UTAH WEST DESERT RAPTOR NEST SURVEY AND MONITORING PROTOCOL MANUAL



CREATED BY THE UTAH LEGACY RAPTOR PROJECT
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INTRODUCTION AND PURPOSE OF DOCUMENT

Raptor nest surveys and monitoring can provide critical information to land managers regarding specific sites of importance to raptors, as well as local and landscape-level nesting habitat relationships and annual trends. However, surveys are often conducted by different entities or individuals employing varying methods or levels of effort. To be of the greatest value to land managers at the least cost, survey and monitoring efforts must be standardized to the degree possible and be tailored to the ecology of the species of interest. Given these considerations, the Utah Legacy Raptor Project (ULRP) partners established this protocol document to provide interested parties with the knowledge and tools necessary to conduct a successful survey and monitoring program for raptor species common to the West Desert, with a particular emphasis on Golden Eagles, Ferruginous Hawks, and Burrowing Owls. However, many of the principles and methods put forth here should be relevant and adaptable to other species and users outside this focus. We strongly recommend that the reader become familiar with all aspects of this manual and attend any training provided in their area before heading into the field.

The document draws heavily upon the experiences and data accumulated during 13 plus years of intensive monitoring of thousands of raptor nests by two ULRP partners in particular: HawkWatch International (HWI) and Raptor Inventory Nest Survey (RINS). We extend our deepest gratitude to the impressive number of employees and volunteers that have been instrumental in these efforts and the production of this document.

LEGAL PROTECTION OF RAPTORS AND NESTS

The regulations most relevant to any individuals or entities involved in raptor monitoring or research activities are the Migratory Bird Treaty Act (MBTA; 16 U.S.C. 703-712) and the Bald and Golden Eagle Protection Act (BGEPA; 16 U.S.C. 668-668c). Under MBTA and BGEPA, it is illegal to take, kill or possess any part, nest, or eggs of migratory birds including raptors. Under both regulations, “take” includes capture, possession, killing, or an attempt to kill. Additionally, BGEPA extends take to harassment or disturbance, which is highly relevant to those involved in eagle nest surveys and monitoring. While it is unlawful to destroy or move any raptor nest while there are eggs or young in the nest, it is unlawful to take an eagle nest at anytime. It is also important to note that although it is illegal to possess any bird parts, the illegal possession of eagle parts, such as feathers or talons, is generally prosecuted to the full extent under the law by the U.S. Fish and Wildlife Service (USFWS). In special circumstances, the USFWS may permit take or possession of birds, their nests or parts, but rigorous standards apply and the details are beyond the scope of this document. Any individual participating in bird trapping, banding, or other marking or scientific collecting activities is also required to possess all relevant federal and state permits. First violations of the MBTA or BGEPA can result in fines of up to $100,000 (up to $200,000 for organizations), imprisonment for up to 1 year, or both. Additionally, individual states have their own particular laws and permits regarding birds and nests. The state of Utah explicitly prohibits pursuit, possession, harassment, or killing of birds and other protected wildlife under Utah Code 23-13-2 (Wildlife Resources Code of Utah).

OVERVIEW OF RAPTOR NESTING ECOLOGY IN THE WEST DESERT

A basic understanding of general raptor nesting ecology and behavior is extremely helpful when conducting nesting surveys. The inventory and monitoring of nests is much more efficient when surveyors know which species to expect in a particular area or habitat being searched. With a suite of likely breeding species identified, surveyors can focus efforts on the proper times of year and potential nesting sites associated with those species (e.g., tree or cliff substrates). The information provided in the sections below will equip surveyors with the information necessary to direct focused raptor nest surveys in the West Desert of Utah.

Description of raptor nesting habitat associations

A basic description of the general nesting habitat, nest substrate (i.e., physical location of the nest), and nest type (e.g., stick or burrow) of the 16 raptor species most likely to breed in the West Desert is provided in Table 1. The table is organized in such a manner as to facilitate a quick assessment of the potential nesting species by general habitat types and available nesting substrates.

The majority (10/16) of the raptor species likely to nest in the West Desert occupy nests placed on raised substrates (i.e., trees, cliffs, or artificial structures such as power poles) that are relatively conspicuous and easy to locate. In contrast, the remaining species nest in cliff or tree cavities (i.e., Prairie Falcon, American Kestrel, and Western Screech-Owl), in concealing vegetation on the ground (i.e., Northern Harrier and Short-eared Owl), or in the ground itself (Burrowing Owl) and are more difficult to locate or monitor remotely. However, it should be noted that none of the cavity and burrow nesting species excavate their own nests and are therefore dependent on the presence of existing cavities or burrows (often excavated by burrowing mammals). As a result, searches for cliff cavities with whitewash, tree cavities, or burrows in suitable habitat can be a useful way to identify potential nesting sites prior to the nesting season. Whitewash or mutes can be useful tools for finding potential nests, remember it is not reliable to use to determine recent activity, especially in dry arid regions. In addition, most of the raptors species in Table 1 will use the same nest or proximate nests in consecutive years, making searches near existing stick nests or previous known nesting locations productive. Nest switching commonly occurs between various raptors and Common Ravens and it is recommended that surveyors be familiar with the nesting ecology of Ravens as well (see Table 1) and track it as part of any raptor survey program. For example, Great-horned and Long-eared Owls most often usurp trees nests built by other species in a previous season, Prairie Falcons and Red-tailed Hawks will commonly use inactive Golden Eagle nests, while Ravens will use any of these.

Table 1. Raptor species likely nesting in the West Desert of Utah by typical nesting habitat, nest substrate, and nest type. Species in italics are uncommon nesters in the more common habitats found in the area.

