

1-2003

Birds, Landslides and Pastures: A Biogeographic Conundrum

Mark R. Welford

Georgia Southern University, mwelford@georgiasouthern.edu

Follow this and additional works at: <https://digitalcommons.georgiasouthern.edu/geo-facpres>



Part of the [Geography Commons](#), and the [Ornithology Commons](#)

Recommended Citation

Welford, Mark R.. 2003. "Birds, Landslides and Pastures: A Biogeographic Conundrum." *Geology and Geography Faculty Presentations*. Presentation 1.

<https://digitalcommons.georgiasouthern.edu/geo-facpres/1>

This presentation is brought to you for free and open access by the Geology and Geography, Department of at Digital Commons@Georgia Southern. It has been accepted for inclusion in Geology and Geography Faculty Presentations by an authorized administrator of Digital Commons@Georgia Southern. For more information, please contact digitalcommons@georgiasouthern.edu.

Birds, landslides, and pastures: a biogeographic conundrum

Mark R. Welford Department of Geology & Geography
Georgia Southern University

Current Understanding

- Landslides are naturally-occurring, highly-disturbed narrow yet transient landscape features
- Landslides create a heterogeneous mix of cleared forest, linear strips of succession forest, and undisturbed primary forest
- Pastures and Crop Fields are broader and more permanent than landslides
- Both are common in Northern Andes

Threatened Restricted Range Bird Species



White-faced Nunbird (*Hapaloptila castanea*)



Toucan Barbet (*Semnornis ramphastius*)



Plate-billed Mountain-Toucan (*Andigena laminirostris*)

Photographs courtesy of Iain Campbell and Nicholas Athanas

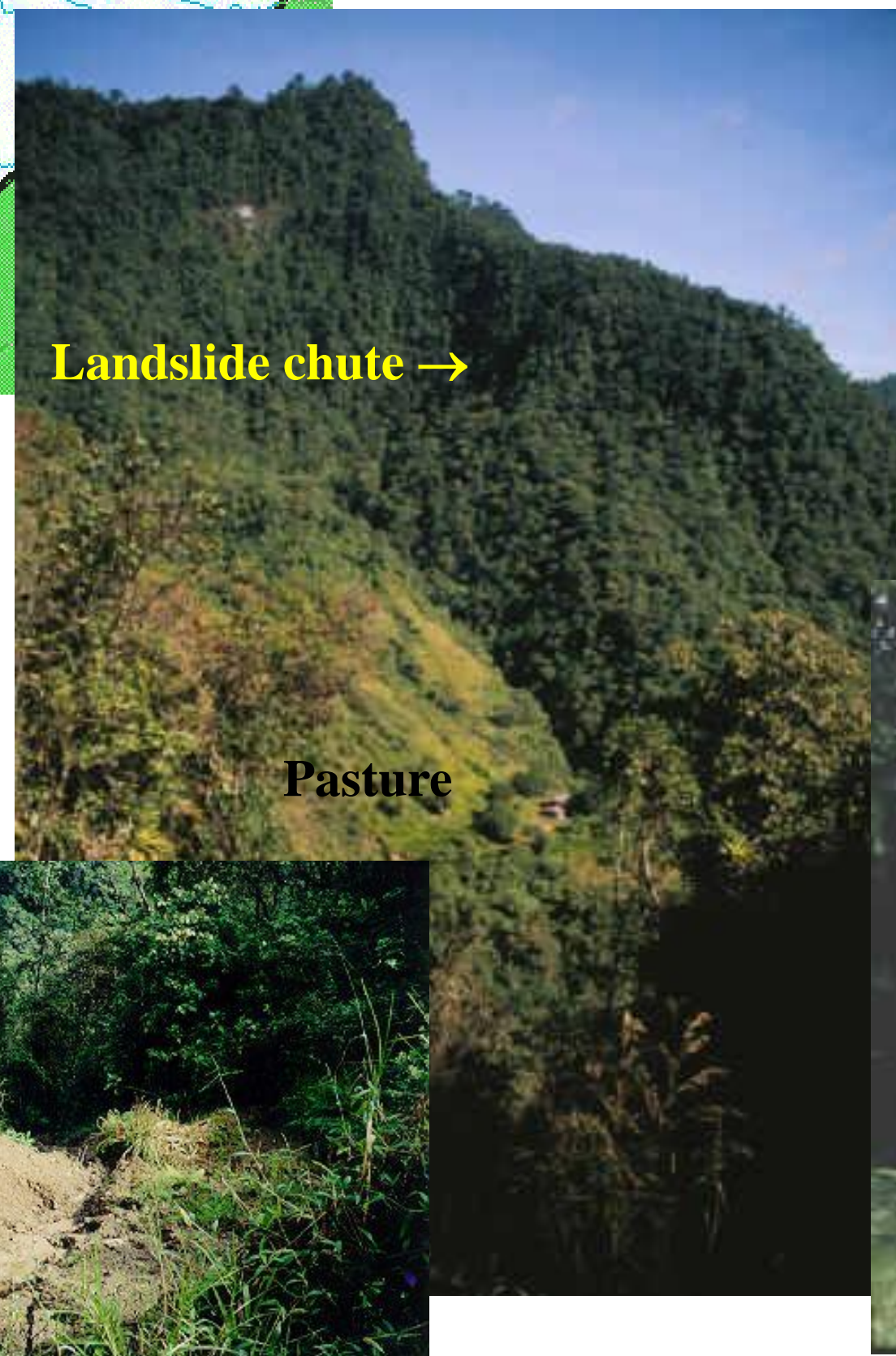
Study Area



Valley - 6 km long, 1650 - 2350 m
Slopes - 20-60°
Thick, highly-weathered soils
296 bird sp. observed



2 yr pasture w/exotic grasses



Landslide chute →



Pasture



Current Pasture

Models

Landslide and Succession Trajectories

Typical slopes

Model 1: Landslide → Secondary Forest → Forest

Typical slopes w/exotic grass colonization

Model 2: Landslide → Grasses w/patches of bamboo & secondary forest

Hollow or chute or 1st order stream channel

Model 3: Landslide → Secondary Forest (if TF ratio >1)

Model 4: Landslide → Grasses (if colonized by exotic grasses)

Abandoned Crop Field/Pasture and Succession Trajectories

Abandoned crop field

Model 5: Crop field → Secondary Forest → Forest

Abandoned crop field (>34° slopes)

Model 6: Crop field → strips of Secondary Forest and landslide scars

Abandoned Pasture seeded w/indigenous grasses

Model 7: Pasture → Secondary Forest → Forest (typically more rapid transition than Model 5)

Abandoned Pasture seeded w/indigenous grasses subsequently periodically burnt or re-used

Model 8: Pasture → Secondary Forest (if TF ratio >1)

