Species Status Assessment

Common Name: Creek-Penn Firefly **Date:** 2024-10-15

Scientific Name: *Photuris cowaseloniensis* **Proposed By:** Katie Hietala-Henschell

Class: Insecta

Family: Lampyridae

Species Synopsis

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

Photuris cowaseloniensis, also known as the Creek-Penn Firefly, is a habitat specialist of open wet meadows in low elevation temperate forests in central New York (Heckscher 2021). It is known primarily from the northeastern US. In New York, it has been described from Madison County (Lloyd 2018) but likely occurs in additional locations in central New York. Lloyd (2018) described this species from Cowaselon Creek valley in 1976 as occupying low areas and old pastures but says it could also be found in drier grassy areas away from the creek and over sandbars and spits where vegetation had reestablished along the creek's edges (Lloyd 2018). *Photuris cowaseloniensis* has not yet been assessed by the IUCN Red List Firefly Specialist Group (Fallon et al. 2022); however, it appears to be rare and endemic to the northeast (Terwilliger Consulting Inc. and the Northeast Fish and Wildlife Diversity Technical Committee 2023).

This species is member of *Photuris* versicolor group which can be extremely challenging to identify due to plasticity in flash pattern and morphology. It is most likely confused with *P. sellicki* but these two closely related species occupy different habitat types (Heckscher 2021). In New York, this species has been observed from June through mid-July (Lloyd 2018).

In 2021, the International Union for Conservation of Nature (IUCN) Red List conducted baseline conservation assessments for nearly 80% of described firefly species in the United States and Canada. The IUCN Red List found approximately 14% of fireflies are threatened with extinction and more than half of the species (53%) could not be evaluated due to lack of data (Fallon et al. 2021). Future firefly work including monitoring and protecting populations of at-risk species, preserving, and restoring habitat, and gathering data to fill critical information gaps (e.g., population trends) for species suspected to be rare or at risk, like *P. cowaseloniensis*, will help inform conservation efforts.

I. Status

a. Current legal protected Status

i. **Federal:** Not listed **Candidate:** No

ii. **New York:** Unprotected

b. Natural Heritage Program

i. **Global:** GU

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

Other Ranks:

-New York 2025 SGCN status: Species of Greatest Conservation Need
-COSEWIC: Not listed in Canada
-IUCN Red List: Not Evaluated
-Northeast Regional SGCN: Proposed RSGCN

Status Discussion:

II. Abundance and Distribution Trends

Region	Present?	Abundance	Distribution	Time Frame	Listing status or S-Rank	SGCN?
North America	Yes	Unknown	Unknown	Unknown		
Northeastern US	Yes	Unknown	Unknown	Unknown	Proposed RSGCN	
New York	Yes	Unknown	Unknown	Unknown	SNR	No
Connecticut	No	-	-	-		
Massachusetts	No	-	-	-		
New Jersey	No	-	-	-		
Pennsylvania	No	-	-	-		
Vermont	No	-	-	-		
Ontario	No	-	-	-		
Quebec	No	-	-	-		

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):

The Dark Skies for Fireflies project (2023-2025), a partnership between New York Natural Heritage Program (NYNHP) and the Office of Parks, Recreation, and Historic Preservation (OPRHP), is an effort to survey fireflies in New York State Parks; however, there are no systematic monitoring efforts directed toward this species.

Trends Discussion

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

Photuris cowaseloniensis is listed a Proposed RSGCN (Terwilliger Consulting Inc. and the Northeast Fish and Wildlife Diversity Technical Committee 2023). This species appears to be endemic to New York. It prefers open habitats, near streams or creeks, and has been described from fields and pastures where it can be locally abundant. However, the loss of meadow and grassland habitat within its range and the decline in quality of fields and pastures may negatively impact this species. Climate change, pollution, and natural system modifications are threats to *P. cowaseloniensis* populations (RSGCN 2023).

Figure 1: Photuris cowaseloniensis North American distribution. Points show records available from Lloyd 2018 (NYNHP 2024).

III. New York Rarity

(provide map, numbers, and percent of state occupied)

Within its range, *P. cowaseloniensis* occurs in open wet fields and meadows in low elevation temperate forests in central New York (Heckscher 2021). Currently, there are no records of *P. cowaseloniensis* in NYNHP element occurrence database. Historic records have documented this species from two sites in Madison County. These records suggest that this species occurs in less than 2% of New York state.

Preliminary data from the Dark Skies for Fireflies survey effort has not yet detected this species (NYNHP 2024). Flash pattern data and voucher specimens were collected in 2023 and 2024. Species determinations and verifications are currently underway.

Figure 2: NYS distribution for Photuris cowaseloniensis based on data from Lloyd 2018 (NYNHP 2024).

Years	# of records	# of Counties	% of counties in State
Pre-1999	2	1	1.6
2000-present	NA	NA	NA

Table 1:*Number of observations of Photuris cowaseloniensis grouped by the dates known to be extant (repeat observations (element occurrences) include the years spanning first observation to last observation) and the number and percent of total of counties these observations fall within for New York State.*

Details of historic and current occurrence:

Percent of North American Range in NY	Classification of NY Range	Distance to core population, if not in NY
100%	Core	

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):

Heckscher (2021) and Lloyd (2018): Wet meadows, old field or pasture, forest edge habitat

Habitat or Community Type Trend in New York

Habitat Specialist?	Indicator Species?	Habitat/ Community Trend	Time frame of Decline/ Increase
Unknown	Unknown	Unknown	Unknown

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

Habitat Discussion:

Photuris cowaselonienis can be found in old fields dominated by goldenrod and wet meadow habitat (Lloyd 2018).

