

Climbing and Raptors - A Handbook for Adaptive Management (Appendices)

Appendix A: Full Bibliography

This bibliography is intended to supplement the citations in “Climbing and Raptors - A Handbook for Adaptive Management,” as a more comprehensive resource for literature on raptor management. Please contact policy@accessfund.org with any additions or questions.

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Appendix B: Volunteer Raptor Monitoring Program Overview

Objectives

1. Locate cliff nests, alternate nests, prey caches, and significant perches of raptor species within or adjacent to climbing areas
2. Determine active nests
3. Verify response predictions to disturbance and assess buffers
4. Monitor nest productivity

Introduction

The backbone of any adaptive management strategy is monitoring. However, before monitoring begins, it may be useful to have a site assessment visit with representatives from local climbing organizations, land management agencies, and the volunteers who will actually do the monitoring.

To make monitoring useful, choices of what ecological attributes to monitor and how to monitor them (frequency, extent, intensity, etc.) must be linked closely to the management situation that motivates the monitoring in the first place¹. Your monitoring should produce feedback for identifying likely future adjustments and the information needed to make them².

Trained volunteers play an important role assisting land managers in monitoring cliff-nesting raptors on public and in some cases private land. Resource monitoring and protection is often necessary to balance resource conservation with recreational opportunities. To effectively manage these raptor species, it is important to survey potential areas for nesting species, establish baseline documentation of population status and response behavior through monitoring, and develop long-term management actions. These actions may include temporary closures, signage, or other restrictions as appropriate.

Specific protocols that make up an effective monitoring program include: ensuring you know where all nests are, monitoring all known nesting sites early in the season until a pair chooses a single one to occupy, and observing in-use nest sites until they have been abandoned or nestlings have fledged (two or more consecutive visits where no birds were seen). Data collected during monitoring should answer the following questions:

1. How has monitoring helped our understanding of factors possibly contributing to site resiliency, activity class, and response class?
2. Are all known nesting sites currently being monitored?
3. How resilient does the nest site seem to disturbance?
4. What is the raptors' response (alert, flight, defensive, neutral) to different types of

¹ Williams, B. K., and E. D. Brown. 2012. Adaptive Management: The U.S. Department of the Interior applications guide. Adaptive Management Working Group, U.S. Department of the Interior, Washington, DC. ISBN: 978-0-615-59913-7.

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² Bormann, Bernard T., Patrick G. Cunningham, Martha H. Brookes, Van W. Manning, and Michael W. Collopy. 1994. Adaptive ecosystem management in the Pacific Northwest. Gen. Tech. Rep. PNW-GTR-341. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 22 p. https://www.fs.fed.us/pnw/pubs/pnw_gtr341.pdf

disturbance if they are observed during monitoring? Individual birds will vary in their response to disturbance.

5. How effective are buffers and seasonal prescriptions at balancing the need for public access (if appropriate) with the needs of raptors where they are most sensitive?
6. Is there evidence to support the need for closures as implemented, or should they be adjusted?
7. Are the closures effective in reducing disturbance? Are there any notable unintended effects that result from the closures?
8. What management adjustment(s) may be recommended specific to time and place?

Monitoring Protocol

Time: It is important that areas are monitored on a regular schedule. Plan to spend 4 hours, preferably starting at sunrise or before dusk, once every two weeks. This amount of time may be needed to observe the number of chicks and how developed they may be. Exercise common sense and feel free to leave early if the weather becomes an issue, or if you have determined the active nest location, breeding stage, and if applicable, number of chicks.

Locations: Land managers/biologists can show ideal locations for volunteers to observe from. If you can get a better view *without disturbing the raptors or crossing private property etc.*, then do so after checking with the land manager or biologist. If a new better observation location is found be sure to describe the new observation point on the map or notes as precisely as possible and always refer your notes to the appropriate point. Observation should take place from outside of any protective buffers (closed areas) to prevent disturbance.

