

PEREGRINE FALCON NEST SITE MONITORING IN ARIZONA

2012 BREEDING-SEASON RESULTS

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Photo by Taylor Cotten

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PEREGRINE FALCON NEST SITE MONITORING IN ARIZONA 2012 BREEDING-SEASON RESULTS

INTRODUCTION

The U.S. Fish and Wildlife Service (USFWS) is mandated by the Endangered Species Act to monitor the American peregrine falcon (*Falco peregrinus anatum*; PEFA) for a minimum of five years after delisting. In cooperation with States, other agencies, recovery team members and individual cooperators, a "post-delisting monitoring plan" was developed to assess population status and provide a system to detect declines in territory occupancy, nest success and productivity throughout the United States (U.S. Fish and Wildlife Service 2003). Monitoring frequency was established at three year intervals. The Arizona Game and Fish Department (Department) and its cooperators completed the third round of formal monitoring during the 2012 breeding season. The primary objectives for this monitoring period were to 1) determine territory occupancy status, 2) assess nest success and 3) document productivity. This report summarizes monitoring results in Arizona during the 2012 breeding season.

METHODS

TERRITORY SELECTION

A random sample of sixty historic PEFA breeding areas in Arizona were selected by the USFWS and provided to the Department for monitoring during the initial formal monitoring year in 2006 (Abbate 2006; Figure 1). A preliminary statewide survey was conducted in 2005 to evaluate accessibility for long-term monitoring and occupancy at that time (Bayless et. al. 2005). Due to poor access and limited visibility, a few sites were removed from the initial list and replaced with alternates. Breeding areas and specific nest sites were identified from the Heritage Data Management System (HDMS) and records from cooperating agencies and individuals. Breeding areas were eligible for inclusion in the random selection of sites in Arizona if they had been occupied at least once from 1997 to 2002 (U.S. Fish and Wildlife Service 2003).

MONITORING PROTOCOL

The monitoring protocol utilized in Arizona was adapted from the *Monitoring Plan for the American Peregrine Falcon: A Species Recovered Under the Endangered Species Act* (U.S. Fish and Wildlife Service 2003). We visited each targeted breeding area a minimum of two times to assess occupancy, and most sites were surveyed on three or more occasions to identify successful nests and estimate productivity once occupancy was confirmed. Monitoring sessions were conducted by one or two observers in four-hour blocks, during early morning (30 minutes before sunrise to 3.5 to 4 hours post sunrise) or evening (3.5 to 4 hours before sunset to 30 minutes post sunset). Observation times were shortened when objectives were completed in less than four hours. Some remote sites with difficult access or lengthy hiking times were monitored during two successive sessions. This strategy involved one evening observation, camping overnight, and completing the session during the early morning of the following day. Though observations were

recorded on separate data forms, these back-to-back sessions were considered part of the same visit.

When no PEFA activity was detected during a monitoring session, observers were instructed to conduct a "reasonable" search for an alternate eyrie location within the area. Recommendations for this additional survey effort included a time limit equal to a monitoring session of four-hours covering a search area of approximately 800m from the known eyrie, or investigating nearby areas with landscape features that could serve as alternate nesting sites.

DEFINITIONS

- An "occupied territory" was defined as a territory where either a pair of peregrines was present (two adults or an adult/sub-adult mixed pair), or there was evidence of reproduction, such as, one adult sitting low in the nest for an extended time (incubation), eggs or young were observed, or food was delivered into the suspected nest site (eyrie or scrape).
- A "successful nest" was defined as an occupied territory where one or more young was observed at ≥ 28 days of age. Offspring age was determined using age-photographs from Cade et al. (1996) and direct observation of fledglings or older nestlings.
- "Nest Productivity" was defined as the total number of young observed ≥ 28 days within a territory.

Monitoring protocol requirements and recommendations are summarized in the 2012 Peregrine Falcon Monitoring Protocol: Occupancy, Nest Success, Productivity (Appendix 1). All observations were documented on the 2012 Peregrine Falcon Occupancy, Nest Success, Productivity Data Form (Appendix 2) and in supplemental field notes.

STUDY AREA

Monitored breeding areas in Arizona were distributed across a large geographic region with the southern most locations near the international boundary with Mexico and the northern most site located approximately 16km from the Utah border (a linear distance of 626km). The monitored sites furthest to the west were along the Colorado River below the Hoover Dam and the furthest east site was approximately 4km from the New Mexico border. Territory elevations ranged from a low of 122m (400 ft) at the Colorado River in western Arizona to 2500m (8200 ft) in the Rincon Mountains in the south central part of the state. Monitored territories occurred within 12 of 15 state counties with none in Navajo and Apache Counties in the far northwest, or in Yuma County in the far southwest part of the state (Table 1).

