Responses to comments regarding the proposed assessment and decision-making framework to inform scaup harvest management

In the April 11, 2007, **Federal Register** (72 FR 18328) and the June 8, 2007, **Federal Register** (72 FR 31789), we requested comments on a proposed assessment and decision-making framework for scaup harvest management. We received comments from 29 agencies, organizations, or private individuals. Some comments were very general in nature or related to fundamental concerns about the models we used or the assumptions we made in the assessment. Other comments were more specific and technical in nature. We responded to the more general, broad-based comments, concerns, and issues in the July 23, 2007 Federal Register. A more detailed, technical response to other comments is provided below.

We have attempted to provide responses to all technical comments received. In what follows, we first restate a comment or criticism, sometimes paraphrasing to capture the essence of a common concern identified by more than one respondent, followed by our response. Comments addressed are formatted in a numbered list.

(1) The model makes the assumption that all scaup harvest additive.

The current formulation of the scaup assessment includes structure that admits the possibility of compensatory harvest mortality. Through the use of a scaling factor, q, the assessment seeks to reconcile information contributed by breeding-population estimates, harvest estimates, and recovery information from banding data in a common estimation framework. If the resulting estimate of q is equal to one, then the harvest is strictly additive. The estimate of q is equal to 0.54 (95% CI = 0.46 - 0.63), which is significantly less than one. However, even though the estimate of q is less than one, we cannot attribute it solely to compensatory mortality. The q parameter may represent scaling differences between the data sets, some level of compensatory harvest mortality, the fact that we are pooling information over different cohorts, or a combination of each of these mechanisms. The requisite information to determine the reason(s) for which $q < 1$ does not exist. Nevertheless, the estimation framework used in the scaup assessment precludes the interpretation that harvest mortality is strictly additive.

(2) Harvest is not likely the cause of the scaup population decline, so why should harvest be restricted? There is also no evidence that reducing scaup harvests will increase the breeding population. Moreover, scaup are the most abundant diving duck and since 1997 have ranked 3rd in species abundance and 10th in the size of the harvest.

Whatever the reason, smaller populations have less of a harvestable surplus than large populations, everything else being equal. There is also empirical evidence that optimal harvest rates (i.e., the harvest potential) of scaup have declined in conjunction with the population decline. Disturbingly, however, harvest rates of scaup have actually increased while the harvest potential and abundance of scaup have declined. We acknowledge that the scaup population decline is most likely being driven by large-scale changes in climate, habitat conditions, or other proximate factors affecting scaup demography (e.g., contaminants), but the best available information suggests that current scaup harvest is not commensurate with population status and exploitation potential. The proposed strategy merely seeks to make scaup harvest commensurate with population status.

(3) The estimated carrying capacity (K) for scaup is 8.2 million when the population has never been that high.

The scaup assessment suggests that population size would only reach this level in the complete absence of harvest and if there was no further deterioration in habitat conditions. Under the current assessment, considerable uncertainty exists in the estimate of K (95% CI = 5.7 - 12.2 million). This range of possible K values is explicitly accounted for in deriving optimal harvests.

(4) The carrying capacity (K) of scaup is changing over time and therefore historical data cannot be used as a basis to determine allowable harvests.

A review of historical data does indeed suggest that scaup population dynamics have changed since the early 1980s and that this has resulted in lower harvest potential. Fortunately, the assessment framework permits model parameters like K to be updated annually and so system changes can be tracked. Of course, if history is not a useful guide to the future, then no modeling effort based on data will provide useful information for harvest management.

(5) The maximum sustainable yield (MSY) or yield curve modeling framework should first be accepted and implemented for midcontinent mallards before being applied to other species. Also, an objective to achieve less than MSY has not been accepted for other waterfowl stocks.

A yield curve represents an estimate of the harvestable surplus as a function of population size, which is derived directly from population biology and modern harvest theory. Yield curves have been used to evaluate the harvest potential of midcontinent, eastern, and western mallards and of black ducks, pintails and other species, in all cases with acknowledgement and consent from the majority of the waterfowl management community. Notably, the harvest-management objective for midcontinent mallards has been in place for over 12 years and is expected to hold the population on the right hand side of the yield curve at about 90% of the maximum long-term cumulative harvest (see Figure 1 in Runge, M. C., F. A. Johnson, M. G. Anderson, M. D. Koneff, E. T. Reed, and S. E. Mott. 2006. The need for coherence between waterfowl harvest and habitat management. Wildlife Society Bulletin 34:1231–1237).

(6) Why did you choose 95% of MSY as a proposed objective?

We acknowledge that the selection of an objective function for deriving a harvest strategy is a policy decision. However, we proposed an objective of 95% MSY because it results in a strategy considerably less sensitive to small changes in population size than a policy based on 100% MSY, and because it allows for some harvest opportunity at relatively low population sizes.

(7) The breeding population data and harvest data are highly uncertain.

We recognize that there is considerable uncertainty in our ability to monitor the scaup breeding population and harvest. We openly acknowledge this uncertainty in our assessment framework by explicitly accounting for measurement error in the estimation of model parameters.

(8) This framework has not undergone peer review.

We have aggressively solicited critical review from the waterfowl management and research community since the initial release of a draft report in February 2004. In response to feedback from federal, state, and private waterfowl biologists, we have made significant changes to the original assessment framework. These changes and the corresponding implications have been communicated back to the management community through presentations and updated reports. Additionally, the assessment framework underlying the harvest strategy was presented at the 2nd Scaup Workshop held in January 2006 which also generated constructive feedback. We are presently in the process of submitting a manuscript that describes our estimation and decision-making framework for publication in a scholarly journal.

(9) This modeling framework should be evaluated with data from other species.

We have conducted similar assessments for other duck species and preliminary results suggest that the logistic model can provide a reasonable representation of population dynamics using a minimal amount of demographic information. We will be sharing these results in the near future.

(10) The harvest rate index (harvest/population size) is low for scaup relative to other species.

First, the life history strategy of scaup suggests that harvest potential may be less than many other duck species (especially dabbling ducks). Secondly, use of the suggested harvest rate index does not account for summer production of young, which appears to be low in scaup relative to other species (thus, providing a harvest rate index that is biased low). Finally, this type of comparison among species may not be appropriate because harvest and population estimates likely are not scaled relative to each other in the same way for all species.

(11) A key assumption in the model is that harvest affects the next year's breeding population.

We are comfortable with the assumption that harvest has some impact on scaup population dynamics, acknowledging that harvest probably is neither completely additive nor completely compensatory. More importantly, the potential for harvest to impact population size is an explicit consideration mandated by the Migratory Bird Treaty Act. On a more practical note, if we were to assume that harvest has no impact on the scaup population, then a model, a harvest strategy, and ultimately an annual decision regarding appropriate hunting regulations would not be required to manage scaup harvests.

(12) The harvest strategy needs to embrace alternative models of population dynamics.

We acknowledge that we rely on one basic characterization of population dynamics (i.e., the discrete logistic population growth with harvest), but the model is sufficiently general to account for a broad range of dynamics and response to harvest. In addition, we account for circumstances where the discrete, logistic model may not perfectly represent scaup population dynamics by explicitly representing this process error in the assessment framework. More importantly, the entire range of population behaviors that are supported by available data are considered in the derivation of an optimal harvest strategy through the use of 27 different combinations of the population parameters (r, q, K).

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