Survey Form: Fill out the provided survey form as completely as possible and use additional sheets of paper for more detailed notes if necessary. Always enter the date, start time, and end time of each survey day. Be sure that the observer(s) names are entered on the survey sheet. Also, enter the time start and time end of any change in bird activity.

On the bottom of the survey form is a section for the volunteer to summarize what was seen that day. When young are visible, be sure to give a complete body description including size relative to the adults and the color of the various body parts. As chicks develop, they replace downy feathers with body feathers and then flight feathers. Colors change from nearly white to darker colors or patterns depending on species. Body parts to focus on would be top and underside of wings, tail, back, belly, chest, and head. Bringing a labeled photo of raptor features that shows differences between the colors of cere, legs, eyes, and plumage into the field is recommended. The following links contain photos to help correctly age chicks based on appearance:

- <http://www.peregrine-foundation.ca/info/ageguide.html>
- <https://www.birdsoutsidemymwindow.org/peregrine-fags/peregrine-chicks-week-to-week-development/#:~:text=After%20Day%2013%20can%20age,on%20tarsi%2C%20sleep%20and%20eat>
- <https://nemesishbird.com/bird-science/ageing-peregrine-falcons-in-the-field/>

Materials Needed: Volunteers must provide their own clothes and gear appropriate for weather conditions. Be sure to take food, water and any medicine one might need. Volunteers should bring their own field guide and binoculars. In some cases the land manager or local climbing

organization may be able to provide a spotting scope or binoculars for use during surveys. A digital camera for photographing the cliff and nest sites is recommended. It is also very useful to bring a GPS device if possible, to mark observation and nest locations. Creating a “binder” (whether digital or physical) of nest site photos, location positions, and monitoring records that can be shared among volunteers is extremely helpful.

Survey Method (Finding Birds):

Nest Location Unknown: Use this method when the current nest location is unknown. The objective is to spot the birds and watch what they do, where they go, and narrow the search to a center of activity (nest, perch, etc.). When a nest is located, switch to the monitoring method. It is often helpful to use a partner. While one person scans the horizon and cliffs, the other can look for soaring birds to follow to a potential nest.

1. Use various fields of view, including spotting scope (if you have one), binoculars, and the unaided eye.
2. Scan the cliff.
 - Follow a pattern (left to right, top to bottom).
 - Become very familiar with the cliff faces.
 - Include the horizon, ledges, whitewash (bird droppings), and potential perch sites (trees, outcroppings, etc.).
 - Pay attention to sounds, too, and become familiar with the different raptor vocalizations. Often birds can be heard before they are seen.
3. Look closely at what is in your field of view.
 - As you become familiar with the cliff, key features will become apparent. Potential nests and ledges may change appearance as the sun angle or intensity changes.
 - Switch back and forth between views and be sure to be aware of all that is around you.
 - Don't let a bird sneak by you while you are focused on using the binoculars or scope (this is where a partner comes in handy).
4. Photograph (better) or sketch the cliff
 - Circle the nest location
 - Point out ledges, cracks, whitewash, snag trees, or other visible features.
 - Refer to this photograph or sketch to label key sites such as nest, alternate nest, perch, food cache, and whitewash.
5. Return periodically to the ledges, dead trees, and cliff horizon.
6. Alternate the above tasks with a partner if available.

Monitoring Method (Watching Birds): Monitoring known nest sites or areas with a known pair of birds will help determine the areas that are important to the birds. Monitoring also helps determine success of the nest and predict future dates for the nesting stages. The key is to first determine if a breeding attempt is being made, and which nest site is being used. Once it is found, monitoring will consist of the following:

1. You may use some of the methods as in surveying, only now you will focus more attention on the nest.
2. Try to establish the current nesting stage by bird behavior (see species information

below). Use the bird's behavior to determine the nesting stages: nest building/courtship, eggs laid, incubation, hatching, or fledging.

