

2020 Ornithology (B/C) - Training Handout

KAREN L. LANCOUR

National Bio Rules Committee Chairman – Life Science

DISCLAIMER - This presentation was prepared using draft rules. There may be some changes in the final copy of the rules. The rules which will be in your Coaches Manual and Student Manuals will be the official rules.

- **BE SURE TO CHECK THE 2020 EVENT RULES** for EVENT PARAMETERS and TOPICS FOR EACH COMPETITION LEVEL
- **THE NATIONAL BIRD LIST** may be found at www.soinc.org under Event Information. States may modify the list for State and Regional Tournaments. See your state website.

TRAINING MATERIALS:

- **Training Power Point** presents an overview of material in the training handout
- **Training Handout** presents introductory topic content information for the event
- **Sample Tournament** has sample problems with key
- **Event Supervisor Guide** has event preparation tips, setup needs and scoring tips
- **Internet Resource & Training Materials** are available on the Science Olympiad website at www.soinc.org under Event Information.
- **A Biology-Earth Science CD, a Taxonomy CD** and the **Division B and Division C Test Packets** are available from SO store at www.soinc.org

THE COMPETITION:

Content:

- **Taxonomic Scheme of the 2020 Official Science Olympiad Bird List is used in competition**
- **Identification, anatomy & physiology, reproduction, habitat characteristics, ecology, diet, behavior, ID calls, conservation, biogeography**
- **Process Skills: observation, inferences, data and diagram analysis**

The Science Olympiad National Bird List will be used for taxonomy questions. States may have a modified Stated Bird for Regional & State competitions which must be posted on their state website by Nov. 1

Kingdom - Animalia
Phylum - Chordata
Subphylum - Vertebrata
Class - Aves

Past taxonomy has been based on morphology, behavior, habitat, nest characteristics, etc., but most recently DNA hybridization techniques have been used with probably the most accurate results of any method.

There are about 10,000 species of birds in about 170 families with 1 to 300 birds per family. When one looks at modern forms of birds only, birds form a homogeneous and distinct group, compared to the other vertebrate classes.

CLASS AVES:

- **Waterproof skin covered in feathers**
- **Endothermic**, warm blooded
- **Hard shelled eggs** that are waterproof
- **Beak or bill** rather than teeth
- **Bipedal** (walk on two legs only)
- **Forelimbs developed into wings**
- **Most members are highly adapted for flight** with forelimbs modified as wings and many weight saving features such as hollow bones.



