Specialist Report 6.0
Sensitive Species and MIS

Oil and Gas Leasing EIS on Lands Administered by the Dixie National Forest

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List of Acronyms & Abbreviations

BE	Biological Evaluation
BLM	Bureau of Land Management
BMP	Best Management Practice
CSU	Controlled Surface Use
EIS	Environmental Impact Statement
FSM	Forest Service Manual
HUC	Hydrologic Unit Code
IRA	Inventoried Roadless Area
GIS	Geographical Information System
LN	Lease Notice
LRMP	Land and Resource Management Plan
MIS	Management Indicator Species
NEPA	National Environmental Policy Act
NL	No Lease
NSO	No Surface Occupancy
PFA	Post Fledgling Area
RFDS	Reasonable Foreseeable Development Scenario
SLT	Standard Lease Terms
TESP	Threatened, Endangered, Sensitive, and Proposed
TL	Timing Limitation
UDWR	Utah Division of Wildlife Resources
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

6.0 Sensitive Species and MIS

6.1 Introduction

This Specialist Report has been prepared in support of the Oil and Gas Leasing EIS on Lands administered by the Dixie National Forest, which is an environmental analysis to identify those lands with Federal mineral rights that should or should not be made available for oil and gas leasing. A more detailed description of Purpose and Need is provided in Chapter 1 of the EIS and a description of the Proposed Action, Alternatives, and leasing options is available in Chapter 2.

Special status species are those identified by state or Federal agencies that warrant special consideration during planning and management activities. Sensitive species and Management Indicator Species (MIS) do not have Federal status but are recognized by each National Forest as warranting attention due to possible threats that management activities may have on a species' persistence (Sensitive species) or due to the predictive value that certain species' population dynamics can have in management planning (MIS).

The Dixie National Forest contains a wide diversity of habitats that support many species that are rare or otherwise important components of the larger ecosystem. Habitats such as mature forests, including bristlecone pine; abundant rock formations, including Claron Limestone; caves; and relatively abundant water provide unique areas for many species with specialized habitat associations.

6.2 Best Science

The techniques and methodologies used in this analysis consider the best available science. The analysis includes a summary of the credible scientific evidence that is relevant to evaluating reasonably foreseeable impacts. In addition, the analysis also identifies the methods used and references the scientific sources relied on. When appropriate, the conclusions are based on a scientific analysis that shows a thorough review of relevant scientific information, a consideration of responsible opposing views, and the acknowledgment of incomplete or unavailable information, scientific uncertainty, and risk.

6.3 Use of a GIS

Alternatives were developed by assigning the leasing options described in Chapter 2 of the EIS and summarized in Table 2.3-1, to site-specific resource components using geospatial data. Using a geographic information system (GIS), the spatial distribution of each resource component and associated leasing option were overlaid. The most restrictive leasing option (i.e., NL or NSO) assigned to a particular resource component supersedes any less restrictive options (i.e., CSU or SLT) assigned to other resource components that occur in the same area or site-specific location. For example, where NSO was assigned to an area of high erosion potential that coincides with the habitat of a sensitive wildlife species assigned CSU, the NSO option would be applied to the area common to both of these resources. As a result, multiple leasing options may apply to a resource component, depending upon its location, even if only a single leasing option was specified for that resource component under an alternative. A full range of leasing options were incorporated into the development of alternatives so that the different alternatives would insure that differing levels of protection were addressed for each specific resource component.

Leasing options were applied to geographical areas that represent the spatial distribution of a resource component. However, it is important to note that leasing options are applied to the resource component and not simply to specific geographic areas and if unmapped resource components were identified in the future they would be protected by the same leasing option. Furthermore, the geospatial data used in this analysis is the best GIS data available; however, it comes from multiple sources and was created at varying scales. As a result, it is not assumed that these data are 100 percent complete or that they meet the US National Mapping Accuracy Standard of the Office of Management and Budget. Unless otherwise stated, GIS data was provided by the Dixie National Forest.

6.4 Description of Affected Environment

Sensitive species and MIS on the Dixie National Forest are described in this section. Species information includes descriptions of suitable habitats, life history information where relevant, and habitat or occurrence data relevant to the Dixie National Forest. Sources used heavily include Bosworth (2003), Parrish et al. (2002), Rodriguez (2004a), Utah Native Plant Society Rare Plant Guide (UNPS 2007), and the draft leasing EIS for the Dixie National Forest prepared in 1993-1994 (USDA 1995a, 1995e, and 1995f). Sensitive species are discussed in Section 6.4.1; MIS are discussed in Section 6.4.2. Bonneville cutthroat trout and northern goshawk are both Sensitive species and MIS.

6.4.1 Sensitive species

The Regional Forester identifies Sensitive species as those for which population viability ("persistence") is a concern, as evidenced by significant current and predicted downward trends in population numbers, density, and/or habitat capability that would reduce a species' existing distribution. Sensitive species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that could result in the need for federal listing (FSM 2672.1). Sensitive species that are known or suspected to occur on the Dixie National Forest are listed in Table 6.4-1. An "X" indicates confirmed presence; "habitat" indicates presence not confirmed but suitable habitat occurs.

Table 6.4-1 Sensitive species known or suspected to occur on the Dixie National Forest, by Ranger District.

	Pine Valley	Cedar City	Powell	Escalante
FISHES				
Colorado River cutthroat trout *Oncorhynchus clarki pleuriticus*	habitat	habitat	habitat	X
Bonneville cutthroat trout *Onchorhynchus clarki utah*	X	X	X	X
MAMMALS				
Pygmy rabbit *Brachylagus idahoensis*	habitat	habitat	habitat	habitat
Townsend's big-eared bat *Corynorhinus townsendii*	X	X	habitat	habitat
Spotted bat *Euderma maculatum*	habitat	X	habitat	habitat
BIRDS				
Northern goshawk *Accipiter gentilis*	X	X	X	X
Greater sage-grouse *Centrocercus urophasianus*	habitat	X	X	X

Peregrine falcon *Falco peregrinus*	habitat	X	X	habitat
Bald eagle *Haliaeetus leucocephalus*	winter/ migrant	winter/ migrant; summer	winter/ migrant	winter/ migrant
Flammulated owl *Otus flammeolus*	X	X	X	X
Three-toed woodpecker *Picoides tridactylus*	No habitat	X	X	X
PLANTS				
Dana's milkvetch *Astragalus henrimontanensis*				X
Navajo Lake milkvetch *Astragalus limnocharis limnocharis*		X		
Table Cliff milkvetch *Astragalus limnocharis tabulaeus*				X
Guard milkvetch *Astragalus zionis vigulus*	X			
Peculiar moonwort *Botrychium paradoxum*				X
Aquarius paintbrush *Castilleja aquariensis*				X
Tushar paintbrush *Castilleja parvula parvula*		X*		
Reveal paintbrush *Castileja parvula revealii*		X	X	X
Yellow-white catseye *Cryptantha ochroleuca*			X	X
Cedar Breaks biscuitroot *Cymopterus minimus*		X	X	X
Creeping draba *Draba sobolifera*		X*		
Widtsoe wild buckwheat *Eriogonum aretioides*			X	X
Pine Valley goldenbush *Haplopappus crispus*	X			
Jones golden-aster *Heterotheca jonesii*				X
Zion jamesia *Jamesia americana zionis*		X*		
Neese's pepperplant *Lepidium montanum neeseae*				X
Paria breadroot *Pediomelum pariense*			X*	
Red Canyon beardtongue *Penstemon bracteatus*			X	
Little (aquarius) penstemon *Penstemon parvus*				X
Pinyon penstemon *Penstemon pinorum*	X			
Arizona willow *Salix arizonica*		X	X	
Podunk goundsel *Senecio malmstenii*		X	X	X
Peterson catchfly		X	X	X

Silene petersonii				
Rock tansy *Sphaeromeria capitata*			X	

*Presence not confirmed.

Mapped habitat areas for Sensitive species, including bald eagle, pygmy rabbit, sensitive bats, peregrine falcon, flammulated owl, goshawk, and sage grouse are shown in Figure 6.4-1.

6.4.1.1 Fishes

Over the past 20+ years, conservation measures and reintroductions have reversed the decline of native cutthroat species, though population numbers are still very low and many populations are isolated by natural and human-made migration barriers (USDA 2006a). Based on GIS data provided by the Dixie National Forest, there are 5,234 acres of occupied stream habitat area (stream width + 300-foot buffer on either side) for Bonneville or Colorado River cutthroat trout (Table 6.4-2). Occupied native cutthroat trout habitat occurs mainly on the Pine Valley (40%) and Escalante (48%) Ranger Districts (see Figure 6.4-1). Bonneville cutthroat trout are present on all four ranger districts, while Colorado River cutthroat trout are present only on the Escalante Ranger District. These species are discussed below.

Table 6.4-2 Acres of occupied sensitive trout habitat on the Dixie National Forest.

	Pine Valley	Cedar City	Powell	Escalante	TOTAL*
Sensitive trout habitat	2,144	600	61	2,609	5,383

*May not add up exactly due to rounding.

COLORADO RIVER CUTTHROAT TROUT

Colorado River cutthroat trout is one of three subspecies of cutthroat native to Utah. The species is restricted to the upper Colorado River drainage. Colorado River cutthroat trout occur in headwater streams and mountain lakes of the Uinta, La Sal, and Abajo Mountains, the Tavaputs Pleateau, and the Escalante and Fremont River drainages (Bosworth 2003); pure strains occur predominantly in isolated headwater streams at high elevation (Behnke 1992, UNHP 2007). National Forest System lands contain 95-100% of the remaining populations of Colorado River cutthroat trout (May et al. 2003).

Colorado River cutthroat trout were petitioned for listing under the Endangered Species Act in December 1999; the US Fish and Wildlife Service determined that listing was not warranted in April 2004 and in June of 2007. The species is cooperatively managed under both range-wide and Utah-specific interagency Conservation agreements (see CRCT Coordination Team 2006). A status review was completed in 2005 (Hirsch et al. 2005).

Colorado River cutthroat have been extirpated from the majority of streams on the Dixie National Forest, although remnant populations have been found in the East and West forks of Boulder Creek on the Escalante Ranger District (USDA 1995e; maps in Bosworth 2003 and UNHP 2007) and elsewhere (see Section 6.4.6). Colorado River cutthroat trout occupy an estimated 35-40 miles of stream habitat and approximately 46 acres of lentic habitat (lakes/reservoirs) on the Escalante Ranger District (USDA 2007a).

BONNEVILLE CUTTHROAT TROUT (MIS AND SENSITIVE)

Bonneville cutthroat trout is one of three subspecies of cutthroat native to Utah. It occurs in streams and lakes of the Bonneville Basin and a limited portion of the Virgin River Drainage (Bosworth 2003). Bonneville cutthroat trout historically occupied most water bodies with suitable habitat within

the Bonneville Basin, including portions of Utah, Nevada, Idaho, and Wyoming (USFWS 2001). In general, habitat is variable, ranging from high elevation streams with coniferous and deciduous riparian trees to low elevation streams in sage-steppe grasslands containing herbaceous riparian zones (Rodriguez 2004a and UNHP 2007). Regardless of habitat, Bonneville cutthroat trout require a functional stream riparian zone that provides structure, cover, shade, and bank stability (UNHP 2007). This subspecies does relatively well in marginal habitats and has also been found in warmer, turbid water where non-native trout cannot survive (Behnke 1992). Most populations are found in the headwater streams and high-elevation river reaches of drainages entering the Bonneville Basin at its east and southeast edge; small populations occur in perennial streams in the Deep Creek Mountains and in a few headwater streams of the Virgin River drainage in the Pine Valley Mountains (Bosworth 2003). National Forest lands contain 80-90% of the remaining populations of Bonneville cutthroat trout (May et al. 2003).

Bonneville cutthroat trout were petitioned for listing under the Endangered Species Act in February 1998. A status review for Bonneville Cutthroat trout was completed in 2001 (USFWS 2001) and the petition for listing was found not warranted in October 2001. Conservation agreements with the UDWR have been developed for the species.

On the Dixie National Forest, Bonneville cutthroat trout are present in isolated streams that are part of the Sevier River Basin (Threemile and Delong Creeks) and a few streams in the Pine Valley Mountains that are in the Virgin River drainage, outside the Bonneville Basin (USDA 2004c and USFWS 2001). Bonneville cutthroat trout occupy an estimated 45-50 miles of stream habitat and a small (approximately 2 acres) reservoir on the Dixie National Forest (USDA 2007a). Occupied streams are relatively small tributaries that are often isolated from the mainstem of the Sevier River due to subterranean flows in alluvial areas or irrigation diversions on tributaries (USFWS 2001).

The Sanford Fire severely degraded Bonneville cutthroat trout habitat in the Cottonwood, Deep, and Deer Creek watersheds. The Sequoia Fire affected habitat in the Pine Valley Ranger District (see Section 6.4.2.1). Bonneville cutthroat trout have been reintroduced to Deep Creek, Mill Creek, Leap Creek, Harmon Creek, and South Ash Creek. Overwinter survival and evidence of reproduction has been observed in all areas except Leap Creek, where survival and reproduction has not yet been observed but is expected. Bonneville cutthroat trout are scheduled to be introduced to Deer Creek and Cottonwood Creek in the near future.

6.4.1.2 Mammals

Mapped acres of sensitive mammal habitat on the Dixie National Forest are summarized in Table 6.4-3.

Table 6.4-3 Acres of mapped sensitive mammal habitat on the Dixie National Forest

	Pine Valley	Cedar City	Powell	Escalante	TOTAL*
Pygmy rabbit habitat	16,302	10,822	25,097	8,532	60,752
Sensitive bat habitat	635	290	684	852	2,461

*May not add up exactly due to rounding.

PYGMY RABBIT

Pygmy rabbits are small, secretive rabbits that dig their own burrows. Pygmy rabbits are limited to habitat characterized by deep, friable soils and tall (often >6 feet), dense sagebrush, which provides both food (95% of the diet) and cover. Burrows are usually located on slopes at the base of sagebrush plants. There are no known locations of pygmy rabbits on the Dixie National Forest, although over 60,000 acres of suitable habitat occurs across all four Ranger Districts (Table 6.4-3; Figure 6.4-1) and pygmy rabbits could be present in many areas. Historic (pre-1983) records exist

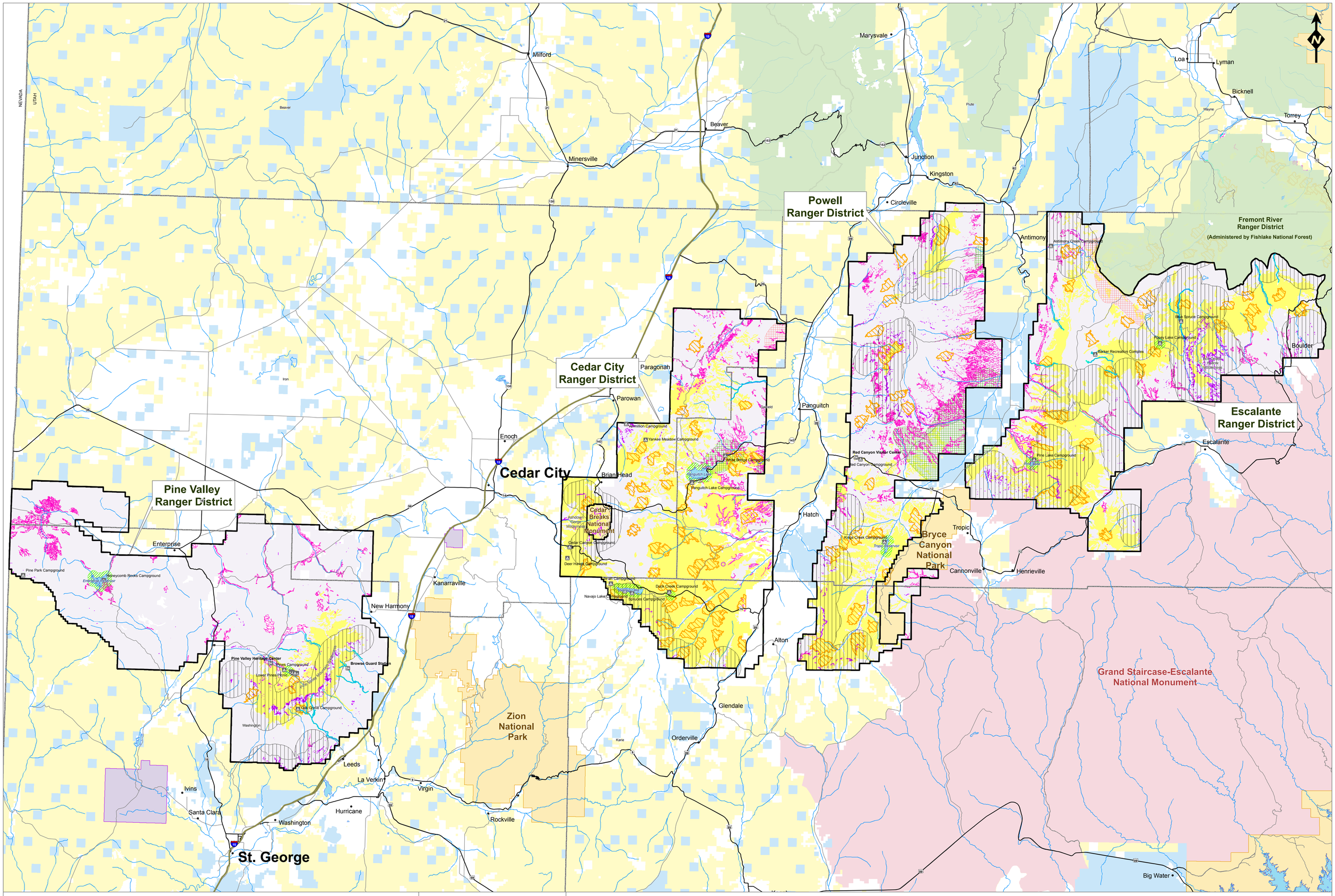
in several areas of the Dixie National Forest (Bosworth 2003).

TOWNSEND'S BIG-EARED BAT

Townsend's big-eared bat is one of the most common bat species in Utah, roosting in a variety of desert and forest communities at elevations between sea level and 10,000 feet elevation. Roosts occur in caves, rocky outcrops, old buildings, and mine shafts (Rodriguez 2004a). In winter, both sexes hibernate in mines or caves, either alone or in small groups. In a survey of 820 potential roosting sites in northern Utah, abandoned mines and caves with small to midsize openings located at low to mid-elevations, in areas dominated by sagebrush, grassland, juniper woodlands, or mountain brush communities were most likely to be occupied by big-eared bats (Sherwin et al. 2000). Several individuals were located and monitored on the Dixie National Forest from 1997 to 2001. Mammoth Cave and Bower's Cave (Cedar City Ranger District) are known to be hibernacula sites for the species from October to February. Mammoth Cave is closed to the public during winter and spring to protect hibernating bats (see Specialist Report 9.0). Almost 2,500 acres of potential habitat for sensitive bats occurs on all four Ranger Districts of the Dixie National Forest (Table 6.4-3; Figure 6.4-1). The largest concentrations of habitat occur in the Pine Valley Mountains (Pine Valley Ranger District), Cedar Breaks and Vermillion Castle areas (Cedar City Ranger District), Sunset Cliffs and Sevier Plateau (Powell Ranger District), and the Box Death Hollow Wilderness (Escalante Ranger District).

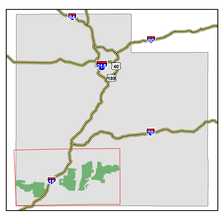
SPOTTED BAT

Spotted bats occur in a wide variety of habitats, including ponderosa pine (*Pinus ponderosa*) forests, pinyon/juniper woodlands, canyon bottoms, open pastures, and hayfields. Limited observations indicate that spotted bats roost in relatively remote and undisturbed areas, typically in rock crevices located high on steep rock faces in limestone or sandstone cliffs (Rodriguez 2004a). Spotted bats forage primarily over dry, open coniferous forest (Groves et al. 1997). Migration patterns are poorly understood, but populations from lower elevation habitats apparently do not migrate. Surveys conducted on six sites on the Dixie National Forest in 1994 resulted in documented occurrence on the Cedar City Ranger District (Rodriguez 2004a). Potential habitat for sensitive bats occurs on all four Ranger Districts of the Dixie National Forest (Table 6.4-3; Figure 6.4-1).



Oil & Gas Leasing EIS on Lands Administered by the Dixie National Forest

FIGURE 6.4-1
Sensitive Wildlife Species Habitat



Legend

- Cities

Forest Sites
- Campgrounds
- Visitor Centers
- Interstates
- Highways
- Minor Roads (1)
- Major Streams & Rivers
- Water Bodies
- County Boundaries
- State Boundaries

National Forest System Lands
- Dixie National Forest
- Wilderness Areas
- Fishlake National Forest

Other Land Administration
- Bureau of Land Management
- GSENM (2)
- National Park Service
- Private
- State of Utah
- Tribal

Special Status Wildlife Habitat
- Bald Eagle Winter Concentration Areas
- Pygmy Rabbit Habitat
- Sensitive Bats, Potentially Suitable Habitat
- Condor/Peregrine Falcon Rim Habitat
- Flammulated Owl Habitat

Cutthroat Trout Habitat (3)
- 300-foot buffer

Northern Goshawk
- Protected Activity Centers

Greater Sage Grouse Habitat
- Brood Rearing
- Lekking

0 2.5 5 7.5 10 Miles

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Accuracy Standard of the Office of Management and Budget. For specific dates and/or additional digital information, contact the Forest Supervisor, Dixie National Forest, Cedar City, Utah. This map has no warranties to its contents or accuracy.

(1) Not all roads are shown. Only some roads are depicted for orientation purposes.
(2) Grand Staircase-Escalanted National Monument. Managed by the Bureau of Land Management.\
(3) Streams and lakes considered habitat for Bonneville Cutthroat Trout and Colorado River Cutthroat Trout with a 300-foot buffer.

Horizontal Datum = NAD 83 Coordinate System = Zone 12N	1:220,000	30 October 2007

6.4.1.3 Birds

Mapped acres of sensitive bird habitat on the Dixie are summarized in Table 6.4-4.

Table 6.4-4 Acres of mapped sensitive bird habitat on the Dixie National Forest.

	Pine Valley	Cedar City	Powell	Escalante	TOTAL*
Goshawk nest areas	1,470	27,157	17,734	16,652	63,013
Goshawk PFAs	2,195	35,669	24,975	21,569	84,406
Sage grouse brood rearing habitat	0	12,165	34,292	10,648	57,105
Sage grouse leks	0	4,759	4,314	292	9,365
Peregrine falcon nest areas	0	2,802	2,034	0	4,836
Peregrine falcon rim habitat	67,782	45,314	104,282	234,382	451,759
Bald eagle winter concentration areas	3,747	6,720	1,744	1,736	13,947
Flammulated owl habitat	37,973	176,849	76,623	145,415	436,860

*May not add up exactly due to rounding.

NORTHERN GOSHAWK (MIS AND SENSITIVE)

Northern goshawks inhabit montane coniferous and deciduous woodland in the West, nesting in stands of intermediate to high canopy-closure with a thin understory, interspersed with small openings, fields, or wetlands. Important internal components of forests where goshawks nest in Utah include snags, multiple canopies, and down woody debris. In southern Utah, goshawks are most often associated with mature to old growth stands of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*), followed by aspen (*Populus tremuloides*; Graham et al. 1999). Goshawks generally nest in large trees adjacent to open flight corridors; they appear to prefer north to east aspects as well as flat to moderately sloped land for nest sites because stands are typically denser (Shuster 1980 and Weber 2006). Nesting activity on the Dixie National Forest generally ranges from 20-30 nests annually (Rodriguez 2004a). Nest buffer areas total 63,000 acres on all four Ranger Districts and Post Fledgling Areas (PFAs) total 84,400 acres (Table 6.4-4; PFAs shown in Figure 6.4-1). Out of 120 goshawk territories monitored in 2004, 42 were occupied and 34 were confirmed active. Active goshawk territories and goshawk production appear to be linked to precipitation data on the Dixie National Forest; the increase in goshawk activity in 2004, for example, coincides with the end of a prolonged 5-year drought (USDA 2004c). In 2005, 39 territories were considered occupied and 36 were active (USDA 2005). In 2006, 50 territories were occupied and 42 were active (USDA 2006).

GREATER SAGE-GROUSE

Sage-grouse are large, chicken-like birds that are brownish grey with conspicuous black and white markings (Parrish et al. 2002). Sage-grouse are dependent on sagebrush habitats, specifically big sagebrush (*Artemisia tridentata*) for brood rearing, nesting cover, and year-round diet. Suitable sagebrush habitat is limited by elevation and topography (USDA 1995e:25). Breeding occurs on “leks” or openings surrounded by sagebrush in broad valleys, ridges, benches, and plateaus or mesas. Lek sites generally have good visibility (for predator detection), acoustical qualities (so mating sounds will carry), and an abundance of sagebrush within 90-200 meters (for escape cover). Hens build nests at the base of a live sagebrush plant and remain in sagebrush vegetation with chicks until conditions are too dry, at which point hens with broods move towards wet meadow or riparian areas. Preferred nest habitats are those with live sagebrush along the periphery for escape cover. Flocks of sage-grouse form in early fall, containing unsuccessful and successful hens and chicks from several broods. During fall and early winter, movements of sage-grouse flocks can be

extensive. Sagebrush habitats are still important in winter (20% canopy cover preferred; Parrish et al. 2002).

Suitable habitat for sage-grouse occurs on all four Ranger Districts of the Dixie National Forest. Brood-rearing areas occur primarily adjacent to the Dixie National Forest, overlapping the northern edges of the Cedar City and Escalante Ranger Districts. Total brood rearing area is 57,105 acres; Table 6.4-4; Figure 6.4-1). Five "lekking" areas are located on or near the Dixie National Forest, two lying between the Cedar City and Powell Ranger Districts, one partly within the Powell Ranger District in John's Valley, one partly within the Powell Ranger District southwest of Antimony, and one within the Cedar City Ranger District near Panguitch Lake. Actual lek sites on the Dixie National Forest (mapped with a one-mile buffer) total 9,365 acres (Table 6.4-4). The current status of these leks is not known (USDA 1995e:25).

Road densities within lekking areas on the Dixie National Forest are relatively high (>3 miles per square mile within the subwatershed) in a few areas, including near leks northeast of Panguitch Lake and White Bridge Campground, and leks north of Highway 12 on the east side of the Powell Ranger District.

PEREGRINE FALCON

Peregrine falcons occupy a wide variety of open habitats, nesting on cliffs, river banks, tundra mounds, large stick nests of other species, tree cavities, or human-made structures. They forage wherever prey concentrate, usually along marshes, streams, and lakes within a 10-mile radius of the nest (Rodriguez 2004a). Marshes, croplands, meadows, river bottoms, and lakes that support good populations of small- to medium-sized terrestrial birds, shorebirds, and waterfowl are important hunting sites. Cliffs are preferred nesting sites, although nests also occur on river banks, tundra mounds, stick nests of other species, tree cavities, and man-made structures (USDA 2003:E-76). No Forest-wide surveys have been conducted on the Dixie National Forest. However, eight nest sites are known on the Forest, three are known on adjacent private/BLM lands, and numerous sightings have occurred within the Forest boundary (Rodriguez 2004a). Peregrine nest areas (with 0.5-mile buffer) total 4,836 acres on the Cedar City and Powell Ranger Districts (Table 6.4-4). Over 450,000 acres of mapped "rim" habitat for both peregrine and California condor (Endangered; see Specialist Report 4.0) occurs across all four Ranger Districts (Table 6.4-4; Figure 6.4-1).

BALD EAGLE

Bald eagles occur in Utah generally on a migratory or wintering basis. Bald eagles are opportunistic predators, especially in winter, when they will feed on any available fish, waterfowl, small mammal, or carrion. Bald eagles tend to concentrate wherever food is available, roosting in large groups in forested stands that provide protection from harsh weather. They may also winter in upland habitats, feeding on small mammals and deer carrion. Marginal roosting habitat is available on the Dixie National Forest wherever large trees occur along bodies of water. Bald eagles typically occur on the Dixie National Forest during late winter (winter residents) or during fall and spring months (thought to be northern migrants). No nesting pairs are known, although one pair has been observed for two summers at Panguitch Lake (without nesting). When water bodies freeze in late fall or early winter, eagles on the Dixie National Forest move down in elevation to forage off the Dixie National Forest (Rodriguez 2004a). Potential bald eagle wintering sites on the Dixie National Forest include Enterprise Reservoir and Pine Valley Reservoir (Pine Valley Ranger District); Duck Lake, Navajo Lake, and Panguitch Lake (Cedar City Ranger District); Tropic Reservoir (Powell Ranger District); and Pine Lake and Posey Lake (Escalante Ranger District). A total of 13,947 acres of winter concentration areas are mapped acres across the Dixie National Forest (Table 6.4-4; Figure 6.4-1). Intensive monitoring of four geographic areas within the Dixie National Forest has occurred since 1996. The greatest number of bald eagle sightings generally occurs at Panguitch Lake; trends on the Dixie are stable (Rodriguez 2004a).

FLAMMULATED OWL

Flammulated owls inhabit montane forest, specifically mature and old growth ponderosa pine and Douglas-fir habitats with open stand structure. This species typically nests in large cavities made by woodpeckers and feeds on nocturnal arthropods (USDA 2003:F-73). Flammulated owls have a low reproductive rate, with a large variation in adult survival. Timber harvesting can have negative impacts on flammulated owls if large old trees, open stand structure, and some dense vegetation for roosting are not retained (McCallum 1994). Flammulated owl surveys have been conducted on the Dixie National Forest, which detected flammulated owls within all four Ranger Districts. The areas where detections were most concentrated occurred within the Paunsaugunt Pleateau (Powell Ranger District) and the Aquarius Pleateau (Escalante Ranger District). Suitable nesting habitat exists throughout the high-elevation forested areas of the Dixie National Forest (USDA 1995e) and covers 436,860 acres (Table 6.4-4; Figure 6.4-1).

