

**Appendix E**  
**Nesting Raptor Survey Report,**  
**February 2012**

# LAKE POWELL PIPELINE PROJECT NESTING RAPTOR SURVEY REPORT

PREPARED FOR



**MWH GLOBAL, INC.**  
671 EAST RIVERPARK LANE  
SUITE 200  
BOISE, IDAHO 83706

PREPARED BY



LOGAN SIMPSON  
DESIGN INC.

**LOGAN SIMPSON DESIGN INC.**  
51 WEST THIRD STREET  
SUITE 450  
TEMPE, ARIZONA 85281

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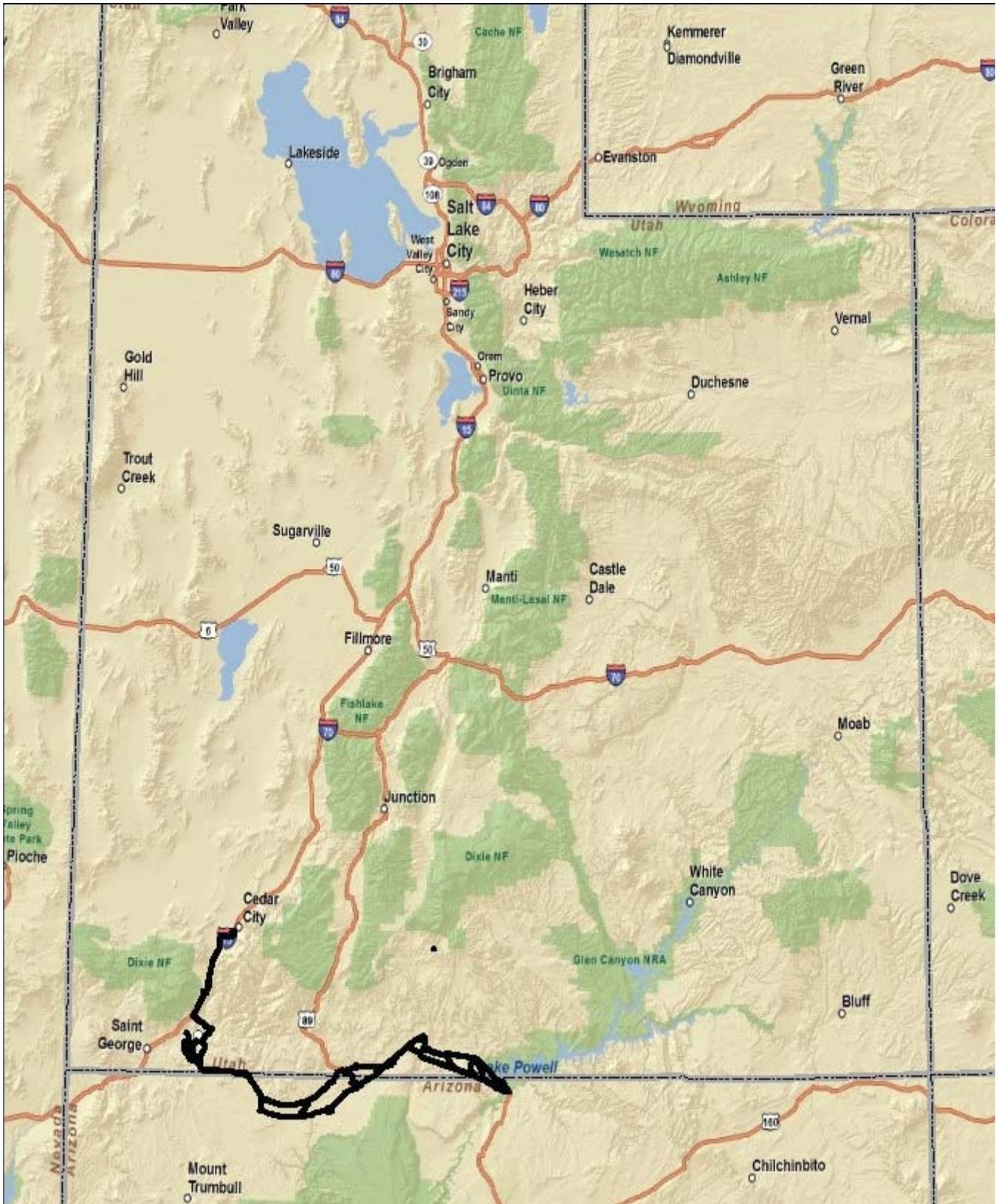
## 1. INTRODUCTION

The Utah Board of Water Resources has proposed a project, the Lake Powell Pipeline (LPP), which when constructed, would deliver water from Lake Powell at Page, Arizona west to St. George, Utah (Map 1). The pipeline project consists of approximately 139 miles of buried pipeline, water intake facilities at Lake Powell, buried and surface water storage reservoirs, irrigation system turnouts, in-line hydro-stations, hydro-electric generation facilities, and transmission lines on federal, state, and private lands in Kane and Washington counties in Utah; and Coconino and Mohave counties in Arizona. Potential alignments include the existing Arizona Highway 389 alignment which crosses the Kaibab Indian Reservation and the southern alignment bypassing the Reservation to the south. The LPP Project no longer extends into Iron County, although it included portions of Iron County when the survey was performed in 2011.

