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BIRDS IN THE CONCRETE FOREST: NEST-SITE USE ON HUMAN-MADE STRUCTURES ACROSS WESTERN ECUADOR

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ABSTRACT: Urban expansion is a major driver of habitat transformation, reducing the availability of natural nesting sites for birds and promoting the use of anthropogenic structures. In this study, we document nesting behavior of native bird species in human-made structures across Western Ecuador, a region experiencing rapid urban growth and significant ecosystem fragmentation. We combined field observations (2023–2025), detailed monitoring of two focal species (*Tyrannus niveigularis* and *Myrmia micrura*) in 2025, and participatory science data from the iNaturalist platform (2009–2025). We compiled 49 nesting records from 15 species using a wide variety of artificial substrates including walls, light poles, roofs, cables, and air conditioning units. Detailed observations revealed successful reproduction in both focal species including nest reuse and biparental care by *T. niveigularis* and repeated nesting attempts by *M. micrura* on an unconventional artificial substrate. Our findings include novel records of anthropogenic nesting for three species and expand existing knowledge of urban nesting ecology in the region. While artificial structures may provide alternative nesting opportunities, they can also expose birds to risks such as disturbance, predation, and reduced reproductive success. These results highlight the importance of urban environments as emerging ecological systems and underscore the value of integrating field observations with participatory science data to better understand species responses to human-modified landscapes in tropical regions.

KEYWORDS: *bird nesting, participatory science, urban birds, urbanization*

Urban expansion is one of the most pervasive drivers of environmental change, reshaping landscapes and altering ecological processes worldwide (Chace & Walsh 2006, McKinney 2008, Reynolds et al. 2019). For birds, these transformations often result in the loss of natural nesting substrates and the increase of predator-exposure, forcing individuals to adjust their reproductive strategies in increasingly human-dominated environments (Marzluff 2001, Farwell & Marzluff 2013). One of the most conspicuous responses is the use of anthropogenic structures for nesting. Several bird species nest on artificial substrates such as lamp posts, building facades, electric poles, and other anthropogenic structures (Turner & Rose 1989, Wang et al. 2015, Baptista et al. 2020, 2024a, 2024b, León-E et al. 2024).

While such behavior may allow birds to survive in altered landscapes, human-made structures can act as ecological traps offering seemingly suitable conditions that ultimately reduce fitness due to exposure to pollutants, nest disturbance, electrocution, collisions, and higher risk of depredation by domestic animals (Mainwaring 2015, Bauerová et al. 2017, Van Doren et al. 2021). Although some urban areas might provide shelter (Martin 1993), the reproductive success in cities tends to be lower than in natural or rural habitats (Rodewald et al. 2013).

Despite growing interest in urban bird ecology globally, information on nesting behavior on anthropogenic structures remains limited across Western Ecuador (a.k.a. The Coast locally). This biodiverse region, between the Andes and the Pacific Ocean, has experienced extensive habitat loss and fragmentation with rapid and often unplanned urban expansion

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reshaping native ecosystems (Cuesta et al. 2017, Rivas et al. 2021). In this study, we aim to document and describe nesting events of native birds using human-made structures across Western Ecuador. Specifically, we: (1) monitored in detail the nesting of two focal species (*Tyrannus niveigularis* and *Myrmia micrura*) through constant field observations; (2) compiled opportunistic field records of additional species nesting on anthropogenic substrates to characterize the diversity of nesting strategies observed in situ; and (3) integrated participatory science data from the iNaturalist platform to identify additional cases.

METHODS

Study Area

This study was conducted in the region of Western Ecuador. This area extends from the foothills of the western Andes to the Pacific Ocean, approximately between 1°20'N and 3°45'S latitude (Fig. 1), and encompasses a wide range of ecosystems. In the north, Western Ecuador is limited by the Chocó rainforest, and in the south, by the coastal desert of Peru. The north is characterized by high annual rainfall and dense evergreen vegetation. Toward the central and southern portions, the landscape transitions into equatorial seasonally dry forests and semi-arid xeric shrublands which are defined by lower precipitation and predominantly deciduous vegetation (Dodson & Gentry 1991, MAE 2013). The warm and rainy season occurs between December and May and the cold and dry season between June and November. This seasonality shapes species composition, distribution and reproductive behavior (Marchant 1960, Armijos-Ojeda et al. 2021).

The Coast is the region with the largest conservation gaps and irreversible land use changes in Ecuador (Lessmann et al. 2014). Tropical forests in this region have experienced severe habitat loss with over 90% of the original forest cover now deforested or fragmented (Dodson & Gentry 1991). This process has led to the widespread transformation of native coastal ecosystems, such as mangroves, wetlands, and dry forests, into urban areas, shrimp farms, and agricultural fields (Carvajal & Alava 2007, Hamilton & Stankwitz 2012, Cuesta et al. 2017, Rivas et al. 2021). The Coast is poorly represented within Ecuador's national system of protected areas (Lessmann et al. 2014), further exacerbating their fragility and the risk of biodiversity loss (Sierra et al. 2002, Portillo-Quintero & Sánchez-Azofeifa 2010, Manchego et al. 2017, Rivas et al. 2024).