Abdim's Stork
Pantora pardus



African Cuckoo
Cuculus gularis



African Darter
Anhinga rufa



African Fish Eagle
Haliaeetus vocifer



African Hoopoe
Upapa africana



African Scops-owl
Otus senegalensis



Bare-cheeked Babbler
Turdoides gymnogenys



Bateleur Eagle
Terathopius ecaudatus



Black-shouldered Kite
Elanus axillaris



Blacksmith Lapwing
Vanellus armatus



Blue-cheeked Bee-eater
Merops persicus



Blue Crane
Anthropoides paradisea



Bronze-winged Cuckoo
Rhinoptilus chalcidipes



Burchell's Starling
Lamprolaima australis



Cape Bunting
Emberiza capensis



Cape Eagle-owl
Bubo capensis



Cape Gull
Larus dominicanus



Cape Sparrow
Passer melanurus



Carmine Bee-eater
Merops nubicoides



Cattle Egret
Bubulcus ibis



Chestnut-banded Plover
Charadrius pallidus



Collared Pratincole
Glareola pratincola



Common Fiscal
Lanius collaris



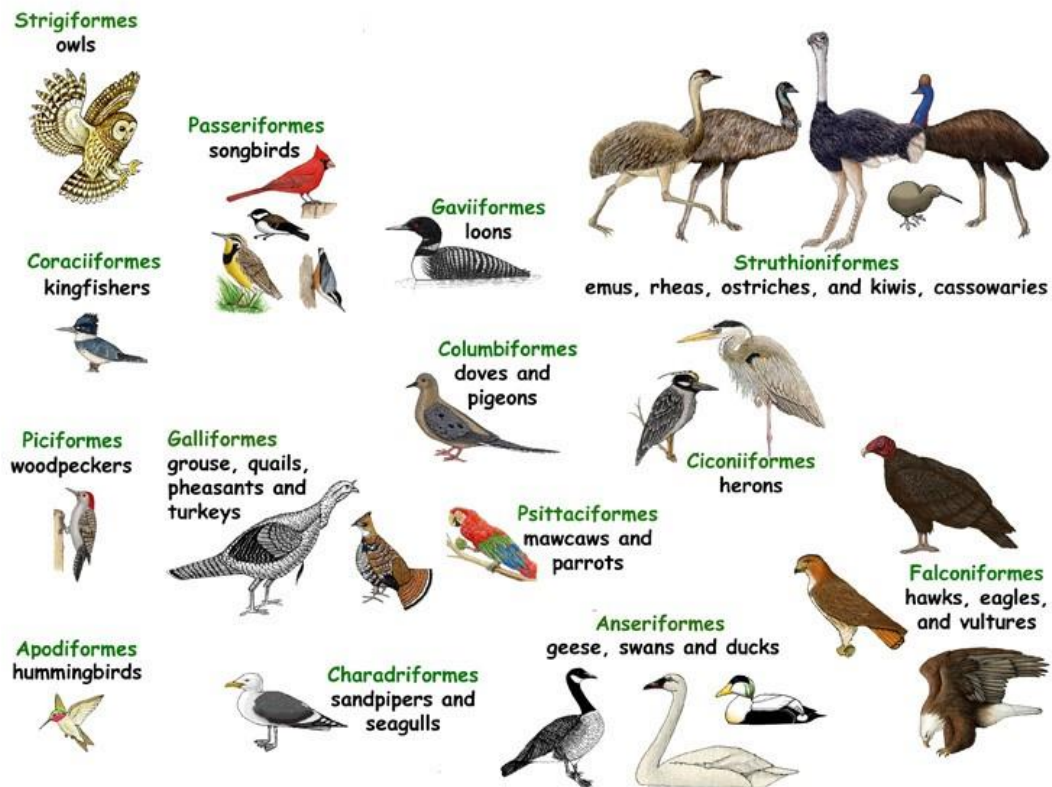
Common Tern
Sterna hirundo

ORDERS AND FAMILIES OF BIRDS: The bird lists are arranged by Orders and Families within the Order. The specie and common names are given for each bird within the Family.

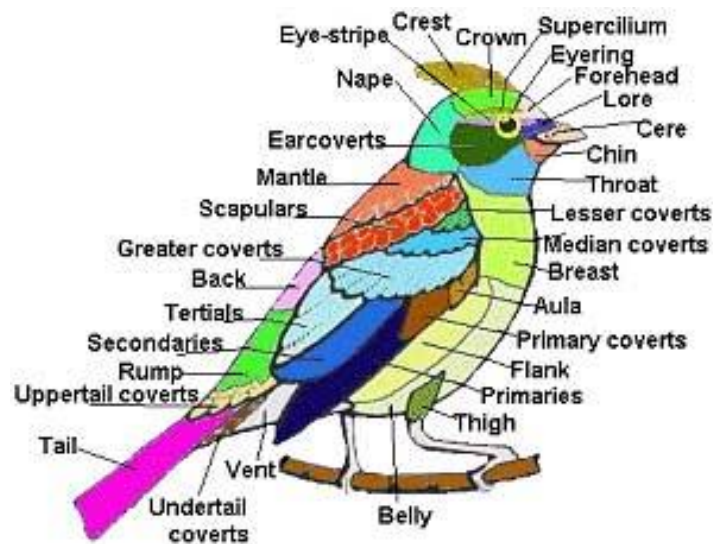
Learn the Order and Family characteristics and then species!!

General tips on arrangement are: (Expect some exceptions of course.)

- The characteristics of an order are for a large group of birds
- The characteristics of the families within an order distinguish groups within an order
- The families reflect how birds have evolved and have many distinctive features and behaviors.
- The characteristics of a genus distinguish groups of birds within an family
- Ocean, shore, game and predatory birds appear first, they are generally large birds.
- Next are hole-nesting birds without true songs, they are smaller.
- Last come the song birds which are still smaller.
- Generally the feeding habits go from eating fish and small mammals to eating seeds and insects.
- Special modifications in morphology allow birds to succeed in their environment.
- These are very helpful in identifying families, species, and their unique behaviors.

