Motion to List Eastern Meadowlark, *Sturnella magna*, as a Threatened Species in Vermont

Proposed by Mark LaBarr, Chair Bird Scientific Advisory Group
9 April 2018

SUMMARY

The Vermont Bird Scientific Advisory Group proposes that the Eastern Meadowlark (*Sturnella magna*) be listed as a threatened species as defined in V.S.A. Title 10, Chapter 123, Sections 5401 – 5402. As noted in the species status review form, Eastern Meadowlarks are significantly declining in numbers because of loss of habitat and human disturbance, there are estimated to be fewer than 300 reproducing individuals in Vermont and the species has declined non-cyclically in Vermont and the Northeast region of the United States

Estimates of populations declines for the Eastern Meadowlark are based on data from the North American Breeding Bird Survey and Vermont's Breeding Bird Atlas. The former suggests a 95% population decline over the last 40 years, the later shows a 55% decrease in distribution over the last 25 years. Based on citizen science data, we estimate the current population to be between 105 and 163 pairs. Although Vermont's population declines seem to be greater than the Northeast as a whole, population declines are significant continent-wide. The primary threats to the species in Vermont is loss of agricultural habitat and increased management intensity on the remaining grass-based hay and pastureland. Although there are opportunities for conservation on public land, conservation of this species as a significant component of our grassland avifauna will require conservation measures on private land. Enrollment of greater acreage in easement programs such as those administered by NRCS or Audubon (The Bobolink Project) will be necessary to halt population declines.

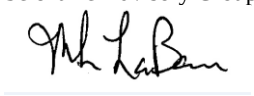
SPECIES STATUS REVIEW FOR BIRDS

STATE OF VERMONT
ENDANGERED SPECIES COMMITTEE

Common Name: Eastern Meadowlark
Scientific Name: *Sturnella magna*

Current Status: Special Concern
Recommended Status: Threatened

Scientific Advisory Group Chair



_____
Date 9 April 2018

Endangered Species Committee Chair

Jim Shallow
Proposal approved by the ESC 19 April 2018

_____
Date

Wildlife and plant species are added to or removed from the list of endangered and threatened species by action of the Secretary of the Agency of Natural Resources, upon recommendation of the Vermont Endangered Species Committee, according to 10 V.S.A., Chapter 123. The Vermont Endangered Species Committee is advised by scientific advisory groups on vascular plants, non-vascular plants, invertebrates, fish, reptiles and amphibians, birds, and mammals.

Definitions

ENDANGERED: A species that normally occurs in the State and whose continued existence as a viable component of the State's wild fauna or flora is in jeopardy, or a species determined to be an endangered species under the Federal Endangered Species Act. [V.S.A. Title 10, Chapter 123, Sections 5401(6) & 5402(b).]

THREATENED: A species whose numbers are significantly declining because of loss of habitat or human disturbance and unless protected will become an endangered species, or a species determined to be a threatened species under the Federal Endangered Species Act. [V.S.A. Title 10, Chapter 123, Section 5401(7) & 5402(c).]

Guidelines for listing as Endangered or Threatened

1. Species (including subspecies and varieties) which may be listed include all wild and free-ranging or naturally-occurring mammals, birds, amphibians, reptiles, fish, invertebrates, vascular and non-vascular plants.

2. Species which may be listed include those native to the State or known to exist as viable, naturalized populations in Vermont.

3. Species which may be listed must have spent at least some portion of their life cycle in Vermont on a sustained basis, breeding or otherwise.

4. Species listed by the Secretary of the Interior as endangered or threatened in the U.S., if occurring as historical or current residents or transients in Vermont, shall be listed in their respective categories.

5. A species shall be recommended for delisting when it no longer meets listing criteria. [Note: A species shall not automatically be recommended for delisting when proactive management is initiated or maintained to protect the species from decline or extirpation.]

6. Attached to this review shall be a SPECIES DOCUMENTATION including the best scientific information available with sources cited.

7. The Endangered Species Committee and its scientific advisory groups shall consider the CRITERIA FOR LISTING when recommending species for listing or delisting, using the best scientific information available and their best expert judgments.

8. Specific numbers cited in the Primary Criteria of the CRITERIA FOR LISTING are guidelines only, and are to be interpreted with respect to the biology of the species. Definitions of terms such as *population* and *reproductive potential* for each species shall be provided by the appropriate scientific advisory groups according to accepted practices in their field of biology.

9. All recommendations based upon the criteria must conform to statutory requirements in the definitions of Endangered and Threatened (see above).

Criteria for Listing as Endangered or Threatened

1.0 ENDANGERED

____ 1.1 The species is known to have occurred historically and regularly in Vermont but has not been documented in the last 25 years;

OR

____ 1.2 The species meets at least one each of these primary and secondary criteria:

PRIMARY CRITERIA

____ 1.2.1 There are estimated to be three or fewer nesting occurrences in Vermont. A nesting occurrence is defined as a pair, colony, or aggregation of individuals concentrated in a discrete area or narrowly distributed habitat type.

