

Species Status Assessment

Common Name: Pale Firefly

Date:2024-10-13

Scientific Name: *Photinus scintillans*
Henschell

Updated By: Katie Hietala-

Class: Insecta

Family: Lampyridae

Species Synopsis

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

Photinus scintillans, also known as the Pale Firefly or the Pine Barrens Firefly, has been observed along roadsides, open fields, forest margins (Faust 2017), pine barrens, and mesic Appalachian and xeric forests (Faust et al. 2019). This species has one of the narrowest ranges in North America (Faust 2017). It can be found in a narrow band from Missouri, Illinois, Indiana, Ohio, Pennsylvania, and into southeastern New York, New Jersey, Maryland, and Delaware. Across its range, this species has been assessed as Least Concern by the IUCN Red List Firefly Specialist Group; however, its population trend is unknown due to a lack of data (Walker 2021). In suitable habitat, *P. scintillans* populations can be locally abundant.

Historic records from the early and mid-1900s are primarily from southeastern New York from Cortlandt Park, Bronx, and Staten Island (Green 1956). These records from New York City area may be extirpated due to the development and growth in these densely populated areas. In New York, this species is typically active from June through July (Faust 2017). The loss of meadow and grassland habitat within its range and the decline in quality of fields and pastures may negatively impact this species. Fireflies in general are poor dispersers, and even more so for *P. scintillans* as females are flightless and lack functional wings (i.e., brachypterous) (Faust 2017, Walker 2021).

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 potentially rare or at-risk species, like *P. scintillans*, 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:** G4
- 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: Least Concern
- Northeast Regional SGCN: Proposed RSGCN

Status Discussion:

This species occupies open areas including fields and pastures. It may also be a specialist of pine barren and forest habitats. Based on historic records, this species appears to occur in southeastern New York, and it is currently documented from just two counties, Bronx and Richmond. West Virginia is the only state with a state conservation rank and *P. scintillans* has been assessed as Imperiled (S2) (NatureServe 2023). This species can be locally abundant within suitable habitat; however, the loss and decline of suitable habitat may threaten populations.

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		No
Connecticut	No	-	-	-		
Massachusetts	No	-	-	-		
New Jersey	Yes	Unknown	Unknown	Unknown	SNR	No
Pennsylvania	Yes	Unknown	Unknown	Unknown	SNR	No
Vermont	No	-	-	-		
Ontario	No	-	-	-		

Region	Present?	Abundance	Distribution	Time Frame	Listing status or S-Rank	SGCN?
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):

Across its range, the conservation status for *P. scintillans* is currently Least Concern; The IUCN Red List firefly Specialist Group was not able to assess the population size and trend for *P. scintillans* due to the paucity of data (Walker 2021). This species can be locally abundant within suitable habitat; however, the loss and decline of habitat may threaten populations. Climate vulnerability and other emerging threats may also impact *P. scintillans* populations (RSGCN 2023). *P. scintillans* may be a specialist of Pine Barren habitats, but is also found in fields, meadows, and forest edges (Faust 2017, Faust et al. 2019). Fireflies that are restricted to specialized habitats tend to be more likely to be threatened by some level of extinction and should be included as SGCN (Fallon et al. 2021).

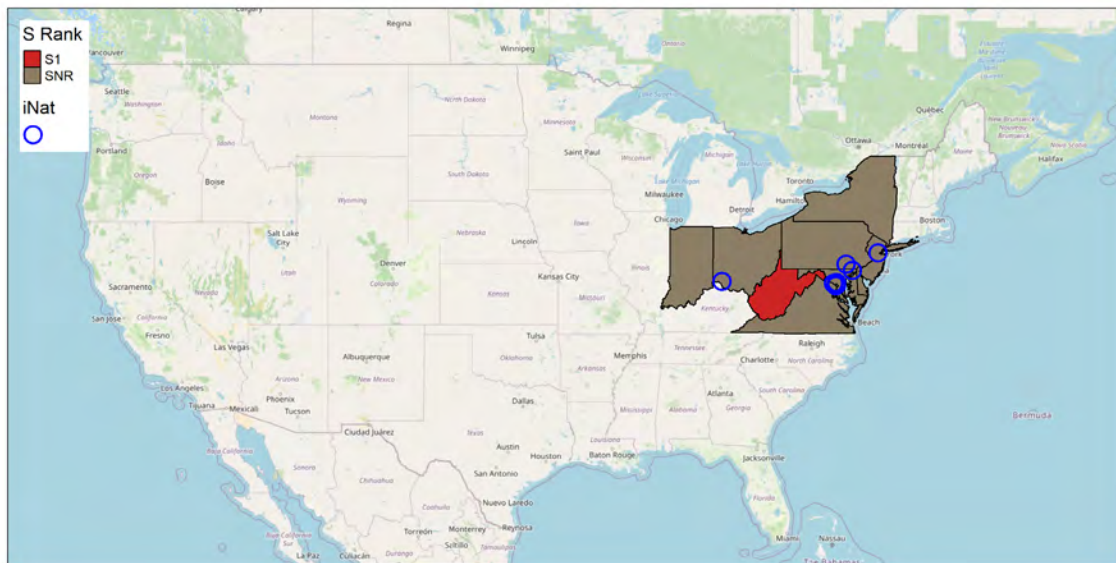


Figure 1: *Photinus scintillans* North American distribution. Points show research-grade iNaturalist observations (iNaturalist 2023, NatureServe 2023).

