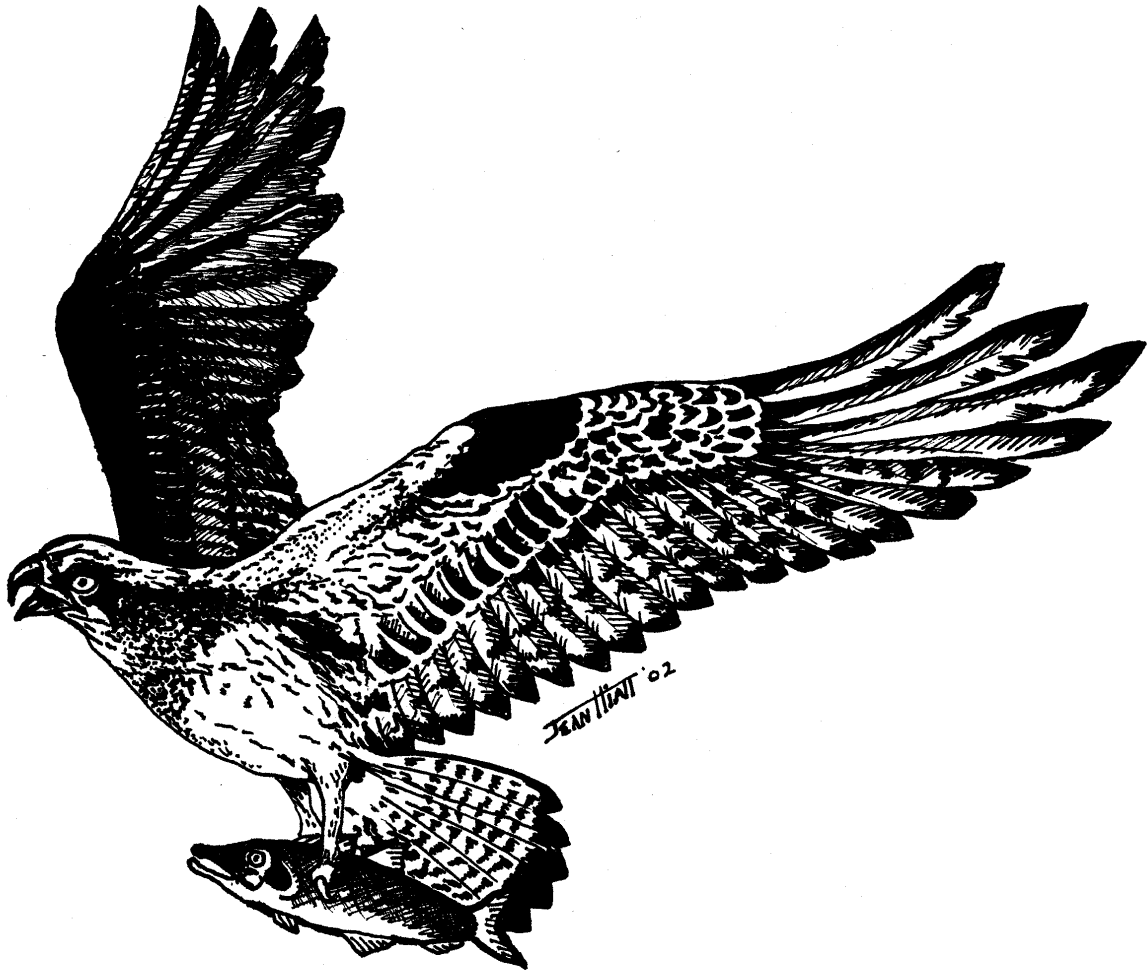


**UTAH FIELD OFFICE GUIDELINES FOR RAPTOR PROTECTION
FROM HUMAN AND LAND USE DISTURBANCES**



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SUMMARY

Proponents of land-use activities are responsible for determining potential impacts to raptors of those activities. Appropriate management strategies for conservation and restoration of raptor populations and their habitats associated with the proposed actions should be devised. The following steps should become routine during initial project planning:

1. Coordinate with appropriate U.S. Fish and Wildlife Service (Service), Utah Division of Wildlife Resources (UDWR), and/or land management agency wildlife biologists at the onset of project planning.
2. Identify species and distribution of raptors occurring within the project area by evaluating existing data and/or conducting on-site surveys.
3. Determine location and distribution of important raptor habitat, raptor nests, and available prey base associated with proposed developments and activities.
4. Ascertain the type, extent, timing, and duration of development or human activities proposed to occur.
5. Consider cumulative effects to raptors of proposed projects when added to past, present, and reasonably foreseeable actions.
6. Minimize, to the extent feasible, loss of raptor habitats and avoid long-term habitat degradation. Mitigate for unavoidable losses of high-valued raptor habitats, including (but not limited to) nesting, winter roosting, and foraging areas.
7. Plan and schedule short-term and long-term project disturbances and human-related activities to avoid raptor nesting and roosting areas, particularly during crucial breeding and wintering periods.
8. Post-project and post-mitigation monitoring are necessary to document stability of raptor populations and their prey base, and to evaluate success of mitigation efforts.

PREFACE

The following raptor protection guidelines were prepared by the Service in coordination with various federal, state, tribal, and private entities with an interest in raptor protection. These guidelines are intended to provide an advisory framework for consistent raptor management approaches statewide.

Incorporation of habitat management and nest/roost site protection measures into land use plans is recommended to ensure project compatibility with the biological requirements of raptors and regulatory statutes. These guidelines are not all-inclusive of available mitigation strategies, nor are all recommendations intended to apply to every project. Project proponents should select applicable management recommendations and/or develop other protective measures based on the project and its potential impacts. Biologists from the Service, UDWR, and land management agencies are available to assist with the identification of impacts (both positive and negative) and the selection and implementation of appropriate protective measures.

These guidelines are also intended to provide land use planners with the means to avoid the direct or incidental take of raptors, their nests, or eggs (as prohibited under parts of the Migratory Bird Treaty Act, Eagle Protection Act, and Endangered Species Act; see *Regulatory Authority* section for further information). In addition, these guidelines provide up-front recommendations to assist land use planners through the National Environmental Policy Act process; essentially, implementation of protective methodologies could reduce potential impacts to raptors and their habitat to insignificant levels and eliminate the need for more extensive discussion of losses in an Environmental Impact Statement.

It is important to realize that these are guidelines and are subject to modification on a site-specific and project-specific basis dependent on knowledge of the birds; topography and habitat features; and level of the proposed activity. Site-specific modifications should be coordinated with appropriate Service, UDWR, and/or land management agency biologists to ensure that the intent of these guidelines is maintained. Revisions to these guidelines may also occur as our knowledge of raptor ecology improves.

INTRODUCTION

PURPOSE

Responsibility for protection of wildlife is rendered in part by the Service's mission to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. Raptors (birds of prey) are protected wildlife and are widely accepted indicator species of environmental quality due in part to their position at the top of biological food chains. Aesthetically, raptors are highly regarded by the public, and anthropomorphic qualities such as nobility, bravery, and wisdom have been widely used to describe these birds. Native Americans hold raptors in high regard for spiritual and religious reasons.

The status of raptors can reflect either numbers or inherent biological characteristics such as sensitivity to environmental conditions. In the western United States, the status of raptors is considered stable for some species, declining for others, and uncertain for still others (White 1994). Currently the status of raptors in Utah is uncertain (J. Parrish, UDWR, 1998, pers. comm.). Certain life history characteristics, including typically long life spans, slow reproductive rates, and specific habitat requirements for nesting and foraging, make raptor

populations particularly vulnerable to disturbances and may retard recovery of some populations (Brown and Amadon 1968, Nelson 1979, Scott 1985, McCallum 1994). An increase in raptor-human interactions resulting from industrial, municipal, transportation, and recreational activities have thus prompted development of the Service's *Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances*.

Objectives of these guidelines are to maintain and enhance all raptor populations in Utah by avoiding, minimizing, or mitigating effects of the following human induced impacts:

- Physical destruction of important raptor habitat components;
- Disturbance resulting in displacement of raptors from high-valued habitat and use areas during crucial time periods (i.e., nesting, winter roosting);
- Direct human caused stress, physical impairment, or mortality; and
- Environmental degradation and contamination.

These guidelines are intended to provide land use planners and resource managers with raptor protection recommendations within the area of influence of land use activities. Protection of nesting, wintering, and foraging activities are considered essential. Implementation of these guidelines is recommended whenever there is potential for an action or project to negatively affect these birds or supporting resources.

