CAPTURE 2006

CONFÉRENCES DU LUNDI 1ER MAI ♦ CONFERENCES ON MONDAY MAY 1ST

Salle 3820 du Pavillon Vachon ♦ Room 3820 of the Pavillon Vachon
Université Laval

9h30-9h45 **Mots de bienvenue ♦ Welcoming words**
Louis-Paul Rivest and Gilles Gauthier, Université Laval

9h45-10h30 **Combining capture-recapture data with other pieces of information in conservation ecology: the impact of longline fisheries on Black-footed Albatross**
Jean-Dominique Lebreton & Sophie Véran, CEFE, Montpellier, France

10h30-11h15 **Multistate capture-recapture models under on open robust design: An application to the demography of sea turtles**
William Kendall, USGS Patuxent Wildlife Research Center and Gary C. White, Colorado State University, Fort Collins, Colorado, USA

11h15-12h00 **Application of capture-recapture methods to demographic analyses of bird populations : Case studies with an emphasis on multistate models.**
Gilles Gauthier, Université Laval

12h00-13h30 Lunch

13h30-14h15 **Handling errors: example of the determination of sex in Larus audouinii.**
Roger Pradel, L. Maurin-Bernier, D. Oro D, O. Gimenez, M. Genovart & R.Choquet , CEFE, Montpellier, France & IMEDEA, Esporles, Spain

14h15-15h00 **The Stratified Jolly-Seber Model.**
Carl J. Schwarz, Simon Fraser University, Burnaby, BC, Canada & Jérôme A. Dupuis, Universite Paul Sabatier, Toulouse France

15h00-15h30 Pause café ♦ Coffee break

15h30-16h15 **Automatic generation of multistate capture-recapture models**
Rémi Choquet CEFE, Montpellier, France

16h15-17h00 **Modeling heterogeneity in closed population models with applications to the robust design**
Louis-Paul Rivest & Sophie Baillargeon, Université Laval

RÉSUMÉS ♦ ABSTRACTS

Combining capture-recapture data with other pieces of information in conservation ecology: the impact of longline fisheries on Black-footed Albatross

J.-D. Lebreton & Sophie Véran, CEFE, CNRS, Montpellier, France

In conservation ecology, the data that can be used to ascertain the sustainability of a man-induced source of mortality are often diverse and incomplete. They range for instance from demographic parameter estimates on neighbouring species to capture-recapture data on populations of the species under concern, often accompanied by censuses or counts. Each such piece of information is in general not precise or certain enough to provide an unambiguous understanding of the situation studied, and some information combination is needed. This is exemplified by a study of the impact of longline fisheries on the Black-Footed Albatross Phoebastria nigripes, a near endemic of the Hawaiian archipelago. We show first how a comparative approach can provide simple rules to estimate the maximum sustainable extra mortality and thus to decide if the by-catch of Albatross by long line fisheries is significant in terms of population dynamics. We then show how survival can be related in a robust fashion to fishing effort, based on capture-recapture data. Finally we combine this capture-recapture information with census information based on a state space model and Kalman filtering techniques. We conclude that the impact of by-catch is strong enough to make mitigation measures highly recommended. We discuss the foreseeable developments of state space models and comparative approaches in conservation ecology.

Multistate capture-recapture models under on open robust design: An application to the demography of sea turtles

William L. Kendall, USGS Patuxent Wildlife Research Center, Laurel, Maryland, USA, and Gary C. White, Colorado State University, Fort Collins, Colorado, USA.

The robust capture-recapture design has been shown to be in some cases helpful and in other cases crucial to the unbiased estimation of survival, as well as transition probabilities from observable to unobservable life history states. We develop open robust design multistate models for the study of a population of adult female sea turtles, where only nesting females are observable and their arrivals and departures from the nesting beach are staggered in time. We use these models to address hypotheses about survival and breeding probability. We also derive from these models estimates of the number of nesters and the total adult female population size (nesters and those skipping breeding combined). Finally, these models permit estimation of the number of clutches laid per female (i.e., residence time). This general approach is also being used for other breeding populations (e.g., grey seals, fish), and could be useful for stopover studies of birds.

