SIMPLE CLASSIFICATION OF FISH AND BIRDS OF UTAH LAKE

This lesson plan has been created as a resource for seventh grade teachers to teach the new core standards to their students. It integrates science standards in a meaningful and fun way. To see which specific standards are addressed, please refer to them below.

OBJECTIVE:

1. Students will be able to use bird picture cards and follow a dichotomous key.
2. Students will create a dichotomous key for fish found in Utah Lake.

STANDARDS ADDRESSED:

7th Grade Science

Standard 5: Students will understand that structure is used to develop classification systems.
- **Objective 1:** Classify based on observable properties.
- **Objective 2:** Use and develop a simple classification system.
- **Objective 3:** Classify organisms using an orderly pattern based upon structure.

TEACHER BACKGROUND:

Review student materials for birds.

General fish characteristics:

- Fins help the fish to swim.
- Spines stiffen the fins to aid in swimming.
- Lighter underside coloration masks the fish from being seen from below, whereas a dark coloration on the back camouflages the fish from above the water.
- Gills allow the fish to absorb oxygen from the water.
- Some fish are streamline-shaped, like suckers and trout allowing the fish to swim faster to avoid predators or swim upstream to lay eggs.
- Some fish are disc-shaped, like bass and perch, making the fish harder to swallow.
- Large pelvic fins support bottom-dwelling fish.
- Small pelvic fins aid swimming in open water.

Utah sucker and June sucker: A comparison of feeding style.

The Utah sucker is a bottom feeder. It has several interesting adaptations to allow it to feed on the bottom of the lake. It has small papillae (little sensory bumps) under its lips. These papillae give the Utah sucker an advantage because it uses the papillae to find its food in dark, muddy conditions. The Utah sucker will then suck up the mud a mouthful at a time and filter the mud for food. Utah suckers do not have gill rakers.

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June suckers do not have papillae. It is a middle column feeder. The June sucker has specialized gill rakers. Gill rakers allow the fish to catch both phytoplankton and zooplankton in the water column. The gill rakers then move the plankton to the mouth. In this way, the June sucker can feed in the water column. The scientific name of June sucker is *Chasmistes liorus.* Liorus means smooth margin. See supplemental materials for pictures and diagrams of gill rakers.

June sucker and common carp: A comparison of reproduction.

The June sucker's reproductive system is designed to produce about 20,000 eggs a year. The June sucker will wait until the high flows of water in the tributaries ebb (flow away from the shore) and will then enter the tributaries to lay its 20,000 eggs in June. The high numbers of eggs produced help ensure that at least a few offspring will survive. The June sucker lays eggs on gravel; this requires them to swim up rivers to find a suitable spawning area.

The common carp's reproductive system is designed to produce about 10,000 eggs at a time, several times during the year. The common carp can lay eggs every two weeks, producing approximately 40,000 eggs a year. The lower amounts of eggs produced allow the carp to produce eggs more often, this helps ensure that if conditions are not right for larval survival, conditions may be right later in the year. The common carp begins producing eggs in April through the end of July. Because carp lay sticky eggs that easily attach to vegetation, they do not need to spawn up a stream where gravel can be found. They can lay eggs on the shores of the lake making survival in Utah Lake more likely.

Other June sucker information:

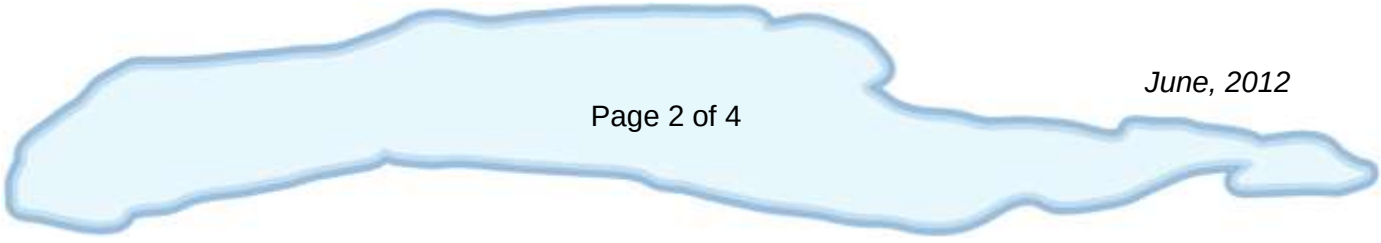
Best predator avoidance is a habitat in which to hide. Another is a flat belly so it can lie on the bottom making it less conspicuous to predators.

Other carp information:

Carp have large scales that protect the fish.

June sucker and white bass: A comparison of shape.

June suckers have a long, slender body. Unfortunately, this slender shape makes the fish very vulnerable to predation. The June sucker body shape is not set up to protect itself against predation. In order to ensure fish survive, the Division of Wildlife resources stock the June sucker into Utah Lake when they have reached a length of at least 8 inches. At this size, they are only vulnerable to the larger fish in the lake.



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The white bass is the second most predominant species in the lake behind carp; it is also a carnivore. Its body shape is very deep meaning bulged in the middle or humped. Its shape makes it so that they don't fit down the mouth of a predator. When a white bass is three inches long, it has developed a hump large enough to prevent predation. Fish biologists consider this type of body shape to be more evolutionarily advanced.

Walleye:

The walleye is so named for its very large eyes. These eyes have the ability to see well in darker conditions, giving the walleye an advantage in a turbid lake like Utah Lake. Walleye is a predatory fish, consuming fish and occasionally crustaceans. Walleye have very large teeth. These teeth are used for grasping its prey and swallowing. The coloration of walleye is all lighter in color allowing the fish to swim in open water.

Channel catfish:

Channel catfish are omnivorous. They eat anything, alive or dead. Acute sense of smell helps them to respond to odiferous food. Channel catfish have barbells (whiskers) that help the fish sense food in murky water. They have flat bellies so they can lie on the bottom and be less conspicuous to predators.

Rainbow trout:

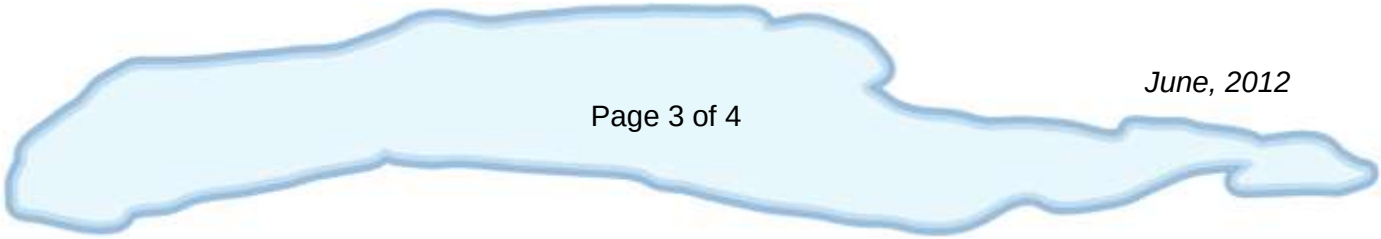
See general fish adaptations. Rainbow trout are not found in abundance in Utah Lake because they have colder water requirements. Their body is adapted to fast flowing water.