REGULATORY AUTHORITY

Raptors as a group are considered migratory birds. As such, federal and state protection is provided for raptors and their habitat through various legal mandates. The following are brief descriptions of provisions included in applicable federal and state laws:

Migratory Bird Treaty Act (MBTA); 16 U.S.C. 703-712

Under authority of the MBTA, it is unlawful to take, kill, or possess migratory birds, their parts, nests, or eggs. Take is defined (50 CFR 10.12) as to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect. Proscription against killing birds, contained in the MBTA and the Eagle Protection Act, applies to both intentional and unintentional harmful conduct and is not limited to physical conduct normally exhibited by hunters and poachers [U.S. v. Moon Lake Electric Association, Inc. (98-CR-228-B; 10th Circuit 1998)].

When taking of raptors, their parts, nests, or eggs is determined by the applicant to be the only alternative, application for federal and state permits must be made through the appropriate authorities. Migratory Bird Permits must be obtained through the Service's Migratory Bird

Permit Office for take of raptor nests (50 CFR 13, 21). The list of migratory birds protected by the MBTA includes raptors and is found in 50 CFR 10.13.

On July 18, 2000, the United States Court of Appeals for the District of Columbia Circuit held in Humane Society v. Glickman, 217 F. 3d 882 (D.C. Cir. 2000), that the MBTA applies to Federal agencies. The United States had previously taken the position that the MBTA only applied to individuals, and not to the Federal Government [Sierra Club v. Martin, 113 F 3d 15 (11th Cir. 1997); Newton Cty Wildlife Assn v. U.S. Forest Service, 113 F 3d 110 (8th Cir. 1997)]. Since the Federal Government decided not to appeal Humane Society v. Glickman, and because all Federal agencies are subject to the jurisdiction of the D.C. Circuit, the Service will implement the MBTA consistent with this decision.

Federal agencies are consequently required to obtain permits for activities covered by migratory bird permit regulations (50 CFR Part 21). Director's Order 131 (December 20, 2000) clarified that permits from the Service are required for any action resulting in intentional take of migratory birds. Permits are not issued for the unintentional take of migratory birds, including raptors; however, unintentional take is still prohibited by the MBTA, as it is a strict liability law.

Executive Order 13186 (66 FR 3853, January 17, 2001) reinstated the responsibilities of Federal Agencies to comply with the Migratory Bird Treaty Act of 1918 (MBTA). The Executive Order establishes a process for Federal Agencies to conserve migratory birds by avoiding or minimizing unintentional take and taking actions to benefit species to the extent practical. The EO, while not eliminating the possibility of violations of the MBTA, is designed to assist Federal Agencies in their efforts to comply with the MBTA.

Eagle Protection Act; 16 U.S.C. 668

Specific protection for bald and golden eagles is authorized by the Eagle Protection Act. It is illegal to take, possess, sell, purchase, barter, or transport any bald or golden eagle, alive or dead, or any part, nest, or egg thereof. "Take" includes to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb (50 CFR 22.3). Recent case law [U.S. v. Moon Lake Electric Association, Inc. (98-CR-228-B; 10th Circuit 1998)] concluded that proscription against killing birds, contained in the MBTA and the Eagle Protection Act, applies to both intentional and unintentional harmful conduct and is not limited to physical conduct normally exhibited by hunters and poachers.

The Eagle Protection Act was amended in 1978 to authorize the Secretary of the Interior to publish regulations that may permit the taking of golden eagle nests that interfere with resource development or recovery operations. Thus, the Service provides for the issuance of permits to "take" inactive golden eagle nests that interfere with resource development or recovery operations if the taking is compatible with the preservation of the area nesting population (50 CFR 22.25). The area nesting population is determined as the number of pairs of golden eagles known to have attempted nesting during the preceding 12 months within a 10-mile radius of a

golden eagle nest (50 CFR 22.3). The Service will issue a take permit when there is a reasonable expectation that no significant long-term loss of eagle habitat will result from the proposed action.

The Eagle Protection Act applies to Federal Agencies as well as individuals. A Solicitor's Opinion dated June 30, 1982 initially concluded that the Eagle Protection Act did not apply to the United States because the United States was not listed among the persons in 16 U.S.C. 668(c) to whom the Act applies. However, following recent court (Humane Society v. Glickman; see above description in the Migratory Bird Treaty Act section) and policy decisions, this Opinion was subsequently revoked by a January 19, 2001 Department of Solicitor Opinion. Eagle permits are also required under 50 CFR Part 22 for Federal Agency actions.

It is the policy of the Department of the Interior that all projects by Departmental bureaus comply with the Eagle Protection Act and to urge other Federal agencies to follow this policy as well. Activities of the Federal government should comply with the intent of the Eagle Protection Act and should refrain from actions that would result in the taking of bald or golden eagles.

Endangered Species Act (ESA); 16 U.S.C. 1513-1543

The ESA provides protection to threatened and endangered raptors and their critical habitats. As of this writing, the ESA protects the following raptor species in Utah: bald eagle (proposed for delisting) and the Mexican spotted owl (threatened). In addition, the California condor was released in northern Arizona as an experimental population (50 CFR 17, Subpart H). Current lists of endangered and threatened species in Utah can be obtained from the Service's Utah Field Office.

Section 9 of the ESA, as amended, prohibits any taking of listed species of fish or wildlife without special exemption. "Take" under the ESA means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Harass is further defined by the Service to include an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering. Harm is further defined by the Service to include an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3).

The National Environmental Policy Act of 1970 (NEPA); 42 U.S.C. 4321

NEPA was enacted to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment [40 CFR 1500.1 (c)]. NEPA requires all federal agencies or project proponents using federal monies to prepare environmental documentation to analyze the environmental impacts of major

federal actions affecting the quality of the human environment. The level of NEPA documentation; Environmental Impact Statement (EIS), Environmental Assessment (EA), or Categorical Exclusion; is determined by the degree of environmental impact. Generally, an EIS level analysis is required for projects with significant environmental impacts.

Mitigation measures can be incorporated into project plans to reduce impacts to the degree that they are insignificant. If that is accomplished, an EA and Finding of No Significant Impact (FONSI) would be appropriate. Mitigation as defined under NEPA (40 CFR 1508.20) includes:

1. Avoiding the impact altogether by not taking a certain action or parts of an action.
2. Minimizing impacts by limiting the degree or magnitude of the action and its implementation.
3. Rectifying the impact by repairing, rehabilitating, or restoring the affected environment.
4. Reducing or eliminating the impact over time by preservation and maintenance.
5. Compensating for the impacts by replacing or providing substitute resources or environments.

The Wildlife Resources Code of Utah; Title 23, Utah State Code

Activities regulated under Utah Code Annotated, Title 23, includes any act, attempted act, or activity prohibited or regulated under any provision of Title 23 or the rules, and proclamations promulgated thereunder pertaining to protected wildlife including: fishing; hunting; trapping; taking; permitting any dog, falcon, or other domesticated animal to take; transporting; possessing; selling; wasting; importing; exporting; rearing; keeping; utilizing as a commercial venture; and releasing to the wild. The terms “endangered” and “threatened” under State Code means wildlife designated as such pursuant to Section 3 of the federal Endangered Species Act of 1973. The term “take” under State Code means to hunt, pursue, harass, catch, capture, possess, angle, seine, trap or kill any protected wildlife or attempt any of such actions. Under Section 23-13-3 of Title 23 of the State Code all wildlife existing within Utah, not held by private ownership and legally acquired, is declared as property of the state. Under Section 23-20-3, Section 23-20-4, and Section 23-20-4.5 of the State Code, the taking, transporting, selling, purchasing or wanton destruction of protected wildlife are further detailed and declared illegal and as such are punishable offenses subject to restitution, reimbursement for damages, and incarceration among other actions.

Federal agencies are not bound to follow Utah law. However, federal activities should be sensitive to Utah concerns.

BACKGROUND

Each raptor nest, its offspring, and supporting habitats are considered important to the long-term viability of raptor populations and are vulnerable to disturbance by many human activities.

Existing literature details site- and species-specific raptor responses to human disturbances and habitat alteration.

