Species Status Assessment

Common Name: Imperial moth **Date Updated:** March 2025

Scientific Name: *Eacles imperialis pini* **Updated By:** NYSDEC Wildlife Section

Class:

Family:

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

There are two imperial moth subspecies: *Eacles imperialis pini* and *Eacles imperialis imperialis*. The *pini* subspecies feeds exclusively on pines, while the *imperialis* subspecies feeds on several different tree species (NYNHP 2011). The pini subspecies is often referred to as the Canadian imperial moth (Schweitzer and Wagner 2011).

The Canadian impartial moth has a limited range in the northern Great Lakes region. It occurs from the north shore of Lake Superior through northern Michigan, southern Ontario, and adjacent Jefferson County New York, where three were collected in 1991 by Tim McCabe, to extreme southwestern Quebec and into the Lake Champlain-Lake George region of New York (Clinton, Washington, and Warren counties), and Vermont (Schweitzer and Wagner 2011).

DEC is not aware of any additional data or new information on population trends or threats to this species since the last SWAP revision in 2015 to indicate a need for change in SGCN status

I. Status

a. Current legal protected Status

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

ii. **New York:** Not listed

b. Natural Heritage Program

i. **Global:** G5T3T4

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

Other Ranks:

-NYS 2025 SGCN Status: Species of Greatest Conservation Need

-IUCN Red List: N/A

-Northeast Regional SGCN: N/A

-NYNHP Watch List

Status Discussion:

Additional surveys are needed before assigning a state rank. As of 2012, there are five extant occurrences in New York State. Occurrences are known to be in the northern portion of the state and on Long Island, but not in between. The short-term trends are unknown. Populations declined in the mid-twentieth century most likely because of increased use of pesticides, metal halide bulbs, and the introduction of parasitoids, such as *Compsilura concinnata* (tachinid fly) that was introduced in 1906 (Hedbor 2006, Schweitzer et al. 2006, Goldstein 2010).

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status	SGCN?
North America	Yes	Increasing	Increasing			-
Northeastern US	Yes	Increasing	Increasing			-
New York	Yes	Increasing	Increasing	Early 2000s		Yes
Connecticut	No	-	-			-
Massachusetts	No	-	-			-
New Jersey	No	-	-			-
Pennsylvania	No	-	-			-
Vermont	Yes	Increasing	Increasing			Yes
Ontario	No data	Unknown	Unknown			-
Quebec	No data	Unknown	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):*
None

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

Eacles imperialis pini is not now imperiled in most of its range, but it was nearly extirpated from the eastern part by the late 1950s. The Canadian imperial moth seems to be recovering somewhat since about 2001. A larva collected around 2002 at Plattsburgh was the first in New York in over 40 years, and David Wagner captured one adult at a blacklight at nearby Clintonville in 2008 (Schweitzer and Wagner 2011).

