

Hallazgos recientes en la ecología invernal de la reinita cerúlea (*Setophaga cerulea*) en los Andes: perspectivas, retos y oportunidades

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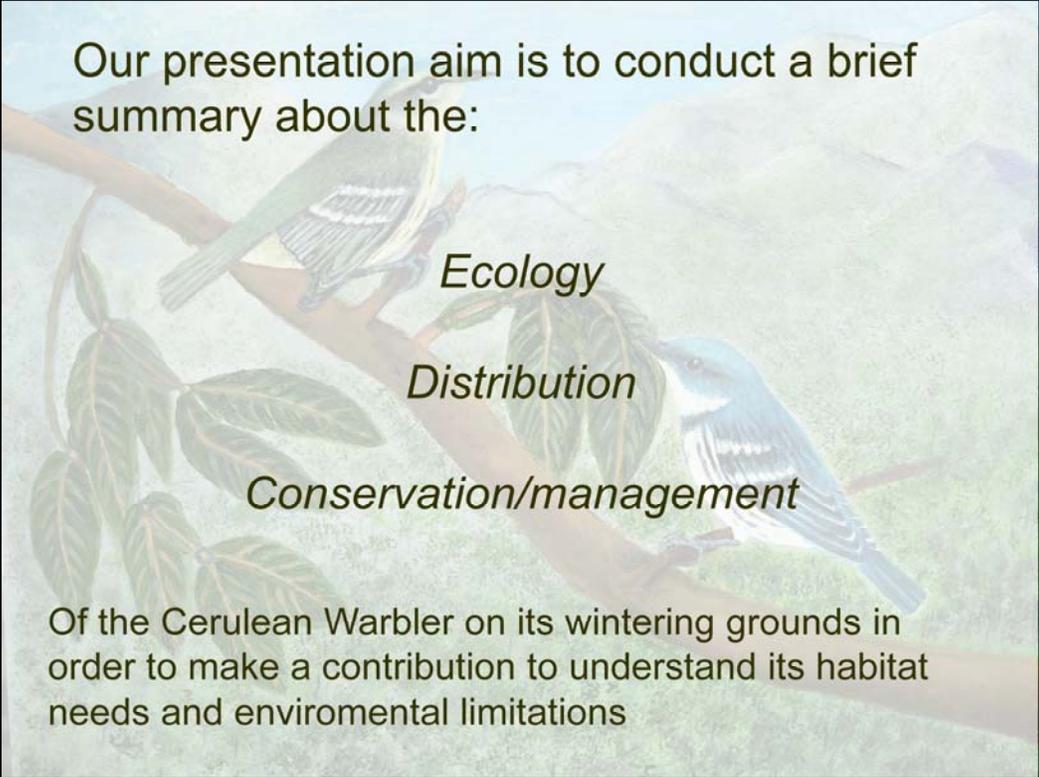
Noviembre 11 de 2011



My dissertation focuses on ecology and conservation of two poorly known components of Andean forest bird communities...

Talk about some ideas of conservation in the andes, and how different antropogenic actions at different scales might be affecting the continuity in a particular group, birds...and outline here how many things are linked together. Also the apparent different view of what the Andes

I think I wanted to keep my tittle broad, in order to be able to introduce several different ideas I want to talk about conservation in the Andes, and try to link the idea that human activities at the local scale may be adding up to create regional and even continental-scale effects. My talk would be a minor contribution to this understanding.

The background of the slide features a soft-focus illustration of two Cerulean Warblers perched on a brown branch. One bird is on the left, facing right, and the other is on the right, facing left. They have bright blue heads and backs with white underparts and dark streaking on their wings. The background is a hazy, green landscape with rolling hills under a light sky.

Our presentation aim is to conduct a brief summary about the:

Ecology

Distribution

Conservation/management

Of the Cerulean Warbler on its wintering grounds in order to make a contribution to understand its habitat needs and enviromental limitations



ecology

Santiago David

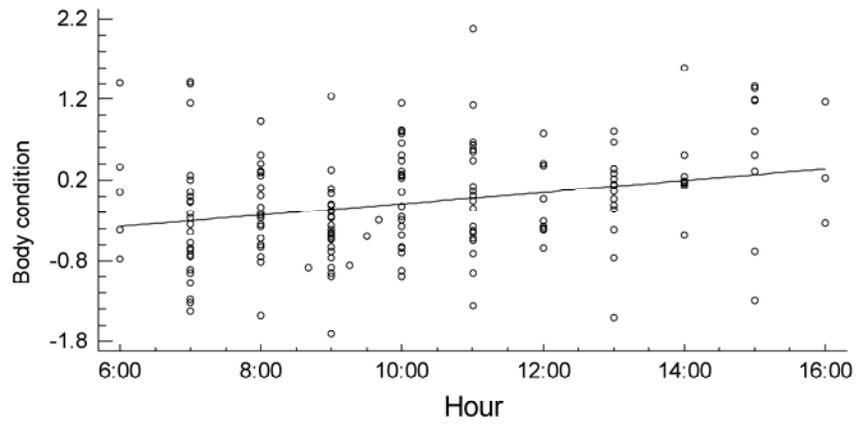
What is limiting Cerulean Warbler on its wintering grounds?

Wintering grounds

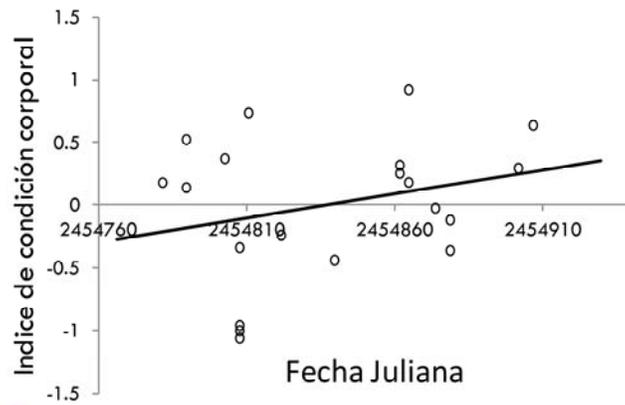
✓ Habitat loss

± Fragmentation (?)

• Limitation in food availability (?)



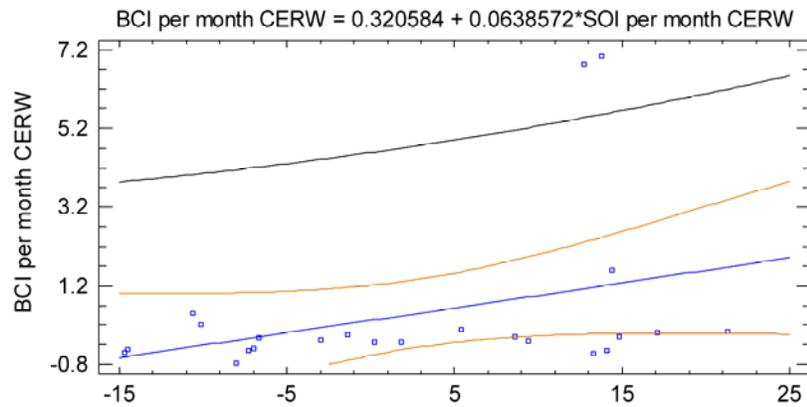
Size-adjusted body condition improved for CERWs as the day progressed ($\beta = 0.001 \pm 0.0004$, $t = 2.43$, $P = 0.02$. Data 2008-2010).



**Significant
(2008-2010)**

Size-adjusted body condition increased for CERWs as the banding season progressed in shaded monocultures...*however*

Cerulean Warbler in shaded monocultures and Southern Oscillation



Cerulean (& Canada) Warbler exhibited poorer body condition during El Niño years (dry) and better during La Niña (rain) in shaded monocultures ($F_{1,21} = 2.82, P < 0.1$. Data from 2003-2010, *unpubl. data*)

Capture history of Cerulean Warbler during eight field seasons in Colombia.