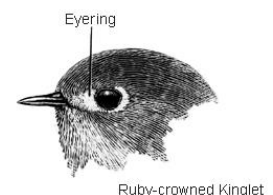
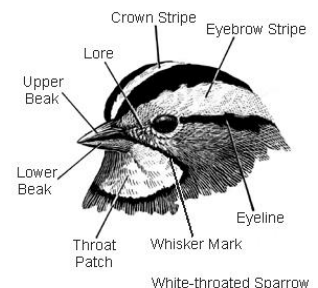
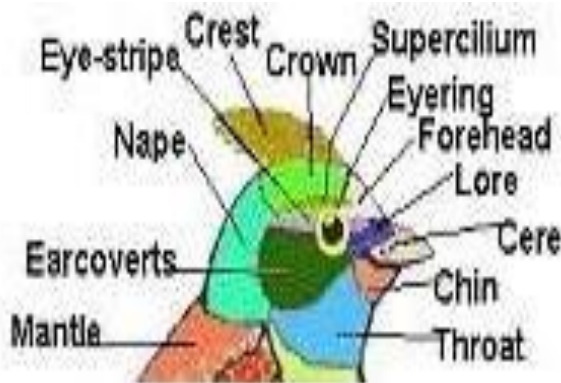


GENERAL MORPHOLOGY: The outline or silhouette of the bird in flight or at rest can identify many families of birds.



HEAD: Many have distinctive stripes or colored patches on their head.

- * **Crown** = tip of the head and **Cap** = a distinctively colored crown as black-capped chickadees.
- * **Crest** = a projection or tuft on the head often brightly colored as cardinals.
- * **Lores** = space between eye and bill and **spectacles** = distinctive eye rings or eye stripe.
- * Size of eye – large eyes are hints that the bird is nocturnal or feeds at night.
- * Color of eye – they may be red, yellow, brown, black, etc.
- * **Ear tufts** = projections near ear region as horned owls (birds do not have visible ears).
- Auricle region** = feathers covering the opening of the ears.
- * **Chin** = the area around the bill
- * **Throat** = the area between the bill and the breast. It may be highly brightly colored as the ruby throated humming birds.



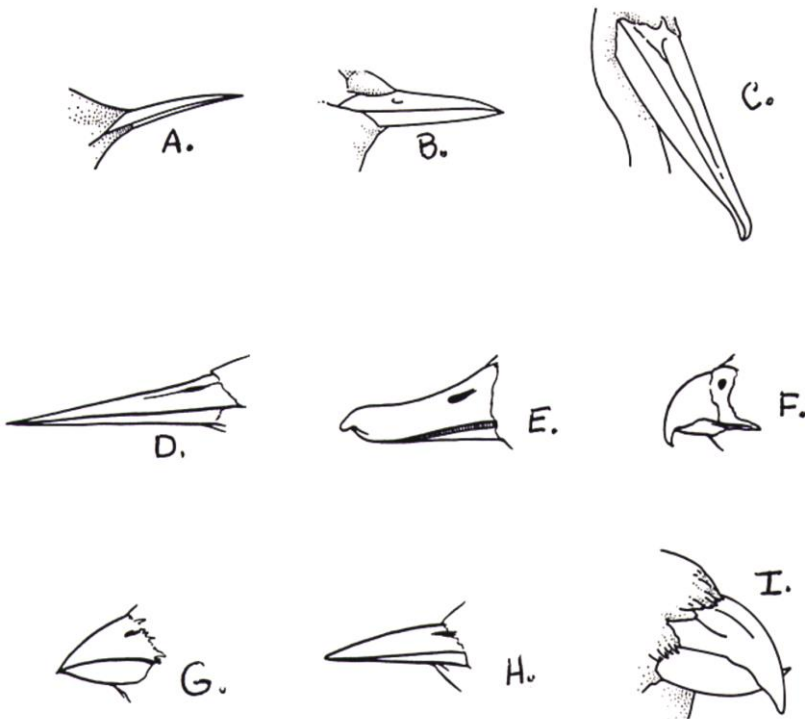
BILL: The two parts are the upper and lower mandibles. Often mistakenly called a beak.

- **Beak** = the hooked bill of a hawk or parrot.
- Since birds have their forelimbs modified as wings, their beaks become very useful tools.
- The bill is modified for eating a specific type of food.

