

# A Preliminary Study of Riparian Songbirds in Costa Rica, with Emphasis on Wintering Louisiana Waterthrushes<sup>1</sup>

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## Abstract

We made preliminary observations on the winter distribution, ecology and behavior of Louisiana Waterthrushes (*Seiurus motacilla*) in Costa Rica during January 1999 and 2000. We visited 24 headwater streams in three of the four principal mountain ranges in the country (Cordilleras Tilarán, Central, and the Talamanca) and confirmed the presence of waterthrushes on ten of these. In all three regions waterthrushes occurred on medium to high gradient streams, averaging 3.5 meters across (range, 1-8m) and at estimated densities of 2-10 birds per kilometer of reach length. Individuals of one to three species of resident obligate riparian songbirds, e.g., Torrent Tyrannulet (*Serpophaga cinerea*), American Dipper (*Cinclus mexicanus*), and Buff-rumped Warbler (*Basileuterus fulvicauda*), were observed along with waterthrushes at three sites (all four species were observed at a single site). Resident riparian passerines were observed at three sites where we did not detect any Louisiana Waterthrushes. We observed agonistic interactions (e.g., agitated chipping, aerial chases, and countersinging) among waterthrushes on three streams, indicating that the species is territorial in winter. We observed no behavioral interactions, however, among riparian songbird species, including at a site where multiple individuals of four species were present. Similar to relationships established for the waterthrush on its breeding grounds in Pennsylvania, headwater habitat characteristics such as extensive forest canopy cover, lack of sedimentation, and abundant aquatic invertebrates, especially within the orders Ephemeroptera and Trichoptera, appear to support the greatest numbers of over-wintering waterthrushes and/or the most diverse riparian songbird communities in Costa Rica.

*Key Words:* Costa Rica, habitat selection, Louisiana Waterthrush, riparian birds, wintering ecology.

## Introduction

It is estimated that worldwide there are as many as 80 species of obligate stream songbirds (i.e., species occurring more or less exclusively in association with fast-flowing stream habitats throughout the year), but only a few of these have been studied in detail (Master et al. 2000). These include White-throated Dipper (*Cinclus cinclus*), American Dipper (*Cinclus mexicanus*), Grey Wagtail (*Motacilla cinerea*) (Bakus 1959a, 1959b; Tyler 1972; Sullivan 1973; Price and Bock 1983; Ormerod 1985; Ormerod and Tyler 1986, 1987; Tyler and Ormerod 1994a) and Louisiana Waterthrush (*Seiurus motacilla*) (Eaton 1958; Craig 1984, 1985, 1987; Robinson 1995; Prosser and Brooks 1998; Mulvihill 1999; Master et al. 2000; Mulvihill et al. 2002; O'Connell et al. 2003). Guilds or assemblages of riparian songbirds have received even less attention (but see Orenstein 1975, Budris 1981, Round and Moss 1984, Tyler and Ormerod 1994b).

On its breeding grounds in the eastern United States, the Louisiana Waterthrush is the only obligate riparian passerine. Recent studies of its reproductive and foraging ecology have demonstrated that the waterthrush is a useful bioindicator of stressors on forested headwater streams across Pennsylvania (Mulvihill 1999, O'Connell et al. 2003). On its wintering grounds, where it retains a close association with headwater stream habitats, it can potentially share this habitat with one or more resident obligate riparian passerines, e.g., Buff-rumped Warbler (*Basileuterus fulvicauda*), Torrent Tyrannulet (*Serpophaga cinerea*) and American Dipper (Mulvihill et al. 1999). There are very few published studies giving details of the waterthrush's winter ecology and no studies have explored the species' possible usefulness as a bioindicator on its wintering grounds or examined its distributional co-occurrence and ecological interactions with resident riparian songbirds. Therefore, we performed a preliminary reconnaissance of possible study sites, and subsequently more detailed habitat analyses and behavioral

