

Conservation of Lahontan cutthroat trout

Oncorhynchus clarkii henshawi

Nevada's native cutthroat trout



University of Nevada, Reno
Statewide • Worldwide

Mary Peacock
Veronica Kirchoff

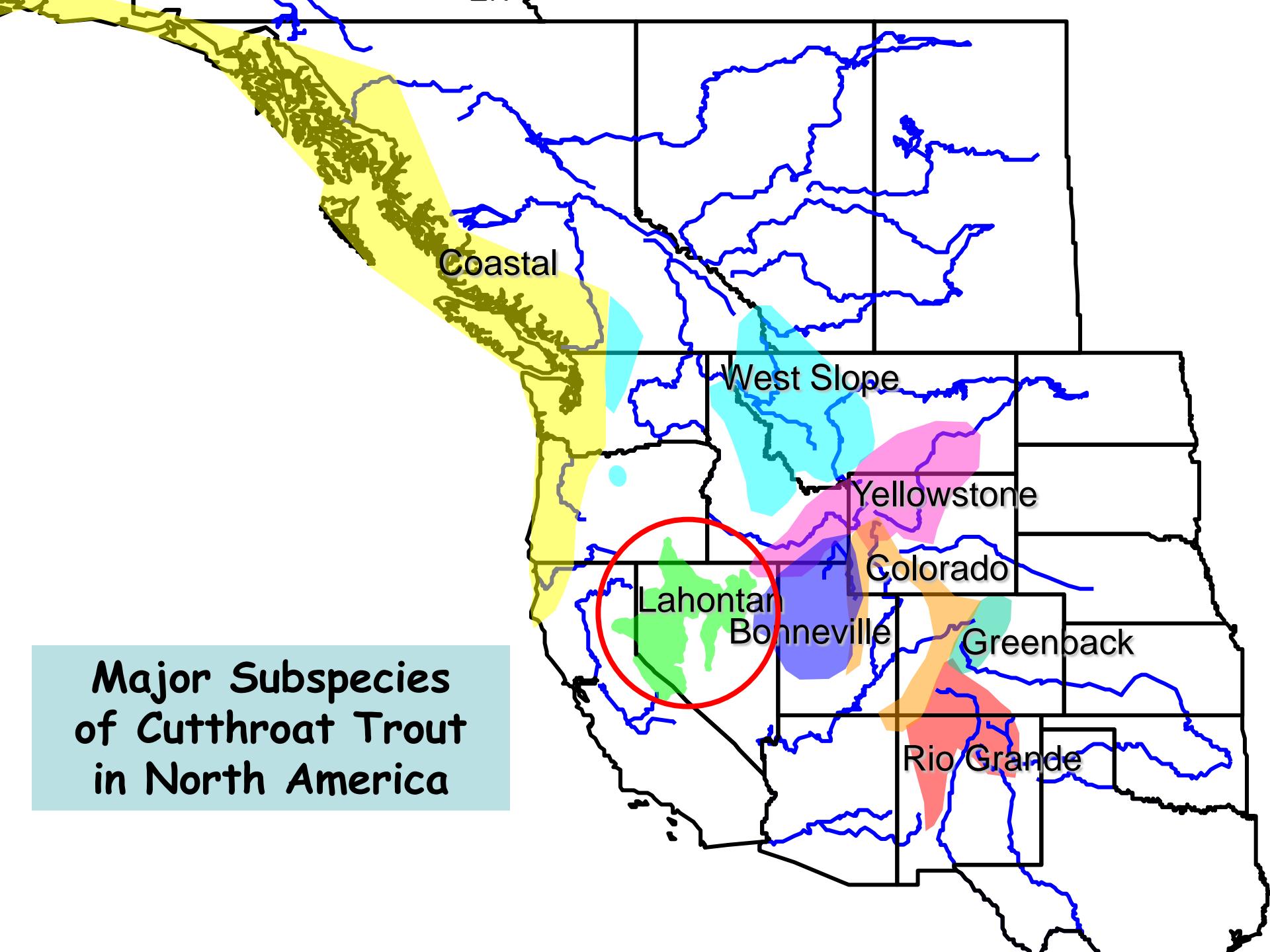


Helen Neville



Lisa Heki

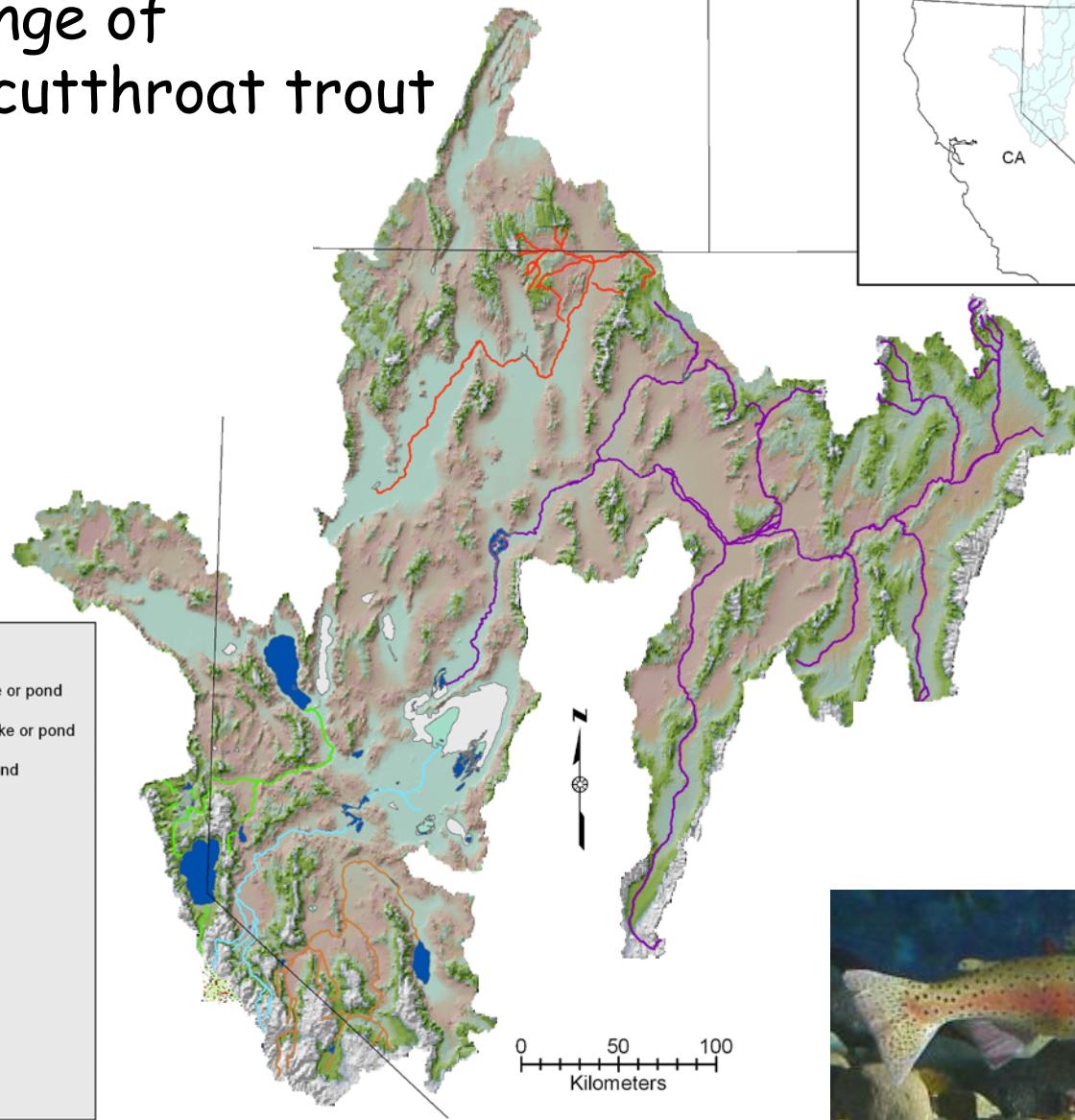
Major Subspecies of Cutthroat Trout in North America



Lahontan Hydrographic Basin

Native Range of

Lahontan cutthroat trout



Lahontan cutthroat trout Status

- Listed as Endangered in 1973
- Downlisted to Threatened in 1975

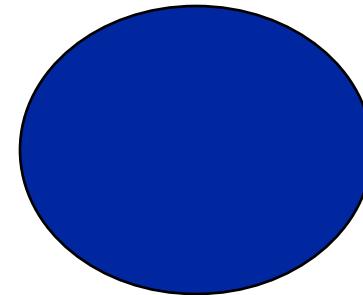
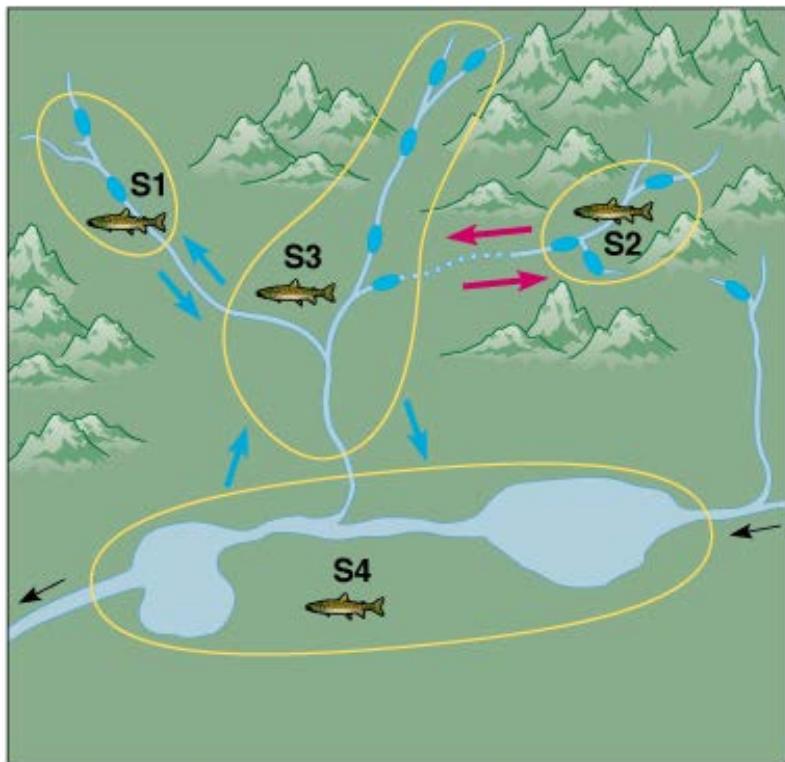
Currently found in
<99% of
historical
distribution in
western basin

<90% in eastern
basin.

