

RESOURCE NOTES

NO. 31

DATE 07/27/00

Methods to Collect Required Data to Develop Rigorous Population Viability Analysis (PVA) Models

*By: Gary C. White
Department of Fishery and
Wildlife Biology
Colorado State University*

***The ninth in a series of 13,
Session 3***

Background

Population viability analysis (PVA) examines the question of whether a biological population of a given size will persist (remain viable) for some specified time period. To develop useful estimates of population viability, stochastic population models must be developed that incorporate demographic, temporal, and individual variation. The lack of individual heterogeneity in previous population viability analyses has resulted in underestimates of persistence, making the conclusions overly pessimistic. Additionally, spatial and genetic variation may be required, depending on the population being modeled and the time frame of the analysis. Estimates of these

variance components must be constructed by removing the sampling variation inherent in estimates of population parameters. Most previous population viability analyses have not separated sampling variation from process variation in the parameter estimates, so they underestimate population persistence. Further, the uncertainty (sampling variance) of parameter estimates must be incorporated into estimates and confidence intervals of persistence if valid inferences are to be made back to the population under consideration.

Discussion

Marked animals have been widely used to estimate population size, survival rate, and recruitment in biological populations. Wild horse populations seem particularly suited to methods of analysis based on marked animals because of the individual heterogeneity in appearance makes many individuals uniquely identifiable, so that capture to apply marks is not required. In addition, DNA techniques provide alternative methods to obtain data on identifiable individuals. Estimation methods based on the Cormack-Jolly-Seber model

available in Program MARK (White and Burnham, 1999, in press) seem well-suited to estimation of wild horse survival rates from inferences on identifiable individuals. Procedures to separate sampling variation from process variation are already available in the program. Recruitment to reproductive age can be estimated from age ratios estimated by population surveys. Population size can be estimated from ratios of uniquely identifiable individuals to unidentifiable animals during the same surveys with estimators provided in Program NOREMARK (White 1996). Thus the techniques required to obtain the data to develop rigorous PVA models for wild horse populations are available and manageable. However, the cost of information is always high, so the real question is whether this information is considered worth the expense by policy makers, and ultimately, the voting public.

Conclusion

Rigorous statistical methods and associated field data collection procedures are available to estimate the necessary parameters to model defensibly wild horse populations. To obtain defensible models, a

WILD HORSE AND
BURRO PROGRAM



commitment to consistent and long-term data collection and analysis must be made by the agency.

Contact

Gary C. White, PhD.
Department of Fishery and
Wildlife Biology
211B J.V.K. Wager
Colorado State University
Fort Collins, CO 80523
phone 970-491-6678
fax: 970-491-5091
email:
gwhite@cnr.colostate.edu

For further reading:

White, G. C. 1996.
NOREMARK: population
estimation from mark
resighting surveys. *Wildlife
Society Bulletin* 24:50-52.

White, G.C. 1999.
(a) Modeling Population
Dynamics. pp. 84-107 in S.
Demarais and P. Krausman,
eds. *Ecology and
Management of Large
Mammals in North America.*

White, G.C. 1999.
(b) Population viability
analysis: data requirements
and essential analysis. pp.

288-327. in L. Boitani and T.
K. Fuller, editors. *Research
techniques in animal ecology.*
Columbia University Press,
New York, New York, USA.

White, G. C., and K. P.
Burnham. 1999. Program
MARK: survival estimation
from populations of marked
animals. *Bird Study*. In Press.

Software and more infor-
mation are available via
WWW at:

[http://www.cnr.colostate.edu/
~gwhite](http://www.cnr.colostate.edu/~gwhite)

RESOURCE NOTES are intended to be early announcements of technical and informational topics for Bureau of Land Management personnel and some of their customers. Information in this RESOURCE NOTE is based on the opinion and experience of the author and has not been peer-reviewed. Conclusions and opinions expressed herein do not necessarily represent those of BLM. Use of trade names does not imply U.S. Government endorsement of commercial products.

If you have received a copy of or found out about RESOURCE NOTES in an indirect way and would like to be included in future mailings, please send the following:

NAME TITLE MAILING ADDRESS and a list of the two or three subject areas that you are most interested in or that most directly relate to your job. Send this information to Phil Dittberner, BLM, RS-140, P.O. Box 25047, Denver, CO. 80225-0047 or phil_dittberner@blm.gov or FAX 303-236-3508.

If you would like to prepare a RESOURCE NOTE for distribution, or you have an idea and author in mind for a good RESOURCE NOTE, please contact Phil Dittberner at 303-236-1833, FAX 303-236-3508 or phil_dittberner@blm.gov with the topic and the name of writer, including an address, phone number, and e-mail address.

Thank you for your interest in RESOURCE NOTES.



National Science &
Technology Center



Bureau of Land Management