



This presentation covers the general progression of the nesting cycle and adult & nestling behaviors at different stages; also describing nestling development and threats to nesting success.



Courtship: Courtship is a time to develop and strengthen the pair bond (or form a new one) and involves aerial displays that may include tandem soaring, swooping, and talon-locking while spiraling downward together. Copulation (perched) occurs mostly before egg-laying but happens at other times too. Adults may be vocal before, during, or after copulation. Courtship also includes nest-building, perching together, “billing”, and preening. Eagles are most active at dawn and the first hours after sunrise, as well as late afternoon/early evening.

Pairs: Like most birds, eagles are monogamous (one partner per season, rare exceptional cases of one male trying to pull off two different nests with two different females). Eagles also mate for life and replacement occurs upon death. 1) It benefits both adults to stay together to gain experience in a territory and finding food (when and where) and other important things; 2) New breeders often are poor nest builders and may fail their first nesting attempt. Experience counts here as well.




	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Courtship & Nest building								
Egg laying								

Nest-building

- ☑ Trees & cliffs
- ☑ Shared effort
- ☑ Multiple nests
- ☑ High site fidelity

Egg-laying



- ☑ Laid at intervals
- ☑ Sensitive time



Nest building: 1) Substrate: Eagles favor building a nest in the tallest/largest tree if in a grove with a good view of the surrounding area. They will build in live trees or snags, where 2 or more large branches come together underneath to support it. Cliff nests may be built on a ledge in the cliff wall, usually closer to the top of the cliff, or on top of rock pinnacles. Distance to water and food influence nest site location – most nests are within 1 mile of water. 2) Effort: Both adults build the nest. It takes only a few days or week at minimum. Adults snap branches in flight or pick up large sticks from the ground and add to the nest. They add finer vegetation (grasses/weeds, stalks, pine needles) into the nest cup and add leafy twigs throughout the nesting season. Nests are built upon year after year, average about 6 feet wide and 4 feet high but can become more immense over time. 3) Over the years pairs usually build >1 nest in their territory, using any one nest in a given year. 4) Site fidelity is high in pairs (same adults come back to same breeding area) and they strongly defend their territory against “floaters” looking to establish themselves. Confrontations over territory sometimes lead to death.

Laying: Lay 1-3 unmarked white eggs 2-4 days apart or more. Before laying eggs the adults will spend time in the nest in preparation. The time around egg-laying is a vulnerable time when repeated and intrusive human activities/disruptions into the breeding area (whether intentional or not) may discourage adults from laying or cause enough stress to produce non-viable eggs.

	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Egg laying								
Hatch								
Incubation <ul style="list-style-type: none"> ☑ After first egg is laid ☑ Relatively short ☑ Division of labor ☑ Nest exchanges 								
Hatching <ul style="list-style-type: none"> ☑ Hatch at intervals ☑ Behavior changes ☑ Brooding 								
Emergencies/Failures <ul style="list-style-type: none"> ☑ Hatch failure ☑ Nestling death ☑ Adult behavior ☑ Disturbances 								
								
								

Incubation: Begins soon after first egg is laid. Incubation period is about 35 days. Adults share incubation duties, with the female usually doing more time. Nest exchanges may occur after only an hour but usually take several hours between exchanges. Frequently the incoming adult brings a new branch or fresh vegetation for the nest, then the incubating adult carefully stands and takes off while the other settles over the eggs and rakes nesting material up against its body. During nest exchange adults may both be in nest or sometimes one adult may leave eggs unattended for a few minutes before the other adult arrives and resumes incubation. First nest exchange of the day often occurs at or before sunrise, with next exchanges following every 1-4+ hours. During incubation, an adult will poke around the nest with its bill arranging nest materials and also standing to turn the eggs – it may roll egg(s) carefully with balled feet or its bill, then rock side to side as it settles back over the eggs. Incubation posture is flat and low and the bird may not be visible above the level of the nest. Adults may vocalize during nest exchanges, to get attention of mate (e.g., if mate is overdue for a nest exchange), or as an alarm call.