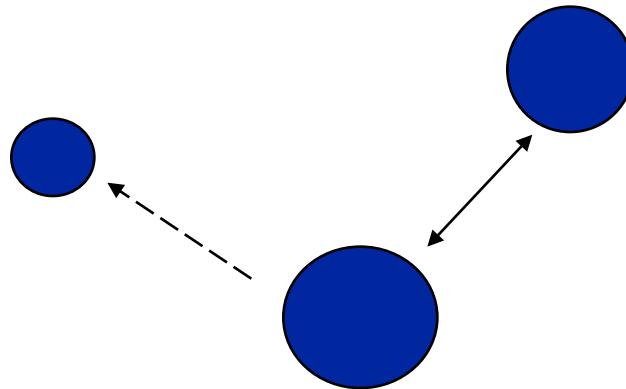


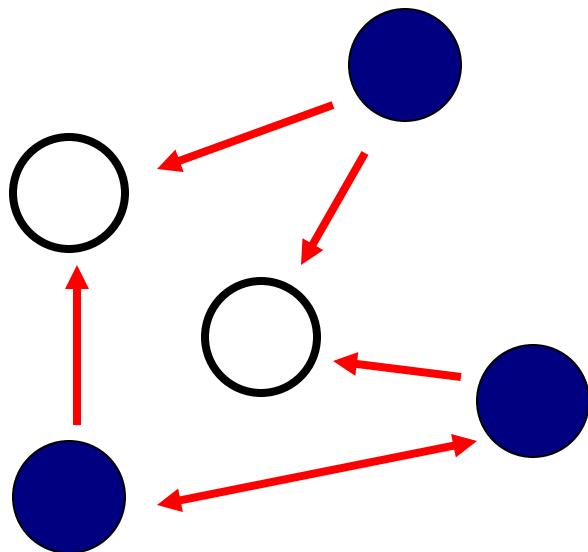


panmictic populations

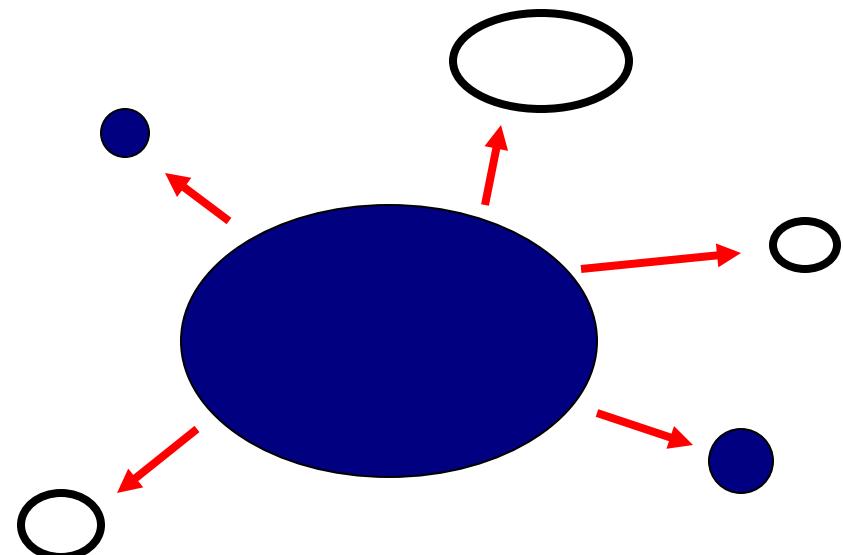


metapopulations

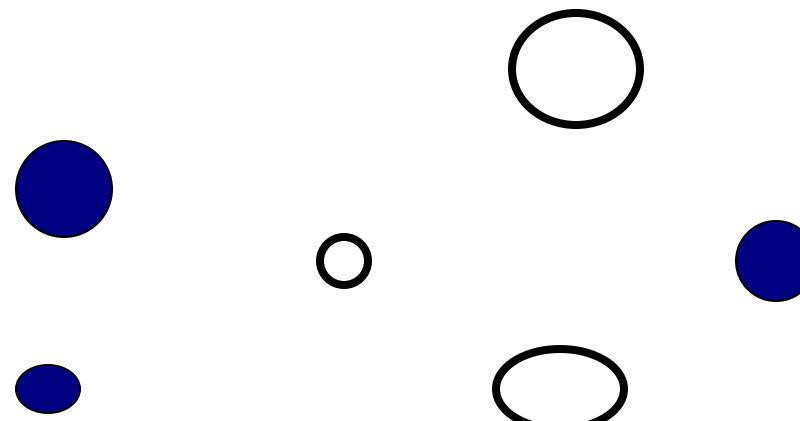




Classical Levins model



Mainland-island model



Non-equilibrium model

- Major threats include:
- Habitat fragmentation, degradation and loss
 - Exotic species



