia Grassland Bird Initiative (vagrasslandbirds.org)

Quail & pollinator habitat and cost share opportunities for habitat management:
Quail Forever (quailforever.org)*

Native meadow establishment & management and landowner outreach:
The Clifton Institute (cliftoninstitute.org)

Regenerative grazing, soil health, farming for profitability, and cover crops:
American Farmland Trust (farmland.org)*
VA Cooperative Extension (ext.vt.edu)

Soil Health:
Virginia Soil Health Coalition (virginiasoilhealth.org)

Watershed stewardship and riparian buffers:
Friends of the Shenandoah River (fosr.org)
Goose Creek Association (goosecreek.org)
Friends of the Rappahannock (riverfriends.org)
Potomac Riverkeeper Network (potomacriverkeepernetwork.org)
Friends of the North Fork (friendsofthenorthfork.org)

Invasive species identification and management:
Blue Ridge PRISM (blueridgeprism.org)

Native plant education, research and conservation, and local native plant nurseries:
The Virginia Native Plant Society (vnps.org)
Piedmont Discovery Center (piedmontdiscoverycenter.org)

Beaver management:
Human-Beaver Coexistence Fund (coexistwithbeavers.org)

Conservation easements:
The Piedmont Environmental Council (pecva.org)*
Land Trust of Virginia (landtrustva.org)
Virginia Outdoors Foundation (vof.org)
Shenandoah Valley Conservancy (shenandoah.org)
Northern Virginia Conservation Trust (nvct.org)

Agricultural best management practices, land-use tax credits, cost-share programs, and loans:
USDA's Natural Resources Conservation Service (find your local service center here)
Farm Service Agency (find your local service center here)

Soil health, water quality improvement, land-use tax, and cost-share programs:
Virginia Soil and Water Conservation Districts (find your district here)

Forest management and stewardship, timber resources, grants, and cost-share programs:
Virginia Department of Forestry (dof.virginia.gov)

Air quality, water quality, environmental enforcement, and loans:
VA Department of Environmental Quality (find a local service provider here)

** VGBI Core Partner*

Illustrations by Nick Garnhart

Acknowledgements

First, we would like to extend a big *thank you* to you, the landowners and land managers, for providing access to your property for this research. We also gratefully acknowledge the following volunteer community scientists for donating their time and expertise.

Property	County	Surveyors
Broad Hollow Farm	Fauquier	Rebecca Harriet and Mary Beth Yarborough (Bird Surveys) Sally Anderson, Julie Pineiro, and Sara Lawrey (Plant Surveys)
Cedar Heights Farm	Rockingham	Zack Perdue and James Wilson (Bird Surveys)
Chapman Farm	Fauquier	Bob Butterworth and Art Drauglis (Bird Surveys)
Cunningham Property	Albemarle	Janet Paisley (Bird Surveys)
Fuller Property	Fauquier	Kate Heneberry, Hillary Davidson, and Corey Hunsdon (Bird Surveys) Paul Guay, Charlie Price, and Richard Dynes (Plant Surveys)
Glen Ora	Fauquier	Lynne Leeper and Kristina Hagman (Bird Surveys) Jenny Meyer and Tonya Taylor (Plant Surveys)
Graves Mill Farm/ Rapidan River Ranch	Madison	Ed LeGrand (Bird Surveys) Deirdre Curran and George Gardner (Plant Surveys)
Lakota Ranch	Culpeper	Alex Bueno, Linda Bueno, and Jeanne Mayo (Bird Surveys) Timothy Cotter, Karl Brotzman, and Jesse Edwards (Plant Surveys)
Leopold's Preserve	Prince William	Phil Kenny and Russ Taylor (Bird Surveys) Valerie Galati, Kieran Haney, Chel Wock, and Jesse Edwards (Plant Surveys)
Martin Farm	Madison	Don Arnold and Sara Lawrey (Bird Surveys)
Meadowbrook	Albemarle	Janet Paisley (Bird Surveys)
Mill Creek Farm	Albemarle	Janet Paisley, Elizabeth Sutphen, and Nancy Cohen (Bird Surveys) Dana Squire, Janet Walker, and Cali Busch (Plant Surveys)

