5. Genetics					
ISSUE 5.1	Research has found that the genetic and geographic distances segregate Colorado greater sage-grouse populations into at least 2 clusters (Oyler-McCance et al. 2005), which should be considered in any potential transplant.				
OBJECTIVE 5.1.1	Prevent the translocation of greater sage-grouse from the eastern part of the statewide distribution to the western part of the statewide distribution (or vice versa), to preserve unique genetic clusters.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
5.1.1.1	Conduct additional genetic sampling and analysis in GrSG populations that have not had genetic samples collected (PPR, MWR, NWCO - Zone 4B), or increase samples in appropriate populations.	CPW	5 years	**CPW:** Researcher, B. Walker, collected feather samples in the PPR and the Hiawatha portion of NWCO from 2007-2012. CPW is also collaborating with Exxon and CSU on a project to use non-invasive genetic mark-recapture data from genetic samples (feathers and pellets) in the PPR. Collection efforts are ongoing. Genetic analysis have not yet been conducted. CPW is part of the WAFWA Rangewide Connectivity Study and will be submitting samples after the 2013 lek season. Sample collection will be directed to specific areas. Previously, tissue (feather, blood, and/or fecal) samples have been collected opportunistically throughout the populations. A 2005 study by Oyler-McCance looked at genetic variation across the GrSG range.	**Thompson, T.R. 2012.** Dispersal ecology of greater sage-grouse in northwestern Colorado; evidence from demographic and genetic data. Ph.D. Dissertation, University of Idaho, Moscow, Idaho, USA. **Walker, B. L. 2012d.** Evaluation of Alternative Population Monitoring Strategies for Greater Sage-Grouse in the Parachute-Piceance-Roan Population of Northwestern Colorado. Colorado Parks and Wildlife annual progress report. **Apa, A.D. 2010.** Seasonal habitat use, movements, genetics, and vital rates in the Parachute/Piceance/Roan population of greater sage-grouse. Colorado Parks and Wildlife Final Report. Fort Collins, Colorado, USA. **CPW:** Birds from the PPR population do not appear to differ greatly from other GrSG sampled in CO.
5.1.1.2	If additional genetic testing indicates a genetic line of demarcation (north to south) between Colorado GrSG populations, all translocations should be north-south, and not east-west.	CPW	Ongoing		
ISSUE 5.2	Small isolated populations of greater sage-grouse may have low genetic diversity, which may facilitate inbreeding depression.				
OBJECTIVE 5.2.1	Monitor genetic diversity within the smaller isolated populations of greater sage-grouse in Colorado.				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**
5.2.1.1	To monitor the genetic diversity and isolation of GrSG populations, obtain blood and other tissue samples as GrSG are captured for other purposes, and submit for DNA testing (see also strategy 8.2.1.4).	CPW	By 2008 and ongoing	See 5.1.1.1.	
5.2.1.2	Continue to develop and refine, if it proves feasible, techniques to obtain DNA from sage-grouse fecal droppings so that genetic testing can be accomplished without capturing birds. **[See Research Strategy 21.7.1.1]**	CPW, Universities	Ongoing		
OBJECTIVE 5.2.2	Maintain genetic diversity present within individual Colorado populations of GrSG so that each small population contains 70% of the overall genetic diversity within Colorado (see also Issue 8.2, Objective 8.2.1).				
Reference Number	**Conservation Strategy**	**Responsible Parties**	**Timeline**	**Implementation**	**Effectiveness**

Reference Number	Conservation Strategy	Responsible Parties	Timeline	Implementation	Effectiveness
5.2.2.1	Increase genetic diversity (if found to be low) within small GrSG populations through augmentation with eggs, chicks, and/or adults.	CPW	5 years		
5.2.2.2	Develop and implement a genetic diversity monitoring plan and schedule for GrSG populations.	CPW, Denver University, USGS	2010		