

# ARIZONA GOLDEN EAGLE NEST SURVEY 2011

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*Photo by Ron Austing*

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# ARIZONA GOLDEN EAGLE NEST SURVEY 2011 SUMMARY REPORT

Kyle M. McCarty and Kenneth V. Jacobson

## INTRODUCTION

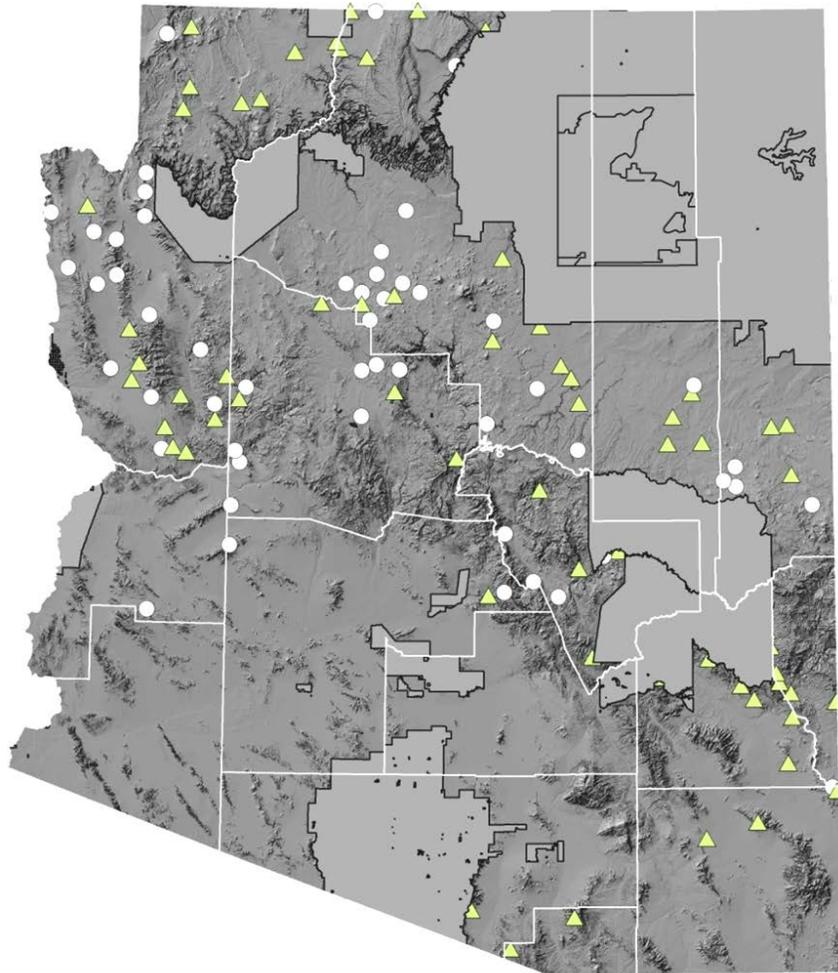
In 1940, Congress passed the Bald Eagle Protection Act in an effort to provide protection for declining bald eagle populations (*Haliaeetus leucocephalus*). In 1962, the Act was amended to include golden eagles (*Aquila chrysaetos*) due to the difficulty of distinguishing between the juveniles of each species, becoming the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668d, 54 Stat. 250). The BGEPA was modeled after the Migratory Bird Treaty Act of 1918 and contains similar language to protect birds, eggs, and nests.

With the removal of the bald eagle from the Endangered Species Act (ESA) in 2007, the BGEPA became the primary law protecting the species. At the same time as the delisting proposal, and as a means of facilitating post-delisting management of bald eagles, the USFWS also codified the definition of “disturb” under the BGEPA (USFWS 2007b). Disturbance includes an action that “causes, or is likely to cause...injury to an eagle” or interference with “normal breeding, feeding, or sheltering behavior” causing a decrease in productivity or nest abandonment (USFWS 2007b). Contrary to the ESA there was no mechanism for permitted take (USFWS 2007a, b). In 2009, the USFWS finalized regulations to provide a mechanism to authorize take (USFWS 2009). In addition to the BGEPA, golden eagles are protected under the Migratory Bird Treaty Act, Lacey Act, Airborne Hunting Act, and the Convention on International Trade in Endangered Species of Wild Flora and Fauna and under Arizona Revised Statute Title 17.

Few long-term studies have been undertaken on golden eagle populations in North America (Kochert and Steenhof 2002, Kochert et al. 2002). Braun et al. (1975) reported as many as 100,000 individuals in North America in the 1970s. Olendorff et al. (1981), using data from USFWS aerial transect surveys in 1974-1978 and other data sources, estimated the wintering population of golden eagles in the western U.S. at 63,242 birds, with a potential 20,500 North American breeding pairs. Watson (1997) estimated the number of breeding pairs at 20,000-25,000 in North America. More recently, the USFWS contracted a study to complete golden eagle aerial transect surveys across the western United States, with an estimated 27,392 golden eagles within the area surveyed (Good et al. 2004, 2007). They repeated the surveys in 2006-2009, and estimated a total of 20,722 golden eagles within the study area in 2009 (Nielson et al. 2010). Given the limitations of short-term survey data, the USFWS cautiously estimated the population up to 30,000 golden eagles across the U.S. (USFWS 2011).

In Arizona, information on breeding golden eagles is limited. Studies have reported on golden eagle productivity in west-central Arizona (Millsap 1981), prey remains in nests (Eakle and Grubb 1986), and nest structure (Grubb and Eakle 1987). The Arizona Breeding Bird Atlas (Corman and Wise-Gervais 2005) found possible, probable, or confirmed evidence of breeding golden eagles in 187 of 1,834 (10.2%) priority blocks. Additional data was gathered during a 2006 Arizona Game and Fish Department (Department) survey effort, which found 14 occupied nests among 85 surveyed locations that had been identified as historic or current breeding areas.

The 2006 survey protocol, however, was limited to only 2 visits in mid-April and mid-June, so occupancy early failures likely missed (AGFD unpublished data). Including this year's data, records of historic and current breeding areas were distributed statewide, with the lowest density occurring in the southwestern corner (Figure 1). Breeding areas are classified as "historic" when occupancy has not been detected within 10 years, regardless of survey effort.

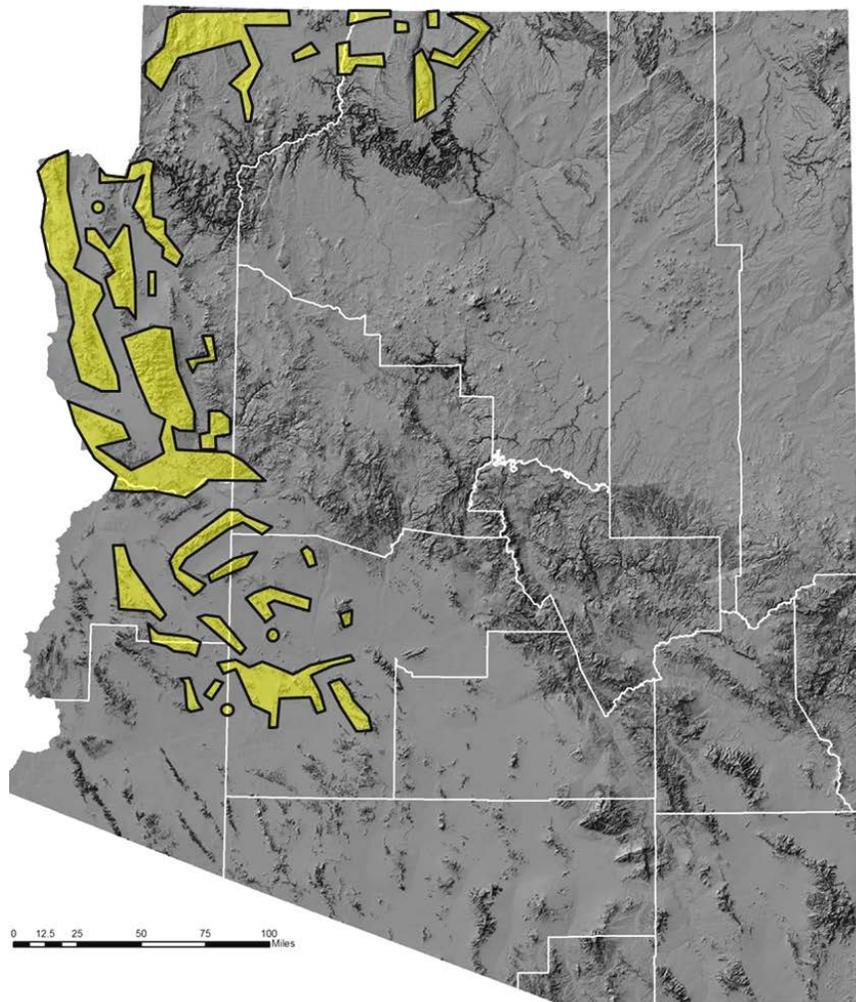


*Figure 1. Distribution of historic (triangles) and current (circles) golden eagle breeding areas in Arizona in 2011. Breeding areas are not shown on Indian lands (shaded). County lines in white.*

In 2011, the Bureau of Land Management (BLM) funded the Department to conduct a 2-year baseline golden eagle nest survey to inventory potential nest sites primarily within and adjacent to proposed wind and solar energy project areas. Future surveys will be necessary to determine occupancy status. The greatest challenge to detecting golden eagle nesting sites is the remote and often inaccessible terrain in which they occur. Helicopters are an indispensable tool for surveying bald eagle nests in similar habitat throughout Arizona (McCarty and Jacobson 2010) and served as the primary search method within this survey.