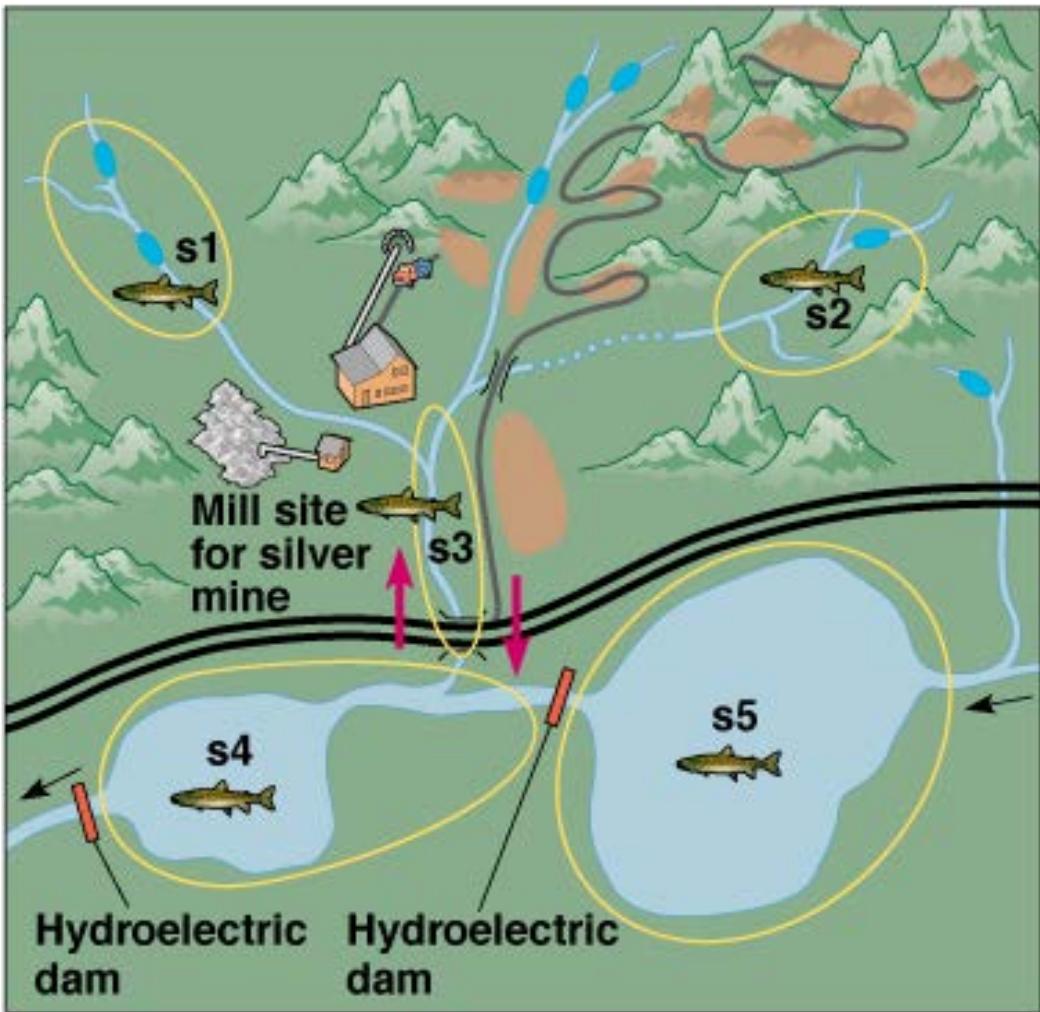
brook trout photo credit: USFS



brown trout photo credit: R.M. McDowall



rainbow trout photo credit: USFS

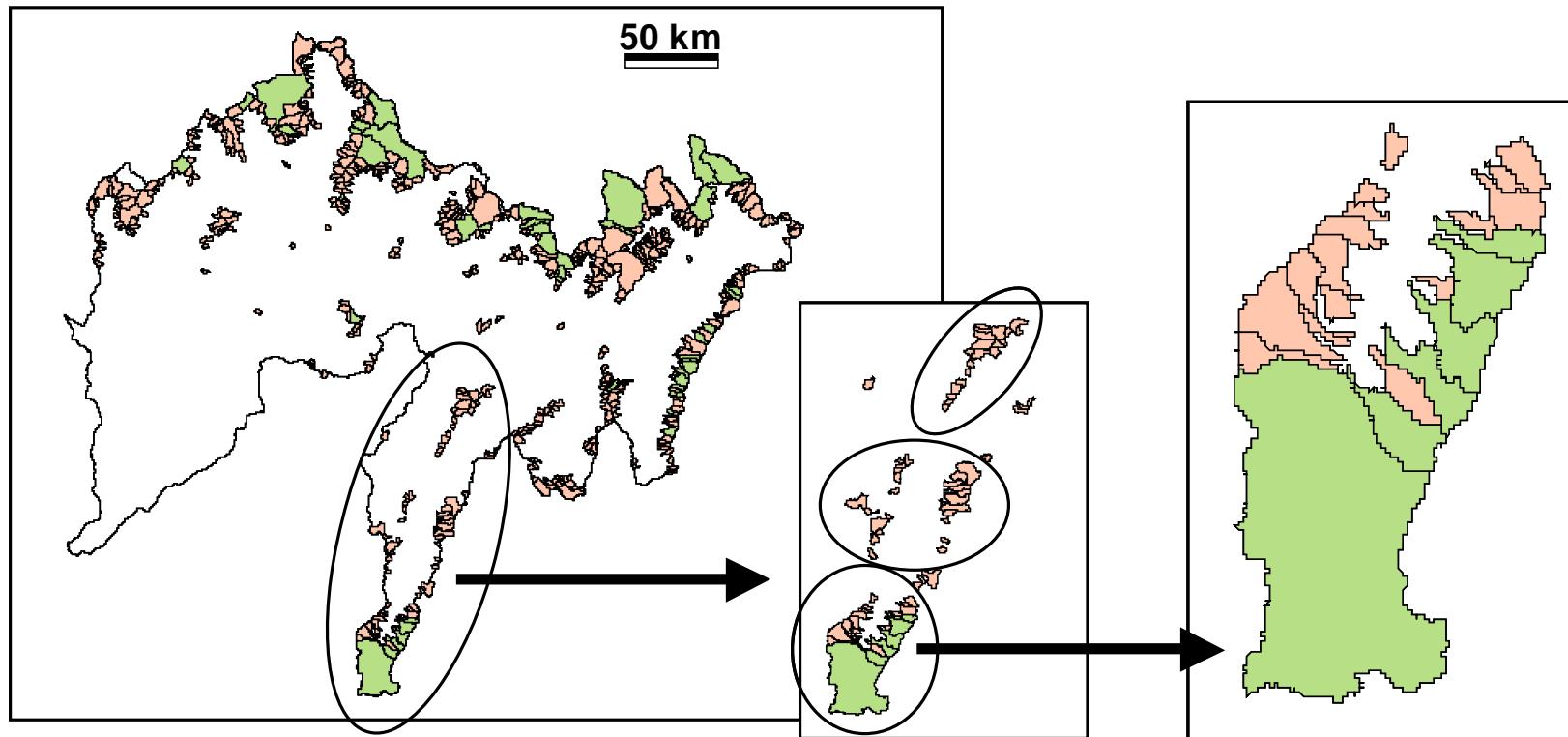


Habitat fragmentation

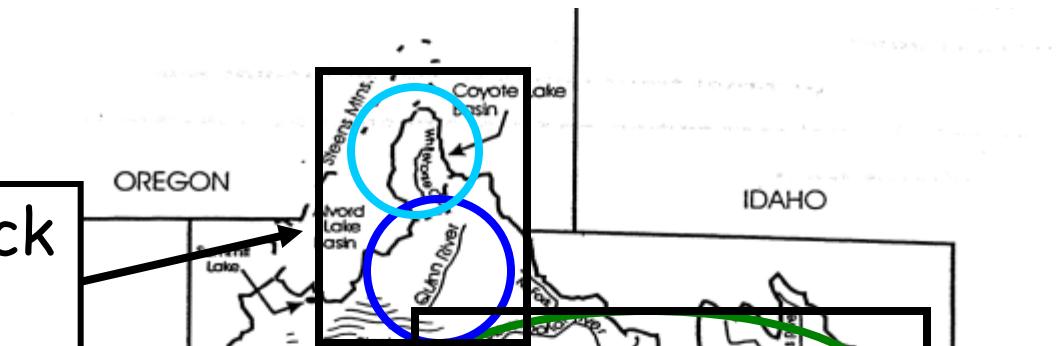
- ✓ loss of spawning habitat
- ✓ insufficient habitat complexity
- ✓ population extirpation

- Egg-laying sites in mountain streams
- Clear-cut (logged) areas
- Roads
- Irregular, infrequent dispersal; minimal gene flow between subpopulations

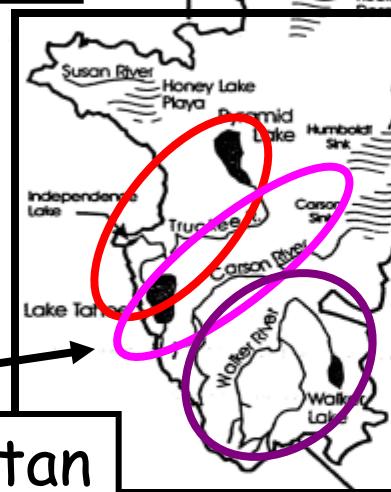
watershed "patch" sizes for cutthroat determined by water temperature



