New RHINO 2.0 population estimation software scheduled for release

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A beta version of the RHINO version 2.0 Bayesian Mark Recapture rhino population estimation package is currently undergoing testing. This new improved version of the software will replace the DOS-based versions of RHINO that have been in use since 1991. The project is on schedule, and it is hoped to release RHINO 2.0 by the end of June 2003. Thanks largely to funding from the SADC Regional Programme for Rhino Conservation, copies of RHINO 2.0 will be made available free of charge to all those who want to use the software to analyse their sighting–resighting rhino observation data to obtain population estimates with confidence levels. RHINO is designed to deal with populations where not all rhinos are individually identifiable (called 'clean' rhinos), and can deal with introductions, removals, deaths, calves becoming independent of their mothers and marking by ear-notching of clean animals to make them identifiable. The programme can also deal with 'trap-happy' rhinos and can be used in parks where users would be better off estimating the size of separate subpopulations within the whole park. RHINO is used to analyse ongoing sighting data rather than sighting data from multiple and intensive discrete surveys. Those interested in getting more information or in getting hold of the new software to estimate rhino numbers should contact Richard Emslie at remslie@ kznwildlife.com or kerynric@absamail.co.za.

The following points summarize the changes and features of the new RHINO 2.0.

- A new feature of RHINO 2.0 is that the user can select to produce separate population estimates for sub-areas within a large park despite the cross-boundary movement of some animals between sub-areas. The new multi-area analysis with cross-boundary movement correction is probably the major enhancement to the software and replaces the area weighting analysis option in previous versions of RHINO. A spin-off is that users can print out a table showing the number of sightings of each animal by area.

- Data can be imported from Microsoft Access (database), Microsoft Excel (spreadsheet) and text files. In addition to importing Access data tables, users can also choose to import data from an Access query. Files can now be selected by browsing.

- RHINO 2.0 uses the familiar Windows format. It is also form based, grouping related topics together onto separate forms. As a result the software is easier to use than previous versions.

- Context-sensitive help is now available by clicking the help button on each of the forms.

- RHINO 2.0 now comes bundled with a manual on CD. However, to make it easier to learn and master the software, RHINO 2.0 will come bundled on CD with the Camtasia AVI player and a number of training AVI videos. By simply clicking on a menu option, users will be able to watch and listen to specific AVI training videos. This will make the software much easier to learn.

- Unlike previous versions of RHINO, users can now go backwards at any stage during an analysis if they would like to change any parameters they have selected. (Users of earlier versions had to quit and restart the analysis from scratch.)

- Users have the option of filtering data before analysing it to select specific subsets of data for analysis. A bigger range of data filters is offered in RHINO 2.0.

- RHINO 2.0 now automatically generates a summary table describing the sightings and special events in the dataset being analysed, broken down by population segment.

- The routines used in RHINO 2.0 are computationally much more efficient than in previous DOS-based versions of the software. RHINO 2.0 has also been completely rewritten. Its modular structure makes it easier to enhance and update than RHINO 1.21.

- An improved clean estimator is used. Maximum clean priors are no longer needed. However, users can supply a field ranger's guesstimate of the

maximum number of clean animals. On the clean posterior probability distribution, RHINO will then shade all probabilities above this level and quantify (based on the data) the likelihood (%) that the clean population is bigger than the supplied maximum guesstimate. RHINO 2.0 also more appropriately deals with records of ear notching than did previous versions.

- A consistent approach has been taken to dropping extreme values of *N* with a very small chance of occurrence, and probability distributions are now routinely normalized (so that probabilities sum to 1).

- An improved routine has been implemented for estimating dependent numbers when there are special codes and trap-happy animals.

- The best-fit mean sighting frequency is now estimated automatically using a root mean square (RMS) error minimization routine to find the truncated Poisson mean with the best fit to the observed frequency distribution of sightings of identifiable (ID) animals present for the whole analysis period. Users can graphically examine how RMS varies with mean sighting frequency. The best-fit value (or other user-supplied value) can be used to indicate the maximum number of sightings of a particular animal users should allow before treating the animal as trap happy (for a specified significance level).

- If users select to drop trap-happy animals, the sighting frequency distribution graph is updated by marking dropped animals in a different colour and indicating on the form how many animals and the total number of sightings that will be dropped.

- Users can enter either 'Uninformative priors', 'Informative priors' or 'Previously saved priors'. Users can save Uninformative or Informative priors. Thumbnail graphs of saved prior distributions are also available as part of the menu to select saved priors.

- On all final posterior probability distribution graph forms, the axes of the initial graph are automatically scaled. However, users can interactively 1) rescale the graph by varying the minimum and maximum *X*-axis and maximum *Y*-axis values; 2) change to view partial ID independent distributions calculated after each fifth of the dataset (if minimum ID independent prior was set at 1); and/or 3) manipulate the credible posterior interval (CPI) value cell to see the effect this has on CPI values. (The CPI is the Bayesian equivalent of confidence levels.)

- Confidence levels can now be shaded on the posterior probability graphs to aid understanding.

- Separate dependent distributions are generated for calves of both Identifiable and Clean animals (if both categories exist), and the total dependent distribution is then automatically generated and displayed as the default dependent graph. All three dependent distributions are now included together on a single form, and different graphs and statistics can be selected using tabs.

- The new RHINO 2.0 includes greatly improved reporting whereby colour graphs and results are automatically inserted into the final reports that are in the form of an MS Word document. If you interactively rescale a graph, this is the version that will be used in the report. *Currently, reporting requires the user to have Microsoft Word and Microsoft Excel installed.*

- Greatly improved simulation options have been added to RHINO 2.0. These allow 1) simulation of a more complicated single-run dataset, which now can also include special codes, dependents, and trap-happy animals, 2) multiple simulation and automated summary analysis of large numbers of runs for a given set of parameters, which can be used to determine more objectively the costs and benefits of notching different numbers of animals (as opposed to collecting more data) as well as providing better guidelines on the minimum proportion of a population one should aim to have notched, and 3) simulation of a simple multi-area dataset.

- RHINO 2.0 calculates additional variables (RMS estimated mean sighting number, and calculated measures of distribution skew and peak), which combined with the multiple-simulation option will provide developers with data that will be used to improve RHINO's in-built statistical expert system (which guides and sometimes warns users) in future versions.