As in many parts of Latin America, urban expansion in Ecuador has occurred rapidly and often without long-term land use planning (Lippe et al. 2022, Noh et al. 2022). These changes are particularly pronounced around major cities (Dalmasso & Fillón 1972, Curillo & Hidalgo 2011, Baker 2012, Delgado 2013, Parés-Ramos et al. 2013, Bonilla Mena et al. 2021, Coronel & Nicole 2022, Mena et al. 2022, Lager 2023). The remaining forest fragments are highly vulnerable to human pressures such as agricultural expansion, cattle ranching, logging, mining, and continued urbanization (Sáenz & Onofa 2005).

Study Species

We focused on the most common native bird species with the highest number of nesting records in the urban areas of Western Ecuador. We excluded wading and marine birds and non-native bird species such as the House Sparrow (*Passer domesticus*) and the Common Pigeon (*Columba livia*). To identify the most common bird species in urban environments, we selected bird records from iNaturalist based on whether they were located within or outside the shapefiles of urban and periurban areas (Instituto Geografico Militar 2022). For subsequent searches of bird nesting events, we focused on the most common species identified in this analysis.

Data Collection

We compiled constant field observations of two species which were monitored in detail whenever possible through ecological and behavioral notes, and casual observations by the authors when they detected the presence of a bird nesting event on human-made structures. The constant field observations were in 2025 with casual observations between 2023 and 2025. For the participatory science records, we compiled observations from the iNaturalist platform between 2009 and 2025, selecting observations from bird species based on two requirements: 1) nesting evidence of birds in any type of human structure such as walls, light poles, air conditioners, tubular, metal, or wooden posts, and furniture amongst others; and 2) location within the iNaturalist region called 'Ecuadorian Pacific Lowlands'. This project's area consisted of the ecosystems of Ecuador that are located west of the Andes and below 1500 m.a.s.l., using the shapefiles of the Ministry of Environment and Energy of Ecuador (MAE 2013). Those records that met the selection criteria were manually added to the project 'Aves en Estructuras Humanas Ecuador' (inaturalist.org/projects/aves-en-estructuras-humanas-ecuador).

RESULTS

After revision, we compiled a total of 49 nesting records from 15 species using both direct observation and iNaturalist records: *Columbina buckleyi*, *Columbina cruziana*, *Zenaida auriculata*, *Amazilis amazilia*, *Doryfera ludovicae*, *M. micrura*, *Forpus coelestis*, *Petrochelidon rufocollaris, Progne chalybea*, *Pygochelidon cyanoleuca*, *Furnarius cinnamomeus*, *T. niveigularis*, *Troglodytes musculus*, *Mimus longicaudatus*, and *Sicalis flaveola* (Fig. 1, Table 1). We documented nesting sites of nine different bird species directly during fieldwork. From these, we monitored in detail two bird species (*T. niveigularis*, and *M. micrura*), described as case studies, and photographed 12 casual records for seven bird species (*Z. auriculata*, *F. coelestis*, *F. cinnamomeus*, *P. chalybea*, *T. musculus*, *M. longicaudatus*, and *S. flaveola*) nesting on anthropogenic structures across coastal Ecuador. Additionally on the iNaturalist platform, 34 observations from 10 of the 15 selected species showed anthropogenic nesting behavior. We did not find records of nesting events of raptors (Accipitriformes and Falconiformes) or woodpeckers (Picidae). Two observers generated the constant field observations, all the authors (4) recorded the casual ones and 22 iNaturalist users generated the records presented in this study.

Nest monitoring cases

Snowy-throated Kingbird (*Tyrannus niveigularis*):

We documented nesting and reuse of a nest by Snowy-throated Kingbirds across two consecutive breeding seasons (2024–25) in a periurban residential area of Manta, Manabí Province (0°57’S, 80°45’W). The nest was located at the intersection of electrical cables and a metallic bracket attached to a concrete streetlight post. The nest consisted of dry twigs, grass stems, and fine roots loosely interwoven and wedged into a small recess formed between horizontal and vertical cables (Fig. 2).

In 2024, we observed two adults constructing the nest and one of them incubating between February 9 and 14 (Fig. 2A). However, no nest monitoring was carried out that year. In the 2025 season, nest maintenance and material delivery started on February 8 (Fig. 2B) and one adult was documented incubating by February 19. The pair periodically returned to the nest carrying twigs. Later on March 7, we observed

