TEACHING KATE
TEACHING KIDS ABOUT THE ENVIRONMENT

CLASSIFICATION

Grade Level: 6 **Time Required: 1 class period**

SC Science Standards

This lesson plan was correlated with only the grade level specified unless otherwise noted.

I. A. 1. a
I. A. 1. b. 1, 2
I. A. 1. d. 1

Purpose

Students will learn about the system of classification by classifying themselves. They will discuss the process used and other options available. Students will give examples of and tell the importance of classifications. Students will learn to use a dichotomous key and apply this knowledge in order to determine different classes of fish, trees or salamanders. Students will define certain elements that determine specific classification differences and understand the process used to identify the topic of their choice.

Skills

Analyzing, classification, comparing and contrasting, discussion, identifying, interpretation, listening, measuring and estimating, observation, problem solving, partner work, reading, verifying, writing.

Concepts

Understanding of classification system, utilization of dichotomous key, identification of differing characteristics, problem solving in a group.

Materials Needed

paper
answer keys
fish classification key
individual fish pictures
actual leaves (identified)
pencils
salamander classification key
individual salamander pictures
tree classification key
5 different cut-outs of different colors (and or numbers) 1 per student (ex. green, blue, orange, yellow, pink hearts)
overhead transparencies of teacher's choice to use to model keys
South Carolina Fresh Water Fishes Poster

Definition of Terms

See *Leaf and Twig Characteristics* page

See *Description of Terms for Trees*

See *Parts of the Typical Freshwater Fish* illustration

Classification — Groups or categories systematically arranged according to established criteria.

Dichotomous Key — Identification key based on a series of choices between alternative characteristics.

Before the Session

Make different shapes with different colored paper and number them in order to create as many possible ways to classify them. Cut out individual salamander and fish pictures and collect various leaves that are accessible to the students. Identify trees and have an answer key for the fish and salamander names. Provide research materials and references for further discussion and learning opportunities. Read PROCEDURE FOR USING THE DICHOTOMOUS KEY.

Background Information

All plants and animals are classified by a group of characteristics specific to an individual species. Using these unique groupings of characteristics dichotomous keys were created. Dichotomous keys may range from very simple to complex depending on the number of characteristics

needed to segregate individual species for classification. The teacher will provide guidance and a mini-lesson about the use of the keys and model accordingly. When discussing characteristics, it should be stressed that good characteristics are those which are always true. For example if students separate themselves by characteristics such as those who wear glasses and those who do not, glasses are not permanent; they may be removed. The same is true of wearing watches or skirt versus pants. These things are impermanent and not good choices. Another example is if a student had two leaves and they were the same but one had a tear- is that a good way to classify? Only if your are trying to tell the individual leaves apart and not the species. Students need not know a lot of details on any one subject of choice.

Suggested Lesson Plan

1. Pass out the colored/numbered shapes and tell the students to form "groups." All students must be classified in the same manner regardless of how they choose to classify.

2. If students go too long without coming to an agreement, call the class to order and discuss what happened. This also will lead to a class discussion of the importance of consistent and specific classifications.

3. Formed groups must list X number of things that can be classified and/or why these things are classified that way and/or examples of the different specific classes.

4. Teacher will model the process for identifying a salamander by randomly picking a picture of one of the choices. Each step will be addressed and each of the following steps will be continued as directed in the key. Students will play an active role in the deciding factors and determining to which numbers to go.

5. When students have a sufficient grasp of the classification process, they can each choose which item they wish to classify based on their own interests. Teacher can offer suggestions as to the easier or harder key depending on the child and the challenge.

6. Students will write down the process they used to identify their choice. They will reflect upon the activity. They can also classify something and list different examples based upon the teacher's specific evaluation techniques.

7. Students will exchange pictures and their answer with someone in their group. That student will see if their partner's classification was accurate or if it is debatable and must justify any ideas - supportive or otherwise. This can also be used for evaluation and reflection topics.

8. Students can display their correct specimens and their classification.

Application

Students will always be subjected to classifications in life, be it grocery store arrangement or prejudice based on stereotypical ideas. It is useful to be able to recognize likeness and differences in all different situations. Classification is useful in order, filing and many other things besides scientific determinations. Classification is a way of identifying species. Using a dichotomous key during a walk through the woods someone who is not familiar with the flora could determine that it is not safe to touch poison oak with 3 leaves per stem but that it is safe to eat the berries off a blackberry or wild strawberry with 3 leaves. Those unfamiliar with the fauna could learn whether that tri-colored snake they almost stepped upon is a king snake or a coral snake.

