Species Status Assessment

Common Name: Monarch butterfly **Date Updated:** April 23, 2024

Scientific Name: *Danaus plexippus* **Updated By:** Katie Hietala-Henschell

Class: Insecta

Family: Nymphalidae

Species Synopsis *(a short paragraph which describes species taxonomy, distribution, recent trends, and habitat in New York):*

The well-known Monarch butterfly (*Danaus plexippus*) is famous for its bright black-and-orange coloration and long-distance migration. Monarchs have expanded outside of North America and have been recently documented in over 70 countries and/or islands (Nail et al. 2019). The North American migratory population has been identified as a monarch subspecies, *D. plexippus plexippus*. The migratory subspecies has been petitioned to be listed under the Endangered Species Act due to drastic population declines (Center for Biological Diversity et al. 2014).

Interestingly, the subspecies categorization is not well-defined for monarchs as both migratory and non-migratory populations can co-occur (Nail et al. 2019). In North America, the eastern and western populations are genetically similar and indistinguishable; however, these populations occupy distinct habitats, have different migratory behavior, and show phenotypic differentiation (Freedman et al. 2021). Nevertheless, the migratory butterflies in eastern and western North America represent the vast majority of all monarchs in the world (Center for Biological Diversity et al. 2014). East of the Rocky Mountains, monarchs have declined nearly 90 percent since 1995, and the 2013-2014 winter count showed these monarchs had dropped to the lowest number recorded yet (Blanton 2014, pers. comm.). The most recent count, from 2023-2024, shows the second lowest numbers since 1993 (Monarch Joint Venture 2024). West of the Rocky Mountains, monarchs have declined more than 99% (Freedman et al. 2021). The best available scientific information indicates that the monarch butterfly is threatened in a significant portion of its native range. The North American monarch population is significant because without it, the redundancy, resiliency, and representation of the species would be so impaired that the monarch would have an increased vulnerability to extinction.

I. Status

a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** yes

ii. **New York:** Not listed; HPSGCN

b. Natural Heritage Program

i. **Global:** G4

ii. **New York:** S5 **Tracked by NYNHP?:** no

Other Ranks:

-IUCN Red List: Least Concern (LC)

-Northeast Regional SGCN: RSGCN (moderate concern)

-NatureServe:

T3 Vulnerable Subspecies (*Danaus plexippus plexippus*)

T1 Critically Imperiled Population – California Overwintering Population (*Danaus plexippus* pop. 1)

T1 Critically Imperiled Population – Mexican Overwintering Population (*Danaus plexippus* pop. 2)

Status Discussion:

The monarch is globally secure (G4). However, there are three infraspecies that are threatened in North America where the Monarch is less secure because of serious threats to their overwintering areas in Mexico and California. (NatureServe 2024).

Monarchs nationwide face significant threats to their survival in both their summer and winter ranges, and their numbers have declined precipitously in recent years. Overall, the eastern North American population has declined by approximately 90% since the 1990s and the western population has declined by 95%. In just the last decade, the eastern population has declined approximately 80% (Semmens et al. 2016). The recent 2023 overwintering count showed that monarch populations are 64% below the threshold needed to ensure they are not at risk of extinction (Center for Biological Diversity 2023). The significant threats facing the monarch are high in magnitude and ongoing (Center for Biological Diversity et al. 2014).

The Center for Biological Diversity and Center for Food Safety filed a legal petition in 2014 to the U.S. Fish and Wildlife Service seeking Endangered Species Act protection for monarch butterflies, a final determination is expected in 2024 (Center for Biological Diversity 2023).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Declining	Unknown	? - 2022	Candidate	-
Northeastern US	Yes	Declining	Unknown	? - 2022		Yes
New York	Yes	Declining	Unknown		Not listed	Yes
Connecticut	Yes	Declining	Unknown			Yes
Massachusetts	Yes	Declining	Unknown			Yes
New Jersey	Yes	Declining	Unknown			Yes
Pennsylvania	Yes	Declining	Unknown			Yes
Vermont	Yes	Declining	Unknown			Yes
Ontario	Yes	Declining	Unknown			-
Quebec	Yes	Declining	Unknown			-

Column options
Present?: Yes; No; Unknown; No data; (blank) or Choose an Item
Abundance and Distribution: Declining; Increasing; Stable; Unknown; Extirpated; N/A; (blank) or Choose an item
SGCN?: Yes; No; Unknown; (blank) or Choose an item

Monitoring in New York *(specify any monitoring activities or regular surveys that are conducted in New York):*

Murtaugh (2014): The eastern population is monitored in many locations, using many methods. Monitoring programs assess local densities of breeding monarchs throughout their breeding range, numbers of individual butterflies passing through migratory stop-over sites, and areas occupied in

the winter range. Other programs assess the timing and location of fall and spring migratory movement. The fact that monarchs are spread over such a large area for most of their annual migratory cycle makes their population dynamics difficult to assess, and integrating information from so many different programs presents a scientific challenge that we are only beginning to address (NAMCP 2008).

Two long-term monitoring programs with broad geographic ranges have focused on the breeding stage of the monarch annual cycle, the Monarch Larva Monitoring Project (MLMP) and the North American Butterfly Associations' (NABA) Fourth of July Butterfly Count (Oberhauser 2007). The MLMP (www.mlmp.org) is a citizen science project developed by researchers at the University of Minnesota that engages volunteer monitors in weekly surveys of immature monarchs on milkweed plants throughout the breeding range. Volunteers provide weekly estimates of monarch egg and larval densities in their monitoring sites. While this program covers the monarch breeding range fairly completely, densities are reported on a per plant basis. This method is easy for volunteers to carry out, but the translation of per-plant density into overall numbers suffers some of the same problems as using area occupied to indicate the size of the overwintering population. Volunteers participating in the NABA annual Fourth of July Butterfly Count monitor summer populations of many adult butterflies, including monarchs (Swengel 1990). During this annual count, volunteers select an area 24 km in diameter and conduct a one-day census of all butterflies sighted within that circle. The counts are usually held within a few weeks of 4 July in the United States, 1 July in Canada and 16 September in Mexico. Like the MLMP, the Fourth of July Counts cover a broad geographic range. However, the count at any given location is conducted on a single day each summer and may miss monarch population peaks (NAMCP 2008).