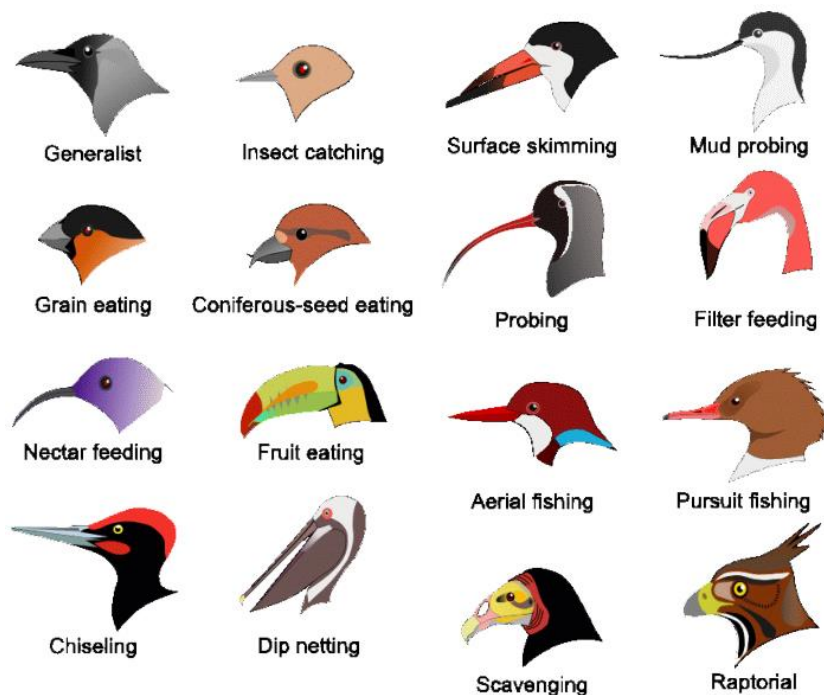
Some common modifications are:

Shape of Bill (diagrams)

Function



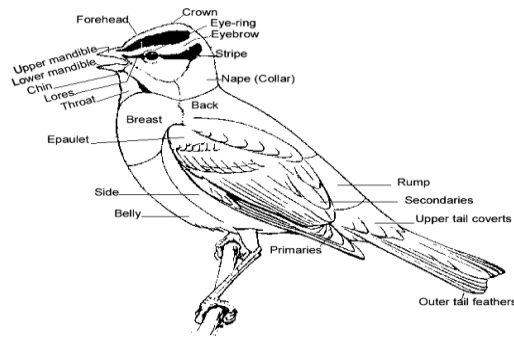
- A. probing flowers for nectar
- B. drilling into trees for insects
- C. scooping fish
- D. catching fish
- E. straining food from the water
- F. capturing prey and tearing flesh
- G. cracking seeds
- H. capturing worms and insects
- I. opening seeds from pine cones



NECK: Most birds have short necks but some such as the crane are long.

BODY: Some birds are stout while others are slender bodied.

- * **Back** = upper surface and **rump** = area closest to the tail.
- * **Breast** (chest) = underside near head and **belly** = underside around legs.
- * **Sides** = belly under wings.
- * Many birds have distinctive plumage patterns but remember that stripes are head to head or lengthwise while bars are wing to wing or crosswise.



PLUMAGE: The color pattern of the feathers along the body varies. It is often unique for a species.

- Feathers are epidermal structures derived from reptile scales
- Feathers tend to grow in dense tracts with bare areas between
- While growing the feather has a blood supply but is sealed off when fully grown
- Feathers can be moved individually by muscles in the skin (arrector pili)
- It is usually brighter in males than females with young of both sexes resembling the female.
- It is usually brightest during the mating season (spring and summer for most birds).
- Feathers help birds stay dry and warm, attract mates and fly
- Preening is the act of grooming and maintaining their feathers
- Preening spreads oil over the feathers which makes them waterproof
- Molting is the process of shedding old feathers and growing new ones
- Most birds molt once a year

