Appendix M

Predation of Greater Sage-Grouse in the Utah Sub-Regional Planning Area

APPENDIX M
PREDATION OF GREATER SAGE-GROUSE IN THE UTAH SUB-REGIONAL PLANNING AREA

During the Draft EIS public comment period, BLM and Forest Service received extensive public comments that provided information on predation and its impacts on GRSG in the Utah Sub-regional planning area. Within the Draft EIS, predator control, which is an issue directly related to predation, was identified as an issued considered but eliminated from detailed analysis. As discussed in **Section 1.6.3**, predator control was not considered for detailed analysis because it is a state-regulated action. This land use plan amendment is focused on increasing GRSG conservation for programs and activities under BLM and Forest Service management authority.

While the BLM and Forest Service maintain that predator control is subject to state regulation, based on the number of comments received during the Draft EIS, the BLM and Forest Service have included in the Final EIS additional information regarding predators in the Utah sub-regional planning area and the potential impacts of predation on GRSG.

Predation is one of five specific Endangered Species Act listing criteria; however, the USFWS did not identify predation as a significant threat to GRSG populations in their 2010 decision to list the species as warranted for protection under the Endangered Species Act. Though USFWS did not list predation as a significant threat, they did note that predation can be a threat at localized levels as documented in the Strawberry Valley, which provides habitat for a Utah GRSG population.

In the listing determination, the USFWS acknowledged that increasing patterns of landscape fragmentation are likely contributing to general increases in predation on the species where predators may be limiting GRSG populations because of intense habitat alteration and fragmentation. Despite the USFWS document stating that predation is not a significant threat to GRSG populations in Utah, the public remains concerned about the influence of predators on GRSG conservation.

Predators that are native to sagebrush ecosystems have always preyed upon GRSG. The species that prey on GRSG tend to be generalists that take prey opportunistically but do not focus

solely or preferentially on GRSG (Hagen 2011). Predators (native and non-native) of juvenile and adult GRSG include coyote, red fox, American badger, bobcat, golden eagles, and other raptors (Schroeder and Baydack 2001; Hagen 2011). Younger birds can also be taken by common ravens, northern harriers, ground squirrels, and weasels. Nest predators include coyote, American badger, common raven, red fox, and black-billed magpie (Schroeder and Baydack 2001; Hagen 2011). Smaller predators of GRSG, such as red fox or skunks, can also serve as prey to larger predators such as coyotes.

Historically, predator control programs in North America were designed to protect domestic livestock, not wildlife (Hagen 2011). Predator control as a tool to manage GRSG populations was rarely recommended, even for threatened and endangered populations in altered or fragmented habitats (Patterson 1952; Schroeder and Baydack 2001). It is likely the termination of widespread predator control in the early 1970s has influenced changes in predator abundance observed anecdotally by the public in recent years. Maintaining and enhancing intact ecosystems of sufficient size and quality to support a particular species is of greater ecological value and sustainability than an alternate approach that relies heavily on human intervention (e.g., artificial feeding, predator control, animal husbandry, and zoos). The former approach works with the natural system that is adapted to working as an interconnected network, while latter approach is costly, temporary, risks variable results, and is not likely to avert an ESA listing (United States Department of Interior 2010).

Human-altered landscapes have contributed to significant increases over historical numbers in some predator abundances, particularly red fox and ravens (Coates and Delehanty 2010; Sauer et al. 2012). The influx of predators in altered sagebrush habitat can lead to decreased annual recruitment of GRSG (Schroeder and Baydack 2001; Coates 2007; Hagen 2011). GRSG in altered systems are also typically forced to nest in less suitable or marginal habitats where predators can more easily detect nesting birds (Connelly et al. 2004). In Strawberry Valley, Utah, low GRSG survival was attributed to the presence and unusually high density of non-native red fox that were likely able to survive in the area because of anthropogenic activity (Baxter et al. 2007). Holloran (2005) attributed increased nest depredation rates on GRSG to high corvid abundance in western Wyoming; the latter was influenced by anthropogenic structures associated with natural gas development. In the same area, Bui (2009) found ravens used road networks, fences, power lines, and other infrastructure associated with development. Bui et al. (2010) also detected a negative association between raven presence and GRSG nest and brood fate. Coates and Delehanty (2010) found increased raven density in northeastern Nevada was associated with decreased GRSG nest success, especially in areas with relatively lower shrub density. Habitat fragmentation, infrastructure, water development, human-subsided food sources, weather, urban development, and improper grazing can increase predation pressure on GRSG. Providing water in amounts, seasons, or distributions greater than reference conditions may draw more human-subsidized predators into an area, which could increase GRSG predation. Additionally, human-subsidized food sources, such as road kill, dead livestock, garbage, and pet food, may draw more human-subsidized predators into an area, which could also increase GRSG predation by supporting non-native predators and/or populations of native predators at levels higher than natural. GRSG populations demonstrate short-term annual and cyclic fluctuations, which are influenced by weather patterns such as drought and the composition and abundance of predators. Longer term trends in GRSG population abundance

and distribution can be a function of habitat loss or deterioration (Garton et al. 2011). The majority of Utah's GRSG populations are expected to persist over the next 100 years, if habitat conditions remain consistent (Garton et al. 2011).

Recent predator control programs designed to benefit GRSG have had mixed results (United States Department of Interior 2010; Hagen 2011). In Strawberry Valley, Utah, fox removal appeared to increase adult survival and productivity but inference is limited because a control area was not included to compare changes in demographic rates, which were coincidentally increasing across the region during the study period (Baxter et al. 2007). Coyote control, however, appeared to have no effect on nest success or chick survival in Wyoming (Slater 2003). In fact, removal of coyotes can lead to a release of otherwise suppressed medium-sized predators, such as red fox, which tend to be more effective predators of GRSG (Mezquida et al. 2006).