Extension

Students may bring a live salamander to class for identification. They could go fishing to obtain the fish. Allow the students to walk on the playground to find leaves. Give the students keys for identifying trees or flowers. Take them on a field trip to a nearby area which contains trees and/or wildflowers, divide the students into groups and let them attempt to identify some of the species found. Give the students a chance to use the keys individually by having them make a collection of plants or insects. Let them utilize their new skill in creative writing. On a rainy day students could classify buttons or dried beans. Other ways to enhance the lesson plan are a discussion of necessary environments; study the specific findings; debate classification; read fish, salamander or tree stories; and make-up a classification key. A social studies link could be forged by a discussion of people and stereotypes.

Resources Available

Familiar Trees of South Carolina. Kessler and Schoenike. (Which also lists various other tree resources such as Trees of North America, The Book of Trees and others.)

Prentice-Hall Biology Laboratory Manual. 1993. Prentice-Hall Inc.

South Carolina Fresh Water Fishes. 1991. Woodward and Donovan. Science Education Center, University of South Carolina- Spartanburg.

Prepared by: Tamara Pendleton

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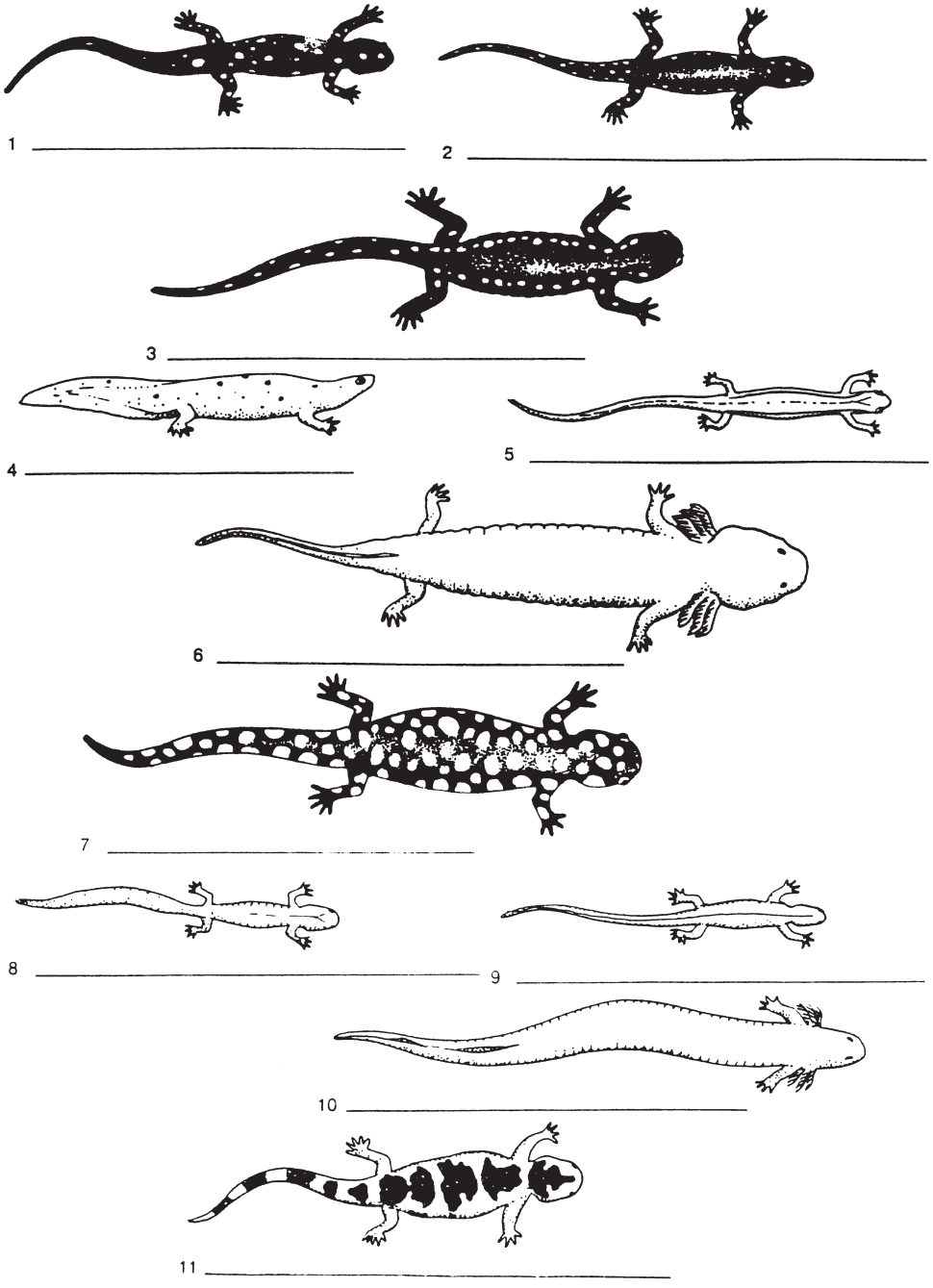
CLASSIFICATION