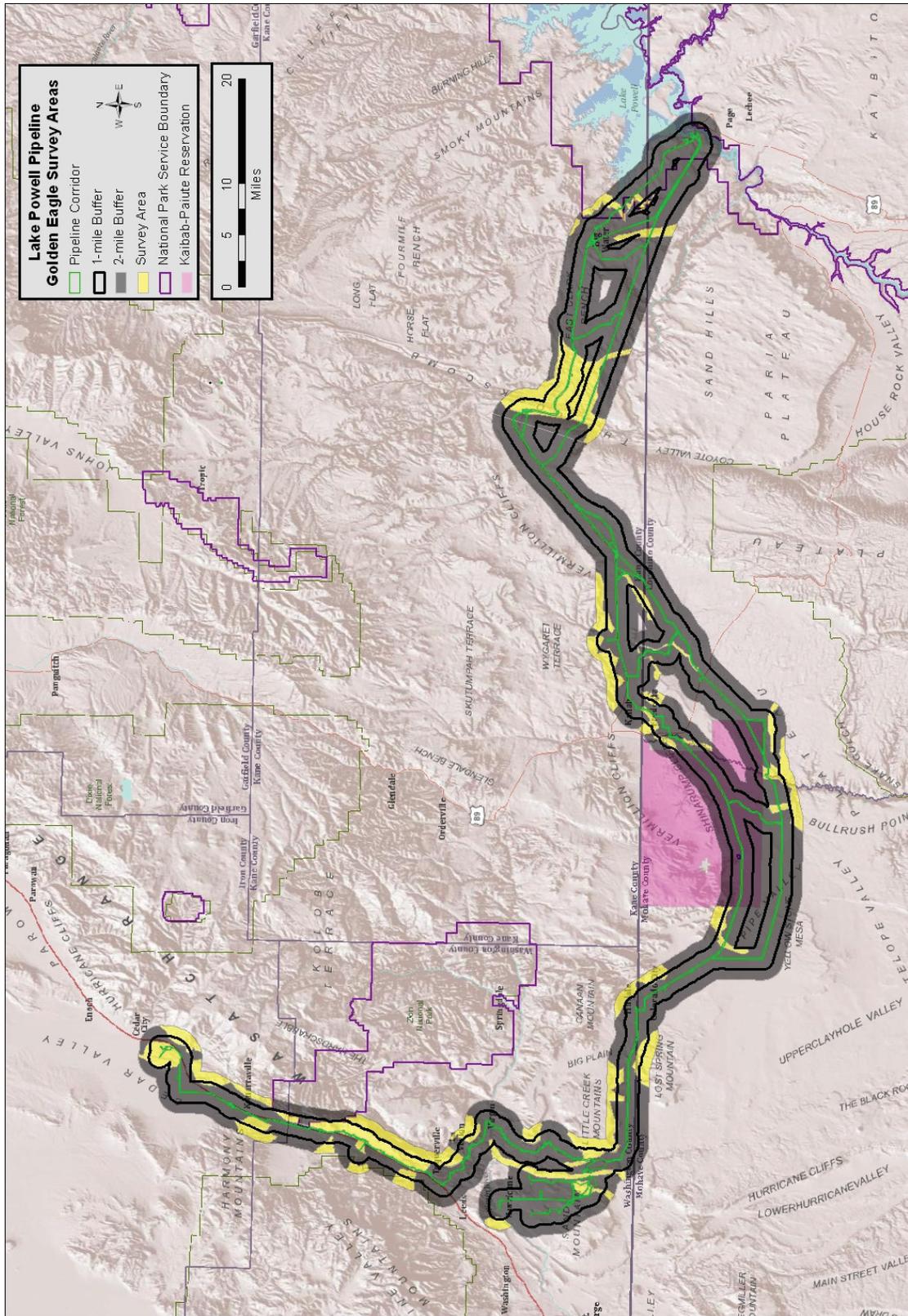
Logan Simpson Design Inc. (LSD) conducted preliminary surveys in October 2011 for nests of diurnal birds of prey (e.g., hawks, eagles, and falcons), specifically emphasizing golden eagles (*Aquila chrysaetos*) in October 2011. This report documents the survey routes, and the potential birds of prey nests observed during the survey. Surveys were conducted within the pipeline corridor, which has a defined width of 150 feet, and within a 1- and 2-mile buffer extending perpendicular from the center of the corridor, producing up to a 4-mile wide evaluation area paralleling the centerline of the corridor (Map 2).

## 2. SPECIES BACKGROUND

Birds of prey (raptors) are protected wildlife and are widely accepted indicator species of environmental quality, due in part to being at the top of the biological food chain and therefore sensitive to environmental changes within their habitats (Romin and Muck 2002). A variety of birds, small mammals, reptiles, amphibians, fish, and insects comprise the bulk of prey for raptor species. Some raptors will feed on carrion as well as live prey, some feed specifically on few prey types (e.g., fish), while other raptors feed on a wide variety of prey. Raptors are inherently mobile and forage over wide areas; however, wintering habitats requirements may differ significantly from nesting habitat requirements. Raptors will use a greater array of habitat types than many avian species, on both a daily and seasonal basis. The types and variety of biotic communities and topographic diversity present in any given area will largely determine the species, density, and distribution of raptors that may be present (Gliniski 1998). In Utah, 16 species of diurnal raptors are known to occur, these include: 12 species in the order Accipitriformes (eagle, hawks, kites, vultures, and ospreys) and four in the order Falconiformes. Table 1 includes a listing of these 16 species and information regarding nest placement by each.



Map 1 State location map



**Map 2**  
**Nesting raptor survey areas within the Lake Powell Pipeline corridor**

**Table 1. Typical nesting substrate of raptors in Utah (from UDNR 2011).**

Species	Conifer Tree	Broadleaf Tree	Pinyon/ Juniper	Cavity Nest	Cliff Nest	Utility Structure	Building	Ground
Bald eagle	X	X						
Northern goshawk	X	X						
Ferruginous hawk			X		X			
Golden eagle		X			X			
Peregrine falcon					X		X	
Red-tailed hawk	X	X	X		X			
Prairie falcon					X			
Swainson's hawk		X	X			X		
Osprey	X	X				X		
Northern harrier								X
Sharp-shinned hawk	X		X					
Cooper's hawk	X	X	X					
Turkey vulture					X			
California condor								
Merlin	X							
American kestrel				X				

Threats and Protections

The general life history of raptors include long life spans, low reproductive rates, and specific habitat requirements for nesting and foraging that make raptor populations particularly vulnerable to disturbances. Increasing disturbance and alteration of habitat from industrial, municipal, transportation, and recreational activities have potential to negatively affect raptor populations (Romin and Muck 2002). Threats to golden eagles include direct and indirect human-caused mortality, disturbance, and the elimination of prey by habitat alteration (Tesky 1994). Urbanization, illegal shooting, trapping, lead poisoning, and collisions with powerlines have caused declines in populations. Climate change, prolonged drought, and invasive species altering prey densities adversely affect golden eagle prey populations. The status of raptors in Utah was and is considered uncertain (Romin and Mack 2002); stable for some species and declining for others (Whittington and Allen 2008; Smith et al 2008; Hawk Migration Association of North America [HMANA] 2011). Proponents of land-use activities are responsible for determining potential impacts to raptors from those activities, as well as for the development of strategies for conserving raptor populations and their habitats associated with the proposed land-use actions (Romin and Mack 2002; Whittington and Allen 2008).

Raptors are considered migratory birds, and as such come under the authority of the Migratory Bird Treaty Act (MBTA) of 1918 (16 United States Code 703–712) administered by the U.S. Fish and Wildlife Service (USFWS). The MBTA prohibits the unlawful taking of any migratory bird or any part, nest, or egg, except permitted by regulation. “Take” includes any attempt to hunt, pursue, wound, shoot, kill, trap, capture, possess, or collect any migratory bird, nest, egg, or part thereof. The prohibition against killing birds contained within the MBTA applies to both intentional and unintentional harmful conduct (Romin and Muck 2002). Eight of Utah’s raptors are also included as special status species by the Bureau of Land Management (BLM) and currently receive additional consideration from the BLM in assessing project related impacts (BLM 2008).