This widespread distribution encompassed a range of topographic characteristics from highly complex canyons and mountain ranges to more open landscapes with occasional geologic uplifts and volcanic formations. A variety of biotic communities were also represented from low elevation semi-desert grasslands and desertscrub environments to middle and higher elevation communities of conifer forests and woodlands up to montane forests (Brown 1994). While many territories were located in very dry regions with limited or no surface water features, a number of

nest sites were located on cliffs above river and stream systems, and several territories were adjacent to larger reservoirs such as Alamo Lake, Saguaro Lake and Lake Havasu. All monitored territory locations were characterized as rural or "wilderness" sites with one exception. This territory is located in Camelback Mountain Park within the Phoenix metropolitan area. While not strictly urban due to the open space park environment in the immediate vicinity of the eyrie, the park itself is surrounded by residential development. Ownership and land management for specific nest site locations were distributed among four federal agencies and two local governments including: the U.S. Forest Service (USFS), Bureau of Land Management (BLM), National Park Service (NPS), USFWS, the State of Arizona, and the City of Phoenix, with the majority (40) within the National Forests (Table 2). The distribution of all monitored PEFA nest sites across the state are shown in Figure 1.

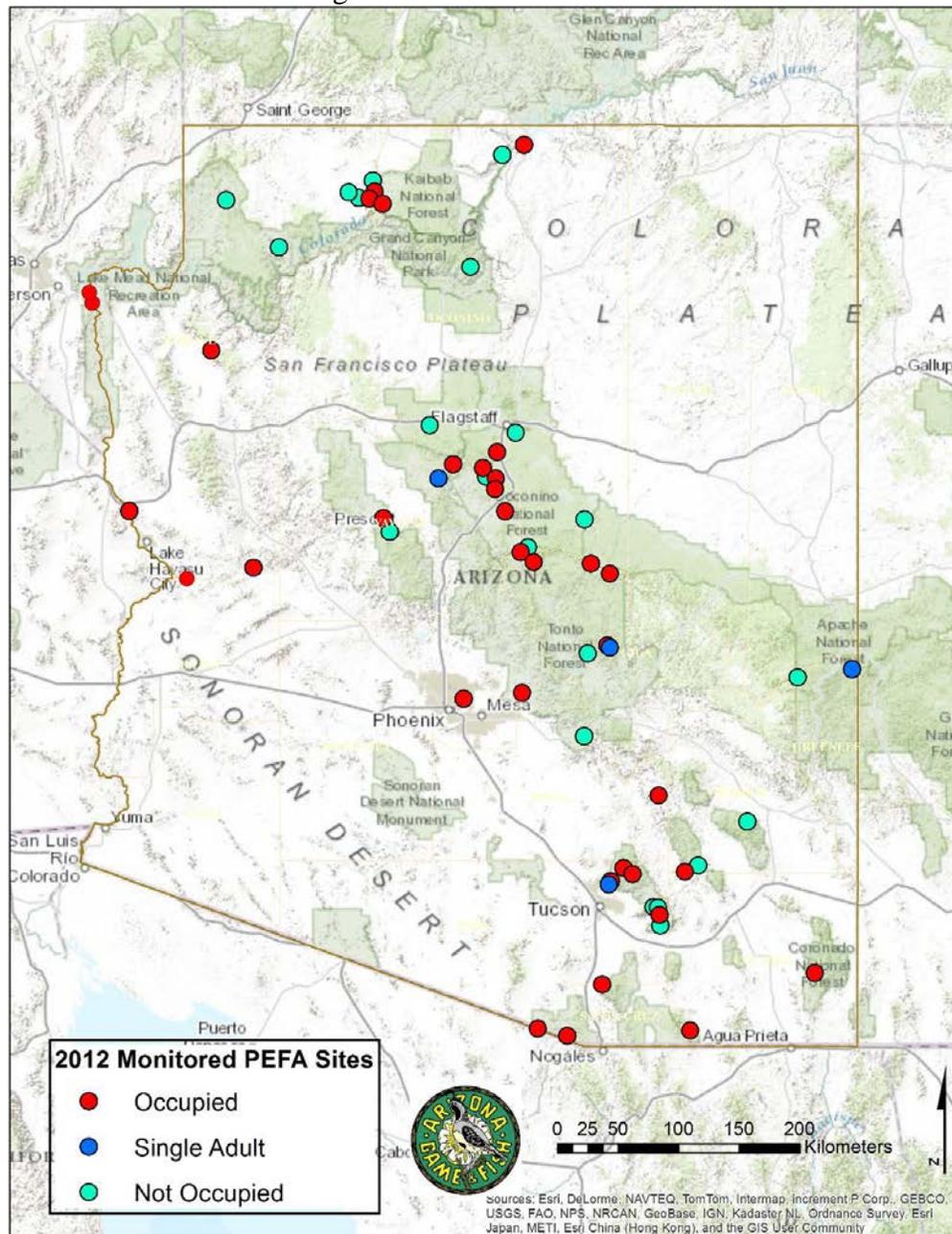


Figure 1. Peregrine falcon breeding area occupancy status – (occupancy defined as presence of two falcons).