Abandoned Pasture seeded w/exotic grasses

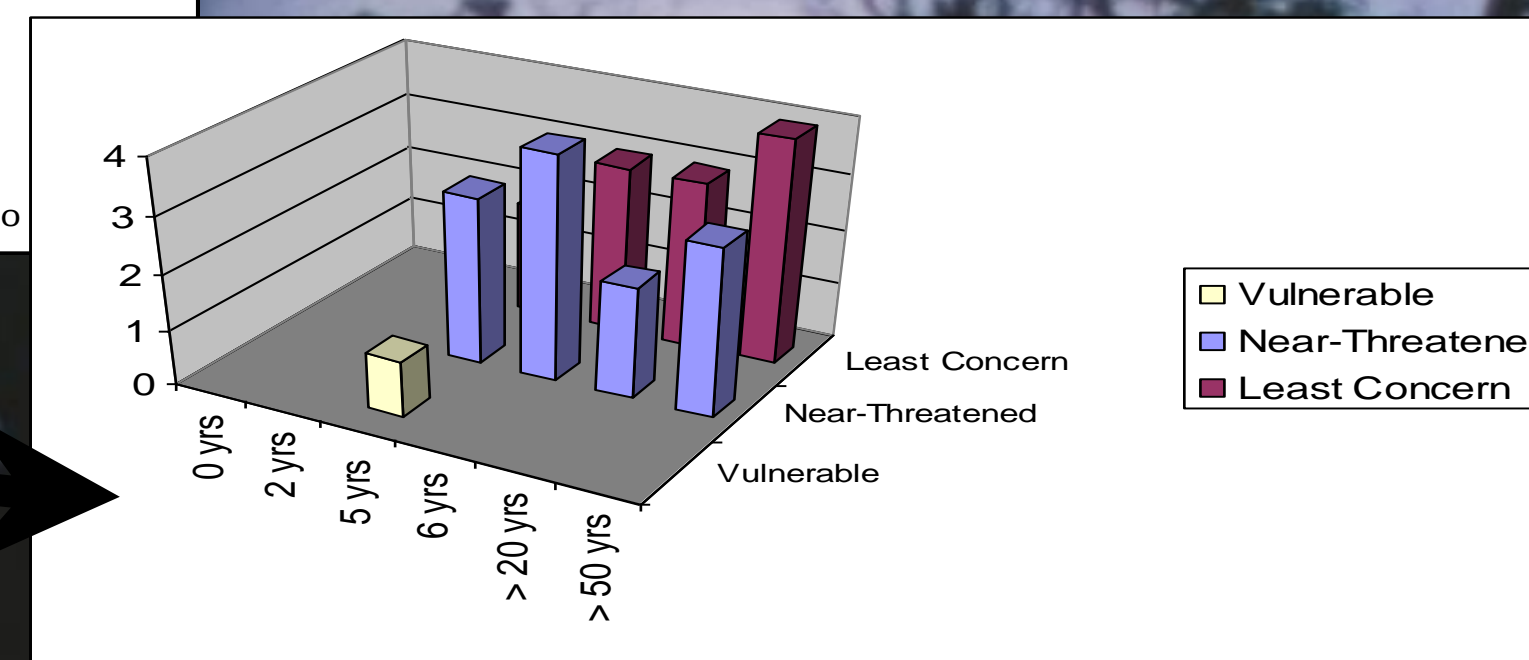
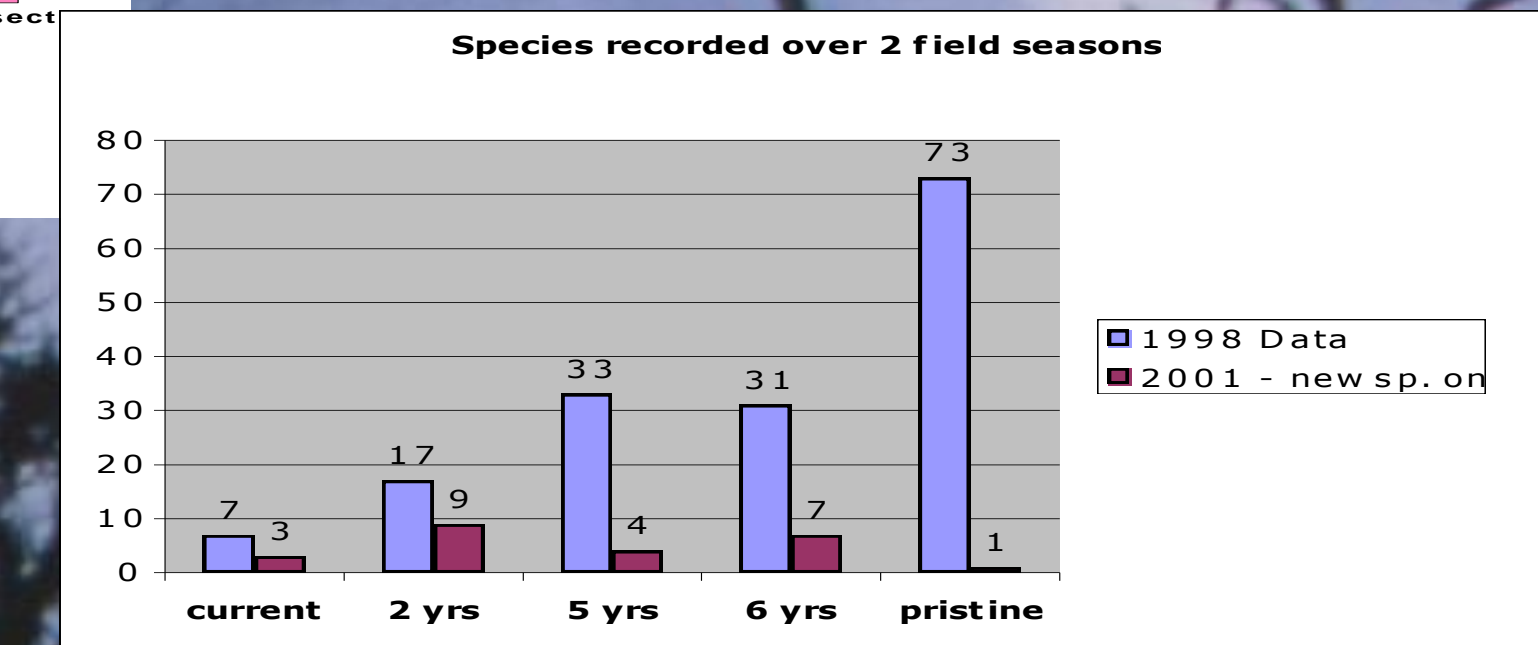
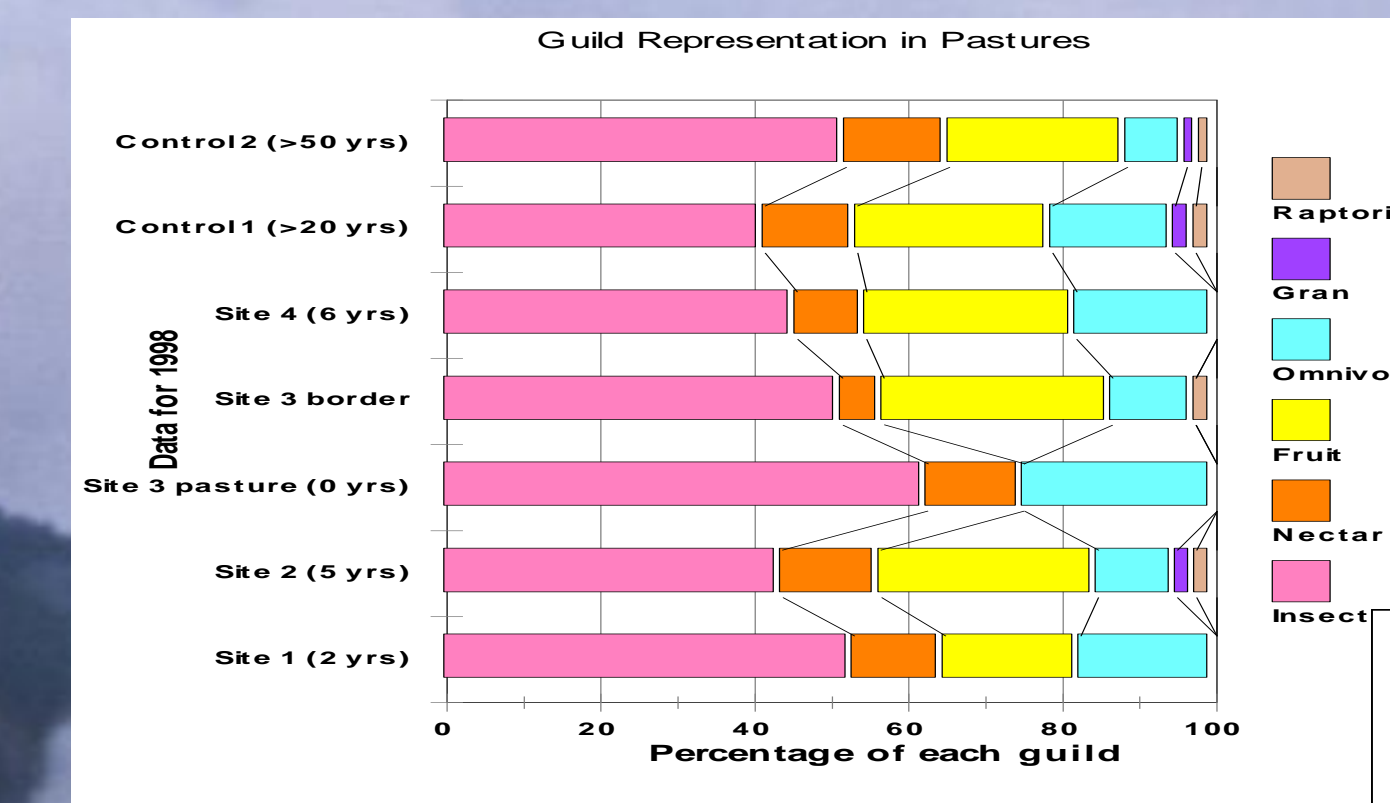
