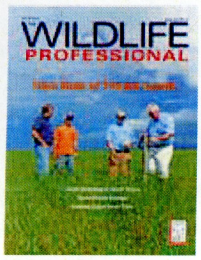
LETTERS TO THE EDITOR



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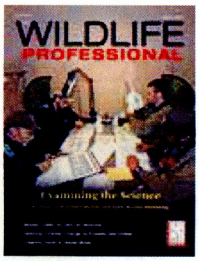

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Wolf Recovery: A Response to Bergstrom

Professor Bergstrom's "Wolf Recovery: A Response to Mech" (summer 2014) offers an excellent opportunity to empirically test which approach to Northern Rocky Mountain (NRM) wolf-recovery planning is more "science-based"—his population viability analysis (PVA) or the Delphi method of collective, experienced, professional judgment.

The Bergstrom et al. (2009) PVA predicted extinction for the NRM wolf "in less than 10 years," *i.e.* by 2018. This is not to criticize PVAs, although they are not without their critics (Caughley 1994). Brook et al. (2000) answered PVA critics with an analysis of PVA use with endangered species, demonstrating high reliability with most of 21 species they examined. Notably the fit between PVA prediction and reality was "noticeably poor" with the single wolf population they used, that of Isle Royale. Still, the fits of most of the populations were good. PVAs do have their place.

However, PVAs are highly sensitive to assumptions and values of inputs (Ludwig 1999), so they are not infallible. Bergstrom (2014) relied on Creel and Rotella (2010) without considering the findings that challenged that paper (Gude et al. 2012). In addition, believing that the relatively few wolves in eastern Wyoming are important for maintaining connectivity to the rest of the NRM population, Bergstrom (2014) also criticized Wyoming's wolf management plan that allows unlimited taking in that part of the state. However, most of the NRM wolf population lies west of Wyoming, not east. Any Wyoming wolves dispersing eastward would enter the Dakotas, a proven sink for wolves (Licht and Fritts 1994).

Bergstrom (2014) also stated that "wolf populations of fewer than 200 are especially vulnerable to mortality of greater than 25 percent and reduced dispersal (Carroll et al. 2014)." However, that reference does not support the statement, and the statement is irrelevant to the NRM population, which has exceeded 200 since 1996.

It is true that Idaho, Wyoming, and Montana would like to reduce their wolf populations. They are trying, but have not been very successful, as expected (Mech 2010). Meanwhile the NRM population has expanded its range into Washington and Oregon, where they are mostly protected. The population of 1,650 wolves that Bergstrom et al. (2009) assumed for the NRM in 2009 and predicted extinction for by 2018 numbered at least 1,690 at last count in 2013 (U.S. Fish and Wildlife Service 2014). Neither the Bergstrom et al. (2009) PVA nor the legal requirements for delisting recognize the important biological fact that the NRM wolf population is contiguous with the entire Canadian wolf population of 60,000 wolves.

Perhaps in four years the PVA will prove more "science-based." Time will tell, of course, but my bet is on the collective judgment of professional wolf biologists that since 1987 has proven correct.

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The Relevance of Evolutionary Biology

Michael Hutchins et al. (2014) recently provided examples of applications of evolutionary biology in the field of wildlife management (summer 2014). In their concluding paragraph, the authors suggest that The Wildlife Society modify certification requirements to include some formal coursework in evolutionary biology. Yet the relevance of evolutionary biology to the field of wildlife conservation was pointed out more than a decade ago in a special issue of the *Wildlife Society Bulletin* (WSB) edited by Paul Krausman, which addressed education in the field of wildlife management and conservation (Krausman 2000).

The Hutchin et al. authors appear to have missed previous calls for expanded training in evolutionary biology. For example, Bleich and Oehler (2000) emphasized that, "The concept of evolution is common to all aspects of science related to living resources. As such, evolutionary theory provides a common link between those interested in, among other things, habitat management, population ecology, or conservation biology." Further, Bleich and Oehler (2000) noted that certification by The Wildlife Society did not require "... completion of courses in the specific fields of evolutionary biology, evolutionary ecology, or population genetics..." and they concluded that "... strong backgrounds in natural history and in evolutionary biology form the most important educational foundation for aspiring wildlife biologists." Indeed, Peek (1989) emphasized