RECORD HIGH SPOTTED TOWHEE NEST IN METRO VANCOUVER, BRITISH COLUMBIA

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ABSTRACT: Most bird species evolved nest characteristics such as height or type of materials that match their life history and niche requirements. Many species, including the Spotted Towhee (*Pipilo maculatus*), commonly nest on the ground or in low shrubs. Urban environments, which comprise many novel anthropogenic structures and related pressures, can alter bird behaviors, including nest-site selection. As part of a multi-year field study in Metro Vancouver, British Columbia, Canada, we located a Spotted Towhee nest that was 7.0 m high. This nest was 2 m higher than the highest nest previously documented in the literature and was much higher than the mean nest height of 0.2 m (median = 0 m) that we have observed in this region. This discovery suggests that the Spotted Towhee's nest-site selection may be more plastic than previously documented and highlights a need to consider factors, particularly in human-modified environments, that influence nest-site selection.

Nest-site selection is influenced by various interacting environmental conditions, resource availability such as food and available nesting material, and the density of both conspecifics and predators (Mainwaring et al. 2014). Urban environments are highly heterogeneous and may have abundant and stable resources capable of sustaining high densities of adult birds (Batáry et al. 2017, Wilson 2025). When the density of conspecifics is high, breeding pairs may be forced to occupy territories whose quality in one or many attributes, such as nesting habitat, is lower (Pulliam 2000). In urban environments where natural nest sites may be limited or absent, birds may take advantage of the many novel structures that resemble natural nesting sites, such as crevices and holes of pipes, poles, bridges, buildings, and even machinery (Reynolds et al. 2019, Liu and Li 2024). While cavity nesters show great plasticity in nest-site selection, many North American passerine species typically build open-cup nests on the ground. This guild is often considered relatively intolerant of urban environments because of the vulnerability of ground nests to disturbance by human activity, vegetation management (e.g., mowing), as well as synanthropic or domestic predators (Chace and Walsh 2006, Reynolds et al. 2019, Minias and Janiszewski 2023). Instances of nonpasserine ground-nesting species nesting in locations such as balconies, windowsills, and rooftops, prompted by a lack of available undisturbed ground and/or predation pressures, have long been documented for species such as the Killdeer (*Charadrius vociferus,* Ankney and Hopkins 1985) and Common Nighthawk (*Chordeiles minor*, Brigham 1989).

Evidence of ground-nesting passerines using anthropogenic structures has not been frequently reported. Several shrub- or ground-nesting species, such as the Dark-eyed Junco (*Junco hyemalis*, Bressler 2020) and the Blue-crowned Laughingthrush (*Pterorhinus courtoisi*, Zhang et al. 2017), however, have been documented building nests at greater heights in areas with more human activity. Higher renesting in direct response to human disturbance at a nest site is also known, as in the Emei Shan Liocichla (*Liocichla omeiensis*, Zhang et al. 2023) and the Great Gray Shrike (*Lanius excubitor*, Antczak et al. 2005). Additionally, anecdotal evidence implicates domestic cats as accounting for a case of the Spotted Towhee building an atypically high nest (Cohen 1899), which suggests predators affect nest height. The Spotted Towhee is a ground-nesting sparrow in the family Passerellidae that breeds through much of western North America from southwestern Canada to Guatemala (Bartos Smith and Greenlaw 2020). Typically, it builds its nests on or close to the ground: previous studies have found between 69% and 92% of Spotted Towhee nests to be on the ground (Baumann 1959: $n = 11$, Davis 1960: $n = 25$, Bartos Smith and Greenlaw 2020: $n = 344$). The highest Spotted Towhee nest on record was at 5.0 m, found within a wildlife refuge surrounded by agriculture in the Sacramento Valley, California (Small 2005). Here we document a Spotted Towhee nest >7 m high in an urban green space in Metro Vancouver, British Columbia, Canada, and discuss why typical ground- or shrub-nesting birds may opt to nest at greater heights.

METHODS AND RESULTS

Since 2022, we have studied the reproductive ecology of Spotted Towhees across five sites of varying habitat types and degrees of urbanization in Metro Vancouver (see Hohn et al. 2025 for descriptions of study sites). We visited each study site one to three times per week for the duration of the breeding season (March–August) from 2022 to 2025 to find and monitor nests, capture adults with mist nets, and resight color-banded individuals. After successfully locating a nest, we continued to monitor it every 3 to 7 days. Once the chicks had fledged or the nest had failed from either abandonment or depredation, we took a series of nest-site measurements, including height from the ground to the base of the nest.

Through a total of four breeding seasons from 2022 to 2025, we found 407 Spotted Towhee nests across the five sites. The mean height of Spotted Towhee nests across all sites was 0.2 m ± 0.5 (standard deviation) and the median was 0 m (i.e., nest built directly on the ground). Of all located nests, 72.7% (296/407) were found on the ground, 21.9% (89/407) were built off the ground but under 1 m in height, and only 5.4% (22/407) were more than 1 m high. One nest found at Terra Nova Rural Park and Natural Area in Richmond (49.172°, –123.196°), however, was a clear outlier, located 7.0 m high. The next highest nests were 4.0 m and 2.5 m above ground. This park is a 39-ha green space with a paved roadway that separates the rural park region, a recreational and small-scale agricultural land, from the natural area, an ecological preserve with one walking trail (Hohn et al. 2025, Figure 1). The site-specific mean and median nest heights at Terra Nova (84 nests, mean = 0.2 m ± 0.8, median = 0) were similar to those at each of the other four study sites.