Likely nesting raptor species	General habitat structure	Detailed nesting habitat description	Nest substrate (less common)	Nest type
Golden Eagle	Open, grass/shrub	Cliff near open/semi-open grass/shrub; avoids heavily forested areas	Cliff, (tree)	Stick
Prairie Falcon	Open, grass/shrub	Cliff near open/semi-open grass/shrub; typically in crevice or pothole, but will use eagle or raven stick nests	Cliff	Cavity, Stick
Ferruginous Hawk	Open, grass/shrub	Single or small patch of pinyon-juniper or outcrop near open grass/shrub; avoids heavily wooded areas	Tree, outcrop, ground	Stick
Red-tailed Hawk	Open, grass/shrub	Patches of deciduous trees, artificial structure, or cliff in open/semi-open areas of grass/shrub; avoids heavily forested areas	Tree, artificial structure, cliff	Stick
Swainson's Hawk	Open, grass/shrub	Single or small patch of trees or artificial structure in open/semi-open area of grass/shrub; avoids heavily forested areas	Tree, artificial structure	Stick
American Kestrel	Open, grass/shrub	Tree(s) with cavity near open areas of grass/shrub with available perches	Tree, (cliff)	Cavity
Northern Harrier	Open	Open areas with some tall vegetation, especially near or in wetlands	Ground	Grass bowl
Short-eared Owl	Open, grass/shrub	Open grass/shrub lands with some concealing vegetation	Ground	Grass bowl
Burrowing Owl	Open, grass/shrub	Available burrows near open areas with bare ground or short grass/shrub; may be near road.	Ground	Burrow
Long-eared Owl	Forest, wooded	Uses Magpie, Raven, or other hawk nests in forested/wooded patch; avoids isolated trees	Tree	Stick
Western Screech-Owl	Wooded, riparian	Variable, but prefers riparian areas with deciduous trees and cavity	Tree	Cavity
Sharp-shinned Hawk	Forest	Mid-sized trees in dense forested areas >4ha	Tree	Stick
Cooper's Hawk	Forest	Mid-sized trees in forested areas >4 ha	Tree	Stick
Northern Goshawk	Forest	Larger trees in open forested areas >4 ha	Tree	Stick
Peregrine Falcon	Variable	Variable habitats; cliff or artificial structure, often near wetlands or other water	Cliff, artificial structure	Scrape
Great Horned Owl	Variable	No unique characteristics; uses nest of Red-tailed Hawks, Ravens, and other raptors.	Tree, (cliff)	Stick
Common Raven	Variable	Highly variable; will use nests of other species; may avoid forest interior	Tree, artificial structure, cliff	Stick

The photographs in Figures 1 and 2 below illustrate typical habitats for common raptors nesting in the West Desert.

Figure 1. Basin and Range topography that illustrates specific raptor habitat including grassland, shrub-steppe, pinyon-juniper, foothill.

Figure 2. Basin and Range topography that illustrates cliff raptor habitat.

Nest characteristics and condition

A review of the nesting habitat and substrate preferences detailed in the previous section reveals that there is considerable overlap in preference between individual raptor species. For example, a small, medium to large stick nest found in a small patch of trees surrounded by open habitat could belong to a Golden Eagle, Ferruginous Hawk, Red-tailed Hawk, Swainson's Hawk, Great-horned Owl, or Common Raven. However, in the absence of visible raptor activity, paying close attention to the characteristics of a particular nest substrate and type can provide additional insights on its potential occupants. Typically, Ferruginous Hawks nest in pinyon or juniper trees (in some areas of the western U.S., on the ground), while Red-tailed Hawks are found most often in deciduous trees (e.g., cottonwoods near homesteads) and cliffs. Common Raven nests are often smaller, constructed of medium sticks, and more loosely built than the other species. At the other end of the spectrum, Golden Eagle nests can be quite large, but typically contain smaller sticks. Similarly, Sharp-shinned Hawk, Cooper's Hawk, and Northern Goshawk nests can be distinguished with some success by considering tree and nest dimensions. Although nest switching does occur between species and overlap in characteristics remains, recording nest dimensions and taking nest photos as directed on the Nest Location Data Sheets can be very helpful.

Additionally, nests that are being built up in preparation for egg-laying, active nests, and recently active nests are generally in better condition than those that haven't recently been tended or active. Specifically, a nest in **good condition** is one that could be used in the present or upcoming nesting season without much work by the nesting pair. For stick nests, the nest top is relatively intact and contains a bowl or is flat or slightly rounded (convex). It may also contain evidence of new material that is darker/less sun-bleached or signs of "sprucing" (i.e., green or brown/orange vegetation lining the bowl). For burrow or cavity nests, a good condition nest has an entrance that is mostly open and unobstructed. In contrast, a **poor condition** nest would require considerable rebuilding or maintenance prior to reuse. For stick nests, it may be unconsolidated, spilling, have a top that is obviously sloping outward, or contain a fallen rock or other obstruction. For burrow or cavity nests, the entrance is partially collapsed or obstructed. Ravens may use nests in any condition. Figures 3 and 4 below provide photographic examples of nests for some of the more likely raptor species breeding in the West Desert.

Golden Eagle nest – active & **good** condition

Golden Eagle nest – **poor** condition

Figure 3. Examples of raptor nest characteristics and condition.

Ferruginous Hawk nest – **good** condition

Ferruginous Hawk nest – **poor** condition

Burrowing Owl – **good** condition (w/mutes)

Burrowing Owl – **poor** condition

Prairie Falcon nest

Red-tailed Hawk nest – adult with nestlings

Figure 3 (continued). Examples of raptor nest characteristics and condition.

Swainson's Hawk nest	Short-eared Owl nest – active
	

Figure 3 (continued). Examples of raptor nest characteristics and condition.

