

Eastern Bluebirds (*Sialia sialis*) Nesting in Photovoltaic Solar Energy Facilities in Eastern New York

Amanda L. Klehr^{1,*}, Alexis N. Laskowski¹, and David I. King²

Abstract - *Sialia sialis* (Eastern Bluebird), a secondary cavity nester, often nests in anthropogenic structures, particularly nest boxes established throughout its range. We describe 3 observations of Eastern Bluebird nests at 2 photovoltaic (PV) solar facilities in eastern New York. At one facility, we observed an open-cup nest on the PV steel support structure, while at another, we observed 2 nests within structures mimicking cavities. At least 2 nests were likely successful. To our knowledge, these are the first documented occurrences of Eastern Bluebird nests within PV solar facilities in the northeastern US. Although further research is needed to determine if successful nesting in PV solar facilities is widespread, our observations suggest that Eastern Bluebirds can nest successfully within these facilities.

Introduction. *Sialia sialis* (L.) (Eastern Bluebird) is found throughout most of North America east of the Rocky Mountains, and breeds from southern Saskatchewan to the Maritime Provinces in Canada down to Texas to Florida in the US (Berner 2008). The species primarily forages in open habitats across its range and is a secondary cavity-nesting species, nesting in natural cavities formed in trees and snags and holes made by other species (e.g., woodpeckers). The species also frequently occupies nest boxes and holes in other anthropogenic structures (e.g., fence posts) (Gowaty and Plissner 2020, Kibler 1969, Pierson and Scanlon 1986, Willner et al. 1983). Often, Eastern Bluebirds nest in nest boxes, a result of various bluebird stewardship programs (e.g., New York State Bluebird Society) which have resulted in nest-box establishment, management, and monitoring efforts across the species' range (Berner 2008, Burrill and Bonney 1988, Ehrlich et al. 1988). Research by Davis et al. (1994) also suggests Eastern Bluebirds prefer nest boxes containing conspecific nests from previous years.

We reviewed the literature regarding nest placement of this species. Our literature review revealed that instances of Eastern Bluebirds building open-cup nests are rarely reported. We are aware of 2 historical records of Eastern Bluebirds building open-cup nests in North America: 1 on surface-mined lands in Kentucky (Allaire 1976) and 1 on a mature oak limb at Clemson University in South Carolina (Sprunt 1946). Other records indicate that Eastern Bluebirds will occasionally use open-cup nests of other species (e.g., *Turdus migratorius* L. [American Robin], *Cardinalis cardinalis* (L.) [Northern Cardinal], *Petrochelidon pyrrhonota* (Vieillot) [Cliff Swallow], *Hirundo rustica* L. [Barn Swallow]) when nest boxes or natural cavities are not available (Gowaty and Plissner 2020, Newforth 1986, Reid 1884, Weeks 1995). More recently, uncommon reports of the species using open-cup nests built by other species on anthropogenic structures (e.g., decks, awnings) have been recorded by volunteers through the Cornell Lab of Ornithology's NestWatch program (www.nestwatch.org).

During the breeding season of 2022, we conducted point-count and habitat surveys at 13 photovoltaic (PV) solar energy facilities in western Massachusetts and across New York state. During these surveys, we unexpectedly encountered breeding Eastern Bluebirds at 2

¹ Department of Environmental Conservation, University of Massachusetts, 201 Holdsworth Hall, Amherst, MA 01003. ²US Forest Service Northern Research Station, University of Massachusetts, 201 Holdsworth Hall, Amherst, MA 01003. *Corresponding author - aklehr@umass.edu

sites despite the absence of nest boxes or tree cavities ordinarily used by this species. This paper reports an observation of an open-cup Eastern Bluebird nest within a PV solar facility in eastern New York, as well as 2 other observations of this species nesting within enclosed structures associated with electrical wiring within another PV solar facility.