____ 1.2.2 There are estimated to be fewer than 100 reproducing individuals in Vermont.

____ 1.2.3 The area occupied by the population(s) is less than 50 acres.

____ 1.2.4 The species is known in the last 25 years from 20 or fewer sites throughout its global range.

SECONDARY CRITERIA

____ 1.2.5 The species has declined overall or noncyclically throughout a significant portion of its global range.

____ 1.2.6 The species has a history of significant decline and/or local extinction in the state with no compensatory establishment of new populations.

____ 1.2.7 The species is restricted to localities within or immediately adjacent to Vermont.

____ 1.2.8 One or more special factors cause the species to be vulnerable to extirpation:

____ 1.2.8.1 The species is in danger of exploitation or is threatened with disturbance.

____ 1.2.8.2 The species occurs in rare or specialized habitat vulnerable to loss, modification, or variations in quality.

____ 1.2.8.3 The species has low reproductive potential or is experiencing reduced reproductive success.

____ 1.2.8.4 The species has other factors that render it vulnerable to extirpation (*list*).

2.0 THREATENED

XX_ 2.1 The species is significantly declining in numbers because of loss of habitat or human disturbance and unless protected will become an Endangered Species.

OR

XX 2.2 The species meets at least one each of these primary and secondary criteria:

PRIMARY CRITERIA

____ 2.2.1 There are estimated to be ten or fewer nesting occurrences in Vermont. A nesting occurrence is defined as a pair, colony, or aggregation of individuals concentrated in a discrete area of narrowly distributed habitat type.

XX 2.2.2 There are estimated to be fewer than 300 reproducing individuals in Vermont.

____ 2.2.3 The species is known in the last 25 years from 60 or fewer sites throughout its global range.

SECONDARY CRITERIA

XX 2.2.4 The species has declined overall or noncyclically in Vermont or the Northeast region of the United States.

____ 2.2.5 The species is restricted to localities within or immediately adjacent to Vermont.

XX_ 2.2.6 One or more special factors cause the species to be vulnerable to decline:

__ 2.2.6.1 The species is in danger of exploitation or is threatened with disturbance.

XX_ 2.2.6.2 The species occurs in specialized habitat that is vulnerable to loss, modification, or variations in quality.

___ 2.2.6.3 The species has low reproductive potential or is experiencing reduced reproductive success.

___ 2.2.6.4 The species has other factors that render it vulnerable to extirpation (*list*).
(lead poisoning from ingestion of lead sinkers; mortality from entanglement in monofilament fishing line; sensitive to mercury accumulation and negative population effects; threats in wintering areas from commercial fishing nets, oil spills, and other stressors)

Other Lists

The Endangered Species Committee, for the purposes of maintaining the most up-to-date information possible, shall obtain for reference lists of species which are of special concern, missing from the state, extirpated, known only from unsubstantiated reports, and/or are imported or transplanted.

Species Documentation

STATE OF VERMONT
ENDANGERED SPECIES COMMITTEE

1. Scientific Name: *Sturnella magna*	7. Surrounding State & Provincial Status: (Note also listed as threatened in Ontario and Connecticut)
2. Common Name: Eastern Meadowlark	Maine: Special Concern
3. Species Code *(Department use only)*:	New Hampshire: Threatened
4. Current Vermont Status: Special Concern, Species of Greatest Conservation need (high priority), S5B	Massachusetts: Not listed
5. Recommended Vermont Status: Threatened	New York: Not listed
6. Federal Status: Not listed	Quebec: Not listed

POPULATION STATUS

8. Global, North American, and Vermont Ranges:

The Eastern Meadowlark's breeding range extends from the north shore of the Gulf of Saint Lawrence, south to northern Venezuela. It is found across the eastern United States, with its range extending west into South Dakota, Nebraska, Oklahoma, and Texas. There is a disjunct population in Arizona and New Mexico. In winter, the species migrates south from the northern quarter of its range, wintering as far north as western New York and Massachusetts.

United States: The greatest population densities are in the Missouri, Ohio, and Mississippi River drainages.

Canada: The species breeds in the southern regions of Canada, with the greatest population densities in areas near Toronto, Ottawa, Montreal, and in the province of New Brunswick.

9. Vermont's Position within Global Range: XX Central ___ Peripheral ___ Disjunct

Vermont is in the northeastern portion of the species' range however, populations are found north, south, and east of its Vermont distribution.

9a. Data used to assess the abundance, distribution, and population declines of the Eastern Meadowlark in Vermont:

The North American Breeding Bird Survey (BBS): The North American Breeding Bird Survey is a 50+ year old monitoring program administered by the Patuxent Wildlife Research Center of the USGS. The BBS uses a set of fixed, 24.5 mile road surveys to assess changes in bird species abundance across North America. Each survey route consists of 50 stops located 0.5 mile apart; each stop is visited sequentially. Each stop consists of a three-minute stationary count during which time the observer identifies all birds by sound and sight in a 0.25 mile radius. Although only one observer is responsible for data collection, other participants may record data. Methods of influencing responses from birds such as pishing and playbacks, are prohibited. Each route is surveyed once/year when breeding activity is at its highest—typically in June and is conducted as close as possible to previous survey dates. Surveys are not conducted when there is precipitation or high winds as these conditions decrease the probability of detection. Surveys begin 30 min before sunrise and span a period of 4 to 4.5 hours, excluding driving time (Sauer et al., 2017). Data are aggregated by survey route. The number of detections of each species/route is the sampling unit which is used as a population index. Changes in the number of species/route are assumed to be indicative of population changes.

