Biology 452
Lab Practical 1 Key (Birds & Mammals)

Station 1

A. White-throated Swift
B. Common Nighthawk
C. Burrowing Owl
D. Caspian Tern
E. Flying Squirrel

1. How many orders do these specimens represent? **5**
2. List the letter(s) of the specimen(s) that are aerial foragers. **A, B, C**
3. Give the order name of specimen B. **Caprimulgiformes**
4. List the letter(s) of the specimen(s) that are nocturnal. **B, C, E**

Station 2

A. Downy Woodpecker (Female)
B. Northern Flicker (Female)
C. California Quail (Male)
D. Kingfisher (Male)

5. List the letter(s) of the specimen(s) that are female. **A, B**
6. List the letter(s) of the specimen(s) that eat(s) invertebrates. **A, B**
7. What technical term describes the type of feet on specimen C? **Semi-palmate**
8. List the letter(s) of the ground-gleaning specimen(s). **B, C**

Station 3

A. Greater Yellow Legs
B. Kingfisher (Female)
C. Downy Woodpecker (Male)
D. Western Sandpiper

9. Write the letter(s) of the specimen(s) with syndactyl feet. **B**
10. Write the order of the species that has a different diet than all the rest. **Coraciiformes**
11. What technical term describes the bill shape of specimen D? **Terete**
12. What is the foraging behavior of specimen A? **Probe-strike**

Station 4

A. Male Ring-necked Pheasant
B. Mourning Dove
C. Female California Quail
D. Killdeer

13. How many foraging behaviors are represented by these specimens? **1**
14. What is the complete common name of specimen D? **Killdeer**
15. Write the letter(s) of the specimen(s) in the order Galliformes. **A, C**
16. Write the letter of the 1 specimen that is NOT native to America. **A**

Station 5

A. Red-Winged Blackbird (female)
B. Marsh Wren
C. Song Sparrow
D. House Finch (female)

17. What is the complete common name of specimen C? **Song Sparrow**
18. What is the **diet** that differs from the diet of the rest of these specimens? **Inverts**
19. What is the complete common name of specimen D? **House Finch**

Station 6

A. Black-headed Grosbeak (male)
B. American Goldfinch (female)
C. Northern/Bullock's Oriole (female)
D. Yellow-Headed Blackbird (male)
E. Spotted Towhee (female)

20. List the letter(s) of the specimen(s) that is/are female? **B, C, E**
21. What is the complete common name of specimen D? **Yellow-Headed Blackbird**
22. What is the diet of specimen A? **Frugivore**
23. List the letter(s) of the specimen(s) that forage(s) by ground-gleaning. **B, D, E**

Station 7

A. Western Kingbird
B. Rufous Hummingbird
C. Violet-Green Swallow
D. Northern Shrike
E. Steller's Jay

24. What is the order of the specimen that is NOT a Passeriformes? **Apodiformes**
25. List the letter (s) of the specimen(s) that is/are aerial foragers. **A, B, C, D**
26. What is the complete common name of specimen A? **Western Kingbird**
27. What is the diet of specimen D? **Vertebrates**

Station 8

A. Black-capped Chickadee
B. Red-breasted Nuthatch
C. White-crowned Sparrow
D. Bushtit

28. What is the complete common name of specimen B? **Red-breasted Nuthatch**
29. List the letter of the specimen that has a diet different from the rest. **C**
30. List the letter(s) of the specimen(s) that is/are ground-gleaners. **C**

Station 9

A. Finch
B. Robin
C. Goldfinch
D. Waxwing
E. Northern Oriole

31. List the letter(s) of the specimen(s) that is/are frugivorous. **B, D, E**
32. What is the special characteristic feature on the bill of bird B? **Notched**
33. What is the foot type of this group of birds? **Anisodactyl**

Station 10

A. Northern Harrier
B. American Kestrel
C. Red-tailed Hawk
D. Barn Owl
E. Osprey

34. List the letter of the specimen that belongs to a different order than the rest. **D**
35. What is the complete common name of A? **Northern Harrier**
36. List the letter of the specimen that is specialized for catching fish. **E**

Station 11

Pied-Billed Grebe (juvenile)

37. (Tax key question using the key below) **1B, 5A, 6A, Order E (1 pt)**
38. What foraging style should you expect from this specimen? **Surface diver**
39. What technical term describes this bird's feet? **Lobate**

