

Amigos

Newsletter

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Wilson Botanical Garden
Las Cruces Biological Station
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**Organization for
Tropical Studies**

Research at Las Cruces

Radio Tracking Tropical Forest Birds



dinner and this to our largest group thus far – 54 guests!

We always welcome volunteers. If you are interested in volunteering and learning more about what you can do to help at the Wilson Botanical Garden, please email us at lcruces@ots.ac.cr.

Tree Tour Booklet for Las Cruces

I am excited to report (because it took a very long time to put together) that we finally finished the Wilson Botanical Garden Tree Tour booklet in both Spanish and English. The self-guided tour is available for purchase from our gift store and takes you on a grand tour of 33 tree species that are found in the garden. The booklet showcases both native and exotic species and each description includes information about the tree's family, as well as detailed information about the specific species. Make sure to get a copy on your next visit and take the tour – it should take about 2 hours or so.



The Orange-billed Nightingale-thrush (OBNT 976) of San Gabriel may be the world's only songbird that was radio tracked for five consecutive years.

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Tropical forests worldwide are being reduced to biologically impoverished remnants embedded in the agricultural countryside – human-dominated and mostly deforested areas consisting of croplands, pasture, gardens, second growth, and forest remnants (Daily et al. 2001). Even though human-dominated areas are the preferred habitat of 1% of the world's 9786 avian species (Sekercioglu et al. 2004), about one-third make some use of such habitats (Sekercioglu 2003). Given the high rate of tropical deforestation, the extent and ecological qualities of heavily deforested countryside will determine whether

some tropical forest species can persist in the absence of extensive forests. That, in turn, will affect the future of much biodiversity.

Understanding the persistence mechanisms of tropical forest species in human-dominated landscapes is a fundamental aspect of tropical ecology and conservation. Many species, including more than half of Costa Rica's native land birds, use mostly deforested agricultural countryside, but how they do so is poorly known. Do they commute regularly to forest or can some species survive in this human-dominated landscape year-round? The diverse agricultural countryside around Las Cruces Biological Station is ideal



birds with mist nets, banded them with color bands, and attached a transmitter to the back of each bird with skin-compatible eyelash glue. Transmitters have negligible effects on passerine welfare (Wells et al. 2003) and our transmitters were 3.6% of the average weight of each study species. After some preening in the first half hour, the birds resumed their usual behavior, flew and fed normally, and were not hindered by the transmitters. In 2003 we recaptured 31 of the birds we had tagged in 2002, and except for their leg bands, none showed any sign of having carried a radio tag. We tracked birds between 5AM and 10PM continuously except during episodes of heavy rain. On average, each bird was tracked for 45 hours distributed across 10 days.

In 2004 and 2005, we monitored 73 *Catharus*, 52 *Tangara*, and 60 *Turdus* nests using established protocol to minimize disturbance. At each study site, we surveyed the vegetation in 1764 fifty by fifty meter plots. We then compared vegetation preferences of our study species with the survey results. In various habitats at each site, we placed electronic data loggers to record temperature and humidity every minute, and to assign habitat temperature and humidity values to bird observations that occurred in those habitats.

We found that remnant trees, riparian strips, and small forest patches in agricultural countryside provided critical dietary, microclimatic, and nesting resources for our focal species. Forest remnants (forest fragments, riparian strips and remnant trees) were favored for foraging and nesting, especially during the dry season, because of their cooler and more humid microclimates. Our study species did not commute from extensive forest; rather, they fed and bred in the agricultural countryside. These birds exhibited two fundamentally different ways of dealing with the loss and fragmentation of their native forest habitat:

Radio tracking in the Las Cruces agricultural countryside.

for investigating these questions, whose answers have crucial implications for the future of tropical conservation and habitat restoration.

Since June 2002, we have been conducting what may well be the most extensive radio tracking (telemetry) project on tropical birds. We have caught, color banded and radio tracked 426 birds of 11 species and collected over 30,000 GPS (Global Positioning System) locations detailing these birds' habitat use, movement, foraging, breeding, and survival patterns. In comparison, the average tropical bird radio tracking paper has under 1000 points on fewer than 20 individuals of one species. In combination with our intensive mist netting/bird banding since 1999 (over 30,000 individuals of 241 species captured at 18 sites covering six habitats) and nest monitoring since 2004 (over 250 nests of six species), multi-year radio tracking of Las Cruces birds is revealing key aspects of bird ecology. We have radio tracked dozens of individuals over multiple years, including an Orange-billed Nightingale-Thrush (*Catharus aurantirostris* or

Catharus) that was tracked for five years in a row, a record for a songbird.