The Vermont Breeding Bird Atlas (BBA): Breeding Bird Atlases have been used throughout the US (and the world) to document changes in the distribution of breeding bird species (for particular regions) over time. Vermont's first BBA was conducted from 1977-1981 (Laughlin and Kibbe 1985). During this survey period, breeding bird distribution was quantified in 179 Priority 1 blocks. Each block was a 5 km x 5 km area ($1/6^{th}$ of a topographic quadrangle), with one block selected at random from each quadrangle in the state. The second Vermont BBA was conducted from 2003-2007 (Renfrew 2013a). The same Priority 1 blocks were surveyed in the second BBA, and an additional 186 blocks were surveyed which were designated as Priority 2. All blocks were surveyed for one to five years. During a survey, participants rigorously searched a block, recording all species of birds observed as well as their breeding behaviors. Data were recorded during species-specific time frames ("safe dates" to avoid counting migrants). Blocks were considered completed once a threshold number of species (generally 75) were documented. The first Vermont BBA is the best data source for a "historical" assessment of the distribution of breeding bird species in the state. Changes in the distribution of species between the first two BBAs can be used to infer population changes over a 25 year period.

eBird: The citizen science database eBird, is a platform for birdwatchers to record their observations (Sullivan et al 2009). The site prompts users to record an outing's location, date, start time, duration, distance traveled, number of people involved, and type of birding conducted such as incidental, stationary, or traveling. Historical records can also be entered. A checklist of all species observed by sight or sound is then completed. eBird aggregates and stores this information on distribution, abundance and habitat use, into open source data. To monitor data quality, all submitted records are verified via computer-based data filters and expert opinion. The program also offers species lists based on the date and area entered, enhancing user-friendliness. Data on all bird species at high spatiotemporal scales is available for all months. We downloaded Vermont eBird data on Eastern Meadowlark occurrence and abundance to generate a population estimate for the state.

Upper Valley grassland bird survey: Grassland bird surveys were conducted from 5/18 to 7/1 2013 in the Upper Valley (Figure 4) in all grassland habitat (hayfield, pasture, or fallow field) that were: a) at least 10 acres (4.5 ha) in size; or b) embedded in a landscape of additional grasslands aggregating to at least 20 acres (9.1 ha). Fixed-plot, 100-meter radius point-count circles were established at each site,

located at least 50-meters from buildings and forest edges. In larger fields, points were established at least 300 meters apart in order to avoid double-counting birds. All surveys were conducted between 0600 and 0930 hours. Birds were recorded for 10 minutes at each point, and individuals within 100m and beyond 100m were recorded separately. Additional individuals that were not detected during point counts were noted if detected while traveling between points (Sydoriak 2014).

10. Historic Occurrences in Vermont More Than 25 Years Ago *(Type, Number, General Location, Regularity of Use, Confidence in Records, etc.)*:

Data from Vermont's first BBA (1977-1981) showed that 27% of the Eastern Meadowlark population was found in the Champlain Valley and 19% in the Green Mountains. The remainder of the population was distributed relatively evenly across the state, with a lower proportion in the Northeast Highlands. During the first BBA, Eastern Meadowlarks were found in about 65% of the Priority 1 blocks in the state (Laughlin and Kibbe 1985).

11. Historic Abundance More Than 25 Years Ago *(Number of Breeding Individuals or Size of Area Occupied, Confidence in Records, etc.)*:

Between 1966 and 2015, BBS data have revealed a significant decline in the population index for Eastern Meadowlarks in Vermont. The 7.92% population decline/year represents a >95% population decline over the 50 year period of record. With the exception of about 5 years, the population has declined in each successive year from ~14 meadowlarks per 24.5-mile route in 1966 and begins to plateau around the year 2000 at 0-1 meadowlark per route. (Figure 1).