Several northeast programs monitor the size, timing, and location of autumn monarch migrations at specific locations, but none in New York. In addition to these point-count methods, the timing of the spring migration of the eastern population has been monitored on a continental scale since 1997 by volunteers who report first sightings to Journey North, an online study of wildlife migration and seasonal change, and Monarch Watch, a research project based at the University of Kansas (Oberhauser and Solensky 2004). In a similar way, the temporal and spatial patterns of fall migration are monitored throughout the flyway through reports of overnight roost sites collected by the Journey South program (United States and Canada) and Correo Real program (Mexico). These studies help to identify specific locations and types of habitats that are essential during fall migration. Data from the Monarch Watch fall tagging program also identify migratory pathways and have been used to delineate yearly geographic variation in the largest concentrations of migrating monarchs (NAMCP 2008).

Region 5 of the USFWS Northeast Habitat Technical Committee has established a Monarch Butterfly Conservation Team to develop measures that New York, and other states in the northeast, can take to have a positive impact on the monarch population, despite not being "ground zero" for the problem.

Trends Discussion *(insert map of North American/regional distribution and status):*

In an analysis of seven programs that have provided consistent data for over ten years, including estimates from breeding, migrating, and wintering phases of the annual cycle, Oberhauser (2007) found that most programs reported relative abundance values below average from 2002 through 2006, although relative abundance values from 2005 and 2006 rebounded from those reported in 2002–2004. Detailed analyses of these data will help to inform additional data collection efforts to explain the reasons for observed patterns. However, the large year-to-year variation in monarch densities will make it difficult to detect long-term trends, and it is important that existing programs continue to collect monitoring data (Murtaugh 2014).

Winter data show peaks in 1990 and 1996 of about eighteen hectares in cumulative area occupied by monarchs, but less than ten hectares of occupied area in all but one winter (2003) over the past decade. An all-time low of 2.19 hectares was recorded in January 2005 (Rendón-Salinas and Galindo-Leal 2005, Cruz-Piña et al. 2006). Crewe et al. (2007) noted a statistically insignificant decrease of about 3% in the number of migrating monarchs that pass through the Long Point National Wildlife Area monitoring site in Ontario over the 11 years of their study. They suggested that high variation among years contributed to the non-significant trend, and that more data are needed to determine whether the monarch butterfly population passing through Long Point will continue to decline, remain stable at its current below-average level, or continue to show periodic recoveries (Murtaugh 2014).

The eastern population of migratory monarchs have shown long-term declines based on annual monitoring since the 1990s (Thogmartin et al 2017b). The monarch population has declined from a recorded high of approximately 1 billion butterflies in the mid-1990s to around 35 million butterflies in the winter of 2013-2014, the lowest number ever recorded. While monarch populations fluctuate year to year, these declines continue to occur. A 22% decline was seen from 2022 to 2023 (Center for Biological Diversity 2023) and a 59% decline was seen from 2023 to 2024 (Monarch Joint Venture 2024). The 2023-2024 overwintering season represents the second lowest population since 1993-1994, when scientists started tracking monarch overwintering sites in Mexico (Monarch Joint Venture 2024). Overall, the monarch population has seen a steep, significant decline of approximately 90 percent (Center for Biological Diversity 2023). Semmens et al. (2016) found a high probability of losing the eastern migrating monarch population over the next 20 years.

In February 2024, the World Wildlife Fund in Mexico reported that the size of the 2023-2024 overwintering population occupied just 0.9 hectares. This small area is similar to the smallest population on record since monitoring began in 1994. The smallest overwintering monarch population was observed during the winter of 2013-2014 when the estimated area of occupancy was 0.67 hectares (onarch Joint Venture 2024). Over the last 20 years, the average forested area occupied by monarchs at the Mexican overwintering sites has been 6.39 hectares. Researchers estimate that between 20-30 million monarchs exist per hectare (Thogmartin et al. 2017a). Thus, the size of the 2023-2024 population represents only 14% of the 20-year average and is less than half the size of the previous year’s population (Monarch Joint Venture 2024).

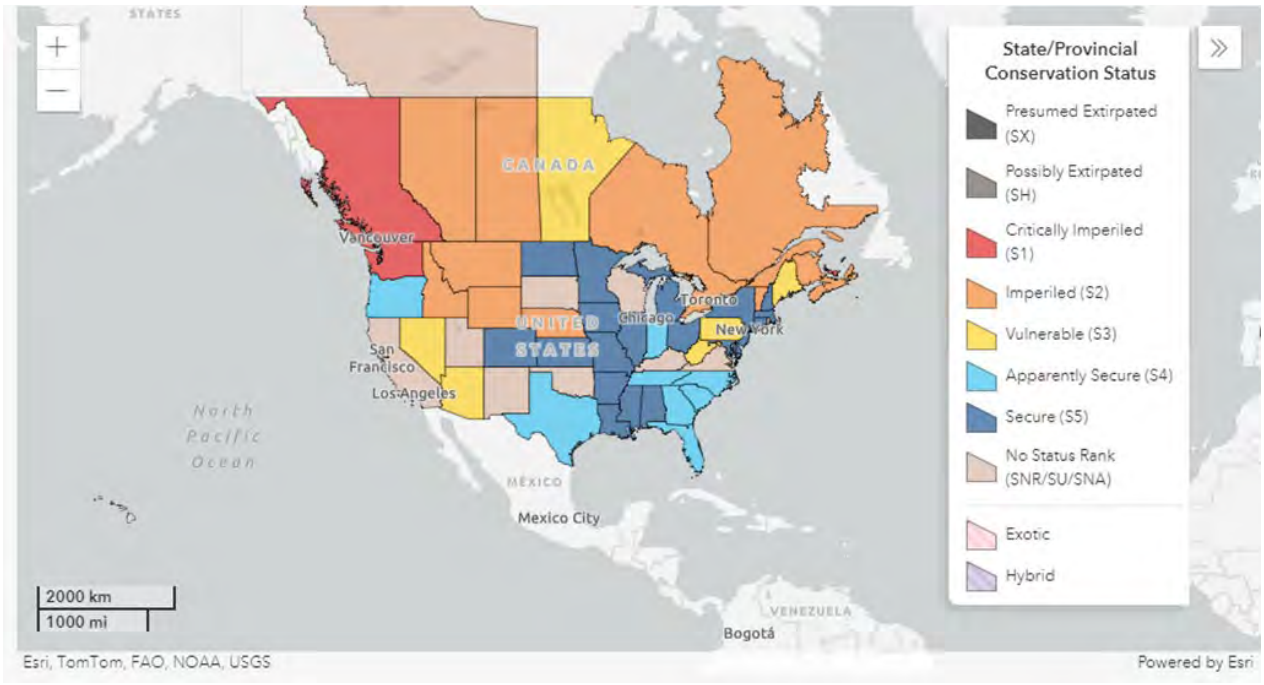


Figure 1. North American monarch distribution and status (NatureServe 2024).