Black bullhead catfish:

Black bullhead catfish feed day and night on the bottom and are omnivorous. The mouth is located under the snout giving the fish the ability to feed on the bottom.

TEACHER MATERIALS:

- Teacher background information above
- Classification key for birds of Utah Lake (dichotomous key)
- Bird structure information sheets
- Birds of Utah Lake cards
- Fish anatomy handout
- Utah Lake fish cards
- Classification key for fishes of Utah Lake (blank dichotomous key)



SIMPLE CLASSIFICATION OF FISH AND BIRDS OF UTAH LAKE

STUDENT MATERIALS:

- Classification key for birds of Utah Lake (dichotomous key)
- Bird structure information sheets
- Birds of Utah Lake cards
- Fish anatomy handout
- Utah Lake fish cards
- Classification key for fishes of Utah Lake (blank dichotomous key)

PROCEDURE:

1. Demonstrate with students how to use a dichotomous key. You may want to discuss a few bird structures and characteristics prior to using the key.
2. Pass out bird cards and the bird dichotomous key.
3. Demonstrate for students the process involved to take one bird picture card through the key listing the pathway (optional) and identify the bird.
4. Have students take the remaining bird cards through the dichotomous key, fill out the pathway used for each bird (optional), and identify the birds.
5. Hold a discussion about the features of a dichotomous key.
6. Pass out the fish cards and the blank dichotomous key titled “Classification Key for Fishes of Utah Lake.”
7. Review fish anatomy with students using the fish anatomy handout.
8. Have pairs or groups of students study the observable characteristics of the fish cards and create their own dichotomous key.

ASSESSMENT:

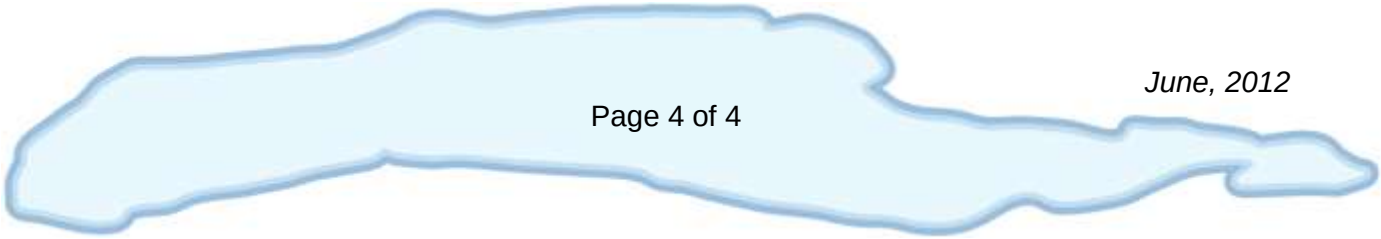
- Dichotomous key
- Students may be required to hand in notes, if desired.

EXTENSIONS:

- Allow students to create another dichotomous key of other wildlife.

ADDITIONAL REFERENCES:

- *Fishes of Utah: A Natural History* by William F. Sigler and John W. Sigler.
- Fish Field Guides (available by searching on line).



Name _____

Period _____

Student Activity: Dichotomous Key

Question	Identify/Go to
1a.	
1b.	
2a.	
2b.	
3a.	
3b.	
4a.	
4b.	
5a.	
5b.	
6a.	
6b.	
7a.	
7b.	
8a.	
8b.	