Season	Average rate (mnh)	Cerulean Warbler captures	New	Intraseasonal recapture	Interseasonal Recapture
2003-2004	113.4	6	6	-	-
2004-2005	234	4	2	1	1
2005-2006	424	3	3	-	-
2006-2007	490	12	11	1	-
2007-2008	533.3	9	8	-	1
2008-2009	326	23	19	2	2
2009-2010	189.5	40	32	4	4
2010-2011	372.4	29	26	3	-
TOTAL	335.3	126	107	11	8

<<< juveniles

Annual survival for Cerulean Warbler (Preliminary information)

Annual $\phi = 0.59$ (95% CI: 0.41 – 0.69)

Adult $\phi = 0.68$ (95% CI: 0.52 – 0.89)

Juvenile $\phi = 0.49$ (95% CI: 0.22 – 0.69)



Based on capture and recapture/resighting on wintering grounds in Colombia, 2005-2009. MARK program

Twenty-five of the 29 color-banded Cerulean Warblers were resighted within the banding season after the initial banding event.

In fact, some birds seemed to be defending territories and were resighted on a weekly basis throughout the season.

Using Program MARK, apparent monthly survivorship for Cerulean Warblers was estimated as 0.97 ± 0.020 SE.

There were no differences in survival based on the sex or the age of the bird.

Within Program MARK, we used the Barker model (Barker 1997) to estimate apparent survival rather than a traditional Cormack-Jolly-Seber survival model (Cormack 1964, Jolly 1965, Seber 1965) because the Barker model allows for live (e.g., recapture or resightings) and dead encounters to better estimate survival (Collins and Doherty 2006). Parameters in the Barker model included: apparent survival (ϕ), recapture probability (P), the probability of finding a bird dead (r), the probability a bird lives (R) or dies (R') and is resighted before the next capture period, the probability a bird staying in the area (e.g., fidelity) and remains at risk of capture in the next capture period (F), and the probability of fidelity to another area (F).

intra-seasonal survival: wintering grounds

0.96 ± 0.08
Apparent Survival
(monthly, Barker model)



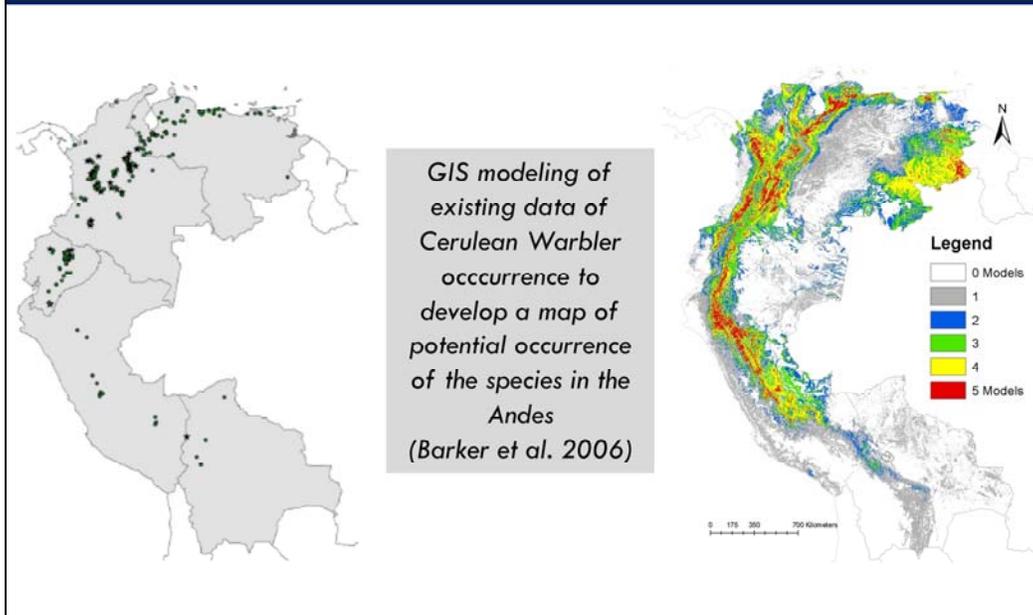
1 out of 19 radio tagged CERWs
killed by raptor (Accipiter?)

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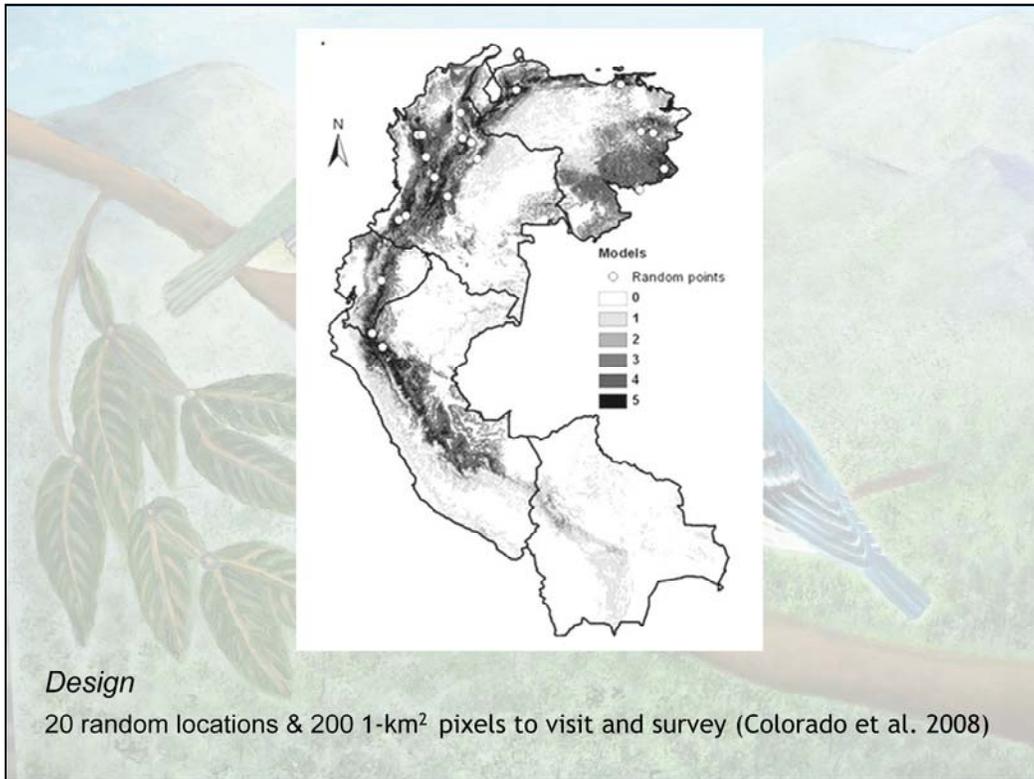
The highest ranked models from program MARK include the covariate 'territory-holder' and accounted for 87% of the AICc weights (Table 2). With the top-ranked model, apparent monthly survival for territory-holders and flock members during the study period (i.e., 3 months) was $0.97 (\pm 0.02 \text{ SE}, 0.91 - 0.99; 95\% \text{ CI})$ and $0.81 (\pm 0.09 \text{ SE}; 0.58 - 0.93 \text{ CI})$, respectively. Detection probability was estimated as $0.20 (\pm 0.08 \text{ SE})$ for territory-holders and flock members.