Hatching: Nestlings hatch days apart (remember eggs were laid at intervals). When eggs hatch, the adults will start bringing food to nest and tearing off tiny bits and offering food to the nestling(s). You may see a sitting adult looking down as if reacting to movement underneath them. When brooding nestlings, posture is slightly higher than incubation. Egg-laying through early nestling stage is another particularly vulnerable time when the eggs and nestlings must always be attended by an adult. Eggs can't be left alone for more than about 20-30 minutes before chilling, even less time if a cold or wet day.

Emergencies/Failures: If eggs don't hatch, adults will initially continue incubating, then start spending longer periods off the eggs and eventually giving up but staying in the area, then may abandon area. If nestlings die, adults will hang around nest area, but feeding of young will be absent. Adults may visit the nest or perch nearby and look into the nest expectantly. Adults should be bringing in food and feeding chicks regularly after eggs hatch.

Factors influencing eagle response to human activities


- ☒ The eagle
- ☒ Proximity
- ☒ Perch height
- ☒ Visibility
- ☒ Frequency
- ☒ Weather
- ☒ Time of day or week
- ☒ Nature of the activity



Threats to nesting success may be due to human activities. Eagle responses to human activities are influenced by many factors: 1) The eagle: age, experience, level of hunger; 2) Proximity of the activity to the eagle, its nest or foraging areas; 3) Perch height (if perched on ground it is more likely to flush than if perched in tree or on cliff); 4) Visibility: Is the activity in plain view, partially hidden, or totally hidden?; 5) Frequency: eagles can become habituated to highly regular events like trains, cars on a nearby road - if the cars don't stop; 6) Weather (e.g., during incubation on a warm day the adult might be quick to flush due to human presence whereas on a cold day it might sit tight and be reluctant to flush); 7) Time of day or week - e.g., influx of "weekend-warriors" causes eagles to shift behavior (a cove on a lake may be highly used by people at mid-day and no good for eagles but absent of people in early morning and provide good fishing for eagles); 8) Nature of the activity: Is the activity moving or stationary? Loud or quiet? Fast or slow? Directly or indirectly approaching the eagle or nest.

Natural threats

- ☒ Predators & competitors
- ☒ Tree death
- ☒ Arizona weather/ climate:
 - Winter storms
 - Floods →
 - Temperature swings
 - Sun exposure
 - Heat
 - Aridity
- ☒ Mexican chicken bugs
- ☒ Falcons
- ☒ Bees



Threats to nesting success can be natural events as well.

Predators & competitors: Great horned owls can take nestlings if left unprotected by adults. Nestlings that accidentally fall from the nest and unable to fly are in danger to coyotes, bobcats, mountain lions, people. Other bald eagles are a threat. Resident eagles are usually aggressive toward other bald eagles in the breeding area. Direct and indirect competition between neighboring pairs of eagles occurs where nests are in close proximity. With abundant food, neighbors can “live and let live” and overlap foraging areas but they do establish clear boundaries around their nests. Intruding eagles (either bald or golden) can be seen any time of the season, but more commonly during the spring migration in March-April. Interactions with other eagles may involve locking talons and flipping each other in flight as residents defend territory or fight over food. One or both residents vigorously chase the intruder out of the area, harass perched intruders, vocalize at them, and/or spend time soaring over the territory after the intruder has left.

Tree death: As trees age and die they become snags which are weaker than live trees and the nest branch or tree can topple in strong winds.

Arizona **weather/climate** presents special challenges to nesting: 1) Winter storms bring high winds and drenching rains that can destroy nests, snap branches/trees, blow nestlings out, chill the eggs, etc; 2) Winter and spring floods can quickly inundate nests, with water rising in feet per hour; 3) Temperature swings of 30 degrees or more from morning to evening; Extremes=Freezing in early season and blistering hot late season; 4) Lots of direct sunlight, cloudless days, and little shade means sustained exposure; 5) Heat to 110 degrees; 6) Dryness leads to rapid dehydration.

Mexican Chicken Bugs: These are blood-sucking parasites similar to bedbugs that occur in

some cliff nests. Generally not an issue for adults, however large infestations can dramatically affect the health of nestlings through loss of fluid (dehydration) and weakening, and make them more susceptible to illness.