USING A CLASSIFICATION KEY - TYPES OF SALAMANDERS



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CLASSIFICATION

CLASSIFICATION KEY TO CERTAIN SALAMANDERS

1. Hind limbs absent	Siren
1. Hind limbs present	2
2. External gills present in adults	Mud Puppy
2. External gills absent in adults	3
3. Large size (over 7 cm long in figure 3-2)	4
3. Small size (under 7 cm long in figure 3-2)	5
4. Body background black, large white spots irregular in size and shape completely covering body and tail	Tiger Salamander
4. Body background black, small round white spots in a row along each side from eye to tip of tail	Spotted Salamander
5. Body background black with white spots	6
5. Body background light color with dark spots and/or lines on body	7
6. Small white spots on a black background in a row along each side from head to tip of tail	Jefferson Salamander
6. Small white spots scattered throughout a black background from head to tip of tail	Slimy Salamander
7. Large irregular black spots on a light background extending from head to tip of tail	Marbled Salamander
7. No large irregular black spots on a light background	8
8. Round spots scattered along back and sides of body, tail flattened like a tadpole	Newt
8. Without round spots and tail not flattened like a tadpole	9
9. Two dark lines bordering a broad light middorsal stripe with a narrow median dark line extending from the head onto the tail	Two-lined Salamander
9. Without two dark lines running the length of the body	10
10. A light stripe running the length of the body and bordered by dark pigment extending downward on the sides	Red-backed Salamander
10. A light stripe extending the length of the body, a marked constriction at the base of the tail	Four-toed Salamander