There have been sufficient studies of intact raptor populations to suggest certain common factors that act to regulate density. Without human intervention, population regulation in many raptor species comes through competition for breeding space, assisted by the presence of surplus adults which breed only when an existing nesting territory becomes vacant. In habitat where nest sites are widely available, breeding density fluctuates generally in synchrony with availability of preferred prey (Pitelka et al. 1975, Woffinden and Murphy 1977, Newton 1979, Smith and Murphy 1979, Smith et al. 1981, Korpimäki 1984, 1986, Hamerstrom 1986, Hornfeldt et al. 1986, Ridpath and Booker 1986, Wiklund and Stigh 1986, Bates and Moretti 1994). The presence of alternate prey species may allow continued breeding success during periods when the availability of preferred prey species is low (Johnstone 1980, Thompson et al. 1982). In other areas, breeding density may be regulated by a shortage of nest sites to a lower level than would occur normally with available food supply (Edwards 1969, Boeker and Ray 1971, Smith and Murphy 1978). Hence, in relatively undisturbed raptor habitat, breeding density is naturally limited primarily by food supply or nest sites, whichever is most limited (Newton 1979, 1991).

Loss and fragmentation of raptor habitat often accompany industrial, transportation, municipal, recreational and other developments. Losses or alterations of habitat can result in a loss or change in the raptor prey base or a loss of historical nesting territories (Thompson et al. 1982, Schmutz 1984, Postovit and Postovit 1987, Williams and Colson 1989). Long term raptor population responses to habitat loss and human disturbances are not well documented for many raptor species. However, there are indications that alterations of the natural environment can strongly influence nesting raptor populations. For instance, local declines in the number of nesting ferruginous hawks in Canada and Idaho resulted from the increased cultivation of native grasslands (Schmutz 1984, Bechard et al. 1986). Golden eagle breeding territories were less successful in areas lacking a mosaic of native vegetation (Thompson et al. 1982) since the habitat was unable to support abundant jackrabbit populations, their preferred prey. Red-shouldered hawk populations in Iowa decreased in response to the clearing of woodlots and bottomland hardwood forests (Brown 1964). Accelerated commercial and urban development was attributed to golden eagle nesting declines along the Colorado Front Range (Boeker 1974). Similarly, Utah's Wasatch Front experienced the loss of many historically occupied raptor nests, likely in partial response to increased urbanization (Murphy 1975). Scott (1985) suggested that nest abandonment may be affected by regional patterns and increases in human disturbance more than by habitat destruction at a specific nest site.

Not all habitat alterations are detrimental to all raptor populations. Bechard et al. (1986) suggested that conversion to irrigated hay lands which support many nest trees and rodent prey may have contributed to local increases in Swainson's hawk nesting density. Habitat alterations may also result in species composition changes. Conversion of grasslands to cultivated fields may have resulted in reduced ferruginous hawk populations with increases in red-tailed hawk populations (Harlow and Bloom 1987).

Besides habitat loss and modification, human activities and development have frequently resulted in disturbances at wintering locations and aborted or reduced nesting attempts. Studies of human disturbances at winter roosting areas have mostly concerned bald eagle responses. Human disturbances may constitute a threat to wintering eagle populations by causing displacement to areas of lower human activity (Shea 1973, Servheen 1975, Stalmaster 1976, Stalmaster and Newman 1978, Brown and Stevens 1997). Human disturbances may also interfere with foraging behavior of eagles (Mathiesen 1968, Stalmaster 1976).

Human disturbances near nest sites have resulted in the abandonment of the nest; high nestling mortality due to overheating, chilling or desiccation when young are left unattended; premature fledging; and ejection of eggs or young from the nest (Bent 1938, Woffinden 1942, Boeker and Ray 1971, Snow 1974, Fyfe and Olendorff 1976, Call 1979, Swenson 1979, Craighead and Mindell 1981, Suter and Jones 1981, Postovit and Postovit 1987, Palmer 1988, Tella et al. 1996, Anderson and Squires 1997). Raptors which successfully nest during a disturbance may abandon the nesting territory the year following the disturbance (Fyfe and Olendorff 1976, Platt 1977, Ratcliffe 1980, White and Thurow 1985). Responses of nesting raptors to human disturbances are generally determined by the type, duration, magnitude, noise level, and timing of activity relative to nesting phenology (Suter and Jones 1981, Götmark 1992, Richardson and Miller 1997).

Overall, raptors display a high degree of fidelity to nest sites and nesting territories (Newton 1979). Certain physiographic features such as elevation, slope, aspect, habitat diversity, prey availability, nest height, and nest substrate have been measured in attempts to characterize site selection by nesting raptors (Murphy et al. 1969, Apfelbaum and Seelbach 1983, MacLaren 1986, Kirmse 1994). The majority of raptor species are firmly fixed on a special type of nest site according to a narrow genetical disposition (Kirmse 1994).

Flushing responses of adult raptors during the breeding season may be related to the duration and frequency of disturbance events, and may vary between species (Fraser et al. 1985, White and Thurow 1985, Holmes 1994). Some level of habituation to continuous or repetitive disturbances may occur (Knight and Temple 1986). Even so, repeated flushing responses by adult raptors due to disturbance may increase energy expenditure during foraging and decrease energy ingestion. Accelerated depletion of energy reserves may result in premature mortality of raptors during harsh conditions (Stalmaster 1983, Knight and Skagen 1987).

Sensitivity of adults and young to disturbance may vary during the nesting cycle (Nelson 1979, Holmes 1994). Generally, courtship, nest construction, incubation, and early brooding are considered higher risk periods during which adults are easily prone to desert temporarily or permanently abandon nests in response to disturbance, leaving the eggs and/or young susceptible to the effects of inclement weather, solar radiation, and predation. The days immediately before and during egg laying and early incubation are the most critical stages of the nesting cycle with respect to abandonment. Disturbance of even limited duration during this time can result in immediate and permanent departure by adults from the breeding territory. During post-brooding

and post-fledging dependency periods, feather development of the young is sufficiently advanced to provide some protection from the elements. Nevertheless, even temporary flushing from nests by adults due to disturbance during these periods can still result in mortality of the young which continue to be dependent on parental care and are at risk of predation.

The type of disturbance can determine to some degree the response of raptors. Declines of local and regional raptor populations can result from aborted or reduced nesting attempts, particularly when the disturbance is prolonged or permanent such as industrial and transportation developments or urban expansion (Boeker and Ray 1971, Craighead and Mindell 1981, Bednarz 1984, Gerard et al. 1984). Dispersed recreational activities can deter nesting success. Out-of-vehicle recreational activities are generally considered more disturbing to raptors than in-vehicle recreational activities (French 1972, Garber 1972, Kahl 1972, Skagen 1980, Fraser et al. 1985, Holmes et al. 1993, Holmes 1994). Stopped vehicles, particularly when occupants exit the vehicle, have been reported to provoke negative responses from nesting or perching raptors more often than moving vehicles (Steenhof 1976, Beck 1980, Scott 1985, White and Thurow 1985). Reactions of raptors to fixed-wing aircraft and helicopters are reportedly mixed and may be related to the amount of helicopter hovering time spent above a nest, height above the nest, or the frequency of aircraft flights within a nest's vicinity (Hancock 1966, Carrier and Melquist 1976, White and Sherrod 1973, Call 1979). Associated high noise levels and increased human activity may preclude use of otherwise acceptable raptor habitats. Areas with limited human access tend to exhibit higher nesting densities and higher fledging success for raptors (Fitzner 1980, Harmata 1991).

Raptor tolerance levels to disturbance can be species-specific. Evidence suggests that some falcons, ospreys, and owls are generally more tolerant of human-induced disturbance and human environments. Golden eagles, turkey vultures, northern harriers, Cooper's hawks, northern goshawks, and sharp-shinned hawks appear much less tolerant of disturbances. Buteos (ferruginous hawk, red-tailed hawk, swainson's hawk) exhibit a wide range of acceptance levels (Thomsen 1971, Martin 1973, Herron et al. 1985, Hayward 1994, Bloom and McCrary 1996), however, some have speculated that the ferruginous hawk should be considered the most sensitive raptor to human disturbance (Woffinden and Murphy 1977, Olendorff 1993). Bechard et al. (1990) found that ferruginous hawks nested twice as far away from human habitation than red-tailed or Swainson's hawks. Additional disturbances within already altered environments may be less disruptive than disturbances associated with isolated breeding pairs of raptors in unaltered habitats. Raptor species may be less tolerant of disturbances when populations of prey species are at low levels (Snow 1974, White and Thurow 1985, Call and Tigner 1991, Holmes 1994).