## STUDY AREA

In 2011, helicopter surveys were conducted in portions of Coconino, La Paz, Maricopa, Mohave, Yavapai, and Yuma Counties surrounding and within proposed renewable energy project areas (Figure 2). Terrain was characterized mainly by basin and range topography with wide valleys separated by rugged mountain chains.



*Figure 2. Aerial golden eagle nest survey areas completed in Arizona in 2011 (shaded).*

The northern half of the survey area was diverse in habitat, characterized by eight biotic communities (Brown 1994) including Mohave Desertscrub, Sonoran Desertscrub [Lower Colorado River Valley and Arizona Upland Subdivisions], Great Basin Desertscrub, Great Basin Conifer Woodland, Semidesert Grassland, Interior Chaparral, Plains and Great Basin Grasslands, and Rocky Mountain (Petran) Montane Conifer Forest. Elevations ranged from 137 m (450 ft) at the Colorado River to 2,566 m (8,417 ft) in the Hualapai Mountains. The northern half included the Arizona Strip (north of the Colorado River and Grand Canyon National Park), as well as the

mountains bordered by the Bill Williams River to the south, Lake Mead to the north, the Aquarius Mountains to the east, and the Colorado River to the west.

Habitat in the southern half of the survey area was mostly Sonoran Desertscrub [Lower Colorado River Valley and Arizona Upland Subdivisions], with some Interior Chaparral in the uplands. Elevations ranged from 137 m (450 ft) at the Colorado River to 1,732 m (5,681 ft) in the Harquahala Mountains. This half of the survey area was bordered by Interstate 8 to the south, the Bill Williams River to the north, the White Tank Mountains to the east, and the Dome Rock Mountains to the west, excluding the Kofa National Wildlife Refuge and Yuma Proving Ground.

## METHODS

We prioritized survey effort to lands adjacent to or administered by the BLM, most of which occur in the western half of the state, which contained proposed wind or solar energy development projects. These lands are often intermingled with private or state trust properties. In addition, the survey area included lands managed by the U.S. Forest Service, U.S. Fish and Wildlife Service, and National Park Service (Lake Mead National Recreation Area). Efforts were focused on cliff nest surveys within a 10 mile radius of each proposed project and as much of the surrounding suitable nesting habitat as possible, however due to limited flight time we did not search forested areas for tree nests.

ArcMap was used to calculate slopes greater than 40 degrees to coarsely identify potential cliff-nesting habitat within and surrounding the priority survey areas. In addition, we compiled and reviewed data on sightings of golden eagles or nests from various state and federal agencies and the Department's Heritage Database Management System to identify specific areas of interest.

A two to three-person team conducted surveys between February and June 2011. At least one observer was a Department biologist with five or more years of experience in helicopter searches for cliff-nesting bald eagles. The pilot had extensive experience in flying low-level wildlife surveys in Arizona, including golden eagle nest searches. Helicopters flew at approximately 60 meters (200 ft) above ground level and at 50-60 knots (58-70 mph). Topography, presence of high-tension wires, and wind influenced altitude and speed. We made multiple passes of tall cliffs and complex terrain as necessary for a complete survey of these substrates.

Although our goal was to inventory large eagle-sized nests and not to determine productivity, we timed the flights to correspond with the golden eagle breeding season in order to opportunistically collect some occupancy data. Without additional visits, nest survey flights were insufficient for designating sites as "unoccupied". When we were able to determine breeding status, we followed operational definitions derived from Postupalsky (1974, 1983) and Steenhof and Kochert (1982) (Appendix A). A site was termed a "breeding area" (BA) only if the site was documented as occupied within the last 10 years. Sites with documented occupancy more than 10 years old were termed "historic BAs". Any areas with "large" nests and not enough observations to designate occupancy status were termed as "potential BAs". "Large" refers to nests we deemed of suitable size for breeding golden eagles as compared to our experience with bald and golden eagle nests in Arizona. "Medium" refers to nests that were not likely to have

been large enough for eagles. Golden eagle nestlings were aged following Hoechlin (1976) and Driscoll (2010).

## RESULTS

The 2011 golden eagle nest survey effort totaled 98.1 hours over 17 days (Table 1). We examined 9 known BAs, 20 historic BAs, and suitable cliff nesting habitat throughout the western third of Arizona as illustrated in Figure 2. Significant findings include 17 new BAs, 4 occupied historic BAs, 5 occupied but previously known BAs, and 134 potential golden eagle BAs with 208 suitable nest structures in varying condition. A single golden eagle was documented in the area at 12 of these potential BAs indicating possible occupancy. In addition, there were 13 sightings of golden eagles not clearly associated with nests.

Date	Areas surveyed	Time (min)
2/22	Cerbat Mountains, White Hills	390
2/23	Black Mountains	420
2/24	Black Mountains, Lake Mead Recreation Area, Grand Wash Cliffs, Long Mountain	440
3/9	Black Mountains (south of Highway 68), Hualapai Mountains	335
3/10	Hualapai, Mohave and Bill Williams Mountains; Aubrey Peak Wilderness, Bill Williams River	380
3/11	Hualapai Mountains, Santa Maria River, Poachie Range, Trout Creek, Austin Peak	410
3/22	Little Horn and New Water Mountains; Tank and Palomas Mountains (east of Yuma Proving Ground), Agua Caliente, Baragan, Turtleback, and Gila Bend Mountains	340
3/23	Plomosa, Eagletail, and Dome Rock Mountains	445
3/24	Eagletail and Gila Bend Mountains	195
4/12	Harcuvar, Granite Wash, Harquahala and Little Harquahala Mountains	315
4/13	Gila Bend Mountains	230
4/14	Big Horn, Belmont, Saddle, White Tank, and Maricopa Mountains	345
6/13	Vermilion Cliffs, Paria River, Coyote Buttes, Shinarump Cliffs	260
6/14	Kaibab Plateau (eastern slope), Snake Gulch, Kanab Creek, Yellowstone Mesa	400
6/15	Lost Spring Mountain, Hurricane Cliffs, Hole-N-Wall Canyon, Seegmiller Mountain	425
6/16	Virgin Mountains, Black Rock Mountain	280
6/17	Virgin Mountains, Wolf Hole Mountain, canyons and buttes in area	275

Results for documented nest structures/potential BAs are located in Appendix B. Areas worthy of further discussion (new BA's, historic BAs, known BA, and golden eagle sightings) are described here. Nest locations are sensitive data, considered confidential by AGFD, and omitted from this report. Management agencies requiring specific locations should contact the AGFD Heritage Data Management System at (623) 236-7612.

## SURVEYS IN SUITABLE HABITAT

The suitable cliff nesting habitat surveyed in 2011 was primarily located in the western third of Arizona (Table 1 and Figure 2) and resulted in the identification of 17 new breeding areas (Table 2) and 134 potential BAs encompassing a total of 208 nests (Appendix B). At 12 of the 134 potential BAs, a single golden eagle was documented near large nests indicating a likelihood of occupancy (Table 3).

### La Paz County

*Harquahala West.* – On April 12, we saw a golden eagle fly from a cliff where it had been perched above a large, empty nest. Another large cliff nest in fair condition was found approximately 0.5 miles away. We saw no evidence of nesting activity.