Golden eagles receive federal protection under the MBTA and the 1962 amendments to the Bald and Golden Eagle Protection Act (Eagle Act; 16 United States Code 668-668d). The Eagle Act prohibits the "taking" of bald and golden eagles. This Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." "Disturb" means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: 1) injury to an eagle; 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (16 United States Code 668c; 50 CFR 22.3). In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

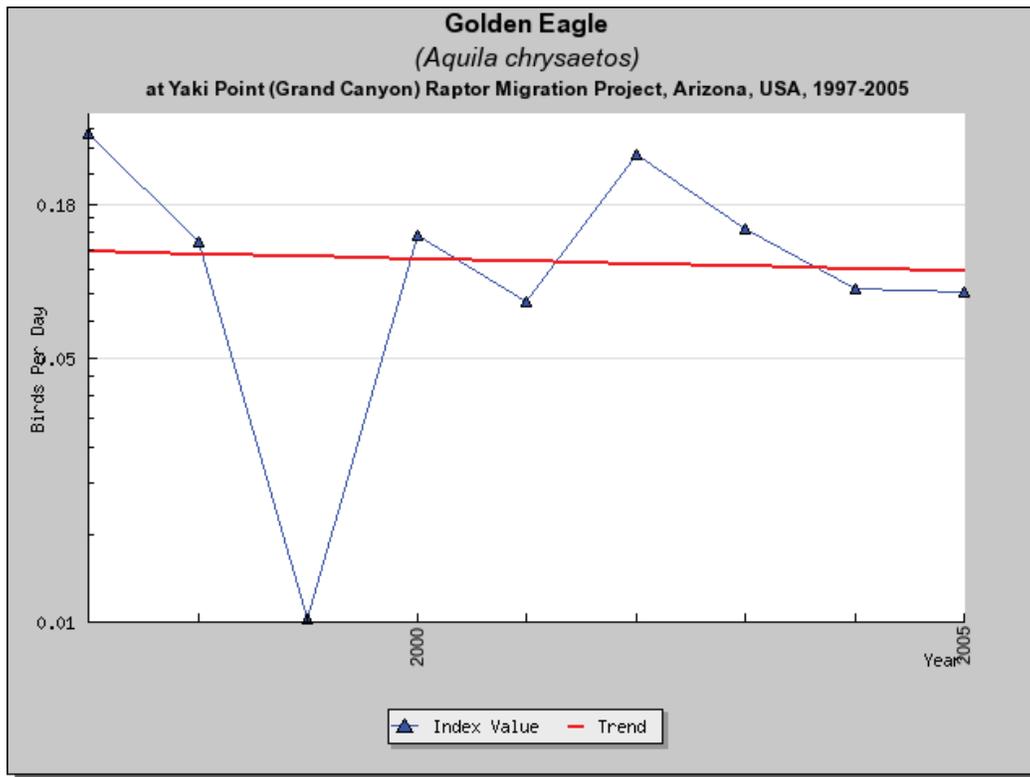
### Golden Eagle Life History Information

Golden eagles are an upper trophic-level aerial predator that forages on reptiles, birds, and mammals up to the size of mule deer fawns and coyote pups, and also scavenge and utilize carrion (USFWS 2010). Studies of golden eagle nests in central Arizona revealed that jackrabbits were the most frequently captured prey (Glinski 1998), with medium sized mammals such as ground squirrels and prairie dogs being secondary prey (Glinski 1998; Corman and Wise-Gervais 2005). The nesting season of golden eagles is prolonged, extending more than six months from the time eggs are laid to until young are independent (Kochert et al 2002 in Corman and Wise-Gervais 2005). In North America, the golden eagle breeds from northern and western Alaska east through the Northwest Territories to Labrador, south to Baja California and northern Mexico, into central Texas, western Oklahoma, and western Kansas. Golden eagles nest on cliffs, in the upper one third of large deciduous and coniferous trees, or on artificial structures such as windmills or electrical transmission towers. Nests are built in locations that afford an unobstructed view of the surrounding habitat (Glinski 1998; Corman and Wise-Gervais 2005; USFWS 2010). Golden eagles construct large, flat or bowl-shaped nests. Existing nests may also be used and altered with additional sticks and soft material (USFWS 2010). Nest size varies, from large and multi-layered to a small augmentation of sticks in caves with little material other than extant detritus (USFWS 2010). Pairs may have several alternate nests within a territory, but only one nest is chosen for egg-laying. Golden eagle mating occurs between late February and early March in Utah. Golden eagles normally lay two eggs (Glinski 1998) that are incubated by the female for 45 days, with juveniles remaining in the nest for 60-75 days. Adults care for post-fledgling birds for an additional 30 days. Family units may stay together for several months after fledging. Eaglets do not reach adulthood until the fourth or fifth year. Golden eagle pairs commonly refrain from laying eggs in some years, particularly when prey, especially rabbits, are scarce. Therefore the number of young that golden eagles produce each year largely depends on a combination of weather and prey population cycles (Kochert et al 2002 in Corman and Wise-Gervais 2005).

Eagles make use of distinct geographic areas and landscape features throughout their home range. The USFWS defines these locations for golden eagles as "important eagle-use areas" that include "an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that is essential for the continued viability of the site for breeding feeding or sheltering eagles" (USFWS 2009).

Golden Eagle populations are believed to be declining throughout their range (Pagel et al 2010), as well as locally in northern Arizona (unpublished Arizona Game and Fish Department data). A declining trend has also been noted in migrating golden eagle observations documented locally at the Grand Canyon during the last decade

(Figure 1; HMANA 2011; USFWS 2010; Smith 2010; Smith et al 2008; Kochert and Steenhof 2002). Due in part to recent declines in golden eagle populations, the USFWS has provided guidance that can be used by agencies for avoiding and minimizing disturbance and other kinds of take, including short and long-term site-specific monitoring of local golden eagle populations (USFWS 2010). Additionally the BLM has established seasonal restrictions in proximity to some nesting raptors (BLM 2008; BLM 2010).



**Figure 1**  
**Yaki Point (Grand Canyon) Raptor Migration Project Site Profile (HMANA 2011)**

### 3. METHODS

There is minimal information available on diurnal raptors within the LPP project area that allows for the site-specific determination of raptor species occurrence, nesting, winter roosting, foraging, and other important raptor habitats. As such, information from a broad range of sources was used, including data provided in the Utah Department of Natural Resources (UDWR) Raptor Survey Guidelines (UDWR 2002). Searches for raptor nests and raptor breeding territories focused on species-specific suitable nesting habitat. This initial survey for unoccupied nest structures was conducted in suitable nesting terrain and habitat types (e.g., cliffs, ridges, and in areas with mature trees) utilizing appropriate methods for conducting raptor surveys (e.g., aerial surveys and ground surveys). Prior to conducting raptor nest surveys and applying the USFWS definition of “important eagle-use areas”, potential important raptor-use areas were identified within the project corridor and within a 1- and 2-mile corridor buffer, providing a 4-mile wide evaluation area paralleling the centerline of the LPP corridor. The 4-mile wide evaluation area was designed to be essentially consistent with Pagel et al (2010) and spatial buffers recommendations (Appendix A). Potentially important raptor-use areas were delineated using topographical and aerial maps as a background in ArcMap, and included areas suitable for raptor nesting, such as canyons, cliffs, and areas with trees of variable height. In addition, the locations of suitable artificial structures such as power

transmission line towers were identified. These potential raptor-use areas became the focus of both the aerial surveys and ground based follow-up surveys. Raptor nest searches were conducted October 4-6, 2011, outside the period of active nest use by these raptor species. As such, observation data was limited to unoccupied raptor nests structures and incidental observations of raptors present within 2 miles of the proposed LPP development corridor.