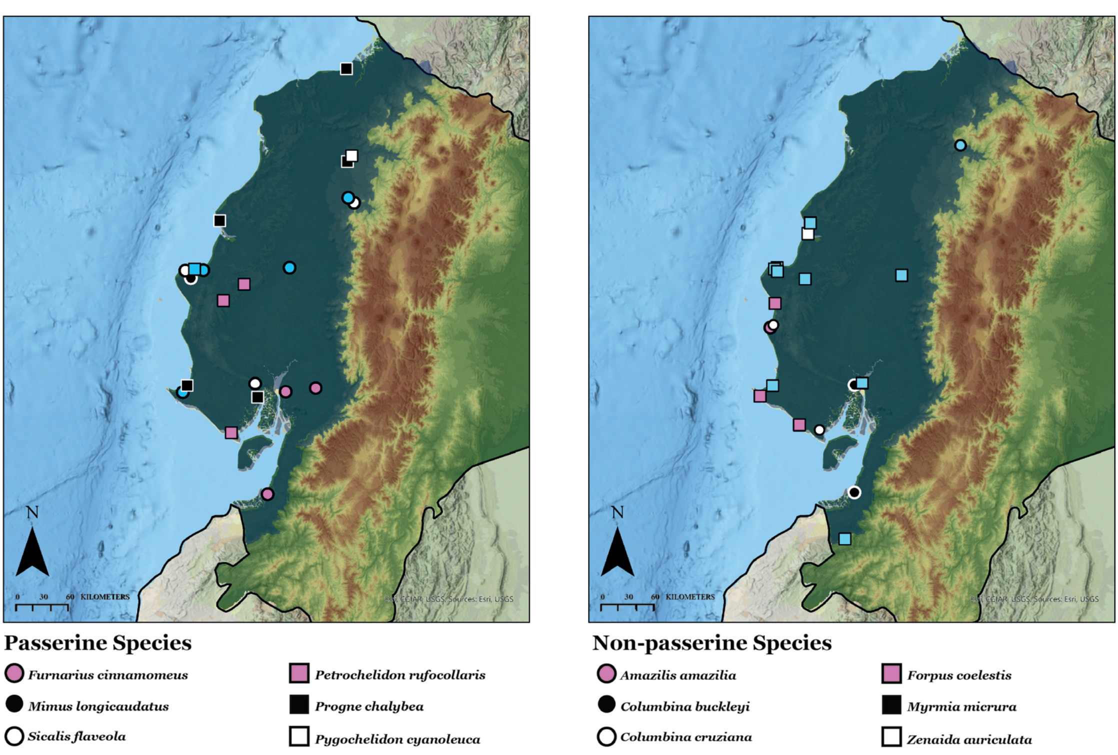

Figure 1. Distribution of records of bird nesting records across the Western Ecuador region. The blue silhouette shows the extension of the study region. Maps show observations of passerine (left) and non-passerine birds (right).

an adult removing a fecal sac from the nest while faint chick calls were audible, suggesting successful hatching. On March 12, three nestlings were photographed (Fig. 2C) confirming the presence of a brood. Care was biparental: both adults alternated foraging trips and nest guarding. When Tropical Kingbirds (*Tyrannus melancholicus*) or other passerines approached the area, the Snowy-throated Kingbirds displayed aggressive territorial behavior. On March 16, we observed them defending the nest from an icterid (Fig. 2D), most likely *Dives warszewiczi*, and feeding the chicks a dragonfly (Fig. 2E). We also saw the chicks being fed butterflies (e.g., *Dione vanillae*), katydids (Tettigoniidae) and small insects (Fig. 2F). We observed occasional fecal sac removal with adults collecting them directly from the cloaca as chicks flexed and expelled waste, demonstrating typical nest sanitation behavior. Nestlings were vocal, frequently begging with open mouths and raised heads.

By March 21, the chicks had grown noticeably, displaying adult-like plumage including a dark facial mask, pale underparts, and brownish wings with yellowish bellies (Fig. 2G). On March 26, we recorded all three fledglings perched in a large *Samanea saman* tree with its base approximately 15 m from the nest but with branches extending closer to it (Fig. 2H), suggesting that fledging had occurred recently. Although they did not return to the nest, the fledglings continued to receive parental care through later dates. We observed the three fledglings until the last days of March when observations ended. Overall, the incubation period was approximately 17 days while the nesting period lasted for about 19 days. In 2026, no nest of this species was recorded on that light pole. We found no records of Snowy-throated Kingbirds nesting on human-made structures on the iNaturalist platform.

Short-tailed Woodstar (*Myrmia micrura*):

We recorded two consecutive nest observations of Short-tailed Woodstars in Bahía de Caráquez, Manabí (0°35’S, 80°25’W), both in the same structure: a horizontal green plastic tube (Fig. 3A), part of a hanging decorative ornament (a rattle) surrounded by potted plants and adjacent to a patio of a white house. We first observed the nest construction in early March 2025 which took approximately around a week to complete. The female incubated the eggs for about 16 days and two chicks successfully hatched. The juveniles left the nest approximately two weeks after hatching. Around three weeks later, the female returned to the same nest, performed repairs, and initiated a second breeding attempt. This second clutch, recorded on April 28, also consisted of two eggs. However, the nest was subsequently abandoned, most likely due to disturbance caused by gardening work involving machinery.

Table 1. List of nesting events in Western Ecuador from participatory science observations.

Species	Location	Year	Nesting structure	Reproductive outcome	Source	Observer
Columbina buckleyi	Guayaquil, Guayas	2020	Wall	Not observed	iNaturalist	María Verónica Núñez Gallegos
Columbina buckleyi	Machala, El Oro	2023	Wall and cables	Two chicks in nest	iNaturalist	Roy Alexander Zambrano Morales
Columbina cruziana	Puerto López, Manabí	2020	Roof gutter	Not observed	iNaturalist	Frank Dietze
Columbina cruziana	El Morro, Guayas	2023	Metal beam	Two chicks fledged	iNaturalist	Benjamín Navas
Zenaida auriculata	Portoviejo, Manabí	2019	Metal beam (roof)	Not observed	iNaturalist	Jaime Camacho
Zenaida auriculata	Guayaquil, Guayas	2019	Wall and metal structure	Not observed	iNaturalist	Jaime Camacho
Zenaida auriculata	Guayaquil, Guayas	2020	Window wall opening	Not observed	iNaturalist	Jaime Camacho
Zenaida auriculata	Quevedo, Los Ríos	2021	Roof	Not observed	iNaturalist	Arianna Alava