Common Raven nest on irrigation equipment	Common Raven nest – active/incubating
	

Figure 4. Examples of non-raptor nest characteristics.

OVERVIEW OF BASIC RAPTOR BREEDING SEASON BEHAVIOR

Nesting season activity

Understanding typical raptor breeding season behavior is critical to efficient nest searching and monitoring. Prior to actual egg-laying, raptors engage in relatively conspicuous territorial, courtship/copulation, and nest building behavior that can reveal likely subsequent nestling locations. In contrast, raptors are generally quite inconspicuous and secretive during the incubation and early nestling stages. Activity around nests increases as nestlings grow and their increasing food demands require regular prey deliveries by the adults. Additionally, as chicks approach fledging age, adults are away from the nest hunting more often, while chicks are more visible due to their increased size and activity levels. Late in the nestling stage, chicks may regularly stand in the nest, flap their wings, or be found out of the nest on nearby branches, ledges, or the ground. Remember it is imperative not approach the birds or to handle them – that this is natural behavior for fledglings and while they might look "injured" to us, they should not be disturbed. Observed nesting season activity and the chronology information in the following section will help surveyors schedule field visits to optimize their likelihood of detecting conspicuous nesting activities.

Nesting season chronology

Nesting chronology information, specifically information on the typical timing and length of various nesting activities such as incubation and fledging, is useful for nest survey planning and guiding proper temporal nest protections. Table 2 provides the range and average nesting period dates (from egg-laying to fledge) and length of various nest stages for likely local raptor nesting species. This information can be used in the preseason to project expected nest start, hatching or fledging dates for individual species and to optimize scheduled survey outings accordingly. For active nests with visible nestlings, the information can be used in conjunction with photographic aging guides (available for a number of species at: http://srfs.wr.usgs.gov/library/reprints.html) to estimate the potential fledging date of most raptor species to within a few days. Additionally, paying attention to the time of year can help determine likely identity of species at nests that are difficult to see into. For example, only Great-horned Owls or Golden Eagles are likely to begin nesting as early as January or February, while Swainson's Hawks are by far the latest starting tree/stick nesters.

Table 2. Nesting season chronology of raptor species likely nesting in the West Desert.

Species	Nesting period range	Average nesting period	Nesting length	Incubation period	Fledging age
American Kestrel	15 Apr–24 Jul	1 May–29 Jun	59 d	30 d	29 d
Burrowing Owl	10 Apr–5 Aug	30 Apr–12 Jul	73 d	29 d	44 d
Common Raven	20 Mar–30 Jun	11 Apr–5 Jun	55 d	23 d	32 d
Cooper's Hawk	15 Apr–1 Aug	10 May–14 Jul	65 d	35 d	30 d
Ferruginous Hawk	22 Mar–16 Jul	13 Apr–28 Jun	76 d	32 d	44 d
Golden Eagle	8 Feb–10 Jul	2 Mar–16 Jun	106 d	42 d	64 d
Great Horned Owl	15 Jan –7 Jun	20 Feb–11 May	80 d	33 d	47 d
Long-eared Owl	1 Mar –2 Jul	15 Mar–16 May	62 d	27 d	35 d
Northern Goshawk	15 Apr –17 Jul	1 May–7 Jul	67 d	32 d	35 d
Northern Harrier	15 May–12 Aug	25 May–30 Jul	66 d	31 d	35 d
Peregrine Falcon	15 Mar–14 Jul	15 Apr–28 Jun	74 d	34 d	40 d
Prairie Falcon	1 Apr–16 Jul	14 Apr–24 Jun	71 d	33 d	38 d
Red-tailed Hawk	18 Mar–20 Jul	11 Apr–25 Jun	75 d	31 d	44 d
Sharp-shinned Hawk	15 May–3 Aug	28 May–23 Jul	56 d	31 d	25 d
Short-eared Owl	1 Apr–28 Jul	30 Apr–28 Jun	59 d	31 d	28 d
Swainson's Hawk	20 Apr–14 Aug	8 May–21 Jul	74 d	34 d	40 d
Western Screech-Owl	1 Mar–4 Jun	15 Mar–15 May	61 d	28 d	33 d

RECOMMENDED SAFE MONITORING PRACTICES

Raptors are sensitive to human activities and disturbance may result in nest or territory abandonment and unlawful take. Raptors are particularly sensitive to disturbance during the courtship, egg-laying, and incubation periods. Signs of disturbance include visible agitation, alarm calls, standing on the nest, flushing from the nest, circling/diving toward observer, etc. If raptors exhibit signs of disturbance, vacate the area immediately and return at a later date and observe from a more remote location. **Direct approach or disturbance of active nests should be strictly avoided.** To limit the potential for disturbance, all survey activities during these periods in particular should be carried out from recommended safe distances (see Table 3) with binoculars or spotting scopes. **Whenever possible, remain in your vehicle while observing** to further reduce potential disturbance. Surveyors should also attempt to record data and **vacate the vicinity of active nest sites as quickly as possible** to minimize disturbance. Nest location coordinates or any other "at nest" data should be collected when nests are inactive (e.g., after fledging or failure). If it is absolutely necessary to approach a nest more closely (e.g., to determine nestling or fledgling status), intrusion should not occur until nest chronology or observations clearly suggest nestlings are >2 weeks old. In addition, closer intrusions should be limited to times of day and weather conditions that will not expose eggs or nestlings to excessive heat, cold, or moisture. Nesting raptors can be aggressive toward intruders and we recommend surveyors wear a helmet and protective eye wear when intruding near any active nest. **Note: We DO NOT endorse closer intrusion of active nests at any time, as disturbance and illegal take is possible.**

Additional practices that we recommend to protect raptors, nests, and the West Desert environment are listed below:

- Treat all nest locations as sensitive information.