We recently published (Sekercioglu et al. 2007) the findings of the first two years of radio tracking and nest monitoring of our three focal species, *Catharus* (low forest dependence), Silver-throated Tanager (*Tangara icterocephala* or *Tangara*, medium forest dependence), and White-throated Thrush (*Turdus assimilis* or *Turdus*, high forest dependence), based on data from 156 individuals, 8101 GPS locations, and 185 nests. These are forest birds that vary in their vulnerability to deforestation (Stiles 1985) and are representative of the species found both in forest and human-dominated landscapes.

For this paper, we tracked birds in 2002 wet and 2003 dry seasons, in four coffee-dominated landscapes (980-1080 m) ranging in tree cover (forest fragments, riparian strips, and remnant trees) from 5.1% to 14.2%. Because we wanted to understand persistence mechanisms of forest birds frequently found in the countryside, all birds were captured in partially-shaded coffee plantations, the most prevalent form of agriculture in the region. We caught

sedentary usage of agricultural areas and high mobility among forest remnants. *Catharus* adapted to coffee plantations and second growth. More forest dependent *Tangara* and *Turdus* spent most of their time in forest remnants, largely avoiding coffee plantations and other open habitats, even though all individuals were caught in coffee plantations. Although trees constituted only 11% of land cover, *Tangara* and *Turdus* spent 69% to 85% of their time in them.

The heterogeneous nature of the Las Cruces landscape and the high diversity of fruiting trees were important factors in the persistence of *Turdus* and *Tangara* in the countryside. *Catharus*, observed foraging on 14 plant taxa, was mainly insectivorous and mostly foraged on or near the soil. *Tangara* and *Turdus* mostly consumed fruits and foraged on 71 and 45 taxa respectively. Fruits of *Cecropia peltata*, *Syzygium malaccense*, and *Ficus* spp. were especially favored. *Catharus* individuals were found in the hottest and driest microclimate, *Tangara* preferred coolest and most humid conditions, and *Turdus* was intermediate.

Tangara and *Turdus* had bigger home ranges and greater movements. Adult predation was not a major source of mortality since only 5 out of 156 birds we radio tracked were preyed upon. Breeding success of *Catharus* and *Tangara* in deforested habitats was not different than in forest remnants, where *Turdus* experienced reduced breeding success. Nevertheless, benefits of higher breeding success in coffee plantations may be negated by lower fledgling survival in this habitat, as we observed during our pilot study in 2006.

Our Las Cruces radio tracking research is important in multiple ways. First, our findings have revealed the crucial value of small forest remnants, not just forest fragments, but also riparian strips and even individual trees, which were used

by more forest dependent study species 5 to 34 times more frequently than one would expect based on land cover. This shows that not only the Costa Rican law for protecting riparian forests is right on target, but also means that even modest habitat restoration that increases tree land cover by a few percentage points has disproportionate importance for native forest birds. Second, our project shows the importance of working with local research assistants, who have become expert radio trackers with unequalled knowledge of the terrain, and without whom our large sample sizes would have been impossible. Finally, the interesting twists and turns in avian demographics revealed by our diverse methods show the necessity, for effective conservation research, of long-term ecological monitoring that integrates a variety of techniques focused on all stages of avian life cycle.

The conservation value of working landscapes in the tropics can be boosted significantly with relatively little investment and conflict because remnant trees, riparian strips, forest fragments, and their residents also supply people and domestic animals with fruits, shade,

clean water, crop pollination, and other ecosystem services (Sekercioglu 2006). Tropical countryside has high potential conservation value, which can be enhanced with even modest increases in tree cover. Our findings have applicability to many human-dominated tropical areas that have the potential to conserve substantial biodiversity if appropriate restoration measures are taken. We hope that our multi-faceted approach will continue to uncover interesting and important aspects of bird ecology in the Costa Rican agricultural countryside and help guide effective tropical conservation efforts, and will solidify the standing of Las Cruces Biological Station in the annals of tropical conservation ecology.

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The banding team hard at work.