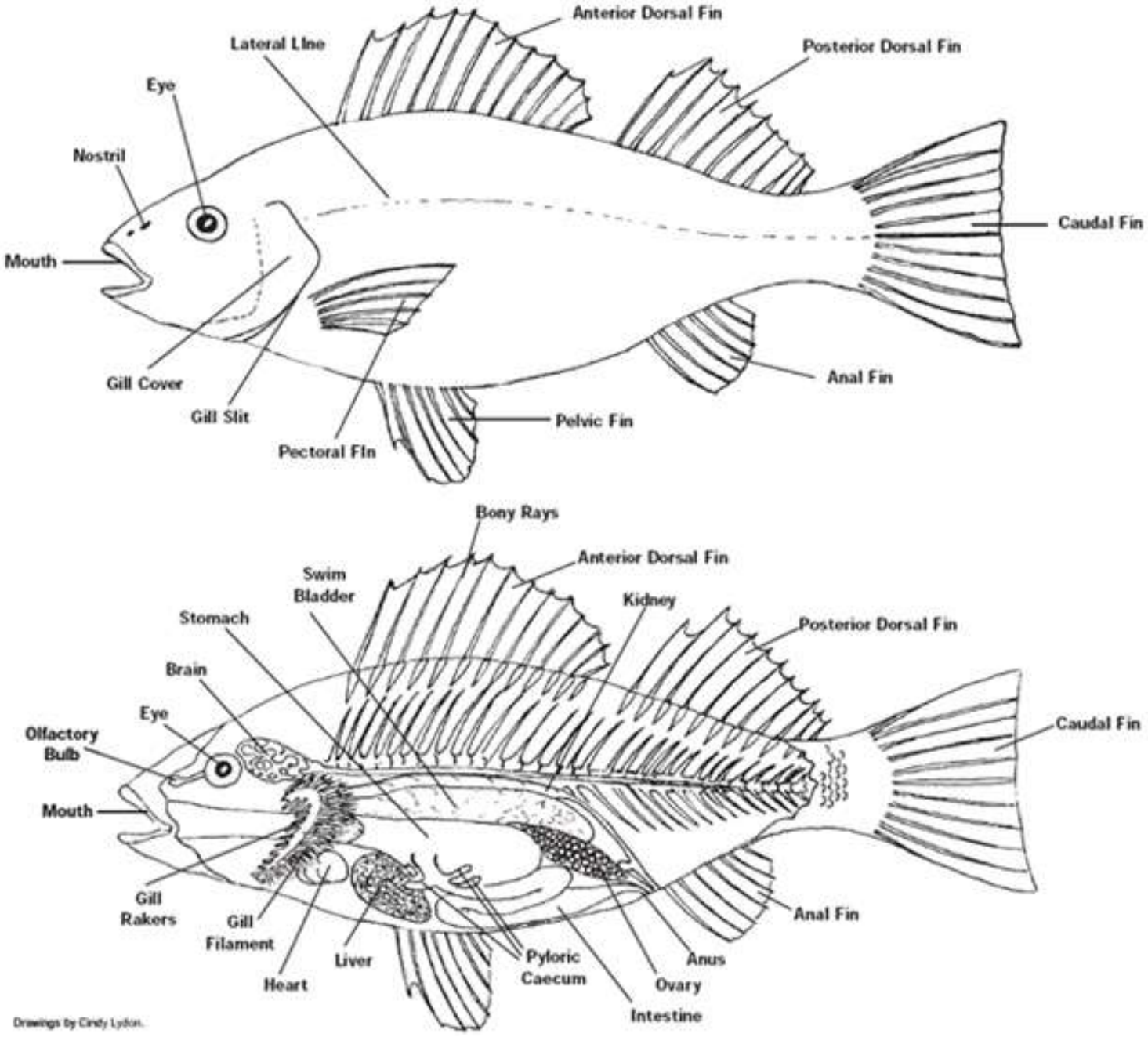
Name _____

Period _____

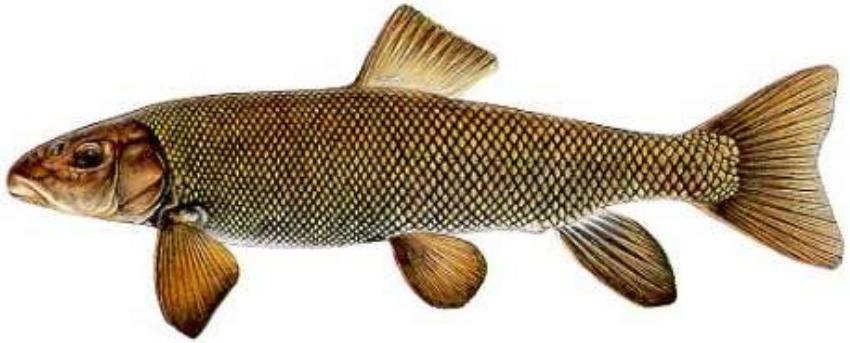
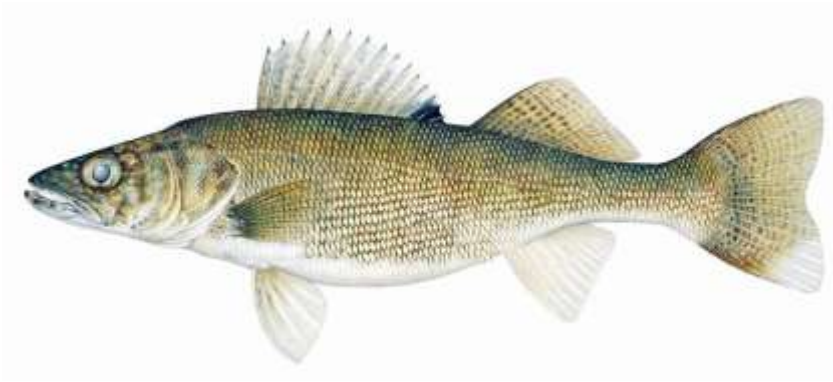
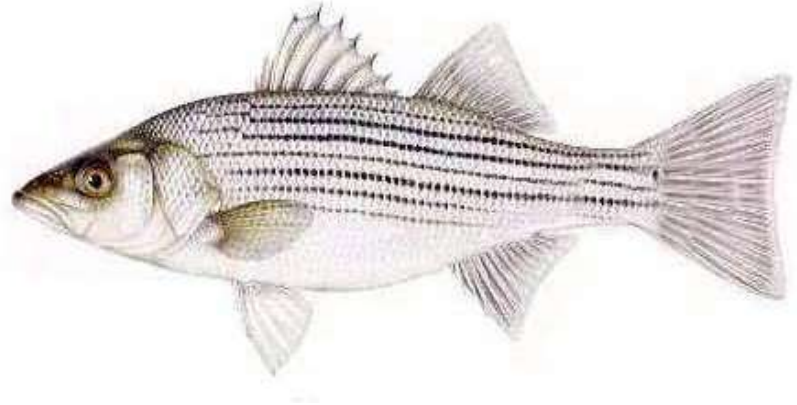
CLASSIFICATION KEY FOR FISHES OF UTAH LAKE

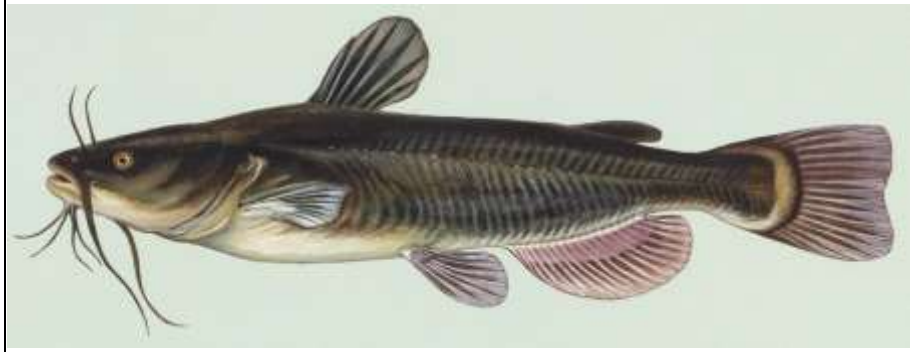
Examine the fish cards looking closely at observable traits. Develop a dichotomous key according to the characteristics you observe.