*Kofa.* – On March 22, 2011, we discovered a golden eagle incubating on a cliff nest (#1) (Figure 3). Another large cliff nest (#2) in fair condition was found less than a mile away.



Figure 3. *Harquahala Wilderness Area (left) and Kofa breeding area (right).* Photos by Kyle McCarty and Kenneth Jacobson.

*Plomosa Mountains.* – On March 23, 2011, we saw a golden eagle perched on Black Mesa. There was a substantial amount of whitewash on the perch. Although no nests were found in the immediate vicinity, we did find a large nest in fair condition approximately 1.5 miles away.

### La Paz/Maricopa Counties

*Eagletail Mountains.* – On March 24, 2011, we saw a golden eagle flying low over the mountains, and found four large cliff nests in fair to good condition within a mile of the bird. We saw no evidence of nesting activity.

### Maricopa County

*Harquahala.* – On April 12, 2011, we saw one golden eagle perched within the Harquahala Wilderness Area (Figure 3) but were unable to locate any nests. During a ground search of the same area on May 27, we found a cliff nest (#1) with a 5-week old nestling and one adult.

### Mohave County

*Black Mountains East.* – On February 23, 2011, we discovered a golden eagle incubating in a cliff nest (#1). A second adult flew to the nest.

*Black Mountains North.* – On February 23, 2011, we saw a pair of golden eagles perched together in the area of a large cliff nest (#1) which was in good condition.

*Black Mountains South.* – On March 9, 2011, we discovered a golden eagle incubating on an east-facing cliff nest (#1).

*Black Mountains West.* – On February 23, 2011, we discovered a golden eagle incubating in a cliff nest (#1). A second adult was flying in the area. At least 3 other large cliff nests were found within 1.5 miles (#2, 3, and 4) (Figure 4).



*Figure 4. Golden eagle incubating at the Black Mountains West breeding area. Photo by Kyle McCarty.*

*Black Mountains 2 North.* – On February 24, 2011, we saw a golden eagle perched less than a mile from at least five large cliff nests in the area southwest of Mount Perkins. We saw no evidence of nesting activity.

*Black Mountains 3.* – On February 22, 2011 we surveyed the area and found several large cliff nests in a promising area at the edge of the Detrital Valley near Highway 93. During a ground survey on March 7, we saw a golden eagle fly low along the east side of the cliff face and go out of view behind a large rock below the high cliffs. Although there were five nests of poor quality and one large nest in good condition in close proximity on the cliffs, we saw no evidence of nesting activity.

*Black Mountains 15.* – On February 23, 2011, we saw a flying golden eagle that performed a brief undulation flight display, perhaps in response to the helicopter, about 7 miles north of Highway 68. There were several large cliff nests in the general area, with the closest one approximately 1.3 miles away. We saw no evidence of nesting activity.

*Black Mountains 22.* – On February 23, 2011, we saw an adult golden eagle perched on a butte in the area of three large cliff nests, approximately 2.5 miles north of Highway 68. We saw no evidence of nesting activity.

*Cerbat Mountains East.* – On February 22, 2011, we flushed a golden eagle from a perch near a large cliff nest. It circled over the nest and perched again. Another large cliff nest in good condition was found approximately 1.2 miles away. We saw no evidence of nesting activity.

*Cerbat Mountains West.* – On February 22, 2011, we discovered a golden eagle incubating in a relatively small cliff nest (#1) on an outcrop.

*Cerbat Mountains North.* – On February 22, 2011, we saw a golden eagle performing an undulating flight display near a large cliff nest (#1) that was buried in snow, with a second golden eagle flying in the area.

*Grand Wash North.* – On February 24, 2011, we discovered a golden eagle incubating in a large cliff nest (#1), and found two other large, old nests (#2, #3) within 0.5 miles.

*Grand Wash North 2.* – On February 24, 2011, we saw a pair of golden eagles perched on the cliffs near Grapevine Wash, and found a large cliff nest (#1) approximately one mile away.

*Hualapai South.* – On March 10, 2011, we discovered a golden eagle incubating on a north-facing cliff nest (#1).

*Hurricane Cliffs 3.* – On June 15, 2011, we saw a golden eagle perched on the cliffs less than 0.5 miles from three large nests, at least two of which were in good condition.

*Long Mountain.* – On February 24, 2011 we found a large cliff nest and one golden eagle flying in the area. We saw no evidence of nesting activity.

*Middle Grand Wash.* – On February 24, 2011, we discovered a golden eagle incubating on a cliff nest (#1), with a second golden eagle in the area executing an undulating flight display.

*Middle Hurricane Cliffs.* – On June 15, 2011, we saw an adult golden eagle in flight being chased by a common raven. The eagle flew to a perch in a cliff alcove where there appeared to be a nest, possibly with a nestling, however the ledge was concealed by shrubbery and we were unable to confirm the nest sighting. There were also two other large cliff nests in fair to good condition in the immediate area.

*Seegmiller Mountain.* – On June 15, 2011, we saw a golden eagle perched and found three large cliff nests within a mile of its location. Two of the nests were in good or very good condition, and one was in poor condition with a rock in the nest. One of the good nests appeared to have a dark form laying inside, possibly a feathered nestling, however due to windy conditions we were unable to confirm the nest contents. A fourth large nest in fair condition was found within 1.6 miles of the perched eagle.

*Trout Creek.* – On March 11, 2011, we saw a golden eagle fly to a cliff nest (#1) and start incubation. We likely had arrived during a nest exchange.

*Virgin Mountains.* – On June 17, 2011, we discovered a golden eagle nestling in a cliff nest (#1). The nestling was at least 5 weeks old with a mix of dark and white plumage.

*White Hills South.* – On February 22, 2011, we saw a pair of golden eagles flying in the area of at least two large cliff nests (#1, 2).

Yavapai County

*Harcuvar North.* – On April 12, 2011, we discovered a golden eagle in a cliff nest (#1) with two downy nestlings, 1-2 weeks old. Another large nest (#2) in poor condition was found 2.2 miles away. On May 26, two adults were in the area and the two nestlings were approximately 6 weeks old by plumage.

*Poachie.* – On March 11, 2011, we discovered a golden eagle incubating on a nest (#1) in a pothole-type ledge on a cliff (Figure 5). Two other old, large nests (#2, 3) were found 1-2.2 miles away, and assigned to the same breeding area.



*Figure 5. Golden eagle incubating at the Poachie breeding area. Photo by Kyle McCarty.*

Table 2. Summary of new breeding areas in 2011.				
Breeding Area	Status <sup>1</sup>	Elevation (feet)	Nests in area <sup>2</sup>	Comments
<b>La Paz County</b>				
Kofa	A	2,450	2	On 3/22, one adult incubating in new nest #1. Second nest < 1 mile away.
<b>Maricopa County</b>				
Harquahala	A	3,980	1	On 5/27, one 5-week old nestling in nest with one adult.
<b>Mohave County</b>				
Black Mountains East	A	4,130	1	On 2/23, one adult incubating in new nest #1. 2 <sup>nd</sup> adult in area.
Black Mountains North	O	2,640	1	On 2/23, pair observed near nest.
Black Mountains South	A	2,680	1	On 3/9, one adult incubating in new nest #1.
Black Mountains West	A	4,000	4	On 2/23, one adult incubating in new nest #1. 2 <sup>nd</sup> adult in area.
Cerbat Mountains West	A	5,460	1	On 2/22, one adult incubating in new nest #1.
Cerbat Mountains North	O	5,780	1	On 2/22, pair observed near nest.
Grand Wash North	A	5,115	3	On 2/24, one adult incubating in new nest #1.
Grand Wash North 2	O	5,215	1	On 2/24, pair observed near nest.
Hualapai South	A	4,250	1	On 3/10, one adult incubating in new nest #1.
Middle Grand Wash	A	5,615	1	On 2/24, one adult incubating in new nest #1. 2 <sup>nd</sup> adult in area.
Virgin Mountains	A	6,500	1	On 6/17, one 5-week old nestling in new nest #1
Trout Creek	A	3,900	1	On 3/11, one adult flew to incubate in new nest #1.
White Hills South	O	4,050	2	On 2/22, pair observed near nests.
<b>Yavapai County</b>				
Harcuvar North	A	4,160	2	On 4/12, two 2-week old nestlings in new nest #1.
Poachie	A	2,960	3	On 3/11, one adult incubating in new nest #1.

<sup>1</sup> Breeding area status codes: U=unoccupied, O=occupied, A=active, S=successful, F=failed.