Some individual breeding pairs appear relatively unperturbed by human disturbance and human-induced impacts and continue to breed successfully amid development (Mathisen 1968, Bird et al. 1996). In addition, some land-use actions are potentially beneficial for some raptor species, such as: selective logging, utility lines, dams and reservoirs, farming, grazing, fire, mechanical/chemical, and public observation (Olendorff et al. 1989). For example, peregrine

falcons and prairie falcons have been observed nesting on transmission towers, bridges, and buildings in many cities and raptors, including bald eagles and golden eagles, have nested within a few hundred meters of airports, blasting, construction, quarry, and mine sites (Pruett-Jones et al. 1980, Haugh 1982, White et al. 1988, Holthuijzen et al. 1990, Russell and Lewis 1993, Steenhof et al. 1993, Bird et al. 1996, Carey 1998). In Utah, peregrine and prairie falcons have nested in abandoned raven nests on 340 kV transmission towers and a peregrine falcon pair nested on a building in downtown Salt Lake City (Bunnell et al. 1997). Observations of a great horned owl nesting repeatedly atop a coal loadout facility in Carbon County, Utah, suggested a measure of tolerance for that breeding pair (L. Dalton, UDWR, 1998, pers. comm.). It is not fully understood what motivates individual breeding pairs occasionally to select nesting sites within or near human-altered habitats. Nesting within or near human-altered environments may be a manifestation of the decreased availability of high-quality natural nest sites due to increasing development; indicative of high densities of breeding birds; indicative of abundant and available prey; or simply a display of higher tolerance for disturbance by certain breeding pairs.

Much more research regarding raptor responses to human activities and land use is warranted, particularly with respect to long term population responses to habitat degradation. However, the literature suggests that under many circumstances, human land-use patterns can have a negative affect on individual raptors and raptor populations. The concern is compounded when cumulative effects of various land-use activities are considered. It is likely that some threshold level of land use could be reached in a given area beyond which raptor and other wildlife populations could be seriously impacted.

GUIDELINES

Human activities can result in disturbance to raptors and their habitats, potentially resulting in population declines. It is the Service's Mitigation Policy (Fed. Reg. Vol. 46, No. 15, pp. 7644-7663) to "seek to mitigate losses of fish, wildlife, their habitats, and uses thereof from land and water developments." Mitigation as defined [40 CFR Part 1508.20 (a-e)] by the President's Council on Environmental Quality has been incorporated into the Service's Mitigation Policy to sequentially include avoidance, minimization, rectification, reduction over time, and compensation for negative impacts to wildlife and habitats.

To facilitate maintenance and enhancement for all raptor populations amid continued human encroachment into their habitats, the following guidelines, developed according to the Service's Mitigation Policy, provide a framework to:

1. Identify raptor resources potentially affected by proposed land use activities, including raptor nesting, wintering, and foraging habitats.
2. Assess potential level of impacts (both positive and negative) to raptors and their habitats.

3. Protect and enhance high-valued raptor habitat components.
4. Provide reasonable protection for individual raptors and their nesting, winter-roosting, and foraging activities.
5. Document changes in raptor populations in an area during and following a proposed action.

Recommendations provided herein for habitat protection and nest/roost site protection are intended to facilitate a consistent approach to raptor management. As stated previously, it is important to also realize that these guidelines can be modified on a site-specific and project-specific basis based on field observations and knowledge of local conditions. Revisions to these guidelines may also occur as our knowledge of raptor ecology improves. The resulting management actions should always ensure protection of individual raptors and raptor populations.

Guideline modifications should be coordinated with appropriate Service, UDWR, and/or land management agency biologists to ensure that the intent of these guidelines is maintained. Other interested resource specialists such as rock climbing groups (e.g., the Access Fund) or raptor groups (e.g., Hawkwatch International) should also be included as appropriate in efforts to develop raptor management actions and apply these guidelines at specific locales. Guidance specific to certain activities continue to be developed and should be used in combination with these guidelines as appropriate: for example, the Avian Power Line Interaction Committee¹ (APLIC 1994, 1996) has developed practices for raptor protection on power lines and the Access Fund (Pyke 1997) provides guidance for raptor/rock climber interactions.

These guidelines do not supersede provisions of the MBTA, Eagle Protection Act, ESA or associated Recovery Plans.

RESOURCE IDENTIFICATION

In assessing the degree of land use impacts to raptors, it is important first to document the occurrence and distribution of raptors and their habitats within and proximal to areas slated for development or increased human activity.

Existing data -- Proponents of land use activities should assess all existing data available on raptors, including their nests, winter roosts, and foraging habitats within and proximal to areas slated for development or increased human activity. The UDWR maintains a computerized database regarding raptors, which can be accessed for consultation purposes and project impact assessment. Other land management agencies (U.S. Bureau Land Management, U.S. Forest

¹ APLIC is comprised of the Bonneville Power Administration, Edison Electric Institute, 13 electric utility companies, and the U.S. Fish and Wildlife Service.

Service, National Park Service, etc.) also possess site-specific information and should be consulted as appropriate.

- Raptors occurring in the State of Utah are identified in Table 1. Statewide seasonal occurrences for each species are also presented as well as habitats considered important for breeding, wintering, and foraging activities (Wagner 1980, Walters 1981, Palmer 1988, Dalton et al. 1990; UDWR 1997; L. Dalton, F. Howe, and J. Parrish, UDWR, pers. comm.). In addition, Table 1 identifies level of state and/or federal protection provided for each species (the Service and UDWR should be contacted for the most current legal status of each species).

Surveys -- When existing raptor information is unavailable or determined to be insufficient, raptor surveys should be conducted to determine species and locate nests, winter roosts, and other important habitats (e.g., foraging). This will assist in a determination of potential impacts from the proposed action. Terrain and habitat types should be evaluated when selecting an appropriate method for conducting raptor surveys (e.g., aerial surveys vs. ground surveys, walking transects vs. driving transects). Biologists from the Service, UDWR, and/or the land management agency are available to assist with the selection of appropriate and site-specific survey techniques. Since surveys can be interactive with nesting raptors, federal and state permits will likely be required.

- Surveys for broad-scale or permanent developments are advised for a minimum three year period prior to the start of construction unless there is existing information about the local raptor population. These surveys should include species use, status, and locations of raptor nest sites (occupied or unoccupied), winter roost sites, and associated habitat use areas.
- Where feasible, pre-project surveys should include at least one cycle of a known prey's population fluctuation since raptor densities are partly responsive to prey fluctuations. Microtine rodents have been documented with fluctuations of 3-4, 4-7, and 9-10 year intervals (Speirs 1939, Elton 1942, Dymond 1947, Keith 1963); prairie dogs and ground squirrels with population fluctuations of 3-5 years (Barnes 1982); and jackrabbit populations have been suggested to fluctuate at 7-10 year intervals (Clark 1972, Wagner and Stoddart 1972, Newton 1979, McAdoo and Young 1980, Thompson et al. 1982, K. Keller, 1998, pers. comm.).
- For the life of the project, a qualified wildlife biologist should be retained to annually inventory and document raptor nesting and winter roosting status within the proposed land use impact area and at least one mile distant to external project boundaries.
- Data and overall results from baseline and annual surveys should be provided to the Service and UDWR for incorporation into UDWR's computerized raptor database. Publishing data and results should also be considered to develop information regarding

raptor populations and responses to human activities and developments.

Prior disturbance history and tolerance of raptors -- As mentioned previously, some individual and breeding pairs of raptors appear relatively unperturbed by some human disturbance and human-induced impacts and continue to breed successfully amid these activities. Nesting within or near human-altered environments may be a manifestation of the decreased availability of high-quality natural nest sites; indicative of high densities of breeding birds; indicative of abundant or available prey; or simply a display of higher tolerance for disturbance by certain individuals or breeding pairs. Accordingly, it is not the intent of these guidelines to restrict current land use activities in those situations where raptors appear to have acclimated to the current level of disturbance and human-induced impacts. However, these Guidelines should be closely followed if proposed land use activities may result in exceeding the current levels and timing of disturbances. Coordination with Service, UDWR, and/or land management agency wildlife biologists should be accomplished when proposed land use activities will result in increasing the current disturbance levels in or near raptor use areas. An assessment of raptor population status/trends in a project area may be important in determining current and projected levels of impact to raptors and their habitats.