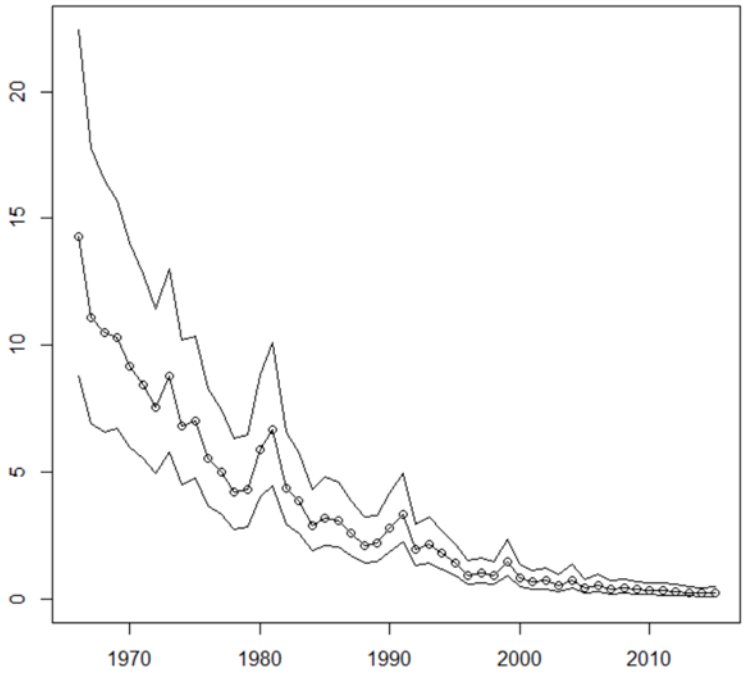
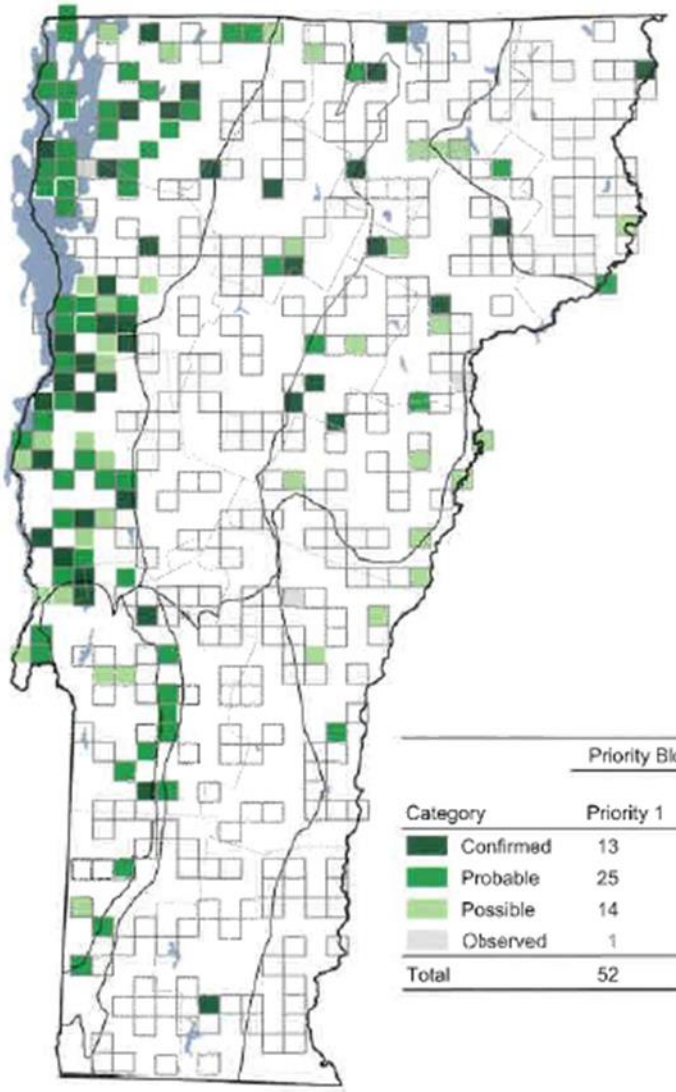


Figure 1. Breeding bird survey results for Vermont, 1966-2015 (Sauer et al. 2017). The Y-axis

indicates the mean number of Eastern Meadowlarks per survey route.

12. Current Occurrences in Vermont *(Type, Number, General Location, Regularity of Use, Confidence in Records, Extent to which the Species has been Inventoried, etc.):*

The current distribution of Eastern Meadowlark in Vermont can be derived from two sources: the second Vermont BBA (2003 to 2007; Fig. 2) and eBird (Fig. 3). Vermont's second BBA showed a notable shift in the population from the first BBA with >50% of the population occurring in the Champlain Valley and another 15% in the Northern Vermont Piedmont. The remainder of the population was distributed fairly evenly across the rest of the state. eBird data show a similar distribution to the second Vermont Breeding Bird Atlas, with most detections in the Champlain Valley. The eBird data shown are detections from a single year (2017), which may be why the distribution is less extensive. However, there could be further range contraction during the subsequent 10 years since the end of the second BBA. An intensive grassland bird survey throughout potential grassland bird habitat in the Upper Valley of Vermont corroborates other evidence that Eastern Meadowlark is extremely rare in the region; a total of 4 Eastern Meadowlarks were detected at 171 point counts (Sydoriak 2014).



Category	Priority Block Count: Priority 1	Priority Block Count: Priority 1 & 2
Confirmed	13	31
Probable	25	44
Possible	14	24
Observed	1	3
Total	52	99

DISTRIBUTION IN CURRENT ATLAS

Biophysical Region	% of region species occupies	% of all records for this species found in region
Champlain Valley	72	54
Northeastern Highlands	13	5
Northern Green Mountains	10	7
Northern Vermont Piedmont	23	15
Southern Green Mountains	3	2
Southern Vermont Piedmont	12	5
Taconic Mountains	28	6
Vermont Valley	75	6

Figure 2. Distribution of Eastern Meadowlark from the second Atlas of Breeding Birds of Vermont, 2003-2007 (Renfrew 2013a).