Observations. On 17 June 2022, while collecting habitat measurements as part of our study of bird use of PV solar facilities at a site in Ulster County, NY, we observed an Eastern Bluebird nest on the steel support structure (racking) of the PV modules. The facility is located ~12 km from the town of New Paltz and 300 m from Route 209, within a mixed hardwood-conifer forest with several nearby residences. We observed a female Eastern Bluebird sitting in a nest from a distance of ~20 m. The nest was located on the lowest “shelf” of the racking structure, ~65 cm above the ground. Upon inspection, we found that the female was incubating 2 eggs and 2–3 nestlings which appeared to have recently hatched or were at most 1 day old, as evidenced by the light, coral-pink skin and sparse, downy tufts (Ehrlich et al. 1988). We documented this finding with photographs (Figs. 1, 2). The nest appeared to be loosely constructed with twigs, grasses, and some hair-like material, along with material that seemed to be from the filter of a discarded cigarette. The interior of the nest was lined with fine grasses, and a portion of the bottom of the nest was open, revealing the exposed steel structure beneath the nest (Fig. 2). We did not observe the nest again until a subsequent visit on 25 July 2022. During that visit, the nest was empty and appeared to be intact. We observed a pair of adult Eastern Bluebirds attending 3 fledglings ~25 m from the nest, suggesting the nest had been successful.

Our research at another site in Albany County, NY, which is located ~8 km from the town of Bethlehem, yielded 2 additional observations of Eastern Bluebirds nesting within a PV solar facility. Unlike the Ulster County nest, these were within anthropogenic structures that mimic cavities (i.e., weather covers for electrical cables; Fig. 3). On 24 May 2022,



Figure 1. Eastern Bluebird nest on the bottom steel shelf of the racking structure supporting photovoltaic (PV) solar panel modules at a PV solar energy facility, 17 June 2022, Ulster County, NY.

we observed 2 Eastern Bluebird pairs carrying nesting materials into these electrical cable weather hoods, and at least 1 of the pairs constructed a nest with twigs and grasses, which we saw on 1 July 2022. We observed adult bluebirds within 50 m of the nest during each of



Figure 2. Eastern Bluebird nest in Ulster County, NY. Contents appear to consist of 2 eggs and 2–3 hatchlings that are less than a few days old.



Figure 3. Eastern Bluebird nest placement inside of the weather hood for electrical cables at a PV solar energy facility, 1 July 2022, Albany County, NY.

the 3 survey visits conducted between late May and mid-July and 2 young bluebirds during the survey visit on 19 July 2022 at this facility.

Discussion. We were initially surprised by the unexpected observation of nesting Eastern Bluebirds in the PV solar facilities we studied, given the absence of either nest boxes or tree cavities they are reported to use as nesting sites, and especially that this species, a cavity-nester, built an open-cup nest at one of our study sites. However, we found several instances in the literature of the Eastern Bluebird and at least 1 other species within the *Sialia* genus nesting outside of cavities and using nests of other species, conveying the breadth of the adaptability of *Sialia* bluebirds. For instance, a nest of a *S. currucoides* (Bechstein) (Mountain Bluebird) was observed in an old, open-cup nest of an American Robin (Murie 1934) and another was reported in a conifer tree within a dense cluster of twigs (Johnson and Dawson 2020). Additionally, *S. mexicana* Swainson (Western Bluebird) rarely nests outside of cavities, but has shown adaptability by nesting in anthropogenic structures, such as crevices of buildings and metal clothes poles (Bent 1949, Guinan et al. 2020).

Eastern Bluebirds have been a focal point of conservation efforts, and it is thought that the provision of nesting boxes through programs such as those run by the New York State Bluebird Society (Davis and Roca 1995) have played a crucial role in their population recovery. In fact, data from the North American Breeding Bird Survey covering the period 1966–2019 (Sauer et al. 2020) have shown a positive population trend of 3.02 for the Eastern Bluebird in the New England/mid-Atlantic Coast region. The provision of nesting structures where previously there were none is one means by which the PV solar facilities appear to have facilitated the occupation of these 2 sites by Eastern Bluebirds. In addition, the Ulster County site was closed-canopy forest prior to development, a habitat not used by Eastern Bluebirds (Gowaty and Plissner 2020). Eastern Bluebirds typically occupy open fields or woodlands (Gowaty and Plissner 2020), where they forage by pouncing from low perches to capture insect prey on the ground (Pinkowski 1977). The structures provided by the PV panels and racking themselves could also serve as suitable perches for foraging activities by bluebirds.

Our observations indicate that PV solar facilities in the northeastern US can provide nesting structures for Eastern Bluebirds, and some pairs may successfully nest at these sites. However, assessment of reproductive success was not the primary focus of our research, and we are conducting an ongoing study to evaluate nest success at PV solar energy facilities in New York and Massachusetts. This ongoing research will provide crucial information in determining whether PV solar facilities can provide an ecological benefit to Eastern Bluebirds and other bird species.