<sup>2</sup> Active nests assigned nest number 1.

Table 3. Summary of single golden eagle sightings near large nests in 2011.			
Location	Date	Nests in Area	Comments
<b>La Paz County</b>			
Harquahala West	4/12	2	Perched above empty nest.
Plomosa Mountains	3/23	1	Perched, 1.5 miles to nearest nest.
<b>La Paz/Maricopa Counties</b>			
Eagletail Mountains	3/24	4	Flying, <1 mile to nearest nest.
<b>Mohave County</b>			
Black Mountains 2 North	2/24	5	Perched, <1 mile to nearest nest.
Black Mountains 3	2/22	5	Flying along cliffs past nests.
Black Mountains 15	2/23	1	Flying, 1.3 miles to nearest nest
Black Mountains 22	2/23	3	Perched on cliff near nests.
Cerbat Mountains East	2/22	2	Flushed from perch above nest.
Hurricane Cliffs 3	6/15	3	Perched <0.5 miles from nests.
Long Mountain	2/24	1	Flying over nest.
Middle Hurricane Cliffs	6/15	2	Flew to possible third nest.
Seegmiller Mountain	6/15	3	Perched, < 1 mile to nearest nest.

## HISTORIC BREEDING AREAS

We surveyed all 20 known historic BAs located within the 2011 nest survey area (Figure 2). Of these, 3 were active, 1 occupied, 2 with one golden eagle and large nest(s), 10 with only nests in varying conditions, and 4 where neither eagles or nests were detected (Table 4). Specific historical data and 2011 survey results for each of these areas are detailed below. Any historic BA documented as being occupied during the 2011 nest survey will be reclassified as a BA in future reports.

### Coconino County

*Johnson Spring.* – Observations in 1979 indicated two fledglings were seen, as well as a cliff nest, however the data form listed two nesting stages with one observation date of April 18, 1979. On June 13, 2011, we found a golden eagle perched in the area of two large cliff nests in poor to fair condition, one of which appeared to be the original nest and was very old. We also documented a second perched golden eagle and a third large nest within a mile. The third nest was in fair condition and did not appear to have been used recently.

*Rock Canyon.* – In 1979 a fledgling was reported, however the data form listed two nesting stages with one observation date of April 19, 1979. On May 2, 2006 one adult golden eagle was seen in the area. On June 14, 2011, we searched the area but did not find any eagles or nests.

*Shinarump Cliffs.* – In 2000, two young were seen on June 12 (one had fledged and one was still in the nest). On June 13, 2011, we were unable to find nest #1, and found three other nests in fair to good condition along the cliffs. Two of these nests were considered to be perhaps not quite large enough to be eagle nests. No eagles were seen and there was no evidence of nesting activity.

*Suicide Ridge.* – In 1978, a fledgling was observed in June. In 2006, a nest was present but no eagles were seen. On June 14, 2011, we found a large nest in the original location, however no eagles were seen and there was no evidence of recent nesting activity.

*Top Rock.* – In 1979, a fledgling was reported, however the data form listed two nesting stages with one observation date of April 18, 1979. On June 13, 2011, we found two large old nests in poor to fair condition in the vicinity of the original location and it was unclear which one, if either, was the original nest. We found another large cliff nest in good condition approximately 2.2 miles to the south. No eagles were seen and there was no evidence of nesting activity.

### Coconino/Mohave Counties

*Loco Point.* – In 1979, a fledgling was reported, however the data form listed three different nesting stages with one observation date of April 16, 1979. On June 14, 2011, we did not find the original nest, but found up to six other large cliff nests within 1.5 miles of the original location. Most of the nests were in poor to fair condition. We also saw a golden eagle soaring in the area over Bulrush Wash, a side canyon of upper Kanab Creek.

Mohave County

*Black Rock Gulch.* – In 1979, one fledgling and two adults were reported. In 2006, no nests or eagles were seen. On June 16, 2011, we found two cliff nests in poor to fair condition within 0.5 miles of the original location. However both nests were considered to be perhaps not quite large enough to be eagle nests. We saw no eagles and no evidence of recent nesting activity.

*Bronco Creek.* – In 1979, a pair of golden eagles was observed with two eggs on April 2, and a three-week old nestling was reported on May 3. In 2006, no nests or eagles were seen. On March 11, 2011, we searched the area and were unable to find the old nest or any likely nest locations. The immediate terrain was low with little potential substrate, and we suspect that the coordinates for the historic record are inaccurate or perhaps refer to an observation point.

*Craig's Knoll.* – In 1979, a fledgling was reported on May 1. On June 15, 2011, we found a nest in the original location that had disintegrated into a large dirt pile on the cliff ledge. We saw no eagles and no evidence of recent nesting activity.

*Eagle Point.* – In 1979, two adults and a pair of two-week old nestlings were seen on May 2. On April 13, 2006 one golden eagle and four inactive nests were seen in the area. On March 10, 2011, we searched the area and found four large cliff nests in close proximity to each other. Two of the nests were in fair to good condition and two were old nests. We saw no eagles and no evidence of nesting activity.

*Elephant Mountain.* – In 1979, an adult was incubating on April 12, and fledglings were observed on June 20. In 2006, no nests or eagles were seen. On March 11, 2011, we found a golden eagle incubating in a new nest (#2) approximately 1.7 miles from the original location, however the original nest was not found.

*Hell's Half Acre.* – In 1979, an adult was incubating on April 11, and a six-week old nestling was observed on June 13. On April 11, 2006 one possible golden eagle was seen, and no nests were found. On March 11, 2011, we were unable to find the original nest, but found two large nests in fair to good condition within 1.6 miles of the original location. We saw no eagles and no evidence of nesting activity.

*Hualapai Mountains.* – A pair of golden eagles with a juvenile was discovered on August 21, 1991, although it is not clear from the records if a nest was actually found. On March 9, 2011, we found an incubating golden eagle in a cliff nest (#2) approximately 0.5 miles from the originally reported location.

*Hurricane Cliffs.* – In 1988, a juvenile was heard vocalizing and an adult was seen leaving the nest on July 7. On June 15, 2011, we found a nest in the original location. The nest was in poor condition, well-hidden in a south-facing alcove on the cliffs. We saw no eagles and no evidence of recent nesting activity.

*Maggie Wash.* – In 1979, an adult was incubating on March 22, and a pair of three-week old nestlings were observed on May 3. In 2006, no nests or eagles were seen. On March 10, 2011, we searched the area and were unable to find the old nest location. There was one outcrop with a

great deal of whitewash on the ledge, however it appeared more suitable for a prairie falcon aerie. We saw no eagles and no evidence of nesting activity.

*Shingle Canyon.* – In 1979, an adult was reported incubating two eggs on February 22, and two 2.5-week old nestlings were observed on May 3. In 2006, no nests or eagles were seen. On March 9, 2011, we found at least 9 large cliff nests within 1.2 miles of the original location, although it is unclear if any of these was the original nest. Six of the nests were in fair to good condition. Although there was no evidence of nesting activity, we saw an adult or subadult golden eagle approximately 1.4 miles from the nearest nest.

*White Hills.* – In 1994, a golden eagle was reported incubating on April 12. In 2006, no nests or eagles were seen. On March 6, 2011, we searched this area and the nearby hills on foot and found a nest in fair to good condition on a tower along the power line transmission road in the general location of the original nest record, however the nest contained no large sticks, was quite flat, and appeared more suitable for use by red-tailed hawks which were seen in the area. We saw no eagles and no evidence of nesting activity.

*Yellowstone Mesa.* – In 1979, three fledglings were reported, however the data form listed three nesting stages with one observation date of April 19, 1979. On June 14, 2011, we found a large, old nest in the area, but did not see a nest in the original location. We saw no eagles and no evidence of recent nesting activity.

#### Yavapai County

*Burro Creek.* – A nest occupied by golden eagles was discovered in 1992. This area has been regularly checked during bald eagle surveys since then. On April 17, 2000 a pair of golden eagles was seen in a nest. On March 15, 2011, we saw no golden eagles and no evidence of nesting activity, however at least three old nests were present on the cliffs in the area from Francis Creek south to Bozarth Point.

*Peoples Canyon.* – In 1979, two young were reported fledged. On April 18, 2006, two adult golden eagles were seen vocalizing but no nests were found. On March 11, 2011, we found a golden eagle incubating in a new cliff nest. An old nest was present in the original location, and we found another large cliff nest in poor to fair condition. All three nests were within 0.8 mile of each other.