THREE-TOED WOODPECKER

Northern three-toed woodpeckers are primarily associated with dense subalpine fir and Engelmann spruce forests at high elevations. Mature to old-growth stands are preferred due to an abundance of insect prey in large snags and downed woody debris. Three-toed woodpeckers excavate their own nest cavities in snags or occasionally in live trees. Nests are found in cavities located 5-12 feet above the ground in dead spruce, tamarack pine (*Larix* spp.), cedar (*Thuja* spp.), and aspen trees (Rodriguez 2004a). Up to 75% of their diet consists of wood-boring beetles and caterpillars that attack dead or dying conifers (USDA 2003:F-80). Populations have been shown to increase in some areas three to five years after forest fires, presumably in response to spruce beetle outbreaks (Koplin 1969). Formal surveys for three-toed woodpecker have been conducted on the Dixie National Forest; however, mapped (GIS) locations are not available. A total of 131 locations have been documented since 1996 and the numbers of individuals are increasing presumably due to the increase of spruce bark beetle infestations. In the Cedar City Ranger District, seven three-toed woodpeckers were detected at six calling points in both 1999 and 2000 near Brian Head in association with a field ecology course (Boswell 2007). Three-toed woodpeckers have also been detected consistently on the Breeding Bird Survey Route #85020 (Navajo Lake). An average of five woodpeckers was detected each year along this route from 2000 to 2004. In the Escalante Ranger District, two nests were found along Barney Top northwest of the Table Cliff Plateau and individuals have been detected east of Antimony Creek.

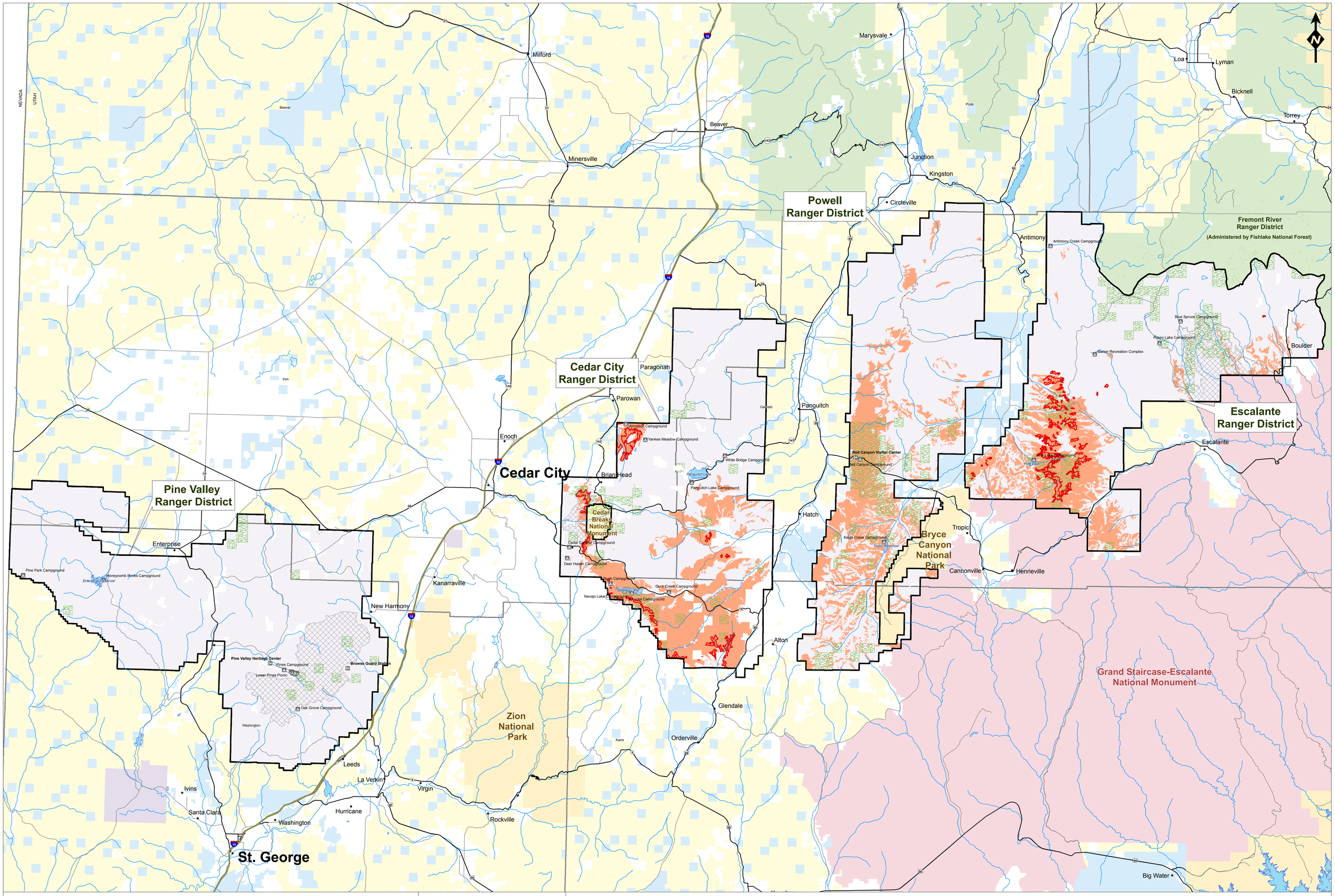
6.4.1.4 Plants

There are over 127,000 acres of sensitive plant habitat (including occurrences) mapped on the Dixie National Forest, spread across all four Ranger Districts (Table 6.4-5). This GIS coverage includes habitat for Threatened and Endangered species also, although no Listed plants occur on the Dixie.

Table 6.4-5 Acres of mapped sensitive plant habitat on the Dixie National Forest.

	Pine Valley	Cedar City	Powell	Escalante	TOTAL*
Sensitive (and TES) plant habitat	9,911	22,263	43,883	51,664	127,720

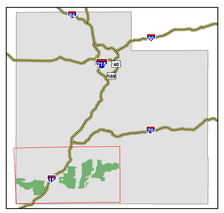
*May not add up exactly due to rounding.



Oil & Gas Leasing EIS on Lands Administered by the Dixie National Forest

FIGURE 6.4-2
Threatened, Endangered & Sensitive Plant Species and Habitat

Horizontal Datum = NAD 83 Coordinate System = Zone 12N	1:220,000	27 February 2008



Legend

- Cities
- **Forest Sites**
  - Campgrounds
  - Visitor Centers
- Interstates
- Highways
- Minor Roads (1)
- Major Streams & Rivers
- Water Bodies
- County Boundaries
- State Boundaries
- **National Forest System Lands**
  - Dixie National Forest
  - Wilderness Areas
  - Fishlake National Forest
- **Other Land Administration**
  - Bureau of Land Management
  - GSENM (2)
  - National Park Service
  - Private
  - State of Utah
  - Tribal
- Bristlecone Pine & Rock Gardens
- Claron Sandstone Formation
- Threatened, Endangered & Sensitive Plants

0 4 8 12 16 Miles

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Accuracy Standard of the Office of Management and Budget. For specific dates and/or additional digital information, contact the Forest Supervisor, Dixie National Forest, Cedar City, Utah. This map has no warranties to its contents or accuracy.

NOTES
(1) Not all roads are shown. Only some roads are depicted for orientation purposes.
(2) Grand Staircase-Escalanted National Monument. Managed by the Bureau of Land Management.

There are 24 sensitive plants that are known or suspected to occur on the Dixie National Forest (Table 6.4-6). Half (12) of these species occur on Claron (Wasatch) Limestone or within rock garden and bristlecone pine communities (Figure 6.4-2), which are underlain by the Claron Limestone Formation. Claron Limestone is widespread on the southern Cedar City, central Powell, and southern Escalante Ranger Districts (Figure 6.4-2) and is associated with the following sensitive plants: Navajo Lake milkvetch, Table Cliff milkvetch, reveal paintbrush, yellow-white catseye, Cedar Breaks biscuitroot, widtsoe wild buckwheat, Neese's pepperplant, paria breadroot, Red Canyon beardtongue, podunk goundsel, Peterson catchfly, and rock tansy (Table 6.4-6).

Table 6.4-6 Sensitive plant species on the Dixie National Forest. Information taken from Rodriguez 2004a, UNPS 2007, Welsh et al. 1987, and USDA 1995f.

Species	Description	Habitat	Dixie National Forest occurrence
Dana's milkvetch	perennial herb; yellow-white flowers with purple tips open April-May	washouts, gravelly loam soil; 7,000-9,200 feet	Escalante Ranger District: Henry Mountains and Aquarius Pleateau
Navajo Lake milkvetch	perennial herb; yellow-white or pinkish purple flowers open June-Aug	steep slopes with clay soils, loose rock; assoc with bristlecone pine on pink Wasatch Limestone and along terrace below high water mark at Navajo Lake; 8,800-10,500 feet	Cedar City Ranger District
Table Cliff milkvetch	perennial herb; pink-purple flowers open June-Aug	steep, unstable limestone slopes on pink Wasatch Limestone; 9,200-10,170 feet	Escalante Ranger District: Table Cliff Plateau
Guard milkvetch	perennial herb; pink-purple or pale flowers open April-July	assoc witih pinyon-juniper, mountain mahogany, and oak-Garrya; 5,000-8,200 feet	Pine Valley Ranger District: Pine Valley Mountains
Peculiar moonwort	succulent; spike-like; cluster of sporangia have frosted, glaucous coloration	wet meadow, along intermittent draws, grassy fields on south-facing slopes; up to 9,870 feet; at about 10,800 feet	Escalante Ranger District: near Cyclone Lake on the Aquarius Plateau and near Jacobs Valley
Aquarius paintbrush	perennial herb; yellow inflorescence; "flowers" open June-Aug	silver sage meadows or cobbled rocky areas; 9,150-10,500 feet	Escalante Ranger District: top of Boulder Mountain
Tushar paintbrush	perennial herb; purple-fringed, green bracts; rarely purple; "flowers" open June to Aug	alpine meadows and talus slopes above timberline; tertiary igneous rockbeds sandy gravel; 10,000-12,000 feet	Cedar City Ranger District (suspected)
Reveal paintbrush	perennial herb; magenta to rose bracts; "flowers" open mid-June to mid-July	assoc with bristlecone and ponderosa pine; heavy clay soils from pink Wasatch Limestone; west to southwest-facing	Cedar City and Powell Ranger Districts

		slopes; 7,800-8,500 feet	
Yellow-white catseye	perennial herb; pale yellow flowers open May-late June	dry, open sites on southern, warm slopes; pink Wasatch Limestone; 6,500-9,000 feet	Powell and Escalante Ranger Districts
Cedar Breaks biscuitroot	perennial; flowers pink or pale purple with white margins open July-Aug	assoc with bristlecone, ponderosa pine, and spruce fir; Wasatch Limestone; 8,000-10,400 feet	Cedar City Ranger District
Creeping draba	perennial mustard; yellow flowers open July-Aug	igneous gravels and talus in alpine tundra or spruce-fir; 10,000-12,000 feet	Cedar City Ranger District (suspected)
Widtsoe wild buckwheat	perennial herb; yellow flowers open late May - June	dry, open ridgetops; pink Wasatch Limestone; 7,500-9,000 feet	Powell and Escalante Ranger Districts
Pine Valley goldenbush	woody shrub; yellow disk flowers open Aug	moderately open areas assoc with ponderosa pine, manzanita, fir, and aspen; 5,970-9,200 feet	Pine Valley Ranger District
Jones golden-aster	perennial herb; yellow ray flowers open May-Sep	on sandstone or in sand on south and west-facing slopes; 4,000-9,400 feet	Escalante Ranger District: Hell's Backbone Road and within Death Hollow Wilderness Area
Zion jamesia	woody shrub; white flowers open June-early August	assoc with pinyon-juniper, oak, and ponderosa pine; cliffsides, hanging gardens; 4,200-6,000 feet	Cedar City Ranger District: Kolob Terrace
Neese's pepperplant	perennial herb; white flowers open May-early June	dry, sandy sites, mostly open with little cover; pink and white Wasatch Limestone and Navajo Sandstone; 7,300-9,000 feet	Escalante Ranger District
Paria breadroot	perennial herb; cream to yellow-white flowers with purple open June-July	ponderosa pine or pinyon-juniper; calcerous or sandy soils on Wasatch Limestone, Navajo Sandstone, and Quaternary alluvium; 5,500-8,000 feet	Powell Ranger District (suspected)
Red Canyon beardtongue	perennial herb; blue to violet flowers open May-early June	pine needle duff on clay loam soils of calcerous, gravelly slopes and rock slides along pink Wasatch Limestone; 6,900-8,300 feet	Powell Ranger District: Bryce Canyon and Red Canyon
Little (aquarius) penstemon	perennial herb; blue flowers open June-Aug	assoc with sagebrush-grass, pinyon-juniper, and spruce; tertiary volcanic gravels in sandy, gravelly loam;	Escalante Ranger District: Aquarius Plateau between Cyclone and Big Lake

		8,200-11,500 feet	
Pinyon penstemon	perennial herb; blue-violet flowers open May-early June	pinyon-juniper; gravelly soils and volcanic rubble of foothills; 5,620-6,700 feet	Pine Valley Ranger District: Pine Valley Mountains
Arizona willow	small perennial shrub; young stems are bright red; catkins have brown to black pubescent scales	wet meadows, streamsides, and cienegas on volcanic soils; above 8,500 feet	Cedar City and Powell Ranger Districts: Sidney Valley, Rainbow Meadows, and East Fork Sevier River
Podunk goundsel	perennial herb; yellow discoid flowers open June-Aug	assoc with bristlecone pine, spruce, fir, other conifers; talus slopes of Claron Limestone; 8,000-10,000 feet	Cedar City, Powell, and Escalante Ranger Districts: Markagunt and Paunsaugunt Plateaus and Canaan Mountain
Peterson catchfly	perennial herb; bright pink flowers open late July-Aug	assoc with ponderosa pine, aspen, and spruce-fir; open calcerous limestone and igneous gravels; 7,000-11,200 feet	Cedar City, Powell, and Escalante Ranger Districts
Rock tansy	perennial herb; yellow flowers open in July	occurs with bristlecone pine on exposed slopes of Cedar Breaks Limestone; 5,000-7,800 feet	Powell Ranger District Garfield county only

6.4.2 Management Indicator Species

Management Indicator Species (MIS) are species associated with certain vegetation types that are used in the planning process to monitor certain habitats on the Dixie National Forest. MIS are selected based on five criteria: 1) the species must have a strong, but not exclusive affinity for one vegetation type; 2) the vegetation type is key habitat to the life cycle of the species; 3) the species must be sensitive to habitat alteration; 4) the species must be highly visible and in adequate numbers as to make monitoring easy; and, 5) the species must be somewhat representative of all species that utilize the vegetation type. Some MIS species are designated as such due the high level of interest given them by the public, including Bonneville cutthroat trout, other trout, and big game.

With the exception of Bonneville cutthroat trout, all MIS are found on all four Ranger Districts and are present in many or most areas of their respective habitats. MIS on the Dixie include trout species (Bonneville cutthroat, other cutthroat, rainbow, brook, and brown), aquatic invertebrates, mule deer, Rocky Mountain elk, northern goshawk, wild turkey, and northern flicker. MIS species are presented with associated habitats in Table 6.4-7 and described in more detail below.

Table 6.4-7 MIS species and associated habitats on the Dixie National Forest (USDA 1986).

MIS	Associated habitat	Occurrence
Bonneville cutthroat trout	Headwater streams	All Ranger Districts except Escalante
Cutthroat trout (other spp.) *Onychorhynchus clarki*	Streams, rivers, lakes, and reservoirs	All Ranger Districts
Rainbow trout Oncorhynchus mykiss		
Brook trout *Salvelinus fontinalis*		

Brown trout *Salmo trutta*		
Aquatic macroinvertebrates	Streams, rivers, lakes, and reservoirs	All Ranger Districts
Rocky Mountain Elk *Cervus canadensis*	Grass-forb, sapling to mature aspen, sapling to old growth conifer	All Ranger Districts
Mule deer *Odocoileus hemionus*	Grass-forb, sagebrush, mountain brush, pinyon-juniper, sapling to mature aspen, sapling to mature conifer	All Ranger Districts
Northern goshawk	Riparian trees, mature aspen, mature to old growth conifer	All Ranger Districts
Northern flicker *Colaptes auratus*	Mature aspen, mature conifer	All Ranger Districts
Wild turkey *Meleagris gallopavo*	Mountain brush, pole to mature aspen, mature to old growth conifer	All Ranger Districts

6.4.2.1 Trout

In general, the key components of trout habitat include cool, clear water; deep pools and cover, typically associated with well vegetated stream banks and large woody debris; floodplain habitat for rearing and velocity refugia; and the availability of suitable spawning gravels, which should include a minimal amount (<25%) of fine substrate less than 6.35 mm in diameter (Sigler and Sigler 1996, Harig and Fausch 2002, Chapman 1988, and Magee et al. 1996). Spawning is influenced primarily by water temperature and flow, which are influenced by latitude and elevation. Generally, the distance trout migrate to spawn is short and the post-spawning mortality rate is high (Sigler and Sigler 1996).

Lack of recent fish population data on most streams in the Dixie National Forest makes population and MIS habitat assessments difficult, as baseline data on the Dixie National Forest is still being accumulated. The UDWR was collecting the bulk of fisheries data until 2003 with little input from the Dixie National Forest. From 2003 to present, however, Dixie National Forest personnel have collected fish population data at various sites across the Dixie National Forest in cooperation with UDWR. Monitoring is expected to continue at 10-20 streams/stations per year, allowing the Dixie National Forest to revisit all major stream fisheries every 4-7 years and determine population trends.

The Sanford Fire affected Cottonwood, Deep, and Deer Creeks on the Powell Ranger District and the Sequoia Fire affected several tributaries of Ash Creek on the Pine Valley Ranger District, where Bonneville cutthroat trout were located (see Section 6.4.1). Aquatic habitat condition data from 2005 indicated that surveyed streams on the Dixie National Forest where the fire occurred (i.e., Antimony, Cottonwood, Deep, Deer, Mill, and Water Canyon Creeks) were lacking invertebrate diversity by several metrics, including low total taxa richness, few Ephemeroptera/Plecoptera/Trichoptera taxa (mayflies/stoneflies/caddisflies), virtually no longer lived taxa, low predator richness and abundance, and high dominance of relatively few taxa. Most stream sites were found to be dominated by black flies and mayflies, two taxa that tend to colonize streams after disturbances (Wisseman 2006) and monopolize resources. Surveys of Deep, Deer, and Cottonwood Creeks in 2005 found that none of the streams met LRMP standards for fish and riparian habitat conditions (USDA 2005). Additional streams were surveyed in 2006 (i.e., Harmon and Leap Creeks) and similar conditions were found in the analysis (Wisseman 2007). Trout reintroductions thus far appear successful in at least Deep Creek, Mill Creek, Harmon Creek, and South Ash Creek (Section 6.4.1). Other native fish and aquatic species in these areas are recovering naturally.

BONNEVILLE CUTTHROAT TROUT

Bonneville cutthroat trout are discussed in Section 6.4.1 (Sensitive Species).

CUTTHROAT TROUT

Cutthroat trout have the greatest North American distribution of all western trout species (Behnke 1992) and are economically important to the fishing industry and for consumption over virtually all of their range (Rodriguez 2004a). There are four subspecies of cutthroat trout in Utah, three of which are native (Sigler and Sigler 1996; UNHP 2007). Inland cutthroat occur in high mountain lakes and streams. Most cutthroat trout evolved apart from rainbow and redband trout, and lack isolating mechanisms that would allow them to live with other trout (including nonnative species) without hybridizing. Non-native trout, including rainbow, brown, and brook trout, impact native cutthroat trout primarily through hybridization (rainbow trout) and competition (brown and brook trout). As a result, cutthroat trout are often limited to small headwater streams; however, prior to the introduction of non-native fishes cutthroat trout were found throughout streams and large river systems (Quist and Hubert 2004). In general, cutthroat trout function better than nonnative species in relatively cold, high-altitude headwaters (Behnke 1992). Cutthroat trout occur on all four Ranger Districts of the Dixie National Forest.

RAINBOW TROUT

The native range of rainbow trout includes drainages of the Pacific coast from Alaska to Mexico. The species is not native to Utah and has been introduced to cold waters throughout the state and elsewhere in the world (Sigler and Sigler 1996). Rainbow trout feed primarily on invertebrates and other fishes. Stream-resident rainbow trout are primarily drift feeders, but will also feed on the surface. Lake-resident rainbow trout are more often piscivorous (fish-eating) than stream-resident trout (Sigler and Sigler 1996). Rainbow trout spawn in the spring, similar to cutthroat trout, and as a result readily hybridize with native cutthroat trout. Because the species is popular with anglers and most Utah rainbow trout do not reproduce in the wild, the UDWR stocks millions of rainbow trout in Utah waters each year (UNHP 2007). To reproduce, rainbow trout require a high amount of dissolved oxygen in the water and temperatures between 7 and 17 ºC. Where rainbow and cutthroat trout co-exist, similarities in spawning time and location often lead to the production of rainbow-cutthroat hybrids (UNHP 2007). Rainbow trout occur on all four Ranger Districts of the Dixie National Forest.

BROOK TROUT

Brook trout are a coldwater char native to the eastern United States and Canada. Brook trout are more suited to high, cold lakes, and small, cold streams than either rainbow or brown trout (Sigler and Sigler 1996). As a result, they have been stocked in high mountain lakes and streams across Utah and have become established (UNHP 2007). High mountain lakes on the Boulder Mountain area of the Escalante Ranger District support popular recreation fisheries for brook trout. Brook trout are voracious feeders and are omnivorous, feeding on drifting invertebrates in streams and on zooplankton in lakes. Brook trout spawn in late fall and early winter and can successfully reproduce in a small lake with no inlet or outlet (Sigler and Sigler 1996). While brook trout will prey on native cutthroat trout, they are not usually piscivorous. Brook trout more often displace cutthroat trout populations via interference competition (Quist and Hubert 2004). Brook trout are present on all four Ranger Districts of the Dixie National Forest.

BROWN TROUT

Brown trout are a largely piscivorous fish native to Europe and western Asia. They were introduced to Utah prior to 1900 (Sigler and Sigler 1996). Brown trout are a highly adaptable species present in most streams and reservoirs at the foot of many mountain ranges (Rodriquez 2004). In Utah, the species has been established in many cold water areas and is a popular sport fish (UNHP 2007). Brown trout prefer cold water with temperatures up to 26 ºC, and habitat areas with boulders, cobble, logs, rootwads, and overhead cover. Although they prefer cool lakes and sreams, brown trout do not normally inhabitat these areas, but are present in many of the lower elevation waters that can be relatively warm and are sometimes polluted. Brown trout are more tolerant of warm

water and degraded habitat than other native or non-native salmonids, and are often the only trout present in these areas. Brown trout do not hybridize with native cutthroat trout. However, brown trout exert considerable predation pressure on native cutthroat trout (Quist and Hubert 2004). Brown trout are present on all four Ranger Districts of the Dixie National Forest.

6.4.2.2 Aquatic macroinvertebrates

Aquatic macroinvertebrates are invertebrates that live in water and that are large enough to be seen with the naked eye. They are useful indicators of aquatic habitat conditions due to their strict habitat requirements. Most macroinvertebrate species are adapted to fast-water stream environments, as evidenced by flattened bodies, streamlined shape, suckers, friction pads and hooks, secretions, and upstream migrations. Species include mayflies (Ephemeroptera), stoneflies (Plecoptera), caddisflies (Trichoptera), and true flies (Diptera); as well as crustaceans, mollusks, and freshwater earthworms (Rodriguez 2004b).

Aquatic macroinvertebrates are responsive to changes in aquatic habitat condition due to land management actions, such as those that cause sedimentation, changes in water chemistry, low streamflow, and high streamflow (Rodriguez 2004b). Communities are also naturally dynamic, due to seasonal variations, life cycles, and natural stream disturbances, thus macroinvertebrates are used as habitat condition indicators only when MIS fish population data is lacking.

6.4.2.3 Big game

Big game (Rocky Mountain elk and mule deer) are the most visible wildlife on the Dixie National Forest and valuable to recreation resources (Specialist Report 3.0), and as such are the focus of several leasing options and conservation measures on the Dixie National Forest, including Standards and Guidelines (Section 6.7). The area occupied by big game throughout the year and over an entire life cycle is large because many animals migrate between ranges and move long distances in search of resources or suitable habitat. The area covered by big game often includes many different habitat areas that serve as seasonal ranges, including crucial and substantial summer range, crucial and substantial winter range, and calving (elk) or fawning (mule deer) areas (Table 6.4-8). Calving and fawning areas are relatively abundant on the Dixie and thus have no associated leasing options; these areas are discussed briefly.

Table 6.4-8 Acres of mapped big game habitats on the Dixie National Forest.

	Pine Valley	Cedar City	Powell	Escalante	TOTAL*
Big game winter range	18,868	35,613	51,995	71,236	177,713
Big game summer range	149,612	108,646	148,477	19,214	425,949
Elk calving range	0	288,695	225,521	19,214	533,429
Mule deer fawning range	394,126	364,004	326,397	316,902	1,401,429

*May not add up exactly due to rounding.

Road density is particularly relevant to big game due to their wide-ranging movements. Road density is discussed below, followed by life history and habitat information for Rocky Mountain elk and mule deer.

ROAD DENSITY

On average, there are about 1.5 miles of road per square mile on the Dixie National Forest (USDA 2004c). Road density is above the USDA (1986)-recommended threshold of two miles per square mile of habitat, over which habitat effectiveness for big game is thought to decrease, in several subwatershed areas (6th-level Hydrologic Unit Code) of the Forest. The subwatersheds with the greatest road density per square mile of habitat are located in the southern and central Cedar City

Ranger District (ten out of about forty subwatersheds with greater than three miles of road per square mile of habitat) and in the southern Powell Ranger District (four out of about thirty five subwatersheds with greater than three miles of road per square mile of habitat). One subwatershed on the Escalante Ranger District (Clay Creek 160300020401) is also above the threshold. These relatively densely roaded areas overlap areas of mule deer (Cedar City, Powell Ranger Districts) and elk (Escalante Ranger District) winter range as well as mule deer summer range (Cedar City, Powell Ranger Districts).

SUMMER AND WINTER RANGES

Winter range for deer and elk on the Dixie National Forest covers approximately 178,000 acres, mainly on the Escalante and Powell Ranger Districts (Table 6.4-8; Figure 6.4-3). Summer range for deer and elk covers almost 426,000 acres and occurs on the Pine Valley (35%), Cedar City (25%), Powell (35%), and Escalante Ranger Districts (5%; Table 6.4-8; Figure 6.4-3).

ROCKY MOUNTAIN ELK

Elk are migratory ungulates that formerly ranged over much of North America. In general, elk require mature, semi-open stands of deciduous and conifer forest, and dense brush understory for feeding, escape, and thermal cover. Elk habitat also includes foothills, plains, valleys, mountain meadows in summer, and travel corridors, although some elk herds do not migrate. In general, elk prefer to live within one half mile of a water source (UDWR 2005). Elk are herbivorous, grazing and browsing in herbaceous and brush stages of forests as well as open areas such as meadows, open parklands, and riparian areas. Major predators of elk include humans, mountain lions, and coyotes. Competition for food may occur with domestic livestock, wild horses, and mule deer (Rodriguez 2004a).

Seasonal movements and calving areas: Elk usually migrate from high mountain meadows to lower elevations when snow cover increases and food becomes less available, seeking out areas within river bottoms and canyons, and lower mountain meadows. Migration between seasonal ranges generally occurs along well-established routes (USDA 1995e:23). Calving occurs in areas with available water and brushy vegetation that provides dense cover near openings and seclusion from human disturbance. Elk calving areas occur on 533,429 acres, mainly within the Cedar City (54%) and Powell (42%) Ranger Districts (Table 6.4-8). Elk calving occurs from April to June, often in aspen groves, during which time elk are sensitive to human activities. Elk have specific habitat needs for calving, and calving areas are slightly more sensitive than deer fawning areas (USDA 1995e).

UDWR population objectives: Elk herds have increased dramatically in Utah over the past 30 years, although in the past 10 years elk herds have been relatively stable (UDWR 2005). Elk habitat occurs across the entire Dixie National Forest and elk are well distributed. The six herd units on the Dixie National Forest are healthy and close to objectives (USDA 2006b), although population numbers were slightly lower in 2006 than in previous years (UDWR 2006). Elk herds are monitored on hunt units within all four Ranger Districts by UDWR. Populations that are above objectives are managed by hunting (USDA 2004c).