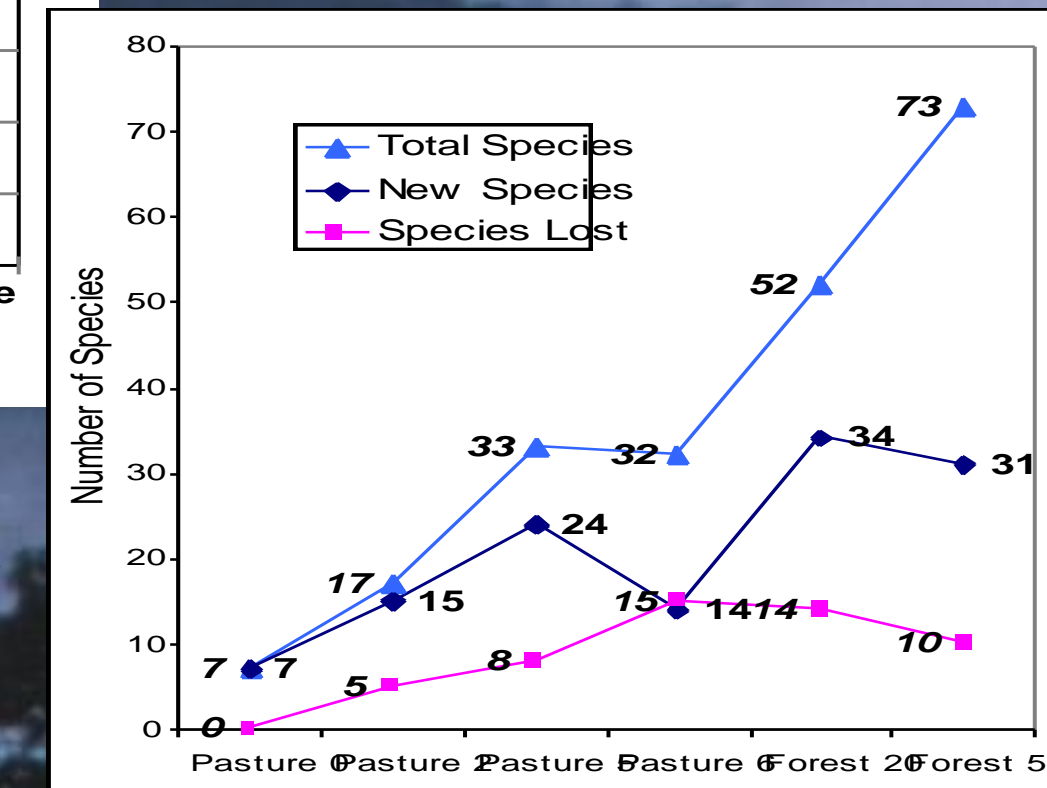
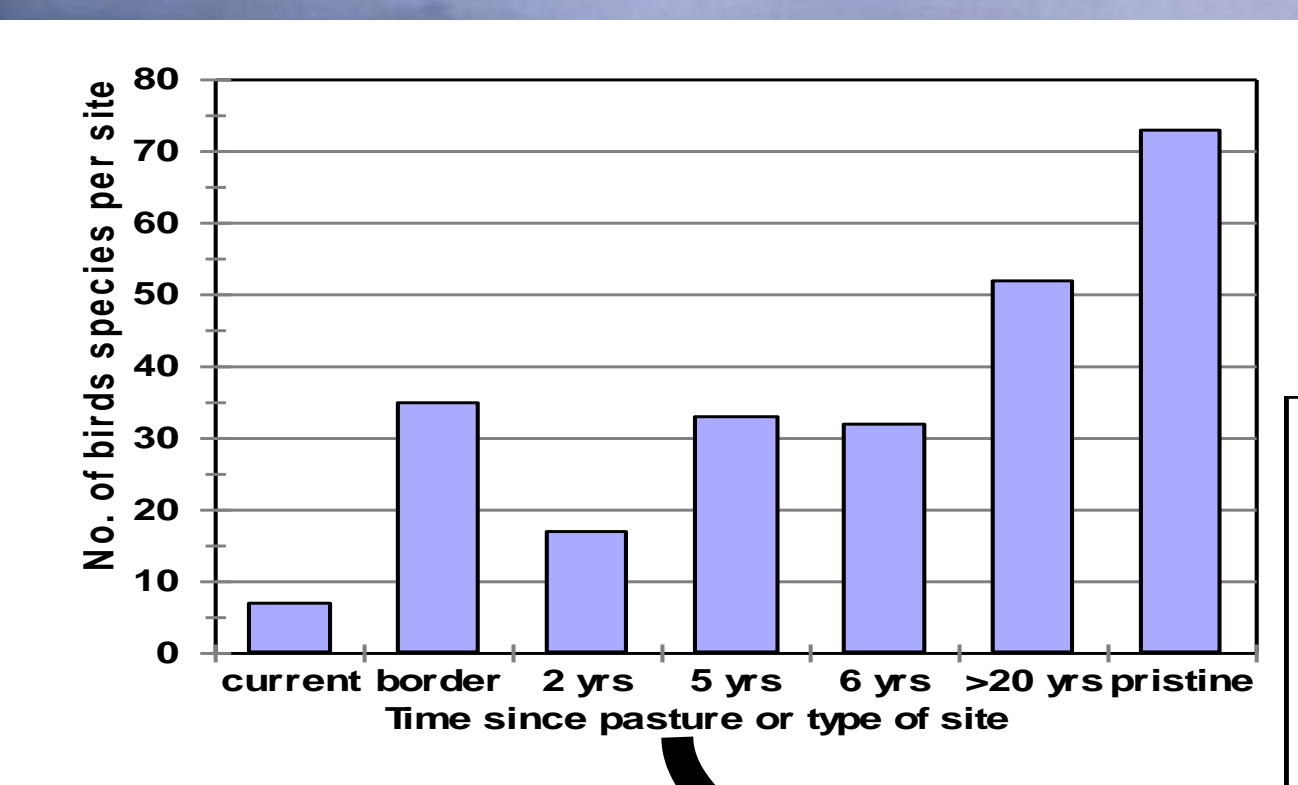
Model 9: Pasture → Grasses w/clumps of bamboo and isolated trees

