

# State of the Fireflies of the United States and Canada:



Bethany Beach Firefly

## THREATENED & NEAR THREATENED SPECIES PROFILE

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This species profile was compiled based on information gathered from the IUCN Red List assessments and augmented with new information that has become available since its publication. Full Red List assessments (including range maps) are available at [www.iucnredlist.org/](http://www.iucnredlist.org/).

### KEY TO SPECIES PROFILE

#### Conservation Status

IUCN—Red List ranking

NS—NatureServe Global (G), National (N), and Subnational (S) Conservation Status Rank:

|                    |  |
|--------------------|--|
| GX   NX   SX       | Not located despite intensive searches and virtually no likelihood of rediscovery  |
| GH   NH   SH       | Known from only historical occurrences but still some hope of rediscovery  |
| G1   N1   S1       | At very high risk of extinction or collapse  |
| G2   N2   S2       | At high risk of extinction or collapse   |
| G3   N3   S3       | At moderate risk of extinction or collapse   |
| G4   N4   S4       | At fairly low risk of extinction or collapse   |
| G5   N5   S5       | At very low risk of extinction or collapse   |
| GNA   NNA   SNA    | A conservation status rank is not applicable because the species or ecosystem is not a suitable target for conservation activities |
| GNR   NNR   SNR    | Global rank not yet assessed   |
| GU   NU   SU       | Currently unrankable due to lack of information or due to substantially conflicting information about status or trends             |
| G#G#   N#N#   S#S# | Numeric range rank (e.g., G2G3, G1G3) is used to indicate uncertainty about the exact status of a taxon or ecosystem type          |

SGCN—Species of Greatest Conservation Need, legal designation by state

US ESA—Species' legal status under the US Endangered Species Act

#### Male Size Ranges

The documented size range for males of each species has been provided in the profiles as follows:

9–10 mm



With the smallest size in grey ( ) superimposed over the largest size in green ( ). When printed at 100% scale, the bars match the lengths provided.

#### Habitat Threats

| Pollution            | Agriculture         | Habitat Loss, Degradation, Fragmentation | Climate & Severe Weather |
|----------------------|---------------------|--|--------------------------|
| Excess light         | Crop systems        | Habitat loss                             | Climate change           |
| Energy & mining      | Livestock & pasture | Trampling / crushing                     | Severe storms & flooding |
| Pesticides & run-off |                     | Invasive species                         | Drought                  |
|                      |                     | Water quality                            | Sea level rise           |
|                      |                     |  | Rising temperatures      |

# *Photuris bethaniensis*

## Bethany Beach Firefly



CRITICALLY  
ENDANGERED  
CR



Bethany Beach firefly freshwater interdunal swale habitat along the Atlantic coastline [above]; a pinned specimen [middle]; firefly collected during a survey. (Photos: Emily May [above]; Christopher M. Heckscher [middle and on cover]; Kayt Jonsson, USFWS / flickr [bottom].)

### Conservation Status

- » **IUCN:** CR
- » **US ESA:** Under review for listing (USFWS 2021)
- » **NS:** G1; S1 (DE), SNA (MD)
- » **SGCN:** Delaware (DE)
- » **DE ESA:** Endangered

### Distribution

USA—Delaware, Maryland

### Description

The Bethany Beach firefly is a habitat specialist primarily associated with threatened freshwater interdunal wetlands that occur along a 20-mile stretch of Delaware’s Atlantic coast, although additional populations are now documented in Maryland. These wetland habitats form in barrier beach systems in the shallow depressions found between sand dunes. While brackish swales can be found all along the east coast, freshwater swales are less common. These swales are characterized by saturated soils that are seasonally inundated by freshwater from aquifers and recharged with rainfall. Organic matter that builds up in the swales provides habitat for Bethany Beach firefly larvae, which hunt along the soil surface and pupate in chambers just under the soil surface or under logs.

Currently, the most significant threat to this species is habitat loss and fragmentation due to coastal development. Other threats include decreased water quality, recreational activities and related infrastructure, habitat fragmentation, light pollution, pesticides, and climate change-induced sea-level rise, increased incidence of severe storms, and increased temperatures and phenological shifts (changes in the timing of a species’ life cycle events). Loss of larval prey species, invasive plants such as the common reed (*Phragmites australis*), and disease or predation may be impacting the Bethany Beach firefly as well.