Peregrine Falcons: Peregrines occur in or near many bald eagle breeding areas. Although rare events, territorial falcons can seriously injure or even kill an eagle.

Bees: Also rare, aggressive bees have killed and injured a few nestlings.



Hatching: When eggs first hatch, the young are downy, with eyes open, and immobile. It may take several days before a second nestling hatches (if there are two), and they hard to see. The babies are much more visible during feeding, which occurs several times a day. As they get larger and stronger over the first couple of weeks they are more able to sit up.

Nestlings: (Small, first down): First week. Covered in off-white down with a proportionately “large”-looking head. <6 inches in length.

Nestlings – Second week

- ☑ Off-white down
- ☑ Head looks proportionately “normal”

Threats

- ☑ Weather
- ☑ Intruders
- ☑ Lack of food



Nestlings: (Large, first down): Two weeks. Off-white down. May have medium gray second down growing in. Proportionately “normal”-sized head. Up to 9” long.

Threats: The early nestling stage is a particularly vulnerable time. Nestlings must be brooded and constantly attended by adults until they are a few weeks old. One or both adults is always either at the nest or nearby with the nest in sight. The pair is very responsive to intruders, whether human or eagle, in this period (egg-laying to young nestling), and they are very reluctant to leave the nest unattended.

Food shortages negatively affect the health and development of young.

Nestlings – Third week

- ▣ Medium gray down
- ▣ White down on head/neck



Three weeks (Second down): Medium gray down is darker, longer, denser/woollier/coarser than first down which gets covered by this new down. Head retains off-white down that contrasts with the darker body. Dark brown contour feathers on back and neck may be emerging but cover <5% of the body. Approx. 18" long.

Nestlings can thermoregulate (temperature control) upon acquiring this new stage of down. Adults are now spending less time at the nest, although they will always be nearby watching and will continue to brood or shield nestlings during extreme conditions (heat, cold, rain, snow). By May, the Arizona heat starts becoming a real threat to the well-being of nestlings. When overheating, eagles hold their mouths open to cool off (similar to what your dog does). This is a sure sign of stress. Some nests have very little shade and an adult stands with its wings out, with nestlings in its shadow. After a long turn at the nest, an adult will often fly to water to drink and cool off, or find a shaded cliff.

Nestling behavior: An older, bigger nestling sometimes beats up on its smaller, younger sibling. The small one may not compete for food and it may succumb to the abuse, however if food is plentiful then there is a better chance for both to survive. Nestlings back up to the edge of nest and shoot feces off the side. On windy days the nestlings hunker down and may not be visible.

Nestlings – Fourth week

- ☑ Medium gray down
- ☑ Feathers emerge
- ☑ Preening



Stage 3a (Early contour growth): Four weeks. Medium gray down with emerging dark brown feathers that cover 5-50% of the body.

“Shed” natal down as feathers fill in. Watch for an increase in time spent preening by nestlings as indication of feather growth. Feathers first start appearing on shoulders, head, upper back.

Nestlings may start some active flapping, exercising of wings – with more and more of this over the next weeks. They start pecking at food but are not able to tear it apart. You may notice differences in development between the chicks, as older and more dominant nestlings have more feather growth and may be larger.

Nestlings – Fifth week

- ▣ Medium gray down
- ▣ Feathers cover 51–95%



Stage 3b (Late contour growth): Five weeks. Medium gray down with emerging dark brown contour feathers that cover 51-95% of the body. Nestlings are active, react to disturbances in the area and other birds flying around. Adults spend less and less time at the nest.

Nestlings – Sixth week

- ▣ Feathers cover body
- ▣ Tufts of down possible



Stage 3c (Contour with down patches): Six weeks. Covered with dark brown contour feathers with small patches of off-white down on head and medium gray down on body. Beak and cere remain dark, as do eyes. Active flapping, exercising of wings. Adult female may spend more time attending the nestlings than male and be protective of the young when he is in the nest.