Transient Form Ratio (Brunsdon and Thornes, 1979)

TF > 1: Because the mean recurrence time of events capable of producing change is shorter than the time taken for the system (or component of the system) to recover, there is likely to be a poor correspondence between agents and resulting forms; that is, forms will be predominantly transient.

TF < 1: the system has the potential to adjust to new conditions before the next major disturbance so that characteristic forms will tend to prevail after the initial recovery period, leading to more reliable process-response relationships

Field Data (1998, 2001)



Models and Pasture Data

Unconstrained Succession - 1, 2, 3, 4

Current, 5 yrs, >20 yrs, >50 yrs = Models 1, 5, 7

- Rapid increase in bird species w/time from disturbance
- 5 yrs - many restricted-range sp. observed

Limited Succession - 1, 2, 3

2 yrs and 6 yrs = Models 2, 3, 6, 8

- Slower increase in bird species

Fully Constrained Succession - 1

Current = Models 4, 9

- Very few bird species observed
- Rare White-faced Nunbird bred in landslide (possible landslide specialist)

Common & rare birds recorded in pastures and in landslide scars

Birds in (1)

Azara's Spinetail
Plain-tailed Wren

Birds in (2)

Yellow-bellied Chat-Tyrant
Slaty-throated Whitestart
Russet-crowned Warbler
Turquoise Jay
Chestnut-crowned Antpitta
Speckled Hummingbird
Spillmann's Tapaculo*
Smoke-colored Pewee

Birds in (3)

Spillmann's Tapaculo*
Chestnut-crowned Antpitta
Azara's Spinetail
Strong-billed Woodcreeper
Striped Treehunter
Russet-crowned Warbler
Black-crested Warbler
Masked Flower-piercer
Smoke-colored Pewee

Birds in (4)

Russet-crowned Warbler
Spillmann's Tapaculo*
Chestnut-crowned Antpitta
Striped Treehunter
Masked Trogon
Speckled Hummingbird
Green Violet-ear
Plain-tailed Wren
Smoke-colored Pewee
Glossy-black Thrush
Black-crested Warbler

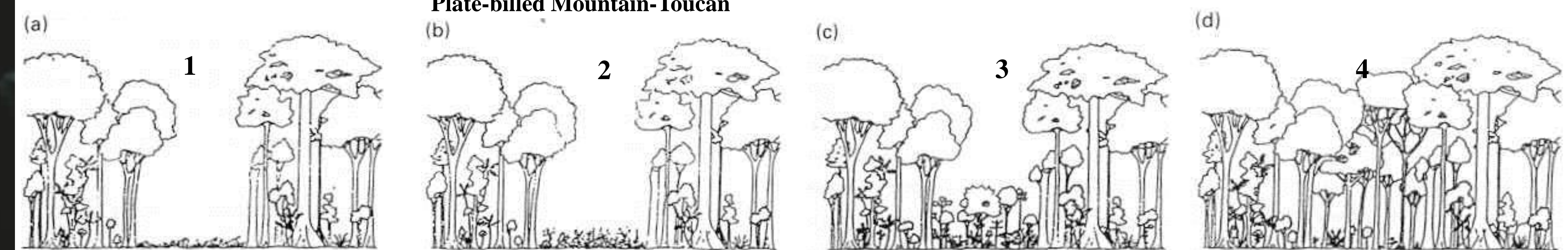
Preliminary Data on Rare or Restricted Range Birds recorded singing in or breeding (B) both pastures and landslide scars undergoing succession:

White-faced Nunbird (B)
Giant Antpitta
Tanager-finch (B)

Giant Antpitta
Swallow-tailed Nightjar (B)
Toucan Barbet
Plate-billed Mountain-Toucan

Toucan Barbet
Plate-billed Mountain-Toucan
Beautiful Jay

Toucan Barbet
Plate-billed Mountain-Toucan
Dark-backed Wood-Quail



Landslide and Succession Dynamics

Typical slopes

Model 1: Landslide → Secondary Forest → Forest

Typical slopes w/exotic grass colonization

Model 2: Landslide → Grasses w/patches of bamboo and secondary forest

Hollow or chute or 1st order stream channel

Model 3: Landslide → Secondary Forest (if TF ratio >1)

Model 4: Landslide → Grasses (if colonized by exotic grasses)

Abandoned Crop field/Pasture and Succession Dynamics

Abandoned crop field

Model 5: Crop field → Secondary Forest → Forest

Abandoned crop field (>34° slopes)