2012 MONITORING RESULTS

We observed 35 (58%) occupied nest sites from our sample of 60 breeding areas in 2012 (Table 3, Figure 2). Of these occupied sites, 10 (28%) were confirmed as successful. There were no eggs or young detected at 24 additional occupied locations (Figure 2). One other occupied site (Pumphouse Wash) was documented as a failure after eggs were confirmed early in the season. This nesting pair stopped incubating and did not return to their original scrape site. A second occupied site (Al Fulton) was suspected to have failed after a female was observed apparently incubating, but no eggs or young were detected. Twenty-one (35%) of all breeding areas monitored were considered unoccupied after two visits were completed and no PEFA were detected. We observed single territorial adults at four (7%) of our monitored breeding areas (Appendix 3). We detected 14 offspring that fledged or reached 28 days of age from all successful nests combined resulting in productivity per occupied site and productivity per successful site at 0.4 and 1.4 young per nest respectively (Figure 3). When we grouped monitored breeding areas by land management, occupancy rates ranged from 0% to 75% for those managed lands with three or more monitored PEFA locations (Table 1). The lowest occupancy outcome of monitored PEFA breeding areas was in the northwest region of the state where only 4 of 10 (40%) were occupied. Six of these breeding areas were within the Bureau of Land Management’s Arizona Strip Field Office jurisdiction.

Table 1. PEFA 2012 breeding area occupancy by land management area.

<u>Agency</u>	<u>Management Area</u>	<u>No. Monitored</u>	<u>No. Occupied</u>	<u>Occupancy Rate (%)</u>
USFS	Apache-Sitgreaves	4	2	50
USFS	Coconino	10	6	60
USFS	Coronado	12	8	67
USFS	Kaibab	4	3	75
USFS	Prescott	4	2	50
USFS	Tonto	6	3	50
BLM	Arizona Strip Field Office	6	0	0
BLM	Kingman Field Office	2	2	100
BLM	Safford Field Office	1	1	100
AZ State	Graham and Yavapai Counties	1	1	100
USFWS	Bill Williams Natl. Wildlife Refuge	1	1	100
USFWS	Havasut Natl. Wildlife Refuge	1	1	100
NPS	Glen Canyon National Rec. Area	1	1	100
NPS	Grand Canyon National Park	1	0	0
NPS	Lake Mead National Rec. Area	2	2	100
NPS	Saguaro National Park	3	1	33
Phoenix	Camelback Mountain Park	1	1	100
Totals	17 Management Areas	60	35	Mean =58

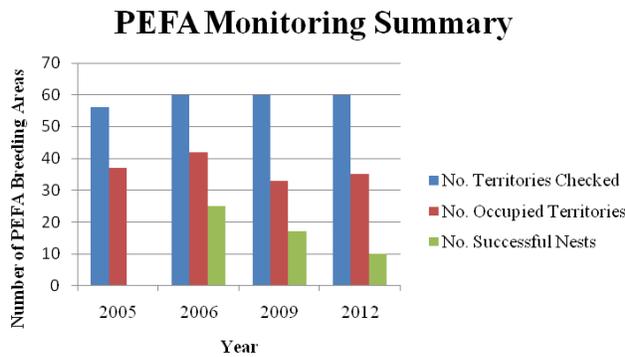


Figure 2. Peregrine falcon breeding area occupancy and success in Arizona 2005-2012.

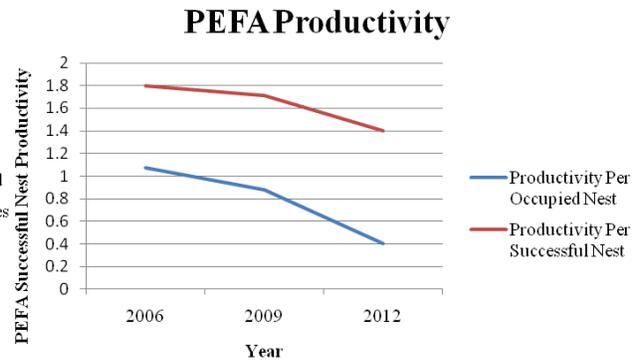


Figure 3. Peregrine Falcon productivity in Arizona 2006-2012.

DISCUSSION

OCCUPANCY

Monitoring of PEFA breeding areas in Arizona during 2012 confirmed occupancy at two more sites (35) than 2009, but still lower than 2006 (42) [Abbate 2006, 2009, Appendix 3]. Despite expanded searches in breeding areas where no PEFA were detected after two visits, no new PEFA activity was observed. It should be recognized that in some breeding areas, the topographic complexity and difficult terrain limit foot access to potential alternate nesting locations. We suspect occupancy in these areas may occasionally go undetected if reproductive pairs selected alternate sites away from known eyries; thus requiring aerial surveys for a definitive assessment. The statewide occupancy rate in 2012 was also impacted by lowered PEFA activity in localized breeding areas. For example, six unoccupied sites of 10 were clustered in an area mostly north of the Grand Canyon (Arizona Strip) and may suggest some local influence such as limited precipitation and reductions in prey resources or some other unknown factor. Even so, overall occupancy rates for the monitoring sample in Arizona have been below the nationwide range estimate of 75% to 94% (USFWS 2003).

NEST SUCCESS

The large number of occupied sites documented with unknown outcomes (24) in 2012 may indicate a number of failed nests, pairs that did not attempt to nest or a combination of these. Most eyries within our monitoring sample must be observed from angles and distances that does not allow for direct views of nest ledges or scrape sites. Therefore, at some of these territories we could not determine if eggs or young were present during the incubation and nestling stages of the breeding season. Determination of nesting status from adult behaviors such as a moving to the back of a ledge for an extended period, remaining in a low posture position or observation of feeding motion were often inconclusive in determining the presence of eggs or young nestlings. It is also possible that the visitation schedule at some sites could have missed early fledglings that did not survive until the next visit. Nevertheless, we would expect to detect fledglings at some of these sites during later visits, but our observations did not provide enough evidence to determine reproductive status.