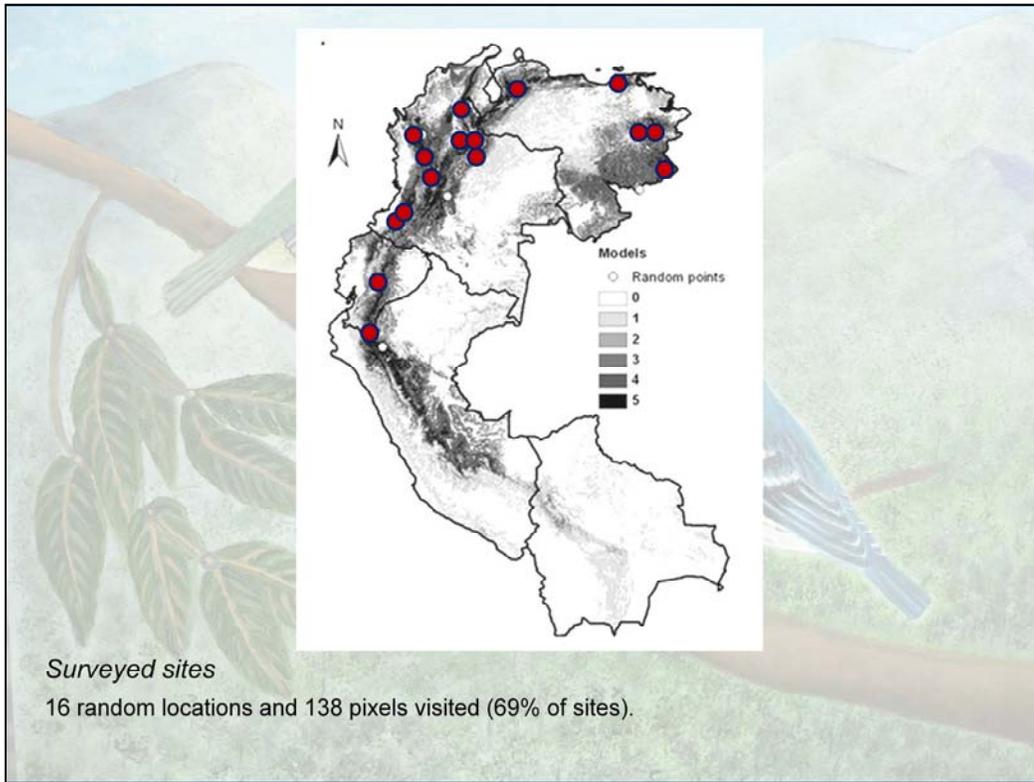
Framework



We started studying Cerulean Warbler as a cooperative effort; a species which is widely distributed all over south America throughout the Andes (~ 200,000 km² of potential habitat). This species, besides its already noted conservation issues, I believe is interesting for being widespread distributed and gives the opportunity to evaluate a wide gradient, geographically and ecologically. talk about the habitat modeling and how that was the framework for the work. This is important b/c it determines the pool from which you selected sites.

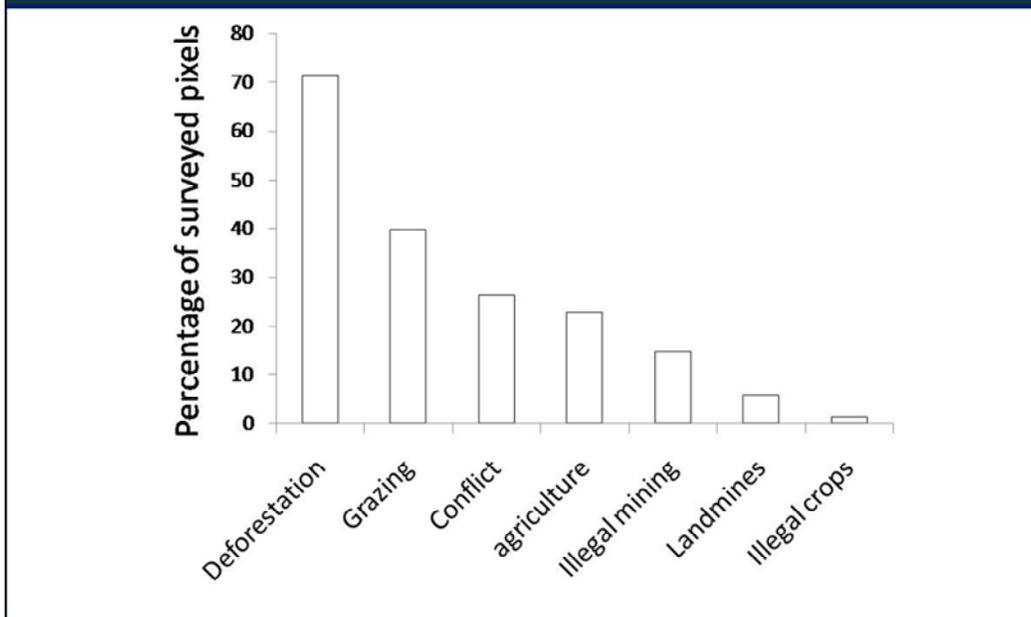


Plus vegetation information



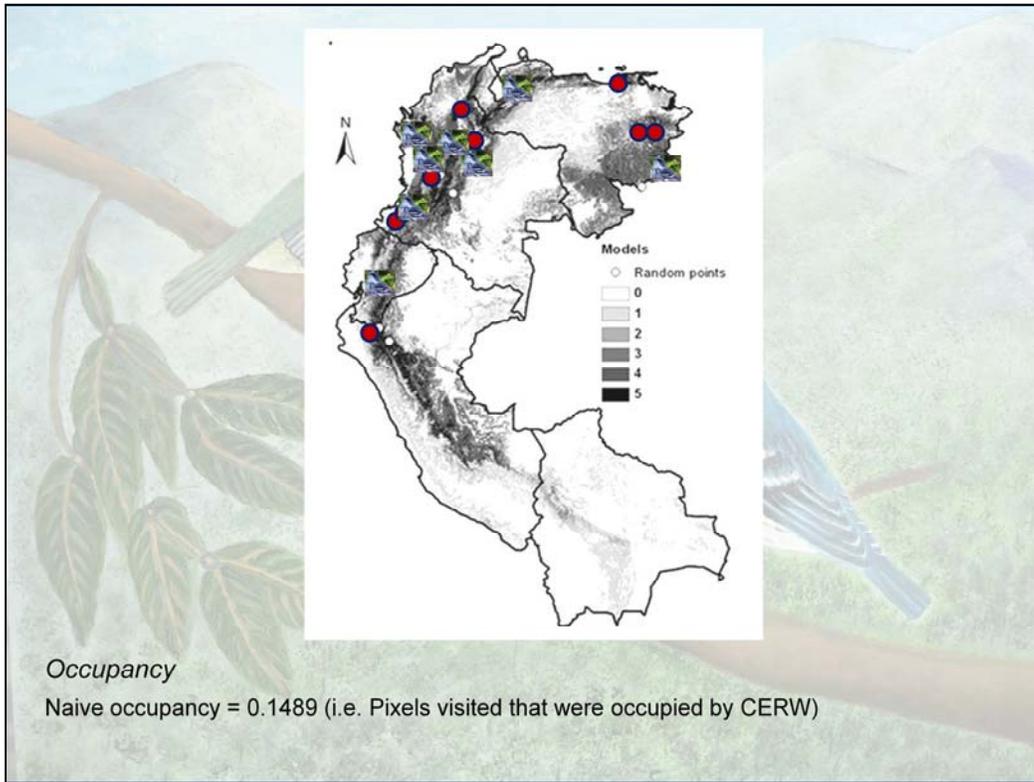
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Summary of threats