Model 6: Crop field → strips of Secondary Forest and landslide scars

Abandoned Pasture seeded w/indigenous grasses

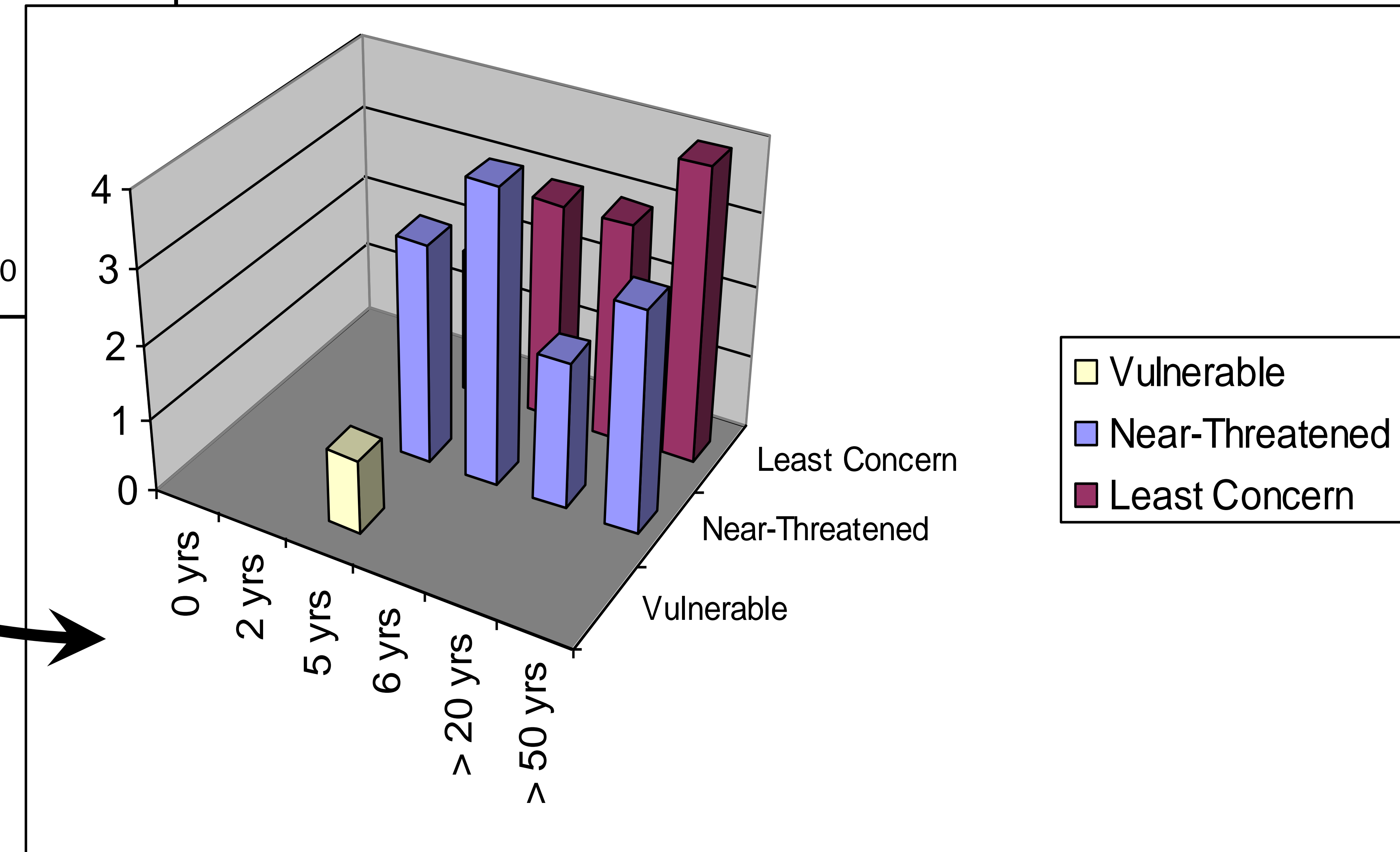
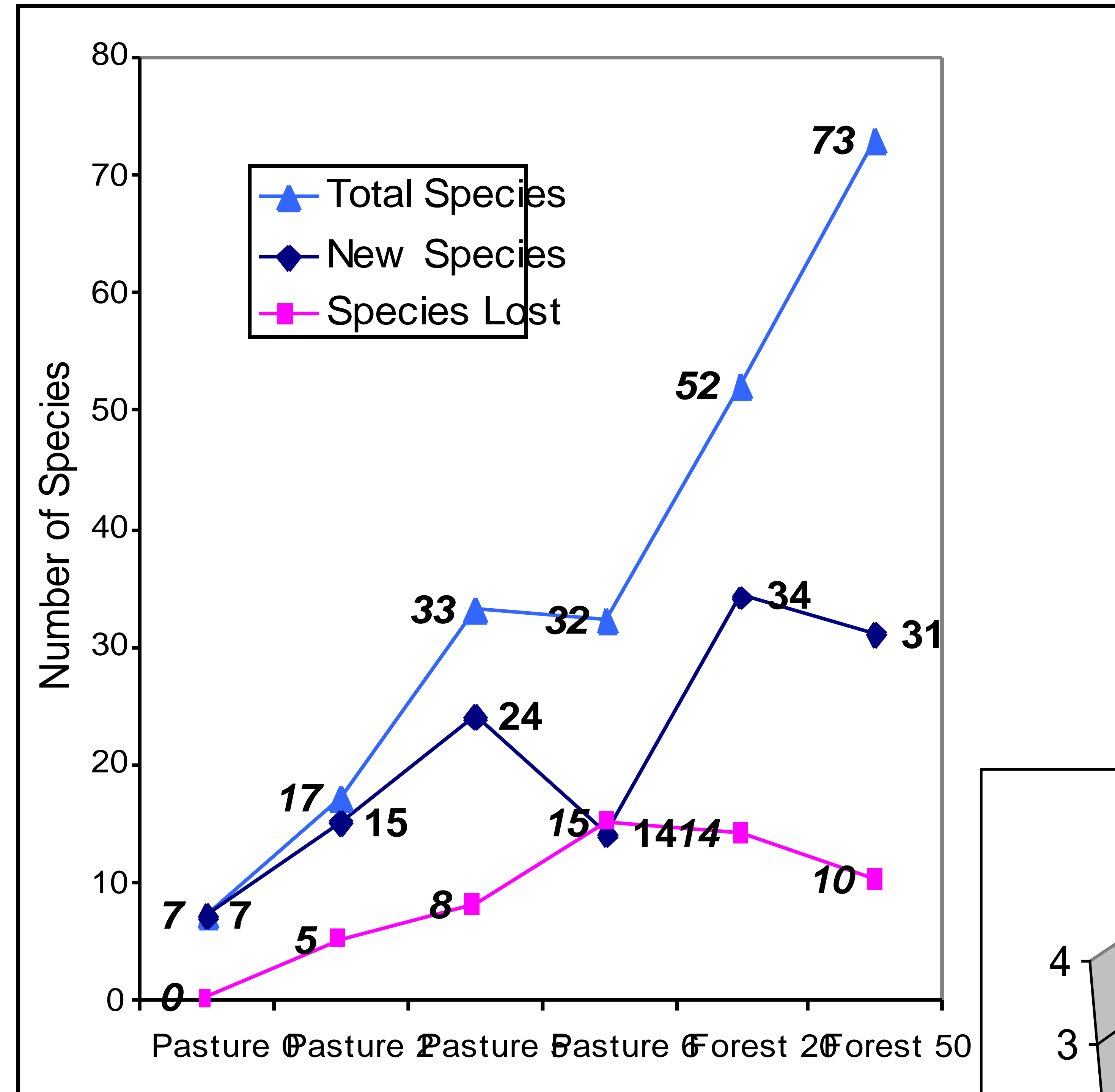
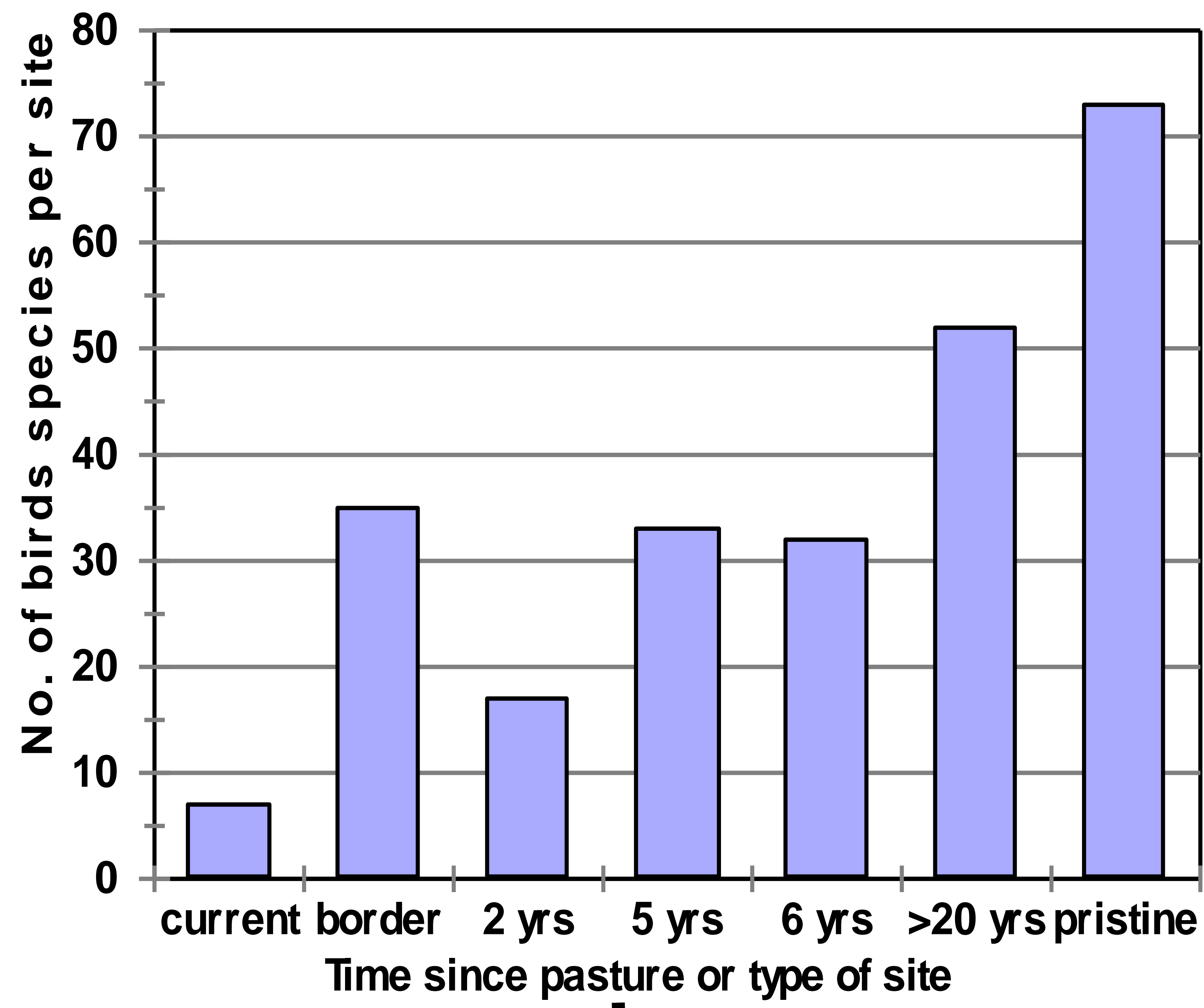
Model 7: Pasture → Secondary Forest → Forest (typically more rapid transition than Model 5)