3. Sketch and note the bird characteristics such as color, size and male or female (if possible). Include information on young such as color, size, number, and any differences between multiple young. Often, one chick develops slightly faster.
4. Establish the nest or eyrie location in notes and on photo or sketch.
5. Establish the perches, food caches, alternate nests in notes or on sketch. Pay particular attention to the male's perch, as it is often above the nest ledge (for peregrines) and can help locate the nest ledge.
6. Determine a viewshed boundary. Distinguish between behavior occurring within or outside the viewshed. Identify climbing routes, staging areas, access trails, descent routes, etc., that exist within the viewshed.
7. Note other wildlife activity and behaviors. Are crows, ravens, owls, or other raptors present? In particular, note how close vultures and corvids (crows, ravens, etc.) approach a nest site and how the raptors respond. This can be very telling - a high passing vulture will not necessarily elicit a response, but a close passing vulture will, unless the raptors are too busy incubating or brooding, in which case some females will let a vulture pass.
8. Determine a hatch date (to within approximately one week) or chick age and hatch date once chicks become visible at the nest ledge.
9. Monitor specific locations as determined by the program lead (predetermined response assessment points). Establishing assessment points is an important element to understanding the cause and effect relationships impacting birds in an adaptive management monitoring plan. Assessment point locations are assigned to investigate the raptor's response to a specific disturbance in a given landscape (i.e. to movement in an open meadow vs. in a wooded area).
10. Distinguish between behaviours occurring within or outside the viewshed, and in openings or locations with visual screening.
11. Determine fledging success and date of fledging (if possible). The young are successfully fledged if they are seen away from and above the nest. The notes from previous visits that describe the young's development are clues to determine likely success and date.

Other Recommendations:

- If the weather is too cold, windy, rainy, or snowy, feel free to go home (the birds probably won't be active anyway). Try to return to the site as soon thereafter as possible.
- Though ideally this should never occur, if an observer flushes a bird off a nest (particularly in inclement weather) they should leave the area right away and return to monitor it several hours later or the next day, and be more cautious as they approach the nesting site, or seek a further away viewing spot at a safer distance. Eggs that are not being incubated can become non-viable or be vulnerable to predators.
- If you do not see any birds in the area, do not get frustrated. The lack of birds in an area is important information for this project.

Appendix C: Raptor Species Descriptions

Peregrine Falcon

The peregrine falcon is a large, dark falcon with a thick, dark mustache mark on the head (also called a helmet). In flight, the wing beats are deeper and higher than the prairie falcon. The peregrine flies with rapid wingbeats followed by long glides. Its amazing dives, performed at speeds up to 200 mph, add to its popularity. The underwing is dark and the breast is pale. The wing tips extend to the end of the tail when it is perched. The wingspan is from 3-1/4 to 3-3/4 feet.

Males are blue-grey and generally have a white breast, while the females are more heavily barred on the belly and have a brownish cast on the back and upperwing coverts. Immature birds have a vertically streaked belly while the adults have a horizontally barred belly. Fledglings are chocolate brown and tan, while second year peregrines have a mix of gray and brown as they replace their juvenile feathers.

Peregrine falcons were protected under the Endangered Species Act in 1973, when the known population consisted of only 324 nesting pairs. Populations have increased from their very low numbers, and peregrines were “delisted” federally in 1999 when the number of known nesting pairs hit 1650.

The peregrine falcon nests on cliffs, in holes, or on ledges (called “eyries” once eggs have been laid). The falcons do not use sticks for a nest. Instead they create a “scrape” from the dirt and pebbles on a ledge surface. Nests are typically located on cliffs 30 meters or higher, often above a high talus slope, especially in the western US. Southern exposures are more common but they have been known to nest on all aspects. Higher cliffs are preferred over shorter cliffs. Nests are usually located near a water source.