Species	Location	Year	Nesting structure	Reproductive outcome	Source	Observer
Zenaida auriculata	El Bunque, El Oro	2021	Air conditioning unit	One chick observed	iNaturalist	lexypizarro
Zenaida auriculata	Canoa, Manabí	2023	Bamboo roof	Not observed	iNaturalist	David Torres
Zenaida auriculata	Punta Blanca, Santa Elena	2024	Wall	Not observed	iNaturalist	Jaime Camacho
Amazilis amazila	Puerto López, Manabí	2009	Cables / lighting wires	Not observed	iNaturalist	Jeremy Baker
Doryfera ludovicae	Palma Real, Pichincha	2017	Roof	Not observed	iNaturalist	Edison Ocaña
Doryfera ludovicae	Palma Real, Pichincha	2018	Roof	Not observed	iNaturalist	Edison Ocaña
Forpus coelestis	Salinas, Santa Elena	2023	Wooden post	Six eggs, outcome unknown	iNaturalist	Assad Guerra
Petrochelidon rufocollaris	General Villamil, Guayas	2022	Wall	Not observed	iNaturalist	Juan Romero
Petrochelidon rufocollaris	Honorato Vásquez, Manabí	2022	Wall	Not observed	iNaturalist	Pedro Manzaba
Petrochelidon rufocollaris	Sucre, Manabí	2023	Wall	Not observed	iNaturalist	Jaime Camacho
Petrochelidon rufocollaris	General Villamil, Guayas	2023	Wall	Not observed	iNaturalist	Humberto Bonilla
Petrochelidon rufocollaris	Sucre, Manabí	2024	Wall	Not observed	iNaturalist	Pier Luigi Maquilon
Progne chalybea	Las Peñas, Esmeraldas	2017	Streetlight post	One chick observed	iNaturalist	Edison Ocaña
Progne chalybea	Chongón, Guayas	2022	Metal beam	One juvenile observed	iNaturalist	Diana Cárdenas
Progne chalybea	Puerto Quito, Pichincha	2023	Wooden beam on wall	Not observed	iNaturalist	Don Wellmann
Progne chalybea	Punta Blanca, Santa Elena	2024	Wall	Two chicks observed	iNaturalist	Jaime Camacho
Pygochelidon cyanoleuca	Puerto Quito, Pichincha	2021	Roof	Three hatchlings observed	iNaturalist	Luis Valle
Furnarius cinnamomeus	Naranjito, Guayas	2018	Wooden post	Not observed	iNaturalist	Marco Durán
Furnarius cinnamomeus	Delia, Guayas	2023	Wooden post	Not observed	iNaturalist	Jorge Abad Lozano
Troglodytes musculus	Santo Domingo, SDT	2019	Furniture	Five eggs observed	iNaturalist	Fundación Madre Yumbo
Troglodytes musculus	Carlos Julio Arosemena, Los Ríos	2015	Wooden post	Not observed	iNaturalist	josefocj

Species	Location	Year	Nesting structure	Reproductive outcome	Source	Observer
Troglodytes musculus	Ballenita, Santa Elena	2023	Plastic tube	Not observed	iNaturalist	Assad Guerra
Sicalis flaveola	Santo Domingo, SDT	2019	Streetlight post	Not observed	iNaturalist	David Torres
Sicalis flaveola	Cerro Blanco, Guayas	2018	Wooden post (roof)	Not observed	iNaturalist	Benjamín Navas
Zenaida auriculata	Manta, Manabí	2025	Air conditioning unit	Not observed	Casual field observation	Daniel Velasco Cedeño
Zenaida auriculata	Manta, Manabí	2025	Streetlight post	Not observed	Casual field observation	Elías Viteri-Basso
Zenaida auriculata	Manta, Manabí	2025	Streetlight post	Not observed	Casual field observation	Daniel Velasco Cedeño
Zenaida auriculata	Manta, Manabí	2025	Streetlight post	Not observed	Casual field observation	Daniel Velasco Cedeño
Forpus coelestis	Cayo Paraíso, Manabí	2023	Roof	Not observed	Casual field observation	Elías Viteri-Basso
Forpus coelestis	General Villamil, Guayas	2023	Roof	Not observed	Casual field observation	Ariel Guerrero Campoverde
Forpus coelestis	Manta, Manabí	2025	Roof	Not observed	Casual field observation	Daniel Velasco Cedeño
Forpus coelestis	Manta, Manabí	2025	Streetlight post	Not observed	Casual field observation	Daniel Velasco Cedeño
Progne chalybea	Canoa, Manabí	2023	Wall	Not observed	Casual field observation	Walter Vivas
Progne chalybea	Manta, Manabí	2025	Roof (tile openings)	Not observed	Casual field observation	Daniel Velasco Cedeño
Furnarius cinnamomeus	Machala, El Oro	2025	Light post	Not observed	Casual field observation	Walter Vivas
Troglodytes musculus	Manta, Manabí	2025	Wall	Not observed	Casual field observation	Daniel Velasco Cedeño
Mimus longicaudatus	Manta, Manabí	2025	Air conditioning unit	Not observed	Casual field observation	Daniel Velasco Cedeño
Sicalis flaveola	Manta, Manabí	2025	Air conditioning unit	Not observed	Casual field observation	Daniel Velasco Cedeño
Myrmia micrura	Bahía de Caráquez, Manabí	2025	Hanging decorative swing	Two successful fledglings	Constant field monitored	Leonardo Viteri Velasco & Daniel Velasco Cedeño
Tyrannus niveigularis	Manta, Manabí	2024	Streetlight post	Not observed	Constant field monitored	Daniel Velasco Cedeño
Tyrannus niveigularis	Manta, Manabí	2025	Streetlight post	Three fledglings	Constant field monitored	Daniel Velasco Cedeño