Abandoned Pasture seeded w/indigenous grasses subsequently periodically burnt or re-used

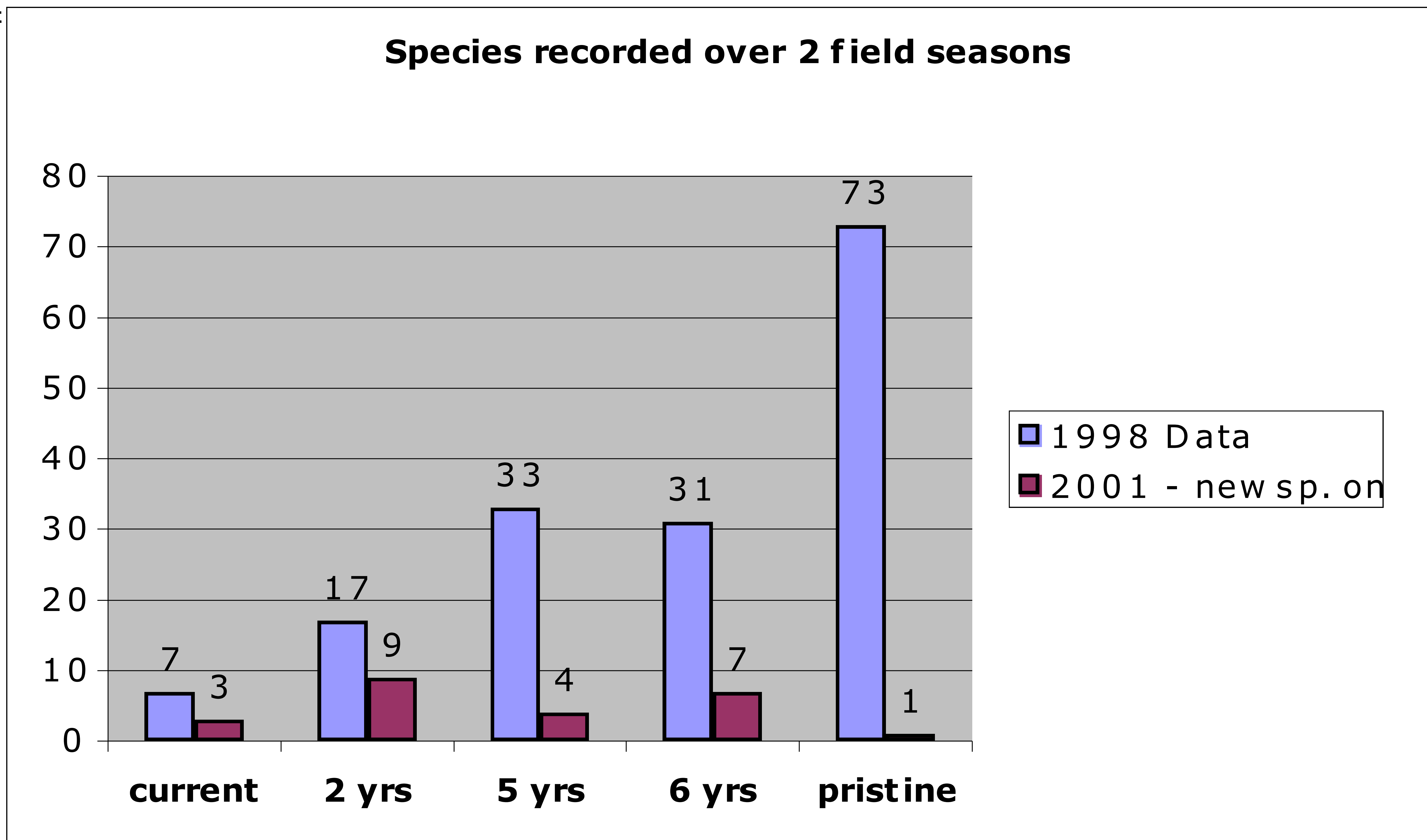
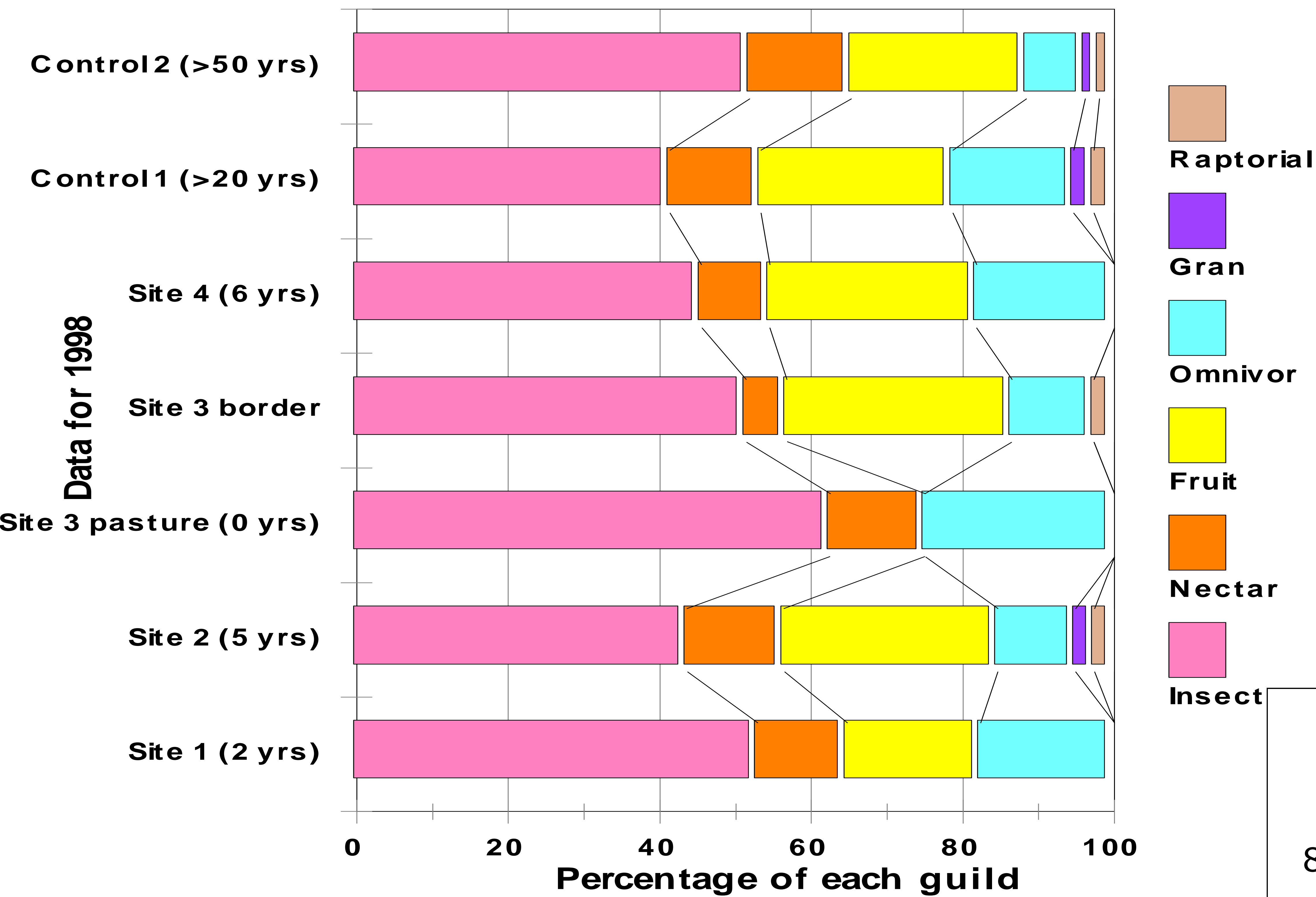
Model 8: Pasture → Secondary Forest (if TF ratio >1)

