Endangered Genes of the Yellowstone Ecosystem

Appendices, Literature Citations

Jim Bailey
Belgrade, MT
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www.jamesabailey.com

Appendix 1. The Endangered Species Act – In 1973, Congress found that species become threatened or endangered because they have been depleted in numbers. A 1978 amendment to the Act allowed the Fish and Wildlife Service to sparingly list "distinct population segments". In a 1996 policy:

> the Service recognized that "important components of the evolutionary legacies" of species could define distinct population segments.
>
> the Service recognized that occurrence in an unusual ecological setting may define a distinct population segment. Unusual ecological settings should have unusual patterns of natural selection.
>
> the Service considered the Act to mandate conservation of populations as "elements of natural diversity."
>
> the Service recognized the interrelated goals of conserving genetic resources and the Act's mandate for conserving ecosystems. I presume this is recognition that genetic diversities are components of ecosystems – an obvious but easily neglected idea.
>
> the Service concluded that a distinct population segment must be "markedly separated" from other populations and that "ecological separation" may qualify for distinctness. However, it is not clear if incomplete separation of a population along a cline of changing natural selection processes would qualify.
>
> the Service concluded that a distinct population may be considered significant if it occurs in a unique ecological setting; if it differs markedly in genetic characteristics; or has other biological and ecological importance.

These positions of the Fish and Wildlife Service provide an uncertain but arguable basis for claiming that preserving the genetic adequacies of distinct wild vertebrate populations is required under the Endangered Species Act.

Appendix 2. Park Service Mandates and Policies – The most important mandate for the Park Service is its 1906 Organic Act which directs that resources be left unimpaired for future generations. The Act's directives were further elaborated in 2006 Management Policies wherein Section 4, Natural Resources Management, is especially pertinent for wildlife. Section 4:

> recognizes that natural resources include biological processes such as evolution, that park resources are still evolving, and that the Service will allow this evolution to continue.
>
> defines "natural" as a condition in the "absence of human dominance".
>
> concludes that all biological processes of naturally evolving ecosystems, and the genetic

integrities of animal species should be maintained in their natural conditions.

directs that any interventions in natural processes will be minimized.

directs that, in cases of uncertainty as to impacts of activities within Parks, the protection of natural resources will predominate.

Appendix 3. Montana Wildlife Law – The Montana Constitution requires that natural resources shall not be degraded. Presumably this would include genetic degradation.

The Montana Wildlife Code (Chapt. 87):

emphasizes big game animals and repeatedly refers to population numbers to be maintained and controlled. Viability of populations is considered only in relation to available habitat, especially forage, not to genetic qualities of the animals.

allows the state game commission to regulate numbers for “biologically sound” management of big game. Genetic adequacy could be construed as biologically sound.

includes an Endangered Species Conservation Act that recognizes protection of imperiled species only by enhancing their numbers; but:

also recognizes the mandate that “unreasonable” degradation of natural resources is to be prevented; and recognizes that “other natural factors” may threaten survival or recruitment of imperiled species. These stipulations could provide weak references to genetic qualities of populations.

The Montana Environmental Protection Act (Chapt. 75) mandates consideration of: irretrievable commitments of resources”; “all components of the natural environment”; and presently “unquantified environmental amenities”. These stipulations could provide weak references to genetic qualities of populations.

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