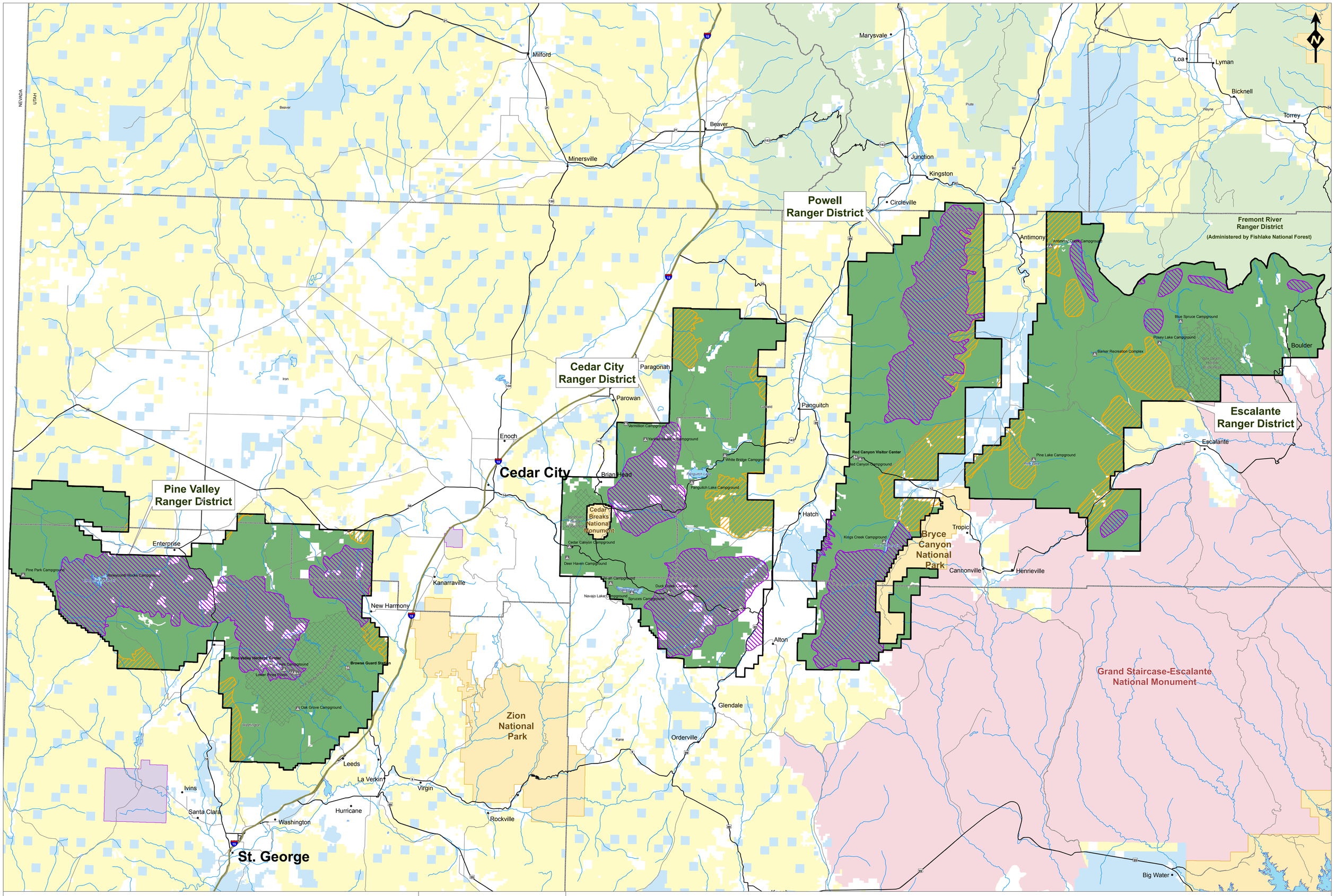
MULE DEER

Mule deer are adaptable ungulates that occur in wide variety of habitats. Mule deer occur in early- to intermediate-staged coniferous forests, desert shrublands, chaparral, and grasslands, preferring habitats with a mosaic of vegetation stages that provide cover, open areas, and water (Rodriguez 2004a). Mule deer habitat is nearly always characterized by areas of thick brush or trees interspersed with small openings (UDWR 2003). Mule deer are herbivorous, grazing and browsing on new growth of shrubs, forbs, some grasses, and salt or mineral licks. Major predators of mule deer include humans, mountain lions, and coyotes. Competition for food may occur with domestic

livestock, wild horses, wild pigs, and black bears (Rodriguez 2004a).

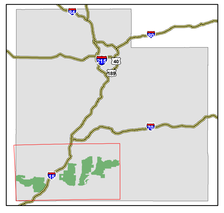
Seasonal movements and fawning areas: Mule deer often migrate from lower to higher elevations in spring and summer where water and forage are more available. In winter, mule deer concentrate at lower elevations. Migration between seasonal ranges generally occurs along well-established routes (USDA 1995e:23). Fawning occurs in moderately dense shrublands and forests, dense herbaceous stands, and high-elevation riparian and mountain shrub habitats with available water and forage. Fawn production is closely tied to the abundance of succulent, green forage during spring and summer months (UDWR 2003). Deer fawning areas occur on all Ranger Districts of the Dixie National Forest and cover 82% (1,401,429 acres) of its area (Table 6.4-8). Mule deer fawning on the Dixie National Forest occurs during spring and summer, between 16 May and 1 July, during which time mule deer are sensitive to human activities and disturbance.

UDWR population objectives: Mule deer are the most important game animal in Utah (see Specialist Report 3.0, Recreation). Mule deer populations have been declining for the past 30 years, due mainly to loss and degradation of habitat (UDWR 2003). Mule deer habitat occurs across the entire Dixie National Forest and mule deer are well distributed. Populations have increased in all six management units on the Dixie National Forest as of 2006 (USDA 2006b; UDWR 2006). As for elk, mule deer herds are monitored (populations estimated) on all four Ranger Districts by the Division of Wildlife Resources and managed by hunting (USDA 2004c).



Oil & Gas Leasing EIS on Lands Administered by the Dixie National Forest

FIGURE 6.4-3
Big Game Summer & Winter Range



Legend

- Cities

Forest Sites

- Campgrounds
- Visitor Centers
- Interstates
- Highways
- Minor Roads (1)
- Major Streams & Rivers
- Water Bodies
- County Boundaries
- State Boundaries

National Forest System Lands

- Dixie National Forest
- Wilderness Areas
- Fishlake National Forest

Other Land Administration

- Bureau of Land Management
- GSENM (2)
- National Park Service
- Private
- State of Utah
- Tribal

Mule Deer & Rocky Mountain Elk

- Crucial Summer Range
- Crucial/Substantial Winter Range

Miles: 0 2.5 5 7.5 10

Original data was compiled from multiple source data and may not meet the U.S. National Mapping Accuracy Standard of the Office of Management and Budget. For specific dates and/or additional digital information, contact the Forest Supervisor, Dixie National Forest, Cedar City, Utah. This map has no warranties to its contents or accuracy.

(1) Not all roads are shown. Only some roads are depicted for orientation purposes.
(2) Grand Staircase-Escalanted National Monument. Managed by the Bureau of Land Management.

Horizontal Datum = NAD 83 Coordinate System = Zone 12N	1:220,000	27 February 2008

6.4.2.4 Birds

NORTHERN GOSHAWK

Northern goshawks occur throughout the Dixie National Forest and are discussed in Section 6.4.1.

WILD TURKEY

Wild turkeys are large game birds that use distinct habitats during different periods of the year. Preferred winter habitat contains at least 50% mature forest, either ponderosa pine or cottonwood, depending on the subspecies (Merriam's and Rio Grande, both found in southern Utah). Summer and fall habitats consist of mowed hay fields, grazed pastures, glades, or open woods. Nesting habitat is varied, but hens usually nest near the edges of old fields, along trails, in hay fields, or in patches of briar or similar vegetation, and close to a source of permanent water. Nests are frequently abandoned if disturbed (Rodriguez 2004a).

Large areas of high value habitat for Merriam's turkey exist in the Pine Mountain Wilderness Area, in the southwest corner of the Powell Ranger District, and in the southwest portion of the Cedar City Ranger District. Critical habitat covers most of the central portion of the Escalante Ranger District. The southwest corner of the Cedar City Ranger District also is included in a larger critical nesting area. Critical habitat for the Rio Grande subspecies is located off the Dixie National Forest between the Escalante and Powell Ranger Districts and all across the Pine Valley Ranger District (USDA 1995e:25). Wild turkeys occur on all four Ranger Districts of the Dixie National Forest. Numbers of both subspecies are either stable or have increased over the past 10 years. The UDWR manages wild turkey populations on the Dixie National Forest (USDA 2004a).

NORTHERN FLICKER

Northern flicker is a migratory woodpecker that excavates its nest in dead tree trunks, dead parts of live trees, or in telephone poles. Northern flickers have been found in a variety of habitats, including wooded areas with stands of dead trees, open areas, forest edges, clear-cuts, burns, agricultural lands, and residential areas. Flickers feed mainly on ants, but will consume a variety of other insects. This species migrates to the southern part of its range in the US and to northern Mexico for winter, and has also been found on Grand Cayman, Cuba, and the Nicaraguan highlands (Rodriguez 2004a). Northern flickers occur on all four Ranger Districts of the Dixie National Forest. Approximately 112 line transects were surveyed in 2003, locating 287 northern flickers. In 2004, 110 line transects were surveyed, locating 329 flickers. The end of a 5-year drought may have contributed to the flicker population increase in 2004 (USDA 2004c). In 2005, 211 flickers were detected (USDA 2005) and in 2006, 430 were detected (USDA 2006b).

6.4.3 Pine Valley Ranger District

Rainbow trout, brook trout, and brown trout have been introduced onto the Ranger District as sport fisheries. Bonneville cutthroat trout were discovered in 1973 in two tributaries to the Santa Clara River: Water Canyon and Reservoir Canyon creeks (USFWS 2001), and since their discovery, fish from these two creeks have been used to establish populations in eight other Pine Valley Mountain streams (listed in Table 6.4-9). Area populations are stream residents with good recruitment and considered “conservation populations,” meaning no risk of hybridization with other salmonids and limited disease risk. While most populations are isolated, there is connectivity between Leeds Creek, Horse Creek, Pig Creek, and Spirit Creek; as well as between South Ash Creek, Harmon Creek, and Mill Creek (USFWS 2001). Leap Creek, Mill Creek, Harmon Creek, and South Ash Creek are recovering from the 2002 Sequoia Fire and occupied mileage is known to be less than indicated in Table 6.4-9 (thus for these streams occupied length represents available habitat).

Table 6.4-9 Streams on the Pine Valley Ranger District with Bonneville cutthroat trout. Stream miles based on GIS data provided by the Dixie National Forest; fish per mile obtained from USFWS (2001).

Stream	Occupied Stream Length (mi)	Fish/mi
Leeds Creek	7.1	158
Horse Creek	0.9	NA
Pig Creek	1.3	143
Spirit Creek	2.7	162
South Ash Creek	2.6	117
Harmon Creek	2.7	108
Mill Creek	2.9	157
Leap Creek	1.5	81
Reservoir Canyon	2.9	339
Water Canyon	2.2	73

Sensitive wildlife found on the Pine Valley Ranger District include Townsend's big-eared bat, bald eagle (wintering), flammulated owl, and northern goshawk. This Ranger District contains large areas of sensitive plant species occurrences and habitat primarily in the eastern region of the Ranger District, the Pine Valley Mountains, and the Pine Valley Mountain Wilderness Area. Additional smaller areas of sensitive plant species habitat occur north, west, and south of the Pine Valley Mountains (Figure 6.4-2).

6.4.4 Cedar City Ranger District

Rainbow trout and brown trout form the base of a popular recreational fishery in several streams and reservoirs on the Cedar City Ranger District, including Duck Creek, Panguitch Lake, and Navajo Lake. Conservation populations of Bonneville cutthroat trout exist within the Threemile Creek drainage on the east side of the Ranger District near Panguitch: occupied streams included Threemile Creek (3.4 occupied stream miles), Delong Creek (3.4 occupied stream miles), and Indian Hollow (1.7 occupied stream miles).

Sensitive wildlife found on the Cedar City Ranger District include Townsend's big-eared bat, spotted bat, bald eagle (mainly during winter, and during summer on Panguitch Lake), peregrine falcon, northern goshawk, sage grouse (leks and habitat), and flammulated owl. This Ranger District contains large areas of sensitive plant species occurrences and habitat: a narrow border exists along the edge of the Markagunt Plateau along the southern edge of the Ranger District and includes a small region of the Ashdown Gorge Wilderness Area, and in the northern region of the Ranger District, another area of potential habitat exists around Twin Peaks (Figure 6.4-2).

6.4.5 Powell Ranger District

Non-native fish on the Powell Ranger District include rainbow trout, brook trout, cutthroat trout, and brown trout. Tropic reservoir on the East Fork Sevier River supports a popular recreational fishery for rainbow trout. Prior to the Sanford Fire, two known conservation populations for Bonneville cutthroat trout existed on the Ranger District: one in Left Fork Sanford Creek and one in Deep Creek (6 miles of occupied habitat in Deep Creek prior to the Sanford Fire; USFWS 2001). The fire extirpated populations in both creeks. In 2006, UDWR stocked 40-50 Bonneville cutthroat trout in Deep Creek at the Dixie National Forest boundary, which have since begun to move into suitable habitat on the Dixie National Forest (Deep Creek = 0.8 occupied stream miles). While both creeks continue to recover, fish habitat inventories in 2004 indicate that cutthroat habitat is still in poor condition.

Sensitive wildlife on the Powell Ranger District include bald eagle (wintering), peregrine falcon, northern goshawk, sage grouse (leks and habitat), and flammulated owl. Sensitive plant species occurrences and habitat are throughout the southern half of this Ranger District along the Paunsaugunt Plateau (Figure 6.4-2).

6.4.6 Escalante Ranger District

Non-native fish, including rainbow trout, brown trout, brook trout, and tiger trout have been introduced and presently constitute popular recreational fisheries in the Escalante Ranger District. High mountain lakes on Boulder Mountain are a popular recreation fishery for brook trout. Three known populations of Bonneville cutthroat trout exist: in Center Creek (4.8 occupied stream miles), Ranch Creek (2.9 occupied stream miles), and Rob's Reservoir (2 acres).

There are eight populations of Colorado River cutthroat trout in streams located entirely on the Escalante Ranger District (Table 6.4-6) as recognized by Hirsch et al. (2005). All populations are in streams that drain into the Escalante River System. Four other populations occur in lakes or reservoirs, including Dougherty Lake (2.75 acres), Tall Four Reservoir (0.7 acres), Long Willow Bottom Reservoir (2.9 acres), and Round Willow Bottom Reservoir (7.1 acres). The latter two Reservoirs are also stocked with hybrid sport fish (see Specialist Report 4.0). Bonneville cutthroat trout are present in Center Creek and Ranch Creek.

Table 6.4-10. Streams and reservoirs on the Escalante Ranger District with Colorado River cutthroat trout. Stream miles based on GIS data provided by the Dixie National Forest; fish per mile and habitat quality data obtained from Hirsch et al. 2005.

Stream/Reservoir	Occupied Habitat mi (acres)	Habitat	Fish/mi
Water Canyon	2.8	Poor	50-150
White Creek	1.6	Good	151-400
Twitchell Creek	2.4	Good	50-150
Dougherty Basin Inlet	0.3	Good	NA
Pine Creek	7.6	Excellent	> 400
West Branch Pine Creek	1.5	Excellent	151-400
East Fork Boulder Creek	4.4	Good	> 400
West Fork Boulder Creek	5.6	Excellent	> 400

Sensitive wildlife that can be found on the Escalante Ranger District include bald eagle (wintering), northern goshawk, sage grouse (leks and habitat), and flammulated owl. This Ranger District contains relatively large areas of sensitive plant species occurrences and habitat. In the southwestern region of the Escalante Mountains, habitat occurs primarily along the western side, while in the northwestern region, habitat occurs along the Aquarius Plateau. Habitat also occurs in most of the eastern region of this Ranger District, which contains the Boulder Mountains and the Box Death Hollow Wilderness Area (Figure 6.4-2).

6.5 Impact Analysis

This section describes the changes to the human environment that could occur as a result of implementing the Alternatives outlined in Chapter 2. Changes to the human environment are described using the terms "effect" and "impact," which are synonymous under the National Environmental Policy Act (NEPA). Effects may be direct, indirect, or cumulative in nature.

- Direct effects occur at the same time and place as the action.
- Indirect effects are reasonable foreseeable effects that occur later in time or are removed in

distance from the action.

- Cumulative effects are those impacts to the environment that result from the incremental impacts of an alternative when added to other past, present, and reasonably foreseeable future actions.

In this Specialist Report, the direct and indirect effects of an action are discussed in combination for the affected resource components in Section 6.5.4. Cumulative effects are described by alternative in Section 6.5.5.

NEPA requires that effects in an EIS be discussed in terms of context and intensity. In this Specialist Report, context refers to the location, type, or size of the area to be affected relative to each resource component. Intensity refers to the severity or level of magnitude of impact. In this Specialist Report, the intensity of effects are defined as Major, Moderate, Minor, or Negligible. In addition, the duration of effects can be temporary, short term, or long term. These terms are described more specifically in Table 6.5-1.

Table 6.5-1 Summary of Terms used to Describe Effects in the Specialist Report.

Attribute of Effect		Description
Quality	Beneficial	An improvement of current conditions.
	Adverse	A degradation of current conditions.
Magnitude (Intensity)	Negligible	No measurable change in current conditions.
	Minor	A small, but measurable change in current conditions.
	Moderate	A moderate, measurable change in current conditions.
	Major	A big, easily measurable change in current conditions.
Duration	Temporary	Short-lived (i.e., during construction).
	Short-term	10 years or less.
	Long-term	More than 10 years.

6.5.1 Connected Actions

The Alternatives described in Chapter 2 do not authorize surface disturbance. Therefore, environmental impacts in this Specialist Report are analyzed as connected actions. Connected actions are defined by the Council on Environmental Quality (CEQ 1508.25) as actions that: 1) automatically trigger other actions which may require environmental impact statements; 2) cannot or will not proceed unless other actions are taken previously or simultaneously, and; 3) are interdependent parts of a larger action and depend on the larger action for their justification. Forest Service regulations (36 CFR 228.102(c)(4)) require the Forest Service to consider the subsequent actions that would be authorized by a lease as connected actions. Connected actions are the basis of the environmental analysis from which leasing decisions would be made. In this Specialist Report, connected actions are the predicted disturbance from oil and gas leasing activity, which is discussed in Chapter 2 of the EIS.

6.5.2 Issue Statement

Post-leasing activities could impact Forest Sensitive and Management Indicator (MIS) species and their habitats.

Construction and operation of oil and gas facilities such as power lines, drill pads, drill rigs, roads, and production facilities could impact Forest sensitive plant species both through direct loss of habitat and through indirect loss of habitat due to disturbance. See Specialist Report 4.0 for a

description of how oil and gas leasing can affect terrestrial and aquatic wildlife.

Construction and operation, including human presence and transportation, of oil and gas facilities such as power lines, drill pads, drill rigs, roads, and production facilities could negatively impact wildlife both through direct loss of habitat and through indirect loss of habitat due to disturbance. Key terrestrial habitat areas are often a small percentage of the larger area, but are important to a significant portion of a species' population during some life stage. Impacts, both direct and indirect, to these key habitats could impact a large number of animals. Species affected likely include elk and mule deer winter ranges, some fawning and calving areas and rutting areas, sage-grouse leks and brooding areas, and northern goshawk nesting territories.

All of the perennial water bodies on the Dixie National Forest have populations of fish and aquatic wildlife. Many of these systems have populations of native, forest sensitive, and sport fish populations. Additionally, since water is such a limiting factor in the arid southwest, all of the water bodies are a critical ecosystem component. Construction and operation of oil and gas facilities within and adjacent to water bodies (streams, lakes, and reservoirs), riparian areas, and wetlands could have negative impacts on aquatic species due direct habitat loss, increased sediment, and introduction of other pollutants. Sedimentation and other contaminants could occur from the construction, widening, and use of roads, pads, and other facilities, as well as clearing of vegetation. Species that may be impacted include aquatic invertebrates, Bonneville cutthroat trout, Colorado River cutthroat trout, sport fish, and native non-game fishes.

6.5.3 Indicators

In this Specialist Report, effects will be described using indicators developed for each resource. Using the environmental conditions described in Section 6.1 as a baseline, indicators are used to predict or measure change in a resource related to effects of the Alternatives. Some indicators are quantitative and measure effects based on numerical thresholds, while other indicators involve a narrative to qualitatively describe any changes relevant to baseline conditions.

<u>Measurement indicators</u>

- Acres of direct disturbance of habitat and indirect habitat loss as compared to available
- Narrative discussion on potential effects related to fragmentation of existing habitats and populations.
- Number of visits and noise levels
- Road density by subwatershed (6th Level HUC)
- Increase in invasive plants
- Impacts determinations from BE (changes in viability).
- Compliance with UDWR population objectives
- Compliance with the fisheries classification system employed by the State of Utah for streams.
- Compliance with LRMP Standards and Guidelines for MIS.

6.5.4 Direct and Indirect Effects

Under Alternatives B, C, D, and E, it is assumed that activities described under the Reasonable Foreseeable Development Scenario (RFDS) would occur. Activities described under the RFDS include 60-120 acres (depending on Ranger District) of overland travel associated with seismic surveys, 80-330 acres (depending on Ranger District) of land clearing surface disturbance associated with road and pad building for exploration wells, and 254 acres of land clearing surface disturbance for a production field. The locations of these activities are not yet known. Specialist Report 4.0 contains a discussion of general impacts to wildlife and fisheries related to oil and gas

activities (i.e., seismic, exploration, road building, and production). As for all wildlife, impacts to Sensitive species and MIS associated with oil and gas generally include a direct loss of habitat in addition to behavioral avoidance of a larger area around the direct disturbance, due to human presence and noise. Continuous noise disturbances, such as from drilling or constant traffic, would create a larger avoidance zone than would noise created by seismic surveys, which involve short blasts. A Biological Evaluation would be completed at the time operations are proposed; this document would disclose all potential impacts to Sensitive species. Compliance with the LRMP in terms of potential impacts to MIS are discussed in Section 6.7, and with regard to *Measurement Indicator #8* in Section 6.5.4.2.

Table 6.5-2 lists the leasing options by resource component, for each alternative. Leasing options are described in Section 6.5.4.1.

Table 6.5-2 Leasing options by alternative for Sensitive species or MIS.

Resource	Leasing options under each alternative				
	A	B	C	D	E
Sensitive species habitat, (includes areas not mapped)	NL	NSO	CSU	CSU	SLT
Sensitive trout habitat (5,383* acres)	NL	NL 500 ft	NSO 300 ft	CSU 300 ft	SLT
Pygmy rabbit habitat (60,752 acres)	NL	NSO	CSU	CSU	SLT
Sensitive bat habitat (2,461 acres)	NL	NSO	CSU	CSU	SLT
Goshawk nest areas (63,013 acres)	NL	NSO 0.5-mile radius	NSO 0.5-mile radius	CSU 0.3-mile radius	SLT
Goshawk PFAs (84,406 acres)	NL	CSU	CSU	CSU	SLT
Sage grouse leks (9,365 acres)	NL	NL	NSO	NSO	SLT
Sage grouse brooding habitat (57,105 acres)	NL	NL	CSU	TL May 1 – July 15	SLT
Peregrine falcon nests (4,836 acres)	NL	NSO	NSO	CSU	SLT
Peregrine falcon rim habitat (451,759 acres)	NL	CSU	CSU	TL Feb 1 – Aug 31	SLT
Bald eagle winter concentration areas (13,947 acres)	NL	NSO	NSO	CSU	SLT
Flammulated owl habitat (436,860 acres)	NL	NSO	CSU	CSU	SLT
TESP plant habitat (127,720 acres)	NL	NSO	CSU	LN	SLT
Elk and mule deer winter (177,713 acres)	NL	NL	CSU	TL Dec 1 – April 15	SLT
Elk and mule deer summer (425,949 acres)	NL	NL	TL May 15 – July 5	TL May 15 – July 5	SLT

* Includes a 300-foot buffer; total acres under Alternative B (500-ft buffer) = 8,869.

6.5.4.1 Impacts by Leasing Options

Leasing options would dictate the conditions under which impacts from connected actions (described in the RFDS) may occur. Impacts from connected actions under each leasing option are

discussed in this section; impacts under SLT are described more extensively in Section 6.5.4.2. Impacts to MIS and Sensitive species considering leasing option overlaps (i.e., overlaps with more restrictive leasing options assigned to other resources) are discussed in Section 6.5.4.3 (Impacts by Alternative).

NOT AVAILABLE (NA)

NA applies to lands that are not administratively available for leasing, including Wilderness Areas and Brian Head Ski Resort. No oil and gas leasing is being considered in these areas and no disturbance to Sensitive species or MIS in these areas would occur. This leasing option does not apply directly to any Sensitive/MIS resource component.

NO LEASE (NL)

NL applies to lands where no new leases would be authorized. No disturbance to Sensitive species or MIS would occur under NL. Under Alternative A, NL would apply to all Sensitive species and MIS with assigned leasing options (listed in Table 6.5-2). NL would also apply to Sensitive fish habitat, sage grouse leks, sage grouse brooding habitat, and big game summer and winter range under Alternative B. Because no leases would be authorized under NL, there would be no disturbance related to oil and gas activities and thus no direct or indirect impacts to any MIS or Sensitive species' habitat covered by this leasing option.

NO SURFACE OCCUPANCY (NSO)

NSO would prohibit occupancy of the land for oil and gas related activities (e.g., construction of well pads, central tank batteries, access roads, pipelines, power lines, and other linear structures). Excluding those related to seismic activities, no disturbance to Sensitive species or MIS from exploratory or production activities would occur under NSO.

NSO would apply directly to sensitive trout habitat; sensitive bat habitat, goshawk nest areas, sage grouse leks, peregrine falcon nests, bald eagle winter concentration areas, and TESP plant habitat under at least one alternative (see Table 6.5-2). Impacts under NSO with regard to applicable measurement indicators are described in Table 6.5-3. *Measurement Indicator #1* (habitat loss) is discussed for all species; *Measurement Indicator #2* (fragmentation of habitat) is discussed only for sensitive trout and sage grouse because their movements are most likely to be impeded by structures on the ground; and *Measurement Indicator #3* (number of visits and noise levels) is discussed for pygmy rabbit habitat, sage grouse leks, and raptors. *Measurement Indicator #4* (invasive plants) is discussed for sensitive trout, pygmy rabbit, and sage grouse.

Table 6.5-3 Impacts under NSO with regard to *Measurement Indicators*. NA = Not Applicable.

RESOURCE COMPONENT	*MI #1 Habitat loss*	*MI #2 Fragmentation*	*MI #3 Noise*	*MI #4 Invasive plants*
Sensitive trout habitat	Seismic activities would not remove stream habitat (stream crossings not allowed*) and a riparian buffer would be in place. Impacts negligible.	Seismic activities would not fragment stream habitat (stream crossings not allowed.)* Impacts negligible.	NA	Seismic activities may introduce invasive plants that would degrade the aquatic habitat (see CSU). Indirect impacts would be long term and moderate because populations could be affected, as described for CSU (below).
Pygmy rabbit habitat	Seismic activities could remove 60-120 acres of habitat (0-1% of	NA	Seismic blast impacts would be temporary and minor because	Invasive plants may spread via seismic activities; impacts could be long term (see CSU).

	available). Impacts short term and negligible to minor due to the small area of disturbance relative to available habitat.		pygmy rabbits would be unlikely to abandon their burrows. Reproductive rates would not be affected.	Impacts would be moderate because reproduction could be affected by this level of habitat change.
Sensitive bat habitat	Seismic activities could remove 60-120 acres of habitat (9-40% of available). Impacts minor and short term because impacts would most likely be to foraging habitat and would affect only some individuals.	NA	Seismic blast impacts may disturb many individual bats but not populations and would not affect reproduction because noises would be temporary. Impacts to bats would be minor.	NA
Sage grouse leks	Seismic activities could remove 60-120 acres of habitat (2-40% of available). Impacts short term and minor to moderate to major due to the limited amount of lek habitat available and the value of this habitat to sage grouse.	NA	A TL would be in place during the breeding season within a one-mile radius of leks, so no noise impacts would occur. Impacts negligible.	Invasive plants may spread via seismic activities; impacts could be long term (see TL). Impacts would be minor because reproduction would probably not be affected.
Goshawk nest areas	Seismic activities could remove 60-120 acres of habitat (0-4% of available). Impacts negligible to minor due to the small area of disturbance relative to available habitat.	NA	Seismic blasts may cause temporary impacts in which raptors may be displaced but would return to the nest or roost following the blast. Impacts to roosting raptors would be negligible to minor, because individuals would be temporarily affected. Impacts to nesting raptors would be short term and moderate because reproduction would	NA
Peregrine falcon nests	Seismic activities could remove 60-120 acres of habitat (4-6% of available). Impacts negligible to	NA		NA

	minor due to the small area of disturbance relative to available habitat.		be affected for one season.	
Bald eagle wintering habitat	Seismic activities could remove 60-120 acres of habitat (2-7% of available). Impacts negligible to minor due to the small area of disturbance relative to available habitat.	NA		NA
Sensitive plant habitat and locations	Seismic activities could remove 60-120 acres of habitat (0-1% of available). Impacts negligible to minor due to the small area of disturbance relative to available habitat and the likelihood that sensitive plant populations could be avoided.	NA	NA	NA

*Under Alternative C, linear features (e.g., roads, pipelines) would be allowed as perpendicular stream crossing under NSO. Direct and indirect impacts to sensitive fish may occur during construction of stream crossings under this modified NSO; see Section 6.4.4.3.

TIMING LIMITATION (TL)

TL prohibits surface activities during specified time periods, and so would avoid direct and indirect impacts to Sensitive species and MIS during sensitive periods, such as on a seasonal habitat during the season of use. This stipulation does not apply to the operation and maintenance of production facilities unless the findings of analysis demonstrate the continued need for such mitigation, and that less stringent, project-specific mitigation measures would be insufficient.

Timing Limitations (see Table 6.5-2) would apply directly to sage grouse brooding habitat, peregrine falcon rim habitat, and big game winter and summer range. Impacts to these species under TL with regard to applicable measurement indicators are described in Table 6.5-4 and below. *Measurement Indicator #1* (habitat loss) and *Measurement Indicator #3* (noise) is discussed for all species; *Measurement Indicator #2* (fragmentation of habitat) is discussed for big game and sage grouse as their long-distance movements may be impeded by structures on the ground. *Measurement Indicators #5* and *#7* (Road Density and Compliance with UDWR population objectives) are discussed below with regard to big game.

Refer to Stipulation forms (Appendix 6A) for descriptions of the each TL.

Table 6.5-4 Impacts under a TL with regard to *Measurement Indicators*. NA = Not Applicable.

RESOURCE COMPONENT	*MI #1 Habitat loss*	*MI #2 Fragmentation*	*MI #3 Noise*
Sage grouse brood rearing habitat	Oil and gas activities outside the TL could disturb up to 7% of available habitat. Impacts short to long term, depending on the activity, and minor to moderate because reproduction could be affected by a reduced amount of suitable habitat.	Roads or linear disturbances constructed outside the TL period could fragment sage grouse brooding habitat by narrowing or blocking migration corridors; these impacts would be short to long term, depending on the activity, and moderate because the stress of taking an alternative (i.e., longer) route between seasonal ranges could impact a large number of individuals and thus affect the reproductive rate of the population.	Noise disturbances from oil and gas activities outside the TL would not disturb sage grouse during the brooding period. Impacts negligible to minor.
Peregrine falcon "rim" habitat	Oil and gas activities outside the TL could disturb up to 1% of available habitat. Impacts short to long term, depending on the activity, and negligible to minor due to to the relatively small amount of disturbance relative to the available habitat.	NA	Noise disturbances from oil and gas activities outside the TL would not disturb nesting birds. Impacts negligible to minor.
Big game winter range	Oil and gas activities outside the TL could disturb up to 2% of the winter range in any one Ranger District. Impacts short to long term, depending on the activity, and and minor due to the relatively small amount of disturbance relative to the available habitat.	NA	Noise disturbances from oil and gas activities outside the TL would not cause adverse effects. Impacts negligible.
Big game summer range	Oil and gas activities outside the TL could disturb up to 4% of the summer range in any one Ranger District. Impacts short to long term, depending on the activity, and and minor due to the relatively small amount of disturbance relative to the available habitat.	NA	Noise disturbances from oil and gas activities outside the TL would not cause adverse effects. Impacts negligible.