Acknowledgments. We thank the New York State Energy Research and Development Authority (NYSERDA) for funding the research that led to this discovery and the staff of the solar energy facilities that provided us with access for this research. We are also grateful to C. Frame, J.M. Magill, and K.A. Peters for their thoughtful reviews of the manuscript.

Literature Cited

- Allaire, P.N. 1976. Nesting adaptations of bluebirds on surface-mined lands. *Kentucky Warbler* 52:70–72.
- Bent, A.C. 1949. Life histories of North American thrushes, kinglets, and their allies. *Bulletin of the US National Museum* No. 196. 454 pp.
- Berner, K.J. 2008. Eastern Bluebird (*Sialia sialis*). Pp. 438–439. *In* K.J. McGowan and K. Corwin, (Eds.). *The Second Atlas of Breeding Birds in New York State*. Cornell University Press, Ithaca, NY. 714 pp.

- Burrill, J.L., and R.E. Bonney Jr. 1988. Eastern Bluebird (*Sialia sialis*). Pp. 316–317. In R.F. Andrlé and J.R. Carroll (Eds.). The Atlas of Breeding Birds in New York State. Cornell University Press, Ithaca, NY. 551 pp.
- Davis, W.H., and P. Roca. 1995. Bluebirds and Their Survival. University Press of Kentucky, Lexington, KY. 164 pp.
- Davis, W.H., P.J. Kalisz, and R.J. Wells. 1994. Eastern Bluebirds prefer boxes containing old nests. *Journal of Field Ornithology* 65:250–253.
- Ehrlich, P., D. Dobkin, and D. Wheye. 1988. The Birder's Handbook. Simon and Schuster, Inc., New York, NY. 785 pp.
- Gowaty, P.A., and J.H. Plissner. 2020. Eastern Bluebird (*Sialia sialis*), version 1.0. In A.F. Poole (Ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY. Available online at <https://doi.org/10.2173/bow.easblu.01>. Accessed 20 October 2023.
- Guinan, J.A., P.A. Gowaty, E.K. Eltzroth. 2020. Western Bluebird (*Sialia mexicana*), version 1.0. In A.F. Poole (Ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY. Available online at <https://doi.org/10.2173/bow.wesblu.01>. Accessed 20 October 2023.
- Johnson, L.S., and R.D. Dawson. 2020. Mountain Bluebird (*Sialia currucoides*), version 1.0. In P.G. Rodewald (Ed.). Birds of the World. Cornell Lab of Ornithology, Ithaca, NY. <https://doi.org/10.2173/bow.moublu.01>. Accessed 22 October 2023.
- Kibler, L.F. 1969. The establishment and maintenance of a Bluebird nest-box project: A review and commentary. *Bird-Banding* 40:114–129.
- Murie, O.J. 1934. Unusual Mountain Bluebird nests. *Condor* 36:164–165.
- Newforth, P. 1986. Eastern Bluebirds raise brood in Barn Swallow nest. *Sialia* 8:43–44.
- Pierson, T.A., and P.F. Scanlon. 1986. Use of fencepost cavities by nesting Eastern Bluebirds in southwestern Virginia. *Wilson Bulletin* 98(3):479–482.
- Pinkowski, B.C. 1977. Foraging behavior of the Eastern Bluebird. *Wilson Bulletin* 89:404–414.
- Reid, S.G. 1884. The birds of Bermuda. *Bulletin of the US National Museum* 25:163–279.
- Sauer, J. R., W.A. Link, and J.E. Hines. 2020. The North American Breeding Bird Survey, analysis results 1966–2019: US Geological Survey data release. Available online at <https://doi.org/10.5066/P96A7675>. Accessed 2 January 2024.
- Sprunt, A., Jr. 1946. Unusual nesting of two birds in South Carolina. *The Auk* 63(1):94–95.
- Weeks, H.P., Jr. 1995. Successful nesting of Eastern Bluebirds in Cliff Swallow nests on bridges. *Sialia* 17:123–125.
- Willner, G.R., J.E. Gates, and W.J. Devlin. 1983. Nest-box use by cavity-nesting birds. *American Midland Naturalist* 109(1):194–201.