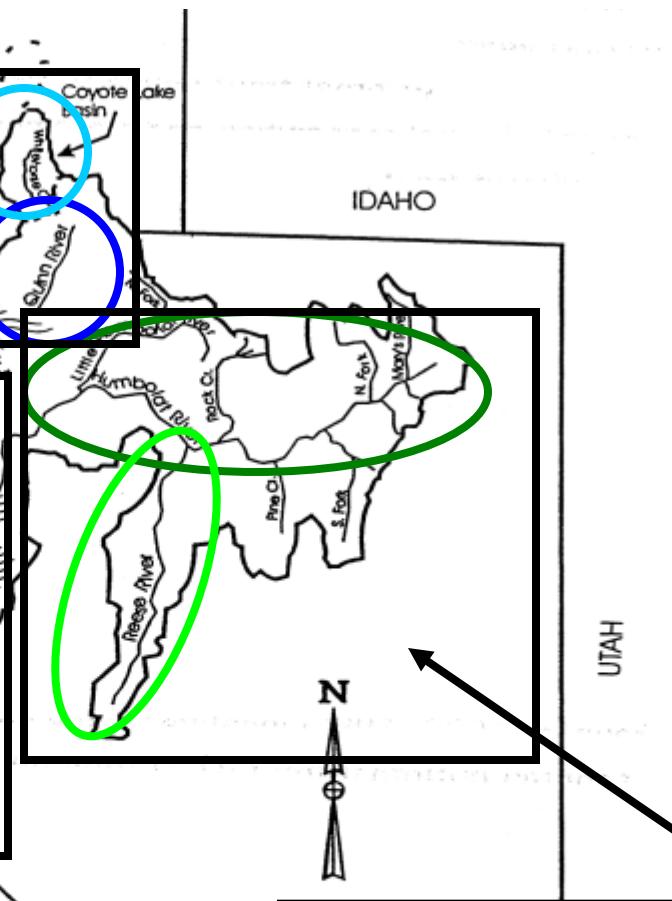
• Quinn River/Black Rock Desert



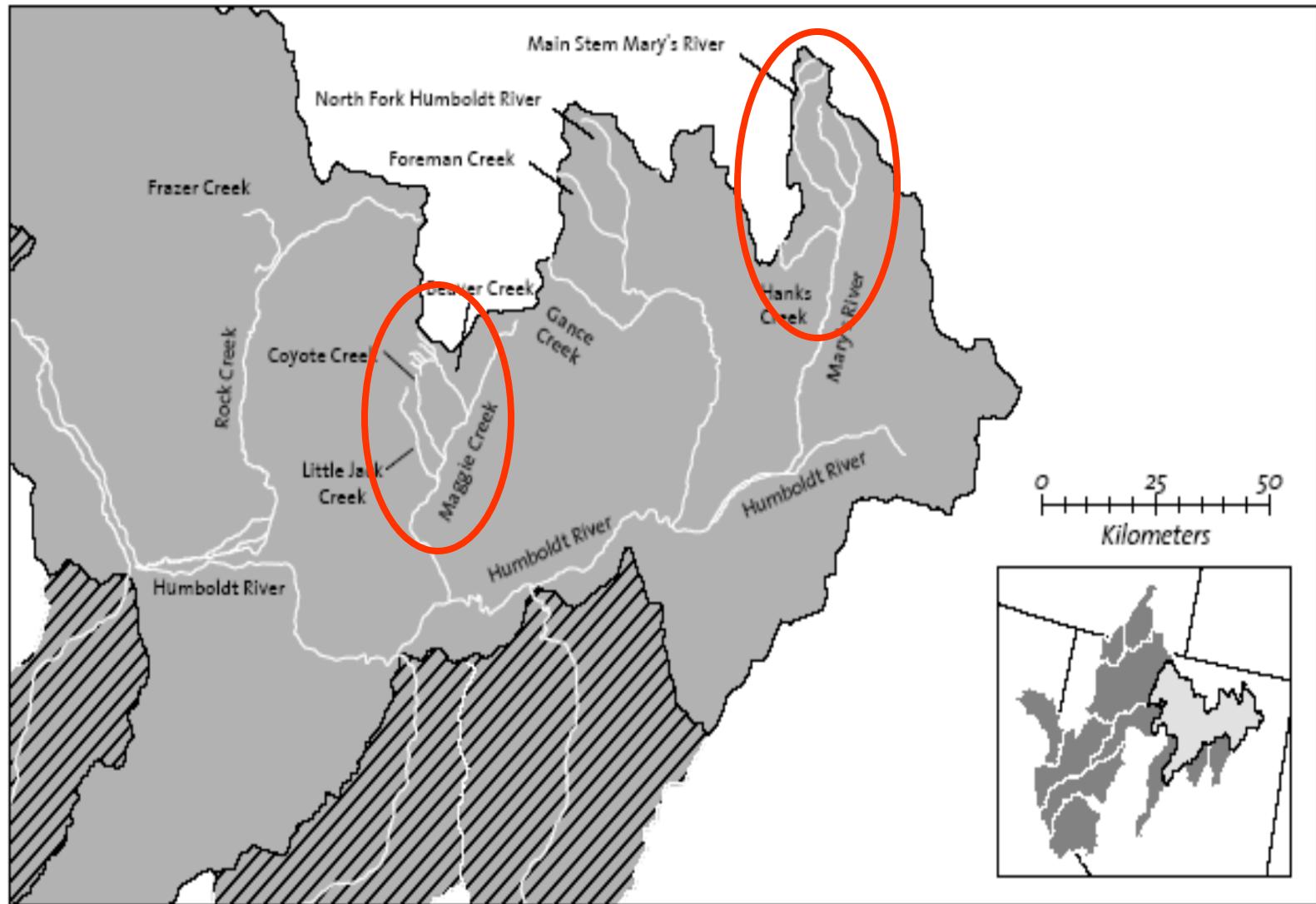
• Western Basin/Lahontan



• Eastern Basin/Humboldt



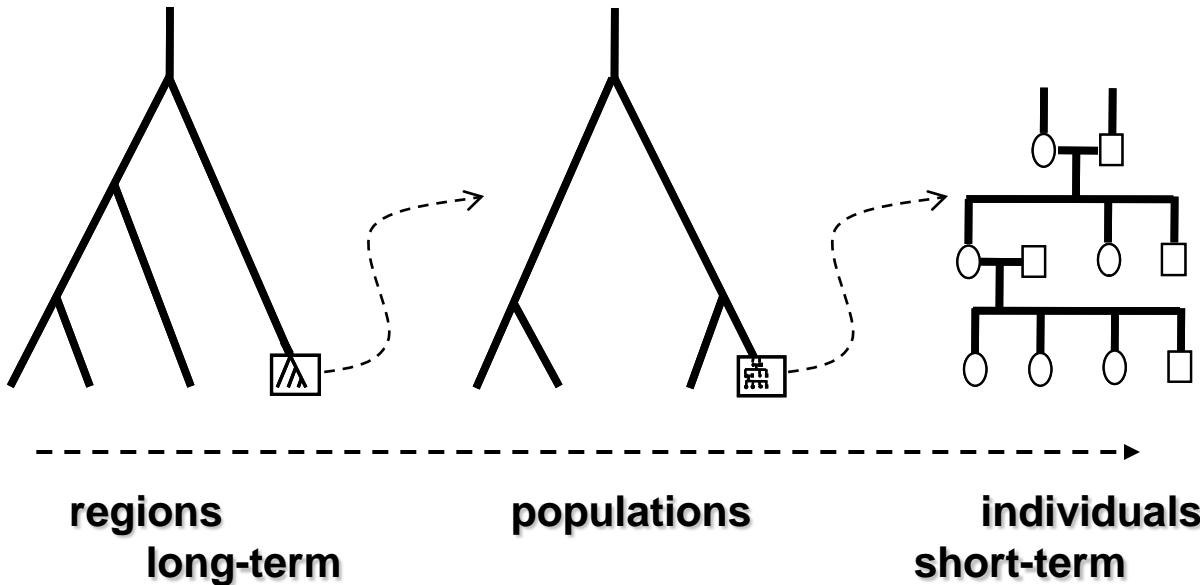
Miles
0 20 40



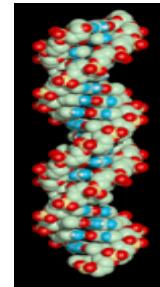
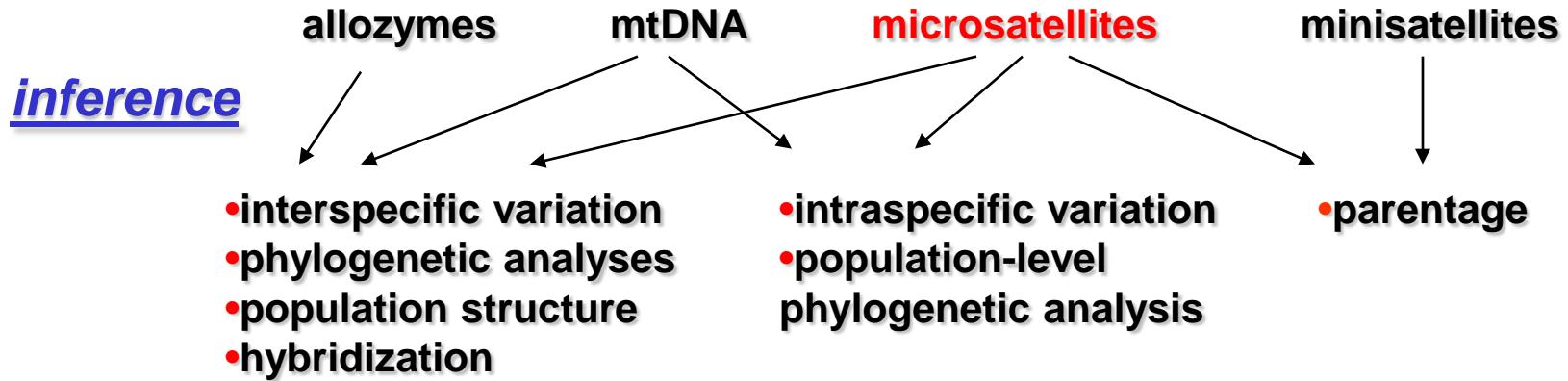
Interconnected stream systems in the Humboldt River drainage