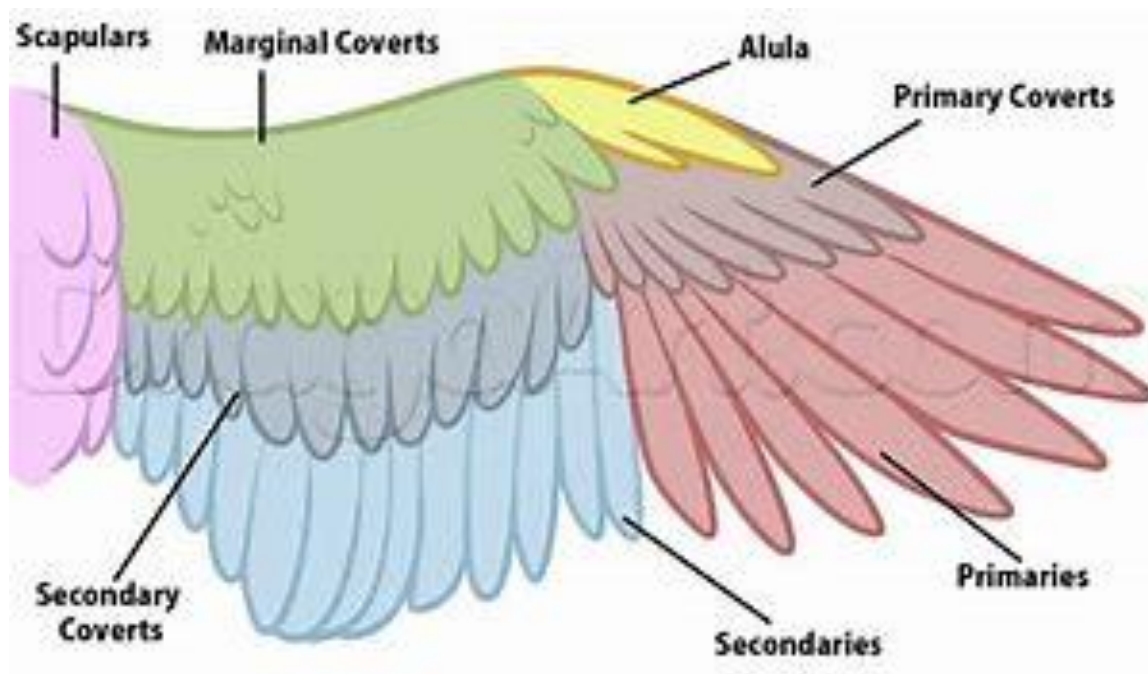


WINGS: Wings are used for true flight as well as gliding, balance during hovering and perching, and during courtship. Many have distinctive white or colored patches.

- * Wings can be long or short, pointed or rounded.

- * **Shoulder** = part of wing nearest to the body. There are two sets of flight feathers.

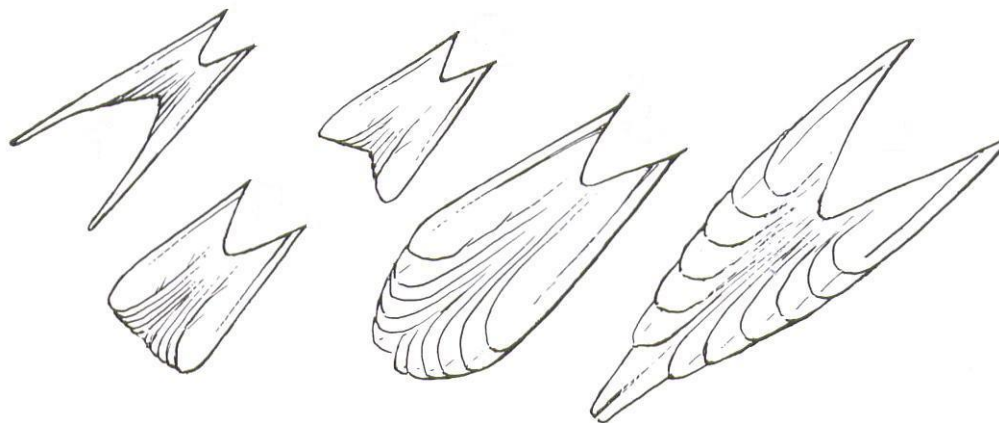
- * **Primaries** = from bend outward to tip and **secondaries** = from bend toward shoulder.



TAIL: The tail is used for steering and breaking during flight. It can also be used in courting displays.






- * The shape and color pattern is useful in identification.

- * The tail can be long or short and its shape can be square, rounded, pointed, elongated, forked or notched.



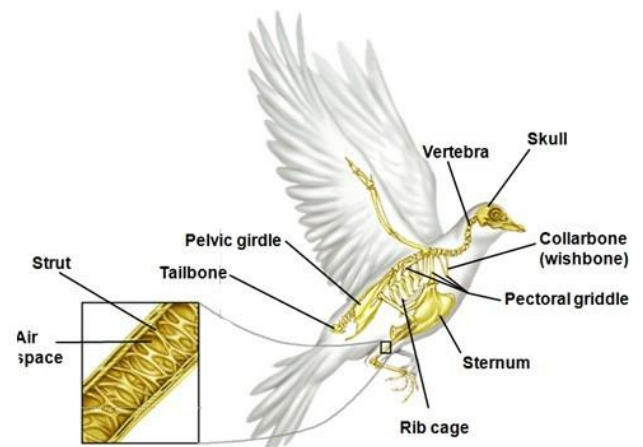
LEGS: The length and thickness of the legs as well as the shape of the foot are clues to the way the bird lives.

