

# VIANEY LEOS BARAJAS

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## CURRENT POSITION

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### Postdoctoral Researcher

August 2019 - Present

*Modeling the prevalence of Nontuberculous Mycobacteria in the Hawaiian Islands.*

Dept of Statistics & Dept of Forestry and Environmental Resources

North Carolina State University

## EDUCATION

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### Ph.D., Statistics

July 2019

Iowa State University

Ames, IA, USA

Dissertation Title: *Incorporating Multi-Scale Structures and Physiological Processes into the Modeling of Animal Movement.*

### B.S., Mathematics with minor in Applied Statistics

June 2011

California State University, Bakersfield

Bakersfield, CA, USA

## RESEARCH INTERESTS

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Time Series, State-Space Models, Hidden Markov Models, Bayesian Statistics, Spatio-Temporal Models, Statistical Ecology, Data Science

## RESEARCH PUBLICATIONS

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### Peer-Reviewed Journals

1. Ötting, M., Deutscher, C., Langrock, R. and **Leos-Barajas, V.** (2019) *The hot hand in professional darts.* Journal of Royal Statistical Society: Series A (*In press*).
2. Gardiner, R.Z., Hamer, R., **Leos-Barajas, V.**, Peñaherrera-Palma, C., Jones, M. and Johnson, C. (2019) *State-space modelling reveals habitat perception of a small terrestrial mammal in a fragmented landscape.* Ecology and Evolution.
3. Adam, T., Grieves, C., **Leos-Barajas, V.**, Meese, E., Lowe, C., Langrock, R. and Blackwell, P. (2019) *Joint modeling of multi-scale animal movement data using hierarchical hidden Markov models.* Methods in Ecology and Evolution
4. Papastamatiou, Y.P., Watanabe, Y.Y, Demšar, U., **Leos-Barajas, V.**, Bradley, D., Langrock, R., Weng, K., Lowe, C.G., Friedlander, A.M. and Caselle, J.E. (2018) *Activity seascapes highlight central place foraging strategies in marine predators that never stop swimming.* Movement Ecology 6:9
5. Papastamatiou, Y.P., Iosilevskii, G., **Leos-Barajas, V.**, Brooks, E.J, Howey, L.A., Chapman, D.D., Watanabe, Y.Y. (2018) *Optimal swimming strategies and behavioral plasticity of oceanic whitetip sharks.* Scientific reports, **8**, 551.
6. Langrock, R., Adam, T., **Leos-Barajas, V.**, Mews, S., Miller, D.L., Papastamatiou, Y.P. (2018) *Spline-based nonparametric inference in general state-switching models.* Statistica Neerlandica, **72**, 179-200
7. **Leos-Barajas, V.**, Gangloff, E., Adam, T., Langrock, R., van Beest, F., Nabe-Nielsen, J. & Morales, J.M. (2017) *Multi-scale modeling of animal movement and general behavior data using hidden Markov models with hierarchical structures.* Journal of Agricultural, Biological, and Environmental Statistics, **22**, 232–248.

8. Gangloff, E., Chow, M., **Leos-Barajas, V.**, Hynes, S., Hobbs, B., Sparkman, A.M. (2017) *Integrating behaviour into the pace-of-life continuum: Divergent levels of activity and information gathering in fast-and slow-living snakes*. Behavioural processes, **142**, 156–163.
9. **Leos-Barajas, V.**, Photopoulou, T., Langrock, R., Patterson, T.A., Watanabe, Y.Y., Murgatroyd, M. and Papastamatiou, Y.P. (2017) *Analysis of animal accelerometer data using hidden Markov models*. Methods in Ecology and Evolution, **8**, 161–173.
10. Towner, A.V., **Leos-Barajas, V.**, Langrock, R., Smale, M.J., Kaschke, T., Jewell, O.J.D. and Papastamatiou, Y.P. (2016) *Sex-specific and individual preferences for hunting strategies in white sharks*. Functional Ecology, **30**, 1397–1407.