CONSISTENTLY UNOCCUPIED BREEDING AREAS

Six breeding areas within our monitoring sample have not been occupied (i.e. there were no PEFA detected) during all three formal monitoring years (2006, 2009, 2012). We suspect these sites may be marginal activity areas that can only support nesting when resources and environmental conditions are at their most favorable, or they may be used as alternate sites with such low frequency that PEFA occupancy can only be detected during annual surveys over an extended period. When we remove these six locations from our analysis and use the smaller sample size ($n = 54$), the occupancy rate increases from 58% to 65%. This may suggest that an alternate or increased sample would provide different monitoring results.

NEST SITE COMPETITION, POSSIBLE PREDATION & DISTURBANCE

A number of sites may have been influenced by competition or predation from ravens or other raptors that were nesting or consistently active in the immediate vicinity of the historic eyries. We observed nesting ravens or persistent raven activity at six sites including Finger Rock, Willow Springs, Thumb Butte, Alamo Lake, Elephant Head, and John Long Canyon. We detected prairie falcon activity at Kanab 16.5 and Sunshine Point and a red-tailed hawk nest with young was confirmed at the No See Um cliff site. The monitors at the tenth site of concern (Pine Canyon) suggested this pair may have been impacted by rock climbers as there is an obvious climbing route through the eyrie cliff. Since 2006, site monitors have indicated apparent increased raven activity at a number of PEFA breeding areas within our monitoring sample and we suggest this may be impacting nest success, nest attempts, and nest site locations for PEFA pairs that have historically nested in these locations.

CONCLUSION

A summary of outcomes for the three formal interval monitoring years (2006, 2009, and 2012) and the preliminary survey completed in 2005 indicates some fluctuation in the number of occupied territories and suggests a downward trend in the number of successful nest sites since formal post-delisting monitoring began in the state (Figure 2). That said, the variation in the number of occupied sites between all monitoring efforts is relatively small with the exception of 2006 where occupancy substantially higher than other years. We also suggest that the methods used do not allow us to determine if the reduction in PEFA reproductive activity is an early indication of actual population decline, sample bias, or some deficit associated with the monitoring protocol methodology. For example, some commentators have suggested that using broadcast surveys would increase our occupancy results by eliciting responses from territorial individuals that would otherwise go undetected due to breeding activity that is not visible from known observation points. In addition, surveys of breeding areas where specific nest sites have not been located and reproductive outcomes were undetermined may benefit from the use of aircraft. Thus allowing searches for alternate breeding locations within complex topographic areas that cannot be adequately searched from the ground within the current project scope of work and funding limitations.

As in previous formal monitoring years, we suspect indices resulting from our 2012 monitoring effort are under-estimated as evidenced by the presence of multiple pairs where eyries were hidden from view and final outcomes were undetermined. There were also some sites where pairs or individuals were initially detected near historic eyries, but were not found during follow-up visits – a possible indication of alternate site use. We suggest consideration of these influences on monitoring results in Arizona be part of the planning process for future monitoring efforts and included in the design of potential management actions or implementation of conservation strategies.

We recognize the current monitoring results are below target values for the Southwest Region and this remains a concern. However, the results of PEFA monitoring in Arizona have been below USFWS target values during all formal monitoring years. In the absence of baseline data for occupancy and nest success in Arizona prior to initiation (2006) of post-delisting formal monitoring surveys, we recommend the interpretation of this data be done with caution and suggest comparison to indices from other regions may be premature without further study.

LITERATURE CITED

- Abbate, D. 2006. Peregrine falcon nest site monitoring in Arizona: 2006 breeding-season results. Arizona Game and Fish Department, Research Branch, Phoenix, Arizona.
- Abbate, D. 2009. Peregrine falcon nest site monitoring in Arizona: 2009 breeding-season results. Arizona Game and Fish Department, Research Branch, Phoenix, Arizona.
- Bayless, M.L., M.F. Ingraldi and K. Signor. 2005. Arizona peregrine falcon statewide occupancy survey. Arizona Game and Fish Department, Research Branch, Arizona.
- Brown, D.E. (ed.) 1994. Biotic Communities: southwestern United States and northwestern Mexico. Univ. of Utah Press, Salt Lake City.
- Cade, T.J., J.H. Enderson and J. Linthicum. 1996. Guide to Management of Peregrine Falcons at the Eyrie. The Peregrine Fund, Boise Idaho.
- U.S. Fish and Wildlife Service 2003. Monitoring Plan for the American Peregrine Falcon: A Species Recovered Under the Endangered Species Act. U.S. Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland OR. 53pp.

APPENDIX 1: Arizona Game and Fish Department - Peregrine Falcon Monitoring Protocol, Occupancy, Nest Success, Productivity - January 2012.