- The feet of birds are nearly devoid of muscles for greater agility and greater resistance to freezing damage since they are mostly bone, tendons & tough skin
- Some birds extend their legs during flight while others hold them under their body.
- The feet are modified for perching, clinging, walking or swimming.
- Some common modifications are:

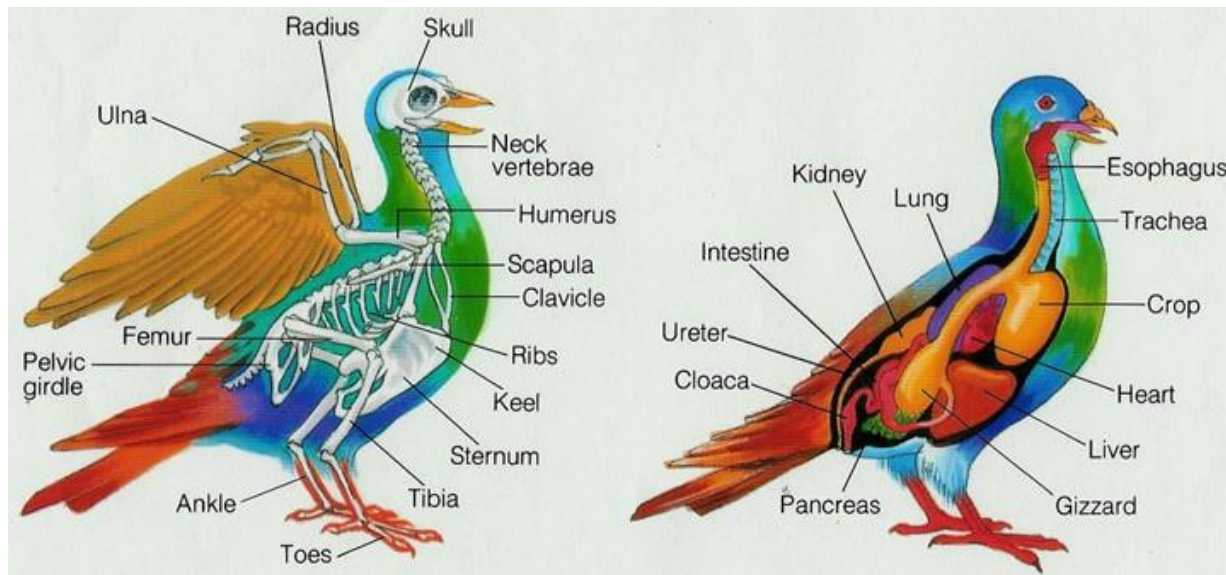
Foot Shape (diagrams)	Function
 A.	A. perching
 B.	B. wading
 C.	C. climbing or clinging
 D.	D. swimming
 E.	E. preying

ADAPTATIONS FOR FLIGHT:

- Entire anatomy is designed around flight
- Small compact body, reduced weight with all heavy organs close to center of gravity
- Center of gravity and propulsion systems are properly balanced
- Body is light yet strong enough for flight
- The skeletal system is exceptionally light and delicate yet sturdy
- Many bones are fused together to make the light but strong
- Strong flight muscles to move wings that can make up to 50% of body weight
- Active metabolism which provides energy for muscles and large lung capacity
- The eyes are perhaps the most important sense organ – they are disproportionately larger than in other vertebrates. Birds of prey have very large eyes
- Hearing is also well developed and includes a wide range of sounds



