

BALD EAGLE MOLTS AND PLUMAGES, Years 0-5

	SOUTH			MIDDLE SOUTH OF 40° lat. N			MIDDLE NORTH OF 40° lat. N			NORTH		
	Year	Molt	Plumage	Year	Molt	Plumage	Year	Molt	Plumage	Year	Molt	Plumage
N												
D	Hatch											
J												
F			Juvenal	Hatch								
M												
A						Juvenal	Hatch					
M										Juvenal	Hatch	
J	.5											Juvenal
J				.5						.5		
A							.5				.5	
S												
O												
N												
D	1	Prebasic I: Head, neck										
J												
F		Body, wings		1	Prebasic I: Head, neck		1	Prebasic I: Head, neck		1	Prebasic I: Head, neck	
M		Tail			Body, wings			Body, wings			Body, wings	
A					Tail			Tail			Tail	
M												
J	1.5		Basic I									
J												
A				1.5		Basic I		1.5		Basic I		Basic I
S												
O												
N												
D	2	Prebasic II: Head, neck										
J												
F		Body, wings		2	Prebasic II: Head, neck		2	Prebasic II: Head, neck		2	Prebasic II: Head, neck	
M		Tail			Body, wings			Body, wings			Body, wings	
A					Tail			Tail			Tail	
M												
J	2.5		Basic II									
J												
A				2.5		Basic II		2.5		Basic II		Basic II
S												
O												
N												
D	3	Prebasic III: Head, neck										
J												
F		Body, wings		3	Prebasic III: Head, neck		3	Prebasic III: Head, neck		3	Prebasic III: Head, neck	
M		Tail			Body, wings			Body, wings			Body, wings	
A					Tail			Tail			Tail	
M												
J	3.5		Basic III									
J												
A				3.5		Basic III		3.5		Basic III		Basic III
S												
O												
N												
D	4	Prebasic IV: Head, neck										
J												
F		Body, wings		4	Prebasic IV: Head, neck		4	Prebasic IV: Head, neck		4	Prebasic IV: Head, neck	
M		Tail			Body, wings			Body, wings			Body, wings	
A					Tail			Tail			Tail	
M												
J	4.5		Basic IV/ Definitive									
J												
A				4.5		Basic IV/ Definitive		4.5		Basic IV/ Definitive		Basic IV/ Definitive
S												
O												
N												
D	5	Prebasic V: Head, neck										
J												
F		Body, wings		5	Prebasic V: Head, neck		5	Prebasic V: Head, neck		5	Prebasic V: Head, neck	
M		Tail			Body, wings			Body, wings			Body, wings	
A					Tail			Tail			Tail	
M												
J	5.5		Basic V/ Definitive									
J												
A				5.5		Basic V/ Definitive		5.5		Basic V/ Definitive		Basic V/ Definitive
S												
O												
N												
D												