POTENTIAL LEVEL OF IMPACT TO RAPTOR POPULATIONS

Consequences of human activities to raptor populations will depend in large part on the proportion of nests and habitats affected by a disturbance. The potential level of impacts should be determined prior to proceeding with proposed land use activities:

1. Impacts to raptor habitat should be assessed by quantifying and/or qualifying losses of habitat value. The Service's Mitigation Policy considers habitat value to be the primary measure for determining impacts to wildlife habitat, including raptors. The Service's Mitigation Policy further suggests application of methods such as Habitat Evaluation Procedures (HEP) to evaluate project impacts to wildlife habitats, including raptor habitats as identified in Table 1. Other evaluation methods may be used, including best professional judgement by qualified biologists. Whether a habitat alteration is an adverse impact to raptors and whether it requires mitigation should be determined in coordination with appropriate Service, UDWR, and/or land management agency wildlife biologists.
2. Impacts to raptor population levels can be evaluated in part by determining the proportion of nests potentially affected by project activities for each species. Size of area selected for this analysis should be dependent on the type of disturbance, species of raptors, and topographical and vegetation features. Generally, broad scale land use activities are likely to impart more devastating population effects than single, point disturbances (Nelson 1979).

To ensure comprehensive analysis of proposed project impacts to raptors, evaluations should

address, but not necessarily be limited to the following:

1. Direct and indirect impacts to raptor habitat and nesting success. Direct impacts may include, but are not limited to: loss of foraging habitat from the project footprint, direct mortality of raptors (e.g., due to collisions with vehicles, electrocution on power lines), and loss of nest sites or winter roost sites. Indirect impacts may include, but are not limited to: noise disturbance, degradation of habitat adjacent to the project area, habitat fragmentation, contamination of food sources, and reduction or changes in available prey species.
2. Cumulative impacts of the proposed project to raptor habitat and nesting success when added to past, present, and reasonably foreseeable future actions.
3. Raptor population and habitat trends on “control areas” outside the proposed project area that are not impacted by similar actions as the proposed action.

HABITAT MANAGEMENT

General Guidelines

Habitat loss, degradation, and fragmentation are widely accepted causes contributing to raptor population declines worldwide (Snyder and Snyder 1975, Newton 1979, LeFranc and Millsap 1984). Availability of nests and food supply are considered limiting factors for raptor populations (Whitcomb et al. 1981, Temple 1986, Wilcove et al. 1986, Cline 1988, Watson and Langslow 1989). Raptors compensate for the loss of foraging and nesting habitat by abandoning established territories and/or attempting to utilize less productive or already occupied territories (Nelson 1979, Newton 1979). Other factors affecting raptor distributions and densities include human persecution, exposure to toxic chemicals, diseases, parasites, and predators (Mersmann and Fraser 1988, Newton 1988).

Habitat management recommendations should be planned to:

1. Avoid or minimize impacts to habitats which could reduce or change raptor prey populations beyond the natural range of variation.
2. Avoid or minimize impacts to habitats preferred by raptors for nest and roost locations.
3. Mitigate for unavoidable habitat losses.

Recommendations in the following sections are intended to facilitate project planning efforts in light of regulatory requirements of various wildlife laws and provisions of NEPA. These recommendations are not all-inclusive of available strategies, but provide a framework for land use planners to follow. Project proponents should select from these management

recommendations and/or develop other protective measures based on the raptor species, the project and its potential impacts. Generally, project proponents should first avoid impacts to raptors and only then minimize and mitigate unavoidable impacts. Coordination with biologists from the Service, UDWR, and/or the respective land management agency will help ensure that the objectives and recommendations of these guidelines are achieved. The occurrence and habitat requirements of other wildlife species in the area should also be taken into account when selecting and implementing these habitat management plans.

Guidelines for Avoiding and Minimizing Impacts

Raptor Foraging Habitat

A variety of birds, small mammals, reptiles, amphibians, and insects constitute the bulk of the prey base for raptor species (Steenhof 1983, Palmer 1988). Some species will forage on carrion as well as live prey, some are specialists that primarily take fish, while others are generalists (Steenhof 1983). Construction of facilities, transportation infrastructure, power lines, and other needs contributing to habitat loss and fragmentation are often required by many types of industrial development and can directly and indirectly affect diversity, abundance, and availability of raptor prey populations. Road developments in particular have been shown to restrict movements of small mammals and birds which may affect their dispersal and population levels (Oxley et al. 1974). Management and mitigation efforts should be focused on maintaining and improving habitats sufficient to support healthy prey populations. Some raptors such as burrowing owls use human-altered environments and human structures such as culvert drains and pipes (Botelho and Arrowood 1996). In certain circumstances, these features may be emphasized in management and mitigation efforts.

Recommendations:

1. Avoid disturbance to raptor habitats. Despite limited geographic extent, riparian vegetation provides extraordinary wildlife value, and should be given special attention.
2. Retain or increase snags within and adjacent to project areas as hunting perches for raptors. Prey species also utilize snags as nesting areas, food sources, and overwintering habitat.
3. Minimize impacts over broad areas, to the extent feasible. Place proposed new construction and human activities within already disturbed areas whenever possible.
4. Limit the project footprint to the smallest area necessary to meet project needs.
5. Reclaim disturbed areas and obliterate roads as soon as possible following construction, operation, and completion of project activities.
6. Close or reduce use of roads within known high-use raptor areas, particularly during crucial

raptor breeding or winter roosting periods.

7. Increase prey habitat through measures such as vegetation plantings or thinnings, depending on the target species.

Nesting and Roosting Habitat

Preservation of nesting and roosting habitat is important to maintaining raptor populations. Where feasible, activities should be managed to improve the nest stand structure and roosting habitat for raptors.

Recommendations:

1. Place proposed project developments to avoid direct or indirect loss or modification of nesting and roosting habitat.
2. Enhance nest and roost site availability to increase attractiveness to raptors. For some species, artificial nest sites can be constructed to enhance use of previously or currently disturbed areas. In some situations, natural substrates can be modified or developed to attract nesting raptors.
 - a. Plant trees to expedite replacement in areas suffering effects of habitat degradation. Trees commonly utilized by nesting raptors include aspen, cottonwoods, willows, junipers, ponderosa pines, and other conifers. Where livestock grazing occurs, plantings may need to be protected from livestock damage until they become established. Livestock grazing strategies should be developed to ensure maintenance or improvement of raptor nesting/roosting habitat.
 - b. Trees or snags with existing raptor nests can be stabilized if alternative sites are limited.
 - c. Rockpiles can be constructed to provide perches and nest sites for some raptor species. Prey species also benefit from the hiding and denning values provided by rockpiles.
 - d. Ledges and crevices can be widened or deepened on cliffs to encourage nesting by some raptor species.
 - e. Artificial nest platforms and nest boxes can be constructed for some raptor species to increase potential nesting sites (Millsap et al. 1987). Call (1979) provides appropriate specifications for tree-nesting, cavity nesting, and underground-nesting raptors. Individual artificial nest platform designs are available on a species by species basis for most raptors.
3. Improve existing nest sites. Quality of existing nests may be more important than the quantity

in some areas (Millsap et al 1987).

- a. Remove excessive accumulations of nest material (primarily for cliff-nesting raptors). Long-term buildup of nest material can bring a nest into reach of a cliff top, increasing accessibility by predators.
- b. Remove rocks or other debris which have fallen into nests, rendering them unusable by raptors (primarily for cliff-nesting raptors).
- c. Reinforce and stabilize trees, snags, and cliff ledges which contain existing nests to perpetuate continued use of these established sites.

Direct Mortality within Habitat Use Areas

Of 25 types of land-use actions identified by Olendorff et al. 1989, at least 8 (32%) of these are known to cause individual raptor mortalities, including: wind energy, roads/railroads, utility lines, fire, mechanical/chemical, illegal harvest, heavy metals, and rodent control agents/pesticides. For example, direct mortality of raptors occurs along roadways and railways from collisions with moving vehicles. Raptors foraging along roadside habitats or on road-killed carcasses increase the potential for raptor-vehicle collisions. For instance, in a two-year study, 26 observations were made of young ferruginous hawks eating dead jackrabbits on roads in northern Utah and southern Idaho (Howard 1975). Road-killed jackrabbits have also been identified as a primary food source for bald eagles wintering in Utah (Platt 1976a). Traffic collisions are a significant factor of mortality for many species of owls and at certain levels may result in local population declines (Glue 1971, Shawyer 1987, Moore and Mangel 1996). Illner (1992) documented 21 times greater vehicle-owl collisions along roads with car speeds of more than 50 mph than on roads with slower traffic.