BIRD ANATOMY



- **Brain:** Birds are in fact extremely intelligent creatures, and as any bird owner knows, they never fail to surprise us with their capacity for learning.
- **Spinal Column:** Like all vertebrates, birds have a spinal column that runs the length of their bodies, and encases the delicate spinal cord. The spinal cord is part of the central nervous system and, in essence, acts as the brain's "messenger". When the bird decides that he wants to move, the spinal cord relays the message from the brain to the muscles that correspond to the desired body part, causing movement.
- **Trachea:** The trachea is a long tube that runs from the bird's throat to its lungs, and transports fresh air for the bird to breathe.
- **Esophagus:** The bird's esophagus is a narrow tube that transports food from the mouth to the crop, where it will be stored until it is digested.
- **Lung:** Much like human lungs, avian lungs serve to diffuse air throughout the bird's bloodstream. They are unique, however, in the fact that they have small air sacs that allow air to flow through the lung in only one direction, ensuring a constant supply of fresh oxygen.
- **Crop:** In the same way that a chipmunk stores food in its cheeks, birds store food in their crops. The crop is composed of layers of muscle tissue and holds and softens the food until it's ready to be passed on to the gizzard.
- **Gizzard:** A gizzard is a structure composed of tough muscle tissue which contains roughage that is used to grind the bird's food into a pulp. When the food is sufficiently ground, it is passed into the bird's intestine.
- **Kidney:** Liquids that the bird ingests are passed into the kidneys, which filter out any waste to be expelled from the bird later.
- **Heart:** Much like our human hearts, a bird's heart is divided into four chambers and serves to pump oxygen-rich blood throughout the body. Because birds are such high-energy animals, their hearts beat much faster than those of mammals. Some bird species have a resting heart rate of over 500 beats per minute!
- **Liver:** A bird's liver acts much like a large filter, and rids the bird of any toxins in its body.
- **Ureter:** The ureter is a tube that extends from the kidney to the cloaca, and allows liquid waste to be expelled from the bird's body.
- **Intestines:** A bird's intestines work to digest the food that is pumped into them from the gizzard, absorbing the nutrients that the bird needs to function. After the food is digested, the waste is pushed into the rectum.
- **Rectum:** The rectum allows waste to be expelled from the bird's body.

VOCALIZATION

- Many birds have distinctive calls and songs.
- They can help to identify birds not visible.
- Books and field guides attempt to put sounds into words
- Many have slightly different word translations so be careful about these.
- Listen to the actual sounds or recordings to learn them.



CALLS VS. SONGS

- Calls are short and simple to signal alarm or distress
- Songs are more complex and are used for ownership of feeding territory and courtship.
- In most species only males sing

Types of calls

- Alarm Calls – alerts other birds of a wide range of threats
- Contact Calls – to keep in touch with one another as when they are foraging for food
They are usually short, quick and quiet unless they are separated and it becomes a louder separation call
- Flight Calls – Species that flock often call back and forth while in flight
During spring and fall, songbirds fly at night and their chirps can be heard
- Begging Calls – chicks often make “feed me” calls



Terms used to describe sounds

- Trill
- Buzz
- Rich or thin
- Harsh
- Bell-like, flute-like, whistling, metallic – comparing bird sounds to band instruments

Non-vocal sounds

- Woodpecker drumming rapidly on a tree
 - Ruffling of feathers
- Flapping feathers or wings
- Crashing of birds or ducks into the water



WHERE IT IS OBSERVED:

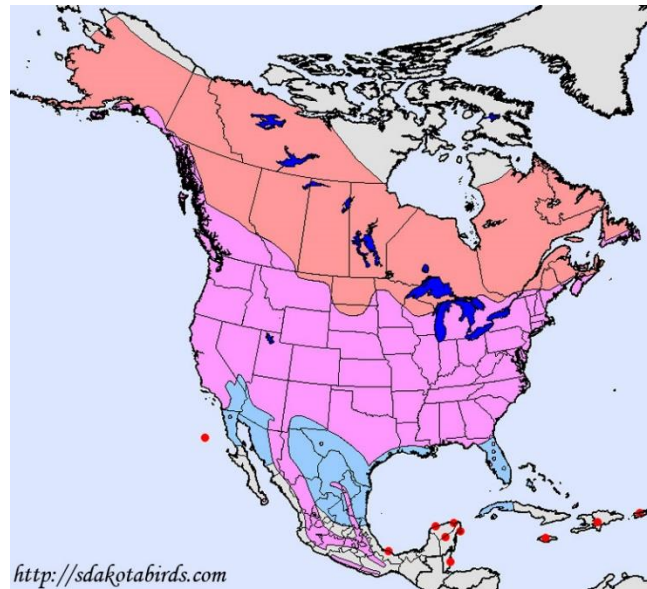
*The type of ecosystem tells a lot about the types of birds living there as well as their modifications and behaviors.

