

Early successional habitats and bird-related ecotourism in the Ecuadorian Andes

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Summary

Since the mid-1980s, exhausted pastures in Northwest Ecuador have been increasingly abandoned, allowing forest regeneration. At ~2200 m in the Tandayapa valley we surveyed four abandoned pastures in 1998 and again in 2001 to evaluate their use by birds. Each former pasture represented a different age of vegetation maturity. Observations in the Tandayapa Valley suggest abandoned pastures do rapidly convert to forest and attract an increasing number of bird species as succession proceeds. Although, data collected in 1998 suggested many bird species and even some restricted-range bird species use these pastures shortly after abandonment, the 2001 data suggests the rate of recruitment slows. Nevertheless, conservation efforts should still be directed toward them.

Introduction

Studies indicate that avian frugivores use abandoned pastures (Andrade and Rubio-Torgler 1993, Da Silva *et al.* 1996, Borges and Stoufer 1999). In fact, avian frugivores deposit a significant number of rainforest seeds under the canopy of isolated trees in pastures (Guevara *et al.* 1992), and they also contribute to seed-rain at the Andean pasture edges (Sarmiento 1997). Few studies have addressed whether the number of frugivores using abandoned pastures changes over time, or whether restricted-range bird species use abandoned pastures. Data collected in 1998 in NW Ecuador at ~2200 m indicated that some forest bird species use (e.g. feed in or sing from) recently abandoned pastures (Welford 2000). The 1998 data suggested that the number of bird species recorded in each successively older abandoned pasture increased, while approximately half the number of species recorded in the forest were recorded in pastures abandoned for at least 6 years (Welford 2000). Moreover, a number of restricted-range Choćo endemics (e.g. Plate-billed Mountain-Toucan, Toucan Barbet) were documented in these abandoned pastures (Welford 2000). The data suggests that many restricted-range bird species survive in areas where pristine montane forest constitutes less than 10% of the local forest cover, and they are more tolerant of edge and more open habitat than previously suspected (Welford 2000). As a result, as degraded, abandoned Andean pastures revert to a more optimal forested state, they may offer conservation-oriented Non-Government Organization's (NGO) an opportunity to investment in the protection of local bird fauna.

In this paper we present field data collected in 2001, compare this data with the 1998 data, and identify longer-term trends in the use of high-altitude (>2000 m) abandoned Andean pastures by birds. The specific objective of this paper is to identify any changes in the number and composition of avian frugivore species and restricted-range bird species using abandoned pastures over time. We are interested in the change in frugivore species through time as these bird species augment seed-rain from the pasture edge into the pasture. We are equally interested in how many restricted-range species use these abandoned pastures, since rather like keystone species that have attracted attention and research funds, restricted-range species attract birdwatchers and their money.

Study site and methods

We conducted our second repeat survey between March-April of 2001 in the Tandayapa Valley (00101S, 07814W) at ~2200 m elevation 40 km west of Quito, Ecuador. Although the Tandayapa valley provides a continuum from lower montane (subtropical) to upper montane-forest (temperate) communities (Best *et al.* 1996), this second survey (as with the first survey) was restricted to abandoned pastures in the upper montane forest community. Extensive deforestation prior to 1990 created a patchwork of cattle pastures, second-growth forest in places dominated by *Chusquea* sp. bamboo, and some pristine forest remnants (Welford 2000). Since 1992 two foreign-run NGO's and several foreign private landowners have purchased most of the west side of the Tandayapa Valley. An Ecuadorian operates a trout farm and protects the forest in the watershed above the farm on the east side of the valley. The majority of the foreign-owned land has been set aside for ecotourism associated with birdwatching, as the is quite accessible to Quito, which is less than a one and a half hour drive away (Welford 2000).

At the study area, all the surveyed sites varied from 3–5 ha in size and occur at approximately the same elevation. However, each pasture was created, maintained and seeded differently (see Table 1).

Table 1: History of each pasture.

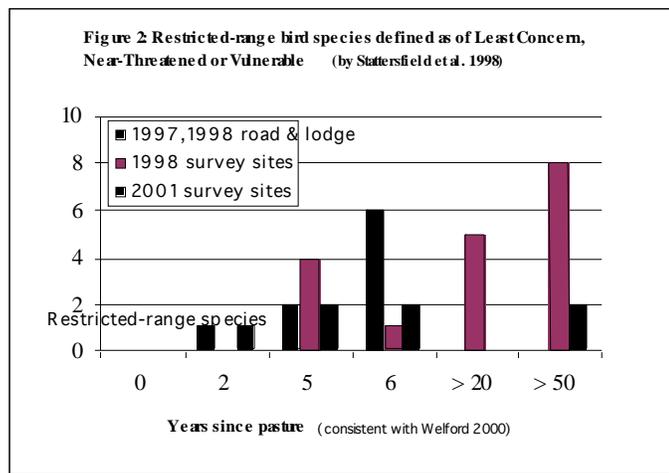
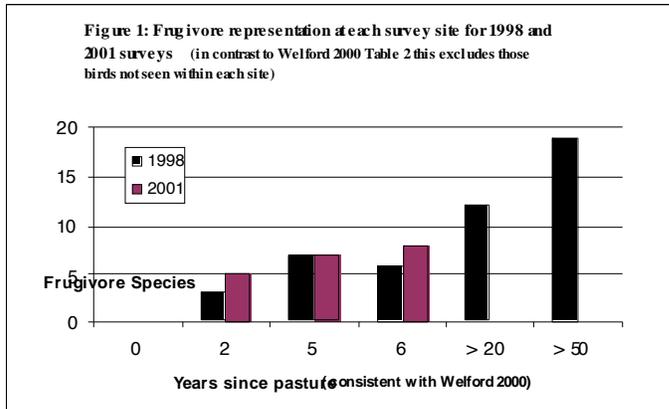
	Current Activity	Grass Type	Age as pasture	Method of pasture creation	Current vegetation
Pasture 0	Cattle grazing	Exotic(?)	+25 yrs	Burn*/cut	Grass, bracken
Pasture 2	abandoned	Exotic/native	+50 yrs	unknown	Grass, 2-3 m shrub
Pasture 5	abandoned	Native(?)	+10 yrs*	Cut*	2-5 m shrub
Pasture 6	Abandoned	Native(?)	+25 yrs*	Cut*	Bamboo, isolated trees
Control 50	Forest			Selective cut	Prime forest