Mated pairs often hunt together allowing one to flush the prey while the other waits at a high elevation to perform its deadly stoop. Birds are the main source of food and they will completely pluck the prey before eating. When prey is abundant, only the choicest parts of the prey are eaten.

Mating behavior centers around the nesting cliff, which may play a bigger role than the actual attraction to a particular mate. A successful pairing of birds is obvious when the pair perches near each other and starts hunting together.

Courtship flights consist of rapid, high climbs, spirals, steep rapid dives, and precise flying often touching in mid-air. The pair becomes familiar with each other at the cliff by touching bills or preening each other. The male will often feed the female and make a vocalization known as a “chitter.”

Though the time period can vary considerably based on geography, the birds will spend most of their time at the cliff in May and June. However they are easier to spot in April when the adult pairs are active and searching for a ledge for the scrape. Falcon whitewash appears different from eagle or hawk whitewash. It is usually long and in vertical streaks rather than in various

spots below the nest common to the eagles and hawks.

Golden eagles seen flying in the area will often stimulate a response from a peregrine. Vultures and ravens may also elicit a response. If you see any large raptors flying in your area, look for a smaller bird flying around it. The adults will often protect a nest site when disturbed by diving and “cacking” (another form of vocalization) at the intruder.

Incubation takes about 32 days. Fledging occurs in 5-6 weeks after hatching. The fledglings are dependent on the adults for 30 or more days after leaving the nest, though once fledged they are no longer dependent on a single location.

Golden Eagle

Adult golden eagles are large, dark brown raptors with a lighter “golden” crown on the nape of the neck. The wingspan is between 6-1/2 and 7-1/2 feet long. In flight, the wings are held flat or in a slight dihedral, and the tail extends from the edge of the wings twice the length of the head. Their diet consists mainly of small mammals.

Males are noticeably smaller in size than females when observed together. Immature golden eagles are also dark brown but they have varying amounts of white on the middle of the underside of the wings and at the base of the tail. Younger birds have larger patches of white. These patches may no longer be visible once the birds reach about 4 years. As birds molt their feathers, older feathers seem lighter than new feathers. This may cause adult birds to be misidentified. *Be sure that the patches are white* and not gray or lighter brown when identifying an immature bird.

Golden Eagles are typically more sensitive to disturbance than other raptors, particularly in areas where they are not habituated to human presence. Care must be taken when approaching the nest sites not to approach too close, or the adult eagles may leave the area and not return until you are gone.

Pairs will typically nest on tall cliff ledges. Occasionally, they will nest in a large tree. Most eagles construct and maintain alternate nests that may or may not be used for egg laying. These alternate nest sites are important in the breeding cycle, as they provide perches, feeding areas, and an additional nesting site if the first one is disturbed. Nests are large in size, made up of sticks, and often shows signs of white wash below the nest.

Typical breeding displays consist of flying in an upward spiral, diving with wings half open, gliding upwards and then diving again. They are also vocal during this time.

When eggs are in the nest, one of the adults will usually be “hunkered” down on the nest, incubating. Typically the female performs this duty, although the male will help out allowing the female a chance to stretch her wings. When viewed through a spotting scope, the female may be observed turning the eggs occasionally. The male might bring food back to the female. When observing the nest, look for an eagle occasionally sticking its head above the nest. When an eagle is flying around in the area, watch and record the response from the eagle on the nest. Pay close attention if food is delivered to the nest and where the food goes after delivery. Generally, food is not consumed at a nest with eggs. The adults may leave a nest during the

incubation period for a short time (about 15 to 30 minutes) to stretch their wings.

Prey items will stay in the nest when the eggs have hatched. The adult will rip pieces off the food and feed it to the chick(s). Note the time and date that either adult does not attend the nest for longer periods of time. This may signify hatching and a point in the nestling's development in which they can thermoregulate themselves and do not rely on the adult, but can also indicate disturbance.