Ongoing control efforts of mammalian and avian predators (except raptors) in southwestern Colorado designed to increase recruitment in a small population of Gunnison's sage-grouse may be showing some success but sample sizes are extremely low (five chicks monitored/year; Colorado Parks and Wildlife, pers. comm.). Raven removal in northeastern Nevada resulted in short-term reductions in raven populations; however, other individuals re-populated the vacated habitat within a year (Coates 2007). Badger predation may also have compensated somewhat for decreases in raven numbers (Coates 2007). Predation by ravens on GRSG in southwestern Wyoming was attributed primarily to territorial pairs, not groups of juveniles, sub-adults, and non-breeding birds (Bui et al. 2010). Thus, the removal of raven groups at foraging sites is unlikely to influence GRSG nest success, and the removal of territorial pairs will likely have only short-term effects until the habitat is re-occupied by a new pair.

GRSG are part of the sagebrush grassland ecosystem that comprises an interlinked web of plant and animal species, including herbivores and carnivores. As one of many prey species in sagebrush habitats, GRSG are adapted to predation and in unaltered systems will persist indefinitely with predation pressure (Hagen 2011). The influence of predation on GRSG population dynamics only becomes a problem when vital rates, especially nest, chick, and hen survival, are consistently reduced below naturally occurring levels (Taylor et al. 2012). Naturally-occurring variability in vital rates is a function of annual variation in conditions (e.g., weather, vegetation cover quality, predator abundance) and is expected with a species that shows cyclic tendencies. Based on a number of research projects, reported vital rates for GRSG populations in Utah vary within range-wide estimates, suggesting predation rates are within the range of normal variability (**Table M.1**, Vital Rates for Greater Sage-Grouse from Utah Studies). Range-wide estimates are only provided for nest success, chick survival, and hen survival. Utah has collected more detailed information on various vitality rates. In some cases, this information is included in **Table M.1**.

Because Utah vital rates are within the range of normal variability, predation does not appear to be a specific localized threat, except in the Strawberry population area, where the effects of predation on the GRSG populations have been documented. Given that predation does not constitute a specific localized threat, this is not carried forward for detailed analysis in the Proposed LUPA/Final EIS.

Table M.1
Vital Rates for Greater Sage-Grouse from Utah Studies

Vital Rate	Range of Normal Variability	Utah Rates	Study Years	Location	Reference
Nest Success*					
	15-86%	66%	2009	Wildcat Knolls	Perkins 2010
		55%	2009	Horn Mountain	Perkins 2010
		48-71%	1998-2006	Parker Mountain	Dahlgren 2009
		50%	2003	Parker Mountain	Dahlgren 2006
		80%	2004	Parker Mountain	Dahlgren 2006
		67%	2003-2005	Strawberry Valley	Baxter 2007
		25%	2003-2005	Strawberry Valley	Hennefer 2007
		15.1-19.1%	2010-2012	Box Elder	Graham 2013
		51-81%	2009-2010	Anthro Mountain	Gruber 2012
		38%	2005-2006	Box Elder	Knerr 2007
		70%	2005	Sheeprock	Robinson 2007
		56%	2006	Sheeprock	Robinson 2007
		100%	2005	Deep Creek/Ibapah	Robinson 2007
		50%	2006	Deep Creek/Ibapah	Robinson 2007
*% of nests where >= 1 egg hatched successfully					
Brood Success					
		80%	2007-2008	Grouse Creek	Thacker 2010
		44%	2005-2006	Box Elder	Knerr 2007
		28.6%	2005	Sheeprock	Robinson 2007
		30%	2006	Sheeprock	Robinson 2007
		50%	2005	Deep Creek/Ibapah	Robinson 2007
		66.7%	2006	Deep Creek/Ibapah	Robinson 2007
*% of broods where >= 1 chick survived to 42 or 50 days					
Chick Survival					
	12-50%	47.5%	2005-2009	Parker Mountain	Guttery et al. 2013
		41 - 60%	2005-2006	Parker Mountain	Dahlgren 2009
		transmitter 0%	2003-2005	Currant Creek/Strawberry	Hennefer 2007
		transmitter 22.5%	2003-2005	Strawberry Valley	Hennefer 2007
		flushed 51.8%	2003-2005	Strawberry Valley	Hennefer 2007
		7.8-16%	2009-2010	Anthro Mountain	Gruber 2012
		60%	2005-2006	Parker Mountain	Dahlgren et al. 2010
*probability of chick surviving to 42 or 50 days					

Table M.1
Vital Rates for Greater Sage-Grouse from Utah Studies

Vital Rate	Range of Normal Variability	Utah Rates	Study Years	Location	Reference
Adult Hen Survival					
	37-78%	61%	2000-2002	Parker Mountain	Chi 2004
		59%	1998-2006	Parker Mountain	Dahlgren 2009
		41 to 61%	2008-2010	Parker Mountain	Caudill 2011
		18%[1]	2009	Anthro Mountain	Gruber 2012
		43%	2010	Anthro Mountain	Gruber 2012
		40%	2005	Sheeprock	Robinson 2007
		50%	2006	Sheeprock	Robinson 2007
		100%	2005	Deep Creek/Ibapah	Robinson 2007
		83%	2008	Horn Mountain	Perkins 2010
		78%	2009	Horn Mountain	Perkins 2010
		64%	2009	Wildcat Knolls	Perkins 2010
		60%	2003-2005	Strawberry Valley	Baxter 2007
		73%	2010-2011	Box Elder	Graham 2013
		84%	2011-2012	Box Elder	Graham 2013

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[1] 2009 and 2010 adult hen survival data from Anthro Mountain includes translocated birds where you would expect higher mortality rates.

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