

Does harvest select for maladaptation in an increasingly variable world?

For several plant and animal species, Darimont et al. (1) present compelling evidence that rates of phenotypic change driven by human harvest far outpace those driven by other selective forces. From a life-history perspective, commercial and trophy harvesting also resulted in smaller size/earlier age at first reproduction, smaller adult body size (sometimes associated with shorter lifespan), and increased reproductive investment. Selection for these traits can mold life histories with faster reproductive tempos that, not surprisingly, can increase maximum yield (in numbers of individuals) under the assumption of a constant environment. In a world in which climatic conditions are predicted to become increasingly variable (2), however, commercial and trophy harvesting practices may be culling the very traits that would be most adaptive in the future.

Recent advances in life-history theory predict that increased environmental variability tends to select for genotypes that convey delayed reproduction, increased longevity, iteroparity, and an overall life history with slower reproductive

tempo (e.g., refs. 3–5). Thus, in terms of life-history traits, human harvest might oppose the direction of selection favored by increasing environmental variability, which should be of grave concern to natural resource managers. Trophy and commercial harvesting practices could be even less sustainable in the future than they currently are (1). Management agencies will thus need to become more proficient in both the ecological and evolutionary aspects of population biology to design harvest strategies that will sustain population numbers and genetic diversity in future environmental conditions.

David N. Koons¹

Department of Wildland Resources and the Ecology Center, Utah State University, 5230 Old Main Hill, Logan, UT 84322

1. Darimont CT, et al. (2009) Human predators outpace other agents of trait change in the wild. *Proc Natl Acad Sci USA* 106:952–954.
2. Salinger M (2005) Climate variability and change: Past, present and future—an overview. *Clim Change* 70:9–29.
3. Koons DN, Metcalf CJE, Tuljapurkar S (2008) Evolution of delayed reproduction in uncertain environments: A life history perspective. *Am Nat* 172:797–805.
4. Metcalf CJE, Koons DN (2007) Environmental uncertainty, autocorrelation and the evolution of survival. *Proc R Soc London Ser B* 274:2153–2160.
5. Morris WF, et al. (2008) Longevity can buffer plant and animal populations against changing climatic variability. *Ecology* 89:19–25.

Author contributions: D.N.K. wrote the paper.

The author declares no conflict of interest.

¹To whom correspondence should be addressed. E-mail: david.koons@usu.edu.