It is not uncommon for the larger sibling to kill and eat the younger, weaker sibling. Often, this happens when the prey base is below optimal, assuring that at least one survives instead of both dying for lack of food and nutrition. Accidents can also happen when the young chicks stretch and test their wings before they are capable of flight.

Red-tailed Hawk

Red-tailed hawks are a very common raptor. They have a wingspan of about 4 to 4-1/2 feet. They appear in varying plumage, from nearly all white to a dark brown. For simplicity's sake, we will refer to the light and dark morph plumage. Most red-tailed hawks will have a bellyband, a red tail (color varies from almost white to dark brown), and a "dash-comma" on the lower side of the wing. The "dash" is on the leading edge (patagial) midway between the body and the bend in the wing. The "comma" is located at the bend in the wing. This is very evident on a light morph bird and becomes more difficult the darker the plumage.

These hawks nest in trees or cliff ledges in virtually every habitat in North America. The nests are made up of sticks. They will sometimes defend their nest if disturbed by making dives or circling overhead.

The male is smaller than the female. Immature birds will appear "dirty" and somewhat less defined in appearance. Colors are more gray and brown. The tail often will have dark bands.

The breeding display consists of a series of steep dives and climbs, gliding with both adults together with their legs extended downward. They may also perform the talon-gripping acrobatics. Refer to the golden eagle life history above for a similar description of their nesting habits.

Prairie Falcon

Prairie falcons are lighter in color than the peregrine. The back is pale brown. The belly is off-white with heavy spots below. The immature falcon has more streaking on the belly than spots. The facial markings are lighter and thinner than the peregrine's and the crown is paler. The prairie also has a dark mark in the "wing pit" area. The wings do not extend all the way to the tail when perched like the peregrine.

In flight, the wing beats extend below the body more so than they extend above the body on the upbeat. The wingspan is 3 to 3-1/2 feet.

Nests are typically on cliff ledges or holes using available pebbles and debris to create a scrape. Females leave the nest as a last resort when disturbed while the male will circle above in

defense. The adults make a lot of noise near the nest when they have young. They will usually warn an intruder with a call if they come too close. If the female does leave the nest, she will stoop toward the intruder screaming her warning call until she is only a few feet from the intruder. The falcons often use a different ledge site than the previous year. There is little tolerance to human disturbance and they will often abandon a nest site if the disturbance is excessive.

During the courtship stages, the male will fly acrobatically and call to the female on a ledge. Occasionally, she will call back or join in the flight. The male will also “strut” on the ledge.

Diet consists of small mammals and birds. The falcon will fly low following the terrain and surprise its intended prey from whatever cover is available. They will occasionally hover.

Nesting Behavior

Incubation: When a full clutch of eggs is laid (it could take up to 4 days), one of the adults will spend a great deal of time incubating the eggs. The female performs most of this duty. Watch the other adult when he or she flies back to the nesting area. Try to determine if it is bringing prey back to the nest. The pair will often exchange this prey at or near the nest and the hunter will take its turn incubating while the incubator feeds away from the nest. Adults will briefly glance toward eggs when not incubating, but do not focus as much attention into the nest as they do after chicks have hatched. It is important to become familiar with the adult’s routine when it arrives to the nest or changes position during incubation. Its behavior will change when the eggs hatch. The adult may be nearly impossible to see when “hunkered” on the nest during incubation. It is helpful to use a scope and keep watching the nest for as long as possible. Eventually, the adult will move head, wings, or get up and stretch. Binoculars may be used, but you will most likely only pick up movement when the adult stands up, departs nest, or arrives at nest. It is best to situate yourself so that you can prop your arms on your knees to keep the binoculars up to your eyes for long periods of time. It is easier to switch roles with a partner, alternating between nest focus with binoculars or scope and scanning the skies.