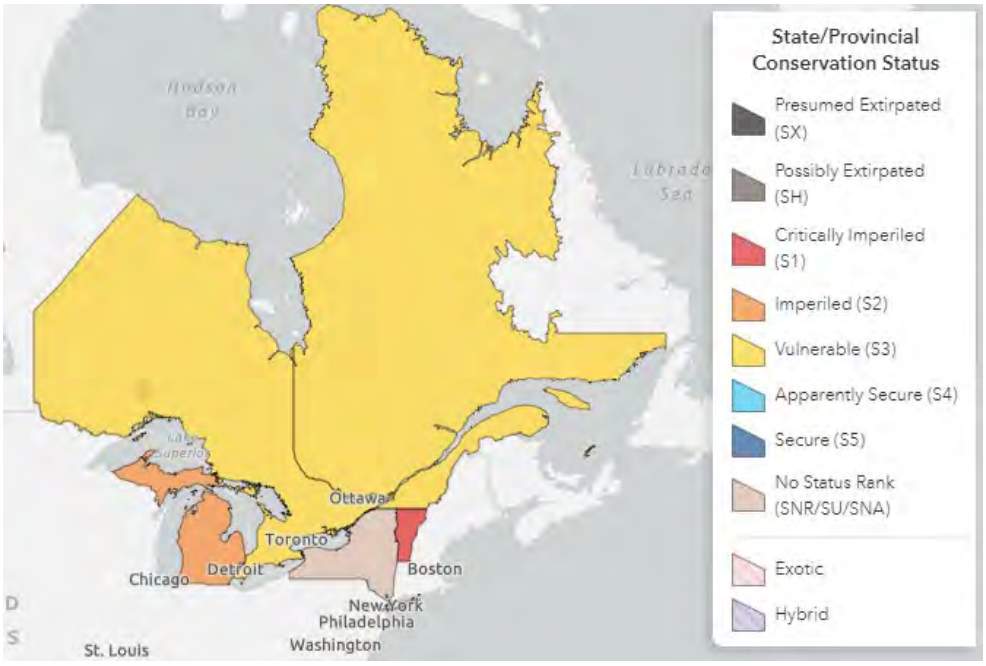

Figure 1. Conservation status of *Eacles imperialis pini* in North America (NatureServe 2024).

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

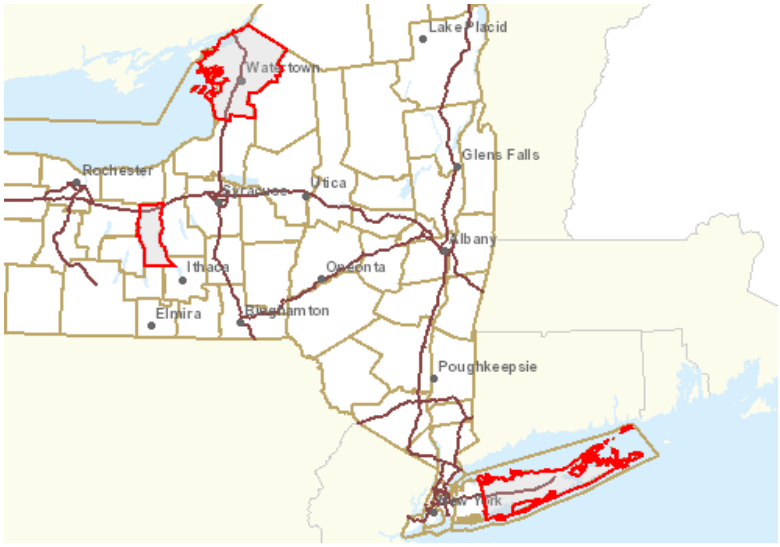

Figure 2. Occurrence of the Canadian imperial moth in New York (New York Nature Explorer 2009).

Details of historic and current occurrence:

Occurrences include: Jefferson County, 1996; Seneca County, 1999; and Suffolk County, 2007.

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%	Disjunct	

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):*

a. Pine barrens

b. Maritime dunes

c. Open alkaline peatlands

Habitat or Community Type Trend in New York

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

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:

In the northern portion of its range, this species has been found in calcareous pavement barrens. On Long Island, the precise habitat has not been verified, except that captures were made between maritime grassland and maritime dunes or between a sea level fen and maritime heathland. The following trees have been recorded as foodplants: basswood, birches, cedar, elms, maples, oaks, pines, and walnut (NYNHP 2011). Most commonly, the Canadian imperial moth seems to occur mostly in sandy pine forests and pine plantations, and sometimes the larvae have been noted as significant defoliators. It also occurs in mixed forests with an abundance of white pine (Schweitzer and Wagner 2011).

V. Species Demographic, and Life History:

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

Adults emerge early in July, but a few are found in June and early August. Recent dates are from 1-28 July in Vermont, and 26 June in Clintonville, NY. The egg stage probably lasts about 12-15 days. The larval stage probably extends over a month, considering the cool climate where average July lows are around 15º C (59º F). Pupation is underground, and there are no reports of any pupae overwintering more than one year (Schweitzer and Wagner 2011).

Adults are strong fliers (NYNHP 2011) and emerge before sunrise and mate after midnight the next day. Females lay eggs at dusk, singly or in groups of 2-5 on both surfaces of host plant leaves. The eggs hatch in about 2 weeks, and the caterpillars are solitary feeders (Butterflies and Moths of North America 2012).

Larval foodplants are many tree species including: basswood, birches, cedar, elms, maples, oaks, pines, and walnut. Adults do not feed. Imperial moths can be found May through July in the northern portion of its range. There is one brood each year (Covell 1984).

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

The imperial moth is believed to be severely impacted by pesticides and parasitoids, such as *Compsilura concinnata* tachinid fly (Hedbor 2006, Goldstein 2010). *Compsilura concinnata* is the greatest concern, and this threat could worsen as the climate warms (Schweitzer and Wagner 2011).

