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Article in *Northeastern Naturalist* · December 2015

DOI: 10.1656/045.022.0418

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An Isolated Occurrence of *Pyractomena ecostata* (LeConte) (Coleoptera: Lampyridae) in the Mid-Atlantic with New Records from New Jersey and Delaware

Christopher M. Heckscher^{1,*} and James E. Lloyd²

Abstract - *Pyractomena ecostata* is an uncommon firefly primarily associated with brackish tidal marshes of the Atlantic and Gulf coasts of Florida. A geographically isolated occurrence is known from coastal southern New Jersey. Herein, we report 2 unpublished locality records from Kent County, DE, that expands the range of the Mid-Atlantic population into the Delaware Bay Estuary. We also report a previously unpublished modern-day record from Cape May County, NJ, perhaps the first New Jersey specimen secured since 1898. These data bring the total known number of Mid-Atlantic collection sites to 6. Although the species is very rare in the Mid-Atlantic, the disjunct population remains extant and therefore should be considered a significant inventory and conservation target due to impending sea-level rise and the spread of the invasive *Phragmites australis* (Common Reed).

The Lampyridae genus *Pyractomena* is widespread in North America east of the Rocky Mountains (Green 1957). However, most species are considered uncommon, and this once thriving genus may be in serious decline. *Pyractomena ecostata* (LeConte) is a large low-flying species that periodically emits brilliant, explosive “firecracker”-like flashes, which appear yellow and are ~1 sec in duration, as it moves slowly over wetlands. Despite its seemingly conspicuous nature, very little has been published regarding this spectacular firefly.

The known distribution of *P. ecostata* is remarkable because published locations include 2 very disparate regions: Florida and southern New Jersey (Green 1957). Most unusual is that the Mid-Atlantic population is disjunct across nearly contiguous and seemingly uniform habitat (coastal tidal salt and brackish marshes) without any obvious geographical barrier. The noteworthy nature of this distribution was remarked upon by Green (1957) in his landmark treatment of the genus. Green (1957) clearly considered the >1360-km hiatus between the two population centers as plausible and stated that the species is found “... occurring in Florida and southern New Jersey, and apparently not in any intervening territory.” The Florida distribution includes counties on both the east and west coastline—the northernmost Atlantic coastal records of that southern population come from Volusia County (Green 1957; J.E. Lloyd, unpubl. data). The New Jersey distribution appears to be far more restricted geographically as the species has only been reported from along the Atlantic coastline in Cape May and Atlantic counties in the extreme southern portion of the state (Green 1957, Wenzel 1896). Thus, considering the conspicuous nature of this firefly and the fact the geographic hiatus has persisted to the present day, the disjunct distribution, apparent to Green in 1957, must be considered an accurate representation of the species’ occupied range. From a conservation perspective, an isolated occurrence in the Mid-Atlantic region should garner considerable attention. Our objective here is to report new distribution records from the Mid-Atlantic and to bring awareness to conservationists and land managers regarding the species’ disjunct range, rarity, and status in the states of New Jersey and Delaware.

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There are 3 historic collection sites known to us from New Jersey (Table 1). Below, we present details regarding 4 unpublished modern-day records of individuals collected from the Mid-Atlantic population, 3 of which extend the range of the species into the Delaware Bay Estuary. The first individual represents a Delaware state record and was collected in 1972. The latter 2 Delaware specimens were collected together at an additional location 40 years later. A fourth record is from 1992 from Cape May County, NJ, and is significant in that it may be the first collection from New Jersey since 4 July 1898 (J.E. Lloyd, unpubl. data), a period of 94 years. Figure 1 presents a geographic representation of all known collection locations from the Mid-Atlantic region.

DELAWARE: **(1)** Kent County, Woodland Beach, 3 – VIII – 1972, collector: T. Rogers (specimen retained by collector; DET J.E. Lloyd); **(2 and 3)** Kent County, both collected from high brackish marsh dominated by *Spartina alterniflora* Loisel (Salt-marsh Cordgrass) adjacent to Bennett’s Pier Road, 2 – VII – 2012, collector: C.M. Heckscher (in private collection of C.M. Heckscher at Delaware State University). NEW JERSEY: **(4)** Cape May County, collected from a causeway in brackish tidal marsh at Sea Isle City, 14 – VI – 1992, collector: J.E. Lloyd (in private collection of J.E. Lloyd at University of Florida).

Green (1957) noted that *P. ecostata* is associated with brackish tidal marshes. The 4 new locality records reported above corroborate that conclusion for the Mid-Atlantic population. However, in Florida the species occasionally has been observed in low, wet pastures along highways apparently apart from brackish influence (J.E. Lloyd, unpubl. data).