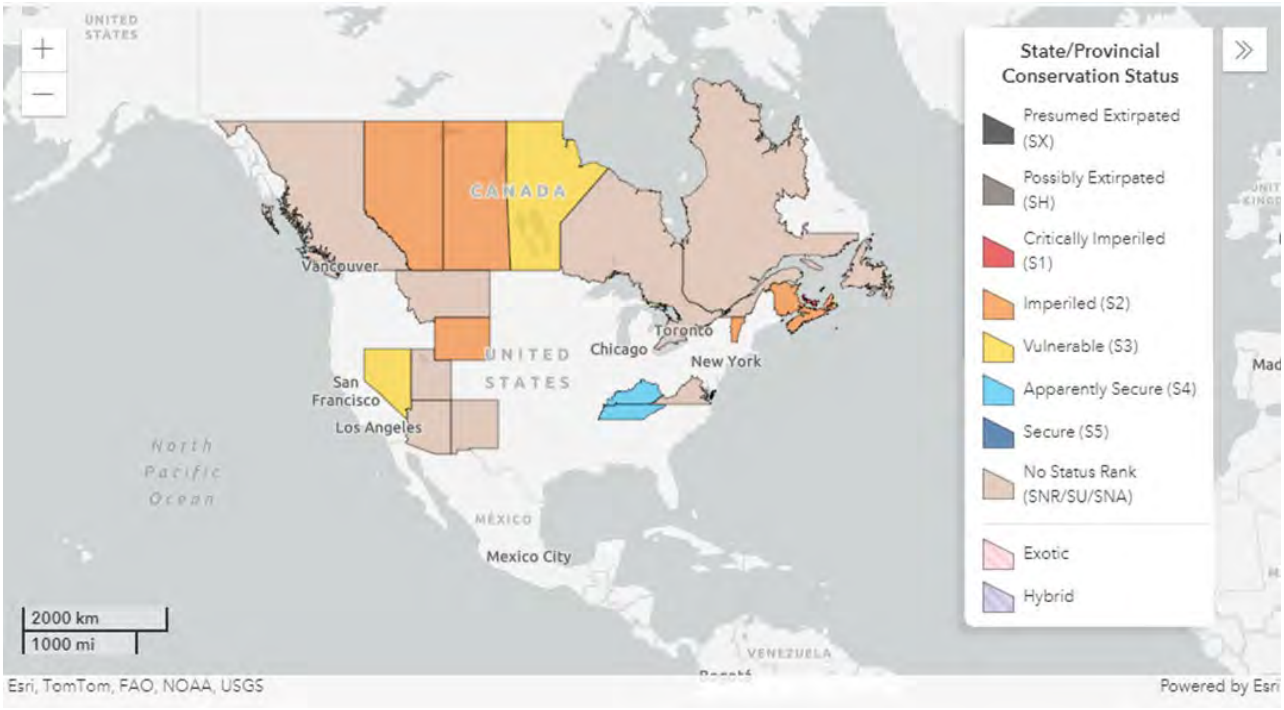


Figure 2. North American Vulnerable Subspecies (T3) *Danaus plexippus plexippus* distribution and status (NatureServe 2024).

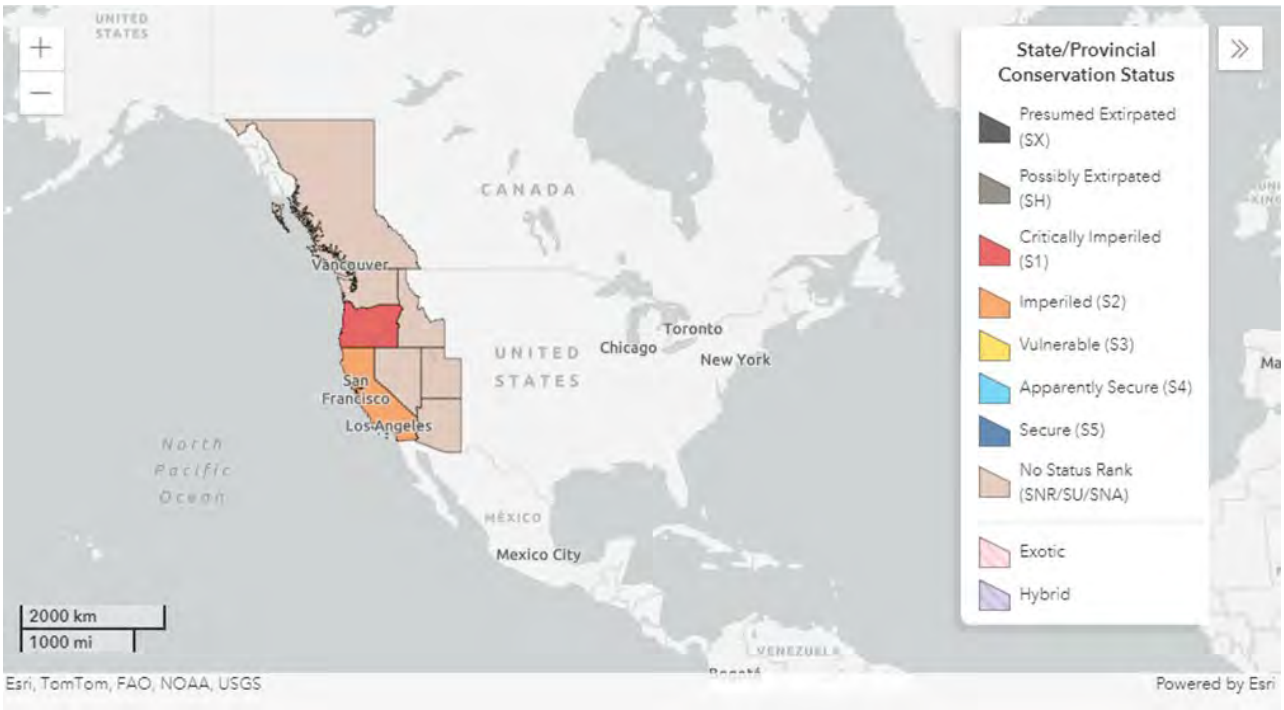


Figure 3. North American California Overwintering Population (T1 – Critically Imperiled Population) *Danaus plexippus* pop. 1. distribution and status (NatureServe 2024).