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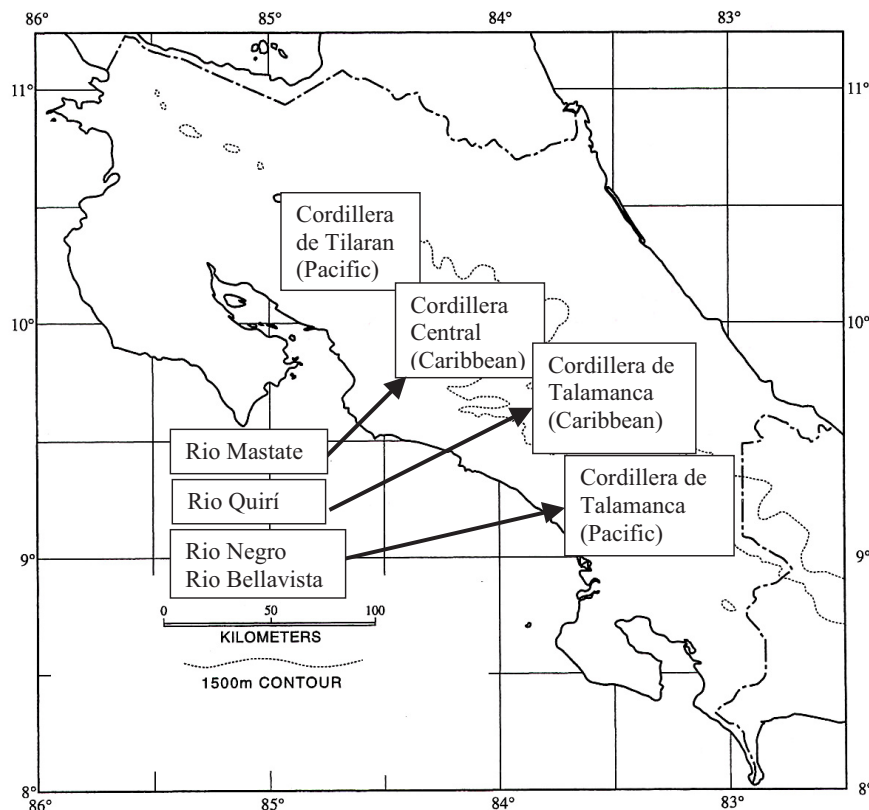
observations, in Costa Rica during week-long expeditions in January 1999 and 2000.

## Study Sites and Methods

We visited potential study streams in three of the four major mountain ranges in Costa Rica including the Cordilleras Tilarán (mostly near Monteverde Cloud Forest Biological Reserve on the Pacific Slope), Central (mostly near Volcán Poas on the Caribbean Slope), and Talamanca (near Tapanti National Park and La Amistad National Park on the Caribbean and Pacific Slopes, respectively) (*fig. 1*). Our objective in 1999 was to visit and rapidly assess as many streams as possible over as wide an area of the country as was feasible. We visited a total of eighteen streams, spending from 30 min to several hours at each, and traversing reach lengths of 100-1000m, in order to ascertain if waterthrushes or other riparian songbirds were present. Estimates of riparian bird density were calculated as the number of individuals of each species observed for a given length of stream explored, expressed as number of birds/km of stream reach. We assumed similar habitat and dispersion of birds of each species for unexplored reach lengths ranging from 0-900 m.

Presence of waterthrushes was confirmed by visual and aural detection, including both call notes and full song, the latter heard on two occasions. Behavioral observations of all riparian birds were conducted opportunistically during systematic searches for waterthrushes on each stream reach. On one stream, the Rio Quirí, which received the most extensive coverage in both years, waterthrushes and other riparian birds were color banded to facilitate recognition of individuals.

Nine streams, including six new sites and return visits to the three most promising 1999 sites, were investigated during January 2000. Field testing of several protocols for quantitatively assessing riparian habitat characteristics, including macroinvertebrate abundance and composition, was a major emphasis during the 2000 expedition. Protocols were tested on four streams, based on high known levels of riparian bird activity and site accessibility, including the Rio Quirí, Rio Mastate, Rio Negro and Rio Bellavista (*fig. 1*). Two sites within a 500 m stream reach were randomly chosen for assessing habitat variables on each stream. We used the U. S. Environmental Protection Agency's Rapid Bioassessment protocol which subjectively scores stream channel characteristics including embeddedness of substrate, water velocity, sediment deposition, channel flow, channel impacts, riffle frequency,



**Figure 1**—Map of Costa Rica depicting general regions (rectangles) where streams were surveyed during January of 1999 and 2000 and the location of the four streams on which habitat data was collected during 2000.

bank stability, bank vegetation cover, and width of riparian vegetation zone (Plafkin et al. 1989). High total scores indicated relatively pristine conditions. We also measured the wetted perimeter at these sites. Values for this index, employed in our breeding ground studies of the Louisiana Waterthrush, were derived from a ratio of the wetted surface of a stream cross section to the average stream depth across the same transect. Large values indicated stream channels with relatively extensive foraging microhabitat for waterthrushes, i.e., proportionately large areas of accessible water surface due to shallow water depth and/or abundant exposed submerged rocks and large woody debris. Canopy height for associated riparian forest was determined using a range finder and percent canopy cover was calculated using a spherical densiometer. Availability of stream macroinvertebrates was assessed based on five random rock flips at each of our two sampling stations. Invertebrates were carefully dislodged from each rock into a shallow pan and enumerated by taxonomic order.

## Results and Discussion

We detected at least one riparian passerine on 13 of 24 streams sampled during both years. Most frequent was the Louisiana Waterthrush which was observed on 10 streams (*table 1*). Buff-rumped Warblers were seen on four streams while Torrent Tyrannulets and American Dippers were observed on three streams each. We observed multiple riparian species (but always including waterthrushes) on just three streams. The Rio Gonzales and Rio Negro each had three species, while the Rio Quirí was the only stream on which all four species were observed together.

