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Comment on "Impacts of Biodiversity Loss on Ocean Ecosystem Services"

John Jaenike, *et al.*

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Worm *et al*. (Research Articles, 3 November 2006, p. 787) used a power relation to predict a global collapse of fisheries by the year 2048. However, a linear regression of the data for the past 40 years yields an excellent fit, with a predicted date of collapse of 2114. Thus, long-term projections of fisheries collapse are highly dependent on the specific statistical model used.

In their recent paper, Worm *et al*. (*1*) predicted "the global collapse of all taxa currently fished by the mid–21st century (based on the extrapolation of regression in Fig. 3A to 100% in the year 2048)," a date that has since received considerable media attention. The regression shown in this figure is a best-fit power relation, which indicates an acceleration in the rate of species collapse. However, examination of the percentage of collapsed taxa by year in figure 3A in (*1*) reveals a substantial mismatch between predicted and observed values over the past 30 years. Specifically, all of the data points for the past 16 years (1988 to 2003) fall above the regression line, and this trend is preceded by another long period (1972 to 1985) in which all of the data fall below the regression. Such systematic departures from the predicted values indicate that a power function may not be an appropriate statistical model upon which to base future projections.

The data in figure 3A reveal an approximately linear rate of collapse from the early 1960s to the present. A linear (rather than power) regression of the data for the past 40 years yields an excellent fit: % collapse = 1.83 + 0.65(Year – 1963); r^2 = 0.99. Inclusion of a quadratic term in the regression does not significantly improve the fit ($P > 0.4$) and thus does not support an accelerating rate of collapse. This equation indicates that the world will reach 100% collapsed species in the year 2114 rather than 2048, which is 2.5 times as long as predicted by Worm *et al*. (*1*). This alternative analysis indicates that one should not put too much reliance on long-term projections based on a specific statistical model in this case.

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Reference

1. B. Worm *et al*., *Science* **314**, 787 (2006).

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