Sage grouse brood rearing habitat

- *Measurement Indicator #4* INCREASES IN INVASIVE PLANTS

Under NSO, seismic activities would be allowed, which could spread invasive plants due to their linear nature and the relatively long distances covered during these activities (see Specialist Report 10.0 - Vegetation). The spread of invasive plants would reduce the amount of functional habitat for sage grouse brood rearing because brome grasses could replace native sagebrush plants that provide effective food, shelter, and temporary cover for sage grouse. Impacts from the spread of invasive plants could be long term because the replacement of some sagebrush within sage grouse habitat would diminish the functionality of this habitat until the invasive species could be eradicated, which could take more than ten years. Impacts would be moderate or major because the reproductive rate of the population could be affected if individuals are not able to seek out remaining areas of suitable, native forage and cover or if alternate vegetation is not available.

Big game winter and summer range

- *Measurement Indicator #5* ROAD DENSITY INCREASES

A substantial increase in road density outside the TL period would have the same impacts as described under SLT (Section 6.4.4.2). If road density increased within a subwatershed with currently high road density, impacts could occur because habitat would be measurably less effective in providing a safe and isolated area for big game to move within. Impacts to big game from a road density increase could be moderate because if a road crossed a seasonal migration corridor and reduced the effectiveness of the habitat, a large number of individuals would be affected. The reproductive rate of the population could also be affected by a road density increase if the security of the population was compromised by the road and became less suitable as a fawning or calving area (see SLT, Section 6.4.4.2).

- Measurement Indicator #7 COMPLIANCE WITH UDWR POPULATION OBJECTIVES

Compliance with UDWR population objectives would be the same as described under SLT (Section 6.4.4.2). Impacts would be negligible because big game populations are currently above objectives and not at risk.

CONTROLLED SURFACE USE (CSU)

CSU provides for controlled but generally allowed surface use, including exploration and development, on all or portions of a lease. Operations would be held to special operational constraints that may otherwise exceed the mitigation provided by SLT, regulations, and operating orders. With regard to Sensitive species and MIS, CSU stipulations would ultimately allow Agencies (e.g., a Dixie National Forest biologist) to control where and when oil and gas activities occurred within a desired area/lease.

CSU stipulations would apply to sensitive trout habitat, pygmy rabbit habitat, sensitive bat habitat, goshawk nest areas, goshawk PFAs, sage grouse brooding habitat, peregrine falcon rim habitat, bald eagle winter concentration areas, flammulated owl habitat, TESP plant habitat, and big game winter range under at least one alternative (see Table 6.5-2). Impacts to these species under CSU with regard to applicable measurement indicators are described in Table 6.5-5 and below. Refer to Stipulation forms (Appendix 6A) for descriptions of each CSU.

Table 6.5-5 Impacts under CSU with regard to *Measurement Indicators*. NA = Not Applicable.

RESOURCE COMPONENT	*MI #1 Habitat loss*	*MI #2 Fragmentation*	*MI #3 Noise*
Sensitive trout habitat*	Impacts as under SLT (Section 6.5.4.2)	Impacts as under SLT (Section 6.5.4.2)	NA
Sensitive bat habitat	Oil and gas activities could disturb up to 100% of available habitat in some ranger districts. No disturbance would occur near cave entrances or winter hibernacula due to CSU; impacts short to long term depending on the activity and minor because only foraging habitat is likely to be lost, which would not affect the reproductive rate of populations.	NA	Noise disturbances to sensitive bats would not occur under CSU because activities in the vicinity of caves or hibernacula would be restricted. Impacts limited to those from seismic activities, which would be temporary and minor to moderate because reproduction could be affected.
Pygmy rabbit habitat	Under the CSU, colonies would be protected but up to 8% of available suitable habitat could be disturbed. Impacts short to long term depending on the activity and minor due to the relatively small amount of disturbance relative to the available habitat.	NA	Some noise disturbances to pygmy rabbits from oil and gas activities could occur because activities would be allowed; however, activities around colonies would be restricted under CSU and noise disturbances that do occur would be unlikely to cause pygmy rabbits to leave their burrows. Only some individuals may be affected by noise therefore impacts would be minor, and short to long term depending on the activity.
Sage grouse brood rearing habitat	Under the CSU, less than 1% of available habitat could be disturbed outside of the TL. Impacts short to long term depending on the activity and minor due to the relatively small amount of disturbance relative to the available habitat.	Because less habitat could be disturbed under the CSU, fragmentation impacts would be of lower intensity than under SLT (Section 6.5.4.2). Impacts minor and short to long term depending on the activity.	Under the CSU, oil and gas activities would be restricted during the brooding period. Noise disturbances from oil and gas activities outside this TL (see Appendix 6A) would not disturb sage grouse during the brooding period. Impacts negligible.

Raptor habitat	Goshawk nest areas	Impacts in terms of habitat loss would be as described under SLT (Section 6.5.4.2).	NA	Noise disturbances outside the TL that is part of CSU for these resource components would not disturb nesting birds. Disturbance to nesting birds would be negligible.
	Goshawk PFAs			
	Peregrine falcon “rim”			
	Bald eagle (winter)			
	Flammulated owl			
Sensitive plant habitat and locations		Under the CSU, plant populations essential to the persistence of the species would likely be avoided. Impacts would be minor to moderate and long term because some individual plants may still be disturbed by oil and gas activities and small populations could be affected.	NA	NA
Big game winter range		Under the CSU, less than 2,500 acres could be disturbed by oil and gas activities (which include a 0.25-mile radius around actual disturbance) outside of the TL. Impacts short to long term depending on the activity and negligible to minor due to the relatively small amount of disturbance relative to the available habitat.	NA	Noise disturbances outside the TL that is part of CSU for this resource component would not disturb big game during winter. Impacts negligible.

Sensitive trout habitat

- *Measurement Indicator #4* INCREASES IN INVASIVE PLANTS

In some riparian areas, tamarisk (*Tamarix ramoissima*), whitetop (*Cardaria draba)*, and Russian olive (*Elaeagnus angustifolia*) are replacing native riparian vegetation such as willows (*Salix* spp.) and cottonwoods (*Populus* spp.). Invasive grasses and species such as rabbitbrush also replace native vegetation and create fewer shaded areas and less stable banks. As a result, higher water temperatures and higher rates of sedimentation characterize the invaded habitat, both of which make habitat less suitable for sensitive trout species that require cold, clear water to spawn. Indirect impacts from the spread of invasive species would be long term and major, because populations of sensitive trout would be affected by a degradation of aquatic habitat. Impacts under CSU would be of this magnitude because seismic activities are allowed (as under NSO) and have the greatest potential to spread invasive species (see Specialist Report 10.0). Adverse impacts from the spread

of invasive plants in aquatic habitat could be long term because the functionality of this habitat would be diminished until the invasive species could be eradicated, which could take more than ten years.

Sage grouse brood rearing and pygmy rabbit habitats

- *Measurement Indicator #4* INCREASES IN INVASIVE PLANTS

Under CSU, oil and gas activities could spread noxious weeds outside of the sensitive period for controlled surface use. As under TL for sage grouse, the spread of invasive plants would reduce the amount of functional sagebrush habitat used by these species. Impacts from the spread of invasive plants within either sage grouse or pygmy rabbit habitat would be minor to moderate and long term for reasons described under NSO (for sage grouse).

Big game winter range

- *Measurement Indicator #5* ROAD DENSITY INCREASES

A substantial increase in road density could still occur under CSU and would have the same impacts as described under SLT (Section 6.4.4.2) and TL (above): minor to moderate and long term.

- Measurement Indicator #7 COMPLIANCE WITH UDWR POPULATION OBJECTIVES

Compliance with UDWR population objectives would be the same as described under SLT (Section 6.4.4.2) and for TL (above): negligible.

LEASE NOTICE (LN)

A lease notice provides more detailed information concerning existing limitations, regulations, or orders, or addresses special considerations. A LN does not impose new restrictions on oil and gas activities and would be attached to leases regardless of other leasing options.

Bald eagle winter concentration areas – A lease notice (LN) would be attached to any lease that occurred in the vicinity of winter concentration areas for bald eagle. This is the case for any lease within Dixie National Forest lands regardless of leasing options. The purpose of the LN in this case is to ensure compliance with and to notify the operator of the Bald and Golden Eagle Protection Act, which prohibits take (including disturbance) of bald eagles, and the Migratory Bird Treaty Act, which prohibits take of migratory birds, including raptors. The LN would list avoidance or minimization measures specific to bald eagle nests that may occur in the vicinity. In order to comply with the Bald and Golden Eagle Protection Act, surveys for bald eagles would be conducted in any area leased for oil and gas exploration that occurs within or near suitable bald eagle habitat. The Bald and Golden Eagle Protection Act prohibits take, possession, and commerce of bald and golden eagles, so to comply with the Act, oil and gas activities would not be allowed in the vicinity of active nests or concentration areas.

Migratory Birds – A lease notice would be attached to any lease within the nesting season for migratory birds. This is the case for any lease within Dixie National Forest lands regardless of leasing options. The purpose of the LN in this case is to ensure compliance with the Migratory Bird Treaty Act. The lease notice would notify the operator of the Migratory Bird Treaty Act, which prohibits take (including disturbance) of migratory birds. Direction from the USFWS regarding migratory birds on USFS lands, however, states that activities occurring within migratory bird habitats should “minimize direct take of individual migratory birds when feasible.” Since conservation of populations is emphasized, a low level of incidental take is assumed. The LN would list avoidance or minimization measures specific to migratory bird nests that may occur in the vicinity. Mitigations

would ultimately be determined by the Dixie National Forest biologist on a case-by-case basis if migratory bird nests are encountered.

STANDARD LEASE TERMS (SLT)

Under SLT, existing laws and regulations would be applied to oil and gas activities. According to the standard surface use requirements attached to any lease, SLT would allow operations to be moved up to 200 meters and be delayed for up to 60 days if the authorizing officer deems it necessary to protect a resource. These allowances could be used to avoid key terrestrial or aquatic habitat areas for Sensitive species or MIS. SLT would be governed by a number of Agency-approved documents and laws containing various operational constraints, including the most recent Onshore Oil and Gas Approval of Operations rules set forth by the USFS and standard constraints for all oil and gas operations dictated by the BLM on all lease applications (see Section 6.5.4.2).

All lease holders would be required to comply with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act under SLT (see Lease Notice). Under Alternative E, SLT would apply directly to all MIS and Sensitive species resource components as the default leasing option. Impacts to these species under SLT are discussed in Section 5.5.4.2.

In general, disturbance to Sensitive and MIS fish and wildlife habitats would be "minimized" under SLT, avoiding "unreasonable or unnecessary disturbances during construction of pads, access, and other facilities, and during operations." Disturbed terrestrial habitat would be reshaped and re-vegetated after use. Roads and drainage structures would be located to "minimize impacts on water quality," such as "on benches upslope from streams, lakes, ponds, riparian areas and floodplains" (USDA 2007b). A Spill Prevention Control and Countermeasures Plan would be approved before operations are authorized, and sediment control structures would be used at the base of fill slopes. Regarding potential noise disturbances to wildlife, operators would be required to "centralize production facilities, use telemetry to monitor wells, and delay non-essential maintenance activities in important wildlife habitat during critical seasons of use to reduce the number of vehicle trips to the sites and activity that could disturb or stress wildlife." In addition, all vehicles and other gasoline or diesel-powered equipment must be equipped with properly functioning mufflers (Appendix 6B).

Agencies will ultimately have a central role in determining where and under what conditions oil and gas activities may occur under SLT, and due to the mandates inherent in their missions to protect natural resources, including obeying all applicable laws, would generally not allow oil and gas activities to adversely impact important natural resources.

6.5.4.2 Impacts of Connected Actions Under SLT

The impacts of connected actions under the RFDS are discussed in this section as separate from leasing options. Leasing options would dictate the conditions under which the following impacts from connected actions may occur, and are discussed in relation to the connected action impacts in Section 6.5.4.3 (Impacts by Alternative). Impacts in this section are discussed assuming no restrictions or stipulations on oil and gas activities other that those listed on BLM form 3100-11 (SLT, BLM 2006) , the Gold Book (USDA and BLM 2007) and those documents referenced within, and the Dixie National Forest Oil and Gas Construction and Operating Standards and Well Site Design Requirements (Appendix 6B).

Acres of habitat disturbance, fragmentation effects, number of visits and noise levels, road density changes, increases in invasive plants, impacts determinations from the BE, compliance with UDWR population objectives, compliance with fisheries classification system, and compliance with MIS Guidelines (*Measurement Indicators #1, #2, #3, #4, #5, #6, #7, #8,* and *#9* respectively) will be discussed by species, as appropriate. Impacts from acres of habitat disturbance (*Measurement*

Indicator #1) are discussed with regard to all species. The amounts of habitat disturbance relative to available habitat of Sensitive species and MIS species (*Measurement Indicator #1*) are summarized in Table 6.5-6. Impacts determinations from the BE (*Measurement Indicator #5*) are listed with regard to all Sensitive species in Section 6.5.3 (see Table 6.5-11). Fragmentation effects (*Measurement Indicator #2*) are discussed only for sensitive fish and sage grouse. Invasive plant increases (*Measurement Indicator #4)* apply to pygmy rabbit, sage grouse, and Sensitive and MIS trout. Road density changes (*Measurement Indicator #5)* and compliance with UDWR population objectives (*Measurement Indicator #7)* are discussed under big game. Number of visits and noise levels (*Measurement Indicator #3)* are discussed for big game, raptors, pygmy rabbit, bats, and sage grouse. Compliance with State of Utah fisheries classification system (*Measurement Indicator #8)* applies only to sensitive fish and compliance with MIS Guidelines (*Measurement Indicator #9)* applies only to MIS.

Table 6.5-6 Percentage of disturbed habitat for sensitive species on the Dixie National Forest impacted by oil and gas activities over the 15 year period, assuming the greatest amount of predicted disturbance in the Ranger District occurred within each habitat.

Resource	Pine Valley	Cedar City	Powell	Escalante
Sensitive trout habitat	19%	100%	100%	27%
Pygmy rabbit habitat	3%	6%	3%	8%
Sensitive bat habitat	63%	100%	100%	82%
Elk and mule deer winter range	2%	2%	1%	1%
Elk and mule deer summer range	<1%	1%	<1%	4%
Goshawk nest areas (0.5-mile buffer)	27%	2%	4%	4%
Goshawk PFAs	18%	2%	3%	3%
Sage grouse leks (2-mile buffer)	--	13%	16%	100%
Sage grouse brooding habitat	--	5%	2%	7%
Peregrine falcon nests (0.5-mile buffer)	--	22%	34%	--
Peregrine falcon rim habitat	1%	1%	1%	<1%
Bald eagle winter concentration areas	11%	9%	40%	41%
Flammulated owl habitat	1%	<1%	1%	<1%
TESP plant habitat	4%	3%	2%	1%

CUTTHROAT TROUT

General impacts to fisheries resources are discussed in Specialist Report 4.0. Specific impacts to sensitive trout species are discussed below.

Under SLT, the ability to move operations by up to 200 meters should prevent most direct impacts to Colorado River and Bonneville cutthroat trout (sensitive trout). Habitat loss (*Measurement Indicator #1*) may occur by the construction of road crossings, by sedimentation inputs, or by other actions that cause adverse changes to water quality or habitat such that the aquatic habitat is no longer suitable. It is likely under SLT that roads crossings will have to be built on several streams, including streams with sensitive trout. Impacts from road crossings are described in Specialist Report 4.0. Given the preference of sensitive trout for high water quality, the impacts of these disturbances would be negligible to minor for short-term turbidity increases and moderate to major for any hazardous material spills (see Specialist Reports 4.0 and 5.0, and general water and watershed impacts in Specialist Reports 7.0 and 8.0).

Regarding sedimentation, pool depth can be reduced by increases in sediment delivery to streams or decreases in stream flow. In a study of cutthroat trout in Colorado and New Mexico, Harrig and Fausch (2002) found that the presence of large deep pools was one of the most important habitat

features. Further, Colorado River cutthroat trout in Wyoming are most associated with deep pools, particularly those formed by large woody debris (Young 1996). Sediment and reduced flows can also decrease the suitability of spawning gravels by limiting oxygen supply to developing eggs and increasing temperature. Overall, roads have the greatest potential to increase sediment levels in streams, with seismic exploration having the least potential. Although adherence to Best Management Practices (BMPs) should limit most impacts, impacts could still range from negligible to minor for small disturbances such as seismic activity and moderate to major for road development. Impacts to aquatic species from sedimentation in streams are analyzed as part of Specialist Report 4.0. Impacts to watershed from sedimentation in streams are analyzed as part of Specialist Report 8.0.

- Measurement Indicator #2 FRAGMENTATION OF HABITAT

Culverts and bridges can serve as migration barriers to upstream movement by sensitive trout. Fragmentation of watersheds reduces opportunities for mixing of genetic diversity, colonization of new habitat, access to areas that provide refuge for fish species in case of disturbances such as fire, and natural recolonization of populations following disturbance. While most culverts and bridges would be expected to be constructed to allow for fish passage, failure to do so could result in the decreased persistence of cutthroat trout populations. These impacts would be long term and could be major because the reproductive rate of populations would be affected if a substantial number of individuals were blocked from moving up- or downstream to spawn or seek out more suitable habitat.

- *Measurement Indicator #4* INCREASES IN INVASIVE PLANTS

Under SLT, the spread of invasive plants would be possible (particularly for seismic activities) in conjunction with any ground disturbance or overland travel associated with oil and gas development or production. Invasive plants would diminish the value of sensitive trout habitat due to raised water temperatures and increased sedimentation, as described under CSU (Section 6.5.4.1). Indirect impacts would be long term and could be moderate for sensitive trout.

- Measurement Indicator #8 STATE OF UTAH FISHERIES CLASSIFICATION SYSTEM

Oil and gas activities would not be expected to result in the reclassification of any streams containing Colorado River or Bonneville cutthroat trout.

PYGMY RABBIT

Direct impacts to pygmy rabbit are possible if occupied habitat (i.e., burrows and rabbits) were disturbed by oil and gas activities. Direct mortality impacts would be short to long term and minor to major depending on the number of individuals impacted.

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

Under SLT, a loss of unoccupied suitable habitat would occur if areas within mapped habitat for pygmy rabbit (50,000 acres) were disturbed. Direct impacts to pygmy rabbit from a loss of suitable habitat under SLT would be short term and minor, due to the amount of habitat remaining (>90%; Table 6.5-6), unless a production field was constructed in which case impacts would be long term and moderate to major.

- *Measurement Indicator #3* NUMBER OF VISITS AND NOISE LEVELS

Under SLT, site visits and noise from connected actions in the vicinity of burrows could interfere with rabbits' ability to detect predators and communicate. Noise from oil and gas activities would have population-level impacts if activities took place in a high-density area and many pygmy rabbits were exposed to predators or were forced into adjacent, less-suitable habitat. Population-level impacts under SLT would be moderate to major, and short to long term depending on the activity.

- *Measurement Indicator #4* INCREASES IN INVASIVE PLANTS

Under SLT, the spread of invasive plants would be possible (particularly for seismic activities) in conjunction with any ground disturbance or overland travel associated with oil and gas exploration or production. Invasive plants would decrease the amount of functional sagebrush habitat for pygmy rabbit, such as if brome grasses replaced native sage, because brome grasses are not as nutritious a forage plant and can not provide shelter or cover for pygmy rabbits. Adverse impacts from the spread of invasive plants in pygmy rabbit habitat could be long term because the the functionality of this habitat would be diminished until the invasive species could be eradicated, which could take more than ten years. Impacts would be minor because although many individuals would be forced to seek out remaining areas of native sagebrush, these impacts are not likely to affect reproductive rates or populations of pygmy rabbits because individuals would probably find alternate forage without a substantial loss of energy. The necessity of seeking out native plants for forage may eventually lead to the habitat no longer being suitable; these indirect impacts, if they occurred, would be moderate because populations and reproductive rates could be affected if many pygmy rabbits were forced to leave their burrows in search of more suitable habitat. Moderate impacts are unlikely but possible.

SENSITIVE BATS

Direct impacts to sensitive bats would occur if activities took place in close proximity to occupied cliffs or caves, such as in the Cedar City Ranger District. Disturbance to hibernacula inside caves would cause adverse impacts to bat populations (Rodriguez 2004a). See Specialist Report 9.0 (Soils) for a more detailed discussion regarding impacts to cave resources. Destruction of hibernacula in the Cedar City Ranger District would be long term and moderate to major because the reproductive rate of the population could be affected if bats were forced to abandon the site when energy levels are low.

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

Under SLT, a loss of suitable habitat would occur if areas within mapped habitat for sensitive bats (1,400 acres) were disturbed. Over 1,000 acres of additional mapped habitat occurs within Wilderness Areas (Pine Valley and Death Hollow) and would not be disturbed. Impacts to sensitive bat habitat would be moderate to major within the Cedar City or Powell Ranger Districts, because a smaller amount of habitat is available (Table 6.5-6) and some of the habitat is occupied, and minor elsewhere. Impacts would be short to long term depending on the activity.

- *Measurement Indicator #3* NUMBER OF VISITS AND NOISE LEVELS

Under SLT, noise disturbances from oil and gas activities could adversely affect sensitive bats if activities took place in the vicinity of active roosts or hibernacula. Noise disturbances could be moderate because a large number of individuals typically utilize a single roost or hibernacula site, and noise could cause a large number of individuals to abandon the area. Abandonment of a

suitable roost could have population-level impacts on the reproductive rate if a number of individuals do not find alternate suitable habitat and do not successfully reproduce. Population-level impacts resulting from noise would be moderate to major and short to long term depending on the activity.

BIG GAME (MIS)

Under SLT, impacts to mule deer and elk from oil and gas activities would occur as a result of habitat loss (*Management Indicator #1*), fragmentation (*Measurement Indicator #2*), number of visits and noise levels (*Measurement Indicator #3*), and road density increases (*Measurement Indicator #5*). Impacts would be more adverse if activities occurred within crucial/substantial value winter or summer ranges during the season of use.

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

Oil and gas activities that occurred within big game seasonal ranges during the season of use would force animals into smaller areas of habitat that may be less suitable than what was disturbed. Impacts on winter range during winter would have the most adverse impacts on big game because animals are most likely to be stressed during this period. When effective winter range sizes are reduced, increases in population density cause increased competition for forage and may reduce the likelihood of calf/fawn survival and general over-winter carrying capacity of the remaining winter range (WFGD 2004). Elk have been found to move up to two miles from disturbance on open winter range and avoid geophysical activities by moving to areas with more cover and also to return to disturbed areas after activities were completed (USDA 1995e). Deer are likely to react similarly to elk and avoid areas where activities are occurring.

In general, impacts from the loss of crucial and substantial winter and summer ranges would be proportional to the percentage of total habitat lost. Thus, disturbance from seismic and exploration drilling and other exploratory activities would be relatively small (Table 6.5-6) and impacts in terms of habitat loss would be minor. Because these activities would last less than ten years and habitats would be restored after use, impacts would be short term. Oil and gas development and production has a greater potential for habitat disturbance impacts because these activities would last for longer than ten years (i.e., long term) and would disturb more acres.

- *Measurement Indicator #3* NUMBER OF VISITS AND NOISE LEVELS

Avoidance and stress responses by wildlife extend the influence of each well pad, road, and facility up to a quarter mile radius for mule deer to more than a half mile for elk on open winter ranges (USDA 1995e). This increases the amount of habitat disturbed substantially beyond the actual footprints of oil and gas activities. It can reasonably be assumed that elk would be displaced at least 0.5 miles from disturbances and deer would be displaced at least 0.25 miles. When disturbed, elk will usually move to areas of dense cover away from roads and people (UDWR 2005). Displacement during blasting (seismic activities) would be temporary because big game would return to the area after completion of the activity. Displacement during exploration activities would be short term and would be most severe during drilling; these impacts would be minor because only individuals would likely be affected, returning to the site following the disturbance. Displacement during the initial stages of production would cause the most severe noise-related impacts. If such production activities occurred on crucial winter ranges during winter and a substantial number of individuals became stressed, impacts would be moderate because many individuals would be displaced from the largest possible area (of any oil and gas activity) and if most experience adverse reproductive effects, such noise disturbances could impact the population.

Elk with new calves and deer with new fawns are particularly sensitive to noise. Direct loss of calves and fawns could occur if substantial noise disturbance occurred during birthing periods (in the vicinity of mothers and calves or fawns) because displacement of mothers and calves/fawns into less favorable habitat could increase the likelihood of calf/fawn mortality from predation, accidents, or disease (USFS 1995e). Because the majority of the Dixie National Forest contains fawning habitat (total = 1,401,429 acres), displacement impacts to mule deer due to noise would be negligible to minor. Impacts to elk in the Escalante Ranger District would be relatively more severe because there is less suitable habitat; impacts to calves in this Ranger District could be moderate if a large number of calves do not survive due to noise and related human disturbance impacts, thus impacting the population. Noise impacts to calving and fawning areas under SLT would be of short term duration because high-level noise disturbances would not last for more than six months to a year (refer to Specialist Report 4.0).

- *Measurement Indicator #5* ROAD DENSITY INCREASES

Seismic operations, exploration wells, and new field development may all require new roads or upgrading of existing roads. Roads can both fragment habitat and put individual animals at higher mortality risk from increased collisions or hunting. Regarding fragmentation, any reduction in the ability of mule deer or elk to move about freely on winter ranges reduces their options for coping with a variety of environmental conditions (e.g., snow depth, wind, etc.) and human disturbances (see general discussion of fragmentation impacts to wildlife in Specialist Report 4.0). Flexibility in movement across ranges is ultimately reflected in the survival and productivity of the population, in that populations can regulate density, and this enhances their ability to recover from population declines (WFGD 2004). In addition to fragmentation impacts, new road construction into previously isolated areas has the potential to impact big game species because roads could create increased public access and traffic, which may lead to intentional or unintentional harassment, poaching, and increased harvest levels by legal hunting. In this way the security of the habitat is diminished. Road kills may also increase. Elk may adjust to low levels of vehicular traffic, particularly if there are visual barriers between the elk and the road (USDA 1995e). Mule deer have been shown to avoid areas within 660 feet of roads, the level of avoidance being greater in shrub habitats than in conifer woodlands (USFS 1995e).

Less than one mile of new roads per well would be constructed, thus the road density threshold of two miles per square mile of habitat may not be exceeded. Increases in road density within the subwatersheds that have the greatest road density, such as in the Cedar City and Powell Ranger Districts, have the potential to impact mule deer and elk. A substantial increase in road density, such as road development for a production field, within the subwatersheds that occur within crucial winter ranges for mule deer or elk, would have long term impacts (impacts from roads reclaimed within ten years would be short term). Impacts to big game from roads would be moderate to major because (population-level) habitat effectiveness and security would be diminished.

- Measurement Indicator #7 COMPLIANCE WITH UDWR POPULATION OBJECTIVES

Oil and gas disturbances would be in compliance with UDWR population objectives for mule deer and elk because a high level of mortality from oil and gas activities is not expected. A production field in the vicinity of crucial winter range has the potential to impact mule deer or elk on a population level if a large herd is displaced into less suitable habitat and experience adverse reproductive effects. Population-level impacts that reduce the population to levels substantially below objectives are not likely, however, because mule deer and elk populations on the Dixie National Forest are currently at (or above) objectives and are not considered to be at risk. Impacts under SLT with regard to population objectives would be negligible.

SENSITIVE RAPTORS

General impacts to raptors are described in Specialist Report 4.0.

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

Habitat impacts to flammulated owls (ponderosa pine, Douglas-fir) and peregrine falcon (rim habitat) would be short to long term, depending on the activity and vegetation type, and negligible to minor due to the large amount of habitat available (Table 6.5-6). Impacts to goshawk habitat areas and bald eagle wintering areas would be minor to moderate due to the slightly smaller amount of habitat available relative to the maximum that could be disturbed (Table 6.5-6). Most of the goshawk habitat in the Pine Valley Ranger District is located either in recreation areas, campgrounds or just off of the wilderness boundary where little to no oil and gas disturbance will occur, so in this Ranger District, impacts to goshawk would be negligible to minor.

- *Measurement Indicator #3* NUMBER OF VISITS AND NOISE LEVELS

Noise impacts to sensitive raptors would be similar to those described for raptors in Specialist Report 4.0. Impacts from seismic activities and exploratory drilling under SLT are likely to be temporary, but could be moderate, depending on the species and the number of individuals affected. Extended noise disturbances could have moderate to major impacts if birds were nesting and many nests of one species were abandoned due to noise; these would be population-level impacts if enough individuals failed to reproduce that season. Influence buffers for sensitive raptors are listed below, following Romin and Muck (2002) for nesting raptors. Within these dates and buffer zones, noise impacts could be moderate. Moderate noise impacts leading to nest abandonment would be short term because raptors are likely to use a different nesting location the following year.

Table 6.5-7 Respective buffer zones and sensitive periods for sensitive raptors that may correlate to adverse noise impacts. Information for all species taken from Romin and Muck (2002).

Species	Zone of influence (miles)	Sensitive period	Activity
Bald eagle	1.0	1 Dec – 15 Feb	possibly nesting
Peregrine falcon	1.0	1 Feb – 31 Aug	nesting
Northern goshawk	0.5	1 Mar – 15 Aug	nesting
Flammulated owl	0.25	1 Apr – 30 Sept	nesting

GREATER SAGE GROUSE

Effects of oil and gas developments on sage grouse populations are not well known, but appear to adversely impact sage grouse largely in the short term (Connelly et al. 2000). The most adverse potential impact under SLT is disturbance of leks, and any oil and gas activities that occurred within two miles of a lek may also disturb sage grouse nesting and brooding activities (80% of all nests occur within this radius; USDA 1995e). A loss of leks or active nests could limit breeding opportunities and recruitment, thus leading to declines in sage grouse populations.