- Avoid alerting the public to nest locations; do not drive off established roads to view nests or mark nest or viewing areas (i.e., practice tread lightly ethics).
- Avoid making loud noises near nests, including vehicle horns, barking dogs, etc.
- Do not "over-visit" nests; nests should only be visited as often as necessary to collect relevant data.
- Travel only on designated roads and trails; respect road closures and private property
- Be aware of exotic plants (e.g., cheatgrass) and minimize your potential to transport them on your vehicle or clothing to the extent possible.
- Do not leave campfires unattended or have fires in unsafe conditions (e.g., high winds); completely douse or bury fires before departing the area.
- Never park your vehicle where vegetation is in contact with the undercarriage.
- If a dead Golden Eagle is discovered, contact the USFWS.
- Avoid driving on muddy roads when it causes damage to the road.

Utah Raptor Guidelines

In 2002, the US Fish & Wildlife Service (USFWS) published the "Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances". The objectives of the guidelines are to maintain and enhance raptor populations in the state of Utah through habitat management, minimization of disturbance and roost/perch/nest site protection. The document establishes suggested seasonal buffer zones (Table 3) around nests to avoid disturbance and take that should be given careful consideration when working with raptors. A complete guideline from the Utah filed office can be found on the Internet at the USFWS website: http://www.fws.gov/utahfieldoffice/Documents/MigBirds/Raptor%20Guidelines%20(v%20March%2020,%202002).pdf

Check http://www.fws.gov/ for more information regarding raptor protection in other states.

Table 3. Recommended seasonal protection buffers for Utah raptor species likely nesting in the West Desert. (Source: Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances).

Species	Spatial Buffer (miles)	Seasonal Buffer
American Kestrel	NN[1]	4/1 - 8/15
Burrowing Owl	0.25	3/1 - 8/31
Cooper's Hawk	0.5	3/15 - 8/31
Ferruginous Hawk	0.5	3/1 - 8/1
Golden Eagle	0.5	1/1 - 8/31
Great-horned Owl	0.25	12/1 - 9/30
Long-eared Owl	0.25	2/1 - 8/15
Northern Goshawk	0.5	3/1 - 8/15
Northern Harrier	0.5	4/1 - 8/15
Peregrine Falcon	1.0	2/1 - 8/31
Prairie Falcon	0.25	4/1 - 8/31
Red-tailed Hawk	0.5	3/15 - 8/15
Sharp-shinned Hawk	0.5	3/15 - 8/31
Short-eared Owl	0.25	3/1 - 8/1
Swainson's Hawk	0.5	3/1 - 8/31
Western Screech-Owl	0.25	3/1 - 8/15

[1] A spatial buffer is not currently considered necessary for the American Kestrel, but actions resulting in the take of birds or nests is still unlawful.

RECOMMENDED RAPTOR NEST MONITORING APPROACH

In order to conduct raptor nest surveys timely and efficiently, surveyors need to be aware of the basic nesting ecology of local raptor species outlined in the previous sections. With this knowledge in hand, it is possible to strategize a plan of attack that minimizes disturbance to the birds as well as the amount of time spent in the field.

Scheduling field visits

Surveyors should use Table 2 and the information on breeding season behavior to **create a survey schedule that maximizes the probability of detecting tell-tale behaviors, nests and key nest stages.** As previously discussed, active nests can be particularly difficult to locate during the incubation period. Ideally, nest surveys will target the pre-laying period when adults are involved in conspicuous territorial displays, nest building, copulation, etc. Many nests are also more easily located early in the season prior to grass growth or leaf-out. For example, because Burrowing Owls nest relatively late when grassy vegetation is tall, it is often most productive to locate available burrows preseason for follow-up monitoring. Similarly, stick nests in deciduous trees are much more easily located prior to leaf-out. We recommend **at least 2 survey visits to potential nesting areas separated by ~2 weeks during the early nesting period of your focal species to confirm the presence or absence of activity**. **Active nests should be revisited at least 2 additional times** to determine chick ages during the nestling period and final nest productivity. The aging guides referenced in the Nesting Season

Chronology section can be used to determine the likely date chicks will reach 80% of fledging age (the standard for determining nest productivity). Additional visits to active nests may be desired based on the goals of the survey and monitoring program (e.g., to track nest or chick survival).

Search strategy

We highly recommend that surveyors print topographic maps corresponding to the survey area of interest prior to entering the field. As discussed in greater detail below, these maps can be used to help guide nest searching, the selection of ideal view points in the field, and to record the location of observed behaviors and nest sites that will be helpful during subsequent field visits. We also recommend indicating areas searched on these maps to avoid search duplication or omission.

Surveyors should use topographic maps, aerial photography, other available maps (e.g., available GIS layers), previous knowledge, and the information in this manual to the extent possible to **identify potential raptor habitat and nesting substrates** present in the survey area of interest. Not all habitats are equal to individual raptors and much time spent searching for nests can be eliminated through thoughtful consideration of the landscape. When in the field, surveyors should key in on vegetation (e.g., scattered pinyon-juniper trees), topography (e.g., cliffs) or other features (e.g., burrow mounds) likely to attract nesting raptors. Often, the easiest way to find nests is by tracking birds observed away from the nest. For example, nests can be found by using binoculars to follow a bird carrying nest material or prey remains, involved in territorial display, etc. **Select a high or strategic view point** that gives a broad view of the surrounding landscape. **Scan potential nest substrates** with optics, but also remember to **regularly search the surrounding area without optics** for perched or flying adults, as nest sites are often located by following birds with sticks or prey back to the nest.

