

Intermediate-level workshop (in person only)

Bayesian integrated population modelling (IPM) using JAGS

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Date: 13 – 17 October 2025

Venue: Colorado State University, Fort Collins, Colorado, USA

Computers: Bring your own laptop with latest R and JAGS

Registration: \$ 700 (regular) and \$ 350 (master and PhD students)

Integrated population models (IPMs) represent a powerful combination of multiple data sources, typically around a single matrix population model, that are informative about the dynamics of a wild population. Typical IPMs combine one or more time-series of abundance data with other data sets that are directly informative about survival probabilities, such as ring-recovery or capture-recapture, or about productivity, such as nest survey data. However, many other sources of demographic information may be envisioned, including age-at-death data, radio tracking data, occupancy or replicated point count data. For non-statisticians the most practical manner to develop and fit IPMs is by using BUGS software (JAGS and Nimble). This course is a practical and hands-on introduction to developing and fitting integrated population models. It is based on the book by Schaub & Kéry, *Integrated Population Models* (Academic Press, 2022).

Beyond IPMs, the course also provides a broad introduction for ecologists and wildlife managers to a wide variety of models fit using BUGS software.

Contents include the following topics:

1. Basic introduction:
 - Hierarchical models as an overarching theme of population modelling, including IPMs
 - Bayesian analysis of hierarchical models
 - Introduction to BUGS software in the context of GLMs and traditional random-effects models
2. Ingredients of Integrated Population Models:
 - State-space models for time-series of counts
 - Cormack-Jolly-Seber models for estimating survival probabilities
 - Multistate capture-recapture models for estimating survival and transition probabilities
3. Integrated Population Models (IPMs)
 - Introduction to matrix population models and their analysis with BUGS
 - Theory of integrated population models
 - Various case studies which differ in complexity and in the data types that are combined

In this intermediate-level workshop about 80% of the time is spent on lecturing and 20% on solving exercises. No previous experience with BUGS software, or Bayesian statistics, is assumed. However, **a good working knowledge of regression (linear models, GLMs) and of program R is required. Moreover, a basic understanding of capture-recapture and/or occupancy models is highly desirable.**

Send your application to Michael Schaub (michael.schaub@vogelwarte.ch), with CC to Marc Kéry (marc.kery@vogelwarte.ch), Brian Gerber (brian.gerber@colostate.edu) and Dave Koons (david.koons@colostate.edu); describing your background and knowledge in statistical modelling, R and JAGS/Nimble, and capture-recapture, by **15 June 2025 at the latest**. Workshop invitations will be sent out immediately afterwards.

We may be able to award a couple of course fee waivers. If you do not have access to any funds for covering registration fees, please describe on a half-page (max) your limited funding situation and why you should get a waiver.