Genetic Tools

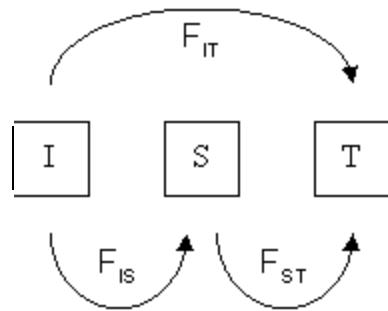
scale



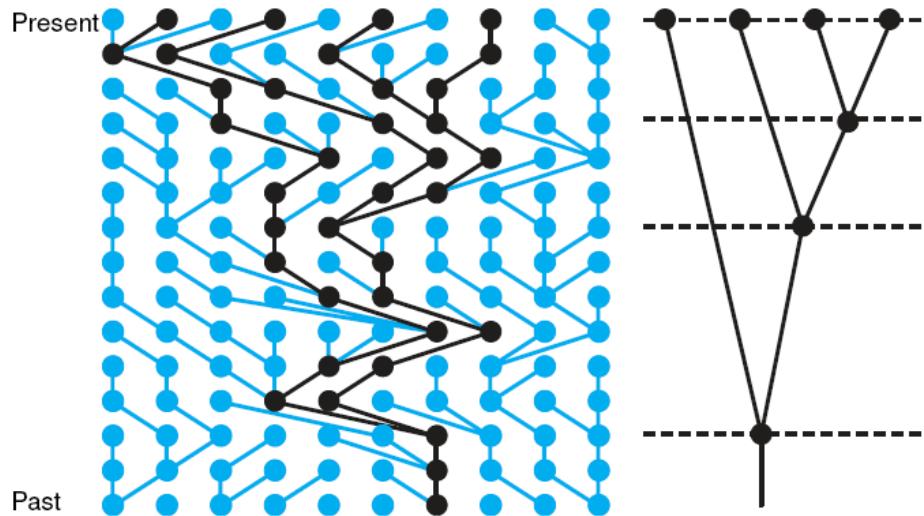
genetic marker



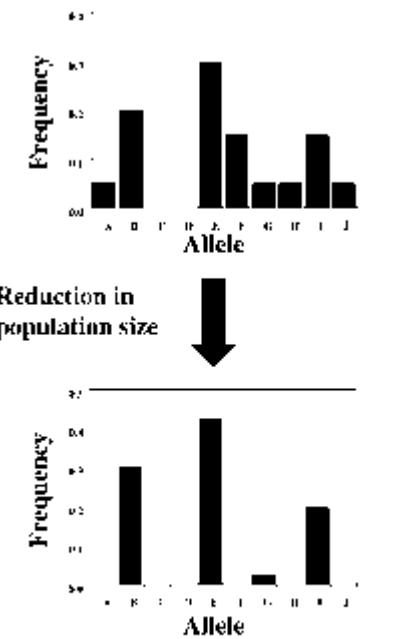
Wrights F statistics



Coalescence

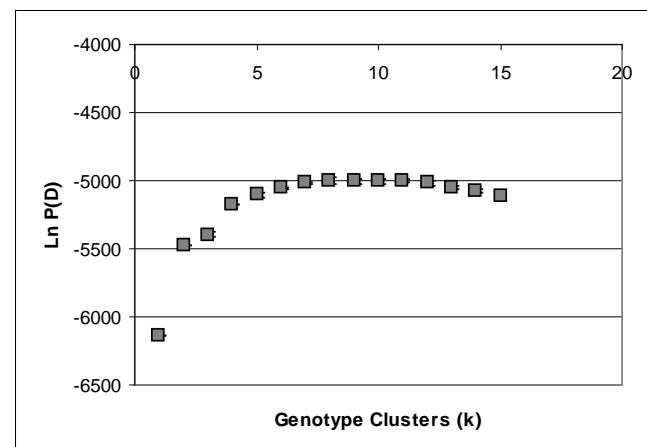
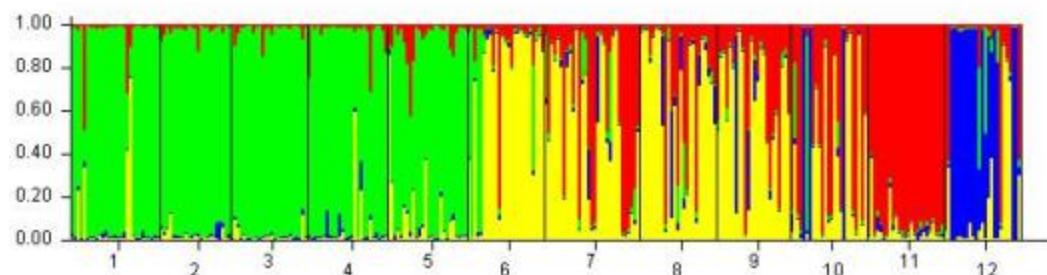


M ratio ($M = k/r$)

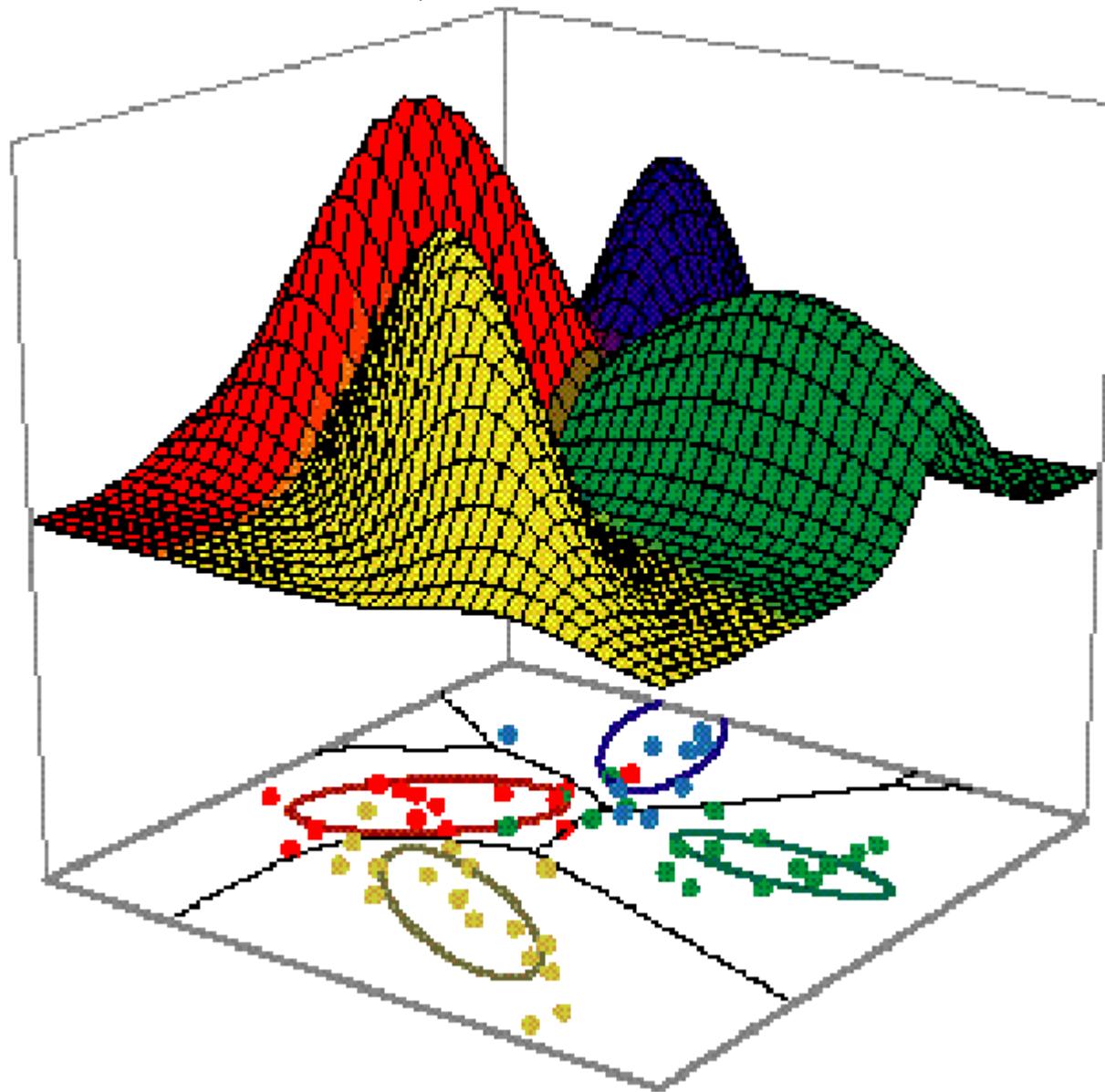


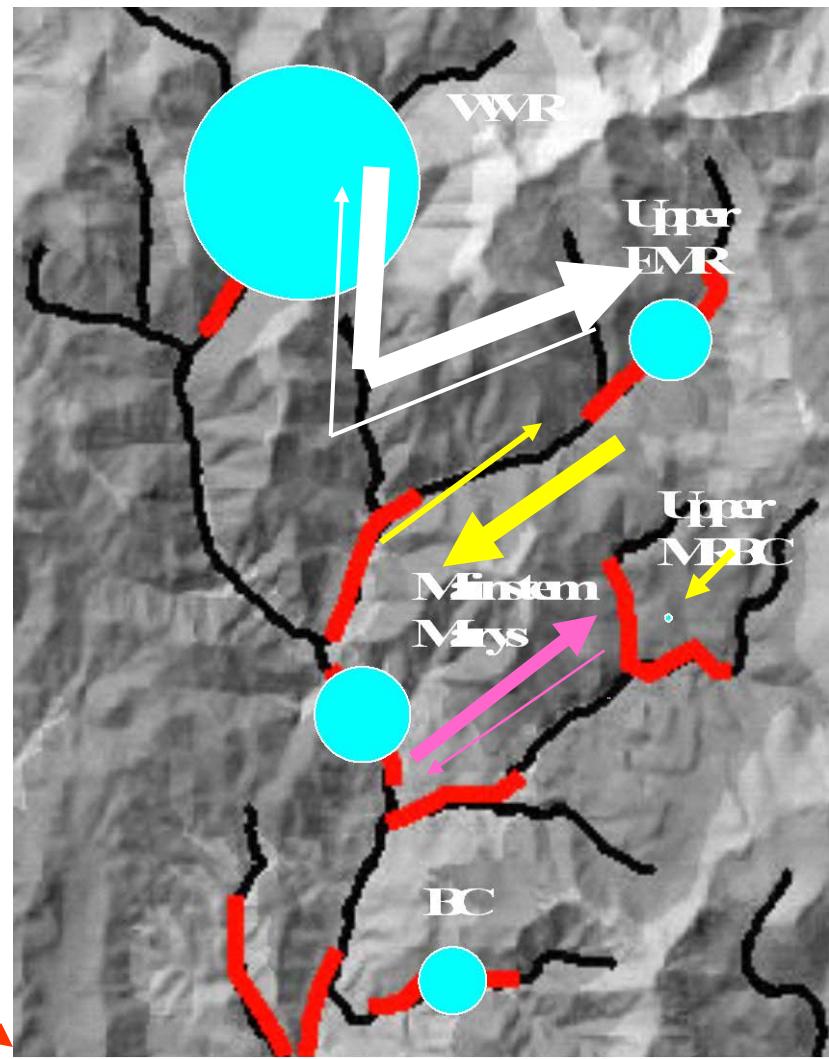
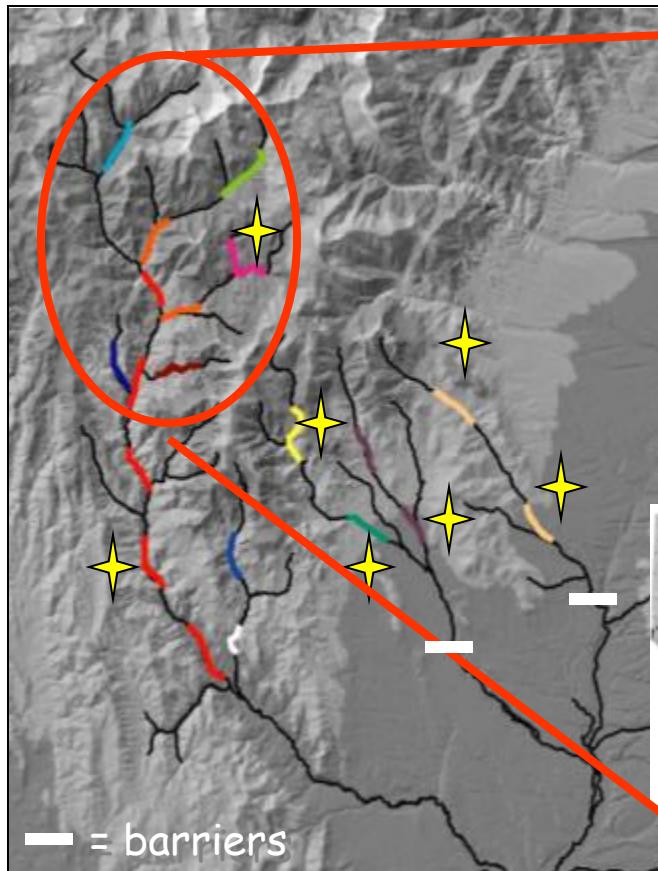
50% reduction in no. of alleles
20% reduction in size range