At projected rates of sea-level rise, 99% of salt and brackish tidal marshes in the Mid-Atlantic states may be severely altered ecologically or destroyed by the year 2100 (Delaware Sea-level Rise Vulnerability Assessment 2012). Therefore, the association of this species with brackish tidal marshes indicates *P. ecostata* is likely threatened by sea-level rise, especially in the Mid-Atlantic where it maintains a geographically isolated and restricted coastal range. The spread of the invasive *Phragmites australis* (Cav) Trin ex Steud. (Common Reed) has severely altered tidal coastal marshes of the Mid-Atlantic states in part by reducing biological diversity, altering ecological community structure and function, and affecting overall biomass (Chambers et al. 1999). The loss of tidal marsh biodiversity due to *P. australis* invasion, including its effect on arthropods, is a primary concern in the Mid-Atlantic states (e.g., Chambers et al. 1999, Gratton and Denno 2005,

Table 1. All known records of *Pyraetomena ecostata* (LeConte) from New Jersey and Delaware with associated best source. Fourteen specimens collected in the months of July and August and reported by Wenzel (1896) and Green (1957) are in the American Museum of Natural History and the New Jersey State Museum collections, including some labeled as collected by R.P. Dow and C. Palm. For details regarding the recent records, see text.

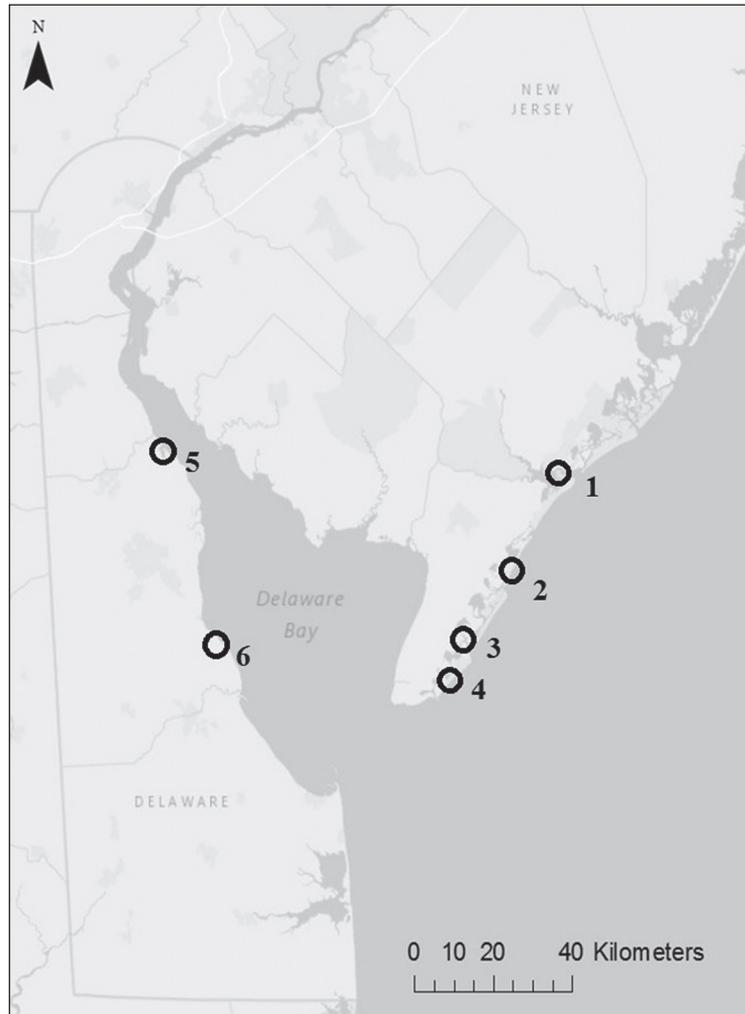
Location	Best references
Historical records	
Anglesea, Cape May County, NJ	Green 1957, Wenzel 1896
Five Mile Beach, Cape May County, NJ	Green 1957
Linwood, Atlantic County, NJ	Green 1957
Recent records	
Woodland Beach, Kent County, DE	T. Rogers collection (collected in 1972)
Sea Isle City, Cape May County, NJ	J.E. Lloyd collection (collected in 1992)
Bennett’s Pier, Kent County, DE	C.M. Heckscher collection (collected in 2012)

Havens et al. 1997). Therefore, this widespread invasive wetland species may threaten the persistence of *P. ecostata* populations in New Jersey and Delaware by altering the ecological quality of coastal marshes.

Despite the collection of just 4 individuals since 1898, the isolated Mid-Atlantic population of *P. ecostata* remains extant, albeit rare. We suspect the species occurs in low numbers at widely scattered locations in the broad salt and brackish high marshes of the southern New Jersey Atlantic coast and lower Delaware Estuary. This species is showy and could not be easily overlooked. Therefore, based on available data, we follow Green (1957) in accepting this occurrence as disjunct from Volusia County, FL, the next-closest known collection site. The occurrence of an isolated and restricted Mid-Atlantic population is significant. Because of its presumed vulnerability to sea-level rise and the invasive *P. australis*, populations of this stunning firefly should be considered an important target for protection, inventory, and monitoring in New Jersey and Delaware.

Acknowledgments. Lori Lester assisted in the creation of Figure 1. Some limited funding was provided by the NOAA Environmental Cooperative Science Center at Delaware State University (NOAA-EPP Award NA11SEC4810001).

Figure 1. A geographic representation of all known collection sites of *Pyrractomena ecostata* (LeConte) in the Mid-Atlantic region: (1) Linwood, Atlantic County, NJ; (2) Sea Isle City, Cape May County, NJ; (3) Anglesea, Cape May County, NJ; (4) Five Mile Beach, Cape May County, NJ; (5) Woodland Beach, Kent County, DE; (6) Bennett's Pier, Kent County, DE. This restricted Mid-Atlantic occurrence is disjunct from Volusia County, FL.



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