Form 1100-001
(R 2/07)

NATURAL RESOURCES BOARD AGENDA ITEM

Item No. 3B2

SUBJECT: Sex-Age-Kill (SAK) Audit final report, Stakeholder Steering Committee report and recommendations

FOR: FEBRUARY, 2007 **BOARD MEETING**

TO BE PRESENTED BY: Keith Warnke, Big Game Specialist
George Meyer and Mark Noll, Stakeholder Steering Committee Co-chairs

SUMMARY:

The Natural Resources Board commissioned an outside auditor's review of the DNR's "Sex-Age-Kill" formula by a panel of nationally recognized experts under the direction of a citizen steering committee. The panel has reviewed the formula, reported to the Board in December, and made its final recommendations to the steering committee in February. The Steering Committee's report and recommendations will give board members and department staff direction in setting deer season frameworks that are ecologically sound and provide ample hunting opportunity.

The SAK Stakeholder Steering Committee has sought clarification from the SAK Model Review Panel of a number of issues that will be addressed for the Board at its February meeting.

Wisconsin has been using the "Sex-Age-Kill" model for more than 40 years to estimate deer populations. The model is based on deer registration information and deer aging stations that are set up around the state during hunting seasons. It uses a complex formula to estimate the statewide deer population based on the percentages of the sex and age of deer killed during hunting seasons. The effectiveness of the model for managing Wisconsin's deer herd and believability of deer population estimates remains a continuing concern with the public and wildlife officials. The estimated number of deer in specific Deer Management Units throughout the state determines in large part the hunting season structures that wildlife staff will recommend to the Natural Resources Board.

The panel of auditors was chosen by a steering committee of representatives from a diverse range of interest groups and individuals.

RECOMMENDATION: Endorsement of the final SAK Report and report of the Steering Committee to the NRB

LIST OF ATTACHED MATERIALS:

No	☑	Fiscal Estimate Required	Yes	☐	Attached
No	☑	Environmental Assessment or Impact Statement Required	Yes	☐	Attached
No	☐	Background Memo	Yes	☑	Attached

APPROVED:

/s/ — 2/1/07
Bureau Director, Tom Hauge — Date

/s/ — 2/1/07
Administrator, Laurie Osterndorf — Date

/s/ — 2/1/07
Secretary, Scott Hassett — Date

cc: Laurie J. Ross - AD/5
Laurie Ross AD/5
Conservation Congress Exec. Council
Tom Hauge - WM/6
Keith Warnke - WM/6
Amy Smith - AD/5
Tribes/GLIFWC
Bill Vander Zouwen - WM/6
Laurie Osterndorf - AD/5
Regional Wildlife Mgt. Supervisors

CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: January 30, 2007 FILE REF: 2300

TO: Natural Resources Board

FROM: Scott Hassett, Secretary

SUBJECT: Sex-Age-Kill (SAK) Audit final report, Stakeholder Steering Committee report and Recommendations

Recommendation:

I am requesting endorsement of the SAK Model Review Panel's final report, "An Evaluation of the SAK Model as Applied in Wisconsin," and report of the SAK Stakeholder Steering Committee.

Background:

The Natural Resources Board commissioned an outside auditor's review of the DNR's "Sex-Age-Kill" formula by a panel of nationally recognized experts under the direction of a citizen steering committee. The panel reviewed the formula, reported to the Board in December, and made its final recommendations to the steering committee in February. The Steering Committee's report and recommendations will give board members and department staff direction in setting deer season frameworks that are ecologically sound and provide ample hunting opportunity.

Wisconsin has been using the "Sex-Age-Kill" model for more than 40 years to estimate deer populations. The model is based on deer registration information and deer aging stations that are set up around the state during hunting seasons. It uses a complex formula to estimate the statewide deer population based on the percentages of the sex and age of deer killed during hunting seasons. The effectiveness of the model for managing Wisconsin's deer herd and believability of deer population estimates remains a continuing concern with the public and wildlife officials. The estimated number of deer in specific Deer Management Units throughout the state determines in large part the hunting season structures that wildlife staff will recommend to the Natural Resources Board.

SAK Review Panel Members:

The SAK Review Panel was chaired by Mr. Mark Boyce, University of Alberta. In addition to Mr. Boyce, the expert panel included Josh Millspaugh of the University of Missouri; John Skalski of Washington State; Duane Diefenbach of Penn State; Lonnie Hansen of the Missouri Department of Conservation, and Kent Kammermeyer, formerly of the Georgia Department of Natural Resources.

Citizen Steering Committee Members:

The panel of auditors was chosen by a steering committee of representatives from a diverse range of interest groups and individuals listed in Appendix A.