V. Species Demographics and Life History

Breeder in NY?	Non-breeder in NY?	Migratory Only?	Summer Resident?	Winter Resident?	Anadromous/ Catadromous?
Yes	Yes	No	Yes	Yes	No

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):

Photuris cowaseloniensis can be seen from June through mid-July in open field or forest edge habitat. Adults typically fly low over tall grass vegetation. Males of this species can be extremely challenging to identify in part because they can emit two species-specific flash patterns, a dot-dash flash, and a short-flash (Lloyd 2018). Lloyd (2018) describes the variety of flash patterns observed. However, additional surveys are needed to unravel the complexities of this species. Females are likely to be predatory, like other species in this genus *Photuris* (Faust 2017).

In general, larvae in the genus *Photuris* are dietary generalists and will scavenge around damp areas looking to consume snails, worms, other soft-bodied invertebrates, and even plant material, such as berries (Buschman 1984).

VI. Threats

Threat Level 1	Threat Level 2	Threat Level 3	Spatial Extent*	Severity*	Immediacy*	Trend	Certainty
6. Human Intrusions & Disturbance	6.1 Recreational Activities	6.1.8 Wildlife observation/photography	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
7. Natural System Modifications	7.3 Other Ecosystem Modifications	(habitat loss/degradation)	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.3 Agricultural & Forestry Effluents	9.3.1 Nutrient loads	Choose an item.	Choose an item.	Choose an item.	Choose an item.	Choose an item.
9. Pollution	9.3 Agricultural & Forestry Effluents	9.3.3 Herbicides & pesticides (runoff)	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.
11. Climate Change	11.1 Habitat Shifting & Alteration	-	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 *Photuris cowaseloniensis.*

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:

Threats to *P. cowaseloniensis* include light pollution, soil and air pollution, pesticides, habitat fragmentation and destruction, and climate change (Lewis et al. 2024). Minimizing these key threats are needed to conserve at-risk firefly species. In addition, Reed et al. (2020) found that fireflies have numerous risk factors that can contribute and make them more susceptible to various threats, including specialized diets, poor dispersal abilities, and unique mating signals and behaviors.

Artificial lights can impair firefly communication resulting in reduced courtship and mating (Faust et al. 2012). Even low levels of light pollution can reduce reproductive success (Owens et al. 2022). Light pollution can be managed by turning off unnecessary lights and planting hedgerows or trees around occupied sites to block trespassing light. Pesticide exposure can reduce fitness and cause mortality, especially in the long-lived, ground-dwelling larval life stage. Runoff or direct exposure of insecticides, herbicides, and fertilizers may degrade firefly habitat and can have lethal and sublethal effects on fireflies (Lewis et al. 2024). Sublethal effects can include changes in the midgut, body convulsions, persistent glow, and other physiological changes (Wang et al. 2022). Indirect effects include contaminating and reducing available prey.

Habitat loss and degradation is another leading threat to firefly populations. While some fireflies are generalists, like the common *Photinus pyralis* (Big Dipper Firefly), others are habitat specialists and are restricted to specific conditions. Once unique habitats – such as wetlands and mature forests – are lost, fireflies may experience direct mortality or be unable to recolonize an area that has been converted or developed. Climate Change can result in more droughts, wildfires, floods, sea-level rise, etc. all of which can potentially negatively impact fireflies in all life stages. Maintaining the natural hydrology of a site will benefit firefly populations.

Overtourism can lead to development and trampling. Impressive firefly light shows can draw large crowds that may increase onsite light pollution or trample individuals and habitat (Lewis et al. 2024). While programing and education/outreach surrounding these species can increase insect conservation and awareness, care should be taken at known sites to limit access areas and light use during breeding.

Additional conservation actions to support at-risk firefly populations include reducing light pollution that spills into parks or other sensitive areas, eliminate the use of broad-spectrum insecticides, modify mosquito control programs to minimize risk to fireflies, and protect wetland and riparian habitat from recreational activities (Lewis et al. 2024).

Table 3. Recommended conservation actions for *Photuris cowaseloniensis*.

Action Category	Action	Description
A.1 Direct Habitat Management	A.1.0.0.0 Direct Habitat Management	Site/Area management
A.2 Direct Species Management	A.2.0.0.0 Direct Species Management	Invasive/problematic species control
B.3 Outreach	B.3.1.0.0 Outreach, communication, and distribution	Awareness & Communications
C.6 Design and Plan Conservation	C.6.0.0.0 Design and plan conservation.	Site/Area protection
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 and natural process restoration
C.7 Legislative and Regulatory Framework or Tools	C.7.1.3.0 Create, amend, or influence regulation	Regulations
C.7 Legislative and Regulatory Framework or Tools	C.7.2.1.0 Create or amend policies	Policies
C.9 Education and Training	C.9.2.0.0 Training and individual skill development	Training

VII. References

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