

1ST PHD COMMITTEE MEETING

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OUTLINE



General timeline



Proposed chapters



Review of coursework

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TIMELINE

	2021				2022				2023				2024	
	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer
Qualifying Exam	x													
Finish Coursework	x													
Preliminary Exam			x											
Begin Dissertator Status			x											
Chapter 1	x	x	x	x										
Chapter 2				x	x	x	x							
Chapter 3							x	x	x	x				
Chapter 4										x	x	x	x	
Planned Publication Submission				x			x			x				x
Expected Graduation														x

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CHAPTER I

A comparison of Dynamic Habitat Indices derived from MODIS, Landsat, and Sentinel-2 as predictors of forest bird distributions in Argentina

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BACKGROUND



Dynamic Habitat Indices
are useful for predicting
bird species richness

Applied less often to
predict individual species
distributions



Global DHIs from
MODIS (1 km spatial
resolution)

Coarse resolution masks
fine scale variation
important for
biodiversity



But...very fine resolution introduces 'false'
heterogeneity



Medium resolution
(~10-50m) may be
'sweet spot'

Landsat (30m) and
Sentinel-2 (10-20m)

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METHODS

1

Develop DHIs from
Landsat and Sentinel-
2

2

Model forest bird
species distributions
using DHIs from
MODIS, Landsat,
Sentinel

3

Rank models

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ANALYSES

- Use model rank to assess role of resolution in predicting species distributions
- Use variable importance to assess role of different DHIs in predicting species distributions
- Resolution Hypotheses:
 - Sentinel-2 in more high ranked models than Landsat and MODIS generally
 - MODIS models in fewest high ranked models
 - Altitudinal migrants well predicted by Sentinel-2 DHIs because they respond to fine scale heterogeneity due to topography
 - Species with large ranges, long-distance migrations, or that are nomadic might be better predicted by Landsat-8 or MODIS DHIs because they may respond to larger landscape features
- DHIs Hypotheses:
 - Tropical species = minimum and cumulative DHIs have higher variable importance in models
 - Temperate, migrant, canopy dwelling species = variation DHI higher variable importance in models

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EXPECTED RESULTS

- DHIs from Landsat and Sentinel for Argentina
- Maps of forest bird species distributions
- Quantitative evaluation of spatial resolution in explaining bird species distributions
- Quantitative evaluation of DHIs in explaining bird species distributions
- Anticipate publishing in: Journal of Applied Ecology or Ecological Applications

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SIGNIFICANCE - SCIENCE

- DHIs from Landsat and Sentinel
 - Landsat – same method, but outside of U.S.
 - Sentinel – not been attempted before
- Quantitative evaluation of spatial resolution in explaining bird species distributions
- Quantitative evaluation of DHIs in explaining bird species distributions
 - Instead of species richness
 - For many species, not just a few species

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SIGNIFICANCE - CONSERVATION

- Maps of DHIs are useful to land managers
- DHIs at multiple spatial resolutions relevant to management at different scales
- Species distribution models of forest birds relevant for conservation planning

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CHAPTER 2

Temporal and spatial variability in temperature and vegetation phenology as predictors of forest bird species distributions in Argentina

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BACKGROUND



Climate and phenology influence biodiversity



High spatial variability related to high biodiversity



Temporal variability positively associated with inter-annual changes

High temporal variability creates unpredictable conditions for survival & reproduction



Risk vs. resilience to climate change

High spatial variability = resilience
High temporal variability = risk

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METHODS

1

Model forest bird
species distributions

2

Temporal and spatial
variability in
phenology and
temperature as inputs

3

Create ensemble
models

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ANALYSES

- Use variable importance to assess role of different measures of variability in predicting species distributions
- Identify trends in which species are best predicted by the different measures of variability
 - Foraging guild, migratory strategy, body size etc.
- Hypotheses:
 - Non-migratory species in areas of stable phenology and temperature
 - Migratory species in areas of variable phenology and temperature
 - Aerial insectivores in areas of stable phenology and temperature

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EXPECTED RESULTS

- Quantitative evaluation of spatial and temporal variability in explaining bird species distributions
- Quantitative evaluation of phenology and temperature in explaining bird species distributions
- Maps of areas where biodiversity may be resilient or at-risk to climate change
- Anticipate publishing in: Journal of Applied Ecology, Frontiers in Ecology and the Environment, Ecological Applications, or Global Change Biology

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SIGNIFICANCE - SCIENCE

- Spatial vs temporal measures
 - Spatial heterogeneity used a lot
 - Temporal variability also important
- Quantitative evaluation of phenology and temperature in explaining bird species distributions
- Maps of areas where biodiversity may be resilient or at-risk to climate change
 - Instead of species richness
 - For many species, not just a few species

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SIGNIFICANCE - CONSERVATION

- Identification of individual species at risk or resilient to changes in temperature or phenology is useful to land managers
 - Can prioritize management of individual species or species groups
- Identification of areas where many species at risk or resilient to changes in temperature or phenology is useful to land managers
 - Prioritize areas; refugia

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CHAPTER 3

Relationships between primary productivity,
human settlement, and bird species richness in
Argentina

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BACKGROUND



Humans settle(d) in areas of high primary productivity (pp)



High primary productivity related to high biodiversity



Conservation and human settlement often at odds



Largest, least threatened protected areas (lowest human pop.) often have low primary productivity and biodiversity

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METHODS

1

Individual SDMs
w/ counterfactual
DHI

2

Stack
counterfactual
SDMs for
richness

3

analyses

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ANALYSES

- Bird species richness & counterfactual cumulative DHIs
 - Difference should be large if/where productivity is important for bird richness
- Human settlements affect cumulative DHI
 - Model productivity without settlements based on climate, soil, topography, and cumulative DHI values for natural areas
 - Test if human settlements are concentrated where primary productivity is highest
 - This could be used to derive SDMs for Argentina without people
- Identify areas of high human settlement, high bird species richness, high productivity

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EXPECTED RESULTS

- Quantification of the relationship between primary productivity, human settlement, and bird species richness
- Maps of areas 'at risk' of biodiversity loss – high human settlement, species richness, and primary productivity
- Anticipate publishing in: Conservation Biology or Biological Conservation

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SIGNIFICANCE - SCIENCE

- Increased understanding of the role of humans in driving other species' distribution patterns
- Cumulative DHIs without people
- Species distribution models without people

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SIGNIFICANCE - CONSERVATION

- Identification of areas 'at risk' of biodiversity loss is relevant for conservation
 - Prioritize management of highly productive, highly biodiverse areas instead of "rock and ice"

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CHAPTER 4

Motivations and professional judgement: the science-action gap and inclusion of biodiversity data in provincial forest land use plans in Argentina

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BACKGROUND



Conservation needs up-to-date info on biodiversity



Biodiversity data often not included in forest land use plans



Science-action gap in conservation



Real-world decisions motivated by many factors

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METHODS

1

Create, pilot, and
pre-test survey

2

Engage land use
planners to
respond to survey

3

Analyze and
interpret results

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ANALYSES

- Unknown....taking a class right now (Ed. Psych 773: Factor Analysis, Multidimensional Scaling, and Cluster Analysis)

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EXPECTED RESULTS

- Identification of beliefs and attitudes of regional land use planners in Argentina
- Anticipate publishing in: ?????

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SIGNIFICANCE - CONSERVATION

- Identify current success and lack of success in communicating to regional land use planners
- Improve land use plans through closing science-action gap

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REVIEW OF COURSEWORK

See certification form