We detected Louisiana Waterthrush at maximum densities ranging from 2.0-10.0 individuals/km of stream

reach (*table 1*). The upper value is identical to what Eaton (1953) observed for one stream in Cuba. Robinson (1995) observed individual waterthrushes in Panama using 200 and 300 meter reaches (3.3-5.0 birds /km). Several of our observations of waterthrushes support previous observations that the species is highly territorial on its wintering grounds (Eaton 1953, Rappole et al. 1992, L. Reitsma pers. comm.). At Rio Mastate, we observed aggressive interactions among three birds that involved agitated chipping, aerial chasing, and full volume countersinging. Similar aggressive interaction (but no singing) between two waterthrushes was observed at Quebrada Cueba. At Rio Quirí, waterthrushes responded weakly (i.e., approached but did not countersing or behave aggressively) to tape playback of territorial song recorded on the breeding grounds.

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**Table 1**—*Species density (number per km of stream reach) on all inhabited streams.*

Stream	Reach (m)	Louisiana Waterthrush	Torrent Tyrannulet	Buff-rumped Warbler	American Dipper
Rio Quirí	300	6.6	6.6	6.6	9.9
Rio Negro	300	3.3	0	3.3	3.3
Rio Gonzales	250	2.0	2.0	2.0	0
Quebrada <sup>1</sup> Cueba	150	10.0	0	0	0
Rio Java	100	10.0	0	0	0
Rio Sarapiquí tributary	250	8.0	0	0	0
Rio Poasito	400	5.0	0	0	0
Quebrada Arboles Caidos	200	5.0	0	0	0
Rio Mastate	300	4.3	0	0	0
Rio Bellavista	300	3.3	0	0	0
Quebrada Segundo	200	0	5.0	0	0
Quebrada Neblina	500	0	0	2.0	0
Rio Poasito tributary	300	0	0	0	2.5

<sup>1</sup>Quebrada = stream

During extensive observations of the four species at Rio Quirí, we observed no interspecific aggression, even on one occasion when all four species were in view simultaneously at a small waterfall plunge pool. Dippers and waterthrushes both fed primarily picking on submerged insects in the water, with dippers picking more in rock crevices and deeper water (often while submerged) and waterthrushes more in shallow water and on rock and debris surfaces. Torrent Tyrannulets perched on large in-stream boulders and fed primarily by hawking for flying insects. Buff-rumped Warblers were usually observed gleaning insects along the exposed stream bank and at the water's edge, sometimes sally-gleaning insects from the undersides of vegetation overhanging the stream (George 2003). Streams with higher estimated maximum waterthrush densities and/ or multiple riparian songbird species present averaged 3.5 m wide (range 1-8 m), had relatively high EPA Rapid Bioassessment and wetted perimeter values, moderate to heavy canopy cover, benthic habitat dominated by cobbles (2.5-15 cm) and rocks (15-50 cm), and moderate to high macroinvertebrate abundance, especially for the orders Ephemeroptera and Trichoptera. The Rio Quirí, with the greatest overall abundance of macroinvertebrates, had the highest estimated maximum riparian bird densities (*table 1*) and, again, was the only stream we visited that supported all four species.

## Conclusions

Habitat selection has important ramifications for the persistence of a species because it influences reproductive and mortality rates (Petit et al. 1995). Therefore, understanding habitat use forms the basis for conservation of these species (Cody 1985, Probst and Crow 1991). This study, although preliminary in nature, offers some insight into habitat selection, distribution, ecology and behavior of Louisiana Waterthrushes on their wintering grounds in Costa Rica. Characteristics of the headwater streams where we estimated the highest maximum densities of wintering waterthrushes, and other riparian songbirds, were similar to those associated with the most productive Waterthrush breeding habitats in Pennsylvania (Mulvihill 1999, Master et al. 2000, O'Connell et al. 2003). Waterthrushes, therefore, belong to a minority of neotropical migrants which are habitat specialists on their wintering grounds, in this case, preferring conditions nearly identical to those in breeding habitats (Stiles 1980, Hutto 1992, Petit et al. 1995). The degree of apparent niche partitioning observed, with regard to the several resident riparian species, and their defense of territories against conspecifics, indicates that waterthrushes are not migrant opportunists relegated to peripheral, disturbed habitats but rather are competitive

habitat specialists well adapted to their tropical wintering grounds (Sliwa and Sherry 1992, Sherry and Holmes 1995). Notwithstanding significant advances in recent decades, more information on habitat requirements and on the influences and consequences of habitat selection is needed for many neotropical migrant landbirds in order to implement conservation strategies (Blake and Loiselle 1989, Strong and Sherry 2001).

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