*Common ecosystems include open ocean, sea shore, salt marsh, freshwater marsh, lakes, rivers, ponds, beaches, swamps, grasslands, deserts, deciduous forests, coniferous forest, suburban areas and city parks.



Birds can be conveniently categorized by their migratory or non-migratory status in an area.

- Residents: are those birds that do not enter or leave the state during migration. Generally, these birds do not move very far during their lifetime.
- Transients: migrate through in the spring and/or fall but do not nest in the area. Some are pure transients that merely pass through.
- Winter visitors: are those birds whose breeding range is somewhere north.
- Summer visitors: are those birds whose winter range is somewhere to the south.
- Perennial visitors: are those of which individuals are always around.
- Casual visitors and accidentals (occur unexpectedly). The remaining 6% defy categorization.



BEHAVIOR: What a bird is doing can tell a lot about its identity and role in its ecosystem.

Types of bird behaviors:

- Posture or how a bird presents itself – size, shape, how it holds its body, attitude
- Movement – flight and walking or hopping
- Flying: the act of staying aloft in the air
- Flight pattern
- Walking/Hopping: movement along the ground
- Flocking: birds grouping together for protection
- Feeding/Drinking style: eating or drinking from the ground or their stored food
- Foraging: the act of looking through ground debris for food
- Preening/Bathing: the act of cleaning oneself or another
- Singing: communication that is species specific
- Giving an alarm call: an abrupt form of communication to warn others
- Territorial: the act of protecting a tree branch or area on the ground
- Courtship
- Nest building and care of young








Questions to ask about a particular bird you are identifying







- Is it alone or in a flock?
- Is it shy or social or aggressive?
- Where is it most of its time?
- How does it fly?
- Is it soaring, gliding, flapping or fluttering?
- Is there a flock flight pattern?
- Is it swimming, dabbling, diving, perching, walking, and/or hopping?
- How does it feed and what does it eat?
- Where does it nest?
- How do the young act?
- How does it react to other birds of its species, other species or other animals?
- Does it have any unique behaviors?



NEST TYPES

<http://www.utahbirds.org/featarts/2013/BirdNests.htm>

Photo / Link	Nest Type	Some Birds that mainly use this type of nest
	Secluded Place (no nest)	<p>Some Raptors Some Owls Some Auks Some Seabirds</p> <p><i>Non-North American Birds</i> Potoos Some Penguins</p>
	Simple Scrape	<p>Most shorebirds and terns Many ducks Some falcons, pheasants, quail and partridges</p> <p><i>Non-North American Birds</i> Ostriches, bustards and sandgrouse; Most tinamous</p>
	Mound	<p>Flamingos</p> <p><i>Non-North American Birds</i> Horned Coots (of South America) Megapodes Including: Australian Bushturkeys and Malleefowl</p>
	Burrow	<p>Burrowing Owls Puffins Shearwaters Most kingfishers</p> <p><i>Non-North American Birds</i> The Crab Plover, miners and leaftossers Some megapodes, motmots and todies</p>
	Cavity	<p>Woodpeckers, chickadees, bluebirds, trogons, parrots Some Nuthatches, kingfishers, owls, ducks and flycatchers</p> <p><i>Non-North American Birds</i> Most hornbills Many barbets</p>

	<u>Plate</u> (Small platform nests)	Grebes, Coots, Black Terns
	<u>Platform</u>	Eagles Osprey Egrets Cormorants
	<u>Pendant</u> (Hanging nest)	Orioles <i>Non-North American Birds</i> Oropendolas, caciques, weavers and sunbirds
	<u>Sphere</u>	Marsh wrens, magpies and American Dippers <i>Non-North American Birds</i> Thick-billed Weavers
	<u>Cup Shaped</u>	(This is the most common nest type) Many passerines Some hummingbirds and some swifts
	<u>Host Nest</u> (Brood Parasites)	Cowbirds <i>Non-North American Birds</i> The honeyguides Many Old World and Australasian cuckoos

Bird Ecology – Roles of birds in the ecosystem

- Indicators of environmental health
- Food source for humans and animals
- Flower pollinators
- Insect control – they eat mosquito larva and reduce many pests
- Disseminate seeds
- Scavengers and Cleaning Carcasses of Dead Animals
- Clean parasites off animals

Challenges to Bird Population health and long-term survival

- Habitat loss
- Residential and commercial development
- Agriculture
- Energy production and mining
- Natural resource use
- Pollution
- Climate change

