


Introduction to Applied Bayesian Analysis in Wildlife Ecology

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Closing thoughts



Course Learning Objectives

1. Understand foundational differences between frequentist and Bayesian approaches
2. Obtain a basic understanding of Bayesian analysis (and associated jargon) to impress your colleagues (and understand methods sections of papers)
3. Fit key statistical models such as linear models, generalized linear models, and mixed models in a Bayesian framework in R
4. Generate a solid Bayesian toolbox that you can build upon for your own work

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2. Bayesian MCMC methods are a "one size fits all" approach. You learn it once, and then you can do so much!
3. Much much much more flexible for complex modeling in ecology:
 - GLMMs
 - Data integration
 - Spatial statistics
 - Multi-species models
 - Joint species distribution models
 - Accounting for imperfect detection

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3. It can take less time up front to learn frequentist methods (but again, learning Bayes pays off in the long-run).
4. I for the most part use weakly informative priors. "True" Bayesians might call me lazy.

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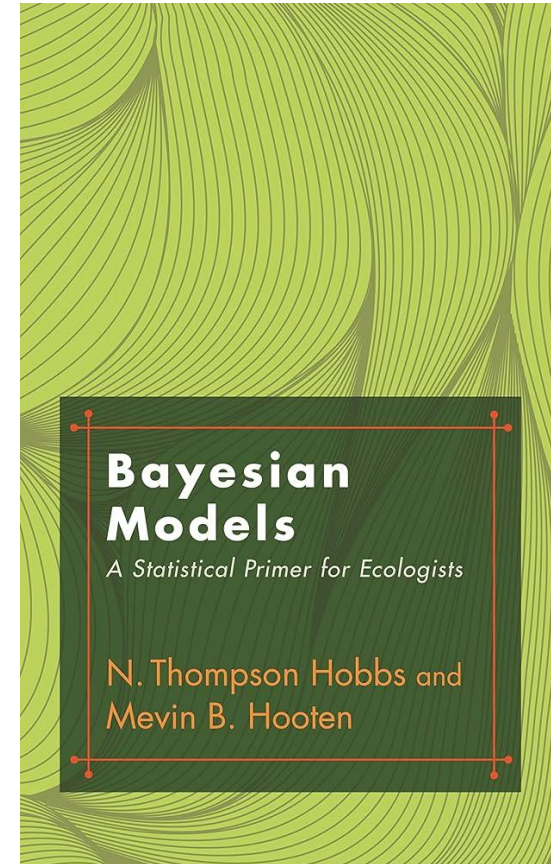
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1. Modern software makes it so much easier!
2. Modern computing power makes it so much faster!
3. Ecological data are complex and often require complex models.

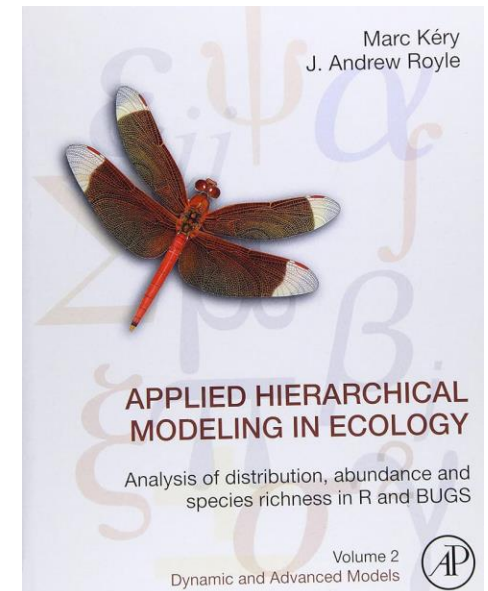
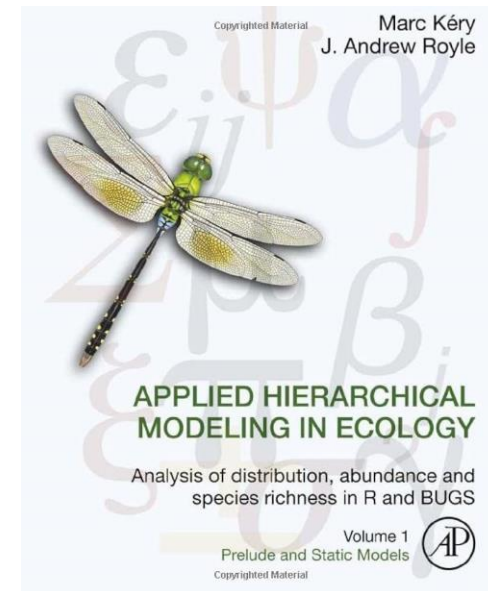
Recommended resources for future learning