(continued on next page)



9–10.75 mm

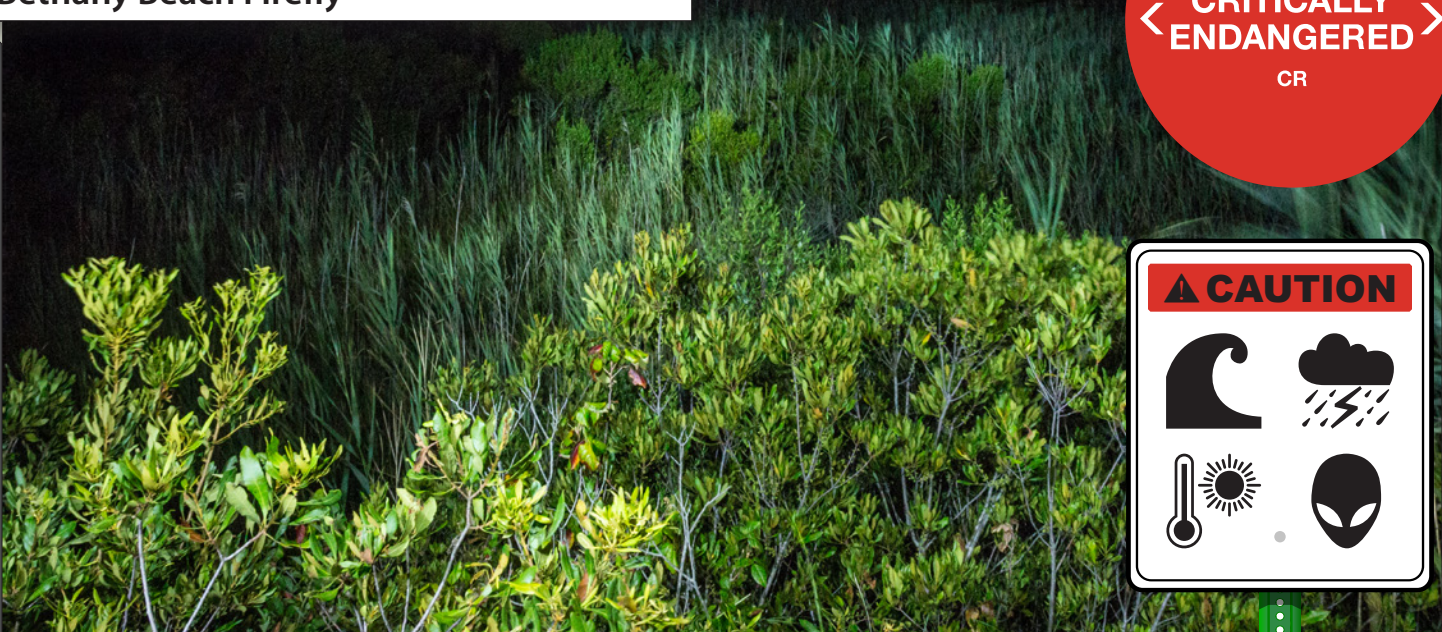




***Photuris bethaniensis* (CONTINUED)**  
Bethany Beach Firefly



CRITICALLY ENDANGERED  
CR



Invasive plants taking over sites like this one surveyed by the U.S. Fish and Wildlife Service & Delaware Division of Fish and Wildlife may be contributing to the species' decline [above];. (Photo: Kayt Jonsson, USFWS / flickr.)

**Flash Pattern & Activity Period**

Adults of this species are active after dark from late June to July or August, when males emit a distinctive bright green double flash about every five seconds.

|   | 0 | 1 | 2 | 3 | 4 | 5 | 6 | Seconds   |
|---|---|---|---|---|---|---|---|---|
| ♂ | █ | █ |   |   |   |   | █ | → Long double-flash over two seconds, repeated at five second intervals |
| ♀ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | ▨ | → Female response unknown*  |

\* Due to the aggressive mimicry utilized by some "femme fatale" firefly species—some of which have been documented using multiple flash-pattern responses—it has been difficult to determine which flash-patterns are used to attract mates or, alternately, to lure in unsuspecting prey males from other firefly species.