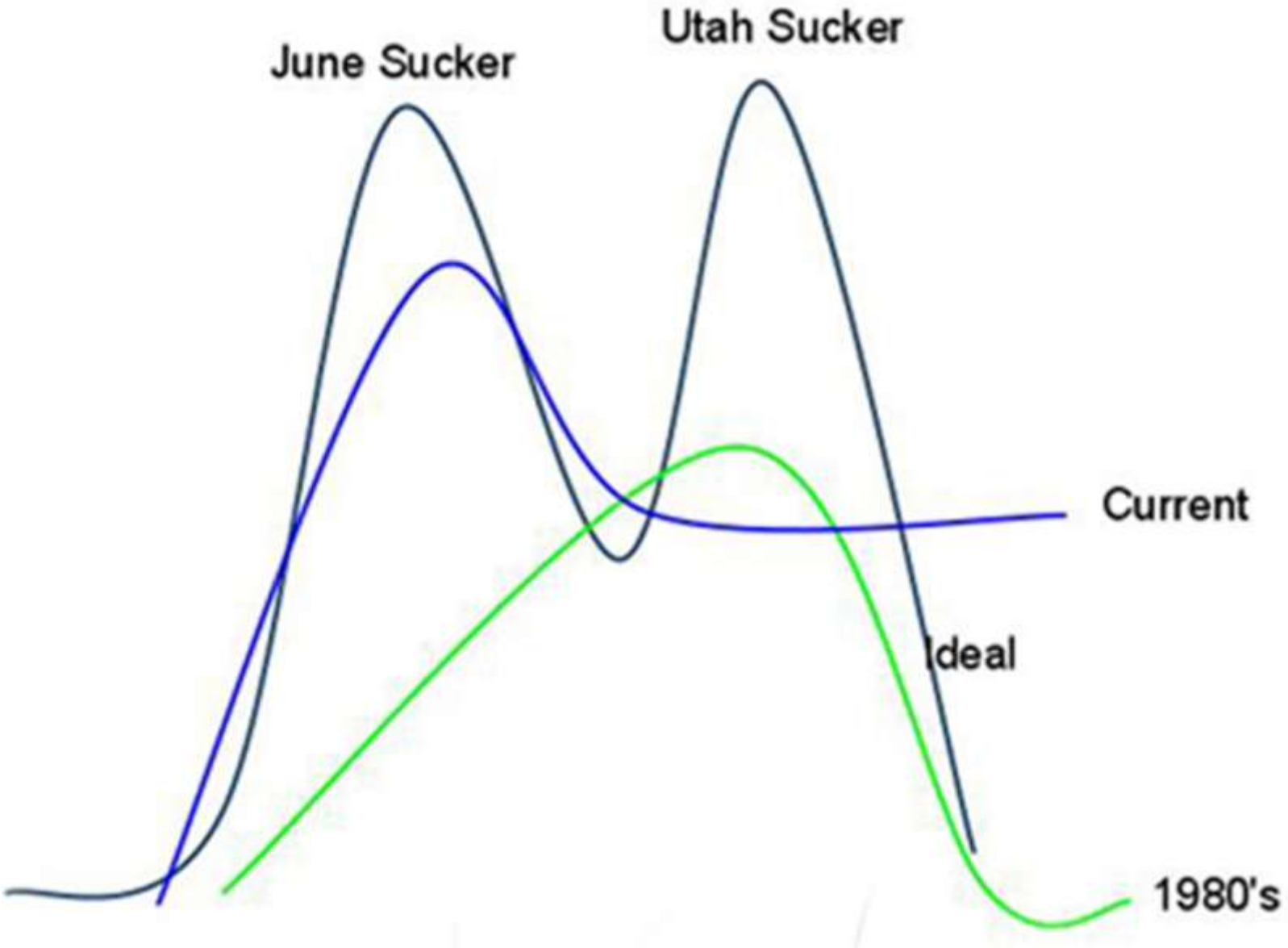
Question	Go To
2a.	

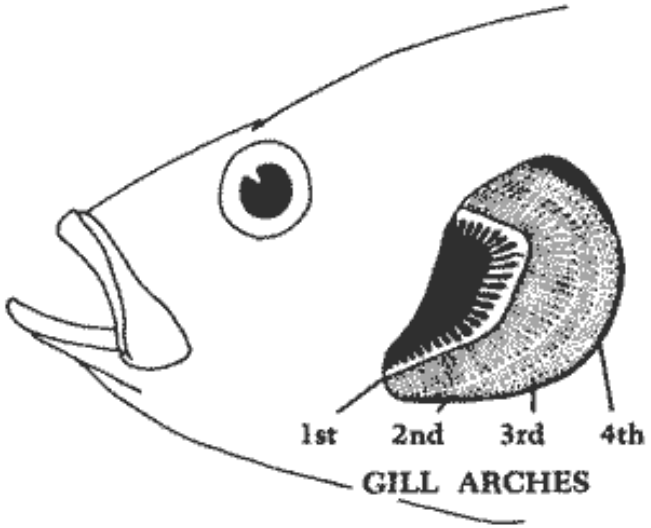


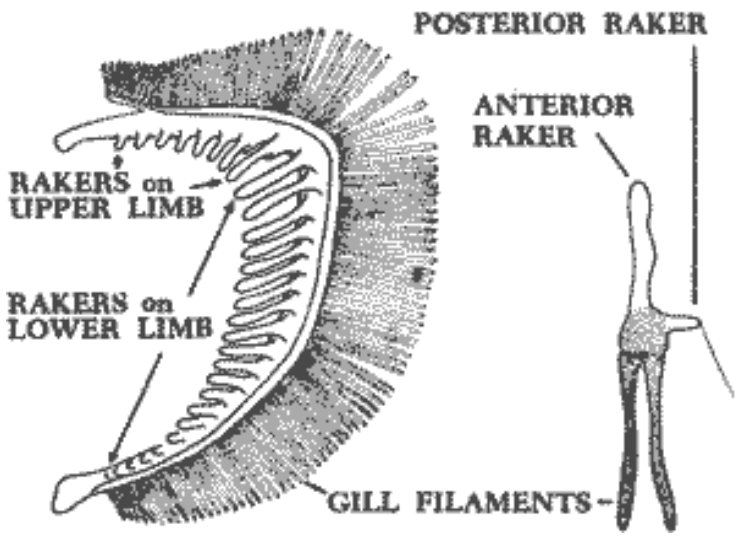
Drawings by Cindy Lydon.

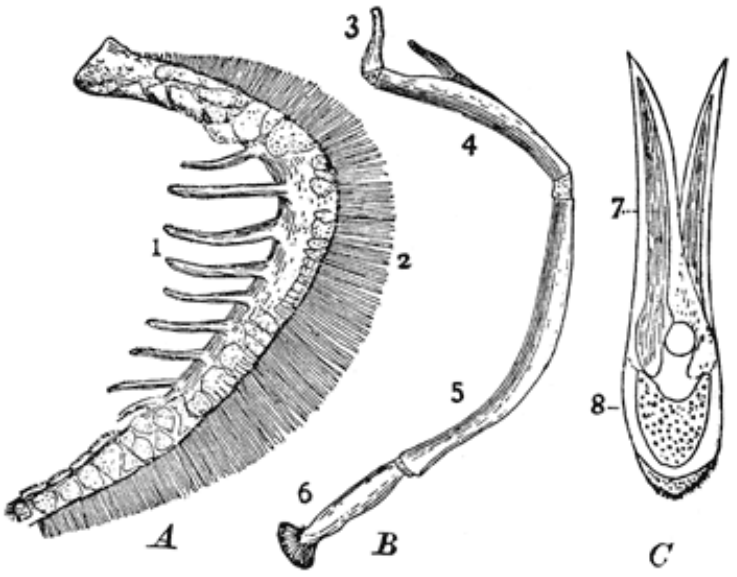
JUNE SUCKER 	**WALLEYE** 
WHITE BASS 	**CARP** 

