

Monitoring vertebrate populations using observational data

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Abstract: Methods for monitoring temporal changes in population size vary from intensive and potentially expensive to less intensive and more easily implemented techniques. In this paper we evaluate the utility of a monitoring technique that can be used to follow many vertebrate species simultaneously at low cost and requires little training of personnel. Observers record the number of individuals seen per hour in the field and these rates of encounter are used as an index of population size. We examine whether encounter rates reflect population size by comparing them with independent censuses of three species over a 7-year period in the boreal forest near Klusane Lake in the southern Yukon Territory. Encounter rates were generally an accurate reflection of variation in population size. In our study system, inter-observer variability did not influence our ability to detect fluctuations in population size; the underlying fluctuations were detected whether data from all or only a group of "high-quality" observers were used. In our study, the benefit of using all available data outweighed the cost of variation among observers because sample sizes were large (averaging over 1200 data points from 33 observers per year). Variation in the length of observation periods did not affect the chance of detecting animals in our study. Encounter rates provide a reasonable index of variation in population size, although caution should be used with species that are uncommon or difficult to detect.

Résumé : Les méthodes d'estimation des changements temporels de taille des populations vont des méthodes intensives, potentiellement onéreuses, aux méthodes moins intensives souvent plus faciles à utiliser. Nous évaluons ici une méthode d'estimation adaptée à suivre plusieurs espèces de vertébrés simultanément, méthode qui ne coûte pas cher et qui requiert peu d'entraînement de personnel. Les observateurs notent le nombre d'animaux aperçus en 1 h sur le terrain et ce nombre sert d'indice de la taille de la population. Nous examinons si la fréquence de ces rencontres reflète la taille des différentes populations en comparant les chiffres obtenus avec les résultats de recensements de trois espèces effectués indépendamment pendant une période de 7 ans dans la forêt boréale de la région du lac Klusane, dans le sud du Yukon. La fréquence des rencontres est généralement un indice assez exact de la taille des populations. Dans notre système, la variabilité inter-observateurs n'influence pas la capacité de détecter les fluctuations dans l'effectif des populations : les fluctuations de la taille de la population ont été détectées dans les cas où les données de tous les observateurs de « haute qualité » ont été utilisées aussi bien que dans les cas où seulement celles d'un groupe d'entre eux ont été utilisées. Dans cette étude, les avantages à utiliser toutes les données disponibles excèdent les coûts reliés à la variation entre les observateurs, à cause de l'importance des échantillons (en moyenne, plus de 1200 données enregistrées par 33 observateurs par année). La variation dans la durée des périodes d'observation n'affecte pas la probabilité de détecter la présence d'un animal. La fréquence des rencontres donne des indices réalistes de la variation de la taille des populations, mais il faut user de prudence dans le cas d'espèces peu communes ou difficiles à repérer.

[Traduit par la Rédaction]

Introduction

Numerous techniques have been developed for estimating abundance in animal populations, and they vary in the amount of effort required to conduct the work. Direct census (e.g., Falls 1981) and mark-recapture (e.g., White et al. 1982; Pollock et al. 1990; Krebs 1999) provide data on actual numbers of animals but require intensive effort to obtain information on one or a few species. Other highly standard-

ized monitoring methods such as the North American Breeding Bird Survey (e.g., Robbins et al. 1986) and constant-effort mist-netting (e.g., Ralph et al. 1993) provide indices of abundance for several species simultaneously, but still require a considerable amount of effort directed specifically towards the census work. However, there are circumstances in which information on relative population size is required but it is logistically impossible to expend the time and effort solely on intensive censusing. One type of census

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Monitoring Vertebrate Populations

David Vesely



Monitoring Vertebrate Populations:

Monitoring Vertebrate Populations William L. Thompson, Gary C. White, Charles Gowan, 1998-08-17 This book is written to serve as a general reference for biologists and resource managers with relatively little statistical training. It focuses on both basic concepts and practical applications to provide professionals with the tools needed to assess monitoring methods that can detect trends in populations. It combines classical finite population sampling designs with population enumeration procedures in a unified approach for obtaining abundance estimates for species of interest. The statistical information is presented in practical, easy-to-understand terminology. Presented in practical, easy-to-understand terminology. Serves as a general reference for biologists and resource managers. Provides the tools needed to detect trends in populations. Introduces a unified approach for obtaining abundance estimates.