Post-hatch: Once the eggs have hatched, an adult will have to spend some time at the nest helping the nestlings stay warm. As they grow older and bigger, they will be able to thermoregulate themselves and the adults will spend less time at the nest. One thing that will tip you off to hatching is that the prey exchange does not take place. Feeding takes place at the nest when the adult feeds the young bird(s). Observing head bobbing or continued up and down movements of adult’s head usually indicates feeding. A scope is useful to observe the “ripping and tearing” activity as the adult pulls bits of food off prey and feeds the chick. You may be able to estimate the number of hatched chicks by observing where the food bits go. Monitor the adult’s behavior at the nest. When at the nest, the adult will look into the nest more often than when incubating. This “nest focus” is most evident when the adult first arrives at the nest or when it gets up to change position.

Fledge: The young will grow and change colors as they get older. Fledging occurs at approximately 40 days of age. They will start to move around on the ledge or in the nest. You will see them stretching their wings on the edge of the nest before they fledge. Once they fledge, they will stay in the area for a short while. One of the goals of monitoring projects is to determine the success of the nests, which is based on how many young fledge (are seen away

from and above the nest). Pay close attention to the colorings of the young birds. They will slowly transform from all white to near adult plumage before they fledge. Young goldens will appear dark brown or black with patches of white. Record where the white patches are on the body, and how much they changed since last visit.

Monitoring Forms

The following data sheets are a sample taken from an existing monitoring program. Different programs will use varying recording methods - use this example to the extent that it is useful. The most important data to gather is the specific falcon behavior observed along with the exact time it happened - simply noting this down in a field notebook is usually sufficient. Biologists can extrapolate additional information about the birds based on behavior and timing, making these two data points particularly critical to note.

9/2/2020

Raptor Monitoring Data Sheet

Raptor Monitoring Data Sheet

Please fill out every section, if the answer is '0' or not applicable (N/A), please indicate that in the answer space provided

* Required

1. Email address *

2. Date *

Example: January 7, 2019

3. Site *

4. Time Start *

Example: 8:30 AM

https://docs.google.com/forms/d/1JPGFFUbtucfBkQs9JgtjWHUm1Lo9uN_zsG75aJFe4M0/edit

1/8

5. Time End *

Example: 8:30 AM

6. Total Time In Hours, Including Travel (Round up to the nearest quarter hour, e.g. 97 minutes would be entered as 1.75) *

7. Observation point *

8. Start -Temperature (F) *

9. Start -Weather Index *

Mark only one oval.

- ☐ Clear very few clouds
- ☐ Partly cloudy
- ☐ Cloudy or overcast
- ☐ Fog or smoke
- ☐ Drizzle or light rain
- ☐ Rain showers
- ☐ Snow

10. Start -Wind Index *

Mark only one oval.

- ☐ Calm (0-1mph)
- ☐ Smoke Drifts (1-3mph)
- ☐ Wind felt of face (4-7mph)
- ☐ Leaves in constant motion (8-12mph)
- ☐ Raises dust/loose paper (13-18mph)
- ☐ Small trees sway (19-24mph)
- ☐ Large branches in motion (25-31mph)

11. Start % snow coverage

12. End -Temperature (F) *

13. End -Weather Index *

Mark only one oval.

- ☐ Clear very few clouds
- ☐ Partly cloudy
- ☐ Cloudy or overcast
- ☐ Fog or smoke
- ☐ Drizzle or light rain
- ☐ Rain showers
- ☐ Snow

14. End -Wind Index *

Mark only one oval.

- ☐ Calm (0-1mph)
☐ Smoke Drifts (1-3mph)
☐ Wind felt of face (4-7mph)
☐ Leaves in constant motion (8-12mph)
☐ Raises dust/loose paper (13-18mph)
☐ Small trees sway (19-24mph)
☐ Large branches in motion (25-31mph)

15. End % snow coverage

Raptor Monitoring Data Sheet

16. Raptor activity present? *

Mark only one oval.

- ☐ Yes
☐ No
☐ Unknown

17. Nest site located? *

Mark only one oval.

- ☐ Yes
☐ No
☐ Unknown

18. Nest ID *

19. Species *

Check all that apply.