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CLASSIFICATION

GLOSSARY OF TREE TERMINOLOGY

Description of Terms

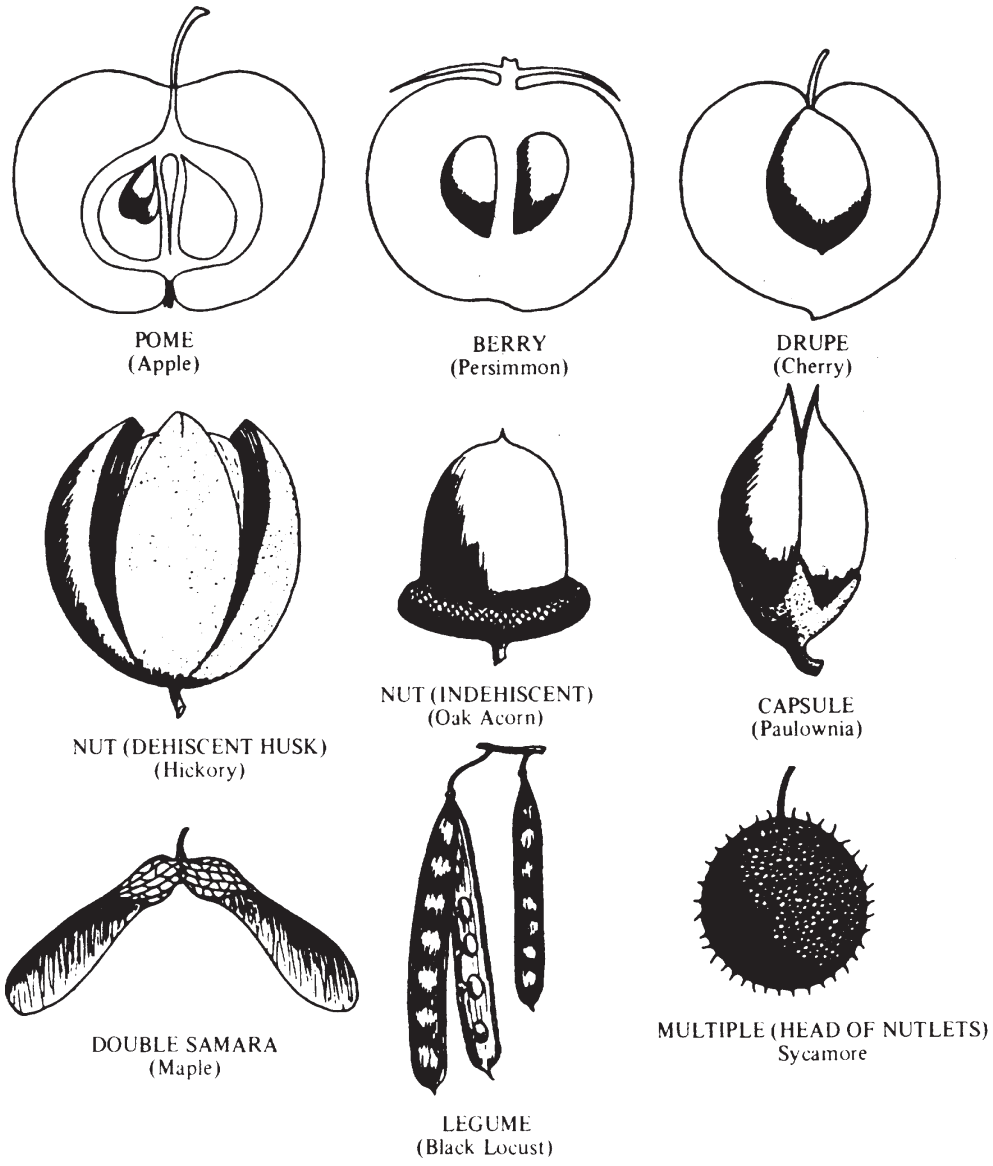
alternate	leaves arranged singly at intervals along the stems
aromatic	with a pleasant spicy odor
apex	the tip or distal end of a leaf
blade (lamina)	the flat or expanded part of a leaf
bract	a small leaf or leaf-like structure beneath a flower or flower cluster
bristle	stiff, strong hair
bud scale	a small modified leaf on the outside of a bud
bud scale scar	the scar left on a twig when a bud scale falls
bundle scar	dot-like scars within a leaf scar, representing the broken ends of ducts which led into the leafstalk
chambered	a pith divided into empty compartments by cross partitions
compound	a type of leaf that has three or more leaflets attached to a common stalk
deciduous	trees on which all leaves fall at the end of every season of growth
dehiscent	the opening by slits or valves of an outer fruit covering
fascicle	a bundle or dense cluster of leaves
falcate	sickle- or scythe-shaped
fruit	the seed-bearing portion of a plant
berry	a simple fleshy fruit, with seeds embedded in a pulpy mass (persimmon)
capsule	a dry fruit which splits open into two or more parts at maturity (sourwood)
drupe	a one-seeded fleshy fruit With the seed enclosed in a stony wall (cherry, sugarberry, holly)
follicle	a dry fruit with one seam in the outer wall
legume	a dry fruit with two seams in the outer wall (black locust)
multiple	a fruit formed from several flowers into a single structure having a common axis
	multiple of follicles - magnolia
	multiple of samaras - yellow-poplar, ash
	multiple of capsules - sweetgum
	multiple of nutlets - sycamore, birch
nut	a hard-shelled dry fruit, sometimes with a husk (hickory, oak acorn, black walnut)
nutlet	a small nut

CLASSIFICATION

GLOSSARY OF TREE TERMINOLOGY - CONTINUED

pome — a fleshy fruit, with seeds encased by a papery wall (apple)
samara — a winged, one-cell, one-seeded, dry fruit (elm, double samara-maple)