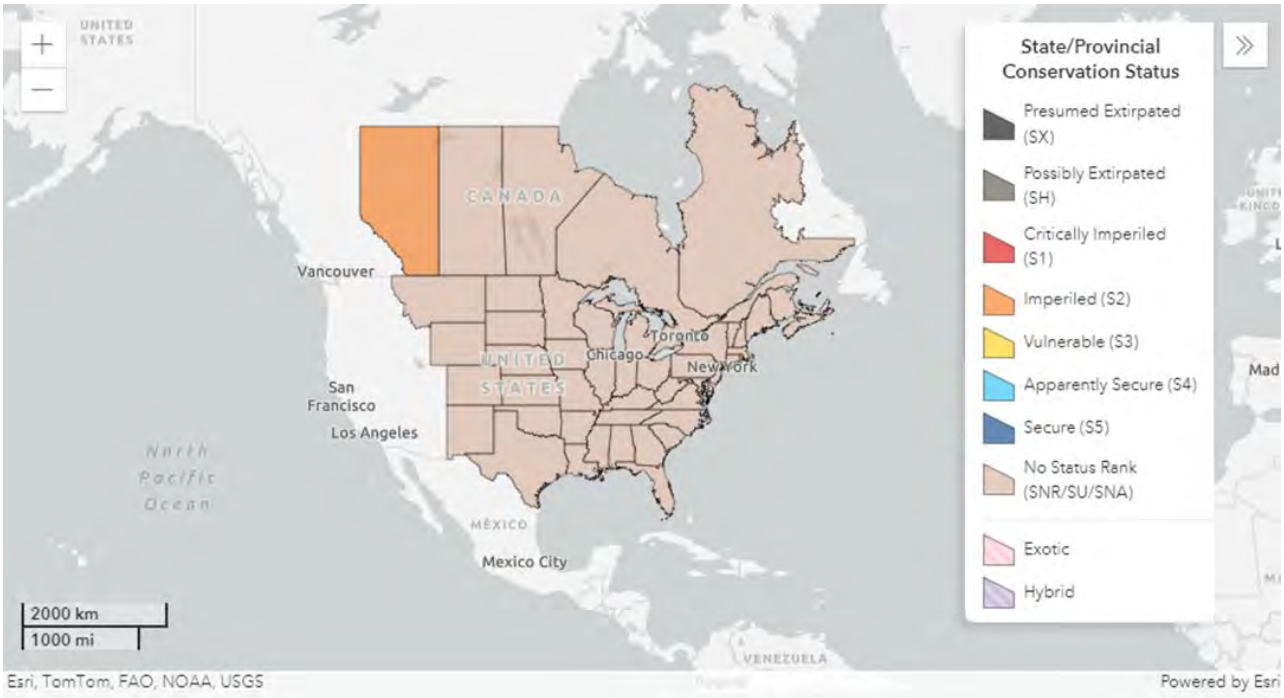


Figure 4. North American Mexican Overwintering Population (T1 – Critically Imperiled Population) *Danaus plexippus* pop. 2 distribution and status (NatureServe 2024).

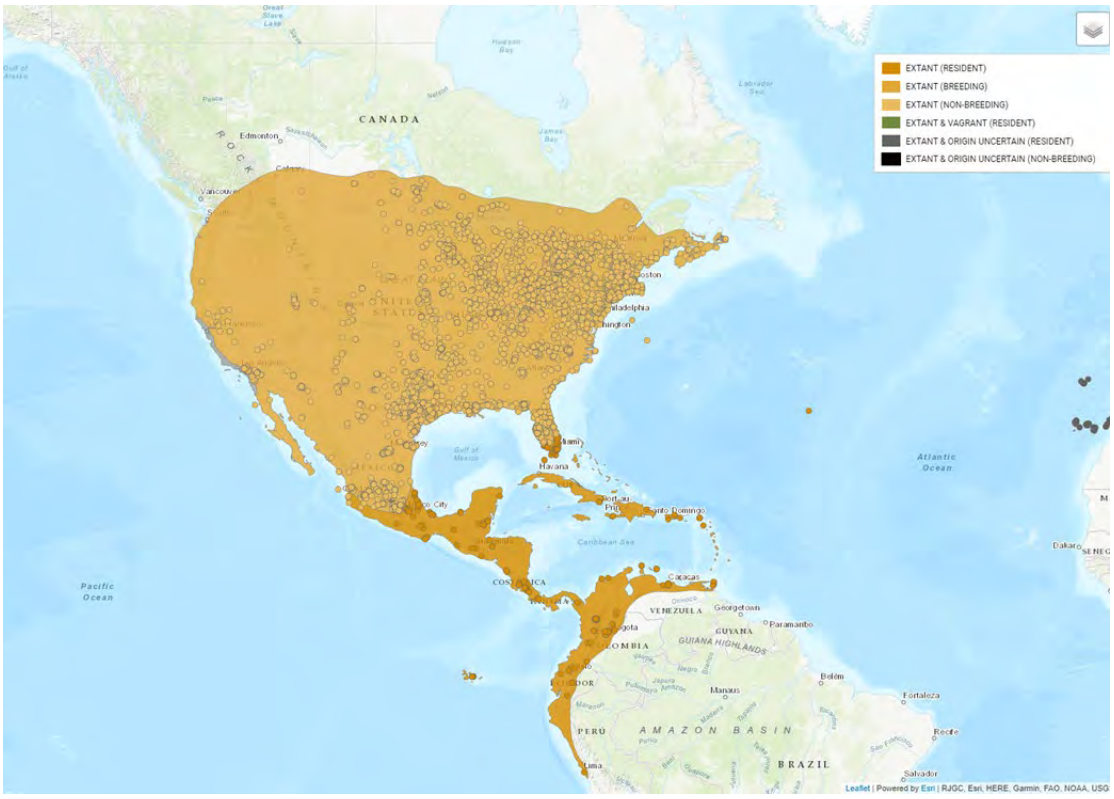


Figure 5. Monarch butterfly North American geographic range (IUCN 2024).