1A	Feet fully webbed (extends between adjacent toes)	2
1B	Partial webbing on toes, or none	5
2A	Totipalmate; all toes large	**Order A**
2B	Palmate, front 3 toes webbed; 4th toe very small, if present	3
3A	Tarsus flattened, feet very far back on body	**Order B**
3B	Tarsus not flattened, feet not as far back	4
4A	Narrow bill with a toothed or saw-like edge & hooked tip or flattened with a nail at tip	**Order C**
4B	Bill is sharply hooked, or straight & sharply pointed	**Order D**
5A	Webbing present on individual toes, not between toes	6
5B	Semi-palmate; or no webbing	7
6A	Tarsus flattened; short legs; single lobe on each toe	**Order E**
6B	Tarsus not flat; longer legs; toes are multilobed or scalloped	**Order F**
7A	Legs long relative to body size; toes long & slender	8
7B	Legs shorter relative to body size; toes not long & slender	11
8A	Bill long, very stout & horny; bare patch of skin in front of eyes	9
8B	Bill short or long, tapered to a sharp point	10
9A	Middle toe pectinate	**Order G**
9B	Middle toe not pectinate; entire forehead is bare	**Order H**
10A	Bill long & slender, may be straight, recurved or decurved	**Order I**
10B	Bill taller at base than at tip, shorter, stout	**Order J**
11A	Raptorial feet	12
11B	No raptorial feet	13
12A	Naked cere; tarsus usually bare	**Order K**
12B	Cere hidden in feathers; tarsus & toes feathered	**Order L**
13A	Feet chicken-like; claws strong & blunt	14
13B	Feet not chicken-like but may be strong or weak; variously modified	15
14A	Bill conical, decurved & feathered to the nostrils	**Order M**
14B	Bill strongly hooked; head & neck bare of feathers	**Order N**
15A	Feet small & weak relative to body size	16
15B	Feet medium-sized to large relative to body size	19
16A	Outer 2 toes fused along half their length (syndactyl)	**Order O**
16B	Outer 2 toes not syndactyl	17
17A	Nostrils open in soft, swollen cere	**Order P**
17B	Nostrils not as above; feet extremely tiny	18
18A	Extremely small body	**Order Q**
18B	Medium sized body; 3rd toe pectinate; greatly enlarged eyes	**Order R**
19A	Zygodactyl feet	**Order S**
19B	Anisodactyl feet	**Order T**

Station 12

A. Red-Winged Blackbird (male)
B. Rock Dove
C. Crow
D. Starling

40. What technical term describes the group of feathers circled by string, on the spread wing? **Alula**
41. Which of the lettered birds belongs to a different order from the rest? **B**
42. What term describes the fleshy region between the bill and head on specimen B? **Cere**

Station 13

A. Mallard (female)
B. Northern Shoveler (female)
C. Wood Duck (female)
D. Redhead (female)
E. Coot

43. List the letter(s) of the specimen(s) that has/have a speculum. **A, B, C**
44. List the letter(s) of the specimen(s) that is/are NOT herbivorous. **B**
45. What technical term best describes the shape of the bill in specimen B? **Spatulate**
46. What technical term best describes the feet of specimen D? **Palmate**

Station 14

A. Sharp-shinned Hawk
B. Hooded Merganser (female)
C. Pied-bill Grebe
D. Double-crested Cormorant
E. Wood Duck (Male)

47. List the letter(s) of the specimen(s) that may eat vertebrates. **A, B, C, D**
48. What is the complete common name of specimen A? **Sharp-Shinned Hawk**
49. What is the foraging behavior of specimen E? **Dabbler**
50. What is the order of specimen D? **Pelecaniformes**

Station 15

(A) Pronghorn Skull
(B) Moose Skull
(C) White Tailed Deer Skull
(D) Horse Skull
(E) Elk Skull
(F) White Tailed Deer Antlers

51. Name the order to which only one specimen belongs. **Perissodactyla**
52. Give the complete common name of the species represented by F. **White Tailed Deer**
53. List the letter(s) of the specimen(s) that shed **antlers** annually. **B, C, E, F**
54. What is the crown shape of the cheek teeth of specimen C? **Lophodont**

Station 16

A. Rodent skull
B. Lagomorph skull
C. Mountain Goat skull
D. Pig Skull

55. What is the crown **height** of the cheek teeth of specimen D? **Brachyodont**
56. List the letter(s) of the specimen(s) with herbivorous diet(s). **A, B, C**
57. Does specimen C have true horns, horns that are shed annually, or antlers? **True horns**
58. What is the order of specimen B? **Lagomorph**