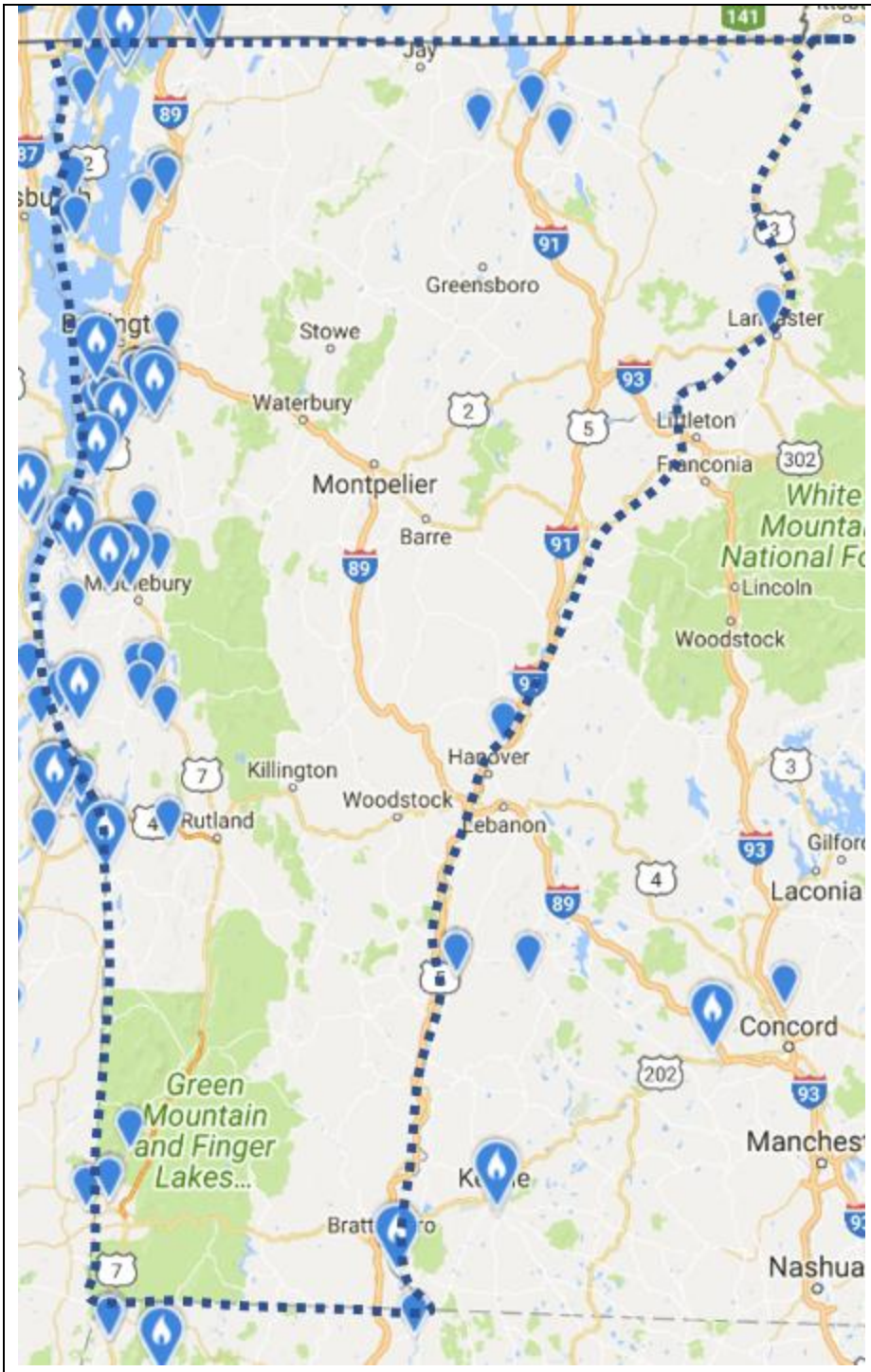


Figure 3. eBird distribution of Eastern Meadowlarks, May-August 2017.