When a nest is found, attempt to determine the condition, species and status through extended observation. To confirm the status of nests where activity is not readily visible to ground-based observers, but the nest is in good shape (i.e., potentially active), we recommend **observing for at least 2 hr per visit unless nest status is confirmed sooner**. However, it is usually possible to confirm activity at Burrowing Owl colonies within a short period (e.g., 30 minutes or less) because actively nesting adults usually are quick to respond to intrusion by vocalizing or flying from the burrow. Survey areas where no bird activity has been seen upon arrival and any present nests have been documented and determined to be in poor shape can be classified as inactive without extended observation. Similarly, to survey efficiently in areas where multiple nests are present, it is desirable to **focus your observation efforts on nests in good condition** after noting those in poor condition.

Additional field observation tips

Observing nests for extended periods through optics can be trying under the best conditions. To maximize the return on time invested, we suggest surveyors follow these viewing tips:

- Select a view point that provides the best possible angle on the nest (e.g., raised locations, locations that provide an unobstructed view, etc.).
- Use a window mounted scope and shading for maximum comfort; turn off the vehicle to minimize vibration.

- Pay careful attention to time of day and sun position. Viewing is best when the sun is behind the observer and early in the morning or late in the day. Heat waves can drastically reduce clarity and birds tend to be less active during the heat of the day.
- Try changing the view angle slightly if you are having trouble discerning what you're seeing in your scope. For example, if you are viewing from a vehicle, try moving forward or backward a few dozen yards to gain a different perspective.

Required field equipment

- Optics such as binoculars and spotting scopes are essential to safely and effectively monitor nesting raptors. There are many styles and models available, which will require research to determine what is needed for the project. A good starting point for research is the Internet and look for sites like: http://www.binoculars101.com/
- Develop an equipment list for field personnel such as: recommended clothing; personal hygiene; first-aid kits; camping equipment; food needs; water storage; vehicle needs; tools; lights; safety equipment; communication devices – two-way radios, cell phones, satellite phones; surveying equipment – binoculars, spotting scopes; camera, GPS units, datasheets, day packs; and maps.

DATA RECORDING

Strict adherence to standardized terminology and established data recording protocols is critical to the proper inventory and tracking of raptor nests. Therefore, we suggest surveyors be fully versed in the terminology and data recording instructions provided below. For each new potential raptor nest found, surveyors should complete a **Raptor Nest Location Data Sheet** (provided at the end of this manual). This form guides the surveyor to collect location information for each new nest site (or observation point, if the nest is active), a physical description of the nest and substrate, a description of the landscape and any human activities in the area, and digital photographs. During each subsequent visit to documented raptor nests, surveyors will complete a **Raptor Nest History Data Sheet** (also at the end of the manual). This form guides the surveyor to collect visit-specific information on nest status, nest condition, and any activities in the vicinity of known nests.

Nest Status Terminology

Active-nest initiation (egg-laying) confirmed through of one or more of the following:

- **Incubating/brooding**: evidence confirms that eggs are being incubated or small young are being brooded. Evidence of an adult in incubation posture for prolonged periods (or in the case of cavity nesting birds, evidence of prolonged presence in nest cavity), adults exchanging incubation/brooding duties, or an adult obviously tending something in the nest (e.g., turning eggs or possibly attending small young).
- **Nestlings**: At least one hatched chick is present. Observation of the nestling, adults bringing food or materials to the nest, adults ripping up food at the nest, whitewash accumulating about and below a nest, or nestling vocalizations from the nest suggest the presence of nestlings.
- **Fledglings**: Young that are able to leave the nest on their own accord and are free-flying (may be indicated by distant or particular location of fledgling away from nest that confirms flight ability). Note: it is generally accepted to count nestlings at **≥80%**

fledge age as fledglings, due to individual variation in actual age at nest departure and the increasing likelihood of missing departures as fledge age nears.

- **Failed**: A nest for which evidence indicates nest initiation (egg-laying), but the nest failed to produce any chicks to fledging age.

Inactive- No nest activity (see above) and no territory occupancy (see below) observed during at least 2 visits separated by at least three weeks during the typical nesting period and no evidence of nest improvements or other signs of recent use.

Occupied Territory- One or more breeding-age adult birds, preferably a pair, observed in close proximity to the nest or known nesting territory, preferably displaying territorial behavior. This implies that the status of the nest is not entirely known and is most often applicable early in the season when closer examination of the area may result in jeopardizing a nesting attempt.

Nest Gone- Indicates that nest has been positively ascertained to be gone (not the same as "not found" below); may be determined through the presence of a collapsed nest or burrow or through comparison of historic nest site photos against current site conditions.

Not Found- Indicates that a previously known nest could not be located for whatever reason, but that it may still exist (not the same as "nest gone" above).

Unknown- Unable to determine nest or territory status at this time.

Nest Condition Terminology

Nest Gone- see status definition above

Not Found- see status definition above

Good- The nest **could be used in the present/upcoming nesting season** without much additional work by the pair. For stick nests, the nest top is relatively intact and contains a bowl or is flat or slightly rounded (convex). May contain evidence of new material of (typically darker/less sun-bleached) or sprucing (i.e., green or brown/orange vegetation lining the bowl. For burrow or cavity nests, the entrance is open/unobstructed.

Poor- The nest **would require considerable rebuilding** or maintenance prior to reuse. For stick nest, it may be unconsolidated, spilling, have a top that is obviously sloping outward, or contain a fallen rock or other obstruction. For burrow or cavity nests, the entrance is partially collapsed or obstructed.

Raptor Nest Location Data Sheet Instructions

Many of the requested fields on this sheet are self-explanatory and are not discussed further here. For the remaining fields, we provide the guidance below.