Monitoring Animal Populations and Their Habitats Brenda C. McComb, Benjamin Zuckerberg, David G. Vesely, Christopher A. Jordan, 2020 We designed this book to offer a comprehensive overview of the monitoring process from start to finish. Although there are books that deal with sampling design and the quantitative analysis of population data, there are few that provide practical advice covering the entire evolution of a monitoring plan from incorporating stakeholder input to data collection to data management and analysis to reporting. This book strives to present an overview of this process. We also acknowledge that any such effort tends to reflect the interests and expertise of the authors and as such there is a distinct emphasis on monitoring vertebrate populations and upland habitats. Although many of our examples tend to focus on bird populations and forested habitats, we have made an attempt to cover other taxa and habitat types as well and many of the recommendations and suggestions that we present are applicable to a diversity of monitoring programs. This book was written to fill a practical need and also to embrace a set of values that we hold dear. We wanted a book that could be used in a classroom because we feel that students in natural resources programs need to know how to design a monitoring program when they enter the workforce. We also realize that many former students now in the workforce did not have that training and may find this book of value to them.

Monitoring Plant and Animal Populations Caryl L. Elzinga, Daniel W. Salzer, John W. Willoughby, James P. Gibbs, 2009-05-11

Monitoring Plant and Animal Populations offers an overview of population monitoring issues that is accessible to the typical field biologist and land managers with a modest statistical background. The text includes concrete guidelines for ecologists to follow to design a statistically defensible monitoring program. User-friendly practical guide written in a highly readable format. The authors provide an interdisciplinary scope to address the current widespread interest in monitoring in many environmental fields including pure and applied ecology, conservation biology, and wildlife management. Emphasizes the role of monitoring in adaptive management. Defines important terminology and contrasts monitoring with other data collection activities. Covers the applicable principles of sampling and shows how to design a monitoring project. Provides a step-by-step overview of the monitoring process illustrated by flow charts and references. The authors also offer guidelines for

analyzing and interpreting monitoring data Illustrates the foundation of management objectives and describes their components types and development Describes common field techniques for measuring important attributes of animal and plant populations Reviews different methods for recording monitoring data in the field managing the data and communicating data to policymakers **Proceedings RMRS.** ,1998 Wildlife Study Design Michael L. Morrison, William M. Block, M. Dale Strickland, Bret A. Collier, Markus J. Peterson, 2008-03-21 We developed the first edition of this book because we perceived a need for a compilation on study design with application to studies of the ecology conservation and management of wildlife We felt that the need for coverage of study design in one source was strong and although a few books and monographs existed on some of the topics that we covered no single work attempted to synthesize the many facets of wildlife study design We decided to develop this second edition because our original goal synthesis of study design remains strong and because we each gathered a substantial body of new material with which we could update and expand each chapter Several of us also used the first edition as the basis for workshops and graduate teaching which provided us with many valuable suggestions from readers on how to improve the text In particular Morrison received a detailed review from the graduate students in his Wildlife Study Design course at Texas A M University We also paid heed to the reviews of the first edition that appeared in the literature *The Bitterroot Ecosystem Management Research Project* ,2000 The varied topics presented in these symposium proceedings represent the diverse nature of the Bitterroot Ecosystem Management Research Project BEMRP Separated into six sections the papers cover the different themes researched by BEMRP collaborators as well as brief overviews of five other ecosystem management projects The sections are Understanding the Ecosystem Its Parts and Processes Understanding the People and Their Relationship to the Ecosystem Implementation for Specific Landscape Areas Overviews of Other Ecosystem Management Research Projects in the West Fieldtrip Abstracts and Poster Session Abstracts The papers presented here are from a symposium held in order to summarize research conducted under the first five year charter for BEMRP The symposium was held 1999 May 18 20 in Missoula Montana for interested public land managers and researchers *Endangered Marine Vertebrates - Recent Advances for Conservation* Mohamed Nejmeddine Bradai, Imed Jribi, Bechir Saidi, Samira Enajjar, 2025-04-23 The destruction of marine habitats and the marine environment generally results from the cumulative impact of several threats such as fishing bycatch illegal and ghost fishing pollution in all its forms chemical organic and physical and climate change All these threats have contributed to the degradation of the seabed and marine biodiversity Endangered vertebrates are the most affected by these problems This book presents scientific information on the biology and ecology of sea turtles sharks and cetaceans as well as fisheries impact on these endangered species to enhance conservation and management efforts *Theory of Wildlife Population Ecology* Bruce D. Leopold, 2018-10-25 Understanding wildlife population ecology is vital for all wildlife managers and conservation biologists Leopold draws on 30 years of research and teaching experience to give students and natural resource professionals the

foundation they need to effectively manage wildlife populations He begins with the key statistical concepts and research approaches necessary to gain insight into various models of population dynamics The many factors that influence wildlife populations are thoroughly explored and their consequences are investigated In addition the author presents techniques for analyzing wildlife harvest data and a lucid discussion of valuable wildlife census methods Frequent examples of foundational literature supplement each chapter with applications of the theories and provide a concise compendium of fundamental concepts of population ecology Abundant statistical exercises reinforce students learning throughout the text

Development of Protocols to Inventory Or Monitor Wildlife, Fish, Or Rare Plants David Vesely,2006 *U.S. Geological Survey Circular* ,2003

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