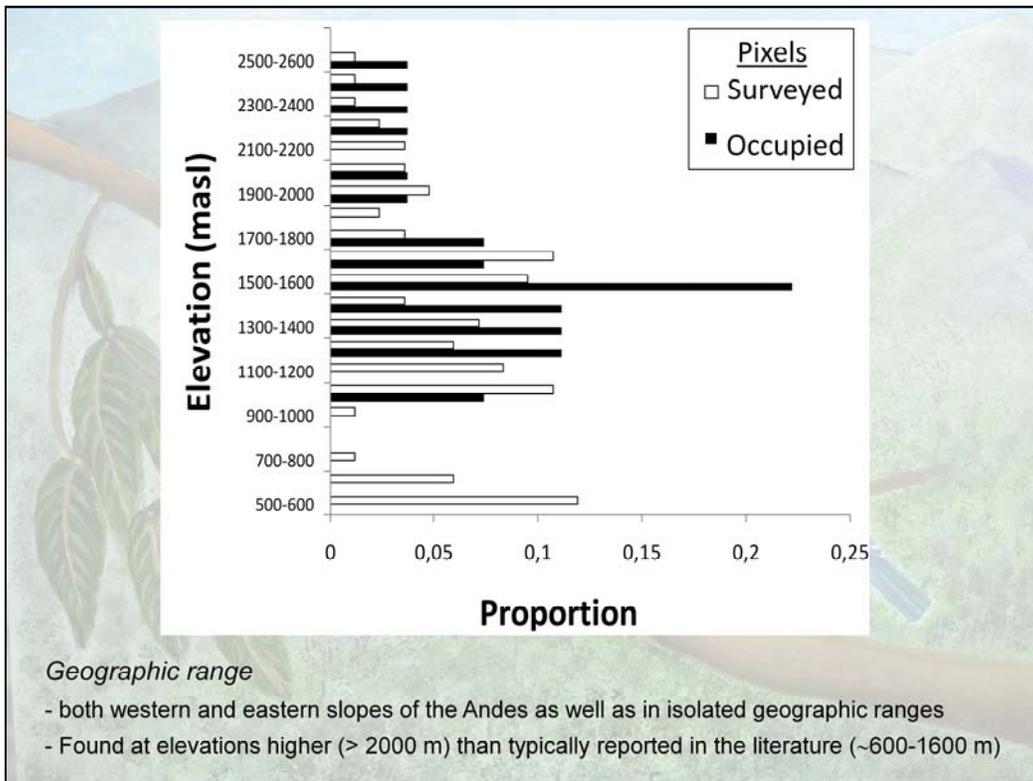


Based on our surveys, indeed, deforestation and grazing are the two major causes of habitat loss in the Andes. Importantly, conflict in particular is a major threat in many areas, not only guerrilla presence, but landmines, illegal crops, illegal mining. For some of those the effects are apparently known (like coca, but governments are reluctant to let conducting studies), but others as internal conflict is in some cases contradictory. Some papers have been published showing that exclusion of people from some areas may actually allow for habitat recovery (but at a HIGH social cost and larger pressure in cities).

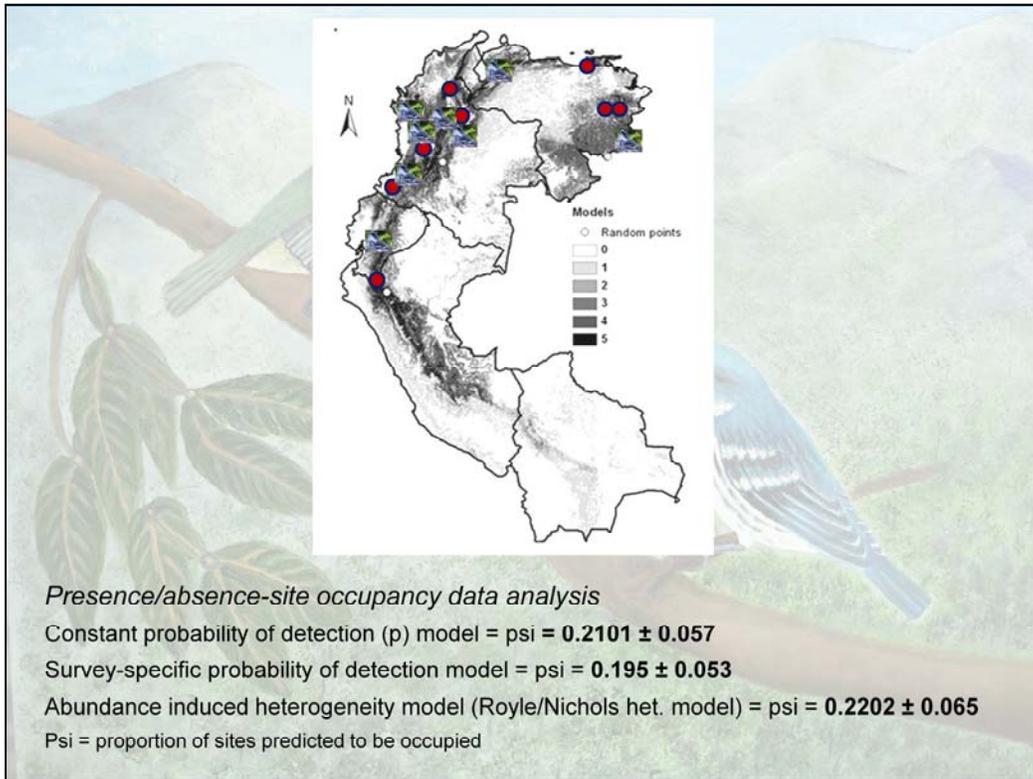
A/ Checking my pixels, grazing was present in ~ 39% of my points. So it is a bit coincidence. Deforestation can include the others, so it represents the proportion of all pixels that had some level of deforestation



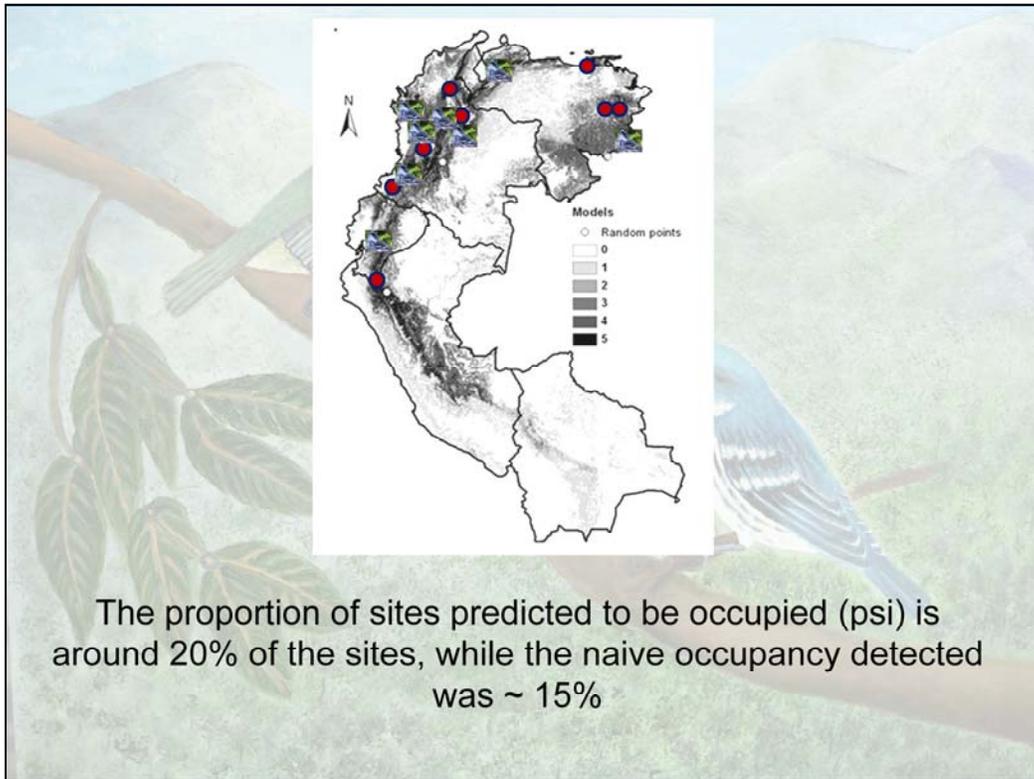
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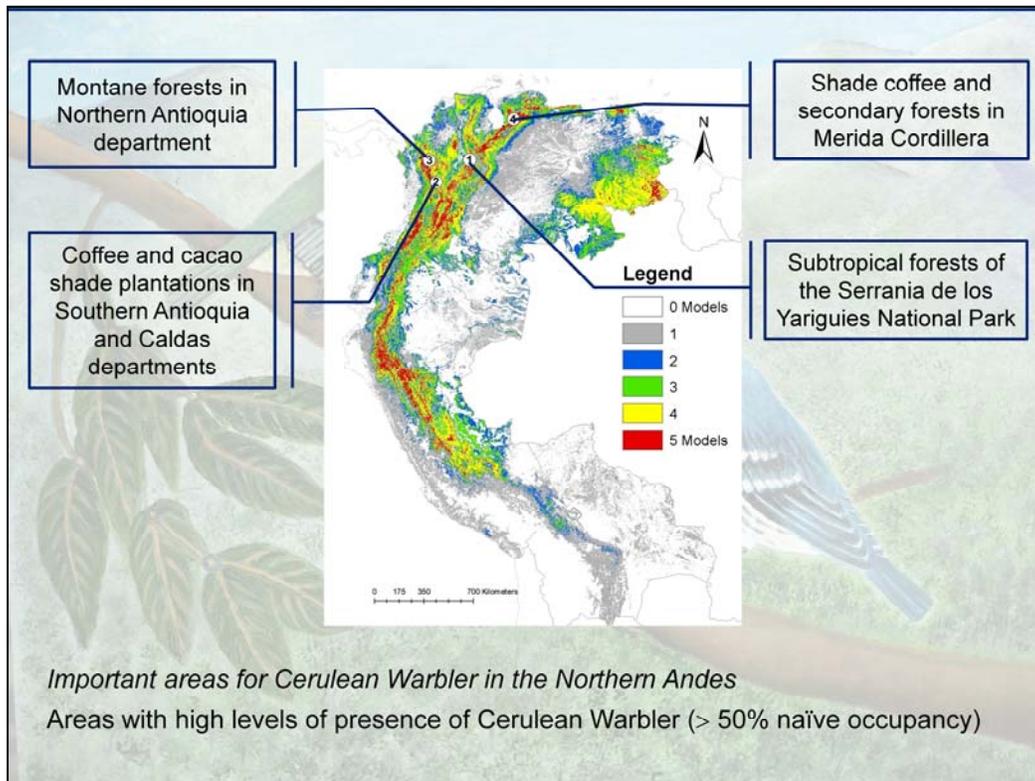
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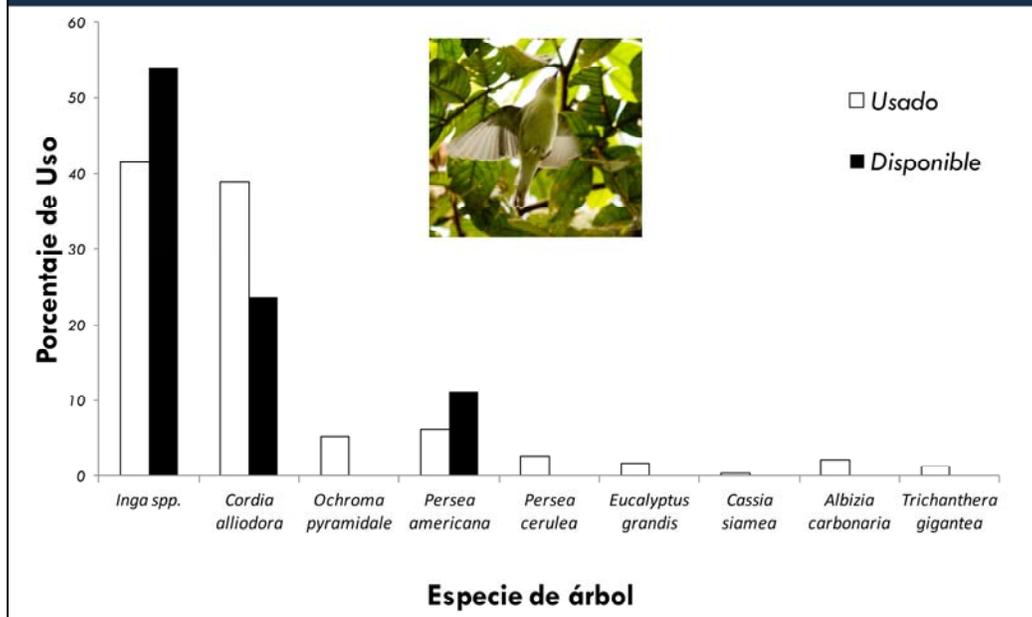
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Tree selection