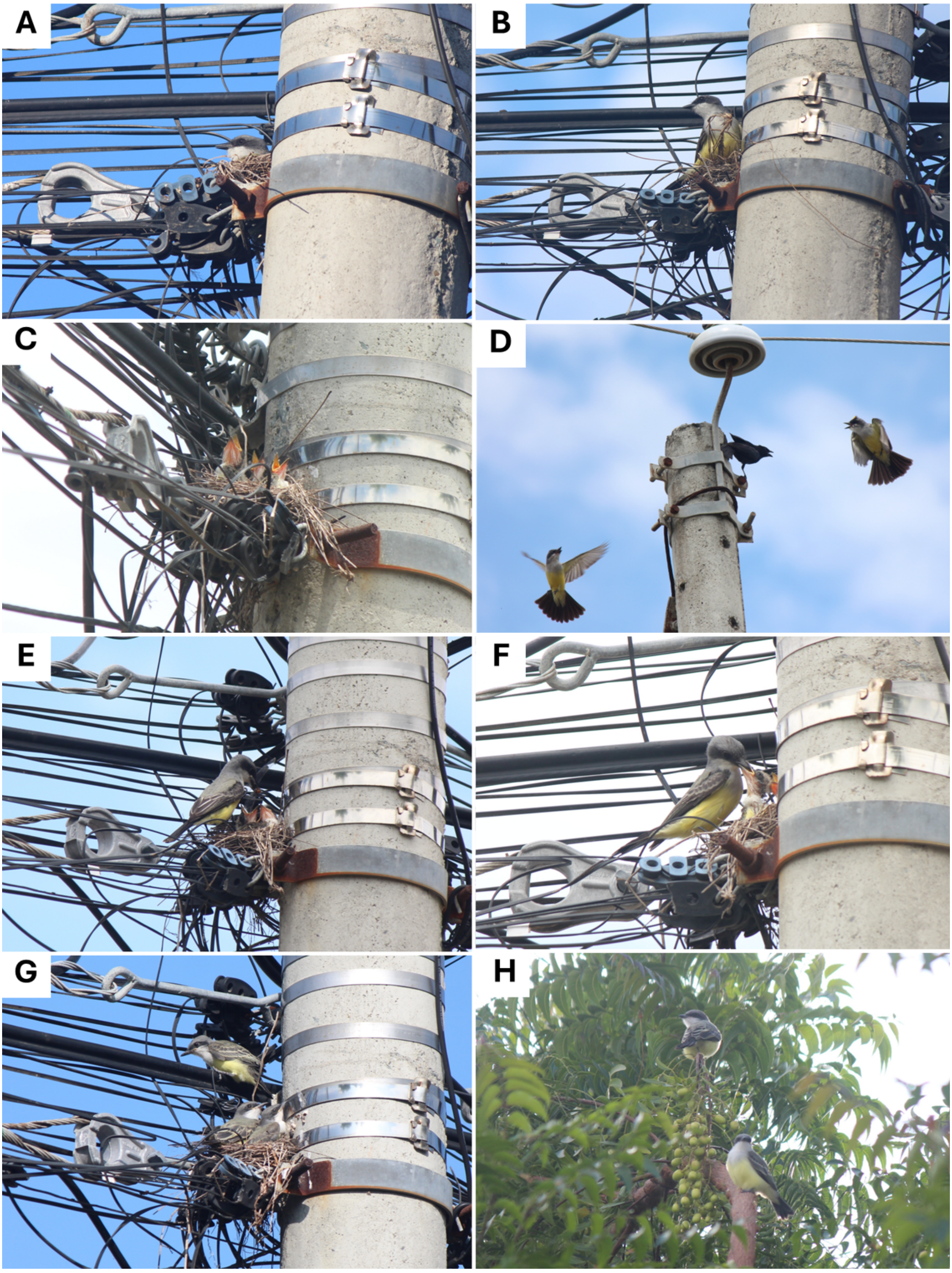

Figure 2. Photographic records of the nesting events of *Tyrannus niveigularis* in Manta, Manabí Province, Ecuador, at the same lamp post in A) 2024 and B–H) 2025. Photographs: Velasco-Cedeño D.

