

Management of bison conservation herds with historic cattle ancestry


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Developing a genetic management plan is integral to Department of Interior Bison Conservation Initiative



Genetic Workshop
September 2008

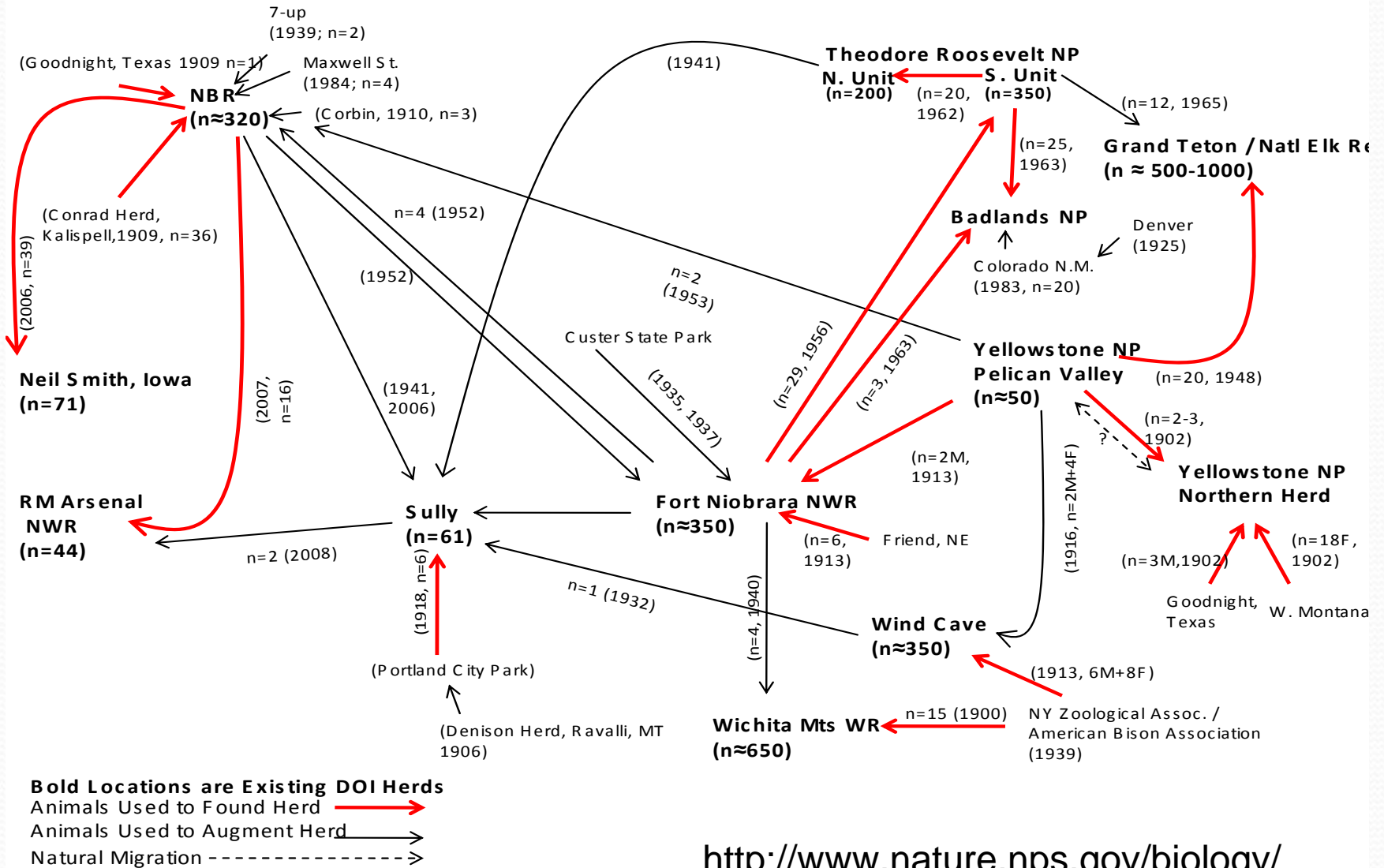


The explosive growth of
information in our human society
is a part of the slower growth of
ordered structures in the
evolution of life as a whole.

How We Know

Freeman Dyson, 2011

Sources and Movement of DOI Bison (M. Schwartz 2010)



Changes with SNP Chip Analysis

- 50KBovSNP Chip used to test animals from all DOI herds
- Allows clearer view of cattle ancestry history
- Analysis not complete, FOIA already requests data
- Cattle ancestry confirmed at Wind Cave and Grand Teton National Parks, Sully's Hill Refuge
- No cattle ancestry found in 20 bison sampled from Yellowstone

Plains Bison Herds of 3 Sorts

- **No Detected Hybridization**
- **Cattle Introgression at $< 2\%$**
- **High Level or Recent Cattle Crosses**