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Habitat-dependent relationships



Is the *value* of different habitats for Cerulean Warbler mediated by landscape and local-scale factors?



In this respect, my study differs from most others that focused exclusively on mature forest in human-dominated matrices (e.g. Stouffer and Bierregaard 1995).

Little is known about how NTMB respond to local and landscape scale environmental variation in their wintering grounds.

We wanted to evaluate the simultaneous effect of multiple spatial scales (e.g. patch-and landscape-levels) on distribution of birds across a range of landscape elements (i.e. habitat types).



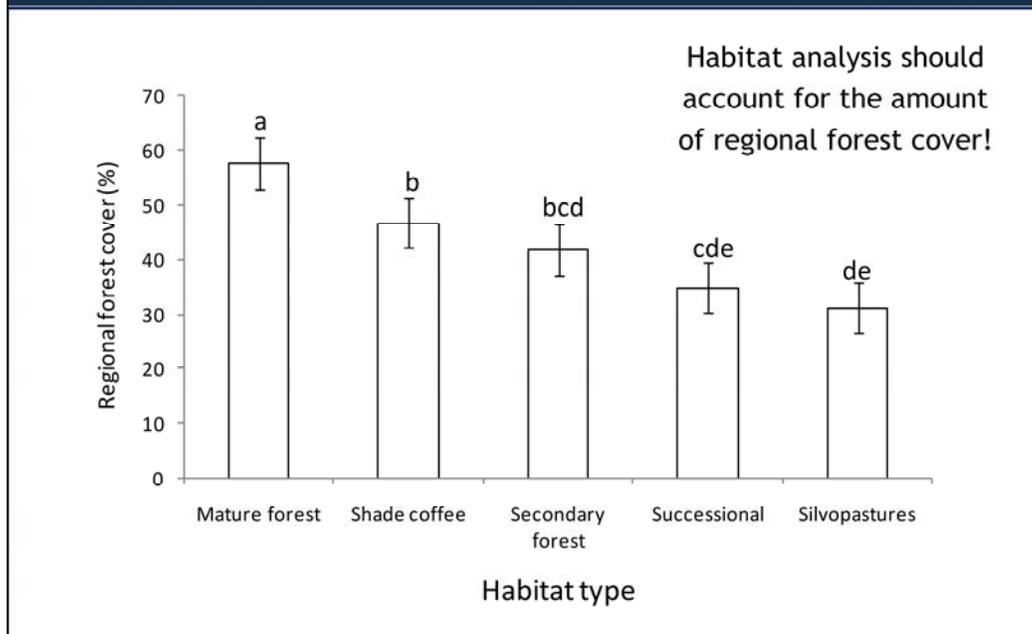
Unfortunately, habitat loss associated to deforestation, agriculture, ranching, etc

But also because of the complex relationships that arise from the interaction of local communities as well as interactions with transient communities, and what is the extent represent a major threat...

- (1) Major on-going changes across the Andes
- (2) Strong relationship between migrants and flocks

How do land uses affect migratory birds and mixed-species flocks?

Importance of regional forest cover



We also know that regional forest cover is important, so...

Strength/novelty of my study. Relevance of regional forest cover in migratory bird/MSF conservation!!

Mature forest is surrounded by greater forest cover than other habitats.

Consequently, habitat analyses should account for regional forest cover.

In particular, we wanted to highlight the importance of considering the landscape context in habitat relationships. It is, what we know from almost all studies in the Neotropics about the effects of forest degradation are related to forest fragmentation (study birds within forest fragments), but if we are assisting to a massive change in our landscapes, it makes more sense to look at other habitats. Yet, we have to consider the remaining forest cover in these areas.

Figure 3.5. Percent forest cover within 1-km² pixels differed among five habitat types in the Andes, 2007-2010. Different letters indicate significant differences among habitats. $\alpha = 0.05$.

we will find an effect of the amount of forest cover at the landscape scale on the habitats, and if is in fact a confounding variable

As expected, there is a strong relationship between those surveyed sites named mature forest and the amount of forest cover at the landscape scale (unequally distributed among habitat types). Hence, it is needed to control for this factor since it can confound the analysis at the patch level (i.e. relationship between NTMB/flocks and habitat type).