## Conference Proceedings

1. Adam, T., **Leos-Barajas, V.**, Langrock, R. and van Beest, F. (2017) *Using hierarchical hidden Markov models for joint inference at multiple temporal scales*. Proceedings of the 32nd IWSM Vol. 2.
2. Hofmann, H., Cook, D., Kaplan, A., Hare, E., **Leos-Barajas, V.**, Sievert, C. and Tyner, S. (2015) *On the move at DinoFun world*. Visual Analytics Science and Technology (VAST), 2015 IEEE Conference on, 159-160.
3. Hofmann, H., Cook, D., Kaplan, A., Hare, E., **Leos-Barajas, V.**, Sievert, C. and Tyner, S. (2015) *Visualizing communication patterns at DinoFun World*. Visual Analytics Science and Technology (VAST), 2015 IEEE Conference on, 161-162.

## Reports

1. **Leos-Barajas, V.**, Wang, Z., Kaiser, M.S. and Zhengyuan, Z. (2017) *Improving Estimates of Real-Time Traffic Speeds During Weather Events for Winter Maintenance Performance Measurement*. InTrans Project 13-485.

## Pre-prints

1. **Leos-Barajas, V.** and Michelot, T. (2018) *An Introduction to Analyzing Animal Movement Data with Hidden Markov Models using Stan for Bayesian Inference*. arXiv:1806.10639 (*Stan Case Study in Preparation*)

## CURRENT WORK

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### Submitted

- *Approximate Bayesian inference for a “steps and turns” continuous-time random walk observed at regular time intervals*  
Ruiz-Suarez, S., **Leos-Barajas, V.**, Alvarez-Castro, I. and Morales, J.M.  
Under Review: *PeerJ*

### In Preparation

- **Methodology**
  - *Hidden Markov Models with Multi-Scale State Processes in Ecology*.  
**Leos-Barajas, V.**, Kaiser, M.S., Holland, K. and Papastamatiou, Y.P. (*Dissertation Chapter - undergoing changes*)  
Will submit to: *Methods in Ecology and Evolution*
  - *Incorporating body condition into the analysis of animal movement*.  
**Leos-Barajas, V.**, Kaiser, M.S., di Virgilio, A. and Morales, J.M.. (*Dissertation Chapter - undergoing changes*)  
Will submit to: *Biometrics*
  - *Introduction to state-space models for ecologists*.  
Auger-Méthé, M., Thomas, L., Newman, K., Campbell, D., Cole, D., King, A., Petris, G., **Leos-Barajas, V.**, Flemming, J., Nielsen, A. and Michaud, N.  
Will submit to: *Ecology*

- **Applications**

- *Neonate garter snakes (*Thamnophis elegans*) exhibit consistent among-individual variation in multiple behavioural measures and habituation at multiple time scales*

Gangloff, E., **Leos-Barajas, V**, Demuth, G., Zhang, H., Kelly, C.D. and Bronikowski, A.M.

Will submit to: *Animal Behavior*

## RESEARCH EXPERIENCE

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### Research Assistant

October 2018– July 2019

*Dashboards for data visualization*

Iowa State University, Office of the Vice President for Research

### Researcher

March 2018–October 2018

*Develop novel statistical methods for making biological inference on niche choices from behavioural time series data.*

Bielefeld University, Statistics & Data Analysis Group, Dept. of Business Administration and Economics.

### Research Assistant

August 2014–July 2016

*Improving Estimates of Real-Time Traffic Speeds During Weather Events for Winter Maintenance Performance Measurement.*

Iowa State University, Dept. of Statistics.

## TEACHING EXPERIENCE

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### Instructor

2016 – 2017

*Introduction to Business Statistics*

Iowa State University, Dept. of Statistics.

### Lab Instructor

2013 – 2014, 2017

*Statistical Methods for Research Workers, Regression for Social and Behavioral Research, Introduction to Business Statistics II*

Iowa State University, Dept. of Statistics.

## WORKSHOPS

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### Instructor

*Markov-switching models in Ecology*

September 27, 2019

Comisión Nacional para el Conocimiento y Uso de la Biodiversidad

Mexico City, Mexico

*Movement Ecology 2019: A to Z with Lots of R* (co-instructor w/ Garrett Street, Jerod Merkle) July 22-26, 2019

A British Ecological Society, Movement Ecology Special Interest Group event.