Aerial surveys were conducted in a Robinson R44 Series helicopter (Figure 2) with two or three biologists as observers and data recorders. Aerial surveys were conducted following techniques described in Pagel et al 2010 and UDWR 2011. The helicopter was flown with doors off on two of three survey days to make observations easier and to increase the field of vision for biologists (Figure 3). Surveys were flown with the doors-on on the third day due to cooler temperatures and threat of heavy rains. Biologists scanned cliff faces for signs of nesting, nests, and whitewash (white streaks of avian excrement). Large trees and power lines were also scanned for nests from the air. Aerial surveys in areas with dense canopy cover should not be considered 100 percent coverage surveys. It is difficult and time consuming to conduct 100 percent coverage surveys in dense vegetation. Aerial surveys in the areas with dense canopy structure included passing over the areas more than once and from different angles. Ground surveys of potentially suitable cliff habitat were conducted where areas were inaccessible to the helicopter. Spotting scopes and binoculars were utilized during ground surveys where biologists maneuvered as close to a cliff as possible in a vehicle and then used optical equipment to identify perching and nesting areas.

Data collected during surveys conducted on October 4-6 was recorded on the LPP Raptor Survey Datasheet (Appendix B). Information collected included date and time of the survey; the type, size, and condition of the nest; the Universal Transverse Mercator (UTM) coordinates for nests and observed golden eagles; and a photograph log documenting nests and golden eagles. Daily track logs of flight and survey routes were also recorded on hand held Garmin CSx60 Global Positioning System (GPS) units.



**Figure 2**  
**Helicopter used for aerial surveys**



**Figure 3**  
**Helicopter with doors off**

## 4. RESULTS

### Habitat Description

The proposed project area lies in southwestern and south central Utah and north central Arizona. Three main ecological regions, the Colorado Plateau, Great Basin, and Mohave Desert, are represented within the project area. The vast majority of the project area occurs within the Colorado Plateau Ecological Region, from Page, Arizona to the community of Hurricane, Utah. The project area north of Hurricane to Cedar City occurs within the Great Basin Ecological Region. The Mohave Desert Ecological Region is represented by the area southwest of Hurricane. Diverse landforms, geologic exposures, and elevation gradients present across the project area contribute to the biodiversity and unique character of the vegetation of the ecological regions.

Habitat suitable for nesting by several species of raptors within the project area includes cliffs, large broadleaf and conifer trees in undisturbed native habitats, large trees within agricultural areas, and also artificial nesting structures such as electrical transmission towers and power poles. Many cliff systems exist within the 1- and 2-mile buffer survey area (Figures 4 and 5). Cliff systems include the Hurricane Cliffs from south of Hurricane north to Cedar City, the Vermilion Cliffs of the Moccasin Mountains from east of Hurricane to east of Kanab, Utah, and the Shinarump Cliffs near Fredonia, Arizona. Riparian areas consisting of large broadleaf trees available for potential nesting include Ash Creek Reservoir (Figure 6), and sections of the Virgin River and Kanab Creek. Large, isolated trees and electrical transmission towers are also available near rural residential areas including Cedar City and Colorado City, Arizona.

Land ownership in the pipeline corridor and 1- and 2-mile buffers includes federal, state, tribal, and private. The largest percentage of land ownership in the pipeline corridor includes large tracts of public lands administered by the BLM. Most of the available cliff habitat is unaltered and suitable for nesting (as evidenced by the number of nests found), even when occurring near residential developments in the vicinity of Hurricane and Fredonia.

### Surveys

Both aerial and ground based surveys were conducted during the same three-day period of October 4-6, 2011. During the aerial survey, 21.3 helicopter flight hours (includes ferry time) were expended over three consecutive days to survey 667 flight miles within the pipeline corridor and the 1- and 2-mile buffers (Map 3). Ground survey crews were comprised of three to four biologists working in pairs or singularly. Ground survey effort totaled 72 team hours over the three days. Total survey effort consisted of the 21.3 aerial survey hours and 72 ground-based survey hours. A total of 142 individual nests (Table 2; Map 4; Figures 7-9) were documented; 91 nests were located within the 1-mile buffer and 51 nests were found within the 1- to 2-mile buffer. The vast majority of nests were located on cliff habitats (129 nests, 91 percent of all nests; Table 2), with nine tree nests (six percent of all nests; Table 2), and four transmission tower nests (three percent of all nests; Table 2) documented. Surveys of cliff nesting raptors ordinarily are initiated in early May when most raptor chicks have generally hatched and parent birds would be less likely to abandon a nest from survey disturbance. Raptor surveys are generally completed by June 1 to ensure that the chicks are young enough that they will not be prematurely flushed from the nest by survey disturbance (UDWR 2011). This initial survey was conducted in October 2011, and therefore the species that constructed the nest or last year's occupancy and nesting success could not be determined in most cases. However, nine adult golden eagles were observed, four of which (Figures 10 and 11) were near recorded nest sites. Additionally two ferruginous hawk nests and four raven nests (based on nest size, structure, and substrate) were identified during the survey.

Table 2 also includes the approximate UTM coordinates for a Cooper's hawk nest confirmed during willow flycatcher surveys conducted by LSD biologists along Short Creek at Canaan Gap, and burrowing owls observed

during vegetation surveys along the East Clark Bench, west of Page. It should be noted that LSD biologists have observed numerous raptors along the LPP corridor while conducting vegetation surveys between 2009 and 2011. It was not uncommon to observe both golden eagles and red-tailed hawks perched on power poles adjacent to Highway 389 between Colorado City and east of Fredonia.