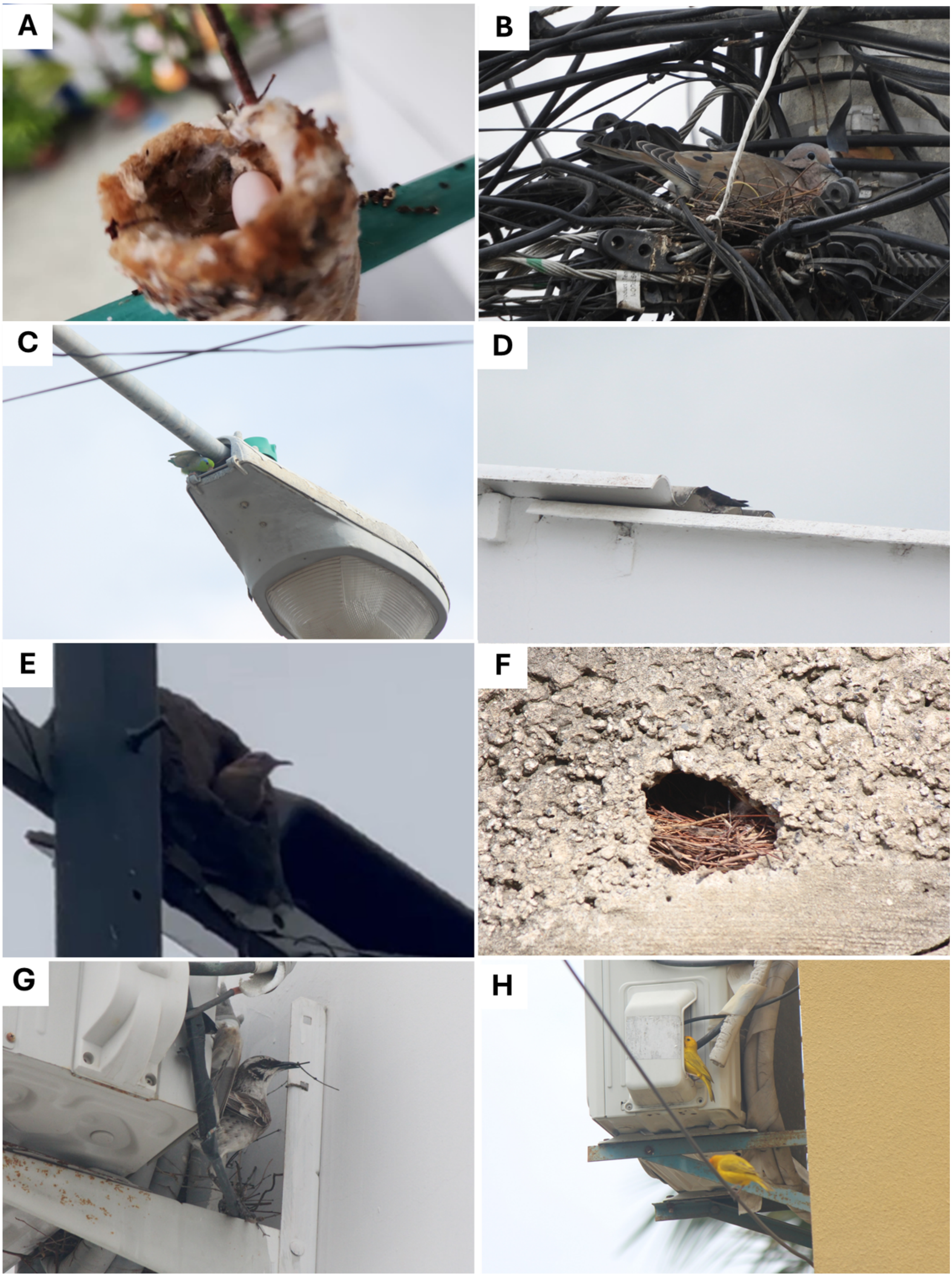

Figure 3. Photographic records of bird nesting events on human-made structures across Western Ecuador: A) *Myrmia micrura*, B) *Zenaida auriculata*, C) *Forpus coelestis*, D) *Progne chalybea*, E) *Furnarius cinnamomeus*, F) *Troglodytes musculus*, G) *Mimus longicaudatus* and H) *Sicalis flaveola*. Photographs: A) Viteri B) Viteri-Basso E., C–D and F–H) Velasco-Cedeño D, E) Vivas W.

Nest field observations

Eared Dove (*Zenaida auriculata*):

We documented four nesting observations of Eared Dove, three of which involved adult individuals actively nesting or incubating in Manta, Manabí. The first record on January 27 2025 involved an individual nesting on a streetlight post among electrical cables (Fig. 3B) located on a busy street surrounded by tall apartment buildings and hotels (0°56'S, 80°44'W). The others were observed in a periurban residential neighborhood (0°57'S, 80°45'W). One individual was perched on its nest built on a tangle of electric cables on a concrete pole. The nest was a simple structure of thin branches. The other individual was nesting and incubating on an air conditioning vent attached to the back wall of a house. Additionally, we recorded an empty nest with a single egg placed at the edge, located on a larger lamp post on an avenue near a children's green area in the same periurban neighborhood as the previous observations.

Pacific Parrotlet (*Forpus coelestis*):

We recorded two nesting observations of Pacific Parrotlet on human-made wooden cabins along the coast. The first record was documented on December 29 2023 in Cayo Paraíso, Manabí (1°18'S, 80°45'W). The second record was on July 11 2023 in Puerto Engabao, a coastal community in the Canton of Playas, Guayas Province (2°33'S, 80°30'W). In both cases, a male and a female were observed actively moving back and forth from the nest.