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

A loss of summer brooding habitat would have a minor impact on sage grouse because less than

10% of the habitat would be disturbed under a worst-case scenario (Table 6.5-6); a loss of leks would have a moderate to major impact because these areas are limited (Table 6.5-6) and would be long term because sage grouse would probably not return to reclaimed leks.

- Measurement Indicator #2 FRAGMENTATION OF HABITAT

Impacts of fragmentation on wildlife are discussed in Specialist Report 4.0. Construction of roads and linear facilities within suitable sage grouse habitat would result in fragmentation. Because many sage grouse populations are migratory and populations that are non-migratory utilize large home ranges (Connelly et al. 2000), linear disturbances that isolate portions of habitat disrupt seasonal movements and prevent sage grouse from utilizing all parts of their habitat. Lekking areas that currently contain a substantial number of roads, on the Cedar City and Powell Ranger Districts, are the most vulnerable to fragmentation impacts. Fragmentation impacts from oil and gas disturbance in these areas would be short to long term, depending on whether exploration activities led to development and production, and moderate to major because population-level impacts could result if large numbers of individuals are restricted in their movements or number of mate choices by fragmentation of habitat.

- *Measurement Indicator #3* NUMBER OF VISITS AND NOISE LEVELS

Noise from seismic activities, exploration drilling, and production field development would displace sage grouse from the vicinity of operations. Sage grouse may return to a disturbed site after oil development activities have ceased, but may not attain pre-disturbance population levels. In general, disturbed leks and breeding areas will not be as productive as undisturbed sites (Connelly 2000) and many studies have documented lek abandonment and lower lek attendance by males and yearling females caused by oil and gas activities (Beck 2006). Noise impacts from oil and gas activities under SLT in the vicinity of leks (within one mile) or brooding areas (between 1 May to 15 July) could be moderate or major and long term because lek or habitat abandonment is more likely at this distance and abandonment would be a population-level impact. Noise impacts only in brooding habitat that did not affect actual leks could be moderate to major if a substantial number of sage grouse were displaced from 1 May to 15 July because the reproductive rate of the population could be affected during this time.

- *Measurement Indicator #4* INCREASES IN INVASIVE PLANTS

Under SLT, the spread of invasive plants would be possible (particularly for seismic activities) in conjunction with any ground disturbance or overland travel associated with oil and gas development or production. Invasive plants would diminish the value of sage grouse habitat (sagebrush) because species such as brome grasses and other annuals are not as nutritious a forage plant and can not provide shelter or cover for sage grouse as effectively as sagebrush. Adverse impacts from the spread of invasive plants in sage grouse brooding habitat could be long term because the functionality of this habitat would be diminished until the invasive species could be eradicated, which could take more than ten years (i.e., long term), as described for pygmy rabbit. Impacts would be moderate to major because adults and juveniles would be forced to move to other areas, could be more vulnerable to predators, and areas that they move into may be less suitable habitat due to fires, urbanization, roads or trails, or poor sagebrush health.

THREE-TOED WOODPECKER

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

Impacts to three-toed woodpeckers from habitat loss would be minor and long term due to the species' preference for mature stands containing snags and downed wood that take many years to regenerate. Spruce fir forest habitat may be lost (1-2%; see Specialist Report 10.0 - Vegetation) on the Cedar City, Powell, or Escalante Ranger Districts as a result of oil and gas activities. Impacts would be minor due to the small amount of habitat that could be disturbed relative to what is available on the Dixie National Forest.

SENSITIVE PLANTS

Under SLT, oil and gas activities that occurred in sensitive plant occurrence areas would disturb sensitive plants unless the 200-meter allowance prevented occupation of these areas. Operations could either be physically moved 200 meters or delayed up to 60 days to prevent impacts to sensitive plants during flowering and seed dispersal. However, a loss of sensitive plant populations or suitable habitat (see *Measurement Indicator #1*) would still be likely under these allowances. Direct impacts to sensitive plants would be long term and moderate because entire populations could be affected if a large number of individual plants can not be avoided under SLT.

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

Impacts from a loss of suitable habitat would be long term and moderate, as for direct impacts to populations, especially in the case of plants growing on unstable substrates that can not be reclaimed. Bristlecone pine/rock garden areas are one example of a habitat that is not easily reclaimed. Direct disturbance (loss) of bristlecone pine areas would constitute long term and moderate impacts to sensitive plants that grow in these areas, including Navajo Lake milkvetch, Cedar Breaks biscuitroot, podunk goundsel, and rock tansy. Bristlecone pine trees are a central part of rock garden communities, and take 50 years to mature before reproducing. For this reason, disturbing these long-lived species sets back the succession process in the community for at least this period of time or indefinitely, if trees do not reestablish. Trees may not reestablish because in addition to slow growth, bristlecone pine trees exhibit poor competitive abilities (Schoettle 2004).

MIS SPECIES

- *Measurement Indicator #1* ACRES OF HABITAT DISTURBANCE RELATIVE TO AVAILABLE HABITAT

Under SLT, oil and gas activities would result in habitat losses for MIS. Within most major vegetation communities on the Dixie National Forest, oil and gas activities would not disturb more than five percent of the habitat, assuming all exploration and a production field occurred within one habitat type (and within one Ranger District; Table 10.5-4). As a result, habitat loss would be minor and short to long term, depending on the activity and vegetation type, for terrestrial MIS that depend on major vegetation types, including mule deer, elk, turkey, goshawk, and flicker. Exceptions may include mature forest areas that are more limited than forested vegetation types as a whole, and take longer to replace; old growth habitat losses would be moderate and long term. Regarding habitat losses for aquatic species, aquatic habitat impacts are described in detail in Specialist Reports 4.0 (Fisheries), 7.0 (Water), and 8.0 (Watershed). Oil and gas activities that occurred near or within aquatic habitats under SLT may leave a negative footprint on those habitats because the allowances to protect waters under SLT are relatively limited. Impacts to aquatic MIS from oil and gas activities under SLT would have the potential to be long term and minor to major (see Specialist Report 4.0 for more extended justification).

- *Measurement Indicator #4* INCREASES IN INVASIVE PLANTS

In some riparian areas, tamarisk, whitetop, and Russian olive are replacing native riparian vegetation such as willows and cottonwoods. Invasive grasses and species such as rabbitbrush also replace native vegetation and create fewer shaded areas and less stable banks. As a result, higher water temperatures and higher rates of sedimentation characterize the habitat, both of which degrade aquatic habitats and specifically make habitat less suitable for sensitive trout species that require cold, clear water to spawn. Impacts from the spread of invasive species would be long term and minor to major, depending on the fish species, number of individuals that are not able to tolerate a slightly higher water temperature and reduced shade levels, and are forced to seek out more suitable habitat. If a substantial number of individuals expended energy to seek out alternate habitat then the reproductive rate of the population could be affected and impacts would be moderate to major.

- *Measurement Indicator #9* COMPLIANCE WITH MIS GUIDELINES (LRMP 1986)

The LRMP (1986) Guidelines for MIS (Management Area 4B – Wildlife and Fish Resource Management; USDA 1986:4-84) and the likelihood of compliance with the Guideline under SLT are summarized in Table 6.5-8.

Table 6.5-8 Fish and Resource Management Guidelines for MIS (USDA 1986) and compliance under SLT.

Guideline	Terrestrial species: big game, goshawk, wild turkey, and flicker	Aquatic species: trout and macroinvertebrates
Maintain habitat capability at a level at least 80% of potential capability for all emphasized species.	MAY NOT COMPLY Production field development under SLT within mature aspen or mature conifer communities may not comply with the Guideline (all species).	MAY NOT COMPLY Oil and gas activities under SLT have the potential to degrade aquatic habitat (see TR 4.0, 7.0, and 8.0) thus any large-scale disturbances within 300 feet of streams may not comply with the Guideline.
Maintain habitat needed to support the coordinated population goals	WOULD COMPLY Population goals are being met for MIS on the Dixie; terrestrial species have generally increased in the past few years due to increased precipitation. Levels of mortality that would affect population numbers are not expected.	MAY NOT COMPLY MIS fisheries and macroinvertebrates are stable but currently below population goals due to recent fires that have degraded habitat. Any further impacts to streams from oil and gas activities may not comply with the Guideline.
Maintain hiding cover (75% of all road edges) that hides 90% of an adult deer or elk from 200 feet away.	WOULD COMPLY Oil and gas activities are unlikely to remove a substantial amount of vegetation along existing roads, thus 75% of hiding cover would likely be maintained.	NA
In forested habitats, maintain 50% minimum hiding cover for deer and elk that is well distributed over the unit, and maintain 30% thermal cover in	WOULD COMPLY Oil and gas activities would not disturb a substantial portion of cover in any one area. At the Ranger District level, these proportions of hiding and thermal cover would be maintained even if the maximum amount of disturbance from a production field occurred.	NA

the unit.		

6.5.4.3 Impacts by Alternative

The degree to which the connected action impacts (Sections 6.5.4.2 and 6.5.4.2) would differ by alternative are discussed in this section. Each alternative involves a unique set of leasing options for each resource component, which would restrict the locations and the nature of oil and gas impacts activities that are allowed wherever these resources occur. Because areas for different resource components overlap, leasing options assigned to each resource component would also overlap and the most restrictive leasing option would take precedence (see Section 6.3).

Table 6.5-9 shows the acres of each resource component under each leasing option, by alternative. Table 6.5-9 incorporates the amount of overlap with more restrictive leasing options (assigned to other resources) in addition to the leasing option assigned directly to each vegetation resource component. The first column under each of Alternatives C, D, and E incorporates the acres within all Inventoried Roadless Areas assigned an NSO stipulation as mandated by the current Roadless Area Conservation Rule (2001). The second column under Alternatives C, D, and E represents the same acres but with less restrictive stipulations, assuming a less restrictive roadless rule is adopted.

Table 6.5-9 Acreage of Resource Components under each Leasing Option, Including Overlapping Options, by Alternative. Totals between alternatives may differ slightly due to GIS modeling error.

Resource Component	Lease Option	Alternative							
		A	B	C NSO/NSO*		D NSO/CSU*		E NSO/SLT*	
Sensitive trout habitat	NA	777	1,322**	777	777	777	777	777	777
	NL	4,606	7,547**	420	420				
	NSO			4,186	4,186	1,722	450	1,404	
	TL					817	1,660		
	CSU					2,067	2,496		
	SLT							3,202	4,606
Pygmy rabbit habitat	NA	10,179	10,179	10,179	10,179	10,179	10,179	10,179	10,179
	NL	50,573	35,794	308	308				
	NSO		14,779	34,723	34,723	13,735	8,822	5,474	
	TL			821	821	16,900	19,802		
	CSU			14,722	14,722	19,938	21,949		
	SLT							45,099	50,573
Sensitive bat habitat	NA	1,076	1,076	1,076	1,076	1,076	1,076	1,076	1,076
	NL	1,385	1,143	57	57				
	NSO		242	1,324	1,324	1,243	989	739	
	TL					105	306		
	CSU			4	4	37	90		

Resource Component	Lease Option	Alternative							
		A	B	C NSO/NSO*		D NSO/CSU*		E NSO/SLT*	
	SLT							646	1,385
Goshawk nest areas***	NA	2,235	2,235	2,235	2,235	212	212	2,235	2,235
	NL	60,781	41,519	85	85				
	NSO		19,259	60,696	60,696	5,379	2,170	11,664	
	TL					8,039	10,146		
	CSU					5,655	6,756		
	SLT							49,117	60,781
Goshawk PFAs	NA	1,787	1,787	1,787	1,787	1,787	1,787	1,787	1,787
	NL	82,691	57,579	40	40				
	NSO		23,700	74,074	74,074	26,418	9,706	18,435	
	TL			3,707	3,707	34,610	45,894		
	CSU		1,112	4,870	4,870	21,663	27,091		
	SLT							64,256	82,691
Sage grouse leks	NA	983	983	983	983	983	983	983	983
	NL	8,383	8,383						
	NSO			8,383	8,383	8,383	8,383	1,529	
	TL								
	CSU								
	SLT							6,854	8,383
Sage grouse brooding habitat	NA	2,075	2,075	2,075	2,075	2,075	2,075	2,075	2,075
	NL	55,029	55,029						
	NSO			40,570	40,570	22,957	20,848	2,109	
	TL			377	377	32,072	34,181		
	CSU			14,082	14,082				
	SLT							52,920	55,029
Peregrine falcon nest areas	NA	811	811	811	811	811	811	811	811
	NL	4,026	2,209	2	2				
	NSO		1,817	4,024	4,024	822	302	527	
	TL					2,929	2,929		
	CSU					275	795		
	SLT							3,499	4,026
Peregrine falcon rim habitat	NA	76,960	76,960	76,960	76,960	76,960	76,960	76,960	76,960
	NL	374,799	256,588	2,574	2,574				
	NSO		105,886	324,722	324,722	141,700	16,283	132,638	
	TL			15,081 5/15-7/5	15,081 5/15-7/5	233,305	358,723		
	CSU		12,324	32,626	32,626				
	SLT							242,161	374,799
Bald eagle winter concentration areas	NA	2,683	2,683	2,683	2,683	2,683	2,683	2,683	2,683
	NL	11,400	7,859						
	NSO		3,405	11,400	11,400	5,091	3,873	1,226	
	TL					4,730	5,906		
	CSU					1,579	1,621		
	SLT							10,173	11,400
Flammulated owl habitat	NA	59,638	59,638	59,638	59,638	59,638	59,638	59,638	59,638
	NL	377,359	244,188	2,380	2,380				
	NSO		133,034	288,264	288,264	86,415	38,716	55,037	
	TL			29,686	29,686	184,187	215,599		
	CSU			57,030	57,030	106,759	123,046		

Resource Component	Lease Option	Alternative							
		A	B	C NSO/NSO*		D NSO/CSU*		E NSO/SLT*	
	SLT							322,322	377,359
Sensitive plant species habitat and occurrences	NA	17,427	17,427	17,427	17,427	17,427	17,427	17,427	17,427
	NL	110,293	70,669	2,018	2,018				
	NSO		39,624	90,184	90,184	40,478	18,050	25,138	
	TL			4,653	4,653	45,987	54,181		
	CSU			13,441	13,441	23,060	37,293		
	SLT					773	773	85,159	110,293
Big game winter range	NA	7,798	7,798	7,798	7,798	7,798	7,798	7,798	7,798
	NL	169,915	169,915	90	90				
	NSO			134,766	134,766	66,245	16,930	49,776	
	TL			58	58	103,671	152,986		
	CSU			35,002	35,002				
	SLT							120,139	169,915
Big game summer range	NA	23,606	23,606	23,606	23,606	23,606	23,606	23,606	23,606
	NL	402,343	402,343	3,397	3,397				
	NSO			339,745	339,745	198,330	36,653	171,169	
	TL			59,202 5/15-7/5	59,202 5/15-7/5	204,015	365,692		
	CSU								
	SLT							231,174	402,343

*The two leasing options listed under Alternatives C, D, and E represent the dual analysis for lands within Inventoried Roadless Areas if 1) the more restrictive rule (2001) remains in effect, or 2) if a less restrictive rule is adopted (see Chapter 2.0 and Specialist Report 2.0).
**Includes a 500-foot buffer under Alternative B; all other buffers for fisheries habitat are 300 feet.
***Alternative D for goshawk nests is smaller buffer area and therefore less total acreage.

A more detailed table that separates the acreage by resource component and Ranger District will be available in Appendix B of the EIS. In this section, impacts are discussed at the forest-wide level. This is done to avoid repetition and facilitate the comparison of impacts across alternatives. However, any pronounced differences in the impacts to a resource component between Ranger Districts will be highlighted (see Table 6.5-10). Any differences among Ranger Districts were emphasized in Section 6.5.4.2.

Impacts by *Measurement Indicators* are summarized in Tables 6.5-10 and 6.5-11, and general differences between alternatives regarding Sensitive species and MIS are outlined in the text below. *Measurement indicator #8* is not discussed in this section or in Table 6.5-10 because the impacts in terms of the fisheries classification system would be the same under all alternatives (see SLT; Section 10.5.4.2). Impacts with regard to this *Measurement Indicator* would be negligible.

Table 6.5-10 Impacts with respect to Measurement Indicators #1 - #5, and #7. *Measurement Indicator #6* is summarized in Table 6.5-11. Measurement Indicator #8 is not presented here because there would be no impacts (see above). *Measurement Indicator #9* is summarized at the end of Section 6.5.4.2. LT = long term; ST = short term; neg = negligible; mod = moderate.

Resource		ALT A	ALT B	ALT C NSO in IRAs	ALT D NSO in IRAs	ALT D CSU in IRAs	ALT E NSO in IRAs	ALT E SLT in IRAs
MIS and Sensitive trout	*MI #2*	neg	negligible	minor-moderate LT	moderate LT	moderate LT	moderate LT	moderate LT
	MI #4	neg	negligible	minor-mod LT	minor-mod LT	minor-mod LT	minor-mod LT	minor-mod LT
Pygmy rabbit	*MI#1*	neg	neg-minor ST	neg-minor ST-LT	minor ST-LT	minor ST-LT	minor ST-LT	minor ST-LT
	MI #3	neg	neg-minor ST	minor ST-LT	minor ST-LT	minor ST-LT	moderate ST-LT	moderate ST-LT
	MI #4	neg	minor LT	minor LT	minor LT	minor LT	minor LT	minor LT
Sensitive bats[1]	*MI#1*	neg	neg-minor ST	minor ST-LT	minor ST-LT	minor ST-LT	minor-mod ST-LT	moderate ST-LT
	MI #3	neg	neg-minor ST	minor ST	minor ST	minor ST	minor-mod ST-LT	moderate ST-LT
Big game (MIS)	*MI#1*	neg	negligible	negligible-minor ST-LT	minor ST-LT	minor ST-LT	minor ST-LT	minor ST-LT
	MI #3	neg	negligible	negligible	negligible	negligible	moderate ST	moderate ST
	MI #5	neg	negligible	moderate[12] ST-LT	moderate[12] ST-LT	moderate[12] ST-LT	moderate[12] ST-LT	moderate[12] ST-LT
	MI #7	neg	negligible	negligible	negligible	negligible	negligible	negligible
Sensitive raptors	*MI#1*	neg	neg-minor ST	negligible-minor ST-LT	minor ST-LT	minor ST-LT	minor ST-LT	minor ST-LT
	MI #3	neg	neg-minor ST	neg-minor ST	neg-minor ST	neg-minor ST	minor-mod ST	minor-mod ST
Sage grouse – Brood rearing habitat	*MI#1*	neg	negligible	minor ST-LT	minor-mod ST-LT	minor-mod ST-LT	minor-mod ST-LT	minor-mod ST-LT
	MI #2	neg	negligible	minor ST-LT	moderate ST-LT	moderate ST-LT	moderate ST-LT	moderate ST-LT
	MI #3	neg	negligible	negligible	negligible	negligible	moderate ST-LT	moderate ST-LT

		MI #4	neg	negligible	minor LT	minor LT	minor LT	minor LT	minor LT
	Leks	*MI#1*	neg	negligible	minor-mod ST	minor-mod ST	minor-mod ST	mod-major LT	mod-major LT
		MI #3	neg	negligible	negligible	negligible	negligible	mod-major LT	mod-major LT
Sensitive plants		*MI #1*	neg	neg-minor LT	minor LT	moderate LT	moderate LT	moderate LT	moderate LT

[1] Impacts most likely within Powell Ranger District
[2] Impacts most likely within Cedar City Ranger District
[3] Impacts most likely within Escalante Ranger District

Table 6.5-11 Determinations of impacts to viability from the BE (*Measurement Indicator #6*).

Resource	ALT A	ALT B	ALT C NSO in IRAs	ALT D NSO in IRAs	ALT D CSU in IRAs	ALT E NSO in IRAs	ALT E SLT in IRAs
Bonneville cutthroat trout	NI	NI	MIIH	MIIH	MIIH	WIFV	WIFV
Colorado cutthroat trout	NI	NI	MIIH	MIIH	MIIH	WIFV	WIFV
Pygmy rabbit	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Townsend's big-eared bat	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Spotted bat	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Bald eagle	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Goshawk	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Sage grouse	NI	NI	MIIH	MIIH	MIIH	MIIH	MIIH
Peregrine falcon	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Three-toed woodpecker	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Flammulated owl	NI	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Sensitive plants	NI	MIIH	MIIH	MIIH	MIIH	WIFV	WIFV

NI = No Impact
MIIH = May Impact Individuals or Habitat but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
WIFV = Will Impact individuals or habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of Viability to the population or species

ALTERNATIVE A

There would be no oil and gas activities on the Dixie National Forest within areas currently unleased. Alternative A would continue present management activities as pertaining to oil and gas leasing. The Forest Supervisor under this alternative would not make any new leasing decisions and no new oil and gas leasing would be allowed on the Dixie National Forest. Current operations, including the Upper Valley oil field on the Escalante Ranger District (28 wells, including nine water-injector wells) would continue (USDA 2006b). In total, there are 12,871 acres of existing leases on the Dixie National Forest. Existing leases will expire and the potential number of wells which could be drilled on the Dixie National Forest would decrease over time. Under Alternative A, adverse impacts to MIS and Sensitive species would be negligible.

ALTERNATIVE B

Chapter 2 of this EIS describes how many acres of the Dixie National Forest would fall under each leasing option under Alternative B (Table 2.5-2) and where those acres are located (Figure 2.5-2). Approximately 65% of the Dixie National Forest would have a leasing option of NL under Alternative B; of the remainder, 20% would be NSO and 5% would be CSU. As under all alternatives, 10% of the Dixie is administratively unavailable for leasing (NA).

Impacts to Sensitive species and MIS under Alternative B could occur from seismic activities, as most resource components are covered at least partially by NSO stipulations. Many resource components are covered completely by NL for other resources under Alternative B, including trout habitat, sage grouse leks, sage grouse brooding habitat, and big game ranges. No impacts would occur to those resource components under Alternative B. Sensitive raptors may be disturbed by seismic noise and impacts could be moderate. Pygmy rabbit and sensitive bat habitat would also have a slight potential for impacts due to the risk of invasive plant proliferation or noise.

Regarding determinations, there would be “No Impact” to sensitive fishes or sage grouse. For all other Sensitive species, oil and gas activities may affect individuals but would not affect populations (“May Impact;” *Measurement Indicator #5*; Table 6.5-11). Although direct disturbance of sensitive raptor nests or sensitive bat roosts, for example, are not likely under Alternative B, foraging and other suitable habitat (that which is mapped in the analysis and that which is not) could be disturbed by oil and gas developments. For most Sensitive species, therefore, oil and gas activities “May Impact” individuals.

ALTERNATIVE C WITH NSO IN IRAS

Alternative C has less restrictive leasing options than Alternative B and more restrictive options than Alternative D. Chapter 2 of this EIS describes how many acres of the Dixie National Forest would fall under each leasing option under Alternative C (Table 2.5-3) and where those acres are located (Figure 2.5-3). Under Alternative C, 73% of vegetation on the Dixie National Forest would be NSO, 12% would be CSU, and 3% would be TL from 15 May (or 1 April, in Cedar City Ranger District) to 5 July. Ten percent would be NA.

Alternative C with NSO in IRAs would have fewer impacts than under Alternative D (with either NSO or CSU in IRAs) and potentially more impacts than under Alternative B. The most noticeable differences between Alternative C and Alternative D are the presence of NSO stipulations for many sensitive raptors under Alternative C, including goshawk (nest areas), bald eagle, and peregrine falcon (nest areas). Impacts to these raptors under Alternative C would be limited to those from seismic activities (i.e., noise), which would most likely be temporary but could be moderate and suitable habitat would still be impacted from oil and gas developments; habitat losses could be minor. Big game winter range is covered mostly by NSO under Alternative C, unlike Alternative D, and so impacts to this resource component would also be limited to seismic activities and of lower

intensity than Alternative D. Impacts to sensitive trout may also be of measurably lower intensity under Alternative C, due to NSO; however, impacts are still possible under Alternative C due to the allowance of road crossings under a special NSO stipulation and the potential of invasive plant proliferation along stream banks.

Regarding determinations, actions "May Impact" would apply to all Sensitive species (*Measurement Indicator #5*; Table 6.5-11).

ALTERNATIVE D WITH NSO IN IRAS

Alternative D has less restrictive leasing options than Alternative C and more restrictive options than Alternative E. Chapter 2 of this EIS describes how many acres of the Dixie National Forest would fall under each leasing option under Alternative D with NSO/CSU in Inventoried Roadless Areas (Table 2.5-4) and where those acres are located (Figures 2.5-5 and 2.5-6). Under Alternative D with NSO in Inventoried Roadless Areas, 33% of the Dixie National Forest would be NSO, 23% would be CSU, and 32% would be TL. Ten percent would be NA.

Impacts under Alternative D with NSO in IRAs would likely not be measurably different than under Alternative D with CSU in IRAs (below) in intensity or duration for any Sensitive species or MIS. Sensitive bat habitat and big game winter range are mostly within IRAs; however, potential impacts under both Alternative D with NSO and CSU in IRAs would be minor and would not differ.

ALTERNATIVE D WITH CSU IN IRAS

Under Alternative D with CSU in IRAs, 8% of the Dixie National Forest would be NSO, 34% would be CSU, and 46% would be TL. Ten percent would be NA.

Alternative D with CSU in IRAs could have impacts on most Sensitive species and MIS. Although CSU or TLs would be in place, the RFDS would still occur and would cause some impacts. The likelihood of moderate or major impacts, which could occur under SLT, would be lower under this Alternative. Several resource components with moderate or major associated impacts under SLT, including most Sensitive species, would likely have fewer associated impacts under Alternative D. For these same species, habitat and fragmentation impacts for species with a TL under this Alternative would be the same as under SLT because habitat could be disturbed outside of the TL. Road density impacts under this Alternative would also be the same as under SLT (see big game) because it is likely that only the timing of road building would be altered under this Alternative, relative to what is allowed under SLT.

Regarding determinations, actions "May Impact" would apply to all Sensitive species (*Measurement Indicator #5*; Table 6.5-11).

ALTERNATIVE E WITH NSO IN IRAS

Alternative E has the least restrictive leasing options of Alternatives A-E. Chapter 2 of this EIS describes how many acres of forest would fall under each leasing option under Alternative E with NSO/SLT in Inventoried Roadless Areas (Table 2.5-5) and where those acres are located (Figures 2.5-7 and 2.5-8).

The intensity and duration of impacts to most Sensitive species and MIS would be the same as described in Section 6.5.4.2 because most resources do not overlap with IRAs substantially. Sensitive species and MIS with enough overlap to possibly reduce the intensity of impacts due to NSO in IRAs include big game (29% of winter range is within IRAs; 40% of summer range is in IRAs), peregrine falcon (35% of rim habitat is within IRAs), and sensitive bats (50% of available habitat is within IRAs). In this analysis, impacts are measurably lower for sensitive bats (see Table 6.5-10). Determinations in Table 6.5-11 are the same between Alternative E with NSO in IRAs and

Alternative E with SLT in IRAs.

ALTERNATIVE E WITH SLT IN IRAS

Impacts to Sensitive species and MIS would be the same as described in Section 6.2.4.2. Regarding determinations, actions "May Impact" would apply to all species except sensitive fish and sensitive plants ("Will Impact;" *Measurement Indicator #5*; Table 6.5-11).

6.5.5 Cumulative Effects

Cumulative effects are the total effect, including direct and indirect effects, on a given resource resulting from the incremental impact of past, present, and reasonably foreseeable future actions. They can result from individually minor, but collectively significant actions taken over a period of time. Cumulative effects may arise from single or multiple actions and the effects may be additive or interactive. The net adverse effect of interactive actions may be less than the sum of the individual effects (countervailing) or the actions may interact to create a net adverse cumulative effect that is greater than the sum of the individual effects (synergistic). The magnitude and extent of the effect on a resource depends on whether the cumulative effects exceed the ability of a resource to function at a desired level (CEQ 1997).

Cumulative impacts may occur to MIS and sensitive trout species or to sensitive plants as a result of connected actions from oil and gas leasing. Cumulative impacts are less likely but may still occur to other MIS or Sensitive species, including sensitive bats, big game, sensitive raptors, sage grouse, or three-toed woodpecker. Individual raptors, bats, or sage grouse could be affected by oil and gas activities that remove habitat or create disturbances that disrupt behavior, and populations of these sensitive species could be affected in the context of past, present, and foreseeable future threats to persistence. Because many populations of sensitive plants, and populations of sensitive trout, on the Dixie National Forest are small and isolated on the forest and are found in few other locations, threats to persistence are more immediate and could be caused by one or a few oil and gas disturbances on the Dixie National Forest. Cumulative impacts to these species are the most likely to occur, although cumulative impacts to all Sensitive species are measurable in this analysis.

6.5.5.1 Description of Cumulative Effects Area

The Cumulative Effects Area for Sensitive species and MIS includes all 6th level HUC subwatersheds occurring on the Dixie National Forest that are within the following boundaries: north of the Virgin River, east of the Union Pacific rail line located west of the Utah-Nevada border, south and east of US Highway 56 and Desert Mount Road, east of Interstate 15 north of Cedar City, and south and west of US Highway 12 on the Fremont River Ranger District. The CEA would also include all the full extent of all big game hunt units (Wildlife Management Units) located on the Dixie National Forest. No data exists for one of the subwatersheds on the west side of the Pine Valley Ranger District and a buffer was created by extending a boundary west from the nearest subwatershed (Nephi Draw HUC 160300061301) along an existing dirt road to its intersection with the Union Pacific rail line at Brown, Nevada. These boundaries were placed on the 6th level subwatersheds due to the presence of several subwatersheds that covered only very small portions of the Dixie National Forest, but extended long distances from the Dixie National Forest boundary. The portions of these watersheds eliminated are likely beyond the extent of any cumulative effects.

Lands within the CEA are managed primarily by the BLM (45% of the CEA), 50% of which is the Grand Staircase Escalante National Monument (23% of the CEA). Twenty three percent of lands in the CEA are managed by the Dixie National Forest. Fifteen percent of the CEA is private land, ten percent in National Park Service (Cedar Breaks National Monument, Zion NP, Bryce Canyon NP, Canyonlands NP, Glen Canyon National Recreation Area), and six percent is State Land with five

percent SITLA (remaining one percent state land includes state parks and wildlife reserves). Actions within the CEA are discussed within 1) various BLM districts (Richfield, Kanab, Cedar City, or St. George) and the GSENM, 2) the Dixie National Forest, 3) National Parks, and 4) SITLA lands, since these areas make up the majority of the CEA. Actions on private lands are not discussed due to lack of data.