**Table 2. Raptor nest survey results includes all raptor nest structures documented within the 1- and 2-mile buffers, as well as golden eagles observed during surveys with no nest observed nearby.**

Unique Identification Number	Easting UTM Zone 12, NAD83	Northing UTM Zone 12, NAD83	Survey Date	Nest Structure			Nest Substrate		
				Stick Nest	Ledge Nest	Pothole Nest	Cliff	Tree	Power pole
147	294611	4106550	10/03/11	1			1		
148	294611	4106550	10/03/11	1			1		
150	294611	4106550	10/03/11	1			1		
152	299930	4119392	10/04/11	2			2		
24	307453	4163199	10/04/11	1				1	
Above nest located in an isolated tree									
25	306982	4162637	10/04/11	1				1	
Above nest located in a juniper tree; Ferruginous hawk nest									
119	314891	4167752	10/04/11	1					1
103	296330	4130335	10/04/11	1			1		
Above entry includes an adult golden eagle near observed nest									
127	303335	4147706	10/04/11			1	1		
Above nest is a potential raven nest									
129	303125	4147497	10/04/11			1	1		
Above nest is a potential raven nest									
11	303175	4145910	10/04/11	1			1		
12	303146	4145449	10/04/11	1			1		
13	302846	4143996	10/04/11	1			1		
14	305481	4152313	10/04/11	1			1		
16	306780	4154554	10/04/11	1			1		
17	306665	4154290	10/04/11	1			1		
18	306565	4154184	10/04/11	2			2		
19	306414	4153993	10/04/11	1			1		
20	307121	4154783	10/04/11	2			2		
120	307526	4163885	10/04/11	1				1	
Above nest is a grass nest located at the top of the tree									
26	310745	4168195	10/04/11	1				1	
Above nest located in a juniper tree									
27	310761	4168265	10/04/11	1				1	
Above nest located in a juniper tree									
28	310363	4168499	10/04/11	2				2	
Above nest located in a juniper tree									
121	306948	4159015	10/04/11	1				1	

Unique Identification Number	Easting UTM Zone 12, NAD83	Northing UTM Zone 12, NAD83	Survey Date	Nest Structure			Nest Substrate		
				Stick Nest	Ledge Nest	Pothole Nest	Cliff	Tree	Power pole
Ferruginous hawk nest									
104	298221	4134344	10/04/11			1	1		
101	303146	4119430	10/04/11	1			1		
2	298623	4125784	10/04/11						
Above entry is a Golden eagle observed with no nest observed nearby									
4	298208	4127860	10/04/11	1			1		
5	298108	4128407	10/04/11	1			1		
6	298321	4128975	10/04/11						
Above entry is a Golden eagle observed with no nest observed nearby									
7	298194	4130040	10/04/11	1			1		
8	300847	4135968	10/04/11	1			1		
9	302772	4142897	10/04/11	2			2		
15	304263	4151307	10/04/11						
Above entry is a Golden eagle observed with no nest observed nearby									
102	301918	4119468	10/04/11		1		1		
95	418338	4107282	10/05/11	1			1		
133	415427	4111089	10/05/11		1		1		
134	455774	4088741	10/05/11	2			2		
135	442034	4091816	10/05/11	1			1		
136	388108	4098166	10/05/11		1		1		
137	383662	4102469	10/05/11	1			1		
138	382250	4101289	10/05/11	1			1		
139	380305	4101814	10/05/11	1			1		
140	376233	4101508	10/05/11	1			1		
141	374748	4100157	10/05/11	1			1		
96	387995	4101525	10/05/11	1			1		
142	367598	4095835	10/05/11	1			1		
143	367320	4095164	10/05/11	1			1		
144	366530	4094531	10/05/11	1			1		
145	365834	4094141	10/05/11	1			1		
146	364227	4094342	10/05/11	1			1		
29	323099	4094760	10/05/11	1				1	
Above nest located in a cottonwood tree									
64	360761	4090573	10/06/11	1			1		
107	294819	4100563	10/06/11	1			1		
108	294838	4101187	10/06/11	1			1		
45	287053	4118204	10/06/11	1			1		
46	303918	4122437	10/06/11	1			1		
123	333604	4082481	10/06/11	3			3		

Unique Identification Number	Easting UTM Zone 12, NAD83	Northing UTM Zone 12, NAD83	Survey Date	Nest Structure			Nest Substrate		
				Stick Nest	Ledge Nest	Pothole Nest	Cliff	Tree	Power pole
124	337097	4081268	10/06/11	1			1		
105	287196	4117813	10/06/11	1			1		
47	336663	4075215	10/06/11	2			1 <sup>4</sup>		1
Above nest is a potential raven nest									
48	338848	4074482	10/06/11	1					1
Above nest is a potential raven nest									
49	350616	4074252	10/06/11	1					1
50	352462	4074403	10/06/11	1			1		
51	351937	4073617	10/06/11	1			1		
52	354854	4072129	10/06/11	1			1		
53	354630	4072508	10/06/11	1			1		
54	354034	4072577	10/06/11		1		1		
55	356531	4073708	10/06/11	2			2		
56	357254	4074554	10/06/11	1			1		
57	363470	4093937	10/06/11	3			3		
58	363141	4092269	10/06/11	2			2		
59	362672	4091828	10/06/11	1			1		
60	362429	4091303	10/06/11		1		1		
106	294836	4099797	10/06/11	2			2		
61	361712	4090976	10/06/11		1		1		
62	360584	4089997	10/06/11	1			1		
63	360627	4089921	10/06/11	1			1		
109	294922	4104158	10/06/11	1			1		
65	333953	4083219	10/06/11	1			1		
66	333620	4083302	10/06/11	1			1		
67	333604	4083303	10/06/11	1			1		
68	332690	4083967	10/06/11	1			1		
110	294555	4106282	10/06/11	1	1		2		
69	310974	4099728	10/06/11	1			1		
111	294594	4106823	10/06/11	1			1		
70	303742	4100628	10/06/11	2			2		
112	294553	4107387	10/06/11	1			1		
71	300272	4100785	10/06/11	2			2		
72	300135	4100413	10/06/11	1			1		
73	300285	4100760	10/06/11	1			1		
113	294751	4108781	10/06/11	1			1		
74	299662	4101499	10/06/11	1			1		
75	299321	4101953	10/06/11	1			1		
76	299187	4102500	10/06/11	1			1		

Unique Identification Number	Easting UTM Zone 12, NAD83	Northing UTM Zone 12, NAD83	Survey Date	Nest Structure			Nest Substrate		
				Stick Nest	Ledge Nest	Pothole Nest	Cliff	Tree	Power pole
77	299149	4102607	10/06/11						
Above entry is a Golden eagle observed with no nest observed nearby									
80	299455	4104385	10/06/11	1			1		
114	294762	4109425	10/06/11	1			1		
81	301338	4106604	10/06/11	1			1		
82	302050	4112770	10/06/11	1			1		
83	301940	4112739	10/06/11	1			1		
84	301736	4112791	10/06/11	1			1		
85	302071	4112554	10/06/11	1			1		
86	301578	4112875	10/06/11	1			1		
87	302996	4113254	10/06/11	1			1		
115	295052	4110246	10/06/11	2			2		
88	302710	4121990	10/06/11	1			1		
89	301998	4123494	10/06/11	1			1		
90	298745	4118673	10/06/11	1			1		
116	294797	4111027	10/06/11		1		1		
Above entry is a falcon scrape									
91	312000	4100103	10/06/11	1			1		
92	311685	4100034	10/06/11	1			1		
93	312920	4100582	10/06/11	1			1		
30	296855	4114272	10/06/11	1			1		
31	296381	4113625	10/06/11	1			1		
32	296374	4113787	10/06/11	1			1		
33	296298	4112009	10/06/11	1			1		
34	296495	4111637	10/06/11	1			1		
35	296571	4111466	10/06/11	1			1		
36	296556	4111392	10/06/11	1			1		
37	296532	4111389	10/06/11	1			1		
38	296305	4111687	10/06/11	1			1		
39	295476	4110413	10/06/11	1			1		
40	295515	4109291	10/06/11	1			1		
41	295965	4104133	10/06/11	1			1		
42	295886	4103645	10/06/11		1		1		
43	295127	4106340	10/06/11	1			1		
44	295175	4106299	10/06/11	1			1		
153	312078	4098191		1				1	
Above entry is a Coopers hawk nest									
154	425852	4104870							
Above entry is the location where Burrowing owls were observed									



