ROLE OF MATHS & STATISTICS IN WILDLIFE POPULATION MANAGEMENT & CONSERVATION - A STUDY

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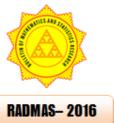
ABSTRACT

The role of Quantitative methods and Statistics are playing a key and vital part in wildlife ecology and Management. Wildlife resources constitute a vital link in the survival of Human species and have been a subject of fascination, interest and research all over the world. Wildlife population is not always static, its number increases and decreases at different places in the same species. Wildlife habitats are under severe pressure due to the danger of extinction of species and a large number of wild fauna have been endangered. Management of animal population of an area calls for an estimate or census of the number of animals. Statistical concepts' help wildlife Biologists and researchers in how to analyze data, recognize good data, sampling analysis of large amount of data collected, population studies and management of animal species. This paper deals with the interrelationship between the applications of different fields of Math's and Statistics to deal with issues such as Animal births, deaths, migration, habitat destruction, predation and other threats on Animal population.

Key Words: Wildlife Management, Data Information, Statistics, Census, Population studies, Ecology.

INTRODUCTION

Wild life includes the whole flora and fauna found in wilderness .Wild life is a renewable natural resource and hence with proper management and care or under natural circumstances, will reproduce itself. It is very essential to understand and get conception about wild life, its management and conservation. The fundamental knowledge about them is must before taking forward steps for applying technology. The scope of wild life is very vast from the view point of an economist, wild life management includes efficient utilization of the natural resources to the maximum human benefit through the process of scientific studies of the population of these animals and their habitat pattern. Wild life management is the judicious use of wild life resources towards attainment of scientific, ecological, economical and ethical, recreational objectives for the benefit of human beings and for importance of nature upon which all the components of ecosystem depend. It also includes planning and studying of habitat and behaviors of wild animals populations. Thus wild life management is the science and art of manipulation of structure, dynamics and relations of wild populations such in order to achieve specific human goals by means of the wildlife resource.

The scientific approach of wild life management includes observation, hypothesis, and application of tested principles of the hypothesis for the better management objectives. The scientific method is a more widely accepted way where a method of observation: Firstly to observe the things carefully.

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Hypothesis: Based on the observations some tentative conclusions are drawn and explanation for the observation is made.

Test of hypothesis: The hypothesis is tested scientifically.

Interpretation of results

All these are kept in mind when scientific research is carried on. There are three aspects of wild life management i.e. wild life (wild life population), its habitat (which includes food, water, space, shelter etc) and the related people who remain in and around the habitats or often come there. Wild life management can be done in the following methods.

1) Wild life census
2) Measurement of productivity
3) Diagnosis of control measures. Etc….

USE OF STATISTICS IN WILD LIFE POPULATION STUDIES

Wild life managers must estimate the sizes of wild life populations ideally three times a year, during breeding season, after the young are born, and before and after the hunting season. They need to know if the population is slowly increasing, slowly decreasing or not changing at all. Knowing this trend in population numbers allows us to make reliable management decisions and take corrective action when necessary.

Statistics consists of trying to understand data and to obtain more understandable data.

Animal censuses are usually done by total counts, sample counts and index counts. The choice of how to do the count, whether on foot, from a vehicle or from an aircraft, will depend on the species to be counted, the size of the area, and the objective of the count.

Statistics is an invaluable tool for biologists during data analysis; they use statistics during several other stages of research. Statistical methods are required to describe the data from both observational and experimental studies. For eg: one can use statistical parameters to describe a population such as the mean height of the plants in the field is 20cm, or a set of observations such as the average number of bacteria in a sample of the pond water is 3 bacteria per cc. Statistical procedures can be used to determine if there is any correlation between two or more parameters of the object studied. Eg: is the height of an organism proportional to the weight of the organism? If two or more parameters appear to be correlated, statistical procedures can be used to determine if one can predict the value of the second parameter if the value of only the first is known.

With the help of statistical knowledge population studies can be done like identifying appropriate sampling or experimental units, defining relevant variables and determining how those variables will be measured. In general, the cost of collecting data increases as the scale broadens, the focus intensifies and/or the demand for accuracy and precision increases. The cost of implementing surveys, as well as the need for skilled and highly trained staff, will also typically increase from measures of occupancy and relative abundance being the least expensive, to estimates of absolute abundance or density being the most expensive. In reality there are often trade-offs to be made between all these factors. Mathematical equations are available to estimate the sample sizes required to produce a reliable estimate of a population parameter. The technique used to estimate sample size will vary according to the particular method used. In the case of population estimation, many methods have been developed over the years to estimate the probability of detection

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associated with various kinds of count statistics. Techniques range from complete counts, where sampling concerns often dominate, to incomplete counts where detection probabilities are also important. Some examples of the latter are multiple observers, removal methods, and capture-recapture. Before embarking on a survey to estimate the size of a population, one must understand clearly what information is needed and for what purpose the information will be used. Population modeling is a tool used by wild life managers. Population modeling is like a book keeping system to keep track of four components of population change :births, deaths, immigration and emigration. In a mathematical symbol population can be expressed as Nt+Bt-Dt+It-Et. By knowing the net change in the size of the population from one year to next year, which helps in better management.

Statistics is a wide and diverse subject, Introductory probability and statistics provides definition for a number of terms like" sample" ,"population", and formulas for a number of commonly used statistics. The knowledge of statistics is useful for ratio estimates, estimating proportions, determining appropriate sample sizes etc. Topics like multivariate analysis, survival analysis, categorical analysis , time series ,spatial statistics are useful for biologists in research. Most biological processes involve changes through time. Therefore mathematical equations or models describing such processes involve describing the rate of change of a variable as a function of other variables. Animal population growth can usually be expressed as an equation, with the growth rate being a function of time and possibly other variables.

Every person managing wild life should know about statistics because

Statistics helps in providing a better understanding and description of a phenomenon of nature.

Statistics help in proper and efficient planning of a statistical inquiry in the field of study.

Statistics help in collecting an appropriate quantitative data.

Statistics helps in presenting complex data in a suitable tabular, diagrammatic and graphic form for an easy and clear comprehension of the data.

Statistics helps in understanding the nature and pattern of variability of a phenomenon through quantitative observations.

Statistics helps in drawing valid inference along with a measure of their reliability about the population parameters from the sample data.

CONCLUSION

The scientific management of animal population of an area calls for an estimate or census of the number of the animal, that an area can support. The application of various concepts of statistics in wild life gives a lot of accuracy by analyzing the data, therefore wild life managers can effectively manage wild life populations Statistical training is very important for all wild life biologists. It is advisable for science students to learn quantitative concepts and skills which will help them in interpretation of graphs, in the field of genetics , in ecological studies and also can be used effectively in wild life management where population census are done. The success of these management programmes lies in effectively conservation methods. Animals are of great value in ecological world therefore their population frequency is tabulated time to time by indices and census for effective management.

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REFERENCES

http://www.google.co.inl/gfe_rd=cr&ei=ncci

www.conservation india.org/events/workshops-

http://digitalcommons.unl.edu/usgsnpwrc/247

A Text Book of Wild life Management by S.K.Singh

Managing Wild Life in India by A.P.Dwivedi

www.wwfnature

www.biosciencemag.org

http://projects.nscu.edu/cals/course/fw353/estimate.htm

www.sciencecentral.org/journal/biodiversity-endangered sps.php

www.clemson.edu/extension/natural_resourses/wildlifepublications/pdfs/fs36wildlife.pdf.

http://en.wikipedia.org/wiki/biostatistics

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