Nest naming

Every documented nest should be given a unique name through an agreed upon convention. We recommend a two-part "location-number" naming system. For example, **BIPA-003: BIPA** is the four-letter code for the 7.5' topo quad (Big Pass) on which the nest is found, **003** is the quad-

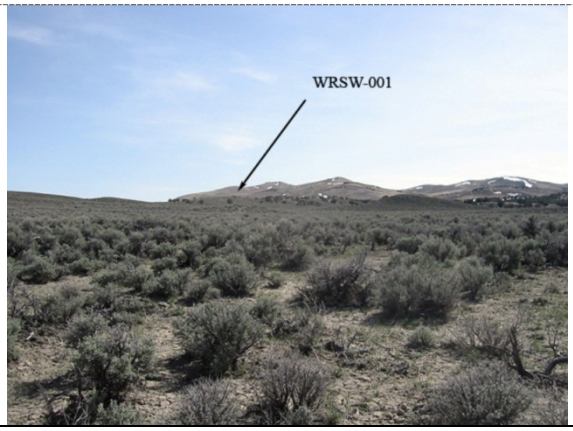
specific nest number in order of nest discovery, always a 3-digit number with leading zeros necessary. Another potential nest naming system that incorporates more detailed location information is based on township, range, and section; e.g., **T3SR3W21-001**. We do not recommend incorporating species information in nest names, as nest switching regularly occurs among various raptor species and ravens.

Status
See the Nest Status Terminology section for definitions.

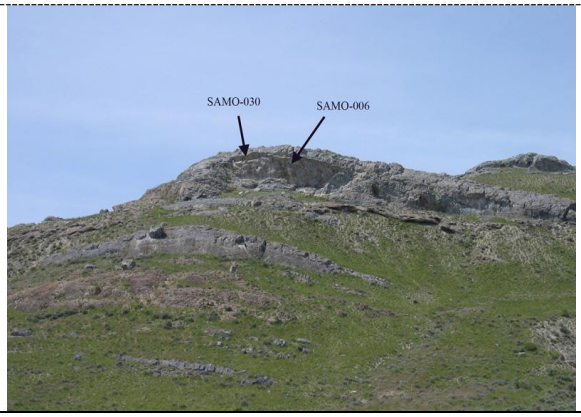
Digital photos
The primary goal of taking nest photos is to provide an efficient means of relocating the nests (along with GPS nest and/or view coordinates). Secondary objectives include documenting nesting habitat, nest characteristics, and aiding in species identification and nestling aging. It is not necessary to take new photos during subsequent visits unless conditions have changed dramatically. We recommend taking at least the following photos: a broader landscape photo from the view coordinates, a zoomed-in photo from the view coordinates showing the nest substrate, and a nest site photo (Figure XX). With this set of photos, surveyors should be able to quickly recognize the general scene when they arrive at view coordinates, point their optics at the correct substrate, and locate the nest on the substrate. Additionally, nestling photos can be taken to aid in species identification or aging. **Note that close up photos of nest sites should be taken when nests are inactive.** Closer shots can be obtained without approaching an active nest by shooting through a spotting scope. For best results, the zoom on the camera should be at its lowest, but the scope can be zoomed up to maximum. Be sure to **record the photo number and orientation of each photo taken while in the field** (also list the camera number if surveyors are using more than one camera). Adding arrows and labels to nest photos can be very helpful to future surveyors (see examples in Figure 5).

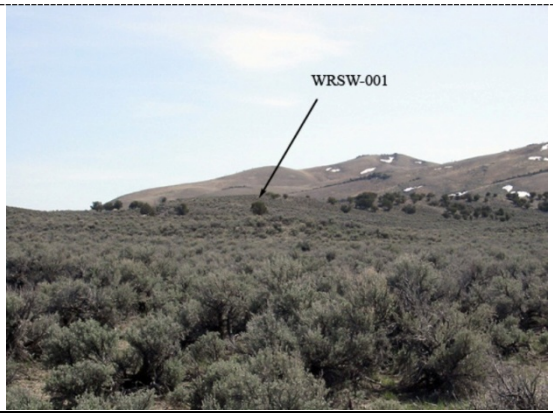
Figure 5. Examples of documenting nest sites with photography.

From view coords: taken from view coordinates (i.e., safe viewing distance and optimal angle); photo should show the broader landscape in which the nest resides.



View coords/zoom: closer perspective from view coordinates that shows the nest substrate location.





Nest site: close-up showing actual stick nest, scrape/ledge, cavity, or burrow

Nestlings: optional photo that can be used for later species identification or chick aging. **Do not unnecessarily approach the nest**; these should be taken with a high-powered scope and/or zoom lens.

Figure 5 (continued). Examples of documenting nest sites with photography.

Estimated height of substrate/nest

The estimated height of substrate refers to the full height of the substrate upon which a nest resides, not the height of nest placement (i.e., nest height). For example, for a cliff nest, the height of the substrate is the height of the entire cliff, while nest height refers to where on the

cliff the nest resides. Similarly, for a stick nest in a tree, the substrate height refers to the full height of the tree, while nest height is the placement of the nest in the tree.

Nest condition
See Nest Condition Terminology section for definitions.

Known or probable alternate nests within territory
Many raptor breeding territories will contain multiple nests and raptors may regularly switch between alternate nests or use one nest preferentially for many years in a row. When a nest is found, note its probable relationship to other known nests nearby. Additionally, when a nest is found for the first time in a particular area, we recommend that surveyors search for other nests nearby that might serve as alternates.

Visibility/exposure of nest
For visibility, note any topographic or vegetative screening that may shield the nest from potential disturbance. Exposure refers to how open or impacted the nest is to the elements (sun, wind, and/or precipitation).

Raptor Nest History Data Sheet Instructions

Many of the requested fields on this sheet are self-explanatory and are not discussed further here. For the remaining fields, we provide the guidance below.