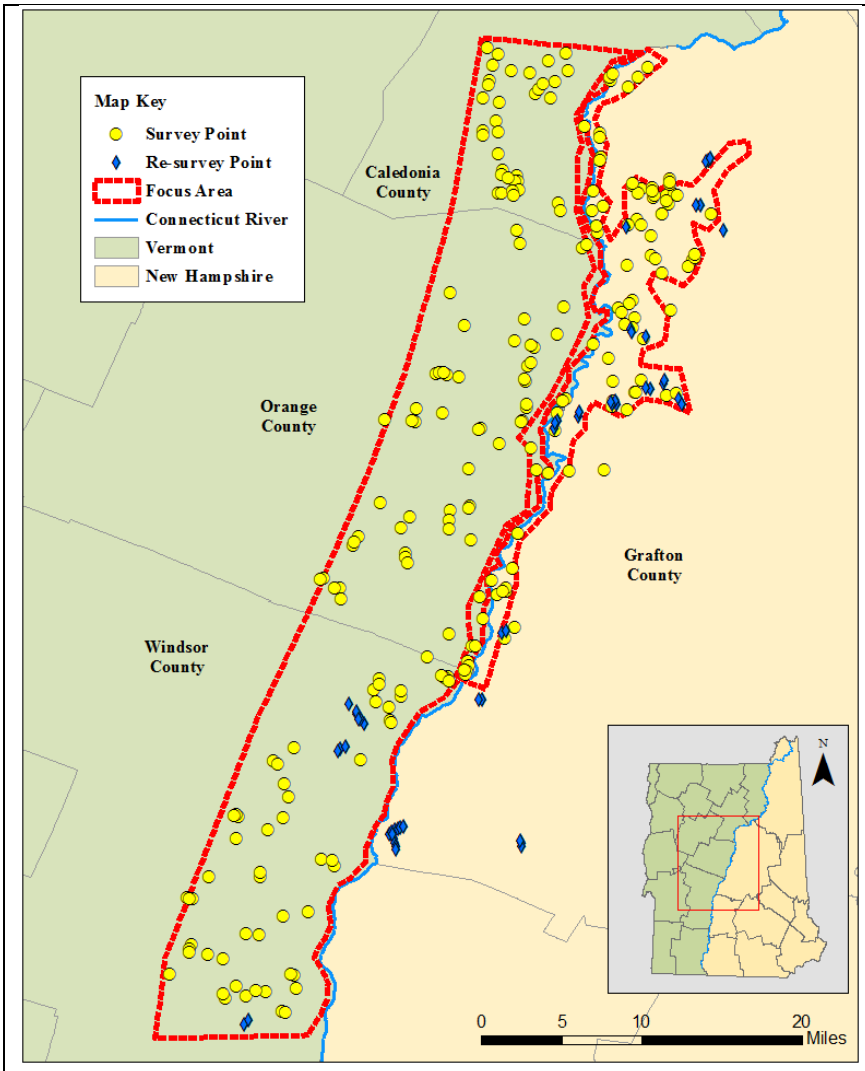


Figure 4. Study area and point count locations (171 in Vermont) for a 2013 grassland bird survey in the Upper Valley. Eastern Meadowlarks were detected on only 4 of 171 point counts.

13. Current Abundance *(Number of Breeding Individuals or Size of Area Occupied, Confidence in Records, Problems in Estimating Abundance, etc.):*

We used eBird data to develop a population estimate for Eastern Meadowlarks in Vermont. There are challenges with using these data. One is the ability to control for observer effort. This is particularly important as eBird has become more popular over the last decade. For example, the number of Eastern Meadowlark sightings/year has increased from 29 to 234 over the last 10 years. The second is the degree to which observers are specific in the locations that are used to enter their data. In particular, a single location may be given multiple names by observers. For example, fields around Shelburne Pond (Chittenden County) have been classified in eBird as the following:

- Pond Rd - Shelburne
- Pond Rd/farm, Shelburne
- Pond Rd, Shelburne

- Pond Rd. fields (Shelburne)
- Pond Rd. in Shelburne
- Pond Rd-Shelburne, between Dorset St & Pond Access Rd
- Pond Road - west
- Pond Road, Shelburne
- Shelburne – Pond Rd. fields
- Shelburne – Pond Road farmland

To minimize the probability that we did not double count birds in the same location that were entered under two different location names, we reduced the original dataset from 604 locations to 497 locations, aggregating where it was obvious that observers were referring to the same location, but with a different name. We tried to be conservative by not over-aggregating the data. Using this method, we developed annual population estimates for the Vermont Eastern Meadowlark population by summing the maximum number of individuals observed at each (differently named location) for each year. The population estimates ranged from 105 to 163 individuals at 48 to 100 sites. We do not believe these data can be used to infer population trends, but we feel they provide a rough estimate of the size of the breeding population. Because we do not know sex of the individuals, we assumed each observation represents a pair. Thus, we believe the breeding population to be between 105 and 163 pairs.

Table 1. Eastern Meadowlark Population Estimate and Number of Sites for 2011 to 2017 derived from eBird data.

Year	2011	2012	2013	2014	2015	2016	2017
Population Estimate	105	111	136	152	141	163	112
No. of Sites	48	61	79	94	82	100	61