Banding – Sixth week



Banding: This is a stressful event for adults and young. We (AZ Game & Fish) band the nestlings at about 6 weeks old. At this age they are strong enough to handle some stress, yet are totally incapable of flight and not inclined to jump from the nest. Also they don't have as much fight in them now (i.e., lesser chance of hurting us or themselves) as they will when they learn better how to use their feet to grab things (before they fledge you may see them repeatedly grab at nest sticks or food). We band nestlings in the morning before the hottest part of day to reduce water loss, and before placing eaglets back in nest we spray them with water to cool them down.

Adult behavior during banding: fly and vocalize, may eventually perch. They occasionally stoop but don't strike the climber. Some adults react mildly, staying perched and just watching. Depending on the pair, it could take several hours before they return to the nest, or they may return within minutes after the area is clear. But they will see the nestlings are OK and they will return.

Nestlings - Week 7-12

- ☑ Feathers completely cover body
- ☑ Flapping
- ☑ Self-feeding
- ☑ Play
- ☑ Branching



Stage 3d (Complete contour): 7-12 weeks. Completely covered with dark brown contour feathers without down patches.

Behavior: Walking, jumping in nest, grabbing things in nest as play-hunting, stretching wings, stationary flapping (while grabbing hold of nest), hop-flapping, low hovering, "branching", mostly feeding self and boisterously taking food that's brought by the adults (may spread wings over food as if possessive of it) and may look aggressive toward adults during prey deliveries; adult male (smaller) usually bears the brunt of the nestling's enthusiasm. Nestlings/Fledglings often vocal when they see adults with food or when they're hungry. Preening a lot now, laying low in heat.

	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL
Fledge								
Nestlings – Fledging Week 10–12 <ul style="list-style-type: none"> ☒ Mottled underparts ☒ Emergencies ☒ Fostering ☒ Adult behavior 								

Bases of some feathers are whitish, especially on underside, and contribute to mottled look of underparts. Variable. Most have white in the underwing lining (“armpits”).

Emergencies: Eaglets at this stage 7+ weeks old are prone to falling from the nest – they could be blown out during heavy windstorms, or accidentally fall while exercising before they are ready to fly. If a nestling disappears from the nest, it may have fallen – especially if it is before the anticipated fledge date. If it survives a fall or is old enough to have fledged, you can usually see the adults perching tight to the area (wherever the eaglet ended up) and occasionally looking down or over at the eaglet. If the nestling is alive on the ground, the adults will react strongly to danger (circling and swooping, vocalizing, perched and agitated, alert). They will take food to the nestling wherever it ends up.

Fostering eaglets: Bald eagles will accept the addition of young to their broods. We have taken injured or rescued eaglets from one breeding area and placed them in a different nest with similarly-aged young if it wasn’t possible to return them to their original nest (e.g., If a nestling is in rehab for too long and it has no siblings the adults will leave; also eaglets fallen from nests we can’t climb back to must be fostered to other areas).

Adult behavior: As fledging approaches, adults may start withholding food, perching with food near the nest, or flying over with food to tempt the nestlings to fly. Adults may encourage nestlings through vocalizations and low circling over/around the nest. When hungry, thirsty, or confident enough, the nestlings fledge.



behavior post-fledging: First flight typically is not very far, and fledglings are reluctant fliers, usually clumsy when they attempt to land. Landing is a skill that takes practice. They may stay at their first perch for a few days before flying again. They may spend time on the ground where it's very vulnerable to predators. Adults will continue to feed it as long as they know where it is (i.e., the adults are tied to the young, not the nest, and will tend to the young wherever they are after fledging). The adults communicate vocally with the fledgling to find each other. Juveniles initially don't go far from the nest, and once flight-proficient they may use the nest tree to perch. Over a period of weeks the juveniles spend more and more time flying/soaring/exploring; Juveniles continue to depend on adults to catch and provide food after fledging, however they may pounce on grasshoppers or other small prey and play-attack objects, or show boldness toward vultures and ravens around food on ground. Juveniles often are quite vocal in the days after fledging, especially when hungry and demanding food. They may harass the adults by flying at them and if they see an adult with food they give chase. Fledged juveniles hang out near water and can be found on riverbanks/shoreline, in the shade avoiding heat.

Migration: 6-8 weeks after fledging, the juvenile leaves the natal area and heads north on its first migration.