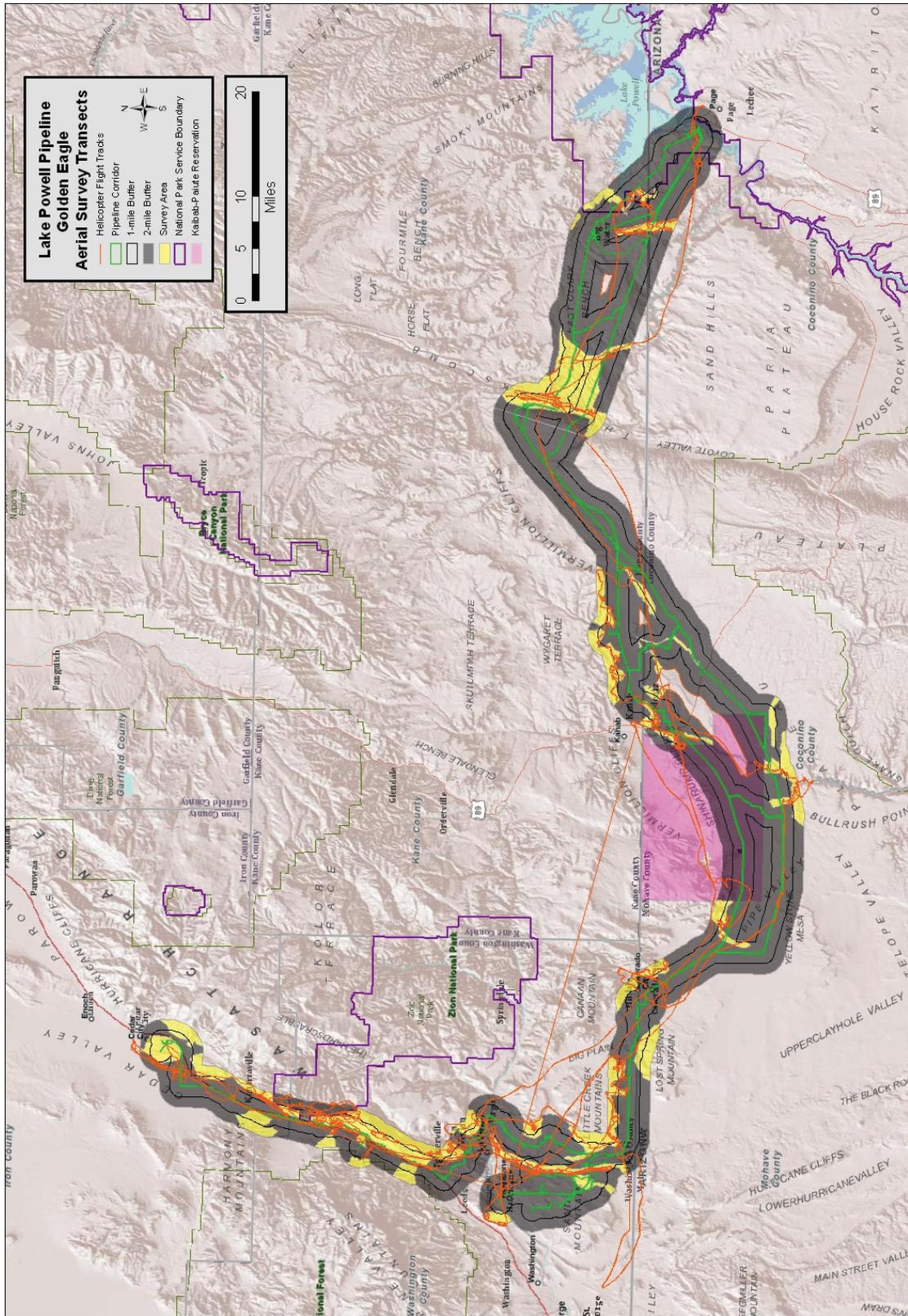
**Figure 4**  
**Cliff habitat northeast of Ash Creek Reservoir, near Zion National Park**



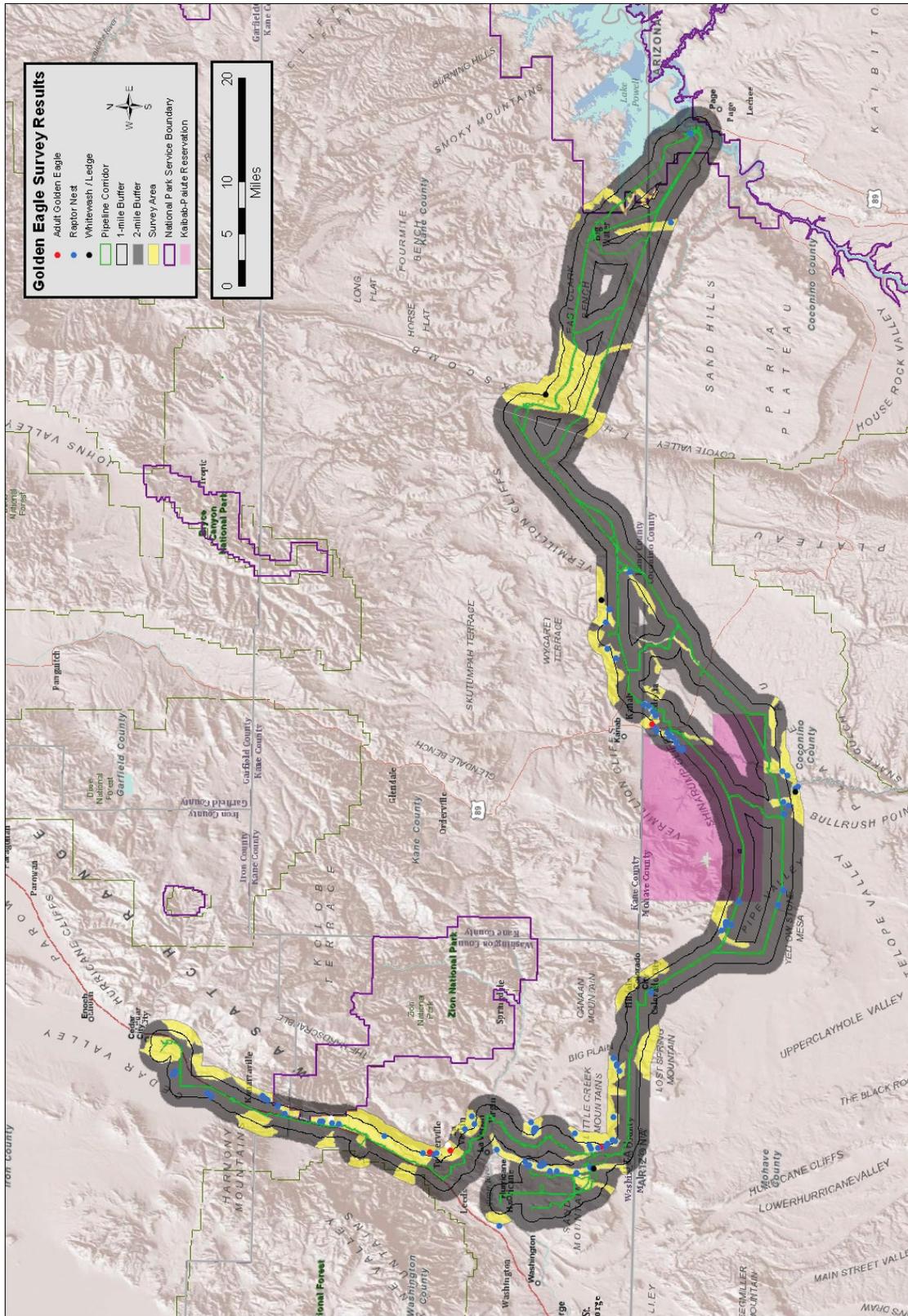
**Figure 5**  
**Cliff habitat along The Divide, 10 miles southeast of Hurricane**