The nest built 7 m above ground was in a row of decorative western red



FIGURE 1. Aerial view of Terra Nova Rural Park and Natural Area in Richmond, British Columbia (scale: 1:1500, www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9). The green space's boundary is indicated in black. The Fraser River and Vancouver International Airport lie to the north, the Richmond city center to the east. The approximate area used by the pair of Spotted Towhees that built a nest 7 m high is encircled in purple.

cedar (*Thuja plicata*) trees that separates a small regularly mowed orchard from a steep water-filled ditch that parallels a roadway (Figure 2). On the basis of time spent in the area during field work and lidar-derived land-cover maps (Latifovic 2020), we estimated that 85% of the ground in a 50-m radius



FIGURE 2. Higher-resolution view of the approximate territory of the pair of Spotted Towhees that built a nest 7 m high. The nest's location is encircled in purple (scale: 1:15, www.arcgis.com/home/item.html?id=10df2279f9684e4a9f6a7f08febac2a9).

Photo by Finola Fogarty

surrounding this nest (i.e., about the size of a Spotted Towhee territory) was accessible to human foot traffic. A regularly mowed lawn under routinely pruned orchard trees surrounded the nest, alongside several roads and driveways that lead to buildings (Figure 2). Our team used a telescoping pole fitted with a custom-built camera to view the contents of this nest (Figures 3 and 4). The nest was built against the trunk of a domestic western red cedar and supported by a platform of dense branches (Figure 4). All three nestlings successfully fledged at ~11 days post-hatching (a typical clutch size and length of the nestling period for this species and park).

In subsequent seasons, we found two additional nests on this territory. One was built 2.41 m high in the outer branches of an orchard tree prior to the trees being pruned that season. The other was built on the ground near the base of an orchard tree within the only unmowed area of grass in the orchard. This patch of <2 m^2 was left unmowed because of an active beehive.

DISCUSSION

While our findings on the Spotted Towhee's nest heights generally align with previous literature, the nest at 7 m was 2 m higher than any previously recorded for the species. Several hypotheses may account for selection of this site. First, the height at which a female constructs her nest may be driven by prior weather patterns such as total or average precipitation. Being built off the ground allows a nest to dry faster after a rain and prevents water from pooling



FIGURE 3. Observation of the 7-m Spotted Towhee nest (approximate location encircled in purple) by means of a telescoping pole with a custom-built camera transmitting to a cellphone app.

Photo by Finola Fogarty

within it, to the detriment of the eggs and/or nestlings (Deeming 2023). This may be particularly important for a typically ground-nesting species in an urban landscape where absorption or drainage may be compromised because of more extensive impervious surfaces or altered hydrology (Fletcher et al. 2024). While urban hydrology could affect nest placement, it seems unlikely



FIGURE 4. Three Spotted Towhee nestlings (estimated to be six days old) in the 7-m nest viewed through the camera on the telescoping pole.

Photo by Elizabeth Gow

to be the main driving factor, as we found mean and median nest height to be similar to those reported in other studies in drier and less urban settings.

Second, urban environments may have abundant and stable resources capable of sustaining a high density of adult birds (Batáry et al. 2017, Wilson 2025). The density of Spotted Towhees we observed at Terra Nova appears to be high relative to estimates elsewhere in the species' range (Birds Canada 2018), suggesting the towhees perceive its habitat quality as high (Bock and Jones 2004). The habitat surrounding the 7-m nest, however, is highly disturbed, lacking ideal nesting locations, comprising mostly roadways, mowed vegetation, and pruned trees, which all pose risks to nests and fledglings (Stanton et al. 2018, Reynolds et al. 2019). The microclimate at the few undisturbed sites was likely not ideal for nesting. The ditch was steep and full of water. The ground under the row of cedar trees was bare, and the foliage on the trees' lower branches was sparse.

Although in our study we did not quantify predation explicitly, that factor may have influenced the selection of this nest site. Urban areas typically have a greater abundance of small and medium predators, including feral and domestic cats, which are associated with proximity to and density of residential buildings (Flockhart et al. 2016, Wilson 2025). Wildlife perceives humans and predators similarly, contributing to changes in behavior such as nest-site selection (Frid and Dill 2002). It is unlikely that the activities of our research team contributed to the selection of this particular nest site, as this nest was the first we located in this territory during our study. Beyond being perceived as a threat, human activity can also destroy nests during mowing, removal, or trampling of vegetation. For a ground-nesting species like the Spotted Towhee, human activity could contribute to selecting nest sites in denser vegetation, in less accessible areas, or at greater heights when suitable ground sites are unavailable. The towhees' using other, more typical

sites within this same territory in subsequent years supports the hypothesis that a lack of ground area inaccessible to human disturbance contributed to the selection of the record-high nesting site.

Urbanization alters the type and quantity of suitable resources available to birds. This new record for nest height in the Spotted Towhee expands understanding of the species' natural history. It also demonstrates that individuals may have behavioral flexibility to adapt to changing environments like cities (Wong and Candolin 2015, West-Eberhard 2024).

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