Raptor mortality on roadways is not well documented in Utah. However, 15 eagles (other raptors were not documented) were reported killed in Carbon and Emery counties in 1996-1997 (M. Milburn, UDWR, 1998, pers. comm.); most of the collisions were reported to involve coal-hauling trucks. Many other raptor deaths likely occurred, but were not reported. Of note, in response to high eagle mortality along I-70 in Emery County, the Utah Department of Transportation in 1989 posted "Eagles on Highway" signs to warn motorists of the bird's tendency to forage on carcasses.

Other causes of direct mortality include improperly constructed power lines which can result in the electrocution of raptors attempting to utilize these structures for perching and nesting sites. Collisions with transmission lines and towers also result in direct mortality of raptor species (APLIC 1994, 1996).

Many human activities and proposed developments increase human access to previously remote areas. Many projects include development of access roads which may remain following project

completion. These roads encourage public use for recreational purposes, unfortunately resulting in illegal shooting and other types of persecution of raptors (Newton 1979).

Recommendations:

1. Reduce maximum allowable speeds on roadways as much as practicable, taking into account the type and service area of the road.
2. Implement a removal program for wildlife carcasses along roadways to avoid further mortality of raptors which are attracted to carcasses. Distribution of carcasses to appropriate areas could be considered to supplement food sources for some raptor species, especially during winter periods.
3. Establish educational programs for project area employees to increase awareness of the potential for vehicular collisions and other encounters with raptor species within the project area.
4. Place road signs indicating raptor use areas at appropriate locations along existing and newly constructed roads. Some caution is warranted here. It may be undesirable to alert the public to the presence of raptors in some areas where the potential for illegal take may increase because of such actions.
5. Install and maintain power line facilities in a way that will reduce raptor collisions and electrocution, and encourage nesting/roosting use of properly constructed transmission towers and power poles where appropriate. Reference guidelines are provided in two state-of-the-art reports by the Avian Power Line Interaction Committee (APLIC 1994 and 1996). Additional recommendations and references are provided in Musclove and Dalton (1990, Section H).
6. Limit the number and extent of access roads to minimize recreational use of previously isolated areas, thus reducing human-raptor interactions and probable conflicts.
7. Remove and reclaim roads as soon after requirements for their use have ended.

Guidelines for Mitigating Unavoidable Impacts

In accordance with Service Mitigation Policy, we advise mitigation for replacement of raptor habitat values lost to unavoidable impacts. Mitigation can be accomplished by increasing habitat values of existing raptor use areas on or adjacent to project lands; restoring or rehabilitating previously altered habitat; acquiring land through fee title acquisition, conservation easements, legislative protective designations, and managing acquired land for raptor habitat values; and/or other land management strategies. Where appropriate, mitigation should be developed to contribute toward implementation of other priority action items such as those included in conservation agreements and recovery plans.

STEP 1

Determine the extent and duration of unavoidable losses of raptor habitat (refer to discussion on *Potential Level of Impact to Raptor Populations*). All opportunities to avoid or minimize impacts should already have been considered.

STEP 2

Determine impacts and mitigation for all phases of proposed land use activities, including construction, operation, and reclamation. Generally, mitigation should be determined by the degree of impact to raptors. The duration of an activity (short-term or long-term) would be part of this determination as follows:

For these guidelines, short-term is defined as an activity which would begin outside of a given breeding season and end prior to initiation of a given nesting season. Long-term is defined as an activity which would continue into or beyond a given nesting season.

1. If the proposed project activity is short-term, reclamation of disturbed areas can be accomplished during and following project completion. Habitat reclamation should involve seeding and/or vegetation plantings with native materials to approximate or improve pre-project conditions. Specification of seed mixes and plant types should be coordinated with local natural resource managers to ensure selection of appropriate species. Seedlings and plantings should be selected which provide diverse and native vegetation, encouraging habitat diversity, which supports abundant prey populations. Fertilization and/or watering programs may be necessary to successfully establish the vegetation.
2. If the proposed project is long-term or permanent, up-front habitat acquisition, development and/or improvement to mitigate for impacted areas should be considered prior to initiation of the proposed activity. The amount and type of mitigation should be based on losses in habitat value. On-site, in-kind mitigation is preferred, however, off-site and/or out-of-kind mitigation may be considered if the resulting benefits to raptor populations offset the predetermined losses for the project area.

STEP 3

Post-project monitoring to determine the effectiveness of habitat mitigation measures on raptor populations should be an integral component of the mitigation plan. Publishing data and results should also be considered to develop information regarding raptor populations and responses to human activities and developments.

NEST AND ROOST PROTECTION

General Guidelines

Raptors typically demonstrate a high degree of fidelity to nesting locations. Successful habitat management should be complemented by efforts to attain natural or pre-development nesting success of local raptor populations and protection of winter roosting activities. Spatial and seasonal buffer zones have regularly been used to protect individual nest sites/territories to ensure successful breeding and to maintain high use areas by raptors.

Recommendations provided herein are in accordance with the Service's Utah Field Office policy that:

No temporary or permanent surface occupancy occur within species-specific spatial and seasonal buffer zones.

Coordination with appropriate Service, UDWR, and/or land management agency biologists should occur when implementing nest/roost site protective measures to ensure that the intent of these guidelines and associated state and federal regulations are realized.

Buffer zones are defined as seasonal or spatial areas of inactivity in association with individual nests or nesting territories. *Spatial buffers* are defined as radii from known occupied and unoccupied nest sites. *Seasonal buffers* are restrictions on the times when human activities should be allowed to occur within the spatial buffers.

Raptor nesting information and buffer recommendations provided in these guidelines were developed for Utah following review of pertinent literature and coordination with knowledgeable wildlife professionals (Call 1979, Jones 1979, Fitzner 1980, Wood 1980, Dubois 1984, USDI Fish and Wildl. Serv. 1984, White and Thurow 1985, Palmer 1988, Johnsgard 1988, Johnsgard 1990, Dalton et al. 1990, Harmata 1991, USDI Fish and Wildl. Serv. 1995, Richardson and Miller 1997, Calif. Burr. Owl Cons. 1997, L. Dalton, F. Howe, and J. Parrish, UDWR, 1998, pers. comm., C. White, Brigham Young Univ., 1998, pers. comm.). While much of this information would be relevant in other states, particularly within the Rocky Mountain region, adjustments may be needed if applying these guidelines outside Utah.

Recommended buffers should be considered as optimal stipulations intended to protect nesting and roosting under a wide range of activities statewide. However, they are not necessarily site-specific to proposed projects. Land use planners should evaluate the type and duration of the proposed activity, position of topographic and vegetative features, habituation of breeding pairs to existing activities in the proposed project area, and the local raptor nesting density when determining site-specific buffers.

Nest site protection recommendations are devised to:

1. Provide reasonable levels of protection during the raptor nesting and wintering periods by applying appropriate spatial and seasonal buffers zones to nest and roost sites.
2. Preclude impacts to nest sites where possible.
3. Mitigate unavoidable impacts to nest sites.

Protection of both occupied and unoccupied nests is important since not all raptor pairs breed every year or utilize the same individual nest within a nesting territory (Scott 1985). Individual raptor nests left unused for a number of years are frequently reoccupied. For instance, non-use may occur over one prey fluctuation period ($7 \pm$ years) for species such as golden eagles or ferruginous hawks (C. White, BYU, 1998, pers. comm.). The importance of individual nest site(s) to overall population stability is unknown, but it is likely that individual sites are selected by breeding pairs for the preferred attributes provided at that location.

Occupied Nests are defined as those nests which are repaired or tended in the current year by a pair of raptors. Presence of raptors (adults, eggs, or young), evidence of nest repair or nest marking, freshly molted feathers or plucked down, or current years' mute remains (whitewash) suggest site occupancy. Additionally, all nest sites within a nesting territory are deemed occupied while raptors are demonstrating pair bonding activities and developing an affinity to a given area. If this culminates in an individual nest being selected for use by a breeding pair, then the other nests in the nesting territory will no longer be considered occupied for the current breeding season. A nest site remains occupied throughout the periods of initial courtship and pair bonding, egg laying, incubation, brooding, fledging, and post-fledging dependency of the young.