Notes

- **South** = Oklahoma, North Carolina, Georgia, Florida
- **Middle South of 40° N lat.** = Missouri, Illinois, Tennessee, West Virginia, Virginia, Maryland
- **Middle North of 40° N lat.** = California, Colorado, Iowa, Wisconsin, New Jersey, Massachusetts
- **North** = Canada, Alaska, Washington, Oregon, Minnesota, Maine
- Nomenclature is taken from Humphrey-Parkes 1959, which *avoids terms that imply sexual maturity* (such as immature, adult, subadult, etc.); these terms are *especially problematic in eagles* because acquisition of definitive plumage does not necessarily coincide with sexual maturity: Eagles may reach their final definitive plumage before they begin to reproduce, or they may begin to reproduce before they reach definitive plumage. Some scholars enclose these terms in quotation marks (“adult,” “subadult,” “immature”) to indicate their *arbitrariness and imprecision*.
- **Molt** = Loss and replacement of feathers (contour and down), which occurs over a period of 5-7 months (after the breeding period) in Bald Eagles. This is a *transitional period*: Contour feather covering changes from day to day, and different parts of the body (head and neck, body and wings, tail) acquire new feathers at different times during the period.
 - Eagles undergo *one molt per annual cycle*, so terms like “winter plumage,” “alternate plumage,” and “breeding plumage” do not apply.
 - Eagles undergo a “**partial**” molt in each annual **cycle** (as opposed to “complete”), meaning that not all feathers are molted every year. Most contour and tail feathers molt annually, but remiges and wing coverts molt sequentially (up to half of the wing flight feathers each year) over 3-4 years.
 - Stages of molt move down the body by feather tracts from head and neck to body and wings and finally tail. These stages overlap (as indicated in the chart by the arrows) depending on how long certain kinds of feathers take to fully grow, from 40 days for some contour feathers to up to 75 days for the longest wing flight feathers (P6, P7, and P8).
 - In breeding eagles molt *begins about halfway through the incubation period*, perhaps earlier for nonbreeders or prebreeders (i.e. birds not yet sexually mature). Molting is triggered by a change in hormones.
 - The beginning, duration, and end of molt can vary from year to year because of *environmental factors (weather, food, etc.)*, and it may also *vary from one individual bird to another*. It also *varies among geographical regions*, often but not always depending on latitude. E.g. in the South, in southern Florida a Prebasic molt may begin in December and end in May, whereas in North Carolina it may begin in January and end in June.
 - Molting can be *interrupted or delayed* by intense nesting demands, food shortage, extreme weather, injury or other impairment, dispersal or migratory activity, etc.
- **Plumage** = Full covering of feathers achieved *at the end of a molt*; synonymous with a “feather generation.” Because molt is partial, a plumage *includes feathers from two, three, or four annual cycles*. Plumage *remains the same* until the beginning of the following cycle’s molt.
 - **Basic** = Designation of a single cycle’s plumage in eagles and other birds that have only one molt per year.
 - In its first 4-5 years an eagle’s annual molt produces a different plumage (**Basic I, Basic II, etc.**), with the most obvious changes in the amount of white in its head and tail, but also in the wing flight feathers and their associated coverts, the nape, ventral contour feathers, and tail feathers, which shorten in length and become more rounded at the ends.
 - *The change from Basic II to Basic III is especially noticeable.*
 - **Definitive** = Final plumage that will not change from year to year. Most Bald Eagles achieve this at about 5.5 years after hatch, although about 25% may reach definitive at 4.5 years.
- Each molt is designated **Prebasic** and numbered with reference to the following plumage (e.g., **Prebasic I** molt results in **Basic I** plumage).

- All Prebasic molts and Basic plumages are collectively referred to as **Predefinitive** (sometimes postjuvinal or intermediate) which is *more accurate than the term “subadult”* referring to an eagle that has not acquired its definitive plumage.
- **Juvenal** plumage (in an eagle’s first year) may be complete at 11-14 weeks, although flight feathers may not be fully grown and hard-penned until after a bird fledges. Juvenal plumage remains for about 10 months until the eagle begins its first Prebasic molt.
- Determining the age of an eagle based on its appearance at any given time is often nearly impossible because there are many variables. It is critical to take into account *the time of year* and thus the point in the annual cycle, and if possible the *geographical origin of the bird* and thus where in the calendar its cycle would be.
 - An eagle at the beginning of a molt looks very different than a bird at the beginning of a plumage 5-7 months later.
 - One should *be clear about half years*: a Predefinitive eagle at 3 years will have a different feather covering than that same eagle in a Basic plumage at 3.5 years.
 - The molting season is longer in the south, so eagles there can replace more feathers in the cycle than further north, and the same basic plumage can appear more advanced in the south than in the north.
 - A predefinitive eagle that has migrated hundreds of miles north during its molt will have a different appearance than a local resident eagle in the same molt.
- Spellings “juvenal” and “juvenile” used as adjectives are interchangeable, whereas only “juvenile” can be used as a noun. For instance an eagle in its first year is a juvenile because it has juvenal (or juvenile) plumage.