Adapted from: *Monitoring Plan for the American Peregrine Falcon: A Species Recovered Under the Endangered Species Act (U.S. Fish and Wildlife Service 2003)*

ARIZONA GAME AND FISH DEPARTMENT
PEREGRINE FALCON MONITORING PROTOCOL
OCCUPANCY, NEST SUCCESS, PRODUCTIVITY
Revised February 2012

Introduction

The U.S. Fish and Wildlife Service (USFWS) is mandated to monitor Peregrine Falcons (PEFA) for no less than five years after delisting in cooperation with States, other agencies and individuals. USFWS has developed the "Post De-listing Monitoring Plan" with the primary objective of detecting declines in territory occupancy, nest success and productivity (indices of population health) throughout the United States. In support of this monitoring plan, and to fulfill the Arizona Game and Fish Department's (Department) commitment to the conservation of this species in Arizona, the Department will conduct monitoring surveys of selected territories (*a random sample of known sites*) based on territory information collected during the 2005 preliminary cliff survey effort (Bayless et.al. 2005) and at least one year of occupancy since 1999. This protocol and the accompanying field data form are adaptations from the USFWS protocol and sample form (U.S. Fish and Wildlife Service 2003), as well as examples and recommendations submitted by various Department personnel.

Observation Season

PEFA territory monitoring will be conducted during the breeding season from February to August 2012. In Arizona, there may be some variation in nesting breeding activity and nesting chronology due to differences between individual pairs, site elevations, prey availability, weather patterns and unknown factors. In general, lower elevations begin breeding earlier and higher elevations are later (but not always). To prevent missing sign of occupancy from early nest failures, every effort should be made to conduct at least one visit during the early breeding (courtship) period - normally mid-February to mid-April. However, during 2012 we need all sites to have the first visit completed as soon possible - i.e. our objective is to have all 60 sites visited at least once by 31 March 2012. Note that earlier observations (prior to incubation) also increase the chances of determining occupancy status, since incubating birds are more secretive.

2012 Visitation Schedule Objectives

Description	Visit 1 Occupancy check	Visit 2 Occupancy check	Visit 3 Success & Productivity check	Visit 4 Success & Productivity check
South Regions and Lower elevations	February 15 th - March 15	March 15 th - April 15 th	April 15 th – May 30 th	June 1 st - July 15 th
North Regions and Higher Elevations	March 1 - March 30 th	April 1 st - May 15 th	May 15 th - June 30 th	July 1 st - Aug 15 th

Monitoring Objectives

Objective 1: Determine Occupancy Status.

The USFWS defines an "Occupied Territory" as:

- a territory where either a pair of Peregrines are present (two adults or an adult/sub-adult mixed pair), or

- there is evidence of reproduction (e.g. one adult is observed sitting low in the nest, eggs or young are seen, or food is delivered into eyrie (nest site)).

Your task: *Confirm the presence of a PEFA pair by seeing both birds at the same time, or documenting evidence of reproduction described above.*

Objective 2: Determine Nest Success.

The USFWS defines "Nest Success" as:

- the proportion of occupied territories in a monitoring region in which one or more young ≥ 28 days old is observed.
- Age is determined by following the guidelines in Cade et. al. (1996).

Your Task: *Confirm the presence of at least 1 nestling (or fledgling if necessary) that is ≥ 28 days old.* You will need to have an observation point looking down into or across from the eyrie. When this is not possible, you may have to time your visit late enough in the season to confirm the presence of older young (e.g., when they begin moving around enough for detection from below).

Objective 3: Determine Productivity.

The USFWS defines "Productivity" as:

- the number of young observed at ≥ 28 days old per territory, averaged across a monitoring region.

Your Task: *Confirm the number of young produced and living until the age of 28 days or greater.*

In most cases, determining the number of young will be the most difficult task and may require several visits. It is understood that some young may go undetected and the actual number of young produced at a particular site may be underestimated. Your goal is to count as many young as possible up until the last visit.

Protocol Requirements and Recommendations

Duration, Timing and Number of Observation Sessions

- *Duration* - Observation sessions are to be scheduled in 4-hour blocks. Visits to determine occupancy status, eyrie location, success, or number of young can be shortened, if the observer can confirm the presence of 2 PEFA, evidence of reproduction, or productivity information in less than 4 hours. Be prepared to spend the most time assessing success and productivity. Plan ahead and know your abilities to access the observation area in plenty of time to conduct 4 hour observations during one of the high activity periods.
- *Time of Day* – All observations need to be scheduled during early morning or evening to maximize detection of PEFA activity. The early morning period is *30 minutes before sunrise to 3.5 to 4 hours post sunrise*. The evening period is *3.5 to 4 hours before sunset to 30 minutes post sunset*. Visibility will be variable depending on your equipment, shade and topography. Use your best judgment in low light conditions when determining exact starting and ending observation times. Sunrise/Sunset Tables for your general work area are available on-line to help you determine the best schedule.

- *Number of Sessions* – Experienced observers with detailed knowledge of their assigned territories and a lot of luck, may be able to document all occupancy and reproductive information during a minimum number of visits. Do not depend on this good fortune! Observers should plan a minimum of 3 visits and allow for 4 or more visits in your schedule.

- *Monitoring Session Protocol:*
 - A minimum of two visits must be conducted if occupancy is not confirmed during the first observation session. The first session is completed during the courtship period and when necessary, extended to early incubation. If no evidence of occupancy is found during the first 4-hour visit, a second 4-hour visit is required (*see Time between Visits below*).
 - Occupied sites will be visited a second time during the estimated early nestling stage to determine the actual age of the nest (incubation, nestling) and estimate an appropriate time for the next visit.
 - A third visit to occupied territories will be made during the late nestling stage (when young are 28 – 42 days of age) to determine nest success and productivity. Additional visits may be necessary to confirm reproductive information when early observations do not allow detection and aging of all surviving young.