Unoccupied Nests are defined as those nests not selected by raptors for use in the current year. Nests would also be considered unoccupied for the non-breeding period of the year (see Table 2). The exact point in time when a nest becomes unoccupied should be determined by a qualified wildlife biologist based upon a knowledge that the breeding season has advanced such that nesting is not expected. Inactivity at a nest site or territory does not necessarily indicate permanent abandonment.

Guidelines for Avoiding and Minimizing Impacts

STEP 1

Determine the appropriate species-specific spatial and seasonal buffer zones as presented in Table 2 for raptors that may be impacted by the proposed land-use activity.

Nesting

- Seasonal buffers represent the outermost dates known in Utah for the arrival of adult

birds at nesting territories through post-fledging dependency of the young. Actual dates for each stage of nesting can vary by region, elevation, and weather conditions; as well as individual pairs. For instance, sharp-shinned hawks in Washington County in southwestern Utah nest two to three weeks earlier than those in Cache County in northern Utah [Platt 1976 (b)]. Routine, annual surveys of nesting localities may provide more precise on-site information regarding individual nests. Survey results should be clearly documented to augment available information on raptors. Biologists from the Service, UDWR, and/or land management agency should be consulted for site-specific nesting chronology which would allow adjustment of these recommended seasonal buffers.

- Typically, the recommended spatial buffers (Table 2) for threatened and endangered species are 1.0 miles (except 0.5 miles for the Mexican spotted owl); recommended spatial buffers for other diurnal raptors are 0.5 miles except 0.25 miles for the prairie falcon; and no buffer is presently considered necessary for the American kestrel and common barn-owl. Exceptions are based in part on suspected tolerance levels within Utah and existing Recovery Plans.

Winter Roosting

- Spatial buffer zones recommended for raptor nesting protection are also encouraged for activities occurring proximal to raptor winter concentration areas from *November through March*. We recommend maintaining a spatial buffer equal to one-half of the recommended buffers for nests (Table 2) unless site-specific topography or vegetation allow for smaller buffers. Appropriate Service, UDWR, and/or land management agency biologists should be consulted prior to adjusting buffers for winter concentration areas.
- Daily activities which must occur within recommended spatial buffers at winter night roost sites should be scheduled *after 0900 hours*, after which most raptors have vacated their roost. Likewise, daily activities should terminate *at least one hour prior to official sunset* to allow birds an opportunity to return to the roost site undisturbed (Call 1979).

STEP 2

Consult Table 3 for recommendations to avoid and/or minimize human impacts to raptor nesting success during the breeding season. Recommendations in the table are NONE, HALF, and FULL; referring to the proportion of the spatial buffer (as presented in Table 2) recommended during progressive points in the nesting chronology.

- Aircraft flight paths should also respect recommended spatial and seasonal buffer zones. Where intrusions within the recommended buffers must occur, flights should maintain a minimum 1000 feet elevation and minimum 30 mph speed during overflights

to minimize disturbance to raptors and raptor nest sites.

STEP 3

Apply the information attained in Steps 1 and 2 to the following guidelines for occupied and unoccupied nest sites to avoid or minimize effects of proposed land use activities to nesting raptors:

- Occupied raptor nests: Activities should not occur within the spatial/seasonal buffer of any nest (occupied or unoccupied) when raptors are in the process of courtship and nest site selection. Egg laying, incubation, fledging, brooding, and post-fledging dependency periods are protected by varying seasonal and spatial buffers (Tables 2 and 3).

Short term land use and human use activities should only proceed within the spatial buffer of an occupied nest outside the seasonal buffer, after coordination with appropriate Service, UDWR, and/or land management agency biologists. Mitigation for habitat loss or degradation should be planned. Long term land use activities and human use activities should not occur within the species-specific spatial buffer zone of occupied nests.

- Unoccupied raptor nests: If a nest site within a territory is deemed unoccupied after sufficient time has elapsed in a specified breeding season and prior to the beginning of the next year's breeding season, human activity could be allowed within the nesting area. This period varies dependent on raptor species. However, as a general rule, even renesting will usually not occur later than May 30 (C. White, BYU, 1998, pers. comm.).

Short term land use and human activities may progress near a nest or nest territory designated as unoccupied. For long term land use activities, unoccupied nests should be protected for 7 years, or the period a known preferred prey species fluctuates from population highs to lows. At the end of the 7-year period, each nest should be evaluated by a qualified wildlife biologist as to its potential future use. Criteria could include the raptor species current population trend in the local area, the corresponding prey species population levels and trends, as well as past, current, and future impacts of the proposed action. Nests could also be considered permanently abandoned if the nest has been physically damaged past the point of repair by raptors.

Long-term land use activities and human use activities should not occur proximally to unoccupied nests unless it is determined that mitigation is appropriate and can be accomplished prior to initiation of the long-term disturbance. Coordination with Service, UDWR, and/or land management agency

biology is recommended when completing this assessment.

STEP 4

Establish and ensure implementation of post-project and post-mitigation monitoring plans to determine possible impacts to the local raptor population as well as success of mitigative measures. Monitoring should include documentation of raptor nesting success, use of historical roost concentration areas, as well as recovery of affected prey base and habitats.

Permits for Unavoidable Impacts

Situations may arise where human activity must occur within recommended spatial and seasonal buffers provided for raptors. For instance, a raptor may decide to construct a new nest in an area already threatened by mining subsidence or within an area previously unused by raptors and scheduled for development. When taking of nests is determined by the applicant to be the only alternative, application for federal and state permits must be made through the appropriate authorities. Coordination with appropriate Service, UDWR, and/or land management agency biologists should occur to ensure compliance with State and Federal wildlife regulations.

Federal Permits

Migratory Bird Permits and Eagle Permits must be obtained through the Service's Migratory Bird Permit Office for take of raptor nests (50 CFR 13, 21-22). The Service will determine upon application whether there is a valid justification for the permit. Permits will not be issued if they would potentially threaten a wildlife or plant population [50 CFR 13.21 (b)(4)]. Permits may be revoked if continuation of the permitted activity would be detrimental to maintenance or recovery of the affected population [50 CFR 13.28 (a)(5)]. Golden eagle nests may only be taken when they are inactive² and only if the taking is compatible with the preservation of the area nesting population [50 CFR 22.25(c)]. The applicant is responsible for determining population level and habitat impacts of the proposed project and developing mitigation measures. For instance, mitigation measures may include reclaiming disturbed land to enhance golden eagle nesting and foraging habitat as per 50 CFR 22.25 (a)(9).

State Permits

Take of protected wildlife is not allowed without having obtained necessary State of Utah permits and/or certificates or registration. UDWR will determine upon application whether there is a valid justification for the permit and/or certificate of registration. Additional permits and/or certificates of registration may be deemed necessary by the Wildlife Board whenever proposed

² Inactive nest in this context means a golden eagle nest that is not currently used by golden eagles as determined by the absence of any adult, egg, or dependent young at the nest during the 10 days before the nest is taken (50 CFR 22.3).

actions are deemed detrimental to wildlife populations in the State of Utah. Each applicant for appropriate permits and/or certificates of registration for a take of protected wildlife is required to provide detailed information why a take of protected wildlife is considered necessary.

Guidelines for Mitigating Unavoidable Impacts

Mitigation Techniques

Examples of techniques to mitigate unavoidable impacts to raptors and their habitats follow. These recommendations are not all-inclusive of available strategies, but provide a framework for land use planners to follow. Project proponents should select management recommendations and/or develop other techniques based on the raptor species, the project and its potential impacts. Success of these techniques is generally varied and somewhat dependent on the species, individual raptors, individual breeding pairs, and type of disturbance:

1. Relocation of young and nests

Extensive coordination with Service, UDWR, and/or resource management wildlife biologists is highly encouraged when attempting relocation of young and nests of raptors. Techniques involving relocation of raptor young and nests have been successfully accomplished for some species and are intended to maintain a breeding pair's use of their home range despite disturbance or loss of the traditional nest site (Postovit et al. 1982). Nonmigratory species such as golden eagles, which maintain an average of four to six nests per nesting territory in Utah, may be more accepting of this strategy than migratory raptors which may shift territories in response to prey availability (Postovit and Postovit 1987). Case studies in Wyoming (Postovit et al. 1982, Parrish et al. 1994) showed high success rates for relocation of golden eagle and ferruginous hawk nests and nestlings. Relocations of great horned owls, short-eared owls, prairie falcons, and red-tailed hawks also have met with success. The following recommendations from Postovit and Postovit 1987 have been provided to foster successful relocation efforts:

- a. Determine a raptor pair's home range and movement patterns.
- b. Select a relocation site as far from disturbance as possible, but within the home range and near preferred use areas such as roosts, perches, and foraging sites.
 - Line of sight visibility to original nest sight should be considered. If distant or not visible from original nest, the relocation may be made in stages with a mobile platform. Moves greater than 1/4 mile distant from the original nest are not recommended. Selection of previously used nest locations or natural substrates for relocation is preferred.
- c. Establish new nest sites at least two years prior to planned relocation to allow acclimation by the adult birds.