Grand Canyon National Park North Rim Entrance September 26, 2007

NPS Management Policies 2006

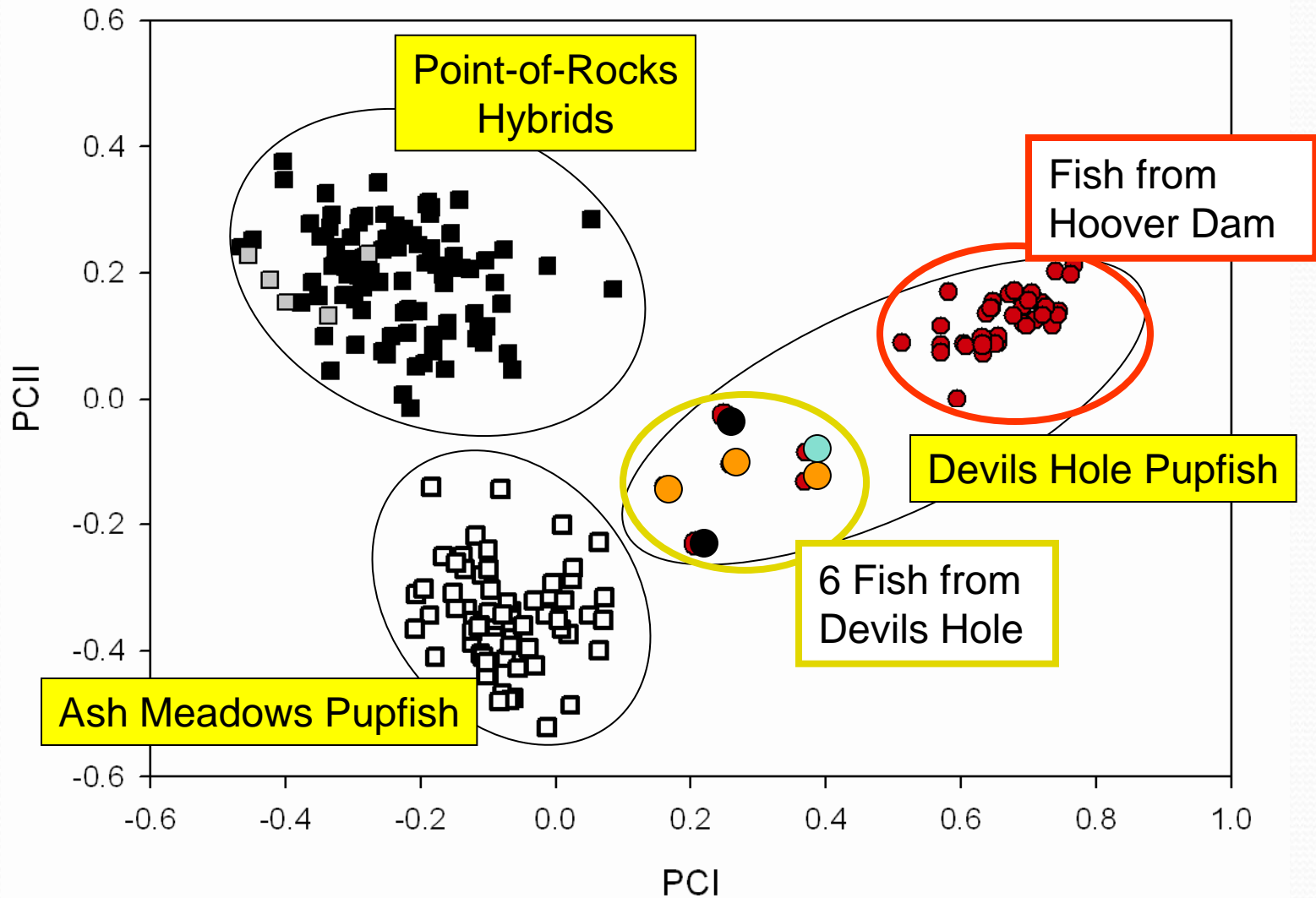
When native plants or animals are removed for any reason – such as hunting, fishing past management, or culling to reduce unnatural population conditions resulting from human activities – the Service ***will maintain the appropriate levels of natural genetic diversity.***



Devils Hole Pupfish

Diabolis cyprinodon

Principle Components Analysis



Questions to be addressed in a a bison genetic policy that is up to speed with DNA technology

- Now that you can identify cattle genes in most DOI bison herds, and they are rare but not randomly distributed across the genome, should we select against them?
- If isolation, genetics drift, and remixing of species and subspecies preserves variation, as with the Devils Hole pupfish and Galapagos tortoise, when is it warranted?
- Using a combination of ID chips and SNP chips, should we be selecting individual bison or monitoring herds?
- If hybridization provides new variation, is that a means to get resilient taxa to face new environmental challenges?



NPS Management Policies 2006

Genetic Resources Management Principles

The Service will strive to protect the full range of genetic types (genotypes) of native plant and animal populations in the parks by **perpetuating natural evolutionary processes and minimizing human interference with evolving genetic diversity.**



We need a consensus for genetic management of all bison herds

- **Herds with low levels of cattle introgression have important conservation genetic value**
- **Yellowstone and descendant herds should be preserved but not be the only source of bison for founding conservation herds**
- **Even herds with recent hybridization may preserve bison characters that are valuable**