- This is how I learned Bayesian stats.
- Focus on methodological concepts and how to "think as a Bayesian"
- No coding.
- Great for getting a firm understanding of the math and stats behind MCMC and how to formulate a hierarchical Bayesian model.



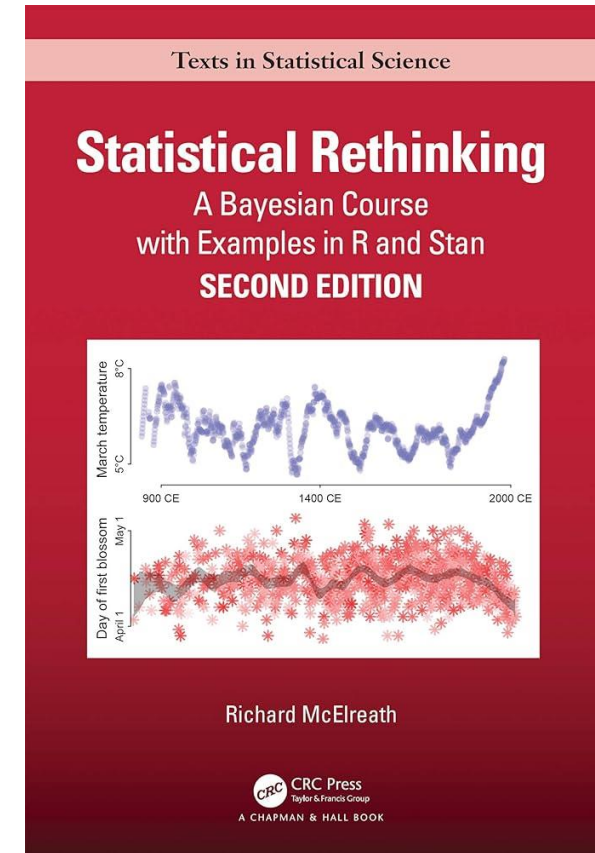
Recommended resources for future learning

- Great resources for practical implementation of Bayesian ecological models using JAGS
- Focus on models commonly used in applied wildlife ecology
- Does not go super in depth on how MCMC works.
- Good place to start if you want to learn more about JAGS and the flexibility it provides for different Bayesian models.
- [Can also find all code translated into NIMBLE online](#)



Recommended resources for future learning

- An enjoyable read that emphasizes how we should be skeptical about models.
- All of McElreath's lectures are also on Youtube: <https://www.youtube.com/@rmcelreath>.
- Great if you want to learn Stan.
- Solomon Kurz translated all the code to brms! <https://bookdown.org/content/4857/>.



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Paul B. Conn ✉, Devin S. Johnson, Perry J. Williams, Sharon R. Melin, Mevin B. Hooten

First published: 15 May 2018 | <https://doi.org/10.1002/ecm.1314> | Citations: 153

Corresponding Editor: Timothy Essington.

ECOLOGY LETTERS

Why environmental scientists are becoming Bayesians

James S. Clark

First published: 15 December 2004 | <https://doi.org/10.1111/j.1461-0248.2004.00702.x> | Citations: 603

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