- *Remote Sites and Time between Visits:*
 - For remote sites, observers should consider two successive 4-hour sessions, one evening, camping overnight, and then one morning on the following day to make the most efficient use of observer time and energy.
 - When this occurs, complete a separate data form for each 4-hour session. However, this overnight effort will still only be considered 1 visit, since USFWS recommends 3 to 4 weeks between visits, and an extended visitation interval will provide a more reliable assessment of occupancy status.
 - Sites with easier access should space observation sessions with 3 to 4 weeks between visits (see visitation schedule above).

- *Occupancy Status and Alternate Nest Sites:*
 - PEFA sometimes have alternate nest sites within the same territory and the pair may be using a location that is several hundred meters or more away from the primary location, and out of sight. If the known eyrie does not appear to be occupied, the USFWS recommends "some realistic survey effort should be expended to try and locate potential alternate nest sites within the territory".
 - This extended search should not be overdone. Investigate all potential alternate sites from your original observation point first. Then expand your search covering logical sites – cracks, ledges, overhangs and holes within approximately 800 meters (0.5 miles). A reasonable search period is 4 hours. Be alert to vocalizations and fresh white wash for clues to an alternate location. Those rock formations or uplifts that have hiking access from all sides should be examined by hiking around the circumference when the distance can be covered within a 4 hour block. (*To PEFA, moving to the opposite side may only take seconds*).
 - Possible alternate sites may include:
 - on the same cliff face, but at a different site

- on the opposite side of a canyon site
- on the back side of a rock outcrop

Observation Conditions and Things to Avoid

- Observations should be conducted during favorable weather conditions. Snow, rain, strong winds and fog will influence PEFA activity and your ability to detect sign of occupation or reproduction, or hear vocalizations.
- Disturbance of occupied sites during poor weather could influence the outcome of the nesting attempt. Use common sense and check predicted weather conditions prior to departure.
- Avoid flushing incubating PEFA.
- Minimize stress by properly locating your observation point (see below).
- Do not attempt to climb eyrie cliff to collect eggs, feathers or dead young. Please notify Dennis Abbate (Research Branch) (520) 609-2167 regarding possible eggs for collection.

Essential Observation Equipment

- ✓ quality binoculars
- ✓ spotting scope with tripod
- ✓ GPS unit
- ✓ Data forms and Protocol
- ✓ Field notebook
- ✓ Camera
- ✓ Area topographic maps (*USGS 7.5 minute Quad*)
- ✓ Compass

Equipment Note:

- Subtle signs of occupancy and reproduction can be missed or take longer to detect when using only binoculars. In addition, species verification is essential, and Prairie Falcons or other raptors can sometimes be misidentified when posture, light conditions or brief observations are limiting. A spotting scope will very helpful in confirming identifications.
- GPS units leave no doubt about your location and PEFA activity area. Use GPS to identify your observation position, and the cliff or eyrie when conditions permit.
- GPS units should be set to collect locations in UTM's. Historical locations have been collected in NAD 27. You may use NAD 83, but make sure you indicate this clearly on your data form.

Locating Your Observation Post

- The USFWS recommends locating your observation post far enough from the nest "so as not to elicit sustained territorial behavior from either adult". This means you do not want the falcons to be constantly "cacking", patrolling the cliff face, or flying overhead due to your presence.
- The observation distance indicated ranges from 150 to 1700 meters. This distance will obviously have a lot of variation from site to site and will depend on local conditions.
- Remember - spotting scopes will permit longer observation distances. You may have to try several locations to find the right position for both the observer and the falcons.

Data Form Completion

- Record all occupancy and nesting observations on the *Peregrine Falcon Occupancy, Nest Success, Productivity Data Form*. One form should be used for each visit.
- Bring the form with you to your monitoring location and complete during your observation session. Do not try to remember important information after you have left the observation post.
- Complete all entries and include sketches, notes, photos and maps when possible. Enter "NA" or draw a line through an entry if information is not available.
- Check off one or more signs of occupancy and nest success.
- Enter productivity observations.
- Climbing accessibility notes are important when a nest site contains eggs that have not hatched out, or significant eggshell fragments can be retrieved. These may be retrieved by expert technical climbers and used for analysis of contaminants.
- Record notes on general observations and behavior.
- Record directions or access information to the site.
- Sketch cliff and eyrie location and/or photograph cliff.
- Record additional information in your field notebooks or on the back of forms. If you think it's important, unusual, or interesting - write it down. Supplemental notes should be attached to the data form.
- Photocopy forms for your records and mail or drop-off originals to:
 - **Dennis Abbate (Wildlife Contracts Branch)**
 - **Arizona Game and Fish Department**
 - **In Care Of - Region 5**
 - **555 N. Greasewood Road**
 - **Tucson, Arizona 85745.**