**Figure 6**  
**Broadleaf tree habitat at Ash Creek Reservoir, near Zion National Park**



**Map 3**  
**Aerial survey routes**



**Map 4**  
**Nest Locations**



**Figure 7**  
**Nest structure on power pole 3 miles south of Cedar City**



**Figure 8**  
**Nest structure near Crescent Butte, 11 miles east of Kanab**



**Figure 9**  
**Nest structure on the Hurricane cliffs near Hurricane**



**Figure 10**  
**Adult Golden Eagle near Fredonia**



**Figure 11**  
**Close-up of adult Golden Eagle near Fredonia**

## **5. RECOMMENDATIONS**

Surveys for the LPP project were conducted by helicopter and ground based observations in suitable raptor nesting habitat to provide information on potential raptor activity and occupancy, with an emphasize on golden eagles. The metrics of interest to the USFWS include: 1) number and location of nests within territories with an occupied nest; 2) number and location of likely eagle nests within apparently unoccupied territories (suspected occupied eagle territory within an occupied nest on the current year); and 3) productivity (number of young surviving greater than 51 days of age) in each occupied nest (USFWS 2010).

It has been reported that some segments of golden eagle populations can be found near their nest sites throughout the year (Pagel et al 2010). The presence of adult golden eagles and large raptor nests observed during the survey indicates potential golden eagle nesting in proximity to the corridor. The 2011 surveys were conducted outside of the breeding season (January – July), so each of the standard metrics required to document raptor nesting could not be accurately determined. In order to provide raptor nesting data, within the corridor and buffer area, with an emphasize on golden eagles, additional raptor surveys for this project are recommended to be conducted by helicopter with supporting ground based surveys to confirm raptor activity, occupancy, breeding status, and fledging success.

Consistent with USFWS (2010) raptor nest survey guidance a two-phase survey effort is recommended with the Phase-one inventory survey to be conducted during late courtship (when the adults are mobile and conspicuous) into early incubation (when the females will be on the nest). Phase-one surveys include two separate surveys conducted 30 days apart. It is recommended that the first Phase-one survey be conducted between March 1 and March 30 when biologists would revisit nests located during the 2011 survey effort to determine current occupancy. The second Phase-one survey would be conducted approximately 30 days after the first survey effort and would also revisit the nests located during the 2011 survey effort. This second survey would document those

nests that were not active during the first survey as well as identify nesting attempts that may have already failed. These Phase-one surveys would determine occupancy, activity, and nesting territories within the corridor and buffer area. If an active nest or pair of birds is located, the search can then be expanded to survey adjacent suitable habitat to determine if additional territories exist. The two separate Phase-one surveys are necessary for the purpose of documenting potential raptor nesting and should be spaced no closer than 30 days apart (USFWS 2010). Ground based surveys would also be conducted at the same time in areas inaccessible to the helicopter or to nest locations easily observed remotely from the ground.

Phase-two monitoring surveys are recommended to be conducted via helicopter in remote access areas and via ground in areas where nests are easily observed, approximately 60 days subsequent to the second Phase-one survey. Phase-two surveys are recommended to revisit nesting territories documented during Phase-one surveys (not the entire 2011 survey area). The presence of golden eagle (as well as other raptors) nestlings, fledglings, or new nest activity would be recorded to indicate nesting success. The two phase survey effort would provide raptor inventory data and initial information of raptor productivity within the corridor in support of the USFWS, BLM, and other land and wildlife managers.

Timeframe for recommended surveys

Phase-one inventory surveys (2 surveys 30 days apart)

Survey 1                      March 1 – March 30

Survey 2                      April 1 – April 30

Phase-two monitoring surveys (1 survey 60 days subsequent to Survey 2)

Survey 3                      June 1 – June 30

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**7. FIELD PERSONNEL AND SIGNATURES**

Logan Simpson Design Inc. field biologists

Bruce Palmer  
Gary Reese  
Heather English  
Kay Nicholson  
Peter Gosling  
Richard Remington  
Shaylon Stump

Prepared By: *Shaylon Stump*  
Shaylon Stump, Biologist  
Logan Simpson Design Inc.

Date: February 13, 2012

Reviewed/Approved By: *Bruce K. Palmer*  
Bruce Palmer, Senior Biologist  
Logan Simpson Design Inc.

