

Introduction to the Peru Highland-Bird Study Sites and Census Methods

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Study System. We worked in the Department of Amazonas, Peru, 1800-3100m, 2016–2019. Sites were located with seven landscapes >10km apart, each containing contiguous tracts of primary forest, forest fragments (<30ha), regenerating shrublands (<30 years old), and a mixed intensity agricultural matrix.

Bird Surveys. During 2016–2017 we sampled bird communities across a gradient of agricultural forest conversion. Because we did not have pre-conversion data and Andean bird communities vary with elevation and microclimate, we implemented a block impact-reference design within seven landscapes > 10km apart. Each landscape consisted of a 10 km² block containing contiguous cloud forest and up to five major habitat components found within agricultural landscapes in the region, all sampled within the same 300-m elevation band. Sampling was stratified among six habitats: contiguous forest, isolated forest fragments (1 – 30 ha), large tracts of regenerating shrubland (>30 ha), fencerows surrounded by pasture, isolated pasture trees (i.e., silvopasture), and high-intensity agricultural plots (mainly cow pasture, potatoes, and vegetables). Fragments had been isolated 15–30+ years based on analysis of Landsat imagery and were surrounded by a mix of pasture, shrublands, and agricultural plots. Shrublands were regenerating pastures (15-30 years after abandonment) with dense stands of 2-3m tall saplings and scattered residual trees. Fencerows were 1-2 meter-wide belts of shrubby vegetation bordering public trails or demarcating parcel boundaries. Pasture trees were >10cm DBH and located within agricultural plots and along fencerows. Contiguous forest and forest fragments (1–6 patches per landscape) were sampled in all seven landscapes, and shrublands, fencerows, pasture trees, and agricultural plots were sampled in five landscapes.

Surveys from 2016 are all from either contiguous forest tracts or forest fragments. There should be recordings for all sites from 2016. Surveys from 2017 are mostly in regenerating shrublands and silvopasture (with a few forest and fragment surveys). I did not do recordings for many of the silvopasture routes, because the species diversity was extremely low and easy to identify correctly and I didn't need to deal with recordings. Shrubs, forest, and fragment routes in 2017 should have recordings. I did a few surveys in 2018 but did not do recordings.

All data were collected by Ian Ausprey.

Survey Sampling Design. We quantified the bird community within each of the six land-use categories using point-count surveys. Each transect contained 6-9 survey points spaced at 100-m intervals beginning with a random start point; fewer points were located within fragments < 6 ha. We selected 100-m intervals to (1) maximize detectability of rare or rarely vocalizing species, (2) maximize the number of points sampled within a given morning and within small fragments, and (3) because the effective detection distance for most species in our system is < 50m. Transects were randomly placed along existing trails

given the steep terrain and thick understory vegetation that restricted quick movement among points. A total of 365 points were surveyed.

One skilled observer (IJA) with several months of training and practice identifying bird songs in the region sampled bird communities May–December in 2016 and 2017. This largely coincided with the dry and transitional seasons, which encompassed breeding activity for most species. We surveyed each point three times during one of the two years. Repeat visits were spaced roughly two months apart to account for any seasonal changes in vocalizations. Each count lasted 10 minutes and occurred during mornings with little rain or wind. We recorded all detections within an unlimited radius, the distance to each detection, and whether the detection was in the targeted habitat component. In agricultural plot transects we also noted the location of detections among three habitat components: agricultural plots, fencerows, and pasture trees. Singing activity declined precipitously or stopped altogether within 2–2.5 hours after dawn, therefore point count surveys were restricted to that time period in order to minimize variation in detectability.

The Peru Highland-Bird Audio Files

Each separate audio file includes all species recorded during a 10-minute census period at a site. Because they were made for the purpose of detecting all calling species at a survey site during a ten-minute period, most of these recordings do not include extended close-up solos such as those in our main animal-sound collection. The individual vocalizations recorded may not stand out as clearly to you as they do to experts such as Ian and Felicity. – Tom Webber, September 2020