Time of status confirmation
This refers to the time at which status confirmation occurred and may not be the same as observation end time. For example, nestlings may be observed shortly after arriving at a nest, but the surveyor may continue to watch the nest in an attempt to age chicks. Or, for a newly found active nest, the nest may be observed after status confirmation to collect additional information requested on the Nest Location Data Sheet.

Status/activity detail
See the Nest Status Terminology section for definitions. Activity detail refers to the subcategories under active status (e.g., incubating/brooding).

Nest condition
See Nest Condition Terminology section for definitions.

Dead/live eggs/young age
The number of dead/live eggs and young and estimated ages can be ranges if applicable. Use available nestling aging guides when possible (see reference in Nesting Chronology section).

Basis for age
Note how age was determined (e.g., describe plumage characteristics, use of available raptor aging guides or behavior, etc.).

Description of adult activity
Note locations and behaviors as well as any distinguishing plumage or characteristics that may be helpful in later identification of the breeding adults. Also note any observed responses to human activities in the area.

Human activity/habitat changes w/in 1-km of nest
Record any human activity or habitat changes within a 1-km radius of the nest; for example, camping, ATV use, new roads or trails, shooting, fire, etc.

Use of GPS Units and Standardized Datum

All nest locations should be recorded with quality GPS units (generally, with position accuracies of ± 3–5 m). **It is critical that surveyors use a consistent datum** (e.g., NAD83) and attach this information to any stored location data (e.g., through metadata). **Specific locations of active nests should be recorded after nest activity ceases.**

RAPTOR NEST LOCATION DATA SHEET (COMPLETE FOR ALL NEW NESTS) **(PG 1/2)**

Nest name: _____ Species: _____ Territory name (if any):_____

Date discovered: _____ Observer(s): _____ active / inactive / unknown

County: _____ 7.5-min Quad: _____ Land Owner: _____

Township: _____ Range: _____ Section: _____ QSection: _____ Elevation(m): _____

GPS model used: _____ UTM Nest: ____ Zone _____E _____N

UTM View Coords: Zone ____ E _____ N _____

Bearing/dist. to nest (m) from view coords: _____

Directions to nest site/location comments: _____

_____

_____

_____

_____

Viewing comments (e.g., ease of viewing, best time of day, etc): _____

_____

_____

_____

Map to nest site:

Digital photos (see survey manual for instructions):			
Type	Camera	Photo#	Orientation
From view coords:			
View coords/ zoom:			
Nest site:			
Nestlings:			

RAPTOR NEST LOCATION DATA SHEET NEST NAME_____ (PG 2/2)

Nest condition: poor / good Nest dimensions: _____ (width-m) _____ (height-m) _____ (depth-m)

<table>
<tr>
<td rowspan="2">Substrate nest is upon (check one):

____deciduous tree (e.g., cottonwood)
____ conifer tree (e.g., juniper)
____ ground
____ open hillside
____ rock outcrop
____ cliff
____ artificial nest structure (e.g., box)
____ manmade structure (e.g., power pole)
If a tree, mostly (circle): live / dead</td>
<td>Slope/exposure of terrain (e.g., N facing cliff or slope, flat ground):
____ NA (flat)
____ N ____ NE
____ E ____ SE
____ S ____ SW
____ W ____ NW</td>
<td>Nest protection from weather:

____ open/none
____ canopy/branches
____ cliff overhang
____ cliff backdrop
____ cavity or hole
Other: _____</td>
</tr>
<tr>
<td>Height of substrate (top to bottom):
_____ m / ft</td>
<td>Height of nest (on substrate):
_____ m / ft</td>
<td>Nest Type:
___stick ___cavity
___scrape ___burrow</td>
</tr>
</table>

Known or probable alternative nests within territory: _____

_____

_____

Vegetation types and percentage cover visible within a 0.8-km (0.5-mile) radius of the nest; focus on the 4-most dominant types; use common names (e.g., 40% sagebrush, 20% pinyon-juniper, 20% cheatgrass, 10% bare ground): _____

_____

Existing human activity or habitat disturbance within 0.8-km (0.5-mile) radius of nest: _____

_____

_____

_____

_____

Additional notes or comments: _____

_____

_____

_____

_____

_____

PLEASE DOUBLE CHECK THIS FORM FOR COMPLETENESS

RAPTOR NEST HISTORY DATA SHEET (COMPLETE EACH VISIT) **Nest name**:____________________

Visit #: ______________ Date (mm/dd/yy): __________________ Observer(s): ____________________________

Obs begin time: ___________ End time: ____________ Time of status confirmation: _____________________

Species: ______________________ Status: active / inactive / occupied territory / nest gone / not found / unknown

Activity detail: incubating-brooding / nestlings / fledglings / failed Nest condition: above / poor / good

Dead eggs: ______ # Live eggs: ______ # Dead young: ______ # Live young: ______ Nest poled? Y / N

Age of young (days): ______________________ Basis for age (plumage/behavior): ________________________

____

Description of adult activity: ____

Human activity/habitat changes w/in 1-km of nest: ____

____

****

Visit #: ______________ Date (mm/dd/yy): __________________ Observer(s): ____________________________

Obs begin time: ___________ End time: ____________ Time of status confirmation: _____________________

Species: ______________________ Status: active / inactive / occupied territory / nest gone / not found / unknown

Activity detail: incubating-brooding / nestlings / fledglings / failed Nest condition: above / poor / good

Dead eggs: ______ # Live eggs: ______ # Dead young: ______ # Live young: ______ Nest poled? Y / N

Age of young (days): ______________________ Basis for age (plumage/behavior): ________________________

____

Description of adult activity: ____

Human activity/habitat changes w/in 1-km of nest: ____

____

****

Visit #: ______________ Date (mm/dd/yy): __________________ Observer(s): ____________________________

Obs begin time: ___________ End time: ____________ Time of status confirmation: _____________________

Species: ______________________ Status: active / inactive / occupied territory / nest gone / not found / unknown

Activity detail: incubating-brooding / nestlings / fledglings / failed Nest condition: above / poor / good

Dead eggs: ______ # Live eggs: ______ # Dead young: ______ # Live young: ______ Nest poled? Y / N

Age of young (days): ______________________ Basis for age (plumage/behavior): ________________________

____

Description of adult activity: ____

Human activity/habitat changes w/in 1-km of nest: ____

____

****

CONTACT PHONE NUMBERS AND ADDRESSES

If you have any questions or problems, please contact (insert project manager's contact information) or if you are out surveying during the week (insert alternate contact information). The following are example contacts.