☐ Peregrine falcon

Other: ☐

20. Nest Status (check all that apply) *

Check all that apply.

- ☐ Active nest
- ☐ Incubation
- ☐ Hatched
- ☐ Fledged
- ☐ Inactive
- ☐ Failed
- ☐ Unknown

21. Number of adults *

22. Number of sub-adults *

23. Number of nestlings *

24. Number of fledglings *

Raptor Monitoring Data Sheet

25. Provide a brief chronological summary of your observations. Note any behavioral changes. *

26. Did you observe any disturbance to the nesting pair or their offspring during your observation? This includes possible disturbance caused by the observer, other people, aircraft, automobiles, etc. If yes please describe

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Google Forms

Detailed Response Class Tables

These tables offer summary descriptive statistics on disturbance distances from an expert opinion survey, split according to results on incubating birds and chick-rearing birds. Opinions outside the 80% confidence interval were generally considered outliers without supporting evidence. From Ruddock and Whitfield 2007, table one, p. 56. It should also be noted that, while a useful measure, Fernandez-Juricic et al. 2005 warns against using distance as a single factor in predicting territorial responses - other considerations like line of sight are also important.

Table 1 - Metric. Summary descriptive statistics on disturbance distances (meters) from the expert opinion survey (Ruddock and Whitfield 2007). These values should be regarded as preliminary until further validation has been undertaken, and may will likely vary based on region and topography.

Raptor Species	Incubation		Chick-rearing	
	Flight Initiation	Alert Distance	Flight Initiation	Alert Distance
	Median (80% range value)		Median (80% range value)	
Red Kite	30 (10-300)	125 (10 - 300)	75 (10-300)	125 (10-300)
Hen Harrier	30 (<10-500)	310	225 (<10-750)	225 (10-750)
Marsh Harrier	30 (10-500)	(<10-750)	75 (10-300)	225 (50-500)
Northern Goshawk	30 (<10-500)	215 (10-500)	75 (10-300)	175 (50-500)
Golden Eagle	225 (10-1500)	125 (10-500)	400	625 (150-1000)
White-tailed eagle	125 (50-500)	400 (100-150)	(100-1000)	510 (150-1000)
Western Osprey	175 (50-750)	510	225 (50-1000)	225 (100-750)
Merlin	30 (<10-300)	(150-1000)	225 (50-500)	400 (10-500)
Peregrine falcon	125 (10-500)	225 (100-175)	225 (10-500)	310 (150-750)
Barn Owl	5 (<10-50)	225 (<10-500)	225 (50-500)	5 (<10-50)
Long-eared Owl	5 (<10-100)	225 (10-750)	5 (<10-100)	30 (<10-300)
Short-eared Owl	5 (<10-150)	5 (<10-50)	30 (<10-300)	125 (<10-500)
		30 (<10-100)	175 (<10-500)	
		75 (<10-500)		

Appendix D: Terms and Concepts

Concepts

Several factors influence the nature and severity of disturbance on wildlife:

Type of Activity

- Speed with which activity (recreation) takes place.

Predictability

- When animals perceive a disturbance as frequent enough to be expected and non-threatening, they show little overt response.

Frequency and Magnitude

- How often and at what intensity does disturbance or stimuli occur, and how is the stimulus perceived by a particular species.

Timing

- Seasonal variation in activity and sensitivity (breeding, wintering, migration, etc.).

Location

- Disturbance from above or behind is more disturbing.
- Distance between wildlife and disturbance (potential threats).
- Visibility within the territorial response area.

Terms

Accipiter - family name for the group of forest-dwelling raptors characterized by short, broad wings and long tails.

Adult - a bird that displays adult plumage and is capable of breeding, though it may take several years for a successful nest.

Buteo - family name for the group of typically rangeland raptors characterized by long broad wings and full tail.