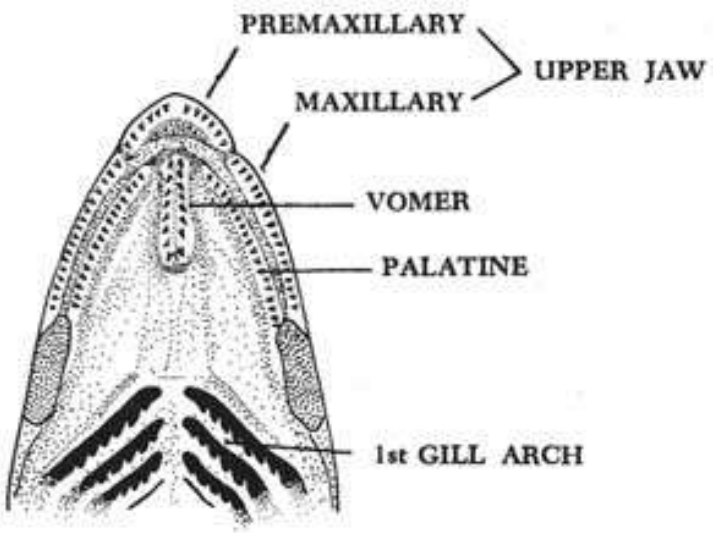
UTAH SUCKER 	**CHANNEL CATFISH** 
BLACK BULLHEAD 	**RAINBOW TROUT** 

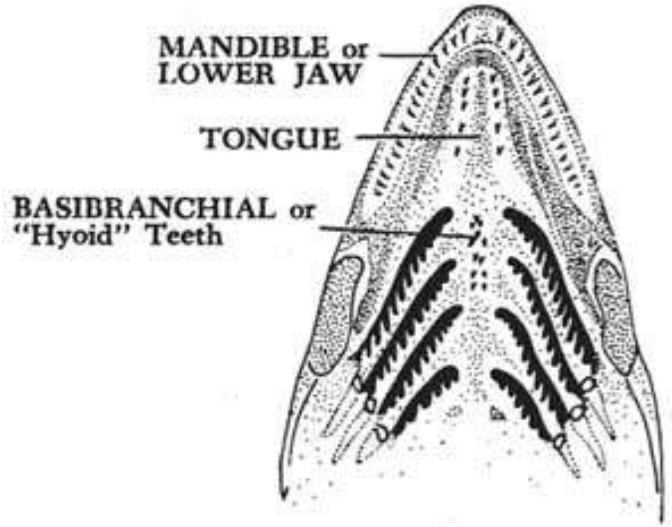

June Sucker
Utah Sucker
Current
Ideal
1980's

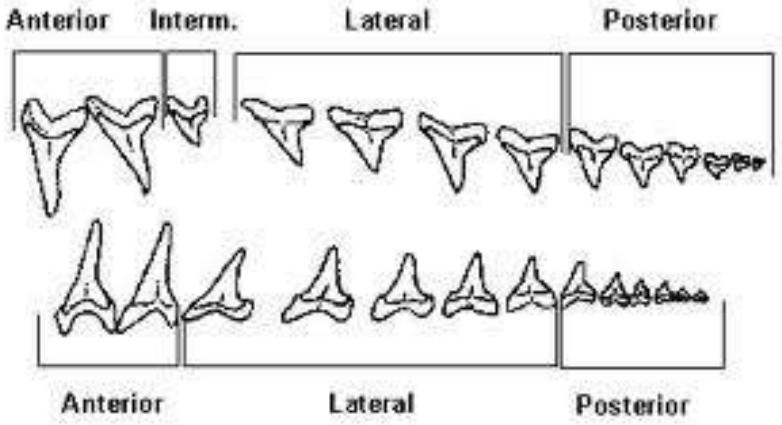

1st
2nd
3rd
4th
GILL ARCHES


POSTERIOR RAKER
ANTERIOR RAKER
RAKERS on UPPER LIMB
RAKERS on LOWER LIMB
GILL FILAMENTS

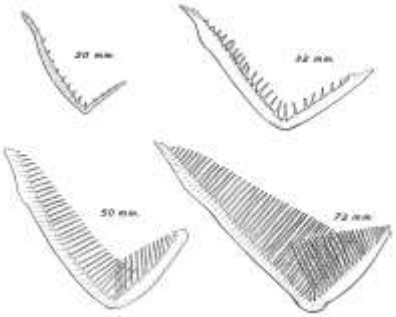

1
2
3
4
5
6
7
8
A
B
C







Gill rakers of planktophagic and predatory fishes.



CLASSIFICATION KEY FOR BIRDS OF UTAH LAKE

Questions	Identify/Go to
1a. Feathers on entire bird are one solid color	**Go to 2**
1b. Feathers on entire bird have more than one color	**Go to 3**
2a. Bird has long black legs and yellow feet	*Snowy Egret*
2b. Bird has large orange pouch-like beak	*Pelican*
3a. Birds head is one color	**Go to 4**
3b. Birds head is more than one color	**Go to 5**
4a. Bird has a predator beak for ripping meat	Go to 6
4b. Bird has green head with a white neck ring	*Mallard Duck*
5a. Bird has binocular predator vision (both eyes facing front)	**Go to 6**
5b. Bird has horizontal field of vision to help locate approaching predators (eyes located on the side)	**Go to 8**
6a. Bird is 30 – 40 inches tall	*Bald Eagle*
6b. Bird is 18 – 25 inches tall	*Red-tailed Hawk*
7a. Black bars and spots on legs	***Peregrine Falcon***
7b.Bird has heart shaped face	***Barn Owl***
8a. Bird larger than 35 inches	Go to 9
8b. Bird smaller than 20 inches	Go to 10
9a. Bird stands one leg and breast feathers simulate weeds for camouflage while hunting	***Great Blue Heron***
9b. Migratory bird has conspicuous white patch on cheek	***Canada Goose***
10a. Bird has black and white stripes	Go to 11
10b. Bird has metallic blue green coloring on top of head and a seed eating beak	*Tree Swallow*
11a. Bird has black bands across head and chest	***Killdeer***
11b. Bird has long thin upturned bill	***American Avocet***

Record the pathway as you take each bird through the classification key. Then list the identified bird:

Bird #	Identification pathway	Identified as
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10		
11.		
12.		