References

- Abbate, D. 2010. Peregrine Falcon Nest Site Monitoring in Arizona: 2009 Breeding-Season Results. Arizona Game and Fish Department, Research Branch, Phoenix, Arizona
- Abbate, D. 2006. Peregrine Falcon Nest Site Monitoring in Arizona: 2006 Breeding Season Results. Arizona Game and Fish Department, Research Branch, Phoenix, Arizona.
- Bayless, M.L., M.F. Ingraldi and K. Signor. 2005. Arizona Peregrine Falcon Statewide Occupancy Survey. Arizona Game and Fish Department, Research Branch, Phoenix, Arizona.
- Brown, D.E. (ed.) 1994. Biotic Communities: Southwestern United States and Northwestern Mexico, University of Utah Press, Salt Lake City, Utah.
- Cade, T. J., J. H. Enders, and J. Linthicum. 1996. Guide to management of Peregrine Falcons at the eyrie. The Peregrine Fund, Boise, Idaho.
- Daw, S, S. Ambrose, M. Beer and M. A. Powell. 2004. American Peregrine Falcon Monitoring Protocol for the Park Units in the Northern Colorado Plateau Network. U. S. Department of the Interior, National Park Service, Inventory and Monitoring Program.
- U. S. Fish and Wildlife Service. 2003. Monitoring Plan for the American Peregrine falcons, A Species Recovered Under the Endangered Species Act. U. S. Fish and Wildlife Service, Divisions of Endangered and Migratory Birds and State Programs, Pacific Region, Portland. OR. 53 pp.
- Ward, L.Z. 1994. Peregrine Falcon Survey Methods. Arizona Game and Fish Department, Nongame Branch, Wildlife Management Division, Phoenix, AZ. 12 pp. plus appendices.

White, C. M., N. J. Clum, T.J. Cade and W.G. Hunt. 2002. Peregrine Falcon (*Falco peregrinus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/660>.

APPENDIX 2: Arizona Game and Fish Department - Peregrine Falcon Occupancy, Nest Success, Productivity Data Form, 2012.

Adapted from: *Monitoring Plan for the American Peregrine Falcon: A Species Recovered Under the Endangered Species Act (U.S. Fish and Wildlife Service 2003)*

ARIZONA GAME AND FISH DEPARTMENT
 PEREGRINE FALCON OCCUPANCY, NEST SUCCESS, PRODUCTIVITY DATA FORM

Date: _____ 2012 Visit No. _____ (check one): 4-hr. pm _____ 4-hr. am _____
 Location Name: _____ EO #: _____ USFWS #: _____ Land _____
 Ownership: _____
 Legal (Township, Range, Section) & General Location Description _____

Detailed Directions to Site and Access Issues (begin from nearest town): _____

Cliff UTM:(easting): _____ (northing): _____ NAD(circle): 27 83 Zone: _____
 Observation Pt. UTM:(easting) _____ (northing): _____ NAD(circle): 27 83 Zone: _____
 Estimated Distance to nest cliff from Observation Pt. _____ Bearing to cliff: _____
 County: _____ DEPARTMENT Region: _____ USGS
 7.5'Quad: _____

Observer(s) _____ Affiliation(s) _____
 Observer contact info (phone and e-mail): _____
 Observation Start Time: _____ Observation End Time: _____ Total (min): _____
 Starting Weather: Temp(c): _____ Wind(mph): _____ Cloud Cover (%): _____
 Ending Weather: Temp(c): _____ Wind(mph): _____ Cloud Cover(%): _____
 General Habitat Type (Brown 1994): _____ Elev.(ft) _____

OCCUPANCY STATUS

Primary Signs Of Occupancy	✓ Check
• Adult feeding young	
• Young or eggs observed with positive species I.D.	
• Adult in low posture (incubating or brooding)	
• 2 Adults / sub-adults interacting (courtship), perched or in flight	
• Adult prey exchange	
• Adult prey delivery to ledge	

Possible to view the nest site well enough to see eggs or young? (yes or no) _____.
 No. Eggs observed: _____. No. Young observed: _____
 If unable to see nest site, please explain: _____
 Stage of reproduction at time of visit (courtship, incubation, nestling, fledgling, unknown): _____

Age, sex & no. of Peregrines present (when known): adult male: _____, adult female: _____
 Adult unknown: _____, subadult male: _____, subadult female: _____, subadult unknown: _____

NEST SUCCESS

Signs Of Nest Success	✓ Check
• Adult feeding young, but young cannot be seen	

• One or more nestlings observed (< 28 days old)	
• One or more nestlings observed (≥ 28 days old)	

PEFA Occupancy, Success, Productivity Data Form (*Part 2*)

Date: _____ Location: _____ Observer(s): _____

PRODUCTIVITY

Nest Productivity (Young Observed)	Check or Indicate Total
• No young detected	
• Number of nestlings observed < 28 days old	
• Number of nestlings observed ≥ 28 days old	
• Total Nestlings Observed	

Climbing Accessibility Notes for Egg & Feather Collection

Climbing Information	
• One or more unhatched or broken eggs observed (yes or no).	
• Estimated Cliff Height	
• Estimated Eyrie Height	
• Type of Eyrie (ledge, hole, crack, etc.)	
• Top of cliff accessible for rappel down to eyrie (yes or no)	
• Eyrie only accessible by climbing up from below (yes or no)	

Behavior and General Observation Notes: _____

Sketch of cliff, eyrie location or other details (indicate north and use back if needed):

(check if completed)

- Attached to this form are 8.5 x 11 map and/or cliff sketches indicating location, date, and observer.
- Photograph of cliff site (digital photo preferred) is attached or being sent to designated location.
- Additional Notes attached

Send Completed Forms to Dennis Abbate, DEPARTMENT, 555 N. Greasewood Road, Tucson, Arizona 85745

E-mail: dabbate@azgfd.gov

APPENDIX 3: Peregrine Falcon Nest Site Descriptions and Monitoring Results 2006, 2009 and 2012.