*best guess

The sites were surveyed in July 1998 and again between March-April 2001 following methods in Parker (1991) and Poulsen and Krabbe (1997) and summarized in Welford (2000). To maintain accuracy, continuity and repeatability, at each survey site in 1998 and 2001, the dawn chorus of resident birds was recorded using the same equipment. Furthermore, birds were recorded from exactly the same location and same time of day within each abandoned pasture. To remain consistent with Welford (2000), all sites will be identified by the time in years since abandonment or disturbance prior to 1998 as either a pasture or forest site.

Results

In a total of 41 surveys conducted over 2 field seasons, we recorded 89 species at the six sites (in Welford 2000 - 97 species were noted, including bird species seen in 1997). The number of species recorded in the pastures increased significantly with time since abandonment ($a = 21.89$, $b = 1.1$, $R^2 = 0.89$). In fact, nine new species were recorded in Pasture 2 and seven new species in Pasture 6 in the 2001 survey. Linear Regression predicts that a pasture abandoned in this valley will within 12 years recruit (i.e. bird species will use and/or sing in the abandoned pasture) half the total number of bird species observed in adjacent pristine forest. However, although $n = 6$, the correlation remains strong.



The number of frugivore species also increases with time, as two new frugivore species were recorded in both Pasture 2 and Pasture 6 in the 2001 survey. Linear Regression analysis of frugivore recruitment using 1998 data predicts pastures will take 17 years to recruit the same number of frugivore species as adjacent forest (Figure 1: >50=19), while this rises to 21.5 years using the 2001 data. The data suggests that the bamboo covering 50% of Pasture 6 might limit recruitment of frugivores and restricted-range species to this abandoned pasture (Figure 1, 2). Both surveys documented few restricted-range species in Pasture 2, 5, and 6 (Figure 2); however, the 2001 survey recorded a Beautiful Jay *Cyanolyca pulchra* in Pasture 2 and Plate-billed Mountain-Toucan *Andigena laminirostris* and Dusky Bush-Tanager *Chlorosingus semifuscus* in Pasture 6. Several restricted-range species were also observed in field reconnaissance 1997 and along the road at Pasture 2 and at the lodge above Pasture 6 in 1998 (see Figure 2: 1997,1998 road & lodge). The data clearly indicate that the number of restricted-range species observed increases in each successively older abandoned pasture. Although each pastures history is different, the data are too limited to identify any significant trends that result from these different histories.

Discussion

Clearly the two data sets indicate that the number of all bird species, the number of restricted-range species, and the number of frugivore species observed increased in each successively older abandoned pasture. Linear analysis of the data also suggests that even when pristine forest

constitutes approximately 10% of the total land cover, abandoned pastures might recruit half the total number of birds observed in adjacent pristine forest within 15 years of abandonment. Although this prediction is both tentative and therefore necessitates long-term capital investment, a perceptive ecotourist lodge owner or long-established NGC might consider these pastures a good investment as they revert to optimal forest habitat. It is important to note that none of these four abandoned pastures have been altered or intentionally seeded either to increase plant, scrub and tree diversity or accelerate the succession of each pasture to forest. In contrast, both the Tandayapa Lodge (an ecotourist facility) and Loma Linda (a private residence) have begun to restore pastures on their property. Both places have planted *Inga* sp trees and put up hummingbird feeders in their pastures. These two facilities have at least 15 hummingbird species visiting their feeders daily (I. Campbell 2000 *in litt*, T. Nunnery 2001 *in litt.*). Loma Linda has had over 100 bird species visit their abandoned pasture (now front garden) and five Choco endemic hummingbird species (T. Nunnery 2001 *in litt.*). Loma Linda also has a resident Northern Potoo *Nyctibius griseus* and from March-June 2001 a Spectacled Owl *Pulsatrix perspicillata* roosted in its abandoned pasture (T. Nunnery 2001 *in litt.*).

In conclusion, even without intervention abandoned pastures recruit bird species rapidly as they revert to forest. Active intervention and restoration seen at the Tandayapa Lodge and Loma Linda has increased the rate at which these abandoned pastures have recruited all manner of bird species, and specifically frugivore and restricted-range species. Furthermore, Loma Linda's pastures were seeded with an exotic grass species and although abandoned for at least 5 years prior to becoming a private residence bird diversity remained low (T. Nunnery 2001 *in litt.*). As a result of active intervention, since 1998 eight Chocó endemics have become resident species in Loma Linda's abandoned pasture (Nunnery and Welford 2001). The incentive to actively restore Tandayapa Lodge's pasture, where the lodge is situated, is financial: the multitude of hummingbird feeders on the lodge's balcony and resident hummingbirds and the mixed-species flocks that move through the rapidly regenerating pasture below the balcony make an immediate, very visual impact. Repeat visits to the lodge are common, and many birders and casual visitors never leave the balcony (I. Campbell *in litt.* 2001).

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