Table 4. Summary of findings at historic breeding areas surveyed in 2011.				
Historic Breeding Area	Status <sup>1</sup>	Elevation (feet)	Date	Comments
<b>Coconino County</b>				
Johnson Spring	O	5,300	6/13	Two eagles and three nests found.
Rock Canyon	--	4,800	6/14	No eagles or nests.
Shinarump Cliffs	--	5,000	6/13	No eagles. One to three nests found.
Suicide Ridge	--	6,000	6/14	No eagles. One nest found.
Top Rock	--	5,650	6/13	No eagles. Two nests found.
<b>Coconino/Mohave Counties</b>				
Loco Point	--	4,400	6/14	One eagle and six nests found.
<b>Mohave County</b>				
Black Rock Gulch	--	4,000	6/16	No eagles. Two nests, perhaps too small for eagles.
Bronco Creek	--	2,900	3/11	No eagles or nests.
Craig's Knoll	--	6,800	6/15	No eagles or nests.
Eagle Point	--	2,900	3/10	No eagles. Four nests found.
Elephant Mountain	A	4,290	3/11	Golden eagle incubating in nest #2.
Hell's Half Acre	--	2,400	3/11	No eagles. Two nests found.
Hualapai Mountains	A	4,950	3/9	Golden eagle incubating in nest #2.
Hurricane Cliffs	--	6,300	6/15	No eagles. One nest found.
Maggie Wash	--	2,700	3/10	No eagles or nests.
Shingle Canyon	--	3,800	3/9	One eagle and nine nests found.
White Hills	--	3,050	3/6	No eagles. One nest found.
Yellowstone Mesa	--	5,600	6/14	No eagles. One nest found.
<b>Yavapai County</b>				
Burro Creek	--	3,400	3/15	No eagles. Three nests found.
Peoples Canyon	A	3,400	3/11	Golden eagle incubating in nest #2.

<sup>1</sup> Breeding area status codes: U=unoccupied, O=occupied, A=active, S=successful, F=failed.

## KNOWN BREEDING AREAS

These areas have documented golden eagle breeding activity in at least one of the past ten years, and were discovered prior to this year's survey (Table 5). Specific historical data and 2011 survey results for each of these areas are detailed below.

### Coconino County

*Walnut Canyon.* – During a ground visit on May 4, 2011, National Park Service and AGFD personnel observed two downy nestlings 1-2 weeks old and one adult golden eagle in a cliff nest (#1) (Figure 6). The NPS reported both nestlings fledged in July.



*Figure 6. Walnut Canyon breeding area. Photo by Susan MacVean.*

### Gila County

*Parker Creek.* – Nest #1 was discovered in 1996 when an active golden eagle nest was reported. In 2006, 2009-2010, a large nest was found but no eagles were seen. We surveyed the area during a bald eagle nest search on February 1, 2011 and saw a pair of golden eagles in courtship flight, and one golden eagle in the area on March 16.

*Pinto Creek.* – Nest #1 was discovered in 2009, when a golden eagle was found incubating in a cliff nest. We surveyed the area during a bald eagle nest search on April 20, 2011 and saw no golden eagles and no evidence of nesting activity.

### Mohave County

*Aubrey Peak Wilderness.* – In 1977, two adults and a juvenile were observed on July 19. In 1979, incubation was observed March 22 and a fledgling was reported June 13. In 2006, a new nest was found with a 4-week old nestling on April 17, but the nest was empty on May 19. On March 10, 2011, a golden eagle was incubating in another new cliff nest and a second adult was seen flying in the area. Five other large cliff nests were also found and assigned to the same breeding area. All 8 nests are located in an area of approximately 2.5 mi<sup>2</sup>.

Yavapai County

*Burro Mesa.* – A nest was discovered in 1979, but was not found during searches of the area in 2009-2011, and we consider it gone. In 2008, two other nests (#2, 3) were discovered approximately 1.5 miles from the originally reported location, and a golden eagle was seen incubating in nest #2 on April 21 that year. On March 15, 2011, during a survey of upper Burro Creek for bald eagles, we saw no golden eagles and no evidence of nesting activity.

*Granite.* – The breeding area was discovered in 1993, when an active nest was observed. The area was occupied by golden eagles in 1994-1995, 1997-1998, 2002, 2005-2006, and 2008, with one nestling seen in both 2006 and 2008. We surveyed the area during a bald eagle nest search on March 15, 2011 and found a golden eagle incubating in nest #2. The nest was empty and failed by April 20.

*Hell Point.* – The breeding area was discovered in 1975 and originally documented as a historic bald eagle breeding area (Hunt et al. 1992). Golden eagles were observed first using the site in 1993, when two nestlings were seen on April 28. Five cliffs nests have been found, at least three of which are still present. In 2006, an 8-week old nestling was seen on May 19. In 2007-2008, the nest attempt failed during incubation. On March 15, 2011, we found a golden eagle incubating in nest #2, and saw an eagle either incubating or brooding on April 20.

*Mormon Pocket.* – The breeding area was discovered in 1992, when an active nest with young was observed. In 2006, two nestlings 5-6 weeks old were seen on May 19. In 2009, an adult was seen incubating on March 16. In 2011, we examined nests #1 and 2 during four bald eagle nest surveys in January to April and saw no golden eagles and no evidence of nesting activity.

*Watson Lake.* – The breeding area was discovered in 1992, when a pair of golden eagles was observed in the area of two cliff nests. Nestlings were seen in 1997-1999, 2001, and 2006, and incubation in 2009. In 2011, we examined nests #1 and 2 during three bald eagle nest surveys in January to April and saw no golden eagles and no evidence of nesting activity. Nest #2 was degraded and in poor condition.

Table 5. Summary of findings at known breeding areas surveyed in 2011.				
Breeding Area	Status <sup>1</sup>	Elevation (feet)	Nest <sup>2</sup>	Comments
<b>Gila County</b>				
Parker Canyon	O	4270	--	On 2/1, pair observed in area in courtship flight.
Pinto Creek	--		--	On 4/30, all known nests empty and no eagles.
<b>Coconino County</b>				
Walnut Canyon	S	6300	1	On 5/4, two 1-2 week old nestlings. Reported to have fledged in July.
<b>Mohave County</b>				
Aubrey Peak Wilderness	A	2790	3	On 3/10, an adult incubating in nest #3. 2 <sup>nd</sup> adult in area.
<b>Yavapai County</b>				
Burro Mesa	--	3800		On 3/15, all known nests empty and no eagles.
Granite	F	4400	2	On 3/15, an adult incubating in nest #2. Breeding attempt failed by 4/20.
Hell Point	A	4200	2	On 3/15, an adult incubating in nest #2. Nest still active on 4/20.
Mormon Pocket	U	4000	--	Nest visited on 1/3, 1/31, 3/15, and 4/20- All known nests empty and no eagles.
Watson Lake	U	5300	--	Nest visited on 1/31, 3/15, and 4/20- All known nests empty and no eagles.

<sup>1</sup>Breeding area status codes: U=unoccupied, O=occupied, A=active, S=successful, F=failed.

<sup>2</sup>Nest numbers are determined sequentially upon discovery and may be derived from Hunt and others 1992; Driscoll and Beatty 1994; Driscoll and others 1992, 1995a, 1995b, 1997, 1998, 1999; Jacobson and others 2004, 2005, 2006, 2007; Koloszar and Driscoll 2001a, 2001b; Koloszar and others 2002; Canaca and others 2004; McCarty and Jacobson 2008, 2009, 2010.

ADDITIONAL GOLDEN EAGLE SIGHTINGS

During the 2011 golden eagle nest survey, 13 sightings of golden eagles were documented that were not closely associated with large nests (Table 6). Additional specifics for two of these sightings are detailed below.

Mohave County

*Boriana Canyon.* – A pair of golden eagles were seen in courtship flights on February 8, 1979, however there was no mention of a nest in the data and we presume no nest was found. On March 10, 2011, we saw an adult or subadult golden eagle perched less than a mile from the original observation. We saw no evidence of recent nesting activity.

Yavapai County

*Cypress Mountain.* – On March 15, 2011, we were in transit during an aerial survey for bald eagles and saw a pair of golden eagles perched together on a boulder 0.5 miles south of Cypress Mountain in Prescott National Forest. We did not search for nests but there was promising cliff substrate and good habitat, and we view this as a promising area for future surveys.