Noble Research Institute

Ardmore, OK, USA

*Hidden Markov Models Workshop* (co-instructor with Roland Langrock)

September 4-7, 2018

Versatile Tools for Analysing Animal Movement and Other Time Series Data

Bielefeld, Germany

*MigraMar Annual Meeting*

December 2017

Half-day workshop on R packages moveHMM and momentuHMM.

Panama City, Panamá

*MigraMar Annual Meeting*

November 2016

One-day workshop on hidden Markov models and their application in animal movement modeling.

La Paz, México

## Assistant

*Inferencia Bayesiana y Stan* (lead instructor Michael Betancourt) Sept 23–25, 2019  
An introduction to Bayesian inference and Stan.  
Mexican Statistical Association – Ciudad de Mexico, MX

*Stan (+R)* (lead instructor Jonah Gabry) June 10–12, 2019  
An introduction to using Stan for Bayesian data analysis  
Calvin College – Grand Rapids, MI, USA

## Attendee

*New Perspectives on State-Space Models* September 2017  
Casa Matemática, Oaxaca, México.

## PRESENTATIONS

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### Oral Presentations

- *Historias con impacto a través de la ciencia de datos* September 2019  
Mexican Statistical Association School on Data Science – **Invited Talk**  
Mexico City, Mexico
- *Incorporating Body Condition into the Analysis of Animal Movement* July 2019  
Department of Statistics at Iowa State University  
Ames, IA, USA
- *Multi-scale modeling of animal movement data* August 2018  
Joint Statistical Meeting – **Invited Talk**  
Vancouver, Canada
- *Modeling the feedback between movement and condition in Merino sheep* July 2018  
International Statistical Ecology Conference – **Invited Talk**  
St Andrews, Scotland
- *An overview of the R package moveHMM* November 2017  
Department of Ecology at Iowa State University  
Ames, IA, USA
- *Analyzing animal accelerometer data using hidden Markov models* July 2016  
International Statistical Ecology Conference  
Seattle, Washington, USA
- *A data-driven Bayesian model monitoring approach for monitoring lake function* May 2016  
Universidad Nacional del Comahue  
San Carlos de Bariloche, Argentina
- *Visualizing the movement of white sharks around South Africa* March 2015  
Graphics Group at Iowa State University Ames, IA, USA
- *Estimating red snapper harvest by charter boats in the Gulf of Mexico* July & September 2014  
International Statistical Ecology Conference & Graybill Conference on Statistical Ecology  
Montpellier, FR / Ft. Collins, Colorado, USA

### Poster Presentations

- *Hidden Markov Models with Multi-Scale State Processes* April 2019  
44<sup>th</sup> University of Arkansas Spring Lecture Series
- *Semi-parametric hidden Markov models using Stan for Bayesian inference.* June 2018  
International Society for Bayesian Analysis World Meeting  
Edinburgh, Scotland

## RESEARCH VISITS

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### Hosted

Cristina Tlapale Hernández  
*from* Centro de Investigaciones Biológicas del Noroeste, México  
*Visiting Bielefeld University* August – October 2018

### Hosts

James Ketchum  
Pelagios Kakunjá  
La Paz, Baja California Sur, México December 10-13, 2018

Alex Hearn  
Galapagos Academic Institute for the Arts and Sciences (GAIAS)  
San Cristobal, Galápagos, Ecuador April 30 - May 5, 2018

Juan M. Morales  
National Scientific and Technical Research Council (CONICET)  
Bariloche, Argentina April – June 2016

Roland Langrock  
Centre for Ecological and Environmental Modeling (CREEM)  
St Andrews, Scotland August 2014

## ADVISING

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### Advisor

Sofía Ruiz Suarez, *PhD Student* (co-advising with Juan M. Morales)  
Department of Statistics  
National University of Rosario, Argentina March 2018 – Present

### Committee Member

Emily Spurgeon, *Master's Student*  
Advised by: Chris Lowe  
Dept of Marine Biology  
California State University, Long Beach October 2019 - Present

## SOCIETIES

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Member of:

- American Statistical Association (ASA)
- International Society for Bayesian Analysis (ISBA)
- American Elasmobranch Society (AES)
- Society for the Advancement of Chicanos and Native Americans in Science (SACNAS)

## LANGUAGES

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**Programming:** R, Rcpp, C++, Stan, JAGS, JMP, SAS

**Reading, Speaking and Writing:** English and Spanish