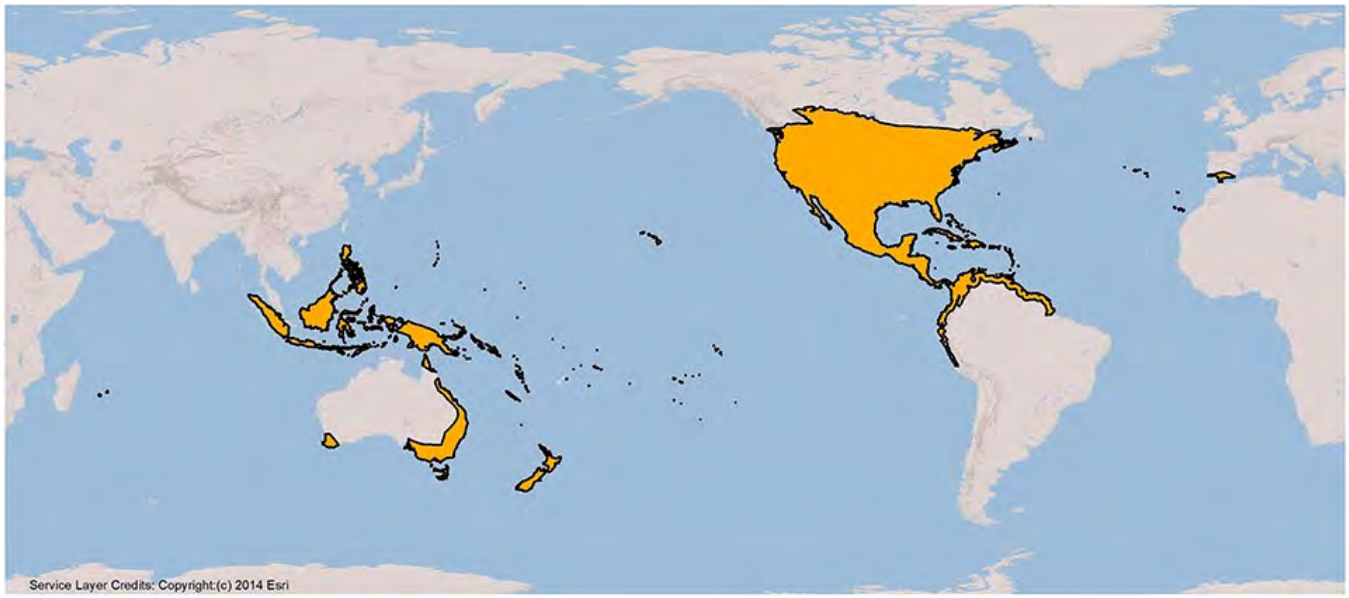


Figure 6. Monarch butterfly geographic range (Nail et al. 2019).

III. New York Rarity *(provide map, numbers, and percent of state occupied)*

New York is a part of the northern breeding region for monarch butterflies. Generations 2-4 occur in the northeast, including New York, from May through September and the fourth generation leaves this area and migrates to Mexico to overwinter (Agrawal 2019, Oberhauser and Solensky 2004). Monarch butterflies disperse during the breeding months making New York specific population estimates difficult. The most accurate population estimates occur when the eastern

population congregates and overwinters in Mexico. However, recent research has shown that the loss of breeding habitat is a driver of decline (Lukens et al. 2020).

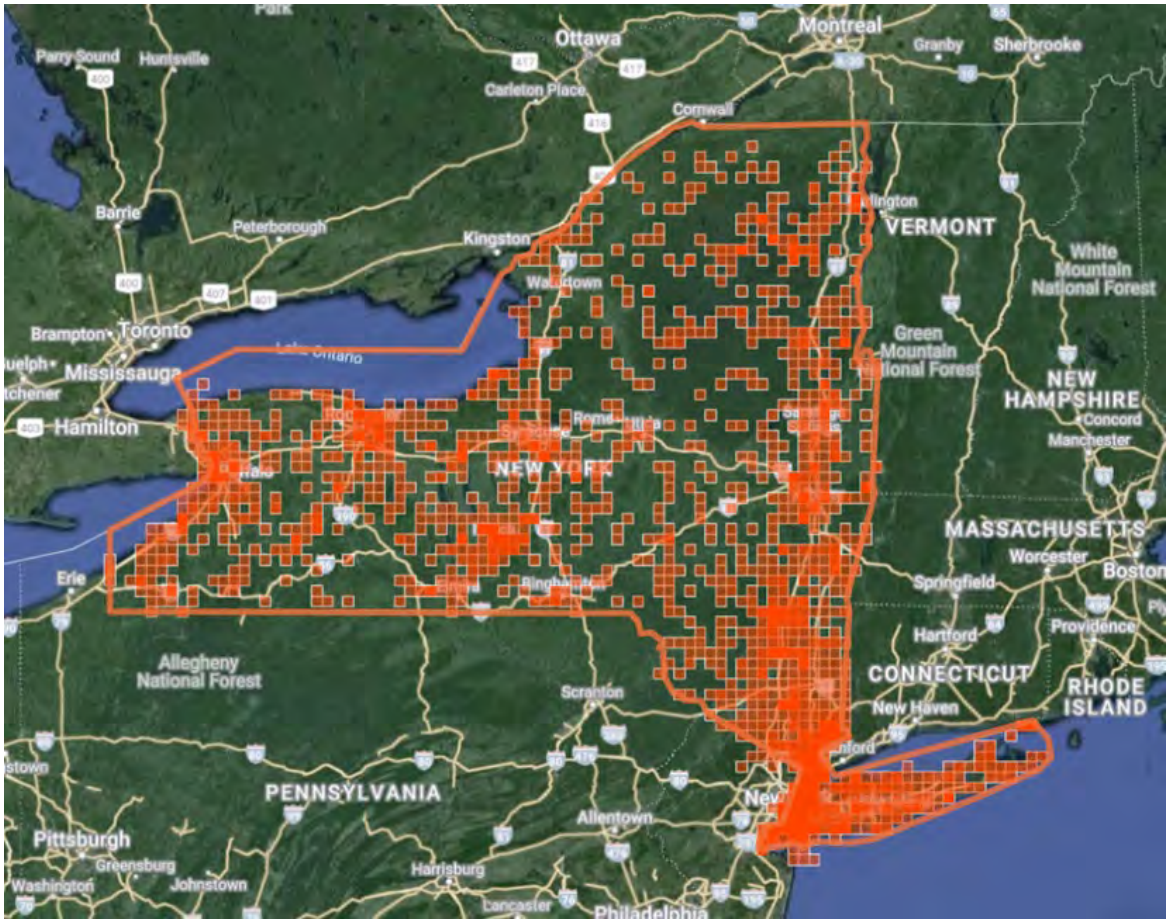


Figure 6. Records of Monarch butterflies in New York (iNaturalist community 2024).