CLASSIFICATION KEY FOR BIRDS OF UTAH LAKE

Name _____

Period _____

Examine the fish cards looking closely at observable traits. Develop a dichotomous key according to the characteristics you observe.

Question	/Go To
2a.	

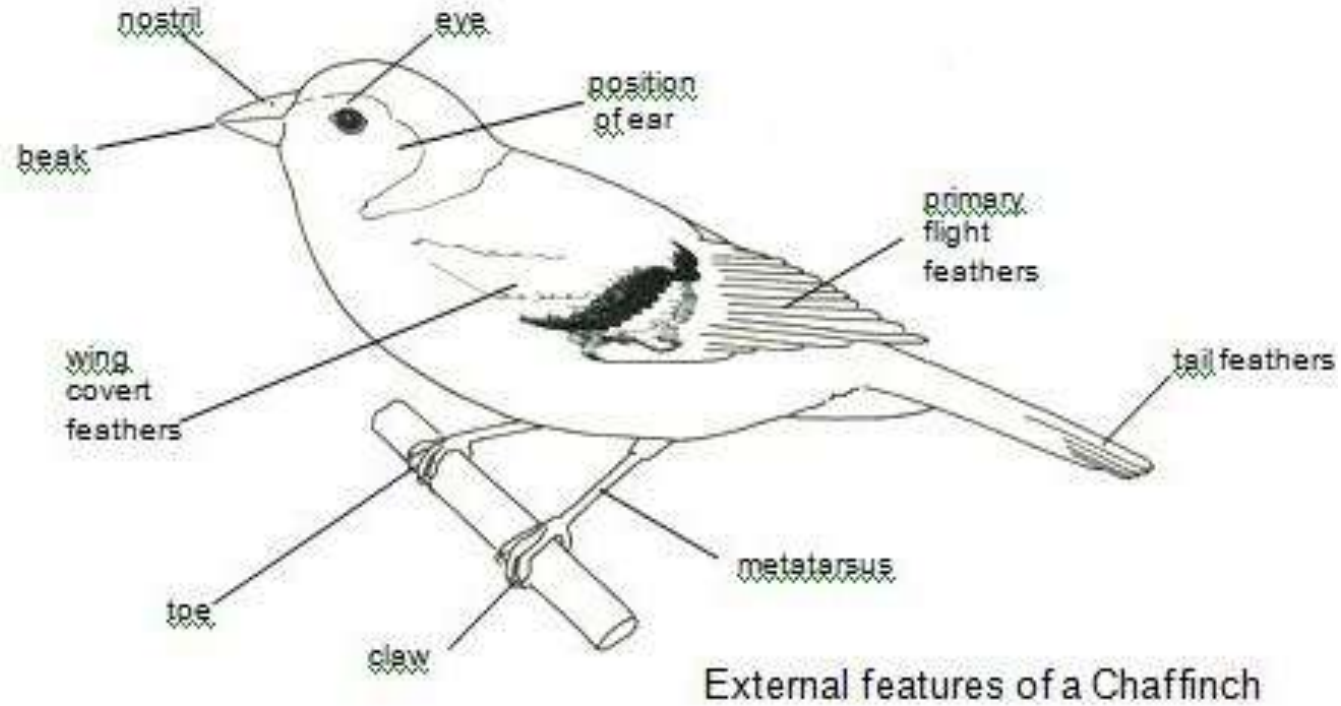
CLASSIFICATION KEY FOR BIRDS OF UTAH LAKE

Student Activity: Dichotomous Key

Question	Identify/Go to
1a.	
1b.	
2a.	
2b.	
3a.	
3b.	
4a.	
4b.	
5a.	
5b.	
6a.	
6b.	
7a.	
7b.	
8a.	
8b.	