BLM Salt Lake Field Office Hours: M-F 7:45 am - 4:30 pm
2370 South 2300 West, Salt Lake City, UT 84119.....801-977-4300

BLM Fillmore Field Office Hours: M-F 7:45 am - 4:30 pm
35 E. 500 N. Fillmore, UT 84631.....435-743-3100

BLM Law Enforcement Officers
Officer 1.....801-977-4314
Officer 2.....801-977-4384

Reporting fires to the BLM (24 hours/day)
Northern Utah Interagency Fire Center (NUIFC) 801-908-1900
•Website URL: http://gacc.nifc.gov/egbc/dispatch/ut-nuc/nuifc.html

U.S. Fish & Wildlife Service Law Enforcement:
Brigham City 435-734-6446
Cedar City 435-865-0861

Utah Division of Wildlife Resources:.....801-538-4700

Injured Bird Rehabilitators
Please capture the injured bird since it is unlikely to be there when you/someone else returns
For instructions on capturing a bird refer to Attachment 2 in appendix of RINS manual.
•Wasatch Exotic Pet Care.....801-943-3367
•Wildlife Rehabilitation Center.....801-814-7888
•Great Basin Wildlife Rehabilitation 801-310-0186
•Southwest Wildlife Foundation.....435-586-4693

State of Utah
Utah Highway Patrol.....801-965-4518
Tooele County Sheriff.....435-882-5600
Utah County Sheriff.....801-851-4000
Rich County Sheriff.....435-793-2285
Millard County Sheriff:
Delta.....435-864-2755

BLM Field Offices
Muskrat.....435-884-3765
2043 Skull Valley Hwy, Grantsville UT 84029
Vernon 435-839-3456
450 N Silver Sage Rd., Vernon UT 84080
Randolph.....435-793-3295
190 N 100 W, Randolph UT 84064

HOW TO HANDLE AN INJURED RAPTOR

General Information

1. Carefully assess whether the bird requires your intervention. It is almost always preferred to *LEAVE THE BIRD IN THE FIELD!* Once a bird is captured it requires many people and much time to ensure the birds survival.
2. All wild birds except starlings, pigeons and house sparrows are protected by State and Federal laws. It is illegal to possess them unless you have State and Federal permits.
3. An injured bird requires immediate, specialized care. Any delay reduces the chance of recovery. This is especially true for nestlings.
4. The feet and talons are the business end of a bird of prey and can inflict serious injuries. The beak is usually not a problem; however, as a safety precaution, do not look an alert adult raptor in the eye as this is a sign of aggression and triggers a response to bite.

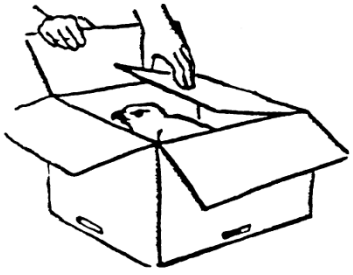
Capture Procedure

1. Wear leather gloves, but not overly thick where you can't detect what part of the bird you are touching or holding. This procedure can be accomplished bare-handed if necessary.
2. Find something to drop over the bird, a towel, a blanket, shirt, or jacket will do.
3. Approach the bird calmly and quietly, and preferably from the rear. Anticipate that the bird will struggle or move. Drop the towel over the bird aiming for the head (to cover their eyes) and back (to help prevent opening their wings). ***GENTLY*** hold the bird to the ground (place your open hand over their back). It may take several attempts, but try to do this quickly: **More handling = more stress = death.**

4. Try to remember the orientation of the bird especially where the beak and feet were before you placed the towel over the bird to prevent injuring you or the bird.
5. Secure the wings and feet making certain that the bird does not injure itself with its talons.
    a. **Procedure**: Slide both hands down both sides of the bird's body, pinning the wings to its body so the bird is between your arms. Move both hands down past the wings along the legs and grasp a leg in each hand, just above the ankle. Lift the bird up to your chest, its back against your chest, with its feet pointing away from you.

Transport

1. A sturdy cardboard box or plastic container (with air holes!), preferably twice the size of the bird, is the best container to transport the bird in.
2. Secure the container, so if the bird begins to fight it can't get out of the container (into your car, or gets away). Again make sure there are air holes for breathing!!



3. If no box is available, keep the bird securely wrapped up, not too tightly though, and place it on the seat in the car or on the floor. Covering the bird's head and eyes will help it remain calm. Keep the bird warm, but be careful of overheating in warm or hot weather.
4. Nestlings require particular attention to warmth and food. Some may need to eat every 10 minutes. Cover the youngster(s) with a towel, etc., to retain heat and also calm them. It is imperative to get them to a rehabilitator.
5. DO NOT FEED OR GIVE WATER TO ANY BIRDS UNLESS YOU HAVE CONSULTED A REHABILITATOR.
6. Locate a rehabilitator as soon as possible (refer to the Injured Bird Rehabilitators section on the Contact page of the Survey Manual) to arrange to deliver the bird(s) there, or contact the Division of Wildlife Resources listed on the same sheet.