Years	# of Records	# of Counties	% of State
Pre-2000	n/a	n/a	n/a
2000- 2023	12,568	62	100

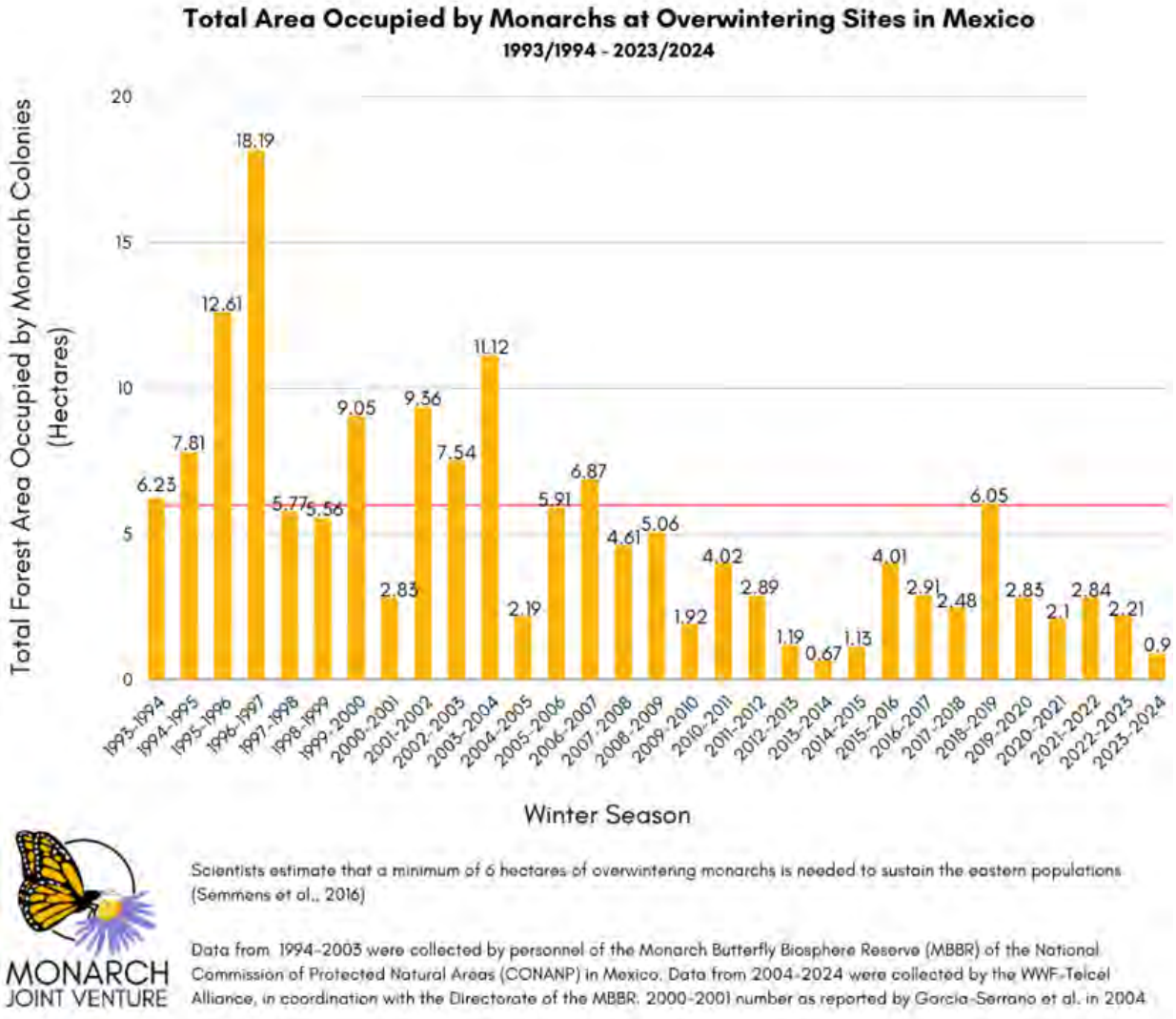
Table 1. iNaturalist citizen scientist records of monarch butterflies in New York (iNaturalist community 2024).

Details of historic and current occurrence:

It is often difficult to compare historic and current records for many species, especially for easily identifiable species like the monarch butterfly. The increase of records for monarchs likely reflects the increased interest and accessibility of data collection with the help of citizen science platforms (e.g., iNaturalist was founded in 2008) and is not likely an increase in population abundance. To date, there are over 12,000 New York monarch records on the citizen science platform iNaturalist (iNaturalist community 2024). Despite these large numbers, current population trends are well below historic levels and continue to highlight monarchs' vulnerability to extinction.

The 2023-2024 monarch overwintering count showed a

59% decline from 2022-2023 and represents the second lowest population since 1993-1994 (when scientists started tracking monarch overwintering sites in Mexico) (Monarch Joint Venture 2024). Recent population estimates are far below the threshold needed to ensure they are not at risk of extinction (Center for Biological Diversity 2023).