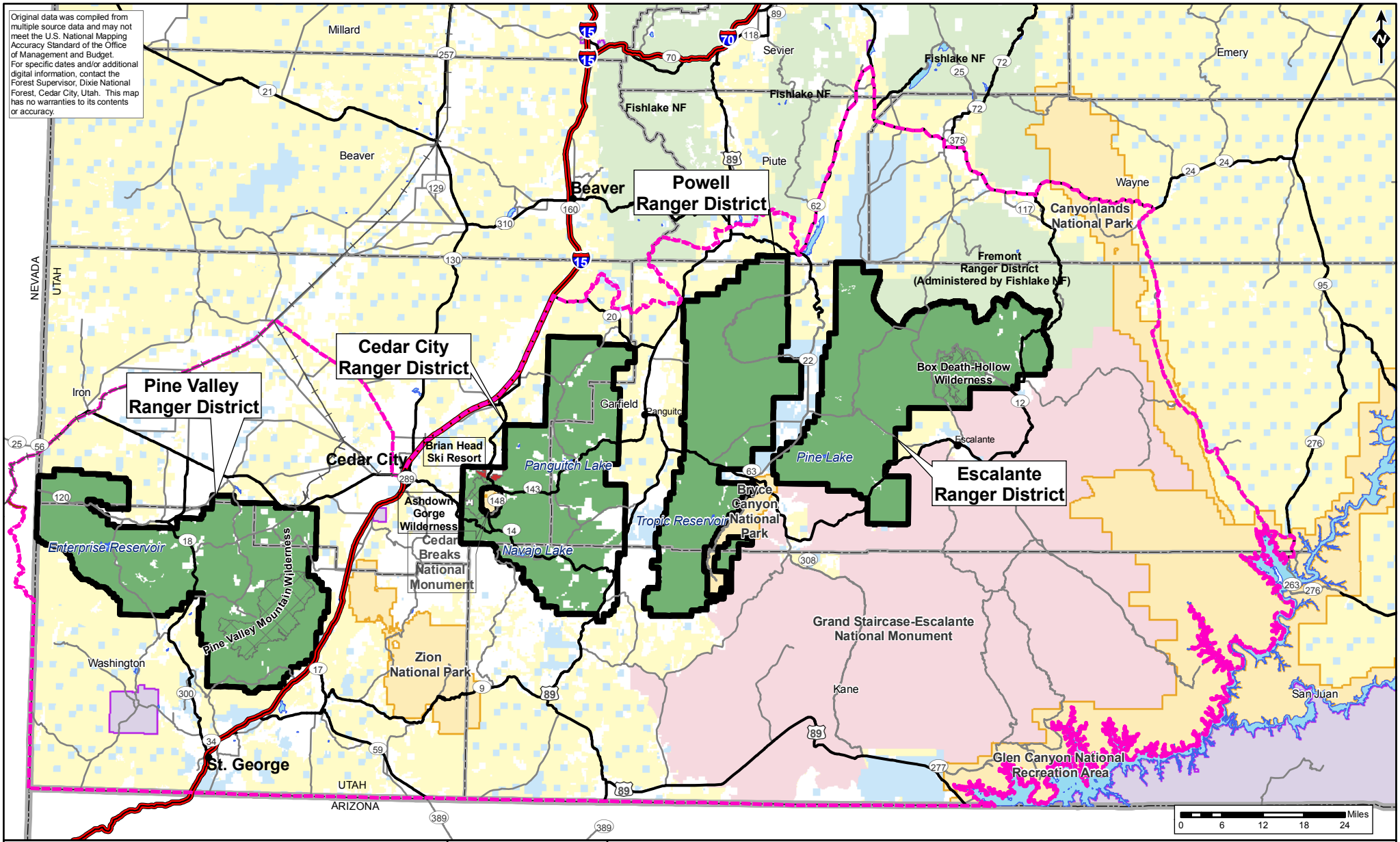
RATIONALE

The 6th Level HUC subwatershed level was chosen as the CEA because Sensitive and MIS fish discussed in this Specialist Report are unlikely to migrate beyond these boundaries. Sensitive and MIS fish are also unlikely to migrate beyond the artificial boundary placed on several of the subwatersheds due to the distance these subwatersheds extend and a general lack of large streams in these subwatersheds. The subwatershed level would cover all terrestrial wildlife movements with the exceptions of some elk and mule deer, migratory birds, and possibly migratory sage grouse populations. Regarding elk and mule deer, by including the full extent of all big game hunt units most movements would occur within the CEA. Further, all mapped crucial and substantial elk habitat and approximately 32% of the mapped crucial and substantial mule deer habitat is contained within the CEA. The majority of mule deer habitat that occurs outside the CEA is located adjacent to the Pine Valley Ranger District. Most migratory birds and sage grouse are expected to move beyond the subwatershed boundary.

6.5.5.2 Past, Present, and Reasonably Foreseeable Actions

Throughout the CEA, wildlife habitats have been shaped by natural disturbances as well as active management and manipulation by humans. On Forest Service land, many forests are characterized by overstocking, layering, and encroachment by shade-tolerant climax tree species, which increases the susceptibility of these areas to fire and insect outbreak that can remove large areas of habitat for species such as goshawks, flammulated owls, and three-toed woodpeckers. BLM lands in the CEA have been affected by increasing OHV use and fire and may be affected in the foreseeable future if some of the many oil and gas leases are developed. In the past year, SITLA lands have been managed for fire rehabilitation, OHV access and closures, sage grouse habitat protection, noxious weed control, grazing management, and energy development (SITLA 2007). In general, private lands are assumed to be in various stages of increasing development, but may contain substantial amounts of MIS or Sensitive species habitat such as for big game, sage grouse, or MIS trout.

Many riparian areas in the CEA have been degraded by management and other activities that have lowered water tables, eroded stream channels, and led to invasive plant encroachment, removal of beaver populations, increased water temperatures, concentrated runoff, and increased sediment from road construction, and changes in upland vegetation density and composition. Impacts to riparian and wetland areas on the Dixie are discussed in Specialist Report 8.0. MIS and sensitive trout and macroinvertebrates have been affected by the changes to riparian habitats, primarily by increased sediment levels from erosion where riparian vegetation has been altered or removed. Sedimentation reduces the amount of exposed gravels for trout spawning, among other impacts. Sensitive trout species have become isolated in headwater streams on the Dixie due to habitat loss from impacts such as sedimentation, in addition to exotic species introductions and water diversions. BLM and other lands (i.e., private) in the CEA contain little to no habitat for sensitive trout. The desired future expansion of cutthroat would therefore occur on National Forest lands. Other MIS trout species can be found on many lands in the CEA, including rainbow and brown trout on BLM land (Beaver Dam Wash, Slaughter Creek, Mammoth Creek, Parowan Creek, Boulder Creek, Calf Creek, and Deer Creek) and brown, brook, rainbow, and cutthroat trout in several stream reaches on private lands (e.g., Santa Clara River at Pine Valley, Blue Springs Creek, Mammoth Creek, Panguitch Creek, Parowan Creek, East Fork Sevier River, Boulder Creek near Boulder, and portions of Deer Creek).



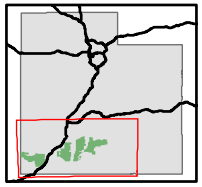
Oil and Gas Leasing EIS on Lands Administered by the Dixie National Forest

FIGURE 6.5-1

Cumulative Effects Area

Utah Division of Wildlife Resources Wildlife Management Units and 6th-level HUCs

28 February 2008	1:1,000,000	Horizontal Datum = NAD 83 Coordinate System = Zone 12N



- Cities
- Railroad
- Minor Roads*
- Highways
- Freeways
- Water Bodies
- County Boundaries
- State Lines

National Forest System Lands

- Dixie National Forest
- Wilderness Areas
- Fishlake National Forest
- Brian Head Ski Resort

Other Land Administration

- Bureau of Land Management
- GSENM**
- National Park Service
- Private
- State of Utah
- Tribal
- Cumulative Effects Area***

*Not all roads are shown. Only some roads are depicted for orientation purposes.
**Grand Staircase-Escalante National Monument. Managed by the Bureau of Land Management.
***Includes extent of all Wildlife Management Units (Utah Division of Wildlife Resources) that intersect the Dixie National Forest and 6th-level HUCS.

The following management activities have the largest impacts on MIS and Sensitive species: development (i.e., roads, permanent structures), livestock grazing, vegetation changes, uncharacteristic fire, insect outbreaks and timber harvest, recreation, noxious weed infestations, and mining/mineral exploration. While impacts in the CEA continue to occur, many of the activities listed have decreased or become better managed in recent years on Federally-owned lands as the importance of overall ecosystem health has been recognized. The past and present levels of each type of activity are listed below along with the general impacts that have resulted and the expected level of future activity.

ROADS AND DEVELOPMENT

Population is increasing in southern Utah, particularly in Washington County (8.4 percent rate of growth) and Iron County (6.4 percent rate of growth). Twenty eight percent of private land on the CEA is within municipalities. Within the Dixie National Forest boundary, developments are occurring on private subdivisions. The largest of which occurs in the Pine Valley Ranger District, on routes between Cedar City, Enterprise, and St. George; and in the Cedar City Ranger District, on routes between Panguitch, Hatch, Alton, Cedar City, and Brian Head and the numerous campgrounds and other recreation sites (e.g., Cedar Breaks National Monument, Brian Head ski resort, Panguitch Lake, and Navajo Lake). Most private land development within Kane County is occurring near and within the Cedar City Ranger District.

In general, road and developments remove vegetation and increase the potential for noxious weed invasion by creating permanently disturbed areas. Private lands within the forest fragment wildlife habitat if they are developed, and developments within the forest are assumed to be increasing. Conversion of lands to agriculture in the CEA generally reduces native shrub vegetation and decreases the amount of habitat available to sage grouse, pygmy rabbit, and big game (winter range). Agriculture development contributes to fragmentation as well as habitat loss (Bosworth 2003).

The construction of roads in close proximity to streams has altered the structure and function of these areas within the CEA. Roads can channel surface water runoff directly into streams, when it would normally travel slowly or diffusely through the watershed. The result is that sediment inputs to streams are high in some areas and have degraded the quality of aquatic habitat. Table 6.5-12 shows the miles of Forest Service routes that have the potential to, or are currently impacting aquatic habitat and that may affect MIS and Sensitive trout species.

Table 6.5-12 Forest Service routes impacting aquatic habitat.

Impacts	Miles of Forest Service Routes			
	Pine Valley	Cedar City	Powell	Escalante
Route presents a high or moderate risk to soil and water resources	342.2	374.2	426.1	551.4
Route impacts stream channels, floodplains, wetlands, or riparian areas	385.1	346.9	152.8	478.0
Route is within a stream channel	0.0	2.2	0.0	0.0
Routes with stream crossing	640.5	591.7	682.7	604.3

Routes within 200 feet of streams	700.7	670.1	815.8	710.2

Source: Dixie National Forest Route Analysis Database

Big game are also affected by road density because they move long distances between seasonal ranges and barriers such as roads can force stressed individuals with limited reserves to take alternate (i.e., longer) routes. Road density is currently high in many areas of the CEA, particularly the Cedar City Ranger District of the Dixie National Forest where some summer range occurs. According to UDWR 2003, winter range (for mule deer) in the CEA needs "improvement" mainly in the areas north of the Escalante Ranger District and between the Cedar City and Powell Ranger Districts. The area between the Cedar City and Powell Ranger Districts also contains areas with high road density that may be contributing to the decline in quality of this winter range.

LIVESTOCK GRAZING

Much of the CEA experienced intense overgrazing in the late 1800s and early 1900s prior to active management on public lands. Although impacts continue to occur, grazing practices have improved considerably since management began. The level of grazing occurring on the Dixie National Forest has been relatively constant over the past 5 years. Grazing is thought to have had moderate adverse impacts on watershed on the Dixie National Forest (Specialist Report 8.0) from grazing allowances in riparian areas. Grazing impacts in riparian areas have affected fishes, including sensitive and MIS trout. On all BLM lands, including the Monument, grazing is allowed and is managed in accordance with BLM guidelines to protect the watershed, aquatic habitat, and water quality, and move toward or maintain properly functioning condition (BLM 1999). Grazing in the Kanab BLM district has decreased significantly in order to recover from recent droughts and improve the range condition in recent years. Grazing on the Monument, on the BLM, and on the Dixie is managed according to Utah Standards of Rangeland Health.

In addition to aquatic species on the Dixie National Forest, grazing has affected species in the CEA that rely on sagebrush habitats, i.e., sage grouse and pygmy rabbit, by directly removing or modifying habitat. Grazing is one of several factors that have contributed to the degradation of sagebrush steppe through conversion to pinyon juniper (Bosworth 2003) and cheatgrass or other exotic species infestations in the CEA. Grazing has also altered the species composition of grass, forb, and shrub layers of aspen forests that make up goshawk foraging habitat (Reynolds et al. 1992). Many sensitive plants, particularly those that do not occur on limestone or sandstone formations, such as sensitive paintbrushes and several penstemons on the Dixie National Forest, are palatable to domestic livestock and wild ungulates and have been directly affected by grazing (Rodriguez 2004).

VEGETATION CHANGES

Compared to historic conditions (late 1800s and early 1900s), most vegetation communities on the Dixie National Forest have changed in relative abundance. Grasslands and aspen communities have declined, having been replaced by dense coniferous forest in many areas (USDA 2006c). Current vegetation trends on the forest include spruce fir forest overtaking aspen, and pinyon-juniper vegetation invading grass, forb, and sagebrush communities (USDA 2006d). For Wyoming big sage, VDDT modeling shows a dramatic decline as stands convert primarily to pinyon and juniper without an aggressive restoration program (USDA 2006e). In general, late successional species have invaded areas where early successional species once prevailed. These changes reduce the habitat available for sage grouse, pygmy rabbit, and big game (winter range). A decline in aspen to conifer encroachment has reduced the available habitat for elk, goshawk, and three-toed woodpecker, although the sensitive bird species can also use conifers. An increase in conifers has generally increased the nesting substrate available to sensitive raptors and woodpeckers.

Vegetation management on the Forest is currently attempting to reverse the trends of climax species encroachment in order to reduce the risk of fire and insect outbreak, and vegetation "restoration" treatments on the Monument are expected to cover approximately 20,000 acres over the next 15 years (BLM 1999).

FIRE

On the Dixie National Forest, one hundred and fifty years of fire suppression and production-focused timber management has created large mosaics of relatively dense, mid-succession, mixed-conifer forests with a large accumulation of woody debris and fuel in many areas (UDNR 2003), which has increased the frequency of large, severe fires. Large, severe fires completely remove vegetation that sensitive raptors use for roosting and nesting; these impacts are usually long term because forests can take 50-100 years to regenerate. In riparian areas, large, severe fires remove vegetation that provided cover and shade over streams as well as an infiltration barrier to protect against sedimentation and flood events. The Sanford Fire (Powell Ranger District, Dixie National Forest) that occurred in 2002 resulted in a collapse of trout populations in Cottonwood Creek, Deep Creek, and Deer Creek watersheds (USDA 2004) that are now in various stages of recovery after reintroductions of Bonneville cutthroat trout. Because native Bonneville and Colorado River cutthroat trout are limited to isolated headwater drainages, the risk of losing individual populations during extreme fire and flood events has increased. The frequency of large, severe fires is expected to increase on the Dixie National Forest in the future due to the limited acres than can be treated to reduce fuel loads and continued climatic changes.

On the Monument (BLM), fires have played a smaller role in the shaping of the landscape and there is little suppression activity (BLM 1999). On the Richfield BLM District, there has been a spike in fire frequency over the past ten years.

SPRUCE BEETLE OUTBREAKS AND TIMBER HARVEST

Timber harvests on the Dixie have generally decreased relative to historic levels as the emphasis of timber harvests has shifted from promoting wood growth (for production) to ecosystem health, primarily in an attempt to reduce the risk of severe spruce beetle outbreaks. Bark beetles (i.e., spruce beetle, mountain pine beetle, and Douglas-fir beetle) have been and continue to be the most notable cause of widespread tree mortality in the Intermountain Region for the past several decades. In the last 10-15 years, spruce beetle has caused up to 80% mortality on approximately 225,000 acres of Utah's National Forests (UDNR 2003). Many of the largest infestations in Utah are on the Dixie National Forest. Many timber harvests on the Dixie National Forest have involved removal of dead spruce trees killed by beetles. The removal of spruce has reduced habitat for sensitive raptors (i.e., goshawk, flammulated owl) and three-toed woodpecker, particularly those that use large diameter trees because older trees are more susceptible to outbreaks. For some sensitive species such as three-toed woodpecker, the death of large stands of spruce has increased the number of available snags (until, in many cases, they are harvested).

INVASIVE SPECIES

In 2005 the Dixie National Forest reported 1,639 acres infested with noxious weeds and treated 955 acres. The number of infested acres in 1998 was 930 acres. A few range areas in the Pine Valley RD monitored by the Dixie in 2006 indicated a downward trend in quality due to increased cheatgrass frequency following fire (USDA 2006c). The trend of increased acres infested with noxious weeds is expected to continue in these areas and across the Forest, particularly in the Pine Valley Ranger District. Cheatgrass is a serious problem being addressed on the Richfield BLM District and has contributed to the increased fire frequency in addition to the loss of desert scrub, sagebrush, and grasslands. The BLM, including the Monument, works cooperatively with local governments and private landowners to identify and control invasive plants. Many MIS and Sensitive species in the CEA have been affected by the spread of invasive plants, which are often

less nutritious and less functional than natives as part of wildlife habitats. Invasive plants usually deplete soil and water resources more quickly and aggressively than native plants, thus out-competing them, and reducing the diversity of the vegetation which tends to diminish the value of wildlife habitats in general. Declines in range conditions have been attributed to weed invasions, among other factors, and have affected pygmy rabbit, sage grouse, and big game (winter range) habitats. Wyoming big sage and mountain big sagebrush types are highly susceptible to cheatgrass invasion, especially when disturbance is severe or areas are below 7,500 feet in elevation with southerly aspects (USDA 2006e).

Aquatic habitats become degraded due to invasive plants replacing natives because grasses tend to replace native shrubs and trees that had stabilized banks from erosion (and sedimentation) and shaded the stream, keeping the water temperature low. In riparian areas, tamarisk, whitetop, and Russian olive are slowly replacing native riparian vegetation such as willows and cottonwoods in the CEA. The introduction and establishment of exotic fish species has also affected fish in the CEA, particularly sensitive trout species on the Dixie National Forest. The presence of exotic fish species is one of the factors that have forced salmonids, including sensitive cutthroat trout, into isolated headwater drainages and left species more susceptible to extinction (Rieman et al. 2003).

RECREATION

Overall, recreation on the Forest has increased relative to past levels. A primary cause of the increase is the burgeoning populations in cities such as St. George and in Clark County (i.e., Las Vegas), Nevada. The areas of the Forest close to Interstate 15 (Pine Valley and Cedar City Ranger Districts) receive the largest amount of visitors from Clark County. Use of the forest for recreation has increased in recent years. Now and in the past, most of the recreation on the Forest is and has been centered on hunting and fishing. Hunting and fishing will continue to be the primary recreational activities of visitors to the Dixie, with OHV use the second most popular use. OHV use is reported as secondary use for 13 percent of visitors (USDA 2006d).

There has been an overall increase in OHV use on the Forest (USDA 2006f) and OHV use is considered one of the biggest threats to the National Forest System (USDA 2006f), including the Dixie. With a general increase in OHV use, illegal encroachment of motorized use into non-motorized areas of the Forest has also increased (USDA 2006d). Development of roads into previously unroaded areas could increase access and increase disturbance if the roads are open to the public. OHV use, particularly cross-country travel, has resulted in direct impacts to riparian and upland vegetation as well as noxious weed introductions. OHV use in upland areas can destroy or alter vegetation, or introduce invasive plants, which degrades wildlife habitat. Many sensitive plants, including yellow-white catseye, wildstoe buckwheat, Jones golden aster, and rock tansy, may be directly affected by OHV users (Rodriguez 2004). On the forest, it is anticipated that the proposed Motorized Travel Management Project, which will restrict motorized use to specific trails, will largely eliminate off-trail or cross-country motorized travel. The vast majority of the Monument area within the CEA is classified as “primitive” or “outback” zone, where motorized and mechanized access is permitted on designated routes (“outback”) or is limited to authorized users (“primitive;” BLM 1999). Few sensitive plants discussed in this technical report occur on the Monument or other BLM lands, thus they have generally not been affected by OHV use outside the Dixie National Forest.

MINING AND MINERAL EXPLORATION

The only producing oil field on the Forest is the Upper Valley oil field, which was discovered in 1964 (USDA 1994). The field is located on the southern edge of the Escalante Ranger District and occurs both on the Forest as well as on adjacent portions of the Grand Staircase-Escalante National Monument. It has approximately 28 producing wells (USDA 2006c), with cumulative production of over 22 million barrels of oil. According to the RFDS, the productive area is a

north-northwest trending elongate ellipse that is approximately 8 miles long by 3 miles wide, with and average distance between wells of about 0.3 miles (UGS 1997).

In total, there are over 300,000 acres of oil and gas leases (authorized or pending) within the CEA on BLM lands (BLM, Utah State Office Adjudication Files, January 2008). These areas may or may not be developed in the foreseeable future. On SITLA land, drilling and the establishment of a gas delivery system may occur on or around the John's Valley block in the next 15 years. This area is sage grouse lekking habitat. Sensitive plants that may be affected by energy developments or mining/mineral extraction on the Dixie National Forest in the foreseeable future include Table Cliff milkvetch, creeping draba, wildstoe buckwheat, Neese's pepperplant, and Tushar paintbrush (Rodriguez 2004).

ADDITIONAL REASONABLY FORESEEABLE FUTURE ACTIONS

Projects in the official planning stages on the Forest and BLM that may affect MIS and Sensitive species' habitats are listed below. Minor projects in Federal lands in the foreseeable future not listed below include routine maintenance, range projects, and minor ROW authorizations. Within Bryce Canyon National Park, several walkways, a trail, and a bridge would be rehabilitated in the foreseeable future. Activities in the John's Valley area (SITLA land) are expected to continue at current rates, specifically development on small scale tracts near Bryce Canyon National Park. SITLA developments are also expected to continue in Washington County and around Cedar City.

Project	Project Description	Approximate Project Location	Potential Impacts to Vegetation Resources
Motorized Travel Planning	Would designate identified routes open to motorized use. With designation of a motorized travel system, cross-country travel would generally be prohibited.	All Ranger Districts on the Dixie National Forest	Would limit cross-country travel and lessen impacts to wildlife.
Bumblebee Fuels Treatment	Treatment of forest fuels north of New Harmony for community protection.	Pine Valley Ranger District; 2 miles northwest of New Harmony	Habitat removal: 104 acres (2007), 100 acres (2008); decreased risk of uncharacteristic wildfire that would remove habitat.
Upper Santa Clara River Vegetation and Fuels Project	Project would treat vegetation in and around the Pine Valley Recreation Area. Treatments will include a timber harvest, thinning, brush removal, and prescribed burning. 714 acres were treated in 2007.	Pine Valley Ranger District; southeast of Pine Valley and west of Pine Valley Mountain Wilderness	Habitat removal: 1,662 total treatment acres, of which 352 acres will be treated in 2008, and 596 acres will be treated in 2009; decreased risk of uncharacteristic wildfire that would remove habitat.
Pine Valley Fuels Treatments	Project involves the construction of fuel breaks around the communities of Pine Valley and Central. Approximately 516 acres were treated in 2003 and 2004.	Pine Valley Ranger District	Habitat removal: 217 acres in 2011; decreased risk of uncharacteristic wildfire that would remove habitat.
Duck Creek Fuels Treatment	The Project would treat approximately 13,700 acres on the Cedar City Ranger District to reduce fuels, enhance fire-tolerant	Cedar City Ranger District; four miles east of Navajo Lake along Hwy 14	Habitat removal: Phase II will treat 600 acres and Phase III 2,800 acres in 2008, 10,000+ acres in 2009, 5,000 acres 2010, and 1,500+ acres in

	vegetation, and provide fuel breaks. Phase 1 of the Project treated 2,800 acres in 2007.		2011; decreased risk of uncharacteristic wildfire that would remove habitat.
Pine Valley Campground Bridge Construction	A new vehicle bridge would be constructed across the Upper Santa Clara River. The Bridge will replace an older culvert and will provide for fish passage.	Campground is located 3 miles east of the town of Pine Valley.	Fish passage will be improved with replacement of culvert by a bridge.
Edward Spring Vegetation Treatment	Regenerate habitat species, grass, and aspen using prescribed fire.	Cedar City RD; Approximately 12 miles northeast of Parowan, near Bear Valley	Addition of grassland and aspen habitats: 1,108 acres in 2008
Skyline Drive Widening Project	The City of St. George is proposing to widen Skyline Drive on the north side of St. George to four lanes. A trail is also proposed in the areas to improve recreational trail connectivity in the northern portion of St. George.	Red Cliffs Desert Reserve (BLM) near St. George, Utah (south of Pine Valley Ranger District)	Would remove habitat within the Reserve (within the foreseeable future).
St. George Switchyard Expansion and Red Butte to St. George Power Line Upgrade Project	Upgrade an existing power line from the switchyard to the Red Butte Substation located near the town of Central.	Pine Valley Ranger District and Red Cliffs Desert Reserve ((BLM; south of Pine Valley Ranger District)	Would remove habitat within the Reserve: 29 acres for power line in late 2008-early 2009.
Bear Valley Rangeland & Prairie Dog Habitat Improvement Project	Vegetative treatments (sagebrush disking) would improve rangeland conditions, vegetative diversity, and Utah prairie dog habitat. Road relocation would also occur to protect prairie dog habitat.	Cedar City Ranger District, Iron County, 10 miles northeast of Parowan	Improvement of prairie dog habitat: 10 acres of road obliteration in 2008, 10 acres of vegetation treatments in 2009, and 277 acres of treatments in 2010.
Edward Spring Vegetation Treatment	Regenerate habitat species, grass, and aspen using prescribed fire.	Cedar City Ranger District; Approximately 12 miles northeast of Parowan, near Bear Valley	Vegetation removal and increase in early succession habitat: 1,108 acres to be treated in 2008.
Midway-Deer Valley Scenery Enhancement and Vegetation Treatment	Would remove dead vegetation and decadent aspen, including the salvage logging of dead spruce. The project would also include the construction of 3.8 miles of temporary roads and the prescribed burning of riparian meadows. Approximately 1,400 total	In the Midway-Deer Valley area along State Highway 14, sixteen miles east of Cedar City.	Habitat removal, including spruce, aspen, and meadow; treatments include 600 acres in 2008, 400 acres in 2009, and 200 acres in 2010.

	acres would be treated.		
Dipping Vat Habitat Improvement Project	Thinning of pine forests and the mechanical treatment of sagebrush for habitat improvement and fuels reduction.	Powell Ranger District; East Fork of Sevier River (John's Valley); seven miles north of Tropic	Improvement of sagebrush habitat on 1,132 acres in 2008.
Cooperative Fisheries Enhancement Project	In cooperation with UDWR, establishe native trout populations in 2 streams on the Dixie (also 8 streams on the Fishlake)	Powell Ranger District	Expansion of native trout populations on the Dixie. Implementation is uncertain as project is on hold.
Marshall Canyon Pinyon-juniper Removal	Treatment within an existing chained area to improve wildlife habitat. Treatments include mechanical removal of pinyon pine and juniper, followed by seeding with native forbs and grass mixture.	Powell Ranger District; western portion of Sevier Plateau (Mt. Dutton)	Habitat improvement on 900 acres in 2008.
King Creek Campground Non-Commercial Thinning	Thin heavily stocked ponderosa pine to improve health and vigor in order to make these stands less susceptible to bark beetle attacks.	Powell Ranger District; 10 miles west of Tropic	Removal of pine tree habitat; disturbance should be minor due to use of developed roads
King Creek Campground Thinning	Thin trees in King Creek Campground to prevent insect and disease mortality and remove hazard trees.	Powell Ranger District; 10 miles west of Tropic	Removal of pine tree habitat; disturbance should be minor due to use of developed roads
Mt. Dutton Vegetation Management Project	Remove dead spruce in Pine Creek, Mt. Dutton, and Adams Head area and establish a diverse mixture of conifer and aspen trees with at least 150 live trees per acre. The project would include timber harvest, prescribed burns, reforestation, road reconstruction, and road decommissioning on 5,490 acres in the upper drainages of Hoodle Creek, Willow Spring Creek, Forest Creek, Pine Creek, and North Fork Deep Creek. Approximately 145 acres would occur in the Deer Creek IRA.	Powell Ranger District; 10 miles southwest of Antimony	Habitat removal on approximately 870 acres, including approximately 620 acres in 2009, 200 acres in 2010, and 50 acres in 2011. Conifer and aspen trees would be established, thus creating a more diverse habitat than what existed before the outbreak.
Robinson/Meadow Timber Stand Improvement	Thinning for timber stand improvement.	Powell Ranger District	Loss of trees; 600 acres in 2008 and 600 acres in 2009.
McGath Lake Dam	Repair deteriorated McGath Lake Dam to protect an important fishery.	Escalante Ranger District: 16 miles north of Escalante.	Reduce risk to fisheries in McGath Lake: 2008
Pockets Vegetation	Would include commercial timber harvest, pre-	Escalante Ranger District; eight miles	Conifer (4,721 acres) and aspen (2,647 acres) habitat

Management	commercial stand treatment, fencing, and travel management on 8,564 acres. Nine miles of new roads would be required, seven miles of unauthorized roads would be designated NFS roads, and 13.4 miles of existing NFS roads would be improved.	southeast of Antimony	removal.
Clayton Salvage	Timber salvage of of dead and dying spruce on the Griffin Top Plateau.	Escalante Ranger District, approximately 14.5 miles northwest of Escalante.	Removal of spruce fir habitat: 248 acres.
Toad Salvage	Salvage of dead and dying ponderosa pine in 2008.	Escalante Ranger District	Removal of ponderosa pine trees.
Bug Lake Salvage Project	Salvage dead and dying spruce on 228 acres in 2007 (in progress). Some road reconstruction may be necessary.	Escalante Ranger District; approximately 15 miles northwest of Escalante	Removal of spruce trees.
UNEV Pipeline	Installation of petroleum pipeline from Salt Lake City to Vegas, passing through the west portion of the CEA. Within the CEA, the alignment would follow an established ROW for the Kern River Pipeline, established in 2003.	Pine Valley Ranger District (Dixie) and St. George and Cedar City BLM Districts	Minor habitat disturbance due to pipeline establishment in existing ROW.