BIRD ADAPTATIONS

Birds - structure and function



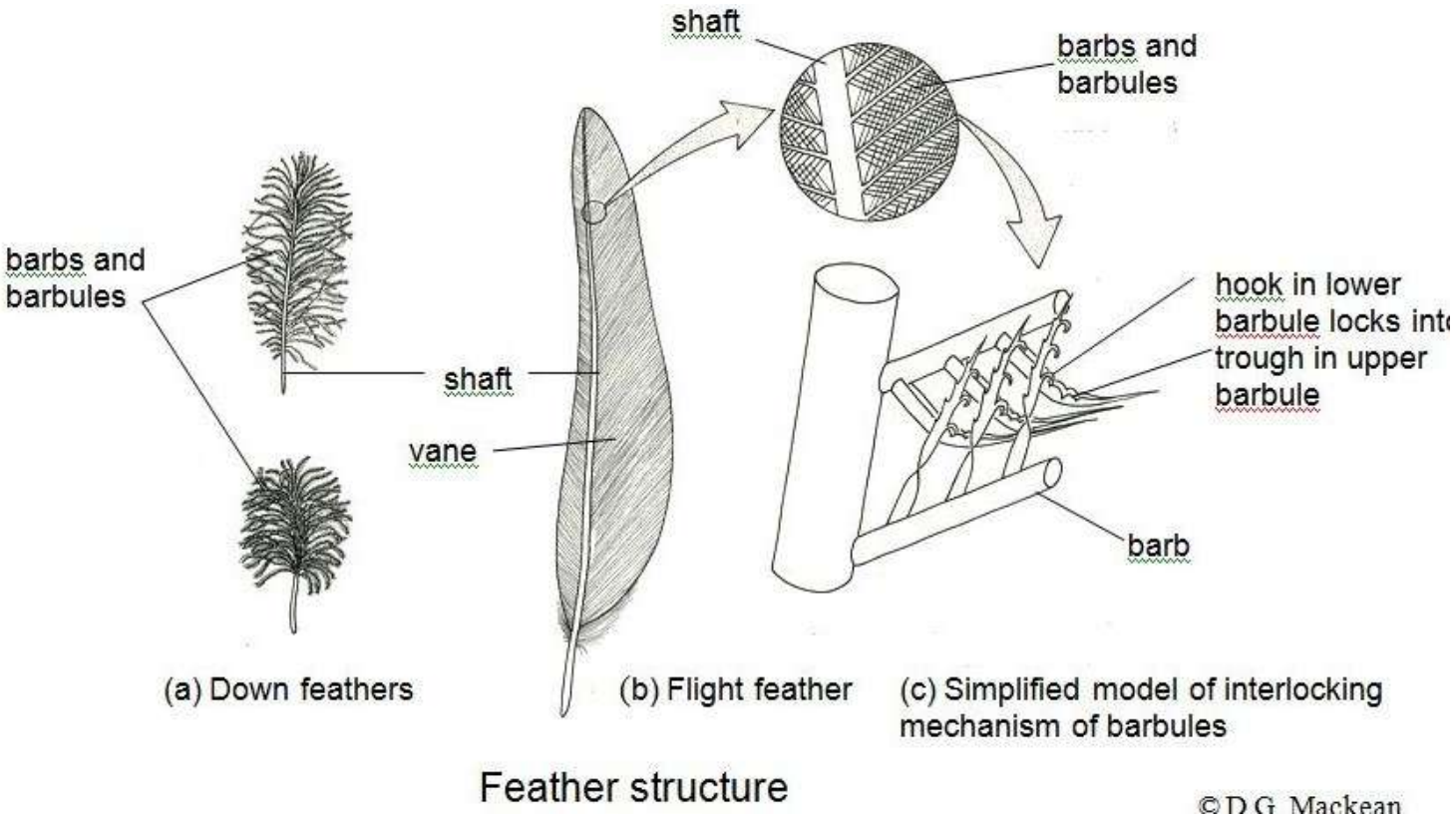
External features of a Chaffinch

Birds are vertebrates - they have a vertebral column and a skull. They are 'warm blooded'; that means they maintain their body temperature at a constant level and above that of their surroundings. Their chief distinguishing characteristics are that they have feathers and their forelimbs are modified to form wings.

The feathers consist of a shaft with rows of fine filaments (*barbs*) on each side. The barbs themselves have finer filaments (*barbules*) branching from them. In the down feathers, the barbs and barbules are loose and fluffy. They trap an insulating layer of air close to the body and so reduce heat losses.

The barbs and barbules of the flight and covert (or contour) feathers are organised in a regular way forming a smooth, water resistant cover. The barbules overlap so that the hooks on one set of barbules engage with grooves on the other set rather like 'Velcro'. If the feathers get damaged in flight, they can be restored to shape by preening.

BIRD ADAPTATIONS



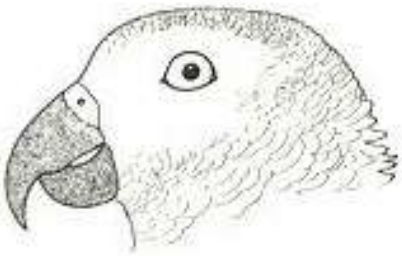
Feather structure

BIRD ADAPTATIONS

Adaptations of beaks and feet

CURLEW
Long, narrow beak probes into mud and sand on the shore and in estuaries to reach burrowing worms and molluscs. Characteristic of most waders, e.g. sandpipers and redshanks

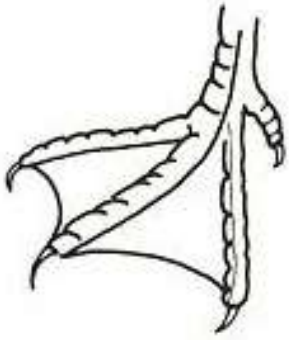
BUZZARD
Powerful, sharp, hooked beak tears flesh from small birds and mammals. This type of beak is characteristic of most birds of prey, including hawks, falcons, eagles and owls



AFRICAN GREY PARROT
Hook-like upper mandible assists in climbing. Sturdy, short beak enables seeds to be gripped and cracked open

The shape and size of a bird's feet and beak are usually adapted to its method of feeding and locomotion.

The drawings are not to scale



HERRING GULL
Hind toe very small. The web between the three front toes provides an expanded surface for swimming and walking on soft surfaces. Characteristic of other gulls, sea birds, ducks, and geese

LITTLE OWL
Three toes directed forward and one back, but they can be bent to meet. They are powerful with sharp, curved talons for catching, holding and killing prey. Characteristics of many predatory birds such as falcons and hawks.

BIRD ADAPTATIONS

Not to scale

BIRD CARDS

1.
Description - 16-20" (41-51 cm). A large, long-legged shorebird with a slender, upturned bill. Upperparts and wings patterned in black and white; under-parts white. Head and neck rust-colored in summer, white in winter.
Habitat - Freshwater marshes and shallow marshy lakes; breeds locally in salt or brackish marshes. Many move to the coasts in winter.
Nesting - 4 olive-buff eggs, spotted with brown and black, in a shallow depression sparsely lined with grass on a beach or mudflat. Often nests in loose colonies.

2.
Description - 9-11" (23-28 cm). Our largest "ringed" plover. Brown above and white below, with 2 black bands across breast, long legs, and relatively long tail. In flight, shows rusty upper tail coverts and rump.
Habitat - Open country generally: plowed fields, golf courses, and short-grass prairies.
Nesting - 4 pale buff eggs, spotted with blackish brown, in a shallow depression lined with grass on bare ground.
Range - Breeds from Alaska east across continent to Newfoundland and southward. Winters north to British Columbia, Utah, Ohio Valley, and Massachusetts. Also in South America.

3.
Description - 35-45" (89-114 cm). Brownish body with black head, long black neck, conspicuous white cheek patch. The smaller Brant has a shorter neck and lacks white cheek patch. The Cackling Goose is smaller, darker, shorter-billed, and found mainly in the West.
Habitat - Lakes, bays, rivers, and marshes. Often feeds in open grasslands and stubble fields.
Nesting - 4-8 whitish eggs in a large mass of grass and moss lined with down; usually on the ground near water or on a muskrat lodge, but sometimes in a tree in an abandoned Osprey or Bald Eagle nest.
Range - Breeds from Alaska east to Baffin Island and south to California, Illinois, and Massachusetts. Winters south to northern Mexico and Gulf Coast. Widespread as a semi-domesticated bird in city parks and on reservoirs.

4.
Description - 18-27" (46-69 cm). Male has a green head, white neck ring, chestnut breast, and grayish body; inner feathers of wing (speculum) are metallic purplish blue, bordered in front and back with white. Female mottled brown with white tail and purplish-blue speculum; mottled orange and brown bill. Form in Southwest ("Mexican Duck") similar to typical female Mallard but darker; speculum blue; bill of male yellow-green; bill of female dusky orange; no white in tail.
Habitat - From ponds, lakes, and marshes to small river bends, bays, and even ditches and city ponds.
Nesting - 8-10 light olive-green eggs in a down-lined nest often placed some distance from water, occasionally even in a tree.
Range - Breeds from Alaska and Quebec south to southern California, Virginia, Texas, and northern Mexico. Winters throughout United States and south to Central America and West Indies. Also in Eurasia.