Top-ranked models for Cerulean Warbler

Models	K	AICc	Δ AICc	W_i
1. CERW presence = <i>local structure</i> + <i>forest cover</i> + <i>local structure*forest cover</i>	4	71.53	0.000	0.35
2. CERW presence = <i>habitat type</i> + <i>forest cover</i> + <i>habitat type*forest cover</i>	10	73.07	1.544	0.16

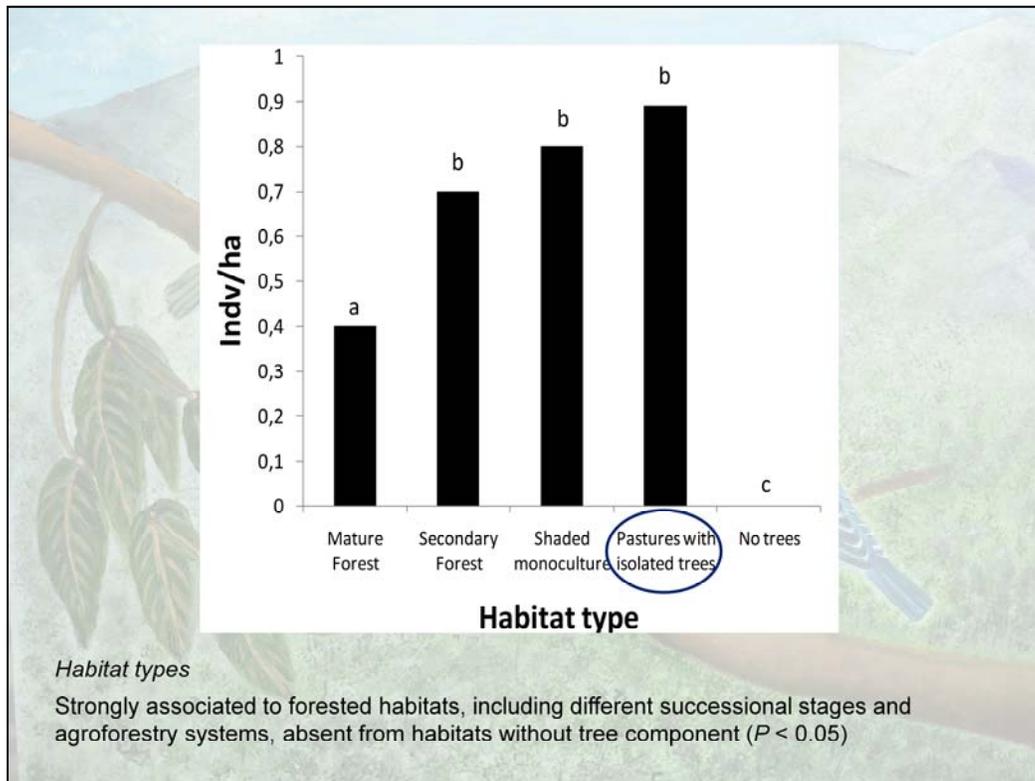
Cerulean Warbler is affected by both the amount of forest available within a landscape and the nature of the matrix

We need to account for that...how to do so??

Using an AIC approach to examine models that best explain richness and abundance patterns of flocks and migrants;

-Mixed species flocks attributes (i.e., encounter rate, size, and species richness) were best explained by the combined effect of patch- (habitat characteristics) and landscape-scale (regional forest cover) factors (Table 3.7).

-Variation in richness and abundance of Neotropical migratory birds detected along transects was explained by strong interactions among local-, patch- and landscape-scale environmental factors (Table 3.8)



Compared to the Colombian study, our densities of Cerulean Warbler were similar in forest

But greater in shade coffee (2.5 in Venezuela versus 0.8 in Colombia)

Currently, it is unclear why this differences exists. It is possible that the sites in Colombia were more isolated or had different floristic structure.



Of the coffee that has been converted, 80%
changed to pasture (for cattle grazing)

But, unfortunately, not all the coffee area has been transformed to other crops,
but to pastures for cattle grazing



To highlight the type of scenario that the Andes is facing, after conversion of monocultures into open pastures with some tree component and how we should work around this new challenge. As seen throughout the presentation, our challenge goes a bit farther, to consider that landscape may actually have a strong effect on what we see, count, and find at the patch level. Something encouraging, is that we know that these habitats, as the one shown in this slide, may actually act as a habitat for birds (we do not know how well they may behave in terms of habitat quality), but it is an starting.

We also are facing a tremendous boom of conservation awareness not seen before, and many people, from different levels, are doing a great job to spread the word. So, the combination of both actions, ecological and social work, must act together in pro of an overall improvement of conditions.