TYPES OF FRUIT



CLASSIFICATION

GLOSSARY OF TREE TERMINOLOGY - CONTINUED

globose	spherical
husk	outer covering of a nut
indehiscent	an outer fruit covering that does not open by slits or valves
internode	the part of a twig between two nodes
lateral bud	a bud that is situated along the sides of a branch and not at the tip
leaf	a lateral outgrowth from the stem whose primary function is the manufacturing of food
leaf margin	the border or edge of a leaf
crenate	a leaf margin that has rounded teeth
dentate	a leaf margin that has pointed teeth that are directed outward
entire	a leaf margin that is smooth without teeth or lobes
lobed	a segmented leaf having pointed or rounded extensions separated by sinuses that do not extend more than halfway to the midrib
parted	a leaf margin where the sinuses extend almost to the midrib
serrate	a leaf margin that has pointed teeth that are directed upward
serrate, doubly	a serrate leaf margin where the primary teeth support another set of teeth
undulate	a leaf margin that is wavy
leaf scar	the scar left on a twig when a leaf falls
leaflet	an individual blade of a compound leaf
lenticel	a corky spot on the bark which originally permitted air to enter the twig
midrib	the central or main vein of a leaf
node	the place on a twig where a leaf is attached
opposite	leaves occurring in pairs at the nodes
palmate	veins or lobes of a leaf radiating from a central point
pendant	hanging or drooping
persistent	remaining attached for long periods of time
petiole	stalk of a leaf
pinnate	arrangement of leaflets attached laterally along the rachis of a compound leaf
pith	central, usually soft portion of a twig
rachis	the midrib of a compound leaf
sessile	without a stalk, “sitting” on the stem
sinus	the space or indentation between the lobes of a leaf blade
spine	a sharp-pointed, rigid, thorn-like structure
terminal bud	a bud that is at the tip of a stem or branch
truncate	abruptly cut off
whorled	leaves occurring three or more at a single node

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CLASSIFICATION

LEAF KEY TO COMMON TREES OF SOUTH CAROLINA

1. Trees with needlelike or scalelike leaves (conifers)	2
1. Trees with broad flat leaves of many shapes and patterns (broadleaves)	11
2. Leaves needlelike	3
2. Leaves scalelike, sometimes prickly on young trees	Eastern red cedar
3. Leaves in bundles or clusters (fascicles) of 5 or fewer (pines)	4
3. Leaves not in bundles or clusters	10
4. Leaves in bundles of 5	Eastern white pine
4. Leaves in bundles of 2 or 3	5
5. Leaves in bundles of 2	6
5. Leaves in bundles of 3 or of 2 and 3	7
6. Leaves twisted, mostly 2 inches long or shorter	Virginia pine
6. Leaves not twisted, mostly more than 2 inches long	Spruce pine
7. Leaves in bundles of 2 and 3	8
7. Leaves in bundles of 3	9
8. Leaves short (2-4 inches), cone small (2-3 inches)	Shortleaf pine
8. Leaves long (6-10 inches), cone large (4-6 inches)	Slash pine
9. Leaves very long (10-14 inches), cone very large (8-10 inches)	Longleaf pine
9. Leaves 5-9 inches long, cones 4-6 inches	Loblolly pine
10. Leaves flattened, evergreen, white on underside	Eastern hemlock
10. Leaves fernlike, deciduous, green on both sides	Baldcypress
11. Leaves fan-shaped, 2 or more feet across	Cabbage palmetto
11. Leaves otherwise	12
12. Leaves opposite or whorled	13
12. Leaves alternate	17
13. Leaves in whorls of 3	Southern catalpa
13. Leaves opposite in pairs	14
14. Leaves compound	15
14. Leaves simple	16
15. Leaflets 3-5, margins with coarse large teeth or shallowly lobed	Boxelder
15. Leaflets 5-9, margins smooth or with fine serrate teeth	White ash
16. Leaves 3-5 lobed, margins doubly serrate	Red maple
16. Leaves unlobed, margins smooth	Flowering dogwood