Station 17

(A) Raccoon Skull
(B) Bobcat Skull
(C) Vagrant Shrew Skull
(D) Little Brown Bat

59. List the letter(s) of the specimen(s) with well-developed carnassials. **B**
60. How many orders are represented at this station? **3**
61. Give the complete common name of specimen D. **Little Brown Bat**
62. List the letter(s) of the specimen(s) that lack an auditory bulla. **C**

Station 18

(A) Red Fox (upper and lower jaw)
(B) Wolf Skull
(C) Black Bear Skull
(D) Virginia Opossum Skull
(E) Northern River Otter Skull
(F) Northern Raccoon

63. Give the complete dental formula for specimen A. **3/3 1/1 4/4 2/3**
64. Name the foraging method that is unique to only one species present. **Aquatic**
65. Name the ORDER of the specimen that is NOT in the order Carnivora. **Didelphimorpha**
66. List the letter(s) of the specimen(s) that is/are omnivores. **C, D, F**

Station 19

(A) Porpoise Skull
(B) Baleen
(C) Harbor Seal Skull
(D) Northern Fur Seal Skull
(E) Walrus Skull

67. Are the tusks of specimen E *incisors, canines, premolars, or molars*? **Canines**
68. What is the complete common name of specimen D? **Northern Fur Seal**
69. What is the suborder of specimen A? **Odontocete**
70. How many orders are represented here? **2**

Station 20

(A) North American Porcupine (X on the IOC)
(B) American Beaver
(C) Ord's Kangaroo Rat
(D) Douglas Squirrel
(E) American Pika

71. List the letter(s) of the specimen(s) that is/are granivores **C, D**
72. List the letter(s) of the specimen(s) that is/are arboreal foragers. **A, D**
73. What is the complete common name of specimen E? **American Pika**
74. Name the opening between the green arrows labeled in specimen A. Be specific. **Infraorbital foramen OR canal**

Station 21:

A. Hoary Bat
B. Townsend's Vole
C. Pallid Bat
D. Silver-haired bat
E. Northern Grasshopper mouse
F. American Kestrel

75) What order does specimen A belong to? **Chiroptera**
76) What is the common name of specimen D? **Silver-haired Bat**
77) List the letter(s) of the animal(s) whose diet include(s) vertebrates. **C, E and F**
78) How many orders are represented at this station? **3**

Station 22:

A. Cascade Golden-Mantled Ground Squirrel skin
B. Vagrant Shrew skin
C. Northern Grasshopper Mouse skin
D. American Pika skin
X. Shrew skull

79) What is the complete common name of specimen A? **Cascade Golden-Mantled Ground Squirrel**
80) Give the letter of the skin that is the same order as skull X. **B**
81) How many orders are represented at this station? **3**
82) List the letter(s) of the herbivore(s). **D**

Station 23:

A. Bushy-tailed Woodrat skin
B. Mountain Beaver skin
C. Muskrat skin
D. Raccoon skin

83) What is the order of specimen C? **Rodentia**
84) What is the complete common name of specimen B? **Mountain Beaver**
85) List the letter(s) of the specimen(s) that has/have an omnivorous diet. **A, D**
86) What is the foraging behavior of specimen C? **Aquatic**

Station 24:

A. Red fox skin
B. Coyote Skin
C. Bobcat skin
X. Coyote Skull

87) List the letter of the skin specimen that belongs to skull specimen X. **B**
88) What is the complete common name of specimen C? **Bobcat**
89) How do specimens A-C walk? **Digitigrade**

Station 25:

A. Great Basin Pocket Mouse
B. Townsend's Mole
C. Ord's Kangaroo Rat
D. Northern Pocket Gopher
E. California Quail (Male)

90) Give the letter(s) of the specimen(s) with external cheek pouches. **A, C, D**
91) What is the complete common name of A? **Great Basin Pocket Mouse**
92) List the letter(s) of the fossorial forager(s). **B, D**
93) List the letter of the **mammal** that is in an order unique from the others. **B**

Station 26:

A. Mountain Goat
B. Nine-banded Armadillo
C. Virginia Opossum
D. Snowshoe Hare
E. Mink

94) Give the order of specimen B: **Cingulata**
95) List the letter(s) of the specimen(s) that is/are terrestrial herbivores. **A, D**
96) List the letter(s) of the specimen(s) with a different colored winter coat. **D**
97) Name the chemical substance that covers the bony plates of specimen B. **Keratin**

Station 27: KEY QUESTION: SHORT-TAILED WEASEL (2 PT)

98) Use the key to identify the species of the specimen at this station. Write out the steps and the specimen letter:

1B, 2A, 3B, 4B, 6B, 9B, 10B, 12B, 13B, 14B, 15A, SPECIMEN M

1A	Toes on all feet with hooves; 2 or 4 pairs of digits	**Specimen A**
1B	Toes on all/most feet with claws	2
2A	Canine teeth in upper jaws large & conspicuous	3
2B	Canines absent	**ORDER X**
3A	Tail short, less than length of hind foot	**Specimen B**
3B	Tail longer than hind foot	4
4A	Dog-like, long rostrum; erect, pointed ears; tail bushy; foot posture digitigrade	5
4B	Never with above combination of characters	6
5A	Fur often reddish-black; tail tip may be white	**Specimen C**
5B	Fur grayish-tan; tail tip not white	**Specimen D**
6A	Ears tapered or rounded; rostrum very short & catlike; tail not bushy	7
6B	Ears pointed or rounded; rostrum not catlike; tail usually bushy, if not, ears very short & round	9
7A	Tail 2-3' in length	**Specimen D**
7B	Tail < 1' in length	8
8A	Ears have long black tufts; tail is 3-5" long, not banded; fur is relatively long & soft	**Specimen E**
8B	Ears may have short tufts; tail is 5-7" & may be banded; fur is shorter, coarser & spotted	**Specimen F**
9A	Tail with alternating light & dark rings or bands; foot posture plantigrade	**Specimen G**
9B	Tail without alternating light and dark rings or bands; foot posture digitigrade	10
10A	Dorsal color of black & white bands, spots or stripes	11
10B	Dorsal color not black & white; if white, nearly all white with black tail tip	12
11A	Back with ≥ 4 lines of broken white stripes or spots	**Specimen H**
11B	Back with ≤ 4 lines of broken white stripes or spots	**Specimen I**
12A	Toes webbed; thick, round tail, tapers to a point	**Specimen J**
12B	Toes not webbed; tail not round or if round, not thick or tapering	13
13A	Body stout; white stripe on forehead; fore claws 30 mm or longer	**Specimen K**
13B	Body slender; no white stripe on head; fore claws < 20 mm	14
14A	Color uniformly medium-dark brown; tail, face & feet not distinctly colored	**Specimen L**
14B	Color is not uniform; belly fur is lighter color; face & tail marked with black	15
15A	Belly creamy with lemon yellow highlights in summer; tail length < 40% of body	**Specimen M**
15B	Belly buffy - orange in summer; tail length >. 40% of body	**Specimen N**
16A	Bony armor on body; sparsely furred	**Specimen O**
16B	Body lacks bony armor; heavily furred body	17
17A	Ear densely furred; tail very short with long, fluffy hairs, or absent	18
17B	Ear thin & not densely covered with short hairs; tail not as above, usually	**Specimen P**
18A	Tail not visible externally; ear short and rounded (length ~ width similar)	**Specimen Q**
18B	Tail short & fluffy; ear length 2X > width	**Specimen R**

Station 28:

Who am I (give the complete common name of the animals described below):

99) I forage aquatically, there is a large space between my front teeth & my prism-shaped grinding teeth. Who am I?
Common Muskrat

Station 29: Taxonomic Key Question (Wolverine) (2 PT)

100. Key out the available skull using the key below. As you have done before, list all steps AND the final Specimen.
1B, 2B, 5A, 6B, 8B, 9B, 10B, 11B, 14B, 16B, 18A, 19A, SPECIMEN Q