Cere - the cere is the soft, fleshy, typically bare patch at the base of the upper side of the bill of some bird species, particularly many birds of prey.

Falcons - family name for the group of fast-flying raptors with narrow, boomerang-shaped wings.

Fledgling - a fledgling is an offspring that can fly. Sometimes these birds are easy to detect because they are poor fliers and they make lots of noise, other times they are difficult to detect because they sit still unless food is delivered.

Harassment - Actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to breeding,

feeding or sheltering. Protected against under ESA restrictions but not under the MBTA.

Learned Responses of wildlife to disturbance fall into one of three categories:

- **Habituation** is the waning of a response to a repeated stimulus that is not associated with a positive or a negative reward.
- **Attraction** is the strengthening of an animal's behavior because of rewards or reinforcement, generally related to food.
- **Avoidance** occurs when wildlife perceives a disturbance as negative and alters behavior to avoid the impacts.

Morph - permanent color variations with a species. Typically a light or dark morph. Sometimes referred to as "phase." Associated with buteo species.

Nestling - A nestling is offspring that is in the nest and unable to fly.

Nesting Phenology is the sequence of nesting events through the breeding season:

- **Nest Building** - the first stage in the phenology events that include courtship, nest building, maintenance, and selection.
- **Egg laying** - occurring over several days, a clutch of eggs are laid in a nest or scrape. Incubation may not start until all or most of the eggs are laid.
- **Incubation** - adult birds tend eggs almost constantly by regulating egg temperature and rolling eggs. Adults appear "hunkered" down during this phase, often looking out of the nest for long periods. Females spend most of the time incubating while males hunt and bring food to the female. The male will spend short periods incubating while female feeds elsewhere. Food is typically consumed away from a nest during incubation.
- **Hatch** - nestlings hatch from eggs. Adult behavior shifts to nest-focus, feeding (dipping and bobbing, tearing and ripping) and food at the nest. Adults needed to regulate young chicks' body temperature for the first few weeks.
- **Fledge** - officially described as hatched young being observed away from and above the nest. Often assumed if chicks are observed at a nest just before fledge expected.

Patagial - the leading edge of wing underside from shoulder to wrist in wing. Markings here often determine species.

Primary feathers - large feathers found on the trailing edge of a wing, also called flight feathers.

Seasonal Nesting Closure - buffered zones established near nesting species, intended to limit disturbance.

Secondary feathers - the smaller feathers found on the leading edge of a wing, between the shoulder and wrist.

Sensitive - As defined by the US Forest Service, those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by <http://www.fs.fed.us/r6/sfpnw/issssp/documents/ag-policy/20021200-fs-sensitive-species-key-policies.pdf>.

Spatial Buffer - one of the concepts of establishing closures dealing with “distance.”

Sub-adult (Immature) - a fledged bird that does not display adult plumage and is incapable of breeding. This is most important for the bald and golden eagle territories as sub-adults commonly hang around in the adults’ nesting territory during the early part of the breeding season.

Temporal Buffer - one of the concepts in establishing closures dealing with “time” (i.e., nesting season).

Threatened - Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range

Appendix E: Relevant Law

Congressional Acts

1900. Lacey Act. <https://forestlegality.org/policy/us-lacey-act>

1918. Migratory Bird Treaty Act. <https://www.fws.gov/laws/lawsdigest/migtrea.html>

1973. Endangered Species Act. <http://www.nmfs.noaa.gov/pr/laws/esa/text.htm>

2003. Bob Stump National Defense Authorization Act for Fiscal Year 2003.
<https://www.congress.gov/107/plaws/publ314/PLAW-107publ314.pdf>

2013. Endangered Species Act of 1973, as amended through the 108th Congress.
<http://www.fws.gov/endangered/laws-policies/esa.html>

Case Law

1977. UNITED STATES of America, Plaintiff, v. FMC CORPORATION, Defendant. No. CR-75-172. United States District Court, W. D. New York. March 18, 1977.
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