CLASSIFICATION

LEAF KEY TO COMMON TREES OF SOUTH CAROLINA - CONTINUED

17. Leaves compound	18
17. Leaves simple	23
18. Twigs with thorns, spines, or prickles	19
18. Twigs without thorns, spines, or prickles	20
19. Twigs with long thorns, leaves twice compound	Honeylocust
19. Twigs with short spines, leaves once compound	Black locust
20. Leaves with terminal leaflets larger than lateral leaflets, twigs with solid pith	21
20. Leaves with terminal leaflets same size as lateral leaflets, twigs with chambered pith	Black walnut
21. Leaflets 5-9, leaflets, petiole, and rachis densely hairy	Mockernut hickory
21. Leaflets 3-7, leaflets, petiole, and rachis smooth or nearly so	22
22. Bark shaggy, peeling in long strips	Shagbark hickory
22. Bark tightly furrowed, not peeling	Pignut hickory
23. Leaves evergreen, thick and leathery	24
23. Leaves deciduous, thin and papery	27
24. Leaves with spine-toothed margins	American holly
24. Leaves with smooth margins	25
25. Leaves large, over 6 inches long, with rusty hairs beneath	Southern magnolia
25. Leaves small, 2-5 inches long, without hairs	26
26. Leaves densely white beneath, without lobes	Sweetbay
26. Leaves greenish or slightly white beneath, occasionally with lobes	Live oak
27. Leaves lobed	28
27. Leaves unlobed or with occasional small shallow lobes	41
28. Leaves with 3 shapes (unlobed, lobed, 3-lobed)	29
28. Leaves with one basic shape	30
29. Leaves with smooth margins	Sassafras
29. Leaves with serrate margins	Red mulberry
30. Leaves star-shaped, with 5 to 7 lobes	Sweetgum
30. Leaves not star-shaped	31
31. Tip and base of leaves truncate, shallowly 4-lobed	Yellow-poplar
31. Leaves not truncated	32
32. Leaves with 3 or more main veins, margins with large coarse teeth	American sycamore
32. Leaves with 1 vein, margins deeply lobed (oaks)	33
33. Leaves with smooth, rounded lobes (white oaks)	34
33. Leaves with bristly tipped lobes (red oaks)	36

CLASSIFICATION

LEAF KEY TO COMMON TREES OF SOUTH CAROLINA - CONTINUED

34. Lobes similar with sinuses halfway to midrib	White oak
34. Lobes uneven with varying depths of sinus	35
35. Three upper lobes square, forming a cross, deep central sinus	Post oak
35. Three upper lobes pointed, shallow, central sinus	Overcup oak
36. Base of leaves bell-shaped, 3-5 leaflets with terminal lobe long and narrow	Southern red oak
36. Base of leaves tapering or rounded with terminal lobe and lateral lobes of same size	37
37. Base of leaves strongly tapering	Turkey oak
37. Base of leaves rounded or shallowly tapering	38
38. Base of leaves rounded, shallowly 3-lobed, with minute bristles at tip of lobes	Blackjack oak
38. Base of leaves shallowly tapering with 5 to 7 lobes	39
39. Leaves leathery, hairy beneath	Black oak
39. Leaves papery, without hairs beneath	40
40. Lobes large, sinuses shallow, narrow	Northern red oak
40. Lobes small, sinuses deep, wide	Scarlet oak
41. Leaves with smooth margins (oroccasionally with shallow teeth)	41
41. Leaves with toothed margins	48
42. Leaves heart-shaped	Eastern redbud
42. Leaves not heart-shaped	43
43. Leaves deciduous, but stay on the tree through the winter, less than 4 inches long	44
43. Leaves deciduous and fall off the tree before winter, 4-10 inches long	45
44. Leaves with occasional lobes and teeth, having a long tapering base	Water oak
44. Leaves with wavy margins, occasionally with teeth, having a rounded base	Laurel oak
45. Leaves 3 or more times as long as wide	Willow oak
45. Leaves less than 3 times as long as wide	46
46. Leaves 6-10 inches long, with occasional large shallow teeth	Water tupelo
46. Leaves 4-6 inches long, without teeth	47
47. Leaves widest in upper half	Black tupelo
47. Leaves widest at middle or in lower half	Common persimmon
48. Leaves with small teeth above the middle, smooth margins below	Sourwood
48. Leaf margins toothed throughout	49