Table 6. Summary of additional golden eagle sightings in 2011.			
Location	Date	Number of Eagles	Comments
<b>Mohave County</b>			
Black Mountains	3/23	1	Immature perched on Sugarloaf Mountain.
Black Mountains	3/23	1	Perched in low hills at edge of Detrital Valley west of Chloride.
Black Rock Mountain	6/16	1	Flew from cliffs near Pocum Wash. Whitewash on perch.
Boriana Canyon	3/10	1	Perched in area.
Cerbat Mountains	2/22	1	Perched in area south of Mt. Tipton.
Cerbat Mountains	2/22	1	Perched on Bull Mountain.
Cerbat Mountains	2/22	1	Perched near mouth of Vock Wash.
Cerbat Mountains	2/22	1	Immature perched in Elements Canyon.
Cornwall Canyon	3/11	1	Flew from mesa top east of Elephant Mountain.
Grand Wash Cliffs	2/24	1	Perched on cliffs east of Music Mountain Mine.
Grand Wash Cliffs	2/24	1	Immature perched west of Black Mesa area of Music Mountains.
Willow Canyon	6/14	1	Perched in a side canyon of Snake Gulch.
<b>Yavapai County</b>			
Cypress Mountain	3/15	2	Pair perched together on a boulder.

OVERVIEW

We discovered 208 new large nests throughout the area surveyed. Some of these nests occurred along the same cliff wall or were in close proximity to each other (<2 miles), and by grouping nests into suspected territories we named 134 potential golden eagle breeding areas (Appendix B). In 12 locations we found a single eagle in the area of at least one large nest indicating a potential for occupancy.

We discovered 17 new breeding areas, 4 occupied historic BAs, and 5 occupied but previously known BAs. In most cases we visited each site only once and were unable to document

productivity, however from our limited data we observed incubation was already underway at some nests in late February and was ongoing in March. Nestlings were observed at four breeding areas and hatching was estimated to having occurred in mid-April through mid-May.

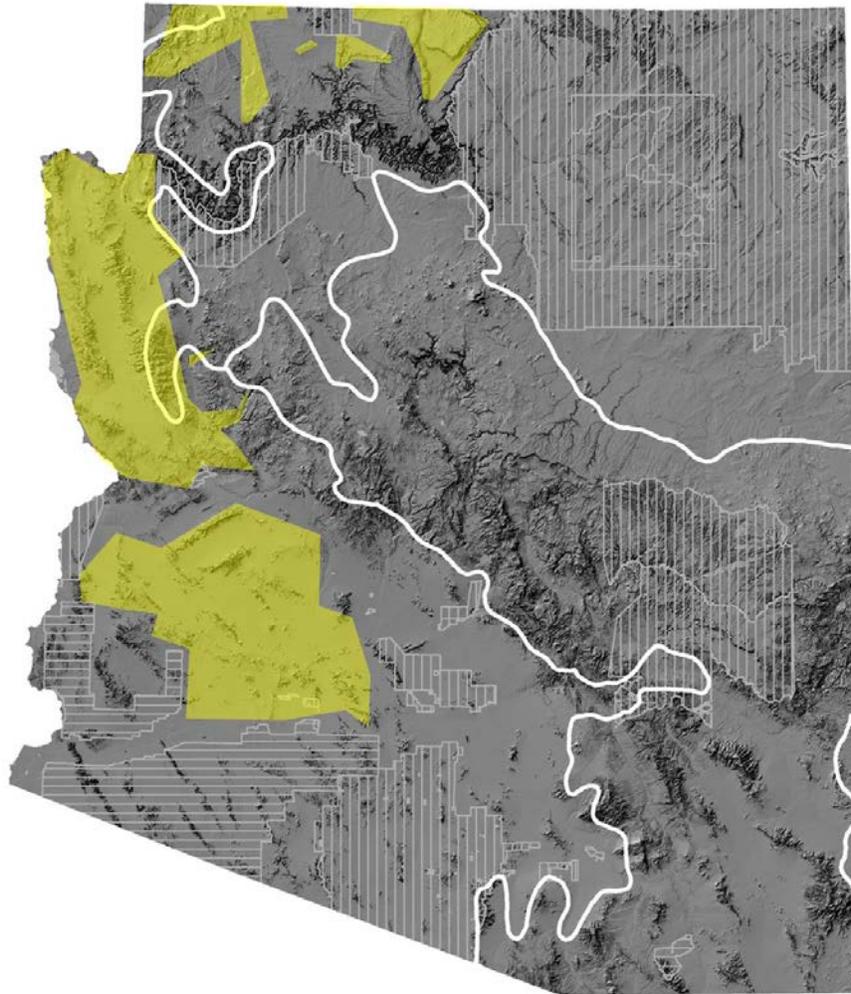
Finally, we had 13 sightings of golden eagles not associated with nests. Areas with sightings of paired or individual birds are promising leads, however sightings of individual golden eagles in February may be non-breeding floater, migrant, or wintering individuals.

#### Bird Conservation Region

Although our surveys were based on the need for golden eagle nest data on and adjacent to BLM lands associated with proposed wind and solar energy projects, management of golden eagle populations is being evaluated by USFWS using Bird Conservation Regions (BCRs) as ecological units. Arizona is approximately divided in thirds by BCR 16, 33, and 34 (NABCI 2000). An insignificant fraction of BCR 35 (Chihuahuan Desert) is represented as well.

Surveys in 2011 occurred mainly in BCR 33 (Sonoran and Mohave Deserts) in southwestern and western Arizona plus portions of BCR 16 (Southern Rockies/Colorado Plateau) in northern Arizona. Tribal lands, military lands, Grand Canyon National Park, and the Kofa National Wildlife Refuge were excluded from this survey due to access and flight restrictions (Figure 7). The majority of accessible survey area within BCR 33 was surveyed in 2011, but some gaps remain. Future nest surveys within BCR 33 should focus on areas not surveyed in the Aquarius Mountains southeast to the Bradshaw Mountains, the Grand Wash Cliffs in the Music Mountains area, the Peacock Mountains, portions of Lake Mead National Recreation Area, Buckskin Mountains near Parker Dam, the greater Tucson area, and mountains around the Gila River from Coolidge Dam downstream to Florence.

The 2011 surveys covered part of the Arizona Strip area in BCR 16, but additional surveys are needed in the Grand Wash Cliffs north of Grand Canyon, upper Parashant and Andrus Canyons, Kanab Creek and tributaries, Kaibab Plateau Saddle Mountain Wilderness Area, and cliffs east of Colorado City. Although surveyed in 2011, additional nest surveys would be beneficial along the Virgin River corridor and Virgin Mountains as we encountered difficult winds in these areas while surveying and at times were unable to approach the cliffs closely or slowly. Nearly the entire portion of BCR 16 south of Grand Canyon and east of the Colorado River were not surveyed in 2011.



*Figure 7. Aerial golden eagle nest surveys completed in 2011(shaded yellow) in relation to Bird Conservation Regions (white borders), Indian lands (vertical lines), and military lands (horizontal lines). BCR 16 is in the north, BCR 33 in the southwest/west, and BCR 34 in the central/southeast.*

#### MANAGEMENT RECOMMENDATIONS

1. Priority areas for future aerial nest surveys include all unexplored suitable breeding habitat and historic BAs within 10 miles of proposed wind and solar projects. Currently, the majority of these areas occur in northern Arizona from Kingman east/southeast to Springerville, and in southeastern Arizona.
2. Future nest survey efforts should also focus completing the nest survey of accessible and suitable habitat within each of Arizona's 3 main BCR's.
3. Obtain access to Tribal and Department of Defense lands to conduct golden eagle nest surveys in those areas.
4. Once nest surveys are completed, aerial surveys should be used in concert with follow-up ground surveys to document occupancy. From the air, surveyors can easily cover wide areas

of golden eagle habitat to discover large nests. From the ground, large nests can be observed for an appropriate duration to determine occupancy. Highest priority for occupancy surveys includes areas with golden eagle sightings and/or potential BAs with large nests in fair to good condition.

5. A representative sample of BA's should be monitored for productivity within each BCR.

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#### APPENDIX A: RAPTOR REPRODUCTIVE STATUS CRITERIA

**Breeding Area (BA):** An area containing 1 or more nests within the range of 1 mated pair of birds. Operationally, once a BA is established, we consider it a BA whether it is occupied by eagles in a given year or not, until or unless it is designated historical (i.e., 10 consecutive years unoccupied).

**Historic BA:** A breeding area documented as having been unoccupied for ten consecutive years prior to the current year.