Bayesian Clustering Analysis



Bayesian Clustering Analysis

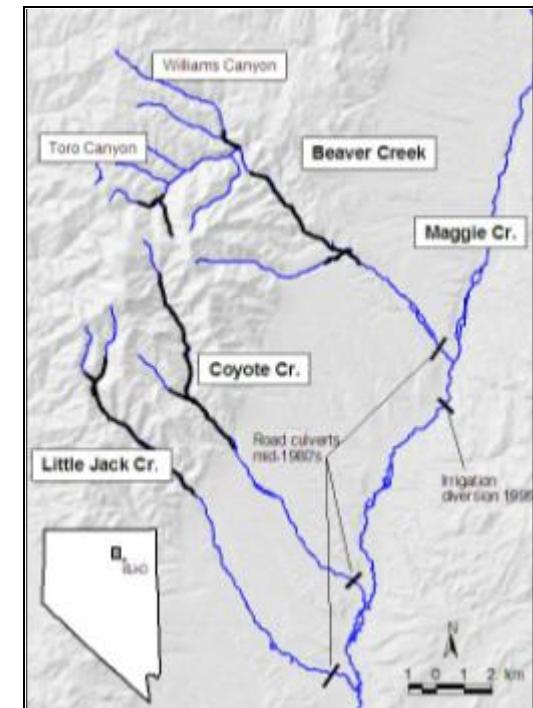
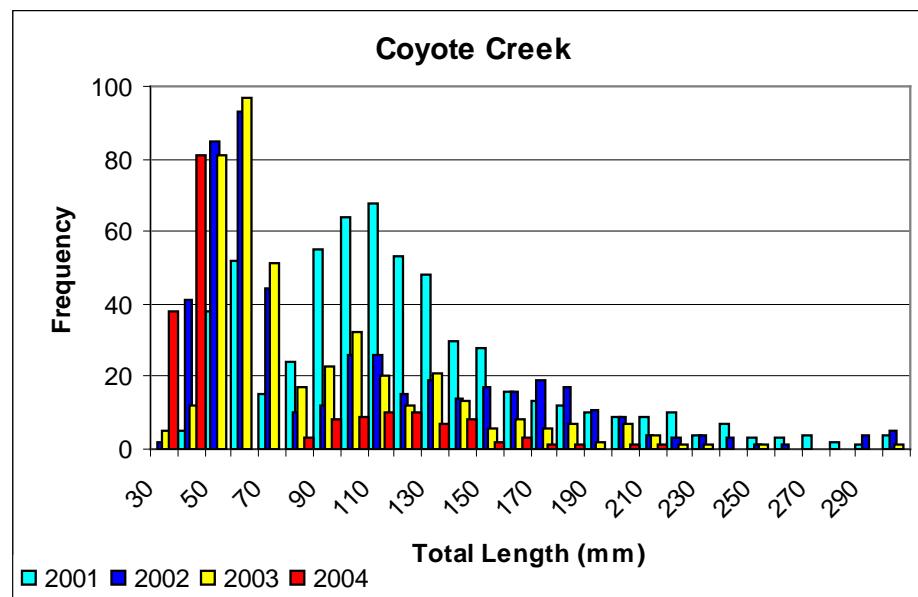
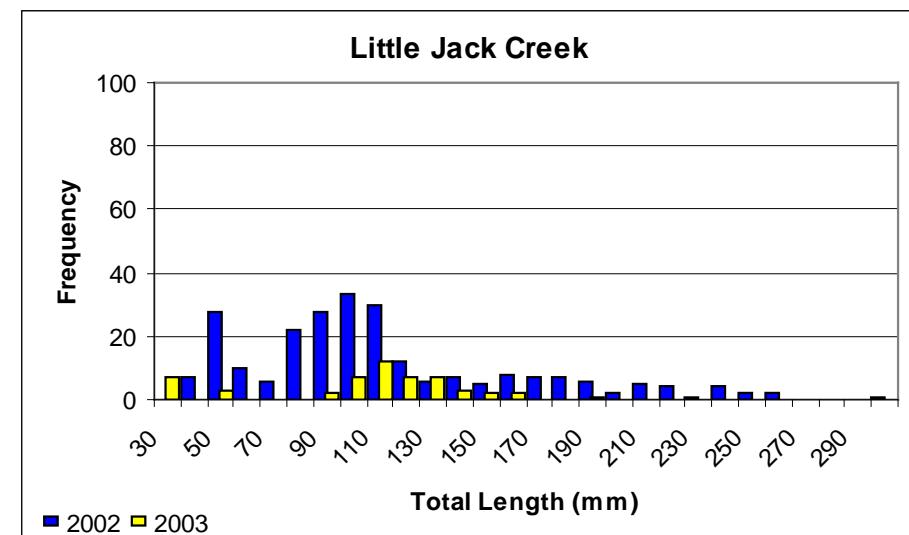
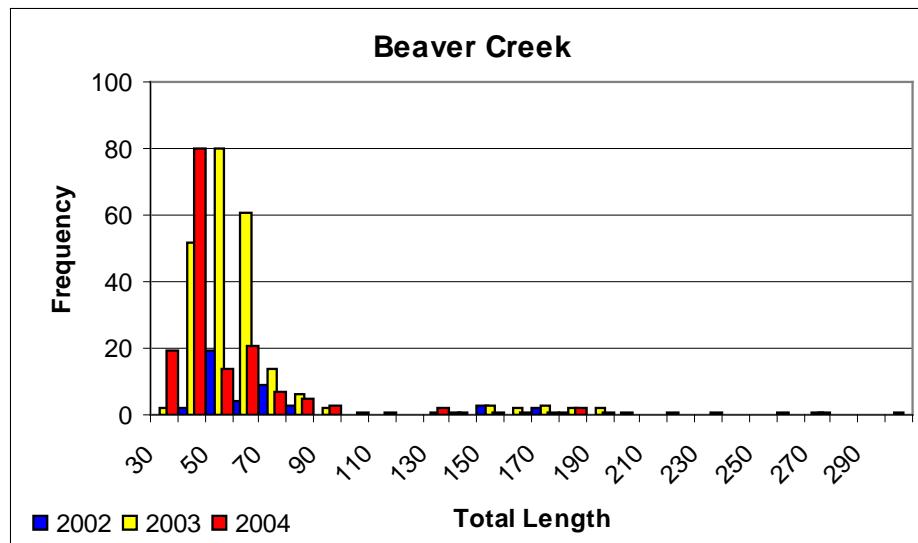