In Manta, Manabí, two additional cases of Pacific Parrotlet using human structures were observed on February 19 2025. One individual was recorded at the entrance of a cavity in the roof of a house, while a pair was seen entering a lamp post (Fig. 3C). Both records were from the same location (0°57'S, 80°45'W) along the main avenue of a periurban residential area.

Gray-breasted Martin (*Progne chalybea*):

One adult Gray-breasted Martin was recorded nesting in a cavity on a house in an urban area (Fig. 3D). This observation was made on December 27 2023 in Canoa, Manabí (0°27′S, 80°27′W). A male and a female were observed perched on a plastic tube near the nest in a non-active state. In Manta, at least three individuals were observed entering the wavy cavities in between roof tiles of houses in a periurban residential area while scanning their surroundings (0°57'S, 80°45'W).

Pacific Hornero (*Furnarius cinnamomeus*):

We recorded a case of Pacific Hornero nesting on a light post at a basketball court (Fig. 3E) on January 12 2025 in San Patricio, Machala, El Oro Province (3°16'S, 79°55'W). The site was a private residential area characterized by open spaces with green areas, trees, and nearby shrubs. The nest was built around the metal structure at the intersection of two posts. A single individual was observed inside the nest, but due to the species' monomorphic characteristics, its sex could not be determined. The bird was later observed foraging on the observation wall before flying toward nearby trees.

Southern House Wren (*Troglodytes musculus*):

On March 7 2025, a nest of Southern House Wren was observed built inside a small circular cavity in a rough-textured concrete wall (Fig. 3F) in a periurban residential neighborhood of Manta, Manabí (0°57'S, 80°45'W). The cavity entrance measured only a few centimeters in diameter and contained a compact nest composed mainly of fine, dry twigs tightly arranged to fill the internal space, providing shelter within the wall structure. Adult wrens at this site displayed marked territorial behavior: when approached at approximately 10 meters, the birds became visibly agitated and began vocalizing persistently, producing loud and repetitive calls while moving between nearby perches.

Long-tailed Mockingbird (*Mimus longicaudatus*):

We recorded two nests of *M. longicaudatus* with individuals actively transporting nesting material on February 11, 2025. The nests were located behind air conditioning units and their vents (Fig. 3G) on the back walls of two consecutive houses in a periurban residential neighborhood in Manta, Manabí (0°57'S, 80°45'W). The nests were large, composed of numerous twigs, and occupied the space between the air conditioner and the house wall. Mockingbirds from these nests exhibited frequent vocal activity at various times throughout the day. On February 13 2025, both nests were visited by a Shiny Cowbird (*Molothrus bonariensis*) which approached while the mockingbirds were distracted. However, within less than ten seconds, the Shiny Cowbird was chased away by the Mockingbird nest owners.

Saffron Finch (*Sicalis flaveola*):

At least two individuals of *S. flaveola* were documented on the condensing unit of an air conditioner on February 11 2025 in Manta, Manabí along the main avenue of a periurban residential neighborhood

(0°57'S, 80°45'W). The area is characterized by houses with small yards and parks distributed across each block. They were observed in pairs repeatedly entering and exiting the unit (Fig. 3H). During these observations, one individual remained outside, seemingly watching, while the other entered the nest. The nests appeared to be under construction or in the process of maintenance as individuals were seen holding branches in their beaks.

DISCUSSION

Nest monitoring and field observations

Nesting behavior in human-made structures was previously reported for *Troglotytes musculus* (León-E et al. 2024), *F. coelestis* (Collar et al. 2020), *M. longicaudatus* (Cody 2020), *P. chalybea* (Turner & Rose 1989), *P. cyanoleuca* (Dayer 2020), *S. flaveola* (Rising et al. 2024), *P. rufocollaris* (Malekan 2020), *F. cinnamomeus* (Kirwan et al. 2023), *Z. auriculata* (Baptista et al. 2024a), *C. cruziana* (Baptista et al. 2024b), and *D. ludovicae* (Stiles et al. 2020). However, this behavior was not previously reported in *C. buckleyi* (Ingels & Greeny 2011, Baptista et al. 2020), *M. micrura* (Schulenberg & Sedgwick 2020), and *T. niveigularis* (Marchant 1960, Cisneros-Heredia 2006, Schulenberg & Johnson 2020). *Amazilia amazilis* has previously nested successfully in captivity which might suggest some flexibility in using artificial structures (Grogan 2000).

Almost all information about the nesting biology of *T. niveigularis* comes from Marchant (1960) who studied this species in southwestern Ecuador. Our nesting records of *T. niveigularis* in Manta during 2024–2025 as well as the presence of this species in the surrounding areas (personal observations) largely agree with the breeding season described for this species: December–June in Peru (Schulenberg et al. 2007) and January–July in Ecuador (Ridgely & Greenfield 2001). Marchant (1960) also recorded nests in southwestern Ecuador in that time range, between February 20 and mid-May (rainy season in Western Ecuador). The nest structure, duration and clutch size also corresponds with previous descriptions: cups of thin twigs and fine fibers, incubation and nesting periods of 15-16 and 14-19 days respectively, and clutch sizes between 2-4 (Schulenberg & Johnson 2020), similar to our observations despite being located on urban infrastructure.