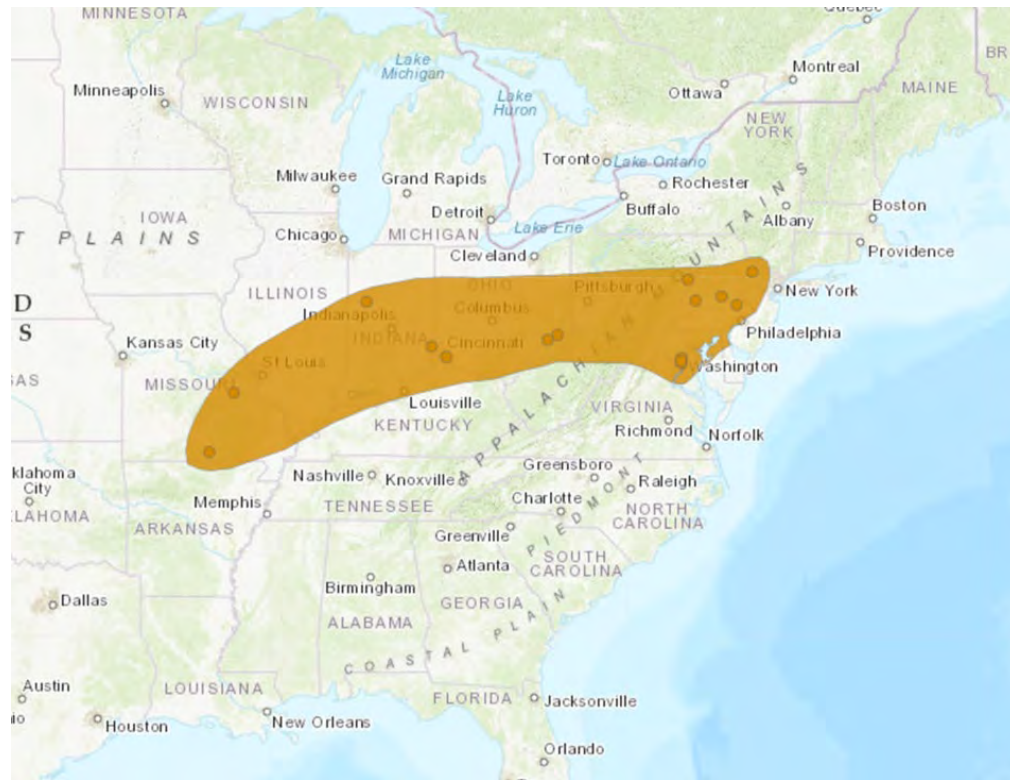


Figure 2. IUCN Red List map of *Photinus scintillans* North American distribution (Walker 2021).



Figure 3: *Photinus scintillans* regional distribution as reported at <https://northeastwildlifediversity.org/rsgcn>.

III. New York Rarity

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

Currently, there are no records of *P. scintillans* in NYNHP element occurrence database. Historic records have documented *P. scintillans* in two counties including Bronx and Richmond. Available records suggest that this species occurs in just over 3% of New York state. However, it is uncertain if the previously documented populations from 1927 and 1940 are still occupied as the Bronx and Staten Island have experienced much land conversion and development in this area of the 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 4: NYS distribution of *Photinus scintillans* based on historic records (pre-1999) primarily from Green 1956. These points represent low accuracy from georeferenced locations based on site, city, and county level descriptions (NYNHP 2024).

Years	# of records	# of Counties	% of counties in State
Pre-1999	3	2	3.23
2000-present	NA	NA	NA

Table 1. Number of observations of *Photinus scintillans* 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
26-50%	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):

NatureServe (2023): Suburban/orchard, Grassland/herbaceous, Subterrestrial

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:

IUCN Red List (Walker 2021):

Photinus scintillans has been observed in pine barrens, mesic Appalachian forests, and xeric forested hillsides, usually in proximity to rivers (Faust et al. 2019). More research is needed to determine if *P. scintillans* is a Pine Barrens specialist.

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):

IUCN Red List (Walker 2021):

Males emit single, sharp, orangish-pink flashes, 0.13-0.16 seconds in duration, at intervals of 2-3 seconds, while flying low over the ground in forested areas (Faust et al. 2019, Lloyd 1966). Activity typically begins in deep shade, about an hour before sunset, depending on light conditions as well as density of flashing males, and lasts around 60 to 90 minutes (Faust et al. 2019; Lloyd 1966, 2018). Females of this species are brachypterous and flightless. They respond to male advances with single pulsed response flashes, at a delay of less than half a second, from display perches, usually on vegetation near the ground, (Faust et al. 2019, Lloyd 1966). Upon dissection, double spiral glands were discovered in males, suggesting they deliver a spermatophore to females during extended, hour long mating sessions (Faust et al. 2019). Females die shortly after laying eggs and do not exhibit any maternal care, as some entirely apterous firefly species do (Faust et al. 2019). There is likely one generation per year; eggs are laid in June and July, larvae hatch and develop and are ready to overwinter as fourth or fifth instar larvae by the end of autumn (Faust et al. 2019). Typically, *Photinus* larvae are suspected to be subterranean, likely feeding on earthworms and other soft bodied invertebrates at or below the soil surface (Buschman and Faust 2014).

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 *Photinus scintillans*.

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. scintillans* 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). *P. scintillans* become active at dusk (Faust 2017), potentially making this species less sensitive to light pollution. 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). *Photinus scintillans* populations are at higher risk to the effects of trampling because females are brachypterous and cannot fly. While programming 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).

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

Table 3. Recommended conservation actions for *Photinus scintillans*.

VII. References

This SSA drew heavily from these resources:

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