BIRD CARDS

5.
Description - 39-52" (99-132 cm). W. 5'10" (1.8 m). A common large, mainly grayish heron with a pale or yellowish bill. Often mistaken for a Sandhill Crane, but flies with its neck folded, not extended like that of a crane. In southern Florida, an all-white form, "Great White Heron," differs from Great Egret in being larger, with greenish-yellow rather than black legs.
Habitat - Lakes, ponds, rivers, and marshes.
Nesting - 3-7 pale greenish-blue eggs placed on a shallow platform of sticks lined with finer material, usually in a tree but sometimes on the ground or concealed in a reed bed. Nests in colonies.
Range - Breeds locally from coastal Alaska, south-central Canada, and Nova Scotia south to Mexico and West Indies. Winters as far north as southern Alaska, central United States, and southern New England. Also in Galapagos Islands.

6.
Description - 55-70" (1.4-1.8 m). W. 8' (2.4 m). A huge white bird with a long flat bill and black wing tips. In breeding season, has short yellowish crest on back of head and horny plate on upper mandible. Young birds duskier than adults.
Habitat - Shallow lakes and coastal lagoons.
Nesting - 1-6 whitish eggs on a low mound of earth and debris on a marshy island; occasionally on rocky islands in desert lakes. Nests in colonies.
Range - Breeds from British Columbia and Mackenzie south to northern California, Utah, and Manitoba; also along Texas Gulf Coast. Winters from central California, Gulf Coast, and Florida south to Panama.

7.
Description - 35-45" (89-114 cm). Brownish body with black head, long black neck, conspicuous white cheek patch. The smaller Brant has a shorter neck and lacks white cheek patch. The Cackling Goose is smaller, darker, shorter-billed, and found mainly in the West.
Habitat - Lakes, bays, rivers, and marshes. Often feeds in open grasslands and stubble fields.
Nesting - 4-8 whitish eggs in a large mass of grass and moss lined with down; usually on the ground near water or on a muskrat lodge, but sometimes in a tree in an abandoned Osprey or Bald Eagle nest.
Range - Breeds from Alaska east to Baffin Island and south to California, Illinois, and Massachusetts. Winters south to northern Mexico and Gulf Coast. Widespread as a semi-domesticated bird in city parks and on reservoirs.

8.
Description - 18-25" (46-64 cm). W. 4' (1.2 m). A large stocky hawk. Typical light-phase birds have whitish breast and rust-colored tail. Young birds duller, more streaked, lacking rust-colored tail of adult; they are distinguished from Red-shouldered and Swainson's hawks by their stocky build, broader, more rounded wings, and white chest. This species quite variable in color, especially in West, where blackish individuals occur; these usually retain rusty tail.
Habitat - Deciduous forests and open country of various kinds, including tundra, plains, and farmlands.
Nesting - 2 or 3 white eggs, spotted with brown, in a bulky nest of sticks lined with shreds of bark and bits of fresh green vegetation, placed in a tall tree or on a rock ledge.
Range Breeds throughout North America, from Alaska east to Nova Scotia and southward. Winters across United States north to southern British Columbia and Maritime Provinces.

BIRD CARDS

9.
Description - 20-27" (51-69 cm). W. 3'2" (97 cm). A small, delicate white heron with a slender black bill, black legs, and yellow feet. In breeding season, it has long lacy plumes on its head, neck, and back. Immature bird similar to adult, but lacks plumes and has yellow stripe up back of leg. Adult Cattle Egret has pale bill, legs, and feet; immature has dark bill, legs, and feet. Much larger Great Egret has yellow bill and black legs and feet. Similar to immature of less common Little Blue Heron, but that species has a stouter, bluish-gray bill, greenish-yellow legs and feet, no yellow skin between eyes and base of bill.
Habitat - Marshes, ponds, swamps, and mudflats.
Nesting - 3-5 pale blue-green eggs placed on a platform of sticks in a bush or reedbed or on the ground. Nests in colonies, often with other species of herons.
Range - Breeds locally from Oregon and California east to New England, mainly along coasts but also at scattered localities inland. Winters regularly from California, Arizona, and Virginia south to West Indies and South America. Also resident in tropical America.

Birds:

1. American Avocet
2. Kill Deer
3. Canada goose
4. Mallard Duck
5. Great Blue Heron
6. American White Pelican
7. Bald Eagle
8. Red Railed Hawk
9. Snowy Egret

MASTER BIRD CLASSIFICATION CARDS

1.

16 – 20

9 – 11 inches

2.

39 – 52 inches

3.

55 - 70 inches

4.

18 - 27 inches

5.

17 - 18

6.

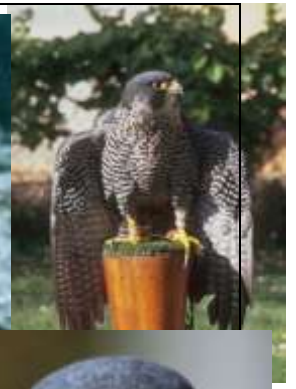
MASTER BIRD CLASSIFICATION CARDS

35 - 45 inches

7.

9.

19 - 25 inches



15 - 21 inches

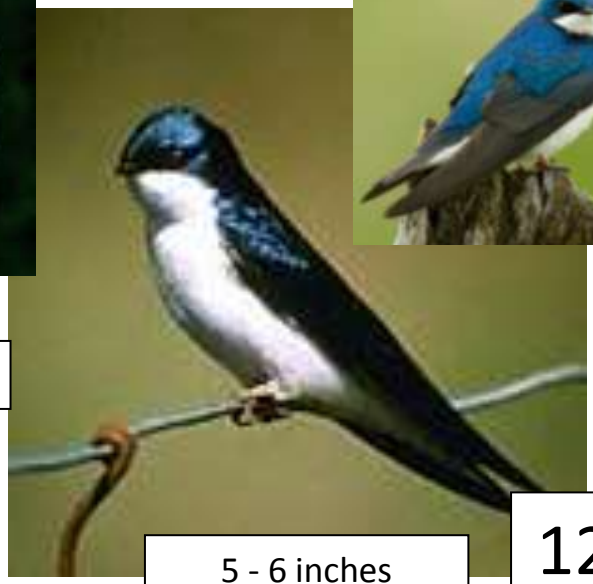
10.

8.

20 - 27 inches

30 – 40 inches

11.



5 - 6 inches

12.

BIRD CLASSIFICATION CARDS

16 – 20 inches

1.

9 – 11 inches

2.

39 – 52 inches

3.

55 - 70 inches

4.

18 - 27 inches

5.

17 - 18 inches

6.

BIRD CLASSIFICATION CARDS

35 - 45 inches

7.

20 - 27 inches

8.

18 - 25 inches

9.

15 - 21 inches

10.

30 – 40 inches

11.

5 - 6 inches

12.

BIRD CLASSIFICATION CARDS