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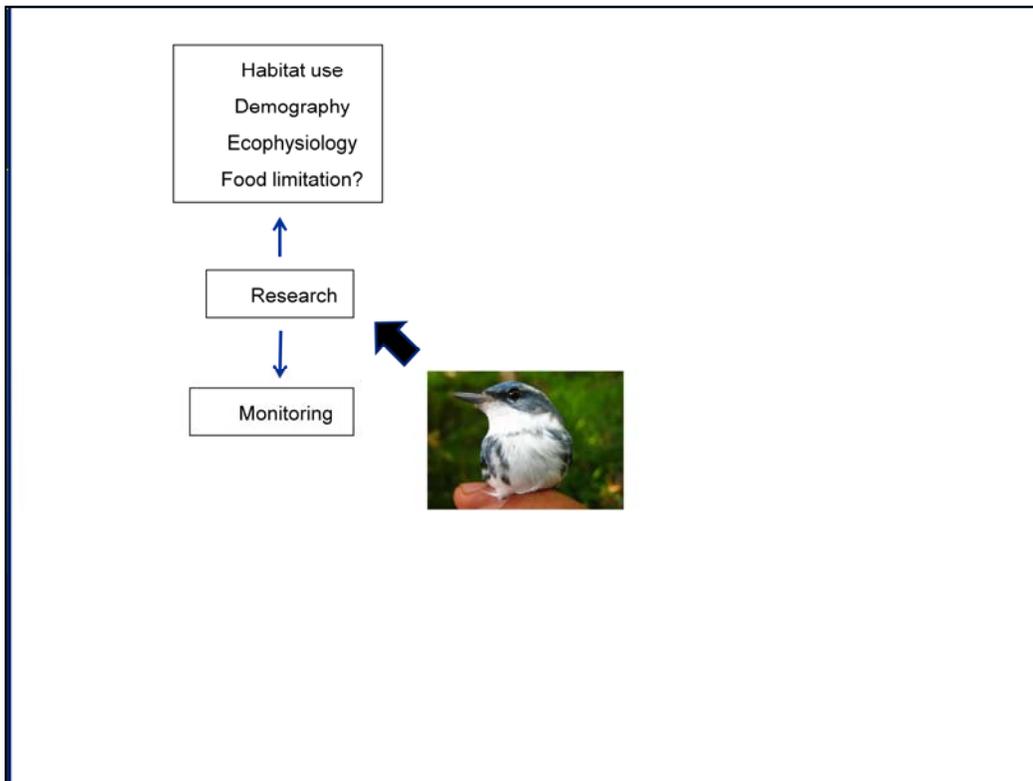
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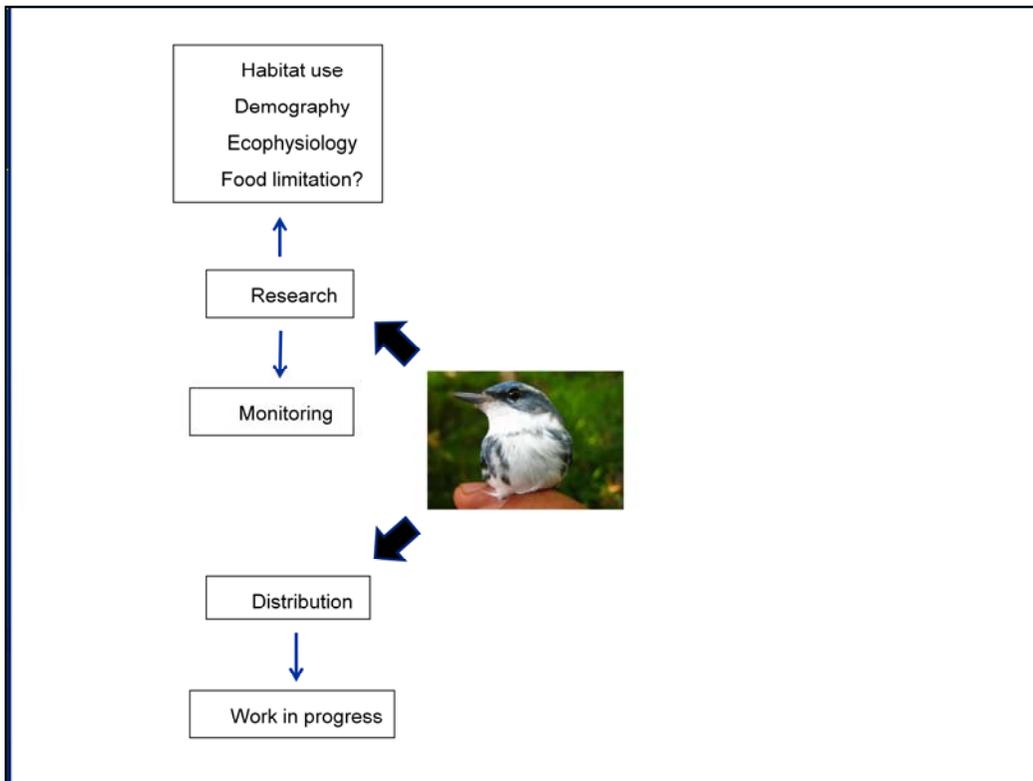
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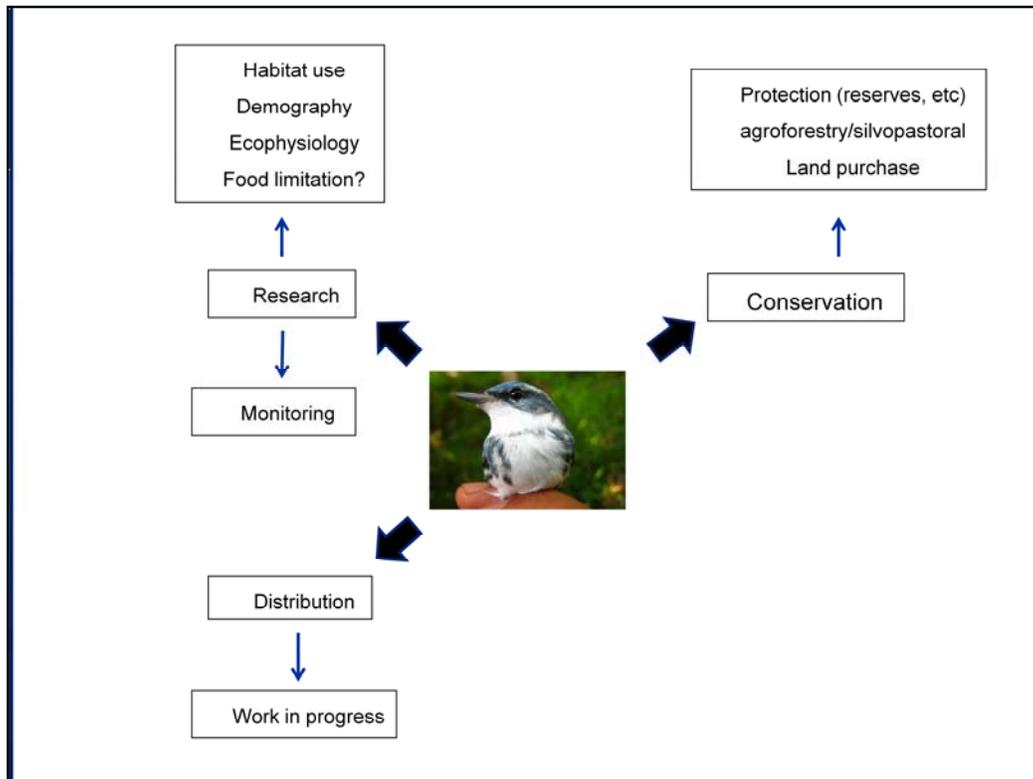
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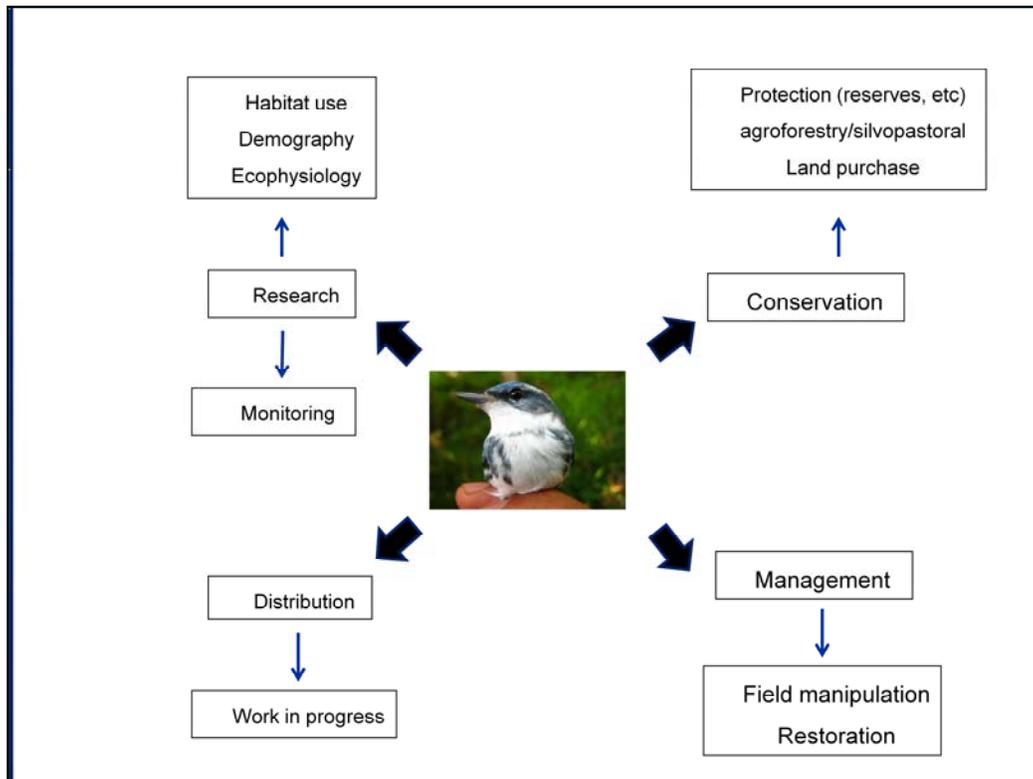
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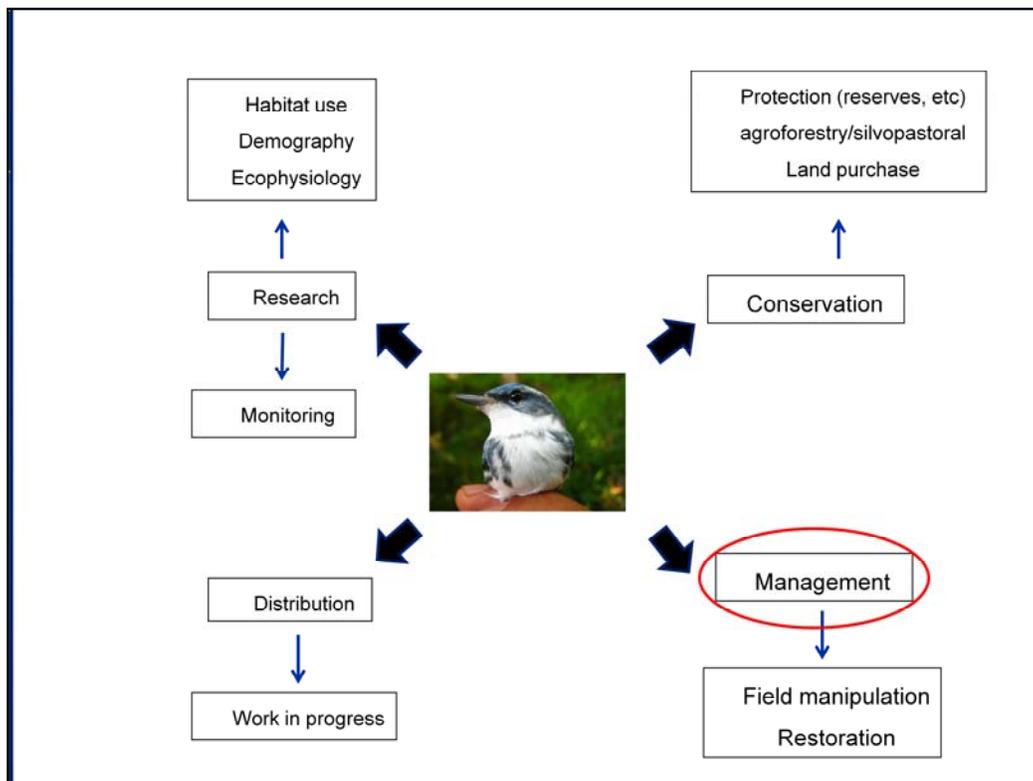
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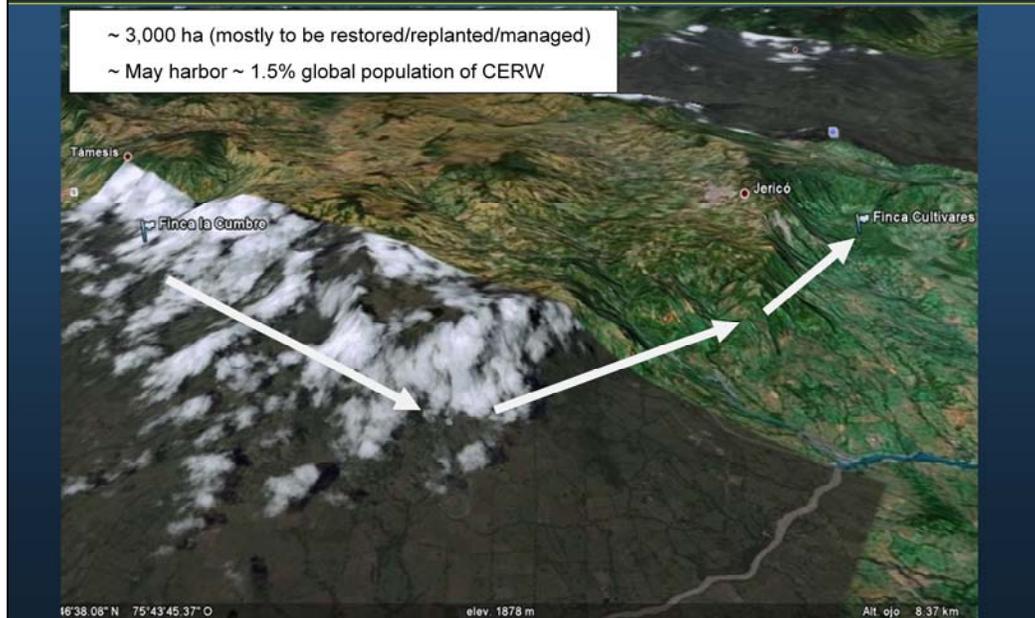
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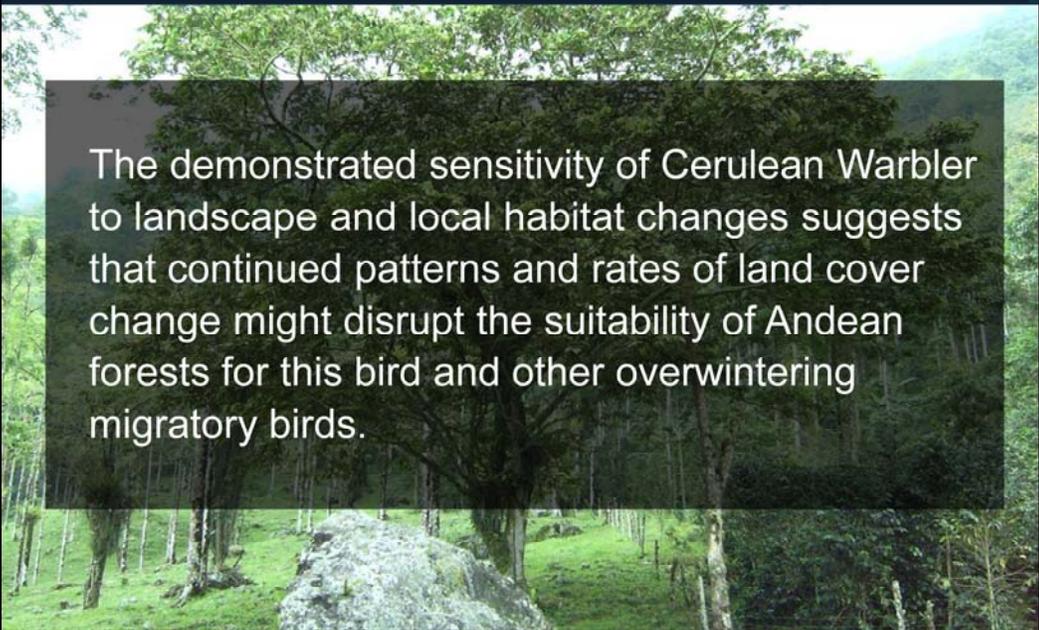
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Case study: Eastern slope of the Western Colombian Cordillera, Tamesis and Jerico corridor



