

Intermediate-level workshop

Bayesian integrated population modeling (IPM)

using BUGS and JAGS

- Instructors:** Michael Schaub & Marc Kéry, Swiss Ornithological Institute,
Sarah J. Converse, USGS Patuxent Wildlife Research Center
- Date:** 1 – 5 August 2016
- Venue:** USGS Patuxent Wildlife Research Center, Laurel/Maryland, USA
- Computers:** Bring your own laptop with latest R and WinBUGS, JAGS or OpenBUGS
- Registration:** USD\$ 600 (normal rate), USD\$ 300 (student rate)

Integrated population models (IPMs) represent the powerful combination, in a single Leslie-type of model, of different data sources that are informative about the dynamics of an animal population (Besbeas et al. 2002; Schaub et al. 2007). Typical IPMs combine one or more time-series of counts with another data set that is directly informative about survival probabilities, such as ring-recovery or capture-recapture. However, many other sources of demographic information may be envisioned instead or in addition, including age-at-death data, occupancy or replicated point count data. Currently, for non-statisticians the only practical manner to develop and fit an IPM is using BUGS software (WinBUGS, OpenBUGS, JAGS).

This course is a practical and hands-on introduction to developing and fitting integrated population models using BUGS software. It is based on the successful book by Kéry & Schaub, *Bayesian Population Analysis using WinBUGS* (Academic Press, 2012), which will be handed out as part of the course.

Beyond IPMs, the course also provides an in-depth introduction for ecologists and wildlife managers to a very wide variety of models fit using BUGS software and as documented in the BPA book.

Contents include the following topics:

Basic introduction:

- Hierarchical models as an overarching theme of population modeling, including IPMs
- Bayesian analysis of hierarchical models
- Introduction to BUGS software in the context of generalised linear models (GLM) and traditional random-effects models

Ingredients of Integrated Population Models:

- State-space models
- Cormack-Jolly-Seber models for estimating survival probabilities
- Multistate capture-recapture models for estimating survival and transition probabilities

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 3/4 of the time are spent on lecturing and 1/4 on solving exercises. No previous experience with BUGS software, or Bayesian statistics, is assumed. However, **a good working knowledge of modern regression methods (ANOVA, ANCOVA, GLMs) and of program R is required**. Moreover, **a basic understanding of capture-recapture and/or occupancy models is desirable**.

Send your application to Michael Schaub (michael.schaub@vogelwarte.ch), with CC to Marc Kéry (marc.kery@vogelwarte.ch); describing your background and knowledge in statistical modeling, R and WinBUGS/OpenBUGS/JAGS and capture-recapture, by 31 March 2016 at the latest. Workshop invitations will be sent out immediately afterwards.