New York's Contribution to Species North American Range:

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
1-25%	Peripheral	

Column options
Percent of North American Range in NY: 100% (endemic); 76-99%; 51-75%; 26-50%; 1-25%; 0%; Choose an item
Classification of NY Range: Core; Peripheral; Disjunct; (blank) or Choose an item

IV. Primary Habitat or Community Type *(from NY crosswalk of NE Aquatic, Marine, or Terrestrial Habitat Classification Systems):*

1. Mixed northern hardwoods

2. Old field managed grasslands

3. Urban and recreational grasses

4. Powerline

5. Oak forest

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Pollinator Species?	Habitat/ Community Trend	Time frame of Decline/Increase
Yes	No	Yes	Unknown	

Column options
Habitat Specialist, Indicator Species and Pollinator Species: Yes; No; Unknown; (blank) or Choose an item
Habitat/Community Trend: Declining; Stable; Increasing; Unknown; (blank) or Choose an item

Habitat Discussion:

Monarch butterflies can be found in a variety of habitats including open meadows and fields containing a variety of wildflowers, coastal beaches with dunes, and man-made butterfly gardens. Monarch larvae are obligate herbivores of milkweeds (*Asclepias* spp*.)* and are likely to utilize any of the approximately 115 species in North America and the Caribbean (NAMCP 2008). Breeding areas generally contain patches of milkweed. Commonly used milkweed species include Common milkweed (*Asclepias syriaca*), Butterflyweed (*A. tuberosa)*, and Swamp milkweed (*A. incarnata*) likely due to their abundance (Lukens et al. 2020). Monarchs have been observed visiting and nectaring from over 30 other flowering species, highlighting the importance of having a diversity of floral resources present beyond milkweed. Wild Bergamot or Bee Balm (*Monarda fistulosa*) is common on the landscape and is frequently visited by monarchs (Lukens et al. 2020)

Migratory North American monarchs overwinter in either high altitude Mexican conifer forests or coastal California conifer or Eucalyptus groves. The overwintering habitats are critical conservation features for North American populations. Lethal cold would impede overwintering success in places like the Gulf Coast and much of Florida some years and it appears these are not major wintering regions (NatureServe 2024).

Certain coastal migratory stopovers also provide important habitat and are conservation sites, especially those along Delaware Bay and Cape May, New Jersey. Adults may holdover for several days before suitable conditions return. Since coastal regions are important flyways, the presence of floral resources that provide nectar in these areas can help migrating monarchs (NatureServe 2024).

V. Species Demographic, and Life History:

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/ Catadromous?
Yes	-	-	Yes	-	-

Column options
First 5 fields: Yes; No; Unknown; (blank) or Choose an item
Anadromous/Catadromous: Anadromous; Catadromous; (blank) or Choose an item

Species Demographics and Life History Discussion *(include information about species life span, reproductive longevity, reproductive capacity, age to maturity, and ability to disperse and colonize):*

Murtaugh (2014): Adults warm up by basking dorsally (with their wings open and toward the sun). Females lay eggs singly under the host leaves, and the caterpillars feed on leaves and flowers. One female can lay up to 400 eggs, which hatch in 3 to 12 days. Striped larvae feed on plant leaves for about 2 weeks and develop into caterpillars, which molt up to 4 times while growing. Three or four generations of monarchs may be born in one summer. Most live only a few weeks. The last generation, born in late August, is the migratory generation. The shorter days and cooler temperatures of autumn prevent the butterflies from maturing enough to reproduce. This allows them to live for about 8 to 9 months – long enough to fly south for the winter and back again to the south-mid Atlantic region to reproduce the following summer. It takes another generation to fly northward to reach New York. Adults make massive migrations from August-October, flying thousands of miles south to hibernate along the California coast and in central Mexico. A few overwinter along the Gulf coast or south Atlantic coast. Along the way, monarchs stop to feed on flower nectar and to roost together at night. At the Mexico wintering sites, butterflies roost in trees and form huge aggregations that may have millions of individuals. During the winter, the butterflies may take moisture and flower nectar during warm days. Most have mated before they leave for the north in the spring, and females lay eggs along the way (Opler et al. 2012).

VI. Threats *(from NY 2015 SWAP or newly described):*

Primary threats to the monarch butterfly include the loss of milkweed—the host plant that monarch caterpillars need to survive—from agricultural and natural areas, loss of floral resources, degradation of overwintering sites, climate change, invasive plants, habitat fragmentation, and anthropogenic breeding programs (Malcolm 2018, Thogmartin et al. 2017b). Thogmartin et al. (2017b) also found that *Ophryocystis elektroscirrha* (OE) parasitism, drought, and glyphosate and neonicotinoid use in the northeast were negatively associated with population size. Temperatures in the northeast appeared to impact population size. Warm temperatures earlier in the season (>70°F in May) were negatively associated with population size, while warm temperatures later in the season (~88°F in late May-early June) were positively associated (Thogmartin et al. 2017b).

Murtaugh (2014): The large-scale use of systemic insecticides such as neonicotinoids within the breeding range of the monarch may pose a considerable threat. Natural enemies such as diseases, predators, and parasites likely also influence the size of the monarch population. Loss of milkweed from the American Midwest is primarily due to the dramatic increase in the use of the herbicide Roundup™ (glyphosate), made possible by the mass-planting of Genetically Modified Herbicide Tolerant corn and soy. Illegal logging has threatened overwintering sites in Mexico, and in California, numerous sites have been logged and replaced with housing developments. Extreme weather events may be negatively impacting monarchs in the eastern U.S. and low monarch populations in California are correlated with years of intense drought. Climate change models predict that future climate scenarios will not be suitable to support overwintering monarchs or the oyamel fir trees that they use in Mexico (Xerces Society 2014). For New York, models predict more

rain and greater storm intensity and frequency (IPCC report), which are likely to increase mortality during migration and breeding periods.

The butterfly's dramatic decline is being driven by the widespread planting of genetically engineered crops in the Midwest, where most monarchs are born. The vast majority of genetically engineered crops are made to be resistant to Monsanto's Roundup herbicide, a uniquely potent killer of milkweed, the monarch caterpillar's only food. The dramatic surge in Roundup use with Roundup Ready crops has virtually wiped-out milkweed plants in midwestern corn and soybean fields (Center for Biological Diversity 2014).

In addition to herbicide use with genetically engineered crops, monarchs are also threatened by global climate change, drought and heat waves, other pesticides, urban sprawl, and logging on their Mexican wintering grounds. Scientists have predicted that the monarch's entire winter range in Mexico and large parts of its summer range in the states could become unsuitable due to changing temperatures and increased risk of drought, heat waves and severe storms (Center for Biological Diversity 2014).