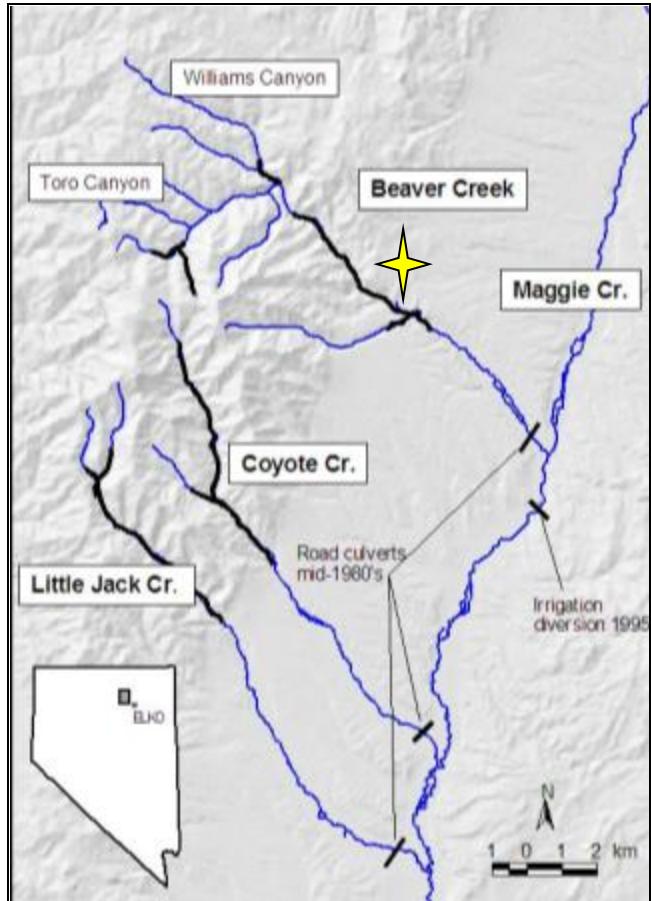


Marys River basin
Global $F_{ST} = 0.119$
Pair-wise $F_{ST} = 0.006-0.319$

(Neville, H. M., J. B. Dunham, and M. M. Peacock. 2006. Landscape attributes and life history variability shape genetic structure of trout populations in a stream network. *Landscape Ecology* 21:901-916)

Maggie Creek System



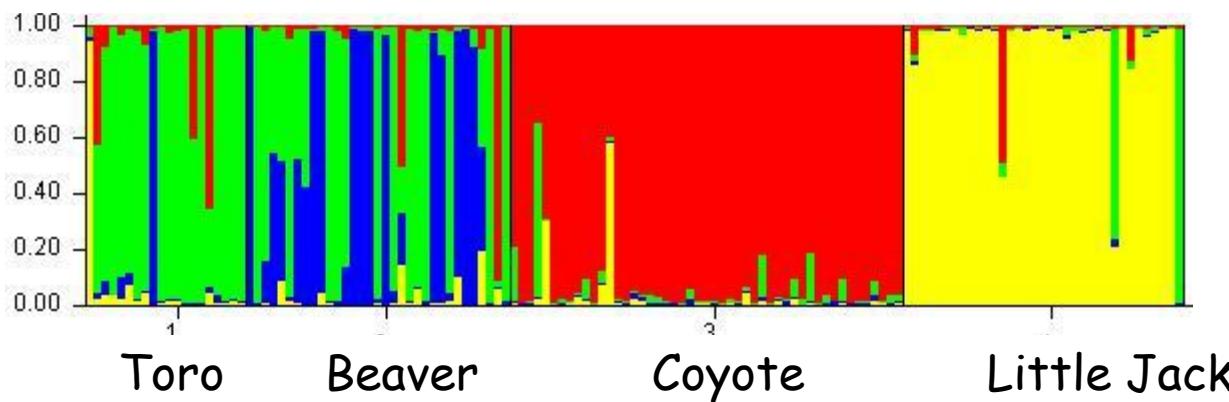
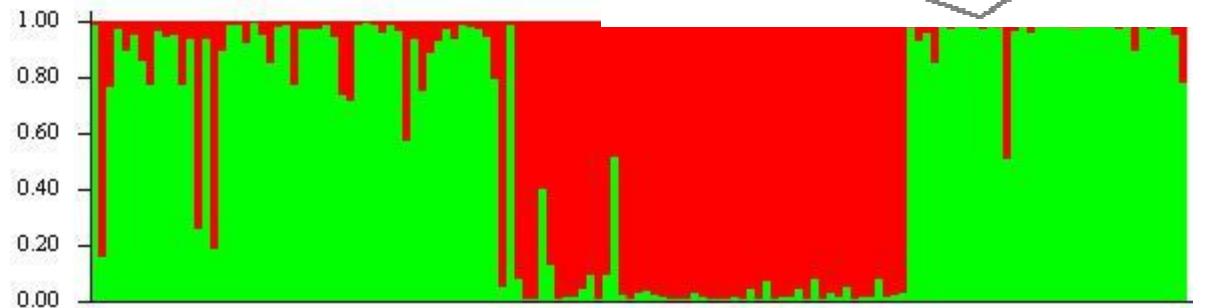
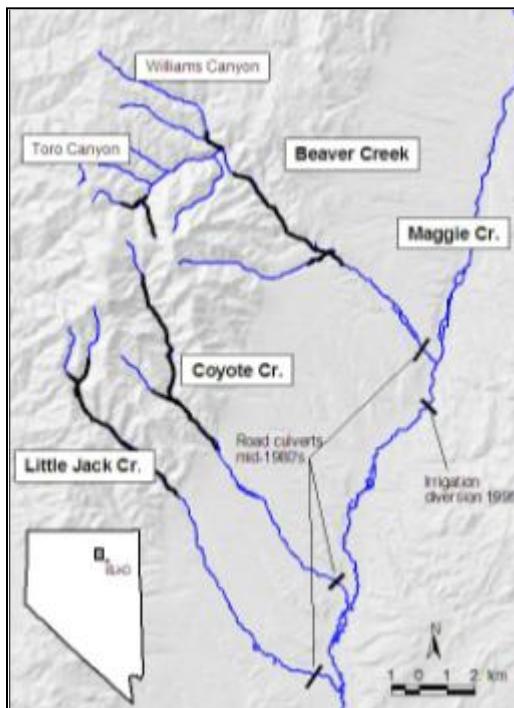
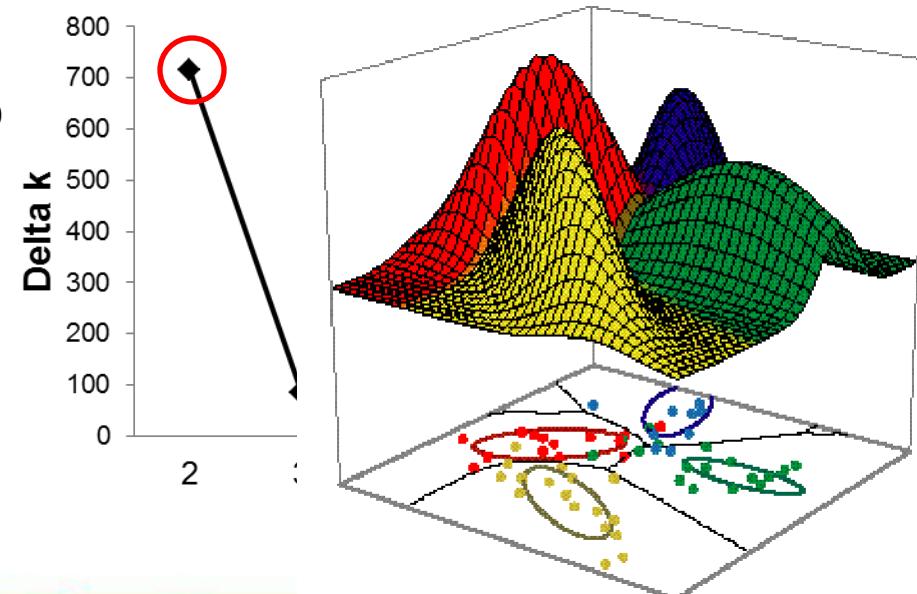
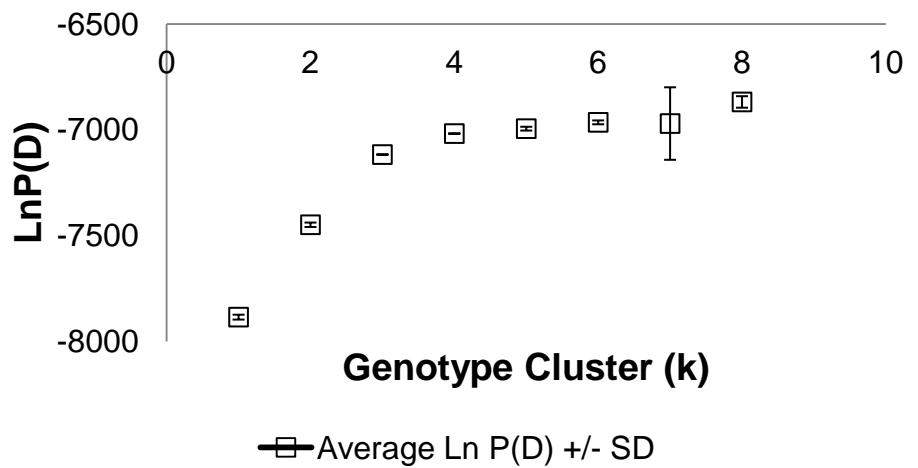