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Mill Run Farm	Fauquier	Rae Stone, Liz Train, and Sara Lawrey (Bird Surveys) Jennifer Holder, Kayla Hinrichs, and Joanne Carpenter (Plant Surveys)
Millway Farm	Fauquier	Bob Butterworth and Art Drauglis (Bird Surveys)
Montaña Farm	Fauquier	Alena Sheehan and Amelia Wilson (Bird Surveys) Jennifer Holder and Lucy Zimmerman (Plant Surveys)
Nuss Property	Fauquier	Rodney Brown (Bird Surveys) Andrea Cubelo-McKay and Tracy Whittington (Plant Surveys)
Pea Ridge Farm	Albemarle	Alex Brubaker and Cali Busch (Bird Surveys) Dana Squire, Andrea Naccarato, and Dorothy Carney (Plant Surveys)
Purple Rock	Loudoun	Lori Dabinett (Bird Surveys)
Raines Property	Rappahannock	VWL Staff (Bird Surveys) Rebeca Sanchez-Burr, Carolyn Smith, and Christina Goldizen (Plant Surveys)
Rallywood Farm	Fauquier	Robert Williams and David Matthew Cazenas (Bird Surveys) Eleanor Tatman and Holly Hintz (Plant Surveys)
Stonehedge Farm	Fauquier	Julie Pineiro and Sara Lawrey (Bird Surveys) Jill Seyfarth and Brigitte Grimm (Plant Surveys)
Two Owls Farm	Fauquier	Margaret Poethig and Gary Harvey (Bird Surveys) Michaela Weglinski and Jyotirmoy Bhavanishankar Kyasapura (Plant Surveys)
Weiss Farm/Frankford Farm	Clarke	Mark Bruns and Chris Siwy (Bird Surveys) Paul Guay, Robin Richards, and Erik Price (Plant Surveys)
White House Farm	Page	Jesse Edwards and Rob Beaton (Bird Surveys) Scott Jost and James Wilson (Plant Surveys)
Woodside	Clarke	Richard Hayden, Tonya Taylor, and April Harper (Bird Surveys) Sally Anderson and Liz Train (Plant Surveys)

VWL Team

Thank you so much for your involvement in this project!

For more information, please contact us at VirginiaWorkingLandscapes@si.edu, (540)-635-0073, visit our website (www.vaworkinglandscapes.org), or find us on Facebook & Instagram.

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VWL biodiversity surveys are conducted on private lands throughout our working region at no cost to landowners thanks to the generous support of our community. These surveys deliver valuable insights into the health and diversity of ecosystems on private lands, informing sustainable land management practices and promoting conservation efforts throughout Virginia. If you have the means, please consider making a donation to support this important work, ensuring we can continue these impactful surveys to others in our community.

Our 2024 survey team was supported by the following:

National Fish and Wildlife Foundation

OCH Conservation Foundation

Sacharuna Foundation

The BAND Foundation

The Raines Family Foundation

The Volgenau Foundation

The Wrinkle in Time Foundation

White House Farm Foundation

Support VWL and Create a Legacy of Biodiversity

The surveys and conservation efforts highlighted in this report are made possible through community support.

100% of Virginia Working Landscapes' funding comes from grants, donations, and the generosity of people like you. Your donation ensures these vital surveys continue, creating a lasting impact on biodiversity for generations to come.

The Smithsonian is a 501(c)3. All contributions are tax deductible.

VWL accepts donations online, by mail, or by phone.

- To donate online, visit **https://www.vaworkinglandscapes.org/donate/**
- To donate by mail, please write checks out to "Smithsonian Institution" with "Virginia Working Landscapes" noted on the reference line and send to:

Attention: Amy Johnson

Virginia Working Landscapes
Smithsonian Conservation Biology Institute,
1500 Remount Rd, MRC 5537, Front Royal, VA 22630

- To donate over the phone, please call our Advancement Team at 202-633-3027.

All photos by Brooke McDonough, unless otherwise noted