NTMB are characterized by using a wide variety of habitats (and how this perception has changed over the time), with some of them as the CERW. Additionally, they interact with the resident community in different complex ways, but I am interested in a particular social system/interaction called MSF. Then I switch with the last bullet

Conclusions

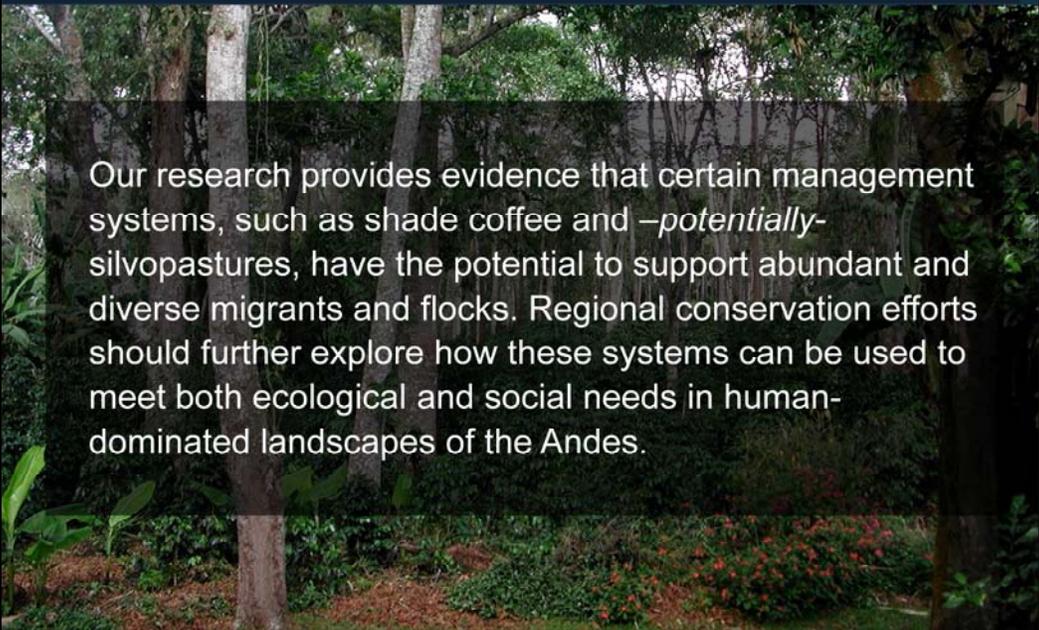


The demonstrated sensitivity of Cerulean Warbler to landscape and local habitat changes suggests that continued patterns and rates of land cover change might disrupt the suitability of Andean forests for this bird and other overwintering migratory birds.

Neotropical migrants and flocks heavily use agroforestry/silvopastoral systems. From a conservation standpoint, this is promising since there is opportunity for social & ecological benefits.

For me, this result is quite important. Suggestions to Regional corporations/agencies about the importance of forest at the landscape level...we have an additional proof that we need to preserve regional forest at the same time that local actions are conducted...

Conclusions



Our research provides evidence that certain management systems, such as shade coffee and –*potentially*– silvopastures, have the potential to support abundant and diverse migrants and flocks. Regional conservation efforts should further explore how these systems can be used to meet both ecological and social needs in human-dominated landscapes of the Andes.

Fortunately, my research provides evidence that certain management systems, such as shade coffee and silvopasture, have the potential to support abundant and diverse migrants and flocks. Regional conservation efforts should further explore how agroforestry systems can be used to meet both ecological and social needs in human-dominated landscapes of the Andes. Ecological services,