Follow-up Questions:

The SAK Stakeholder Steering Committee has sought clarification of the following issues that will be addressed for the Board at its February meeting:

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1. Does prediction of SAK result in a systematic bias (underestimated or overestimated) if the input variables are unbiased?

2. In the report, is “buck reporting rate” the same as “buck recovery rate”?

3. Page 12, #4. The report indicated that WDNR procedural issues (ad hoc adjustments at the DMU level) were identified as a topic of investigation, especially of interest to the Conservation Congress. Can you generalize about the effects of the ad hoc adjustment made by managers in practice?

4. Page 16, equation 10. The report indicates that H-hat includes wounding loss. DNR does not include wounding loss in estimates of H-hat, only in posthunt estimates. Does this result in a negative bias, or is this difference accounted for by including wounding loss in our estimate of buck recovery rates?

5. Page 17. DNR considers the projection of deer abundance in year t + 1 to be an projection, but have always referred to it as a prediction to aid in harvest management decision making, so a better understanding of factors affecting population growth from posthunt year t to prehunt year t + 1 could be helpful. In Mark’s presentation to the Board he indicated we had no estimate of lambda in the southern part of the state. This was evidently a misstatement, because we have estimates for each DMU based on the history of SAK estimates, we just do not attempt to adjust lambda based on WSI in the farmland regions (see page 3 #8; page 20 - 21). Empirical estimation of lambda is based on the time series of DMU-level population estimates.

6. Page 26. When report applies correlation between recruitment and non-harvest survival in the stochastic model, are survival rates of all ages affected equally? If so wouldn’t this magnify change in population size because juvenile survival is more likely to be affected by environmental variation than adult survival? Typically, deer killing winters hit fawns much harder than adults.

7. Page 25 (text), figure 5 (page 90). It appears that the labels in the figure are wrong. It appears that the green dash and dotted line is the moving average and the black dashed line is the 1-year SAK. Was this a 3-year or 5-year moving average?

8. Page 40, Section 11.3. The report indicates that adding sampling error increases the CV from 12% to 58%, a 46% change. However, in section 11.0 (page 35) the report indicated that the average CV due to sampling was 15% for the 16 DMUs analyzed. This seems to be a big difference. How realistic is the assumption that variance components are additive? Is the variance somehow compounded? Is the difference due to the use of arbitrary samples sizes in the stochastic simulation model that were less than the those used in the Monte Carlo analyses? The magnitude of year-to-year variation in the simulated population estimates in figure 18c and 18d appear to be much greater than the actual pattern of estimates in figures 9-16 and figures 19-27. Is there some component of our population estimation system that is not well captured in the simulation model? On average the absolute value of the percent change in population estimates from year to year is about 20% during 1981-2005 for DMUs in Wisconsin. Also the patterns of population trends tend to be similar among DMUs in the same region. From these graphs, it does not appear that the

simulation model is generating patterns consistent with the actual estimates. Why does the 40+ year history of deer population estimates by unit in Wisconsin not show the erratic behavior seen in the simulation analysis?

10. The variation in demographic processes was set by the various models at 20% above and below baseline values. How does 20% annual variation in these parameters compare to expected variation in real systems?

11. Most of the reporting shows confidence limits of 95% (page 37, no.3) despite suggesting that 90% might be sufficient (page 29, paragraph 4). Should a consistent level of precision (90%?) be used throughout the report?

12. Previous analyses have suggested that SAK was most sensitive to Buck Harvest and Buck Recovery Rates. Does this contradict the report's conclusion that doe age samples are most influential (page 38)?

13. What's the value of professional judgments? Specifically, don't the "tweaking" and ad hoc adjustments tend to dampen out extreme SAK predictions and thus tend to reduce the confidence intervals associated with a sample or time series of SAK estimates?

SAK Recommendations that are Already Being Utilized:

One recommendation of the audit is already being utilized. In the many of the northern forest units department staff have used a 10-year average yearling buck percent to estimate the buck harvest rate because of uncertainty in the interpretation of the fairly low 5-year averages. This contrasted with the rest of the state where we used 5-year average yearling buck percents. One of the issues we were interested in the SAK review panel addressing is how best to smooth over the annual variation in yearling percents due to variation in recruitment but not mask overall trends in mortality rates. Some biologists believe that by using a 10 year average in parts of the Northern Forest we have been overestimating mortality rates and underestimating population size. The SAK review panel did not make a recommendation on the most appropriate time span for calculating average yearling percents. However, the Deer Committee at last week's meeting recommended that we use 5-year averages in calculating SAK estimates this year.

Appendix A

SAK AUDIT—Steering Committee List—02/17/06

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