Date: February 13, 2012

## **Appendix A**

### **Nesting Periods and Spatial Buffers for Raptors in Utah**

Nesting periods and recommended buffers for raptors in Utah<sup>1</sup>

Species	Spatial Buffer in Non-Urban Areas	Incubation <sup>2</sup>	Brooding Post-hatch	Fledging Post-hatch	Post-fledge Dependency to nest
Bald eagle	0.5 to 1.0 mile	34-36	21-28	70-80	14-20
Northern goshawk	0.5 mile	36-38	20-22	34-41	20-22
Ferruginous hawk	0.5 to 1.0 mile	32-33	21	38-48	7-10
Golden eagle	0.5 mile	43-45	30-40	66-75	14-20
Peregrine falcon	1.0 mile	33-35	14-21	35-49	21
Red-tailed hawk	0.33 to 0.5 mile	30-35	35	45-46	14-18
Prairie falcon	0.25 to 0.5 mile	29-33	28	35-42	7-14
Swainson's hawk	0.25 to 0.5 mile	33-36	20	36-40	14
Osprey	0.5 mile	37-38	30-35	48-59	45-50
Northern harrier	0.5 mile	32-38	21-28	42	7
Sharp-shinned hawk	0.5 mile	32-35	15	24-27	12-16
Cooper's hawk	0.5 mile	32-36	14	27-34	10
Turkey vulture	0.5 mile	38-41	14	63-88	10-12
California condor	1.0 mile	56-58	5-8 weeks	5-6 month	2 months
Merlin	0.5 mile	28-32	7	30-35	7-19
American kestrel	NN <sup>2</sup>	26-32	8-10	27-30	12
Boreal owl	0.25 mile	25-32	20-24	28-36	12-14
Burrowing owl	0.25 mile	27-30	20-22	40-45	21-28
Flammulated owl	0.25 mile	21-22	12	22-25	7-14
Great horned owl	0.25 mile	30-35	21-28	40-50	7-14
Long-eared owl	0.25 mile	26-28	20-26	30-40	7-14
N. saw-whet owl	0.25 mile	26-28	20-22	27-34	7-14
Short-eared owl	0.25 mile	24-29	12-18	24-27	7-14
Mex. Spotted owl	0.25 mile	28-32	14-21	34-36	10-12
N. Pygmy owl	0.25 mile	27-31	10-14	28-30	7-14
W. Screech owl	0.25 mile	21-30	10-14	30-32	7-14
Common Barn-owl	NN <sup>2</sup>	30-34	20-22	56-62	7-14

**Romin and Muck 2002, Whittington and Allen 2008, BLM 2010**

<sup>1</sup>Number of days

<sup>2</sup>Not necessary

## **Appendix B**

### **Lake Powell Pipeline Raptor Survey Datasheet**



**Appendix F**  
**Protection Plan for Mojave Desert Tortoise**

# Appendix F

## Protection Plan for Mojave Desert Tortoise

### 1.1 Mitigation and Monitoring

This appendix describes best management practices, design criteria, conservation strategies, mitigation and monitoring methods to reduce impacts of LPP Project construction and operation and maintenance on Mojave desert tortoise. Many of these methods would be incorporated into project “Standard Construction Procedures” (SCPs) to be used in the field as LPP Project features and facilities are being constructed.

#### 1.1.1 General Mitigation Procedures

The following procedures would be applicable to all LPP Project features and facilities during construction in identified Mojave Desert tortoise habitat. Protection, mitigation and enhancement measures would include the following:

- Vehicular speeds would be limited to safe speeds in construction zones or on construction access roads during construction, operation and maintenance of LPP Project facilities within Mojave desert tortoise habitat.
- Prior to construction on federal-administered land, a site assessment of Mojave desert tortoise habitat within the project alignment be conducted compliant with the USFWS guidance described within “Preparing for Any Action that May Occur within the Range of the Mojave Desert Tortoise (*Gopherus agassizii*) (USFWS 2010).
- The area directly ahead of trenching equipment would be monitored for Mojave desert tortoise and, any Mojave desert tortoise observed would be handled by a qualified biologist in compliance with the Guidelines for Handling Desert Tortoise during construction projects” (Desert Tortoise Council 1994).
- Trenches would be covered, backfilled, or barriers and working lights placed along open trenches at the completion of each day and no more than 1,000 feet of trench would be open at any one location. All open trenches would be constructed with escape ramps for trapped Mojave desert tortoise to exit the trenches.
- Open trenches would be observed before beginning construction activities daily and Mojave desert tortoise in the trenches would be captured and relocated if possible by a qualified wildlife biologist before active construction commences.
- Effects on wildlife resources would be avoided and minimized by following environmental hygiene and standard hazardous materials control procedures, restoration and erosion control procedures, air pollution prevention procedures, surface water protection procedures, noxious weed control procedures and wetland protection procedures.
- Construction sites would be kept free of trash, garbage and food refuse.
- During construction, access roads and electrical transmission line roads would have access controlled to only authorized personnel who have been instructed in environmental hygiene to limit trash and toxic substances along the roads.

## 1.2 Protection Measures for Mojave Desert Tortoise

In addition to the general mitigation procedures described above, the following mitigation measures would be employed to protect the Mojave desert tortoise:

### 1.2.1 Construction

- All construction personnel would be given basic instruction on Mojave desert tortoise protected status, habitat requirements, distribution, expectation of encounter in the Project area and procedures to follow if a desert tortoise is encountered.
- A qualified desert tortoise biologist would be employed and available to be on site for all construction activities in identified Mojave desert tortoise habitat, whether previously surveyed as occupied or unoccupied. Project personnel would be instructed to take no action regarding any Mojave desert tortoise encountered in or near construction zones until authorized to do so by the tortoise biologist.
- All Mojave desert tortoise habitat to be inundated by the afterbay and forebay would be fenced in accordance with HCP or USFWS protocols, as applicable. A qualified desert tortoise biologist would monitor all fencing construction activities.
- Coordination with Red Cliffs Desert Reserve administration would be performed before any construction in or near designated Take Areas 7 (Hurricane) and 10 (South Hurricane).
- All construction personnel working in areas where MDTs have been identified would be given basic instruction on Mojave desert tortoise protected status, habitat requirements, distribution, expectation of encounter in the LPP Project area and procedures to follow if a desert tortoise is encountered.
- All vehicles and construction equipment would be inspected on all sides and underneath before moving the vehicle or equipment. If a Mojave desert tortoise is under or adjacent to any vehicle or equipment, that vehicle or equipment would not be operated or moved until the tortoise biologist has personally determined how to move the vehicle or equipment safely or has relocated the tortoise to safety.
- On federal lands, the following measures would be employed:
  - Other detailed procedures for protecting desert tortoises are contained in the *Guidelines for Handling Desert Tortoises – Mojave Population and Their Eggs* (USFWS 2009), and a copy of this document would be available at each construction site in Mojave desert tortoise habitat.
  - Equipment and supplies for safely handling, rehydrating, transporting and excluding Mojave desert tortoises, as specified in the USFWS 2009 desert tortoise guidelines would be available at each construction site in Mojave desert tortoise habitat.

### 1.2.2 Operation and Maintenance Mitigation measures

- All operations and maintenance personnel working in areas where MDTs have been identified would be provided basic instruction on Mojave desert tortoise protected status, habitat

requirements, distribution, expectation of encounter in the LPP Project area and procedures to follow if a desert tortoise is encountered.

- A *Mojave Desert Tortoise Protection Plan* for operating and maintaining LPP Project facilities and features would be developed in consultation with the HCP administration and USFWS as applicable. The protection plan would be available at all facilities in Mojave desert tortoise habitat. Equipment and supplies for safely handling, rehydrating, transporting and excluding Mojave desert tortoises would be available at each operating site in Mojave desert tortoise habitat.
- All operation and maintenance personnel would be provided with contact information for appropriate resources (project biologist, USFWS biologist, Red Cliffs Preserve biologist, HCP administration, etc.) that can be contacted in case of encounters with Mojave desert tortoises during operation and maintenance activities.