Abandoned Pasture seeded w/exotic grasses

Model 9: Pasture → Grasses w/clumps of bamboo and isolated trees



Guild Representation in Pastures



Unconstrained Succession

Current, 5 yrs, >20 yrs, >50 yrs = Models 1, 5, 7

- Rapid increase in bird species w/time from disturbance
- 5 yrs - many restricted-range sp. observed

Limited Succession

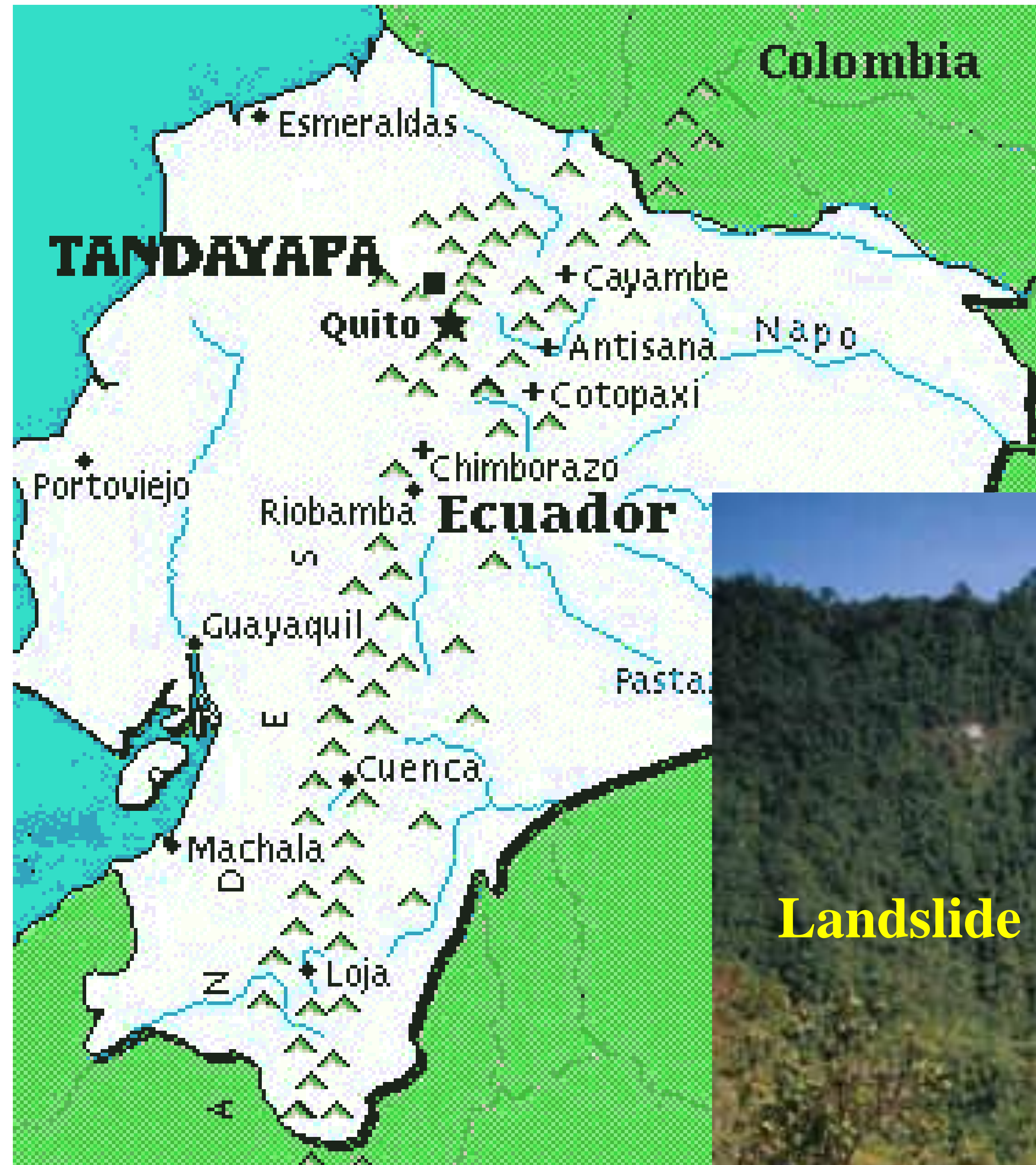
2 yrs and 6 yrs = Models 2, 3, 6, 8

- Slower increase in bird species

Fully Constrained Succession

Current = Models 4, 9

- Very few bird species observed
- Rare White-fronted Nunbird bred in landslide (possible landslide specialist)