Application of capture-recapture methods to demographic analyses of bird populations : Case studies with an emphasis on multistate models.

Gilles Gauthier, département de biologie & Centre d'études nordiques, Université Laval

Capture-recapture methods are now an essential tool to study population dynamics. They allow the unbiased estimation of most vital rates (survival, recruitment, dispersal, population growth rate, etc) and the testing of specific hypotheses using marked animals. I will use several examples of studies conducted in my laboratory to show applications of recently developed capture-recapture models in long-lived birds, especially the Snow Goose (Chen caerulescens) and the Wandering Albatros (Diomedea exulans). These studies use the recapture of live animals, recoveries of dead ones, or a combination of both, to estimate survival, recruitment and dispersal probabilities.

Handling errors: example of the determination of sex in Larus audouinii.

R. Pradel[1], L. Maurin-Bernier [1], D. Oro[2], O. Gimenez [1], M. Genovart [2] & R. Choquet [1]
(1) CEFE, Montpellier, France, (2) IMEDEA, Esporles, Spain,

In a monomorphic species such as the Audouin's gull, determination of sex from behaviour is prone to errors. Repeated observations may allow attributing a gender to an animal with reasonable confidence. However, when capture events are rare because capture rate is low or because the animal has entered the data set late during the study period, mistakes remain possible. We developed a model where we account for uncertainty in the assessment of sex. This model has more parameters than the corresponding model where the true sex is assumed to be the one most frequently given. We examine whether this causes parameter redundancy when the parameters are constant or time-dependent and we discuss how useful it is to incorporate this additional parameter.

The Stratified Jolly-Seber Model.

C.J. Schwarz, Simon Fraser University, Burnaby, BC, Canada & Dupuis, J.A. Université Paul Sabatier, Toulouse France

We develop a multi-state extension of the Jolly-Seber model commonly used to estimate population abundance in capture-recapture studies. We develop both likelihood and bayesian approaches to the problem. This approach is used to estimate the population of walleye in a large lake where tagging takes place at spawning sites around the lake ; recaptures occur around the lake; and movement between sites occurs. Finally we compare the Bayesian and likelihood approaches and point out areas requiring further research and development.

Automatic generation of multistate capture-recapture models

Rémi Choquet CEFE, Montpellier, France

Specifying a multistate CR model can be a daunting task. Parameter Index Matrices first used in SURGE and taken up in MARK are a convenient way to specify the simplest models but cannot deal with complex models, for example additive models. Then, the traditional approach consists in building a design matrix. This matrix tends rapidly to become very large and mistakes are frequent especially when it has to be prepared by hand. Mistakes are also very difficult to detect. Here I present an entirely different approach where constrained models are built in a straightforward fashion using a language interpreted by a generator of design matrices called GEMACO. This powerful language is similar to those used in general statistical software packages such as SAS, S-Plus, Genstat or GLIM; for instance, the formula t+g generates a model with additive effects of time and group.

Modeling heterogeneity in closed population models with applications to the robust design

Louis-Paul Rivest & Sophie Baillargeon, Université Laval

Estimating the size of a closed population using capture-recapture data is a difficult task when the probabilities of capture vary between animals and between capture occasions (model M_{th}). Several models fitting the data equally well can give drastically different population estimates. Log-linear model estimators, including a lower bound estimator, are first presented for M_{th}. Strategies for the analysis of data from such experiments are discussed. Techniques for the application of these estimators to the within primary periods data of a robust design are then presented. The robust design is showed to provide information for the selection of a particular model for M_{th}. Robust design data on the survival and the abundance of vole populations are analysed using *Rcapture*, an R package for the analysis of capture-recapture data using log-linear models.