**Occupied BA:** An occupied BA must have a nest, which is any nest, where at least 1 of the following activity patterns was observed during the breeding season:

- a. Young were raised.
- b. Eggs were laid.
- c. One adult sitting low in the nest, presumably incubating.
- d. Two adults present on or near the nest.
- e. One adult and 1 bird in immature plumage at or near a nest, if mating behavior was observed (display flight, nest repair, copulation).
- f. A recently repaired nest with fresh sticks, or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath.

**Active Nest:** One in which eggs have been laid. Activity patterns (a), (b), and (c) above are diagnostic of an active nest.

**Unoccupied BA:** A nest or group of alternate nests at which none of the activity patterns diagnostic of an occupied nest were observed in a given breeding season. BAs must exist as occupied before they can be recognized and classified as unoccupied.

**Successful BA:** An occupied BA from which at least 1 young fledged during the breeding season under consideration. Nests were successful if at least 1 young was raised past 80% of fledging age.

**Failed BA:** An occupied BA from which no young fledged regardless of cause.

APPENDIX B: POTENTIAL BREEDING AREAS DOCUMENTED IN 2011 NEST SURVEY

Table 7. Summary of potential breeding areas with large nests documented in 2011.				
Area Name	Nest #	Aspect	Elevation (ft)	Comments
Aquarius Mtns2	1	N	5,500	Old nest.
Aubrey Hills	1	S	1,180	Fair-poor condition.
Aubrey Wilderness 2	1	NE	3,090	Large nest.
	2	NE	2,940	2 nests (1 large, 1 medium-large)
	3	NW	2,730	Large nest.
Belmont East	1	--	2,350	Good condition
Belmont West	1	E	3,250	Fair-good condition.
	2	W/NW	3,370	Fair-good condition.
	3	W/SW	3,140	Fair condition.
	4	--	2,820	Poor condition.
Big Horn North	1	--	2,050	2 large nests, good. Red-tailed hawk incubating.
	2	S	2,460	2 large nests, fair-good.
Big Horn South	1	--	2,390	Good condition.
Bill Williams Mtns	1	E	1,430	Large nest. Active red-tailed hawk nest nearby.
Black Mtns 1	1	--	4,270	Large nest.
Black Mtns 2	1	N	2,440	Large nest with lots of whitewash.
Black Mtns 3	1	--	2,980	Several large nests in area. One golden eagle flying in area.
	2	--	3,170	Several large nests in area. One golden eagle flying in area.
	3	--	3,150	Several large nests in area. One golden eagle flying in area.
Black Mtns 4	1	NW	1,960	Large nest low on N side of small ridge.
Black Mtns 5	1	N/NW	2,650	2 large nests.
Black Mtns 6	1	--	2,870	Large nest
Black Mtns 7	1	NW	1,880	Large nest, possible second nest.
Black Mtns 8	1	N	1,190	Large nest in pothole/ledge.
Black Mtns 9	1	E	3,900	At least 6 large nests on E face (2 very old nests on W face).
Black Mtns 10	1	--	4,720	Large nest.
Black Mtns 11	1	NW	3,660	Large nest.
	2	--	2,720	Large nest.
Black Mtns 12	1	NW	2,470	At least 2 old nests (1 large, 1 medium-large size), lots of whitewash.
Black Mtns 13	1	NE	2,900	Old nest.
Black Mtns 14	1	W	3,520	Large nest.
	2	N	3,480	Large nest.
Black Mtns 15	1	NW	3,540	Other nests in area. Golden eagle flying in area.
Black Mtns 16	1	E	3,500	Large nest on ledge.
	2	SE	3,900	Other nests in area (1 with a red-tailed hawk).
Black Mtns 17	1	NE	4,700	Large nest (also an old nest on SW side almost gone).
Black Mtns 18	1	N, W	4,370	2 large nests on cliff.
Black Mtns 19	1	S/SE	4,470	Large nest on cliff, poor-fair condition.
Black Mtns 20	1	N	4,320	Large old nest.
Black Mtns 21	1	N	4,490	2 large cliff nests.
Black Mtns 22	1	SE	3,910	Golden eagle perched on butte. 3 large nests on cliff.

Table 7. Continued.				
Area Name	Nest #	Aspect	Elevation (ft)	Comments
Black Mtms 23	1	S, SE	1,690	At least 2 large nests, possibly 3.
	2	S, SE	1,510	At least 2 large nests, possibly 3.
	3	NW	4,150	Other nests in area.
	4	NW	4,100	Other nests in area.
	5	NW	4,080	Other nests in area.
Black Mtms 24	1	SW	4,240	Old nest.
	2	E?	4,270	Old nest.
	3	N	4,180	2-3 large nests, fair condition.
	4	E	3,920	Poor condition/mulch.
Black Mtms 25	1	W	3,560	Fair condition.
Black Mtms 26	1	N	4,020	Very old nest, poor condition.
	2	E/NE	3,650	Very old nest, poor condition.
Black Mtms 27	1	E	4,000	Old nest, poor condition.
Black Mtms 28	1	--	2,670	Good condition. Lots of whitewash.
Black Mtms 29	1	E	3,080	Many large old nests at various heights, marked some. E or NE facing
	2	E	3,060	Many large old nests at various heights, marked some. E or NE facing
	3	E	3,020	Many large old nests at various heights, marked some. E or NE facing
	4	--	3,060	Very old nest.
	5	--	3,030	Very old nest.
Black Mtms 30	1	ESE	2,910	Fair condition.
Black Mtms 31	1	N	3,300	Large nest.
Black Rock 1	1	--	2,980	Very good condition.
	2	--	3,010	Good condition, medium-large size.
Black Rock 2	1	N	4,310	Poor condition.
Black Rock 3	1	--	3,580	Poor condition.
Cerbats 1	1	SE	4,710	Large old nest.
Cerbats 2	1	E	4,840	2 large old nests near mining operation.
Cerbats East	1	SW	5,370	Golden eagle flushed from perch, circled over nest then perched again. Fair nest on short cliff SW side.
	2	E	5,240	Large nest.
Dome Rock	1	N	2,200	Old nests, poor condition.
Eagle Point	3	N/NE	3,430	2 large old nests. Fair condition. Tucked away.
	4	E/NE	3,240	Good condition.
	5	E	3,170	Fair-good condition
Eagletails	1	N	2,440	Fair condition. Golden eagle flying in area.
	2	NE	2,420	Fair condition. Golden eagle flying in area.
	3	N	2,560	Good condition. Golden eagle flying in area.
Eagletails 1	1	--	2,001	Large nest with large rock in middle.
Eagletails 2	1	N	2,190	2 nests, good-fair condition.
Eagletails 3	1	NE	2,160	Remnant nest on north side of pinnacle
	2	N	2,110	Remnant nest.
	3	W/N	2,900	At least 2 nests adjacent to each other, good condition. Third nest maybe too small.
Eagletails 4	1	NW	2,150	Poor condition.
Eagletails 5	1	W	2,540	Fair-good condition