6.5.5.3 Cumulative Effects by Alternative

ALTERNATIVE A

Under Alternative A, no new oil and gas activity would occur and there would be no cumulative effects.

ALTERNATIVE B

Under Alternative B, there would be no cumulative effects to any MIS or Sensitive species because direct and indirect impacts from oil and gas activities would be negligible or minor.

ALTERNATIVE C

Cumulative impacts to MIS and sensitive fish would be possible under Alternative C because road crossings are allowed that, if improperly installed, could pose a barrier to trout populations or otherwise affect fish habitat on the Dixie National Forest. Because sensitive fish populations are currently isolated on the Forest, connected actions to oil and gas leasing could have cumulative impacts to the species by isolating populations to the point that persistence of the species could be threatened. MIS and Sensitive fish are also affected by sedimentation, increased water temperature (from shade/vegetation removal), and dewatering that can be directly or indirectly caused by the installation and removal of stream crossings. These impacts, if they occurred, would reduce the amount of suitable habitat for trout on the Dixie National Forest. Cumulative impacts to MIS and sensitive fish could be moderate and be long term. Long term impacts to aquatic habitat are

possible because restoration and mitigation efforts in aquatic habitat are often difficult and not effective at restoring the habitat to its original condition. Successful restoration efforts can take more than ten years, thus impacts to aquatic habitats could be long term. Impacts could be moderate if a portion of aquatic habitat on the Dixie National Forest is no longer suitable for trout, because the Dixie contains the best and most valuable trout habitat in the CEA and trout have few options elsewhere (i.e., on BLM, State, or private lands). Thus, a loss of habitat on the Dixie would be more adverse in the context of the CEA, in which habitat on the Dixie is essential to the persistence of MIS and Sensitive trout species.

Under Alternative C (and D and E), there would also be cumulative impacts to big game. Within the CEA, existing road density and road density increases in the foreseeable future are serious threats to security and other functions of suitable big game range. A further increase in road density associated with oil and gas developments under Alternative C could diminish the effectiveness of remaining habitat areas that currently provide isolation from human disturbances (e.g., traffic, poaching, general human presence) that are essential to big game persistence. A substantial increase in road density from oil and gas activity in the context of road density within the CEA would be a cumulative impact to big game. This impact could be long term if roads are associated with a production well, as roads would probably last for longer than ten years. Cumulative impacts would be minor to moderate, depending on where the roads occur: impacts could be moderate if road density increases in a critical habitat area (such as high value winter range) that currently provides enough isolation to be suitable but that has been impacted in the past by roads. If this area were to become unsuitable for big game then cumulative impacts could be moderate.

ALTERNATIVE D WITH NSO IN IRAS

Cumulative impacts to sage grouse may occur due to fragmentation caused by oil and gas; sage grouse move relatively long distances over land between seasonal ranges, and oil and gas disturbances may contribute to the general discontinuity of sage grouse habitat that has been occurring and is expected to continue in the foreseeable future. In addition, roads and other linear disturbances provide movement corridors for animal predators and recreationalists that directly reduce sage grouse numbers and habitat, respectively. Thus fragmentation in the context of current and foreseeable adverse habitat modifications would be a cumulative impact to sage grouse; this impact could be long term and moderate. Impacts would be long term if a production well were developed in sage grouse habitat. Impacts would be moderate if a production well occurred in the vicinity of a lek or blocked a movement corridor.

Cumulative impacts to MIS and sensitive fish and big game would be as described under Alternative C.

Cumulative impacts to sensitive plants would be possible under Alternative D because SLT stipulations may not be sufficient to avoid partial disturbance of a sensitive plant population. Many sensitive plants occurring on the Dixie National Forest are endemic to or isolated within a small area, thus a loss of a substantial number of individuals in one area could affect the persistence of a sensitive plant species. Cumulative impacts to sensitive plants could be moderate, because the persistence of sensitive plant species could be threatened by oil and gas activities and long term because sensitive plant populations of most species tend to be present in very few areas and most are not likely to recover in numbers within ten years if disturbed.

ALTERNATIVE D WITH CSU IN IRAS

Cumulative impacts to sage grouse, MIS and sensitive fish, big game, and sensitive plants would be these same as described for Alternative D with NSO in IRAs.

ALTERNATIVE E WITH NSO IN IRAS

Cumulative impacts to sensitive raptors would be possible under Alternative E. Considering past, present, and foreseeable future habitat losses to sensitive raptors, connected actions on oil and gas leases may lead to cumulative impacts if a substantial number of any sensitive raptor species fails to successfully reproduce due to nest abandonment as a result of oil and gas disturbances. In the context of past, present, and foreseeable future habitat losses and modification, including from the increasing levels of timber harvest due to insect outbreaks and fire, and encroachment of recreational activities into raptor habitat, the failure of sensitive raptors to reproduce in the remaining suitable habitat could lead to a cumulative impact. Impacts would be short term because displaced raptors would find alternate sites the following year, and would be minor because the viability of raptor species would not be threatened by oil and gas activities.

Cumulative impacts to sensitive bats and pygmy rabbit would also be possible under Alternative E. Considering past, present, and foreseeable future disturbances to sensitive bat habitat, further removal of roosting or foraging habitat due to a production field development in the vicinity of a roost or completely within foraging habitat would constitute a cumulative impact to sensitive bats that would be short term and minor. Pygmy rabbit habitat is also decreasing due to the conversion of sagebrush to pinyon juniper and the influx of invasive grasses, thus a large disturbance of sagebrush habitat for a production field under Alternative E could lead to a cumulative impact on pygmy rabbit. Cumulative impacts to both species would be short term and minor. Impacts to both species would likely be short term because habitats could be restored within ten years.

Cumulative impacts to sage grouse, MIS and sensitive fish, big game, and sensitive plants would be these same as described for Alternative D with NSO in IRAs.

ALTERNATIVE E WITH SLT IN IRAS.

Cumulative impacts to sensitive raptors, sensitive bats and pygmy rabbits would be as described under Alternative E with NSO in IRAs. Cumulative impacts to sage grouse, MIS and sensitive fish, big game, and sensitive plants would be these same as described for Alternative D with NSO in IRAs.

Past Actions	Present Actions	Future Actions	Alternative	Cumulative Effect
Past grazing, fire suppression, and spruce beetle outbreaks have led to the death of large stands of spruce fir. The greatest impacts have occurred in forests on the Cedar City and Powell Ranger Districts. Development on private lands, fires, and the spread of invasive plants has occurred on the Pine Valley Ranger District. Fires have degraded aquatic habitat for sensitive and MIS fish.	Vegetation treatments are in progress to improve wildlife habitats. Bonneville cutthroat trout populations are showing signs of recovery in degraded streams where they have been introduced.	Population growth (and development) and the spread of invasive plants are expected to increase in the foreseeable future. Vegetation treatments designed to improve wildlife habitat including chaining of shrubs and pinyon/juniper, are expected to continue at current levels in the foreseeable future. Introductions of Bonneville cutthroat trout in degraded streams would continue.	**Alternative A** No new leases would be authorized and there would no direct or indirect impacts to Sensitive species' or MIS habitat as a result of oil and gas activity.	There would be no cumulative effects under Alternative A.
			Alternative B Overlapping NL options would prevent direct disturbance to habitat in most areas (65%). NSO would prevent permanent disturbance to habitat on (20%) of the forest. Connected actions could still occur on CSU lands (5%).	There would be no cumulative effects under Alternative B.
			Alternative C NSO would prevent permanent disturbance to Sensitive species and MIS habitat in most areas (73%; includes areas within IRAs). Direct and indirect impacts from seismic activities could occur in most habitats.	Cumulative effects could occur as a result of oil and gas activity in areas degraded by past and future management activities. Specifically, cumulative impacts to sensitive fish could occur if stream crossings were improperly installed and posed a barrier or otherwise adversely affected habitat. Cumulative impacts to MIS and sensitive fish could be moderate and long term. Cumulative impacts could also occur to big game as a result of increased road density; this cumulative impact could also be long term and moderate.
			Alternative D with NSO in IRAs NSO would prevent disturbance from connected actions (except seismic) in 41% of the forest, which includes all IRAs. Most Sensitive species' and big game habitat would be covered by CSU or TL.	Cumulative impacts to sensitive fish and big game would be as described under Alternative C. Cumulative impacts to sage grouse could occur due to fragmentation and could be long term and moderate. Cumulative impacts to sensitive plants could occur if part of a plant population were disturbed; these impacts could be moderate and long term.
			Alternative D with CSU in IRAs NSO would cover 8% of the Forest. Other areas of the forest would be largely available for lease and	Cumulative impacts would be as described under Alternative D with NSO in IRAs.

			impacts from connected actions: 80% of the forest is CSU or TL.	
			Alternative E with NSO in IRAs NSO would prevent disturbance from connected actions (except seismic) in 33% of the forest. Connected actions could occur elsewhere.	Cumulative impacts to sage grouse, MIS and sensitive fish, big game, and sensitive plants would be as described under Alternative D with NSO in IRAs. Cumulative impacts to raptors could occur if a substantial amount of nest abandonment was caused by oil and gas activities; these cumulative impacts would be short term and minor. Cumulative impacts to pygmy rabbit and sensitive bats could also occur if a production field occurred in suitable habitat for either species. Cumulative impacts to pygmy rabbit and bats would be short term and minor.
			Alternative E with SLT in IRAs Direct disturbance from connected actions could occur anywhere on the forest, including all Sensitive species and MIS habitat areas.	Cumulative impacts to raptors, pygmy rabbit, and sensitive bats would be as described under Alternative E with NSO in IRAs. Cumulative impacts to sage grouse, MIS and sensitive fish, big game, and sensitive plants would be as described under Alternative D with NSO in IRAs.

6.5.6 Summary

6.5.6.1 Sensitive Species

For determinations of impacts to the viability of Sensitive species, refer to Table 6.5-11.

SENSITIVE FISHES (BONNEVILLE CUTTHROAT TROUT AND COLORADO RIVER CUTTHROAT TROUT)
Direct and cumulative long-term impacts are possible under Alternatives C, D, and E if road crossings are improperly installed and further isolate fish populations on the Dixie National Forest. Direct and cumulative impacts could be moderate.

PYGMY RABBIT
Minor direct impacts are possible under Alternatives B, C, D, and E from habitat loss or an increase in invasive plants within suitable sagebrush habitat. Noise impacts could be moderate under Alternative E. Cumulative impacts would be short term and minor under Alternative E.

SENSITIVE BATS
Minor to moderate direct impacts are possible under Alternatives C, D, and E from disturbance of foraging habitat or caves. Minor impacts could occur due to noise under Alternative B. Cumulative impacts to foraging habitat would be short term and minor under Alternative E.

SENSITIVE RAPTORS (BALD EAGLE, GOSHAWK, PEREGRINE FALCON, FLAMMULATED OWL)
Direct impacts from habitat loss would be minor under Alternatives B, C, D, and E; impacts to some species would be negligible due to a relatively abundance of habitat. Direct impacts from noise associated with human presence, construction, and other activities would be minor to moderate under Alternative E, and would be moderate if a substantial amount of nest abandonment occurs. Noise impacts are most likely to occur under Alternative E because under other alternatives CSU stipulations would restrict operations during sensitive (nesting) periods. Impacts from noise would depend on the raptor species because some species are more abundant on the Dixie National Forest and threats to persistence vary. Cumulative impacts to raptors would most likely be short term and minor under Alternative E.

SAGE GROUSE
Direct impacts could be moderate under Alternatives D and E with regard to fragmentation of sagebrush habitat. Direct impacts to leks could be moderate or major under Alternative E because leks would likely be abandoned if in the vicinity of oil and gas operations. Cumulative impacts could be long term and moderate under Alternatives D and E.

THREE-TOED WOODPECKER
Directs impacts from a loss of spruce fir habitat would be minor and long term under Alternatives B, C, D, and E (see Specialist Report 10.0 – Vegetation). No cumulative impacts, although three-toed woodpecker numbers may be increasing due to increased spruce beetle levels from large-scale outbreaks.

SENSITIVE PLANTS
Direct and cumulative impacts could be moderate and long term under Alternatives D and E if part of a sensitive plant population is disturbed.

6.5.6.2 Management Indicator Species

BIG GAME (MULE DEER, ELK)

Direct impacts with regard to increased road density in currently dense areas could be moderate and long term under Alternatives C, D, and E. Direct impacts due to noise could be moderate under Alternative E if noise disturbances occurred during a sensitive period. Cumulative impacts could be long term and moderate under Alternatives C, D, and E due to road density increases.

OTHER TERRESTRIAL MIS (TURKEY, FLICKER)

Direct habitat impacts would be minor to moderate and short to long term under Alternatives B, C, D, and E, depending on the vegetation type (see Specialist Report 10.0 – Vegetation). No cumulative impacts.

OTHER AQUATIC MIS (RAINBOW TROUT, BROWN TROUT, BROOK TROUT, CUTTHROAT TROUT, MACROINVERTEBRATES)

Degradation of aquatic habitat is possible under Alternative E and would cause direct and indirect impacts to aquatic MIS (also see Specialist Reports 4.0, 5.0, 7.0, and 8.0). Degradation of aquatic habitat could also violate the LRMP guideline to maintain habitat capability levels and support population goals (see Table 6.5-6). Direct and indirect impacts would be similar to Sensitive trout (6.5.6.1, above). Cumulative impacts could be long term and moderate.

6.6 Compliance with Other Laws and Regulations

The Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act prohibits take of migratory birds, which includes some sensitive raptors discussed in this Specialist Report, and bald eagles. Oil and gas leasing with BMPs properly implemented, including appropriate surveys and mitigations (of the location) prior to disturbance, would prevent take of sensitive raptors, including eagles.

6.7 Forest Plan Consistency Determination

Refer to Section 6.5.4.2 for Forest Plan compliance regarding MIS species.

The LRMP (1986) recommends NSO stipulations in all big game winter ranges (Appendix C:2). Alternatives B, C, D, and E would not be consistent with the LRMP.

The LRMP (1986) recommends NSO stipulations “adjacent to roads, rivers, trails, etc.” (Appendix C:2). Thus Alternatives D and E for Sensitive Fisheries Habitat would not be consistent with the LRMP.

Alternatives C, D, and E (CSU, TL, and SLT, respectively) may also not be in compliance with a guideline Wildlife and Fish Resource Management in Management Area 5B, which recommends “Do not eliminate presence of any browse species” (USDA 1986:4-104).

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Appendix 6A - Stipulation Forms

NO SURFACE OCCUPANCY STIPULATION
Sage Grouse Leks
Alternatives C and D

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

Within 1 mile of sage grouse leks as shown on Figure 6.4-1.
This prohibition includes all surface disturbing activities such as roads, well pads, and other facilities.

For the purpose of:

Preventing any loss of viability to sage grouse populations.

A request for a waiver, exception, or modification (WEM) to the above lease stipulation may be requested along with the submission of a Surface Use Plan of Operations (36 CFR 228.104).
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).
R4-FS-2820-14 (8/92)

NO SURFACE OCCUPANCY STIPULATION
Goshawk Nest Areas
Alternatives B and C

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

Within 0.5 mile of active or occupied goshawk nests.
Prior to any surface disturbing activities in known or suspected nesting areas a two-year survey protocol would need to be completed between March 1 and September 30. If an occupied nest is found, no surface disturbing activities may take place within 0.5 mile of the nest(s). Known goshawk nest areas are confidential and are not shown on any of the maps in the EIS.
Exceptions to this stipulation (i.e., a smaller buffer) can be made if topographic barriers or vegetation screening can be utilized to protect the nest site as determined by the Dixie National Forest.

For the purpose of:

Avoiding any loss of viability to goshawk populations on the Dixie National Forest.

A request for a waiver, exception, or modification (WEM) to the above lease stipulation may be requested along with the submission of a Surface Use Plan of Operations (36 CFR 228.104).
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).
R4-FS-2820-14 (8/92)

NO SURFACE OCCUPANCY STIPULATION
Bald Eagle Winter Concentration Areas
Alternatives B and C

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

Bald eagle winter concentration areas shown in Figure 6.4-1.
This prohibition includes all surface disturbing activities such as roads, well pads, and other facilities.

For the purpose of:

Avoiding a loss of viability to bald eagle populations on the Dixie National Forest.

A request for a waiver, exception, or modification (WEM) to the above lease stipulation may be requested along with the submission of a Surface Use Plan of Operations (36 CFR 228.104).
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).
R4-FS-2820-14 (8/92)

NO SURFACE OCCUPANCY STIPULATION
Peregrine Falcon Nests
Alternatives B and C

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

Within one mile of peregrine falcon nests. This prohibition includes all surface disturbing activities such as roads, well pads, and other facilities.
Prior to any surface disturbing activity such as construction and drilling, in areas where peregrine falcon nests are known to occur, surveys would need to be completed. If active or occupied nests are found, construction and drilling activities would not be allowed within one mile of the nest.
Exceptions to this stipulation (i.e., a smaller buffer) can be made if topographic barriers or vegetation screening can be utilized to protect the nest site as determined by the Dixie National Forest.

For the purpose of:

Avoiding any loss of viability to peregrine falcon populations on the Dixie National Forest.

A request for a waiver, exception, or modification (WEM) to the above lease stipulation may be requested along with the submission of a Surface Use Plan of Operations (36 CFR 228.104).
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).
R4-FS-2820-14 (8/92)

NO SURFACE OCCUPANCY STIPULATION
Sensitive Species and Suitable Habitat; Including Pygmy Rabbit, Flammulated Owl, Three-toed Woodpecker, Sensitive Bats
Alternative B

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).
Habitat areas for these sensitive species shown in Figure 6.4-1.
This prohibition includes all surface disturbing activities such as roads, well pads, and other facilities.

For the purpose of:
Avoiding a loss of viability to populations of these sensitive species on the Dixie National Forest.

A request for a waiver, exception, or modification (WEM) to the above lease stipulation may be requested along with the submission of a Surface Use Plan of Operations (36 CFR 228.104).
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).
R4-FS-2820-14 (8/92)

NO SURFACE OCCUPANCY STIPULATION
Sensitive Fish Habitat
Alternative C

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).

Within a 300-foot buffer zone from the high waterline of streams/lakes with cutthroat trout habitat shown in Figure 6.4-1.
This stipulation applies to all surface disturbing activities, such as roads, pads, powerlines, and pipelines, but allows for perpendicular or near-perpendicular crossings such a needed for linear features like roads, pipelines, and power lines as long as they are designed to minimize effects.

For the purpose of:
Avoiding a loss of viability to sensitive trout populations on the Dixie National Forest.

A request for a waiver, exception, or modification (WEM) to the above lease stipulation may be requested along with the submission of a Surface Use Plan of Operations (36 CFR 228.104).
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).
R4-FS-2820-14 (8/92)

NO SURFACE OCCUPANCY STIPULATION
Sensitive Plant Species and Suitable Plant Habitat
Alternative B

No surface occupancy or use is allowed on the lands described below (legal subdivision or other description).
Suitable habitat and occurrences of sensitive plant species as shown in Figure 6.4-2.
This prohibition includes all surface disturbing activities such as roads, well pads, and other facilities.

For the purpose of:
Maintaining viable populations of sensitive plant species on the Dixie National Forest.
To provide more protections (i.e., a buffer) that can be used to avoid individuals, populations, or clusters of sensitive plant species.

A request for a waiver, exception, or modification (WEM) to the above lease stipulation may be requested along with the submission of a Surface Use Plan of Operations (36 CFR 228.104).
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).
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TIMING LIMITATION STIPULATION

Sage Grouse Brood Rearing Habitat
Alternative D

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

May 1 to July 15. These dates may be adjusted by up to 14 days at each end of this period without a waiver, modification, or exception to this stipulation depending on local expertise (wildlife biologists).

Exceptions to this stipulation can be made if it is determined that the habitat is not being used by sage grouse due to seasonal variations or other conditions.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

Prevent high-intensity oil and gas activities (i.e., construction and drilling) in brood rearing habitat during the primary season of use, which would otherwise decrease habitat capability and brood rearing success.

To avoid a loss of viability to sage grouse populations on the Dixie National Forest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Sage Grouse Brood Rearing Habitat
Alternative C

Surface occupancy or use is subject to the following special operating constraints.

Surface disturbance for oil and gas operations is limited to no more than 1 percent of total habitat (1% = 550 acres), including the areas of avoidance due to human activity (i.e., roads and well pads) with radius/buffer to be determined by the Dixie National Forest. Reclaimed oil and gas disturbance which has met reclamation requirements, is not included in the disturbed/avoidance are calculation.

On the lands described below:

Sage grouse brood-rearing habitat. The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

To avoid a substantial loss of sage grouse brooding habitat and to ensure brood rearing success.

To avoid a loss of viability to sage grouse populations on the Dixie National Forest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

TIMING LIMITATION STIPULATION

Deer and Elk Winter Range – Crucial and Substantial
Alternative D

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

December 1 to April 15. These dates may be adjusted by up to 14 days at each end of this period without a waiver, modification, or exception to this stipulation depending on local expertise (wildlife biologists).

Exceptions to this stipulation can be made if it is determined that winter range is not being used by big game due to seasonal variations or other conditions.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-3.

For the purpose of:

Preventing high-intensity oil and gas activities (i.e., construction and drilling) in crucial and substantial winter range during the primary season of use, which would otherwise decrease habitat capability.

To minimize the potential that deer and elk would avoid the area and thus minimize the potential that those population objectives for UDWR hunt units on the Dixie National Forest would not be met.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

TIMING LIMITATION STIPULATION

Deer and Elk Summer Range – Crucial and Substantial
Alternatives C and D

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

May 15 to July 5. These dates may be adjusted by up to 14 days at each end of this period without a waiver, modification, or exception to this stipulation depending on local expertise (wildlife biologists).

Exceptions to this stipulation can be made if it is determined that the range is not being used by big game due to seasonal variations or other conditions.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-3.

For the purpose of:

To prevent high-intensity oil and gas activities (i.e., construction and drilling) in crucial and substantial summer range during the primary season of use, which would otherwise decrease habitat capability.

To minimize the potential that deer and elk would avoid the area and thus minimize the potential that those population objectives for UDWR hunt units on the Dixie National Forest would not be met.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Deer and Elk Winter Range – Crucial and Substantial
Alternative C

Surface occupancy or use is subject to the following special operating constraints.

Surface disturbance for oil and gas operations is limited to no more than 1 percent of the total crucial and substantial deer and elk winter range in each ranger district. This restriction only applies to disturbed areas associated with oil and gas exploration and development and excludes reclaimed oil and gas sites where reclamation requirements have been met.

For production operations during the wintering season of use (December 1 – April 15), the operator must make all efforts to minimize maintenance activities and the number of trips to the site to those essential for assuring production and site integrity. Well maintenance should be planned in advance to avoid the need for workover rig operations during the restricted period.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-3.

For the purpose of:

Avoiding substantial loss of big game winter range.

To minimize the potential that deer and elk would avoid the area due to human presence and noise, and thus minimize the potential that population objectives for UDWR hunt units on the Dixie National Forest would not be met.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Goshawk Nest Areas
Alternative D

Surface occupancy or use is subject to the following special operating constraints.

Prior to any surface disturbing activities in known goshawk nesting areas a two-year survey protocol would need to be completed between March 1 and September 30. If an occupied nest is found, any high intensity activity such as construction and drilling may be restricted within a 180-acre protection area (approximately 0.3-mile buffer).

Exceptions to this stipulation (i.e., a smaller buffer) can be made if topographic barriers or vegetation screening can be utilized to protect the nest site.

On the lands described below:

Goshawk nest locations are confidential. All known nest areas within the lease area would be surveyed if activities are proposed within these areas.

For the purpose of:

Protecting nesting potential for goshawks by maintaining solitude and ambient noise levels. during the nesting season.

To avoid a loss of viability to goshawk populations on the Dixie National Forest.

To avoid mitigations that would be required for goshawk nest disturbance.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Goshawk Post Fledgling Areas (PFA)
Alternatives B, C, and D

Surface occupancy or use is subject to the following special operating constraints.

Prior to any surface disturbing activity in a goshawk PFA, a two-year protocol survey would be required and would need to be completed between March 1 and September 30. If any occupied or active nests are found within the PFA, high intensity oil and gas activities such as construction and drilling may be restricted in the area of the PFA from 1 March to 30 September or until birds have fledged as determined by District Wildlife Staff.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

Providing for goshawk fledgling survivorship by maintaining solitude and ambient noise levels during the fledgling period within the PFA.

To avoid a loss of viability to goshawk populations on the Dixie National Forest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Bald Eagle Winter Concentration Areas
Alternative D

Surface occupancy or use is subject to the following special operating constraints.

Proposed oil and gas activities in a winter concentration area would require surveys to be completed during the late fall and early winter months. If bald eagles are found in the area, high intensity activities such as construction and drilling may be restricted between December 1 and February 15 if birds are present. For production operations in concentration areas, the operator must make all efforts to minimize maintenance activities and the number of trips to the site to those essential for assuring production and site integrity. Well maintenance should be planned in advance to avoid the need for workover rig operations during the restricted period.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

Avoiding a loss of viability to bald eagle populations on the Dixie National Forest.

To provide protections to bald eagles beyond those in the Bald and Golden Eagle Protection Act by implementing seasonal restrictions.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Peregrine Falcon Nests
Alternative D

Surface occupancy or use is subject to the following special operating constraints.

Prior to any high intensity activity, such as construction and drilling, in areas where peregrine falcon nests are known to occur, surveys for peregrine falcon would need to be completed between February 1 and August 31. If active or occupied nests are found, construction and drilling activities may be restricted from February 1 to August 31 within one mile of the nest.

On the lands described below:

Peregrine falcon nest locations are confidential. All known peregrine falcon nest areas would be surveyed prior to activities where operations are proposed within one mile of the nest.

For the purpose of:

Protecting nesting potential for peregrine falcons by maintaining solitude and ambient noise levels during the nesting season.

To avoid a loss of viability to peregrine falcon populations on the Dixie National Forest.

To avoid mitigations that would be required if a peregrine falcon nest were disturbed.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION
Sensitive Bat Habitat

Alternatives C and D

Surface occupancy or use is subject to the following special operating constraints.

Prior to any oil and gas activities within 0.25 miles of a cave, bat surveys would need to be completed between October 1 and May 1 in accordance with USFS protocol. If winter hibernacula (winter roost sites) are located, high intensity activities such as construction and drilling may be restricted from October 1 to May 1 within a 0.25-mile buffer around cave entrances.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

Avoiding a loss of viability to sensitive bat populations on the Dixie National Forest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Pygmy Rabbit Habitat
Alternatives C and D

Surface occupancy or use is subject to the following special operating constraints.

Prior to any oil and gas activities within suitable habitat for pygmy rabbit, surveys would need to be completed. If colonies are located, high intensity activities such as construction and drilling will be restricted year-round within a 100-meter buffer around the estimated center of the colony.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

Avoiding a loss of viability to pygmy rabbit populations on the Dixie National Forest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Flammulated Owl Habitat
Alternatives C and D

Surface occupancy or use is subject to the following special operating constraints.

If any oil and gas activity is requested within suitable habitat for flammulated owl, surveys would need to be completed before oil and gas activities can occur in the area. If owls are detected or nests located, any high intensity activity such as construction and drilling may be restricted within a one half mile buffer around the estimated center of the territory from April 1 to September 30.

On the lands described below:

The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

Avoiding a loss of viability to flammulated owl populations on the Dixie National Forest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

CONTROLLED SURFACE USE STIPULATION

Sensitive Fish Habitat
Alternative D

Surface occupancy or use is subject to the following special operating constraints.

No surface disturbing activities (with the exception of perpendicular crossings for linear facilities such as roads, power lines, and pipelines) would be approved unless the operator demonstrates that they have taken all reasonable measures to minimize soil disturbance. Special conventions beyond normal operating practices may be required in these areas.

On the lands described below:

Streams that support sensitive fish populations. The habitat area for which this stipulation applies is shown in Figure 6.4-1.

For the purpose of:

Avoiding a loss of viability to sensitive fish populations on the Dixie National Forest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820).

Appendix 6B - Dixie National Forest Oil and Gas Construction and Operating Standards and Well Site Design Requirements

Dixie National Forest Oil and Gas Construction and Operating Standards and Well Site Design Requirements

I. INTRODUCTION

The following operating standards and well site design requirements would be required by the Dixie National Forest for oil and gas facilities and operations to assure consistency with management objectives for the Forest. These operating standards should not be confused with stipulations contained in the applicable Federal oil and gas lease(s) which specify requirements regarding surface occupancy and timing within the specific areas in the lease. Operating standards must be consistent with the rights and restrictions established in the applicable lease(s) and are applicable to all drilling and production operations, unless otherwise approved by the responsible officer based on site-specific conditions.

These operating standards supplement the general requirements of the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (Gold Book) and Best Management Practices in place by the responsible agencies at the time of approval, and the Forest Service, Region 4 Oil and Gas Roading Guidelines. Copies will be made available to operators at first notification of proposed operations.

Authority to require such standards is provided by the Mineral Leasing Act of 1920, as amended, Federal Regulations at 36 CFR 228.106-108 (Submission, Review, and Requirements of Surface Use Plans of Operations) and 43 CFR 3162.3 (BLM procedures for approval of post-lease applications for operations).

II. PURPOSE

These operating standards have been developed to help operators meet agency and Forest requirement when planning operations and preparing their Surface Use Plan of Operations and to assure overall consistency with Forest Service management objectives/direction. They have been developed based on experience with oil and gas operations on National Forest System lands as needed to prevent or mitigate effects and conflicts with other uses.