14. Population Trend:
    X Declining
    ___ Stable
    ___ Increasing
    ___ Unknown

Estimate Based on:
X Surveys
___ Counts
___ Observations
___ Other *(explain)*

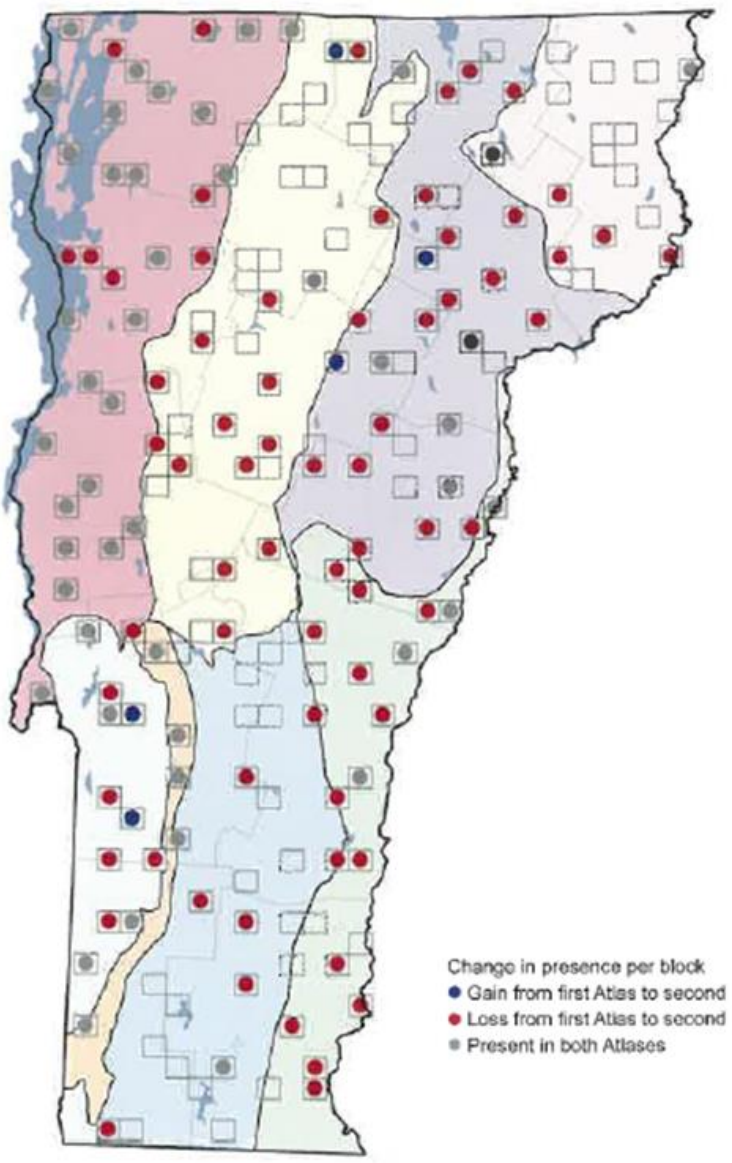
Documentation & Comments:

Results from the North American Breeding Bird Survey indicate that the species is declining across its range. The % change per year from 1966 to 2015 and from 2005 to 2015 showed the greatest declines in Vermont compared to other regions (Table 2). However, the species showed > 3%/year declines in the eastern BBS region, Canada, the United States and across the entire BBS survey area. Furthermore, Eastern Meadowlark presence in Breeding Bird Atlas Priority 1 blocks declined by 55% from the first atlas to the second (Figure 5).

Table 2. Population trend estimates across various regions for the Eastern Meadowlark based on data from the BBS (Sauer et al. 2017). Sample size indicates the number of survey routes on which Eastern Meadowlark were observed on from 1966 to 2015. Trend estimates for the different time

periods are shown as % Change Per Year; lower and upper 95% confidence intervals are given.

Region	Sample Size	% Change Per Year (1966-2015)	95% CI	% Change Per Year (2005-2015)	95% CI
Vermont	25	-7.92	-9.51 to -6.30	-6.12	-11.65 to 0.15
Eastern BBS Region	1815	-3.83	-3.98 to -3.69	-4.02	-4.47 to -3.59
Canada	197	-3.73	-4.25 to -3.25	-4.68	-6.22 to -3.18
United States	2329	-3.26	-3.59 to -3.01	-3.00	-3.53 to -2.23
Survey-Wide	2526	-3.28	-3.60 to -3.03	-3.05	-3.56 to -2.29



CHANGE IN DISTRIBUTION BETWEEN ATLASES

Biophysical Region	First Atlas	Second Atlas	Change	% Change
Champlain Valley	32	25	- 7	- 22
Northeastern Highlands	6	2	- 4	- 67
Northern Green Mountains	16	3	- 13	- 81
Northern Vermont Piedmont	21	6	- 15	- 71
Southern Green Mountains	9	2	- 7	- 78
Southern Vermont Piedmont	17	4	- 13	- 76
Taconic Mountains	9	6	- 3	- 33
Vermont Valley	5	4	- 1	- 20
Totals	115	52	- 63	- 55

Figure 5. Change in Eastern Meadowlark presence for each Priority 1 block (Renfrew 2013b). Red dots indicate a loss over a period of 25 years, from the first atlas to the second. Blue (present in the second BBA only) and grey (present in both BBAs) areas indicate that the species still persists in a

block.

HABITAT IN VERMONT

15. General Description:

Eastern Meadowlark habitat consists of large uncultivated fields, agricultural grasslands, meadows, and pastures (Renfrew, 2013b; Smith, 2008), with territories spanning 1.2-6.0-ha (Ellison, 1985). Minimum patch size is between 5-10-ha, but probability of occurrence only reaches 60% at patch sizes of 1000-ha (Vickery et al., 1994). High quality breeding sites have a high proportion of grass and a low proportion of forbs. Trees and fences act as song perches and are also key features of these areas (Ellison, 1985). Nesting sites are located in areas where vegetation height and density are moderate (Renfrew, 2013b).