Monarchs need a very large population size to be resilient to threats from severe weather events and predation. Nearly half of the overwintering population in Mexico can be eaten by bird and mammal predators in any single winter; a single winter storm in 2002 killed an estimated 500 million monarchs — 14 times the size of the entire current population (Center for Biological Diversity 2014).

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent	Severity	Immediacy	Trend	Certainty
1. Residential and Commercial	1.1 Housing & Urban Areas	(habitat loss)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
1. Residential and Commercial	1.2 Commercial & Industrial Areas	(habitat loss)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
1. Residential and Commercial	1.3 Tourism & Recreation Areas	(habitat loss)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
2. Agriculture & Aquaculture	2.1 Annual & Perennial Non-Timber Crops	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
2. Agriculture & Aquaculture	2.2 Plantations	2.2.1 Plantation of pulpwood	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.1 Invasive Non-Native Plants & Animals	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
8. Invasive & Other Problematic Species	8.2 Problematic Native Plants & Animals	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.3 Agricultural & Forestry Effluents	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.3 Changes in Temperature Regimes	-	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
11. Climate Change	11.4 Changes in Precipitation & Hydrological Regimes	11.4.2 Droughts	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 2. Threats to *monarch butterfly.*

Are there regulatory mechanisms that protect the species or its habitat in New York?

Yes: _____ **No:** ✓ **Unknown:** _____

If yes, describe mechanism and whether adequate to protect species/habitat:

In June 2014 the White House issued a Presidential Memorandum creating a federal strategy to promote the health of honeybees and other pollinators including the monarch. Although this is an important acknowledgement of the large-scale issues that are threatening the monarch, much more tangible action is needed to protect the butterfly and its habitat (Center for Biological Diversity et al. 2014).

Describe knowledge of management/conservation actions that are needed for recovery/conservation, or to eliminate, minimize, or compensate for the identified threats:

Active management is needed to conserve monarch butterflies. An estimated 5-fold increase of the monarch population is needed to cut the risk of losing the eastern migratory population in half (Semmens et al. 2016).

Invasive species control may be an important management action to conserve monarch populations throughout New York. Invasive species, including European swallow-wort (*Vincetoxicum rossicum*) and Black swallow-wort (*V. nigrum*), may displace closely related native milkweed species (*Asclepias* spp.) and are not viable hosts of monarchs. In New York, DiTommaso and Losey (2003) found that captive reared monarchs did not oviposit on *Vincetoxicum* spp. during their experiments; however, larvae will feed on these plants and over half died within 48 hours. Other experiments have found that monarchs will oviposit on invasive *Vincetoxicum* species. In Rhode Island monarchs oviposited between 10-20% of their eggs on *Vincetoxicum* spp. (CasaGrande and Dacey 2007) and in Michigan up to 25% were oviposited on swallow-wort species (Alred et al. 2022). These findings show that exotic swallow-wort species serve as a sink for monarch butterflies and managing this invasive plant would benefit monarchs. Actively managing for other invasive plants, including wild parsnip (*Pastinaca sativa*), thistles (*Cirsium* spp.), and buckthorn (*Rhamnus* spp.), will also benefit native plant communities and monarchs (Lukens et al. 2020).

Another action to help the monarch population recover is to restore habitat and plant milkweed on the landscape. Thogmartin et al. (2017c) modeled different recovery scenarios and found that to reach the recovery monarch population goal more than a billion milkweed stems need to be planted or restored. Managers could also include early and late blooming floral resources into seed mixes used for restoration efforts (Lukens et al. 2020).

Murtaugh (2014): New York State has “inadvertently” supported Monarch conservation by maintaining grasslands on private and public land-primarily for grassland birds. Milkweeds are pioneer species and without regular disturbance would not occur in high abundance.

On private lands, at least 4,157 acres are being maintained as grassland through LIP/SWG and another 1,500 acres being maintained as such through SAFE-CRP, total; 5,657 acres. Since grasslands cannot be mowed until August 15, and in practicality are not mowed until mid-September, they should be providing feeding and nesting opportunity for the butterfly as well. Monarchs are seen moving through the fields in August and September.

On State land (primarily Wildlife Management Areas), about 11,065 acres of grassland are also under a delayed and rotational mowing schedule using PR funding for birds and mammals, but

also benefitting bees and butterflies. This equals a total of about 17,000 acres of grassland in NY, with about 1/3 of it being mowed per year. Goldenrod, milkweed, clover and a diverse array of asters proliferate under this management scheme (del Puerto 2014, pers. comm.).

While a large portion of the threats affecting monarch populations occur outside of the state, region, and even country, one action that states in the northeast and all along the butterflies' migratory pathway could take is the creation of Monarch Waystations (See Monarch Watch) (monarch habitats) in home gardens, at schools, businesses, parks, zoos, nature centers, along roadsides, and on other unused plots of land. To offset the loss of milkweeds and nectar sources it is necessary to create, conserve, and protect milkweed/monarch habitats. Without a major effort to restore milkweeds to as many locations as possible, the monarch population is certain to decline to extremely low levels.

A cursory examination of multi-year Spring and Fall migration data reported by citizen-scientists and gathered and analyzed by Journey North suggests that Monarch movements throughout the Northeast are not random but in fact follow most direct routes, coast lines, ridges, and are influenced by prevailing winds and needing to cross large bodies of water (e.g., Great Lakes, Long Island Sound, Chesapeake Bay). Discrete patterns of movement through New York are discernable, and these are continued in adjacent states.

This non-random pattern of movement warrants further study. It may be possible to designate focus areas or critical movement corridors for the species and to adjust the location of milkweed habitat patches, accordingly, providing enhanced feeding, reproduction, and larval development opportunities along their entire migration.

Action Category	Action	Description
B.3 Outreach	B.3.0.0.0 Outreach	Awareness and Communications
C.6 Design and Plan Conservation	C.6.0.0.0 Design and Plan Conservation	Resource/Habitat Protection
C.6 Design and Plan Conservation	C.6.5.1.3 Develop a conservation, management, or restoration plan for protected private lands	Habitat/Natural process restoration
C.7 Legislative and Regulatory Framework or Tools	C.7.0.0.0 Legislative and Regulatory Framework or Tools	Policies and Regulations

Table 3. Recommended conservation actions for monarch butterfly.

VII. References

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