This breeding pair successfully produced three fledglings that completed development and moved to a nearby tree. High success rates have been reported for this species in some years (Marchant data cited by Schulenberg & Johnson 2020), although known interannual variability precludes broad extrapolations. The species is recognized as insectivorous and a berry eater with documented prey of hymenopterans and coleopterans (Taczanowski 1884; Parker data, cited by Hilty & Brown 1986). It has been reported that, in some years, second broods are attempted (Schulenberg & Johnson 2020), as we observed between 2024 and 2025. Our recorded diet included odonates, lepidopterans and tettigonids, expanding the list of prey observed during rearing. The biology of *T. niveigularis* still presents significant gaps especially regarding movement, behavior and habitat use, underscoring the need for more detailed studies in disturbed environments where the species occurs.

The observations of *M. micrura* in Bahía de Caráquez coincide with the reproduction described for that species in Ecuador, reported between March and July following local rains (Marchant 1960, Barrio et al. 2015). Our first nest construction in March 2025 is in this time range. The duration of the observed cycle—approximately one week for construction, 16 days of incubation, and about two weeks of nesting—fits the previously described incubation periods (15–16 days). The nesting phase was shorter than the 22–23 days recorded by Marchant (data cited by Schulenberg & Sedgwick 2020), suggesting a possible effect of being in an area with nearby humans or the artificial substrate used. As is typical for the species, the female was responsible for incubation and parental care (Schulenberg & Sedgwick 2020). The repeated use of the same nest and its placement on a hanging ornament, a previously undocumented substrate, contrasts with traditional nests located in low-lying shrub forks (Alcívar & Cornejo 2022, Barrio et al. 2015). Finally, the abandonment of the second breeding attempt after gardening activities aligns with hummingbirds' high variability in reproductive success and susceptibility to even minor human disturbances (Mendiola-Islas et al. 2023).

The observations made during the first half of 2025 coincided with the rainy season. During this period, a global La Niña Modoki event occurred (Coastal El Niño) characterized by abnormally high temperatures, intense rainfall, and a notable greening of the Ecuadorian coastal strip. These conditions appear to have favored the reproductive activity of several species. The overlap between heavy rainfall and the repeated use of urban infrastructure by *T. niveigularis*, *M. micrura*, and other species whose breeding depends on rain (Marchant 1960) suggests that wet events associated with El Niño–Southern Oscillation climate anomalies can intensify the productivity and fluctuations in food resources (Grant et al. 2000, Barrantes & Sandoval 2019). These conditions could increase the demand for shelters during nesting and amplify the behavioral plasticity of these birds in environments heavily modified by humans.

Avifauna in Urban Environments

Our comprehension of avifauna in urban environments is scarce and requires new information about the impacts of urban land use on avifauna. Non-extended examples about biodiversity loss are available for Ecuador. In the capital city, urban green areas of Quito now host 59 bird species compared with previous historical records of around 102 species (Chapman 1926, Montenegro-Pazmiño & Cisneros-Heredia 2015). A study in southern Ecuador (urban and periurban Loja city) found that urbanization significantly affects species diversity with granivorous birds showing some positive responses while insectivorous birds declined mainly due to reduced food availability for this guild (Ordóñez-Delgado et al. 2022). Urban expansion can drive biodiversity loss, however, some species are able to nest in human-made structures (Soldatini et al. 2008, Reynolds et al. 2019).

Some species may choose artificial structures to reduce competition for natural sites (Afrifa et al. 2023), others nest near humans to avoid predators or because these structures provide suitable conditions (Reynolds et al. 2019, Yao et al. 2023). These patterns are documented in some study cases. For example, Southern House Wrens in Brazil nest readily in man-made sites, achieving similar reproductive success in both stable and unstable locations (Alexandrino et al. 2022). In Argentina, Eared Doves use building frameworks for nesting, with reproductive success comparable, though low, to natural sites (Barco et al. 2024). Artificial structures, especially when combined with natural vegetation, might help certain species in urban areas to have successful reproduction (Afrifa et al. 2023). However, there are costs. Nesting in artificial environments can lead to plastic ingestion (Lato et al. 2021, Rangel et al. 2025), increased conflict with humans (Hatch 1996, Araneda et al. 2021), more exposure to dog and cat attacks (Díaz et al. 2023), and behavioral shifts such as reduced anti-predator responses (Møller & Díaz 2018).

Patterns of urban expansion further shape avian communities. In flat landscapes, low-density urban sprawl often creates extensive periurban zones where natural habitats are replaced by human infrastructure (Parés-Ramos et al. 2013). On Ecuador's coast, such land use changes have reshaped ecosystems, negatively impacting wildlife (Dodson & Gentry 1991). Fragmentation can drive rapid biotic homogenization where specialist species disappear and are replaced by widespread generalists—a major contributor to biodiversity loss across large areas (Clavel et al. 2010). Effective conservation in urban settings should maintain patches of native vegetation, create green spaces, and reduce direct human–wildlife conflict. These measures are critical in tropical dry forests, considering their high endemism and vulnerability to habitat loss (Prieto-Torres et al. 2018). Participatory science platforms such as iNaturalist can support urban biodiversity management, offering valuable data to understand the distribution, ecology and behavior of bird species (Callaghan et al. 2022).

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AUTHOR CONTRIBUTION

All authors conceived the study, designed the methodology, collected the data, curated the records, interpreted the results and wrote the manuscript. DVC, EVB and AGC conducted the analyses and prepared the figures. All authors approved the final version and agreed to be accountable for its contents.

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