Maggie Creek 2003
Global F_{ST} = 0.046
Pair-wise
 F_{ST} = 0.044-0.095

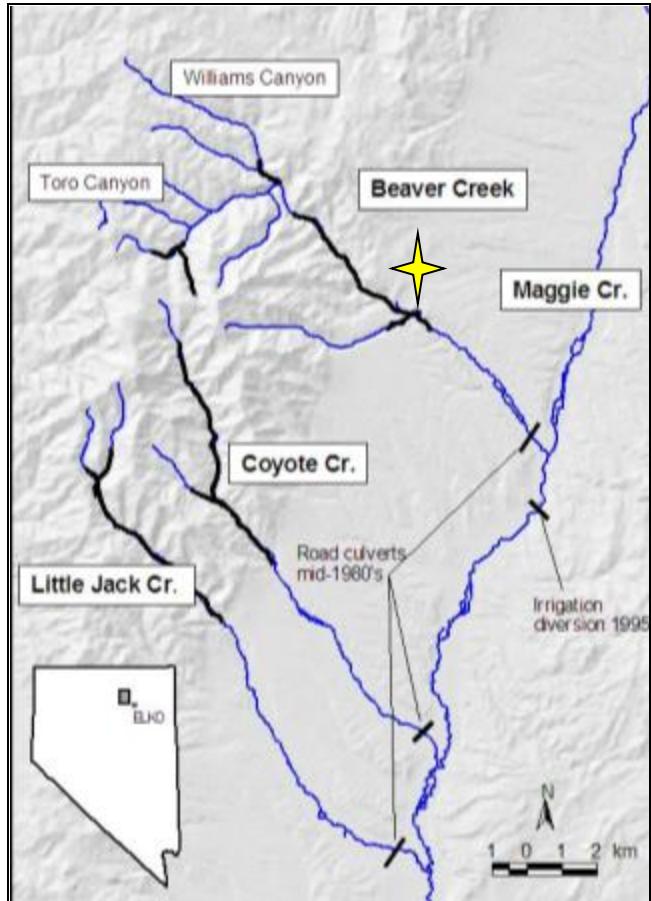
Beaver Creek N = 53
 Coyote Creek N = 49
 Little Jack creek N = 34



Maggie Creek 2003



Toro Beaver Coyote Little Jack

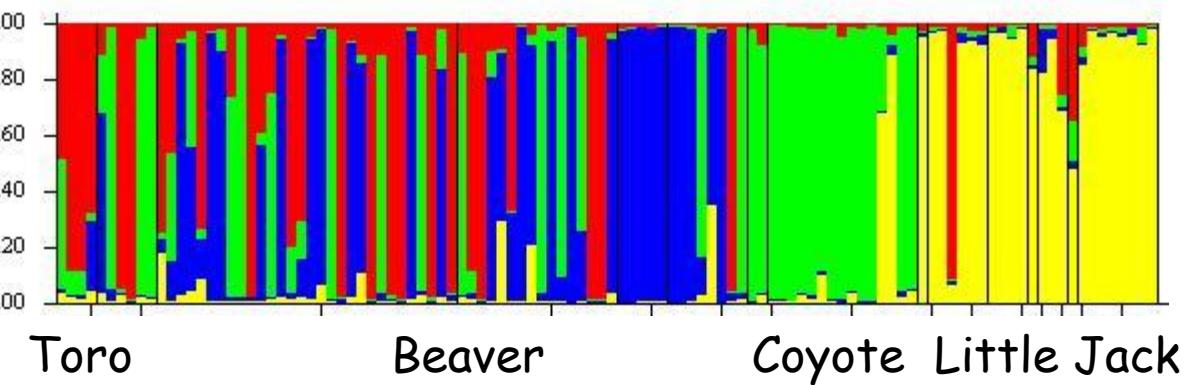
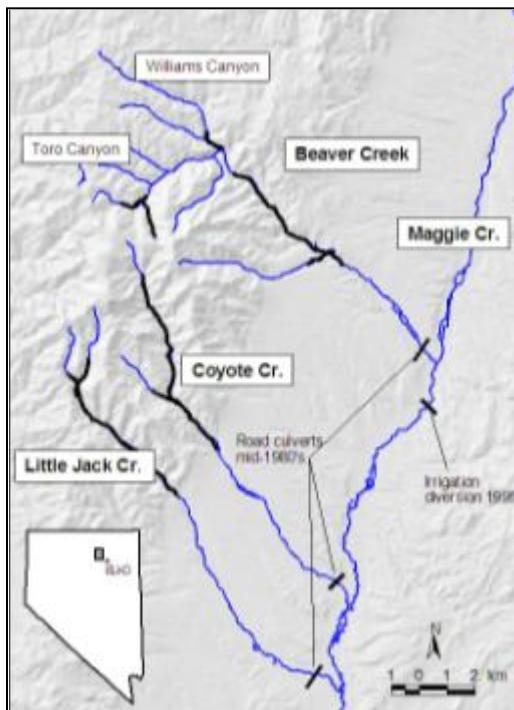
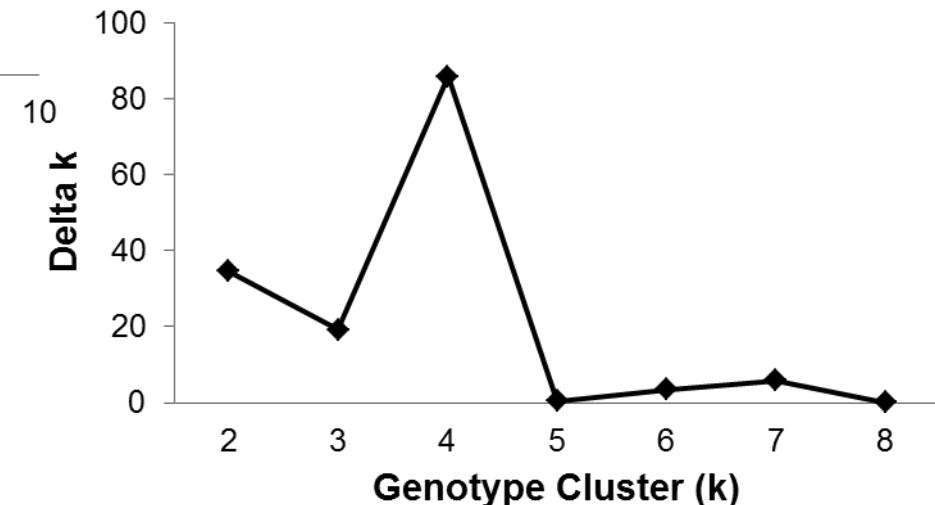
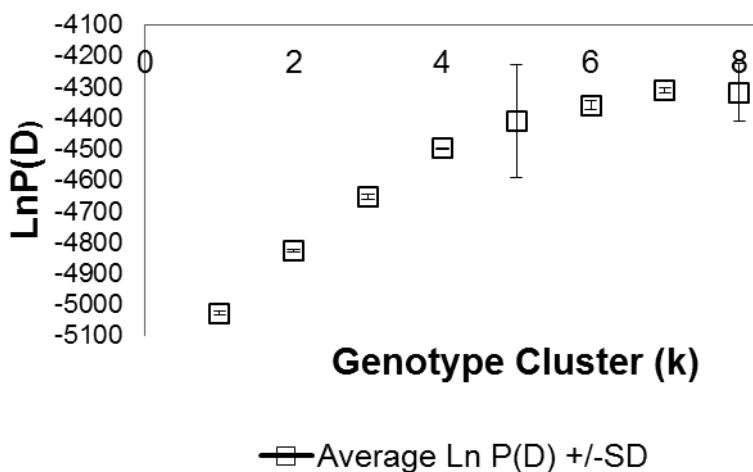


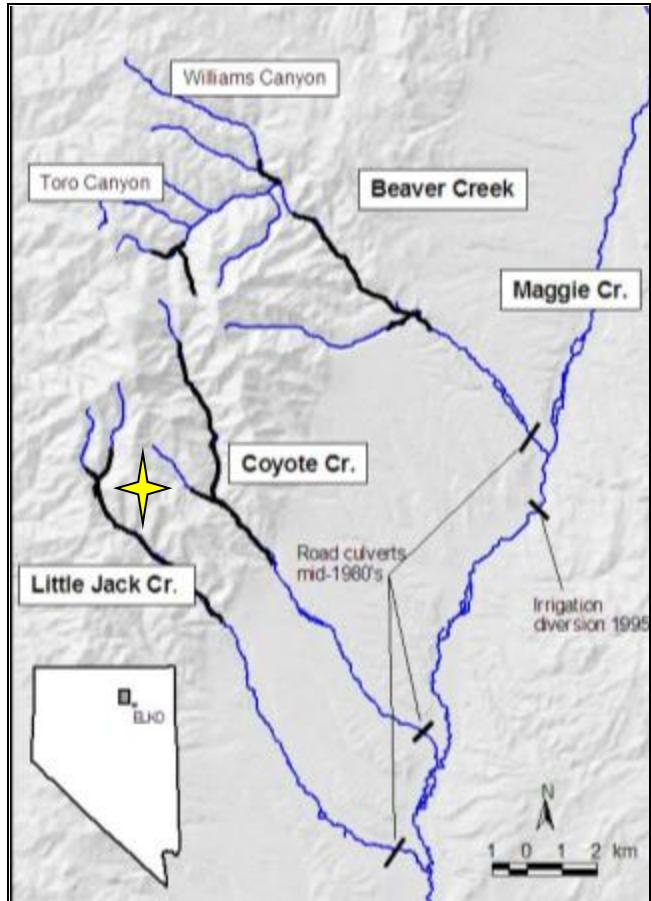
Maggie Creek 2007
Global F_{ST} = 0.044
Pair-wise
 F_{ST} = 0.053-0.078

Beaver Creek N = 71
 Coyote Creek N = 15
 Little Jack creek N = 24



Maggie Creek 2007





Maggie Creek 2009
Global F_{ST} = 0.053
Pair-wise
 F_{ST} = 0.051-0.082

Beaver Creek N = 93
 Coyote Creek N = 69
 Little Jack creek N = 38



Maggie Creek 2009