16. Habitat Losses in Past *(Amount and Location)*:

Both the first and the second atlas indicated that much of Vermont's population is found in the Champlain Valley, but its distribution across the state has declined greatly. Since the late 1970s, the species' distribution has declined in the eastern two-thirds of Vermont, with distribution being especially fragmented in densely forested areas. The species is found in roughly 75% of the priority blocks in the Champlain Valley and Vermont Valley; the species is found in less than 30% of priority blocks in the rest of the state (Renfrew, 2013b).

17. Probable Habitat Losses in Future *(Amount, Location, and Type)*:

Land-use changes including reforestation and development in suburban areas will lead to further decreases in the amount of suitable habitat for Eastern Meadowlark (Ellison, 1985; Renfrew, 2013b; Smith, 2008). Grass-based fields greater than 5.0-ha are important for this species and planting different types of grasses and forbs could enhance habitat quality. Other potential conservation initiatives include conserving nesting habitats via invasive species control (Renfrew, 2013) and modifying hayfield management procedures so that cutting occurs later in the breeding season (Troy et al., 2005).

18. Current Protected Status of Habitat:

___ Unknown Whether Any Protected
___ Believed To Be None Protected
___ At Least One Protected Occurrence
X Several Protected Occurrences
___ Many Protected Occurrences
___ Other *(explain)*

Comments:

The species is found on state wildlife management areas and state parks, although the degree to which these sites are cut sufficiently late in the breeding season varies. They are found on Missisquoi NWR as

well as several privately owned fields each year enrolled in The Bobolink Project. However, this only guarantees protection during the year of enrollment.

POPULATION BIOLOGY

19. Population Threats *(Contaminants, Predation, Competition, Disease, Human Disturbance from Recreation, Collection, Harvest, etc.)*:

    Degree of Threat:
    X Very Threatened, Species Directly Exploited or Threatened by Natural or Man-caused Forces
    ___ Moderately Threatened, Habitat Lends Itself to Alternate Use but is not Currently in Jeopardy
    ___ Little Threat, Self-protecting by Unsuitability for Other Uses
    ___ Unknown

Documentation & Comments:

Like all species of grassland birds in the Northeast, populations face decreases in habitat quantity and quality. Direct loss of habitat in Vermont includes changes in land-use such as, reforestation, increased development in urban and suburban areas, and decreases in agricultural land availability as a result of farm abandonment. Much of the remaining grasslands are managed intensively for dairy farming. Increased management intensity of hayfields, specifically cutting more frequently and earlier—around the beginning of June also decreases habitat quality. These practices conflict with incubation and/or feeding behavior, resulting in nest failure and limiting the species' ability to re-nest. Furthermore, dairy farmers in Vermont are unlikely to change these management practices by cutting later in the year and less frequently, due to economic constraints (Troy et al., 2005).

20. Tolerance To Human Activity:
    X Fragile
    ___ Fairly Resistant
    ___ Tough
    ___ Unknown

Documentation & Comments:

Although comparable data are not available for Eastern Meadowlark, data collected in the Champlain Valley showed that reproductive output of Bobolinks was 0 on fields that were cut early in the breeding season (Perlut et al. 2006). As Eastern Meadowlark and Bobolink have similar reproductive strategies, early cutting is likely equally detrimental to Eastern Meadowlark nest success.

21. Reproduction Parameters *(Age to Sexual Maturity, Annual Production of Offspring, Reproductive Life, or Other Factors that Warrant Consideration)*:

From Jaster et al. (2012): Like other obligate grassland breeding birds, Eastern Meadowlarks nest on the ground. They are sexually mature in their first year (10-11 months of age). Clutch size is typically 2-6 egges, incubation period is 13-14 days and young leave the nest at 10-12 days and are capable of sustained flight at around 21 days. Young generally stay with adults for additional 7 days. Adults will

renest after nest failure, but they rarely have >1 successful nest per year. Most reports of reproductive success (≥1 young fledged) suggest overall rates of <40%. Birth rates of successful nests ranged from 1.7-3.3 young/female.

22. Reproductive Status: *Documentation & Comments:*
    X Reproduces in Vermont
        X Confirmed In Last 2 Years
        ___ Confirmed In Last 10 Years
        ___ Confirmed In Last 25 Years
        ___ Confirmed Prior to 25 Years Ago
        ___ Unconfirmed
    ___ Does Not Breed or is Migratory

23. Additional Study or Documentation Needed:

Additional surveys to provide more accurate estimates of the current population would be helpful. However, current rate of decline is both alarming and consistent across BBS and BBA data.

24. Attachments:
    24.1 Narrative Summary.
    24.2 Relative Reports or Papers.
    24.3 List of Literature Cited or Other References.

25. Scientific Subcommittee Chairman:  Date: 9 April 2018

Literature Cited

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