Appendix 3. Peregrine falcon nest site descriptions (NAD 27), occupancy and productivity 2006, 2009 and 2012.

O = occupied (2 PEFA present), U = unoccupied (no detections), Und = undetermined (1 PEFA and no young detected), xx = not applicable

Territory Name	E.O. Number	DEPARTMENT Region	Occupancy Status			Productivity		
			2006	2009	2012	2006	2009	2012
Kanab / Bullrush Point	2	2	O	O	O	0	Und	1
Confluence Site	3	2	O	Und	O	2	0	1
Parashant	4	2	U	U	U	xx	xx	xx
Aravaipa Virgus	6	5	O	O	O	2	Und	0
Sycamore Basin	8	2	O	O	O	3	1	0
Checkmate	12	2	O	U	O	3	xx	0
Bingo	13	2	O	Und	U	0	0	xx
Valhalla	14	2	U	U	O	xx	xx	0
No See Um	15	2	U	U	O	xx	xx	0
Gooseneck	17	2	U	Und	O	xx	0	0
Calf Pen Canyon	28	2	O	Und	U	1	0	xx
Nash Point	29	2	Und	O	O	0	1	0
Ash Creek	31	5	Und	U	U	0	xx	xx
Carr Canyon	32	5	Und	O	O	0	1	0
Wrong Canyon	33	5	O	O	U	1	1	xx
Elephant Head	35	5	O	O	O	2	0	0
Bill Williams Mtn.	36	2	O	U	U	0	xx	xx
Center Mountain	38	6	O	O	O	1	2	2
Milligan / Maness Peak	46	1	O	U	Und	0	xx	0
Wet Beaver	49	2	O	O	O	0	2	0
Bass / Bear Canyon	52	5	O	U	U	1	xx	xx
Powell's Monument	61	2	U	U	U	xx	xx	xx
Redfield Canyon	63	5	O	O	O	2	Und	0
Cape Final	114	2	U	Und	U	xx	0	xx
Promontory Butte	129	6	U	O	O	xx	0	0
Reef of Rocks (Sea Gods)	130	5	O	O	O	1	2	0
Cross Current Rapids	134	3	O	O	O	0	3	0
Helen's Dome	136	5	O	Und	U	Und	0	xx
Reef Rock (Rincon Mtns)	137	5	O	O	U	3	Und	xx
Happy Valley	138	5	U	O	O	xx	2	2
Pine Canyon	142	6	O	O	O	0	1	0
Verde Box	143	2	O	O	Und	Und	Und	0

Appendix 3. (cont.). Peregrine Falcon Nest Site Descriptions and Monitoring Results during the 2006, 2009 and 2012.

Territory Name	E.O. Number	DEPARTMENT Region	Occupancy Status			Productivity		
			2006	2009	2012	2006	2009	2012
Goldstrike Canyon	145	3	O	O	O	2	2	0
Sycamore Canyon	146	5	O	O	O	1	Und	2
Pumphouse Wash	148	2	O	O	O	3	2	0
Kanab 16.5 (West of Gunsight Pt.)	150	2	O	Und	U	1	0	0
Granite Mountain	151	3	O	O	O	2	Und	0
Fisher Point	153	2	U	U	U	xx	xx	xx
Grand Wash Vole	156	3	O	O	O	0	Und	0
Saguaro	158	6	O	O	O	0	Und	0
Hidden Rim	159	2	U	U	U	xx	xx	xx
Hack / Willow Springs	162	2	O	O	U	0	1	xx
Gobbler Point	165	1	O	O	U	1	1	xx
Al Fulton	167	6	O	O	O	2	1	0
Mt. Kimball	171	5	O	U	O	0	xx	0
John Long Canyon	172	5	O	O	O	2	Und	0
Mount Bigelow	174	5	U	O	O	xx	3	0
Finger Rock Canyon	180	5	O	O	Und	3	1	0
Nine-mile Draw	184	2	O	O	O	2	Und	0
Cold Spring Canyon	190	6	O	Und	Und	1	0	0
Bill Williams River	192	4	O	O	O	1	0	0
Armer Mountain	197	6	U	U	U	xx	xx	xx
Sunshine Point (Hack Canyon)	199	2	U	U	U	xx	xx	xx
Alamo Lake	200	3	Und	O	O	xx	0	0
Havasu NWR – Needles	201	3	U	Und	O	xx	0	0
East Clear Creek	204	2	O	Und	U	2	0	xx
Cerro Del Fresnal	208	5	O	U	O	Und	xx	0
Camelback Mountain	211	6	O	O	O	0	2	4
Thumb Butte	217	3	O	U	U	0	xx	xx
Apache Leap	222	6	O	U	U	0	xx	xx
Totals 60 sites		6 Regions	42	33	35	45	29	14