Table 7. Continued.				
Area Name	Nest #	Aspect	Elevation (ft)	Comments
Eagletails 6	1	S/SW	2,380	2 nests in good-fair condition.
Eagletails 7	1	N	2,990	4-5 good condition nests.
Flattop	2	N	2,960	Medium-large nest on NE side. A common raven flew from nest.
Gila Mtns 1	1	E/NE	1,840	Fair-good condition.
	2	SE	1,700	Fair condition. Red-tailed hawk in area.
	3	W	1,340	Fair condition.
Gila Mtns 2	1	--	1,790	Poor condition.
Gila Mtns 3	1	--	1,900	Poor condition. Large, old.
Grand Wash 1	1	--	5,470	Large nest on second tier of cliffs.
	2	--	5,510	Large nest on second tier of cliffs.
Grand Wash 2	1	--	5,140	Very large nest.
	2	--	5,290	Large nest.
Grand Wash 3	1	--	6,090	Large nest.
	2	--	5,610	Large nest.
Grand Wash 4	1	--	6,180	1 old nest, 1 large nest.
Grapevine Mesa	1	--	2,780	Large nest with nesting material.
Harcuvar Stem	1	W/SW	2,950	2 large nests good. Some good cliffs in this small range.
Harquahala	1	--	3,980	1 GOEA perched. Some good cliffs/outcrops in area. Good habitat.
Hualapai 1	1	N	4,580	Old, poor condition. Lower level.
	2	S	5,160	Old, poor condition but large, on second level of rocks from top.
Hualapai 2	1	S	5,600	good shape
Hurricane Cliffs 2	1	WNW	5,860	2 large nests, fair-good on lower cliffs.
	2	WNW	5,850	1 fair nest lower cliffs, second smaller nest nearby.
Hurricane Cliffs 3	1	N	5,540	1 good nest on lower cliffs. Golden eagle perched nearby.
	2	N	5,510	1 good nest on lower cliffs. Golden eagle perched nearby.
	3	--	5,960	1 nest on higher cliff. Golden eagle perched nearby.
Hurricane Cliffs 4	1	W	5,320	Good condition.
Hurricane Cliffs 5	1	--	5,600	At least 2 nests on white cliff, probably red-tailed hawk.
Hurricane Cliffs 6	1	--	5,180	2 fair nests close
	2	--	5,180	Good condition.
Hurricane Cliffs 7	1	W	5,180	Fair-good condition.
Hurricane Cliffs 8	1	W	4,870	Good condition nest on mid-level cliff face.
Kaibab 1	1	N	6,350	Poor condition. Large but old, spread out on ledge. South side of canyon.
Kaibab 2	1	N	6,130	Fair condition.
Kanab 1	1	NW	4,730	Good condition.
Kanab 2	1	S	5,150	Poor condition. Very old.
Kanab 3	1	--	4,920	Old condition.
Kanab 4	1	--	4,620	Poor condition, very old.
Kanab 5	1	--	4,570	Good condition. 3 large nests close proximity, inside curve of cliff face.
Little Harquahala	1	NE	2,490	Old nest, poor condition.
	2	N	2,350	Old nest, poor condition.

Table 7. Continued.				
Area Name	Nest #	Aspect	Elevation (ft)	Comments
Little Horn	1	E/N	2,930	3 nests with 1 old medium-size. Fair-good condition.
	2	W/S	2,940	Good condition.
	3	S	2,710	Large nest.
Little Horn 2	1	W/S	2,250	Large nest.
	2	~NW	2,310	Large good-looking nest.
Little Horn 3	1	~N	2,390	At least 2 large nests. 1 fair-good, 1 poor condition. Eagle-sized.
Little Horn 4	1	~NE	2,140	Large nest and platform, moderately old
	2	--	2,150	Fair condition.
	3	--	1,880	Large nest.
	4	~N	2,080	Large nest.
Long Mtn	1	W	4,280	Large nest on small outcrop. 1 golden eagle flying in area.
Lost Spring	1	W	5,640	Rough circle of sticks with some greenery.
Lost Spring 2	1	SE	5,280	3 nests on lower red cliffs, probably red-tailed hawk.
McCracken Mountains	2	E/NE	3,890	Old nest on ledge. A few large sticks.
Middle Big Horn	1	E	2,820	2 large nests, 1 fair, 1 good condition.
Middle Hurricane Cliffs	1	NW	5,170	Golden eagle chased by CORA, flew to perch in cliff alcove. Possible nest on ledge behind shrubbery, well-concealed and very hard to see.
	2	WNW	5,310	Fair, large nest on ledge spread out.
	3	NW	5,230	Fair-good condition, tall nest stacked up on lower cliffs.
Mohave	1	N	1,790	2 old nests, perhaps medium-large. 1 large nest good.
New Water 1	1	E/N	2,640	At least 3 large nests, good condition, 1 poor-fair. One nest tucked back deep facing north.
New Water 2	1	E	2,140	Very large nest, good condition.
New Water 3	1	E	2,570	Eagle-sized nest.
New Water Butte	1	--	1,850	Old, fair condition.
New Water Point	1	--	2,180	Large nest, good. Prairie falcon in area.
	2	--	2,100	Fair condition.
	3	--	1,800	Fair condition.
North Black Mtns 2	1	W	3,040	Several large nests in area, mostly W-facing. 1 golden eagle perched in area.
	2	W	3,280	Several large nests in area, mostly W-facing. 1 golden eagle perched in area.
	3	W	3,250	Several large nests in area, mostly W-facing. 1 golden eagle perched in area.
	4	W	3,230	Several large nests in area, mostly W-facing. 1 golden eagle perched in area.
North Harquahala	1	NW	4,060	Nest good condition, but borderline size.
	2	SE	3,150	Nest fair condition, decent size.
North Hurricane Cliffs	1	--	4,480	Poor condition, medium-large size nest near point.
	2	--	4,490	Poor condition, under overhang.
	3	SW	4,530	Poor condition. Old/dirt.
	4	W	4,140	Small nest cup.
Painted Rock	1	E	1,180	Nest poor condition.
Paria River	1	--	4,910	Poor condition.
	2	E	4,910	Poor condition, in large alcove, left side facing downstream.

Table 7. Continued.				
Area Name	Nest #	Aspect	Elevation (ft)	Comments
Paria River	3	--	5,000	Poor condition, river right.
Picacho Hills	1	W	1,780	Fair-poor condition.
	2	--	1,800	Large nest.
Plomosa 1	1	W	2,020	Good condition with rock in nest.
Plomosa 2	1	S	2,280	Large nest.
	2	NW	2,080	Good condition, 2 nests, very large.
Plomosa 3	1	E	2,520	Prairie falcon flushed from cliff, old nest poor condition.
	2	N	2,520	Fair condition. Mid-level.
	3	S	2,190	Good condition.
	4	SW	2,460	Good condition.
	5	W	2,350	Good condition.
	6	NW	1,760	Fair-poor condition
Plomosa 4	1	N	2,190	Good condition.
	2	~E/NE	1,470	1 poor condition. 1 fair-good condition.
Plomosa 5	1	NE	1,890	Good condition
	2	--	1,670	Poor condition.
Plomosa 6	1	N	3,070	Good condition, red substrate.
	2	~W	2,970	3 large, fair condition, with whitewash (2 old nests in alcove, 1 on pinnacle nearby).
Plomosa 7	1	NE	2,740	Large nest, fair condition. Prairie falcon flew from cliff. 1 golden eagle 1.5 miles away.
Plomosa 8	1	NE	1,780	Looks like was a large nest with a medium nest now built on (2 active red-tailed hawk nests in area).
Poachie 2	1	SW	2,900	Poor condition but eagle size.
	2	N	2,690	Fair-good condition.
Rawhide 1	1	E	1,430	Poor condition.
	2	E	1,440	Poor condition.
Rawhide 2	1	NW	2,730	Old but definitely eagle size
	2	N	2,430	Old. Fair condition.
Saddle Mtn	1	E	2,330	Good condition. Second nest in area poor condition.
	2	N	2,670	Fair condition. Old.
Seegmiller	1	NE	4,970	Good-very good condition. Golden eagle in area.
	2	ESE	5,050	Good condition.
	3	ENE	4,950	Poor condition. Rock in nest.
	4	--	5,930	Fair condition nest deep in middle of lower part. Also, possible peregrine falcon in area.
Seegmiller 2	1	E	5,800	Fair condition, medium-large size.
South Harcuvar	1	NW	4,320	Poor condition.
	2	NE	3,420	Fair condition.
Tank	1	NE	1,430	Good condition. Edge of DOD land. Good-looking nesting habitat in restricted airspace.
Trout Creek 2	1	SW	4,740	Fair condition.
Turtleback	1	S	1,150	Nest pretty good condition, at least fair.
Vermillion Cliffs	1	S	6,910	Poor condition.
	2	S	6,950	Poor-fair condition.
Vermillion Cliffs 2	1	S	6,730	Poor condition.
Virgin Canyon	1	--	1,880	Large nest.
	2	--	1,720	Large nests.
Virgin Mtns 2	1	--	3,960	Poor condition.

Table 7. Continued.				
Area Name	Nest #	Aspect	Elevation (ft)	Comments
Virgin Mtns 3	1	--	3,650	Poor condition.
Virgin Mtns 4	1	N	7,050	Fair condition. Medium-large size.
Virgin Mtns 5	1	NW	5,730	Fair condition nest on mid to upper level, deep in bend of cliff face.
Virgin Mtns 6	1	N	5,600	Good condition, nice nest on mid-level of cliff face.
Virgin Mtns 7	1	E	4,950	Fair condition, perhaps too small but usable.
West Harquahala	1	NW	3,490	1 golden eagle flew off cliff. Large nest fair-good condition on cliff below bird, empty. Good cliffs in area.
	2	NW	3,470	Fair condition.
White Hills 1	1	W	4,970	Large nest.