Valley - 6 km long, 1650 - 2350 m

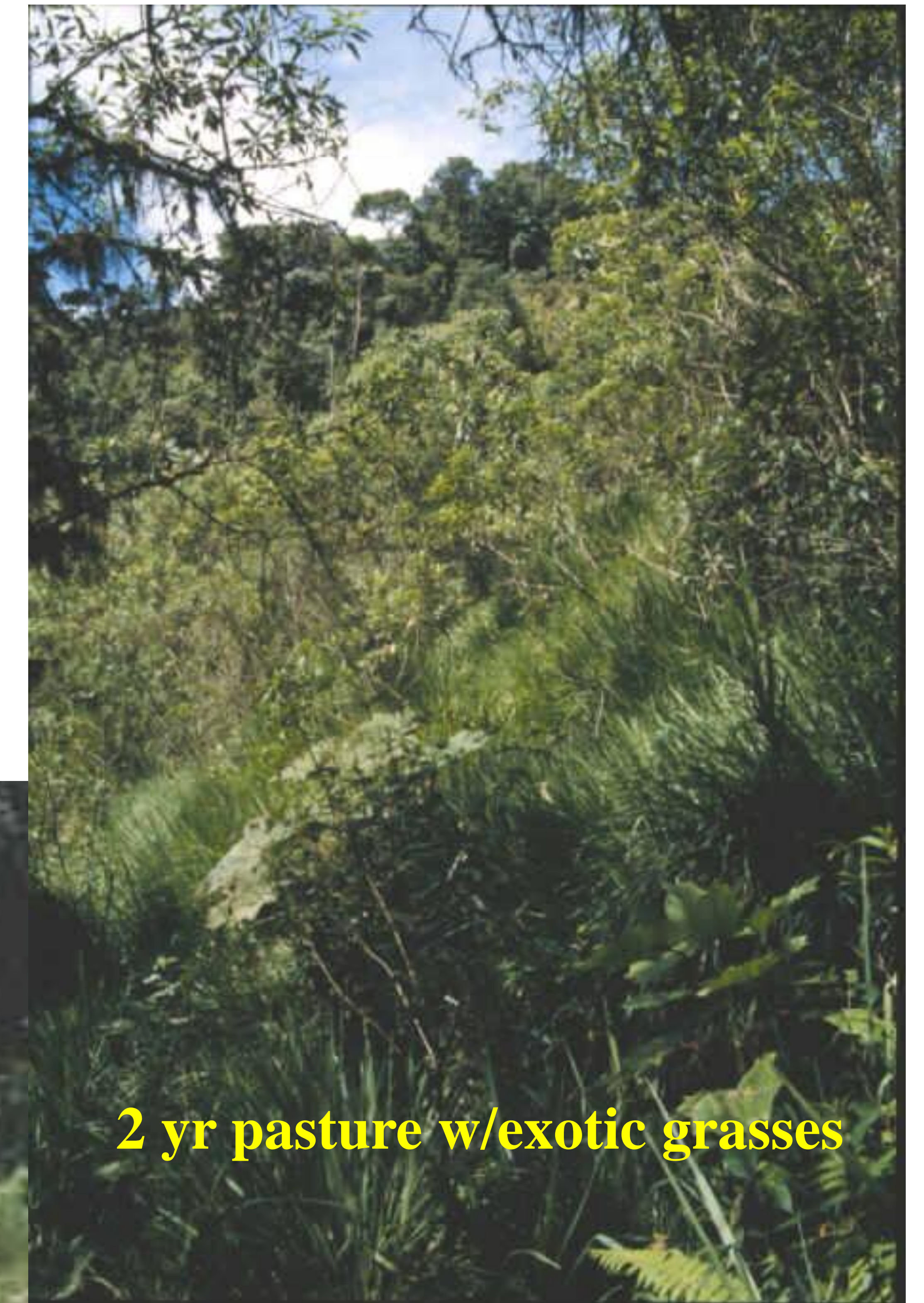
Slopes - 20-60°

Thick, highly weathered soils

296 bird sp. observed



Landslide scar →



2 yr pasture w/exotic grasses



Pasture



Current Pasture

Brunsdon and Thornes (1979)

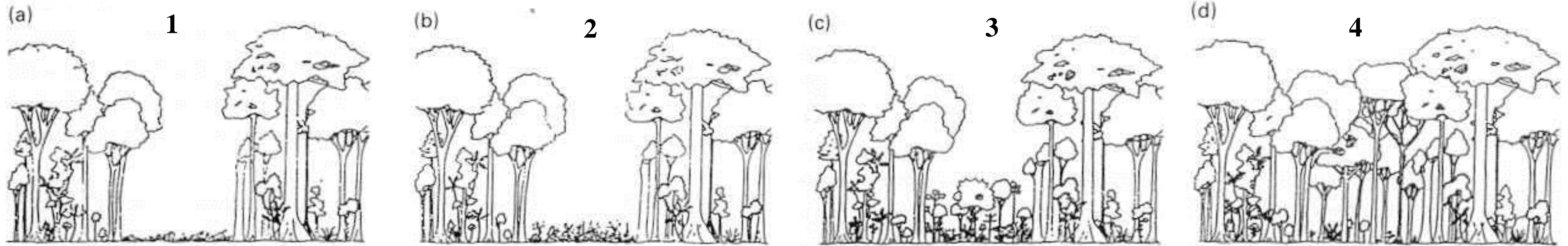
$TF > 1$: Because the mean recurrence time of events capable of producing change is shorter than the time taken for the system (or component of the system) to recover, there is likely to be a poor correspondence between agents and resulting forms; that is, forms will be predominantly transient.

$TF < 1$: the system has the potential to adjust to new conditions before the next major disturbance so that characteristic forms will tend to prevail after the initial recovery period, leading to more reliable process-response relationships.

Unconstrained Succession 1, 2, 3, 4

Limited Succession 1, 2, 3

Fully Constrained Succession 1



Commo Birds in (4)

Russet-crowned Warbler

Spillmann's Tapaculo

Chestnut-crowned Antpitta

Striped Treehunter

Masked Trogon

Speckled Hummingbird

Green Violet-ear

Plain-tailed Wren

Smoke-colored Pewee

Glossy-black Thrush

Black-crested Warbler