- d. Schedule nest relocations to occur outside the raptor's breeding season.
- e. Nestlings should only be moved when they are one-half way through the nestling period since they no longer require continuous brooding by the adults.

2. Deterring use of an existing nest

Extensive coordination with Service, UDWR, and/or resource management wildlife biologists is highly encouraged when attempting to discourage use of an existing nest by raptors. Deterrence measures are restricted to non-lethal methods intended to prevent nesting in areas under active development and at nests where destruction or high levels of disturbance are likely to occur. Nesting raptors would be afforded complete protection until fledging of young is completed. Deterrence is not always successful; consideration should be given to whether other potential nests or nests sites are available within the area. Postovit and Postovit (1987) recommended the following deterrence methods:

- a. Blocking access to nests with welded wire to prevent egg laying.
 - Blocking access to nests has resulted in breeding pairs building new nest sites and accepting existing alternate nests (Parrish et al. 1994). At a coal mine in southeastern Utah, a golden eagle pair succeeded at removing the nesting material from beneath the wire cage, to rebuild the nest at a nearby location (B. Bates, UDWR, 1998, pers. comm.).
- b. Removing nest starts or rendering a nesting substrate unusable.
- c. Repeated disturbance using loud noises.
 - Some wildlife may become habituated over time to loud noises or scare tactics, so this may provide only short-lived deterrence.

3. Habituating raptors to increased disturbance or noise levels

Beginning land use, human activities, or construction prior to the breeding season will allow a pair of raptors to "choose" whether the nest site is still acceptable considering the disturbance. Warning sirens at regular intervals have also been used to alert raptor pairs to potentially startling noises such as blasting. This technique has generally been used where there is no acceptable alternative to the proposed action. While loss of the nest site may occur, the goal of this technique is to avoid the loss of eggs or young and allow the adults an opportunity to select an alternate nesting site.

Monitoring and documentation of results is recommended following any of the aforementioned techniques to maximize success of efforts. Publishing data and results should also be considered to widely circulate information regarding success of raptor mitigation techniques.

CONCLUSION

It has been the intent of these guidelines to provide land use planners with the tools to develop successful raptor management and mitigation strategies proximal to disturbances from land use activities. Raptor survey information attained through implementation of these guidelines will also provide a means to track raptor population trends and document population responses to human use of their environments.

The guidelines have presented recommendations for protection of raptor life stages (i.e., nesting and wintering) as well as raptor habitats. The recommendations are hardly exhaustive of available protective strategies, nor are all recommendations intended to be incorporated on every proposed project. Coordination with appropriate Service, UDWR, and/or land management agency biologists is important during the analysis of project impacts and selection of protective measures.

Project proponents should seek first to avoid or minimize impacts. Where there are inevitable losses or degradations of habitat or disturbance to individual birds, mitigation can be incorporated to lessen the impact. Overall, these guidelines have been designed to maintain viable raptor populations amid continued human use of the environment.

QUATTRO PRO -- TABLE 1 INSERT

Table 2. Nesting periods and recommended buffers for raptors in Utah						
Species	Spatial Buffer (miles)	Seasonal Buffer	Incubation, # Days	Brooding, # Days Post-Hatch	Fledging, # Days Post-Hatch	Post-fledge Dependency to Nest, # Days ¹
Bald eagle	1.0	1/1-8/31	34-36	21-28	70-80	14-20
Golden eagle	0.5	1/1-8/31	43-45	30-40	66-75	14-20
N. Goshawk	0.5	3/1-8/15	36-38	20-22	34-41	20-22
N. Harrier	0.5	4/1-8/15	32-38	21-28	42	7
Cooper's hawk	0.5	3/15-8/31	32-36	14	27-34	10
Ferruginous hawk	0.5	3/1-8/1	32-33	21	38-48	7-10
Red-tailed hawk	0.5	3/15-8/15	30-35	35	45-46	14-18
Sharp-shinned hawk	0.5	3/15-8/31	32-35	15	24-27	12-16
Swainson's hawk	0.5	3/1-8/31	33-36	20	36-40	14
Turkey vulture	0.5	5/1-8/15	38-41	14	63-88	10-12
California condor	1.0	NN yet	56-58	5-8 weeks	5-6 months	2 months
Peregrine falcon	1.0	2/1-8/31	33-35	14-21	35-49	21
Prairie falcon	0.25	4/1-8/31	29-33	28	35-42	7-14
Merlin	0.5	4/1-8/31	28-32	7	30-35	7-19
American kestrel	NN ²	4/1-8/15	26-32	8-10	27-30	12
Osprey	0.5	4/1-8/31	37-38	30-35	48-59	45-50
Boreal owl	0.25	2/1-7/31	25-32	20-24	28-36	12-14
Burrowing owl	0.25	3/1-8/31	27-30	20-22	40-45	21-28
Flammulated owl	0.25	4/1-9/30	21-22	12	22-25	7-14
Great horned owl	0.25	12/1-9/31	30-35	21-28	40-50	7-14
Long-eared owl	0.25	2/1-8/15	26-28	20-26	30-40	7-14
N. saw-whet owl	0.25	3/1-8/31	26-28	20-22	27-34	7-14
Short-eared owl	0.25	3/1-8/1	24-29	12-18	24-27	7-14
Mex. Spotted owl	0.5	3/1-8/31	28-32	14-21	34-36	10-12
N. Pygmy owl	0.25	4/1-8/1	27-31	10-14	28-30	7-14
W. Screech owl	0.25	3/1-8/15	21-30	10-14	30-32	7-14
Common Barn-owl	NN ²	2/1-9/15	30-34	20-22	56-62	7-14

¹ Length of post-fledge dependency period to parents is longer than reported in this table. Reported dependency periods reflect the amount of time the young are still dependent on the nest site; i.e. they return to the nest for feeding.

² Due to apparent high population densities and ability to adapt to human activity, a spatial buffer is not currently considered necessary for maintenance of American kestrel or Common barn-owl populations. Actions resulting in direct mortality of individual birds or take of known nest sites is unlawful.

Table 3. Recommended proportion (None, Half, or Full) of the species-specific spatial buffer zones for level and duration of activities during raptor nesting				
NESTING PHENOLOGY (Risk Level)				
	Courtship and Nesting (High)	Incubation, and Brooding (High)	Post-Brooding Nestling Period (Moderate)	Post Fledging Dependency (Moderate)
In-Vehicle, Recreational^a Activity: Any recreational vehicle driving off-road, or on dirt roads, and not part of a routinely used transportation corridor.				
less than 1 hour ^b	NONE	NONE	NONE	NONE
less than 1 hour ^c	HALF	HALF	NONE	NONE
greater than 1 hour	FULL	FULL	HALF	HALF
Out-of-Vehicle, Recreational Activity: including, but not limited to hiking, dispersed camping, rock climbing, birdwatching, fishing, hunting, biological surveys.				
less than 1 hour ^b	HALF	HALF	NONE	NONE
less than 1 hour ^c	FULL	FULL	HALF	HALF
greater than 1 hour	FULL	FULL	FULL	FULL
Developed Recreation: including, but not limited to ski resorts, snowmobile and off-road vehicle courses, developed campground sites, and group tour operations.				
	FULL	FULL	FULL	FULL
Industrial, Municipal, and Transportation Disturbance: including, but not limited to urbanization; mining; oil and gas development; logging; power line construction; road construction & maintenance; use of explosives; agricultural operations; fixed wing and helicopter overflights.				
less than 1 hour ^b	FULL	FULL	HALF	HALF
less than 1 hour ^c	FULL	FULL	FULL	HALF
greater than 1 hour	FULL	FULL	FULL	FULL

^a Recreational activities are defined as those providing outdoor recreation, entertainment, or adventure.

^b No more than 1 repetition in a 24 hour period for a duration of less than 1 hour is allowable.

^c More than one repetition per 24 hours, spaced no less than 2 hours apart, occurs during daylight hours. Full buffer zone is required for any activities occurring during nighttime hours

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