1A	Teeth absent, rows of baleen in palate instead of teeth	**Specimen A**
1B	Teeth present; no baleen	2
2A	Teeth homodont, not differentiated (not even enlarged canines)	3
2B	Teeth heterodont (differentiated into 2 or more types)	5
3A	Nasal bones telescoped posteriorly; external nares directed vertically upward	4
3B	Nasal bones in normal position over top of rostrum; external nares at tip of rostrum & directed forward	**Specimen B**
4A	Teeth few or many; teeth usually conical & extend to tip of jaw	**Specimen C**
4B	Teeth numerous but rarely > 6 in either jaw at 1 time, squarish in shape	**Specimen D**
5A	No conspicuous gap between the teeth in the front & back of the jaws	6
5B	Wide diastema present between the teeth in the front & back of jaws	23
6A	Canine teeth not larger than any of the teeth preceding them	7
6B	Canine teeth much larger and longer than any of the preceding teeth	8
7A	Teeth pigmented; zygomatic arch absent; tympanum ring like, no tympanic bulla	**Specimen E**
7B	Teeth unpigmented; zygomatic arch present; tympanic bulla present.	**Specimen F**
8A	Incisors 5/4, 50 teeth total	**Specimen G**
8B	Incisors never more than 3/3, teeth never exceeding 44 total	9
9A	Canine teeth triangular in cross-section; lambdoidal and sagittal crests form a high T-shaped ridge; jaw teeth bunodont	**Specimen H**
9B	Canine teeth round, oval or laterally compressed; occipital crests less prominent & not as T-shaped; jaw teeth various	10
10A	Cheek teeth usually with high-pointed cusps that are united to form a W-shape; incisors never > 2 above	**Specimen I**
10B	Cheek teeth shearing, grasping or grinding, never with sharp W-shaped cusps; incisors 1-3 above	11
11A	Cheek teeth simple & all very much alike, either simple cones, cones with accessory cusps, or rounded	12
11B	Cheek teeth more variable with multiple cusps on premolars & molars	14
12A	Cheek teeth with small accessory cusps in a single plane	**Specimen J**
12B	Cheek teeth simple, 1 cusp or peg-like	13
13A	Upper incisors are transversely grooved along tips; upper canines not tusk-like	**Specimen K**
13B	Upper incisors small, not transversely grooved; upper canines large, tusk-like	**Specimen L**
14A	Carnassial pair is greatly reduced, not shearing teeth	15
14B	Large carnassial pair of shearing teeth present	16
15A	Cheek teeth flattened; last upper molar long, rectangular; long rostrum	**Specimen M**
15B	Cheek teeth small, nearly triangular or square shaped; short rostrum	**Specimen N**
16A	Last upper molar is greatly reduced, tiny	17
16B	Last upper molar is not a tiny remnant	18
17A	Dental formula: I 3/3, C 1/1 P 3/2, M 1/1; total of 30 teeth	**Specimen O**
17B	Dental formula: I3/3, C 1/1, P 2/2, M 1/1; total of 28 teeth	**Specimen P**
18A	Short rostrum; 32-38 teeth	19
18B	Long rostrum; 38-50 teeth	22
19A	Total of 38 teeth; palate extending beyond lost molar; heavy sagittal crest extends posteriorly beyond occipital condyles	**Specimen Q**
19B	Total < 38 teeth; palate various; sagittal crest doesn't extend past occipital condyles	20
20A	Tooth total = 36; rostrum as wide or wider than long; postorbital region very constricted; last upper molar is rounded	**Specimen R**
20B	Total < 36 teeth; post-orbital region only moderately constricted or not at all	21
21A	Last upper molar ~ 2X as wide as long, outline dumbbell-shaped; auditory bullae ~ twice as long as wide & smoothly rounded	**Specimen R**
21B	Last upper molar squarish, with the inner edge rounded; auditory bullae are small & round	**Specimen S**
22A	Postorbital processes of frontal thin & depressed or concave above; sagittal crest runs in a V-shaped line	**Specimen T**
22B	Postorbital processes of frontal thick & convex above; sagittal crest at midline of skull only	**Specimen U**
23A	Incisors 1/1 or 2/1 (2nd upper incisor tiny & set behind 1st); 1st upper incisor enlarged, ever-growing	24
23B	Incisor number variable to absent; 1st upper incisor if present, not enlarged, not ever-growing	25
24A	Incisors 2/1; maxillary fenestration(s) present	**Specimen V**
24B	Incisors 1/1; no maxillary fenestration	**Specimen W**
25A	Cheek teeth large, rectangular in shape, lophodont; large incisors 3/3	**Specimen X**
25B	Cheek teeth selenodont; upper incisors absent	**Specimen Y**

Prairie Dog Skull

BONUS A: What is the complete common name of the species seen in lab, that is the closest relative to this skull? **Yellow-bellied Marmot or any of the squirrels OK**

Skins:

A. P. truei (deer mouse)
B. Sagebrush vole
C. House mouse
D. Red-backed vole
E. P. maniculatus (another deer mouse)
F. Shrew (unknown species)
G. Large Townsend's vole
H. Great Basin Pocket Mouse

BONUS B: List the letter(s) of the specimen(s) that is/are voles. **B, D, G**

Skulls:

A. Pelican
B. Albatross
C. Flamingo
D. Crested Screamer
E. Tern
F. Great Horned Owl

BONUS C: List the letter(s) of the specimen(s) that do NOT eat vertebrates. **C, D**

Skins:

A. Ibis
B. Cinnamon Teal
C. Golden-crowned Kinglet
D. Rhea chick
E. Parakeet

BONUS D: Place the letters of these birds in order following the currently hypothesized phylogeny of birds from most primitive to most derived. **D, B, A, E, C**