Climate change may be a threat to *Eacles imperialis pini*. While the typical imperial moth thrives in hot temperature and subtropical climates, Tuskes et al. (1996) reported that Canadian imperial moth larvae are sensitive to high temperatures. It is predicted that can be expected to move northward into at least the Michigan portion of its range with unknown consequences *Eacles imperialis pini* (Schweitzer and Wagner 2011). However, this species has not been assessed in a review of the vulnerability of at-risk species to climate change in New York (Schlesinger et al. 2011).

This species is also attracted to artificial lighting, which can increase predation risk, disrupt behaviors such as feeding, flight, and reproduction, and interfere with dispersal between habitat patches. In addition, many individuals die near the light source. It is not known if the impact of artificial lighting is severe, but the impact is likely greater for small, isolated populations (Schweitzer et al. 2011).

Timber harvest could be an issue, although populations should recover in a few decades if pines are replanted or return naturally. Some pine-dominated habitats favored by this species are fire-maintained, and all stages except for the underground pupa are vulnerable to summer fires that scorch the crowns of the pines. Pitch pines generally re-sprout from the branches and trunk, but with white (*Pinus strobus*), jack (*Pinus banksiana*), or red (*Pinus resinosa*) pine, a complete crown burn would probably kill enough trees to eliminate the imperial moth for a decade or more (Schweitzer and Wagner 2011).

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent	Severity	Immediacy	Trend	Certainty
5. Biological Resource Use	5.3 Logging & Wood Harvesting	-	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	8.1.1 Terrestrial animals (parasitoids)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.6 Excess Energy	9.6.1 Light pollution	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.

Table 2. Threats to *Eacles imperialis pini.*

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:

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

The Freshwater Wetlands Act provides protection for wetlands greater than 12.4 acres in size under Article 24 of the NYS Conservation Law. The Tidal Wetlands Act protects all tidal wetland habitats and adjacent areas under Article 25 of the NYS Conservation Law. This does not provide sufficient protection for the species.

Additional research is needed to gain a better understanding of this species' life history and habitat needs. Monitoring *Compsilura concinnata* and its hyperparasites would also be useful (Schweitzer and Wagner 2011).

Minimizing lighting to maintain dark sky conditions would be beneficial. When lighting is necessary, it is best to use lights that emit red or yellow light because insects are generally not attracted to those colors. However, many sodium lights, which emit yellow light, are so bright that they do attract some insects. The best lighting appears to be low pressure sodium lights which have little effect on flying insects (Schweitzer et al. 2011).

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.0.0.0 Direct Habitat Management	Site Management
A.2 Direct Species Management	A.2.0.0.0 Direct Species Management	Invasive/problematic species control
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	Site/Area Protection

Action Category	Action	Description
C.6 Design and Plan Conservation	C.6.0.0.0 Design and Plan Conservation	Resource/Habitat Protection
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 *Eacles imperialis pini.* (add more lines as needed).

The Comprehensive Wildlife Conservation Strategy (NYSDEC 2005) includes recommendations for the following actions for other moths, and for the imperial moth in particular.

Easement acquisition:
____ Where appropriate, acquire easements to promote moth protection and conservation.
Fact sheet:
____ Create fact sheets covering moths.
Habitat management:
____ Determine best management regime for moth species, including fire and other forms of management.
Habitat monitoring:
____ Develop standardized measures of habitat parameters for each species of listed moth.
____ Investigate threats to food and host plants.
____ Monitor land development projects.
Habitat research:
____ Examine role of light pollution as threat to moths.
____ Determine host/ food plant.
Life history research:
____ Investigate the metapopulation dynamics of those species which warrant it.
____ Examine role of introduced parasites and predators in threats to moths.
Other action:
____ Develop standard definition of what is needed for "viable" populations of moths.
____ Research the role of pesticide use in threats to moths.
Population monitoring:
____ Inventory of species within historical range.
____ Develop standardized survey protocols for moths.
Private fee acquisition:
____ Where appropriate, encourage/assist private entities to acquire land for moth protection and conservation.
State fee acquisition:
____ Where appropriate, acquire land essential to moth protection and conservation.
State land unit management plan:
____ Incorporate needs of moths into state land management plans.

VII. References

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Murtaugh, Jenny. 2013. Eacles imperialis pini Status Assessment for the 2015 New York State Wildlife Action Plan. NYSDEC. Albany, New York.

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