III. PROCESS

Approvals of proposed operations on lease are subject to the application, review, and approval provisions specified in Onshore Oil and Gas Order No. 1, other Onshore Oil and Gas Orders, and all applicable laws and regulations. Surface disturbing proposals must be evaluated under the requirements of the National Environmental Policy Act of 1969 and the Energy Policy Act of 2005. Operators are encouraged to obtain these operating standards from the Forest Service early in the planning and approval process and to incorporate them into their Surface Use Plans of Operations to help streamline the NEPA analysis and approval process. If not incorporated into the initial SUPO, the Forest Service will work with the operator to revise the SUPO to include them or may otherwise require them as Conditions of Approval (COA).

Other standards or mitigations may be required based on site-specific evaluations of proposed activities. They may be modified if needed to address site-specific conditions. Operators are required to comply with all other applicable laws and regulations.

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IV. OPERATING STANDARDS

These standards apply to the lease holder, contractors, and their sub-contractors. The term "operator" as used herein, includes the lease holder and/or company authorized to conduct operations on the lease or their contractors, subcontractors, and all employees or agents thereof.

1. The operator shall submit for review and approval, a detailed construction and maintenance plan for all exploration and production facilities and roads to be constructed or improved (reconstructed) for operations. Unless otherwise approved by the responsible Forest Service officer, pad designs must be consistent with requirements contained in the Dixie National Forest Well Site Requirements (Attachment 1). A road-use permit (or specific approval as part of the Surface Use Plan of Operations) must be obtained from the Forest Service for commercial use, improvement, and maintenance of National Forest System roads under authority of the National Forest Roads and Trails Act. Road designs must be generally consistent with the Forest Service guidelines provided in the Oil and Gas Roading Guidelines, R-4.

2. The designs for roads, pads, and other facilities are subject to approval by the Forest Service. The designs must be approved and signed by a qualified licensed engineer. Any modifications to approved plans are subject to Forest Service review and approval.

3. Existing roads will be used to the extent possible as long as the existing alignment can be used or improved to the required standard. Additional roads or rerouting of existing road segments, if needed, shall be minimized and approved by the Forest Service prior to construction. Roads or road segments replaced and/or abandoned by construction of new roads or rerouting must be reclaimed by the operator. Road locations and designs must be generally consistent with the Forest Service guidelines provided in the Oil and Gas Roading Guidelines, R-4.

4. Locate and design roads and drainage structures to prevent slope failure and minimize impacts on water quality. To the maximum extent feasible, locate facilities, including service and refueling areas, on benches upslope from streams, lakes, ponds, riparian areas, and floodplains.

5. A pre-construction meeting including the responsible company representative(s), contractors, and the Forest Service must be conducted at the project work site prior to commencement of operations. Earthwork must be construction staked prior to this meeting. Approval of the designs and earthwork staking by responsible Forest Service official is required prior to beginning earthwork.

6. A Spill Prevention Control and Countermeasures (SPCC) Plan consistent with the current EPA Region VIII Oil and Hazardous Substances Regional Contingency Plan must be filed with the Forest Service and approved by the authorized officer prior to conducting any construction and operations on National Forest System lands. The plan must address the potential for spills to occur from haulage of materials and supplies to the construction/operations site(s) as well as drilling and production facilities. Material Safety Data Sheets (MSDS) for all potentially hazardous substances used for operations used for operations must be available on-site. Operators must be trained in MSDS protocols.

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7. All surface disturbing activities, including reclamation, must be supervised by a qualified on-site responsible designated company representative(s) familiar with the approved plans as well as terms and conditions of approval. The designated representative(s) must be available for contact within the vicinity of the project area or by telephone at all times that operations are in progress. The name and contact telephone number of the designated company representative(s) must be filed with the responsible Forest Service official. A copy of all approved permits with specifications relative to operations in the project area must be available for inspection at the project site.

8. Topsoil must be salvaged from the area to be disturbed, stored, and protected from erosion and contamination until redistributed over recontoured areas for reclamation. The depth of topsoil to be salvaged must be determined though testing and approved by the Forest Service. Methods of topsoil handling and storage must be approved in project plans and specifications and/or appropriate project permits.

9. All vegetation removed by operations must be stored, used for reclamation, or disposed of as approved in project permits or as specified by the Forest Service. The operator must reimburse the Forest Service for the fair market value of all merchantable timber removed or damaged during operations. Prior to vegetation disturbance/removal all noxious weeds must be removed from the site and handled by approved methods needed to prevent spread of seeds.

10. Where determined appropriate by the responsible Forest Service officer, the operator may be required to bury pipelines and powerlines in or adjacent to roads to reduce surface disturbance and visibility. Designs must provide sufficient depth of cover and signs to indicate the type of pipeline(s), location, and depth to prevent damage from road maintenance and other surface disturbing activities in conformance with applicable Federal and State regulations.

11. Where feasible and appropriate, the operator will be required to centralize production facilities, use telemetry to monitor wells, and delay non-essential maintenance activities in important wildlife habitat during critical seasons of use to reduce the number of vehicle trips to the sites and activity that could disturb or stress wildlife.

12. Where needed to protect wildlife, the operator will be required to construct fences and/or nets on reserve pits or use other approved methods to prevent wildlife use or entrapment.

13. Stream crossings will be planned and constructed to minimize disturbance of the riparian and aquatic habitats by locating crossings at the most advantageous location and by crossing at or near the perpendicular. Structures must be designed to allow fish passage as needed to maintain habitat. Measures must be taken to minimize disruption of stream substrate. When no longer needed for operations, crossings must be removed and the stream and banks restored to pre-disturbance conditions/stream hydraulics. Sediment control measures must be used to minimize sediment introduction during all operations. Timing restrictions (construction and reclamation) may be needed to protect fisheries as coordinated with the Utah Division of Wildlife Resources and through permitting with the Utah Division of Water Rights, Stream

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Alteration Program.

14. Unless otherwise specified by the responsible Forest Service officer, new oil and gas access roads shall be closed to the public. Operators must construct and maintain gates to Forest Service design standards at intersections of project access roads with National Forest System roads or other highways to prevent unauthorized traffic from entering. A locking system will be required to allow a Forest Service lock in addition to the operator's lock.

15. Off-road vehicle travel is prohibited unless specifically approved in project permits.

16. Roads used for drilling and production operations which remain open to public traffic must be properly signed to warn the public of project traffic and associated hazards. Signs must be consistent with the Manual on Uniform Traffic Control Devises, Federal Highway Administration.

17. Vehicle operators must obey posted speed restrictions. If speed restrictions are not posted, the operator and contractors must observe safe speeds commensurate with weather and road conditions.

18. Watering and/or application of appropriate dust suppressants shall be used if dust becomes a concern for visibility and sediment transport. Suppressants and application procedures are subject to approval by the responsible Forest Service officer.

19. Unless otherwise approved by the responsible Forest Service officer, all production pads will be fenced to prevent entry by the public and livestock. Designs and specifications are subject to Forest Service approval.

20. Sediment control structures will be used to catch sediment at the base of fill slopes on exploration and production pads. If silt fences are used, they must be constructed with adequate support and maintained to assure that they function at all times, including the winter season and spring runoff.

21. Establishment of staging areas or camp areas outside of the area permitted for surface disturbing operations for project personnel (operator or contractors) on National Forest System lands is subject to Forest Service approval.

22. All permanent survey markers within the area to be disturbed, including section corners, benchmarks, geodetic survey monuments, etc. must be located and flagged for protection prior to any surface disturbance activities. Disturbance or relocation of monuments requires the approval of the agency responsible for their use and preservation.

23. Water needed for operations must be obtained in accordance with State water law. The location and design of diversions on National Forest System lands are subject to review and approval of the responsible Forest Service official.

24. The operator and all contractors shall take measures needed for the prevention of fires started as a result of their operations and to suppress fires that are started as a result of their operations. Fire suppression equipment must be available to all personnel in the project area consisting of shovels, axes, and other appropriate hand tools. At least

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one properly rated fire extinguisher must be available in each vehicle and around all machinery such that they are readily assessable for suppression of fires. During times of severe fire danger when fire restrictions are implemented by order of the responsible Forest Service officer, all operations must be conducted in conformance with the order. The operator may be required to submit and implement a Fire Prevention/Suppression Plan for review/approval by the responsible Forest Service official.

25. All vehicles and other gasoline/diesel-powered equipment must be equipped with properly functioning spark arresters and mufflers. Spark arresters must meet Forest Service specifications in accordance with USDA Forest Service Spark Arrester Guide.

26. The operator will be held responsible for damage and suppression costs for fires started as a result of operations. Fires must be immediately suppressed to prevent spreading and must be reported to the responsible Forest Service officer.

27. The operator must maintain structures, facilities, improvements, and equipment in a safe and neat manner and in accordance with approved permits. The operator must take appropriate measures in accordance with applicable Federal and State laws and regulations to protect the public from hazardous or conditions resulting from the operations. Such measures must include, but are not limited to, posting signs, building fences, or otherwise identifying the potentially hazardous site or condition.

28. All accidents or mishaps resulting in resource/property damage and/or serious personal injury must be reported to the responsible Forest Service officer as soon as possible.

29. The operator may be required to locate pads and facilities in areas where they can be effectively screened from view from sensitive areas. Production facilities must be located and designed to minimize visibility from sensitive viewing areas. Painting of facilities with a non-reflective paint in the color that would best blend with the background will be required. The color will be determined by the operator with approval of the responsible Forest Service officer.

30. The operator must comply with all applicable laws and regulations pertaining to the storage, use, and disposal of hazardous substances and solid or liquid waste. All fluids, chemicals, and solid wastes must be properly contained on-site. Reserve pits, catchment ponds, and bermed areas must be constructed to prevent seepage into the ground or adjacent areas. A minimum of 2-feet of freeboard must be maintained in all reserve pits and ponds at all times to prevent overflow and spillage into adjacent areas.

31. Chemical containers should not be stored on bare ground or exposed to the sun or moisture. Containers and labels are subject to degradation and punctured drums could leak contents onto the ground. Chemical containers should be maintained in good condition and placed within secondary containment in case of a spill or puncture. Secondary containment facilities must be of sufficient size to contain all appropriate fluids, including diesel or other fuels.

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32. Sanitary facilities must be available to operators and contractors in the project area and properly used and maintained to prevent pollution. The installation of sanitary facilities, other than self-contained chemical toilets is subject to State and Forest Service approval.

33. Unless other methods are specifically approved, all solid wastes, contaminated soil materials, drill cuttings, petroleum products, and other fluids must be properly contained on-site. Disposal of associated waste materials must be at a facility licensed by the State to accept such materials.

34. Harassment of wildlife is prohibited. Pets must be properly restrained to prevent harassment of wildlife, livestock, government officials, and the public.

35. Move-in and move-out of heavy construction and drilling equipment will not be allowed during the opening weekends of the general big-game hunts or holiday weekends (including the observed holiday) from noon the previous day until midnight on Sunday or the observed holiday. Use and maintenance of National Forest System roads is regulated under authority of the National Forest Roads and Trails Act and the National Forest Management Act.

36. Vegetation seeding methods and seed mixes (species and amounts) used for interim and final reclamation must be approved by the Forest Service. Reclamation and revegetation plans and standards for success must be approved in project plans or permits. All vegetation materials, seeds, soil amendments, and sediment control materials must be certified that no noxious weed seed or noxious weeds are present. The operator is responsible for control and eradication of noxious weeds in project area, and the control and eradication of any invasive plant species not present at the site prior to operations, until such time as reclamation standards are met and the company is relieved of further reclamation responsibilities.

37. Vehicles and equipment shall be free of mud, soil, plant materials, and other debris which could contain noxious weed seeds prior to coming onto the Forest. This is needed to avoid transporting noxious weeds, or invasive species to sites on the Forest.

38. The operator shall follow Forest guidelines designed to prevent the introduction and spread of aquatic nuisance species (Dixie and Dixie National Forest Supplement, Forest Handbook 2509.16, chapter 1.

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Dixie National Forest Well Site Requirements

V. WELL SITE DESIGN REQUIREMENTS

A. General Requirements

The operator should propose locating the well site in cooperation with Forest Service personnel on the most nearly level location obtainable that would accommodate the intended use. However, potential well site locations should not be evaluated on the basis of site conditions alone. Access to the well site for road and possible future pipeline locations must also be considered in determining the most suitable location. What may be gained on a good location could be lost from an adverse access route. Plan the well site from the long-term standpoint, assuming a discovery could be made. Future pipeline locations are to be proposed by the operator as a part of his proposal on each well site.

Adjust the well site layout to conform to the best topographic situation. Avoid disturbance of drainages and locate reserve pits away from water courses. Deep vertical cuts and long fill slopes should be avoided. The cut and fill volumes should be balanced, excluding the topsoil and subsoil needed to backfill the reserve pit.

A contour map shall be developed for all well pad locations as an aid in the design of pad settings to the existing topography. This will allow the operator to plan the construction of facilities and the surface manager to evaluate impacts and calculate the bond more expeditiously and accurately. Maps should be prepared to a scale of 1 inch equals 20 feet horizontally and a contour interval of 2 feet vertically, or as otherwise directed by the responsible Forest Service officer.

Once this information is compiled, finished site elevations, cut and fill slopes and their respective catch points, drainage, balanced earth work, adequate storage area locations and other necessary construction features shall be determined and included with the drawings/specifications. Submittals shall include a well site plan (see Drawing No. 1), details of berms, diversion ditches, pits, catchments and other appurtenances and design features. Provide data to support drainage structure design.

B. Clearing

The site must first be cleared of all brush and trees. All merchantable timber must be purchased by the operator prior to cutting, at the appraised price determined by the Forest Service. Grasses and small shrubs need not be removed; however appropriate measure will be required to prevent the spread of noxious weeds and nuisance species prior to starting excavations if they occur on the site. Trees and brush will be disposed of by removal from the Forest, by burning, chipping, or other approved methods needed to prevent the spread of insects. Tree trunks less than 8 inches in diameter and slash can be stockpiled at an approved location to be spread over reclaimed areas. Burning permits will be required and are issued by the Forest Service. Burning would only be permitted if the fire danger is low to moderate.

C. Topsoil Removal and Storage

Surface soil material (topsoil), if present, will be stripped from all areas where surface

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disturbance is necessary and stockpiled. All topsoil will be removed in a separate layer, avoiding mixing with other excavated materials, and stored in a stockpile to prevent loss from erosion or contamination, and from which topsoil may be easily recovered. The depth of surface soil material to be removed and stockpiled will be specified by the Forest Service but will generally include the A Horizon. The topsoil and subsoil stock piles must be located to prevent contamination from the blooie line, flare line, and other operations. Stockpiles shall be contained by silt fencing, ditches and traps or other containment measures to prevent erosion, contamination and loss. If topsoil stockpiles are to remain for more than a single season, seeding with an approved seed mix will be required to minimize loss from erosion and preserve fertility and biological activity.

D. Site Grading

Cut and fill slopes will be such that stability can be maintained for the life of operations. Cut and fill slopes will be constructed as follows (exceptions can be made depending on the type and competency of material encountered):

Height of Slope	Slope
0 – 5 feet	3:1
6 – 10 feet	2:1
over 10 feet	1.5:1

All fills will be free of vegetation and will be compacted in lifts no greater than 12 inches in thickness to a minimum of 90 percent Proctor dry density sufficient to prevent excessive settlement.

The drill site or pad surface will be surfaced with crushed gravel to a depth sufficient to support anticipated loads throughout the life of the well. Usually a depth of 12 inches of gravel is required.

E. Site Drainage

Diversion ditches having the minimum dimensions of 3 feet horizontal to 1 foot vertical (3:1 ditch) will be constructed around the site to divert existing drainages and surface runoff from flowing onto the site. Hydraulic design for ditches is required to determine capacity. The ditch(s) will be located at the top or base of the cut slope (to be determined based on site-specific conditions) and around the toe of the fill slopes (see Drawing No. 1 – Construction Requirements for Typical Well Sites). Straw dykes, catch basins, energy dissipaters or other approved structures will be constructed in the ditch outflow to trap any sediment and dissipate erosive flows. Provide data to support drainage structure designs. A culvert might be necessary where the access road enters the site.

A berm will be constructed around the perimeter of the site to contain all precipitation, spills, and other fluids from leaving the site. The berm will be a minimum of 18 inches high, 12 inches wide at the top, and have 1.5:1 side slopes. Berms will be compacted for stability and to reduce permeability as needed to contain fluids. The site surface will be graded at a minimum of 1 percent to drain to the reserve pit. Use silt fencing, ditches and traps or other containment at toe of fill slopes to prevent erosion and contamination.

The drainage pattern to be constructed will need to be designed for each site, depending on

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site-specific conditions.

F. Construction and Maintenance of Reserve Pits

Reserve pits will be constructed of sufficient size and capacity for the necessary fluids for drilling and to contain any runoff from the drill site. The pad will be graded to empty into the reserve pit or alternative pit or buried tank. Winter operations may require larger pits/tanks due to snow accumulations and runoff. Pits will not be constructed within intermittent or perennial drainage channels. If the operator has concerns that drainage from the pad could contaminate reserve pit muds, the pad can be constructed to drain into alternative lined pits or buried containment tanks.

It is preferred that pits be constructed in undisturbed materials and below the natural ground level to minimize the risk of failure. Where conditions exist that require pits to be constructed of embankment materials, the following criteria are required:

1. The area on which the embankment is to be placed will be cleared of all materials including vegetation, topsoil, and unconsolidated soils and gravels.

2. A foundation keyway will be designed and constructed into native materials to dimensions based on site-specific conditions to provide adequate anchoring and sealing of the embankment.

3. The embankment will be constructed using impermeable materials on slopes of 3:1 into the pit and 2:1 outside the pit. The embankment will have a minimum of 10-foot top width. The materials will be compacted to 95 percent Proctor density.

The following are requirements for construction and maintenance of all reserve pits:

4. Pits must be constructed to contain fluids without leaks throughout the life of operations. If pit liners other than clay coatings are used they must be constructed of sufficiently durable and watertight materials to prevent leakage. Compacted bedding material consisting of sand, clay, or other grout may be required to prevent rocks from puncturing the liner and to seal cracks.

5. A minimum of 2-foot freeboard will be maintained in the pit at all times during the drilling operations or if the pit is left unreclaimed over the winter.

6. If wildlife concerns exist, netting or some other approved method will be used to prevent wildlife use of the pit.

G. Site Reclamation for Nonproductive Wells

Reclamation of the entire site will be required and will commence immediately after drilling, testing, and well plugging/abandonment are complete. The site will be restored to as nearly as practical to its original condition (approximate original contour). Cut and fill slopes will be reduced and graded to conform to the adjacent terrain.

Reserve pits must be allowed to dry before they are backfilled. Fluids that will not dry must be removed from the Forest. All polluting substances or contaminated materials, such as oil,

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oil-saturated soils and gravels will be removed and disposed of at a State licensed facility licensed to receive these materials. Exceptions to allow for reserve pit solidification may be made if the operator can demonstrate to the responsible Forest Service officer that this method would be effective based on site-specific conditions.

Drainages will be reestablished and temporary measures will be required to prevent erosion on the site until all reclamation and revegetation standards established for the site are met.

In general, the well identification standpipe will be set such that it can be buried by at least two feet of soil. A final determination will be made on a case-by-case basis.

After final grading and before replacement of topsoil, the entire surface of the site shall be scarified to eliminate slippage surfaces and promote root penetration. Topsoil will be spread over the site to achieve approximate uniform stable thickness consistent with the established contours.

The site will be seeded and/or planted with a seed mix as approved in the SUPO or as otherwise approved by the responsible Forest Service officer. Nutrients and soil amendments will be applied to the disturbed surface soil needed to meet the revegetation standards.

A temporary fence will be constructed around the site until reclamation standards have been met. The fence design is subject to Forest Service approval will be designed to prevent entry by livestock or wildlife as needed for the specific area. The fence must be maintained such that it is functional at all times as intended to prevent livestock use and unauthorized access by the public. The operator is responsible for damages to the reclaimed condition of the site due to unauthorized access until final reclamation standards are met and the fence is removed. The operator will be responsible for eradicating noxious weeds and nuisance species each season until the final revegetation standards have been met. Once all reclamation standards have been met, the operator is responsible for removal of the fence, gate, and associated structures and materials.

H. Site Reclamation for Producing Wells

Interim and final reclamation for producing wells will be accomplished for portions of the site not required for the continued operation of the associated facilities. All disturbed surfaces will be treated to prevent erosion and to compliment the esthetics of the area. A new site plan will be required encompassing the facilities required for operation and interim reclamation measures. Generally, the following measures will be required:

1. The reserve pit will be reclaimed as previously discussed.
2. All polluting substances and contaminated materials, including contaminated soil and gravels will be disposed of as previously discussed.
3. All cut and fill slopes and other disturbed areas not needed for production operations will be contoured to match the surrounding area, topsoiled, and revegetated as previously discussed.
4. The berm will be reestablished on the production pad where removed to accomplish the reclamation discussed in the previous item.

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5. The pad perimeter and reclaimed area will be fenced. Once reclamation standards have been met for the reclaimed portion of the original pad the fence will be relocated onto the perimeter of the production pad.
6. Measures such as painting facilities an appropriate color, and other practical measures will be used to decrease visibility of the site as viewed from sensitive areas such as roads, highways, and recreation areas. Noise suppression devices and submersible pumps (if feasible) may be required as needed to meet scenic, wildlife, and recreation objectives for the area.

I. Site Maintenance

The site will require periodic maintenance to ensure that drainages remain functional and that surfaces are properly treated to reduce erosion, contamination, fugitive dust, invasion by undesirable plant species, and impacts to the adjacent areas.

All garbage, debris, and foreign materials shall be contained on site in a cage or other enclosure then will be removed to an established/licensed landfill or other recognized facility.

J. Site Reclamation for Production Wells

When production pads and production facilities are no longer needed, the facilities must be removed and final reclamation measures completed as previously prescribed for nonproductive wells. Abandoned or unneeded facilities will be removed/reclaimed within two years. In place abandonment of any facilities such as powerlines, pipelines, etc. will require approval of the Forest Service. If approved, appropriate measures to stabilize and decontaminate them will be required.

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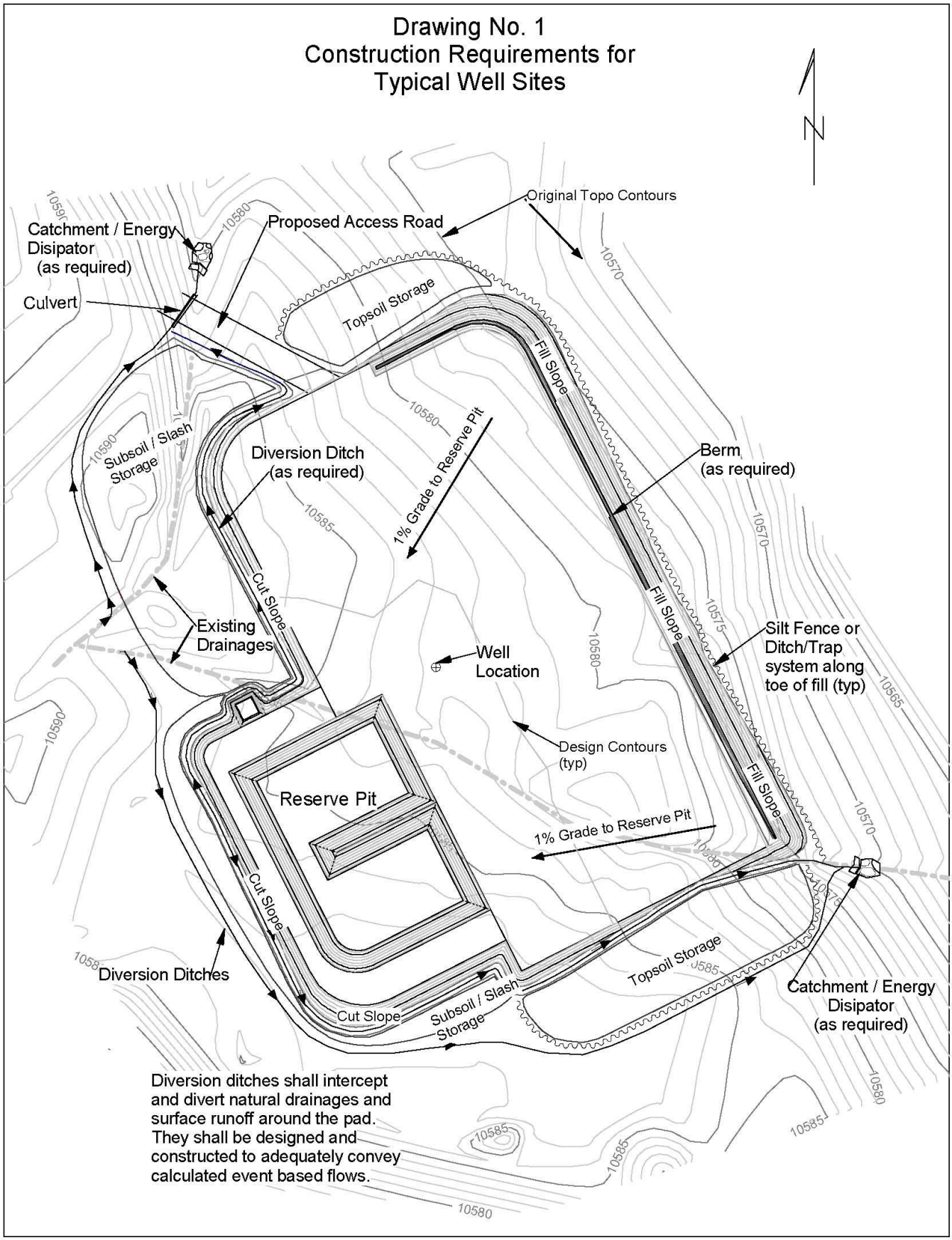
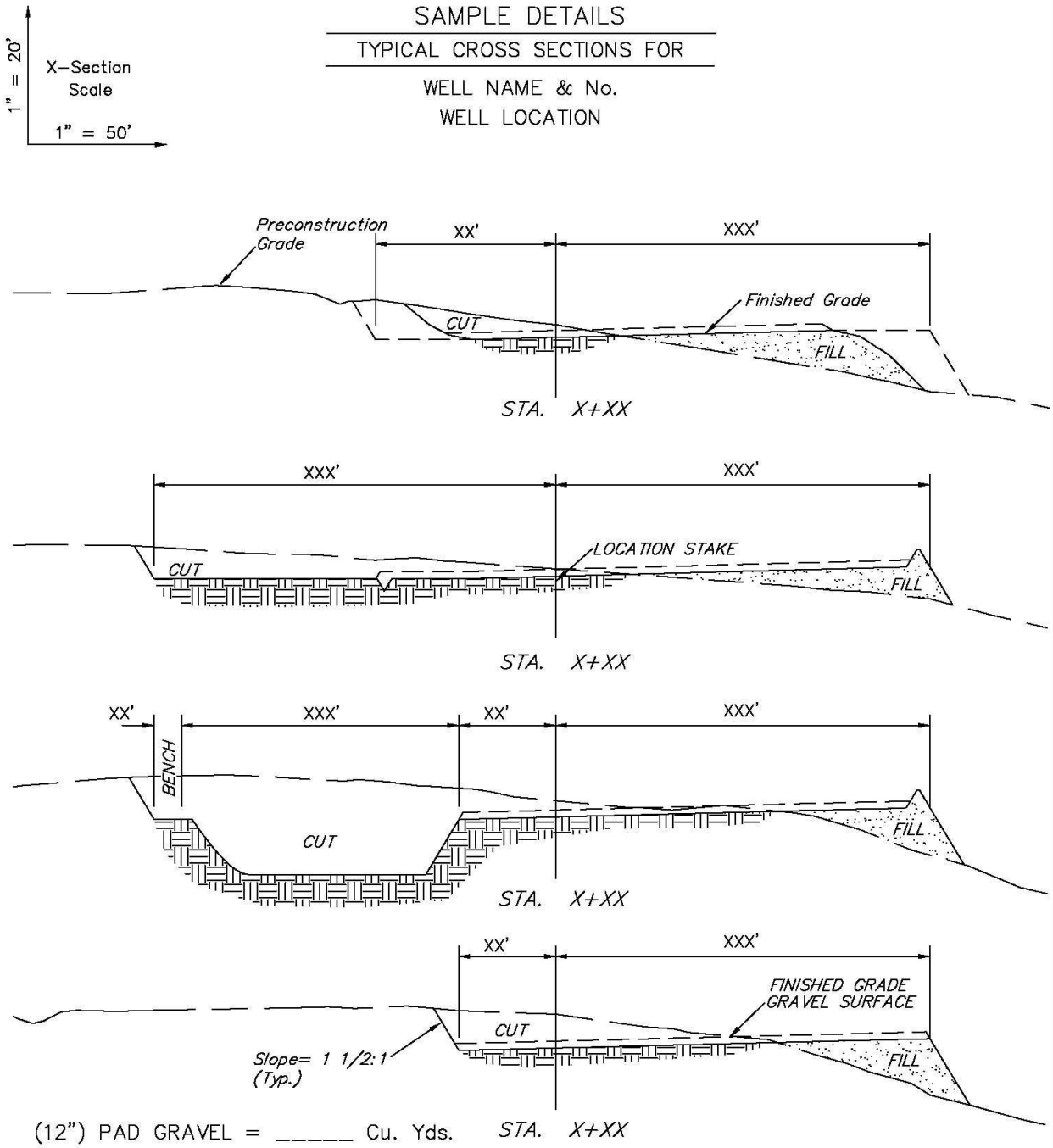
Drawing No. 1
Construction Requirements for Typical Well Sites



SAMPLE DETAILS

TYPICAL CROSS SECTIONS FOR

WELL NAME & No.
WELL LOCATION



(12") PAD GRAVEL = _____ Cu. Yds.

NOTE:
FILL QUANTITY INCLUDES
__% FOR COMPACTION

APPROXIMATE YARDAGES

CUT

Topsoil Stripping (based on xx") = _____ Cu. Yds.

Remaining (excavation) = _____ Cu. Yds.

TOTAL CUT = _____ CU.YDS.

FILL = _____ CU.YDS.

TOPSOIL STORAGE REQUIRED = _____ Cu. Yds.

SUBSOIL STORAGE REQUIRED = _____ Cu. Yds.