CLASSIFICATION

LEAF KEY TO COMMON TREES OF SOUTH CAROLINA - CONTINUED

49. Leaves with parallel veins, each vein ending in a tooth	50
49. Leaves with net veins, not ending in a tooth	56
50. Leaf margins with singly serrate teeth	51
50. Leaf margins with doubly serrate teeth	53
51. Leaves with rounded teeth	52
51. Leaves with sharp points or bristles on the teeth	American beech
52. Leaves downy beneath, petioles yellow	Swamp chestnut oak
52. Leaves smooth beneath, petioles green	Chestnut oak
53. Leaves that have bases with unequal sides (elms)	54
53. Leaves with symmetrical bases	55
54. Leaves 1 to 3 inches long	Winged elm
54. Leaves longer than 3 inches	American elm
55. Leaf bases broadly wedge-shaped	River birch
55. Leaf bases rounded or tapered	American hornbeam
56. Leaves 4 or more times as long as wide	Black willow
56. Leaves not more than twice as long as wide	57
57. Leaves heart-shaped, white beneath	White basswood
57. Leaves not heart-shaped, green beneath	58
58. Midvein paralleled by two prominent lateral veins from leaf base	Sugarberry
58. Midvein distinct, often with rusty hairs beneath	Black cherry

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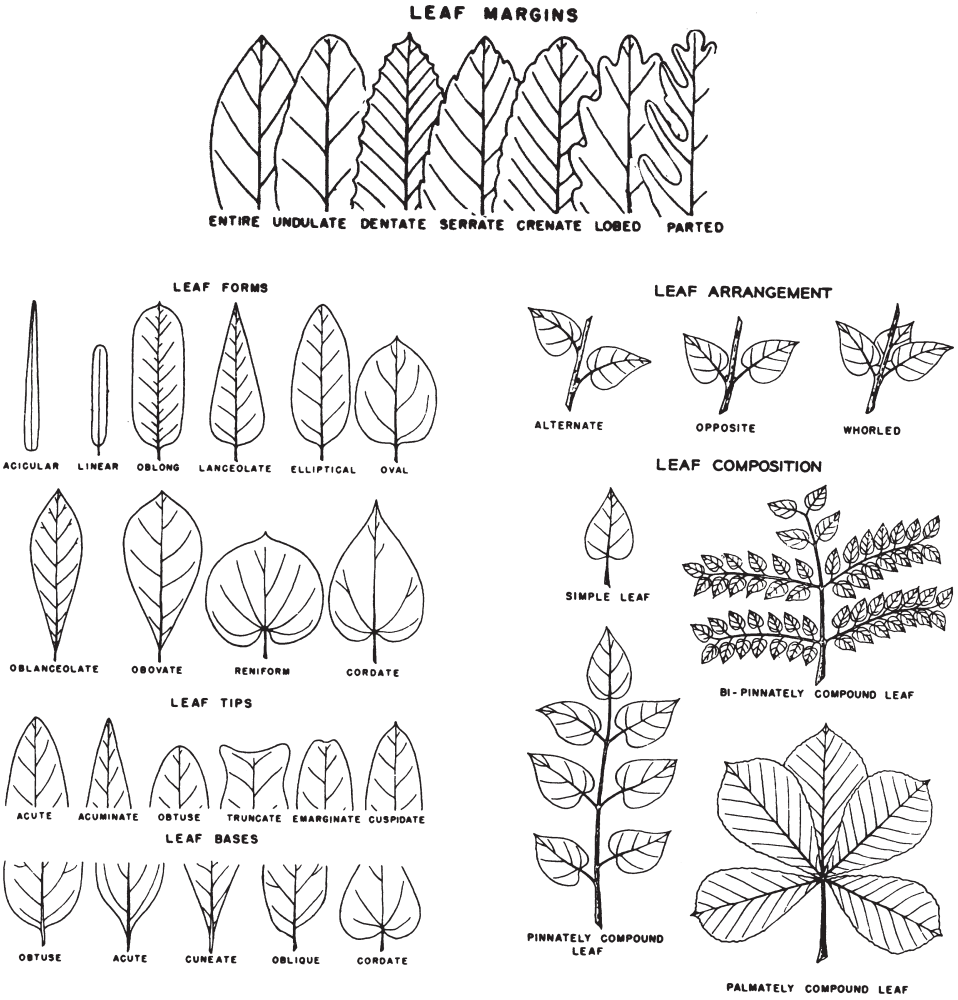
LEAF SHAPES AND ARRANGEMENTS



Acknowledgments

The outstanding drawings of leaf, twig, bud, fruit, and flower characteristics were drawn by William Carey Grimm. Permission to use these illustrations was kindly granted by Mr. Grimm and by the Stackpole Company, Harrisburg, PA, publishers of The Book of Trees, written and illustrated by Mr. Grimm.

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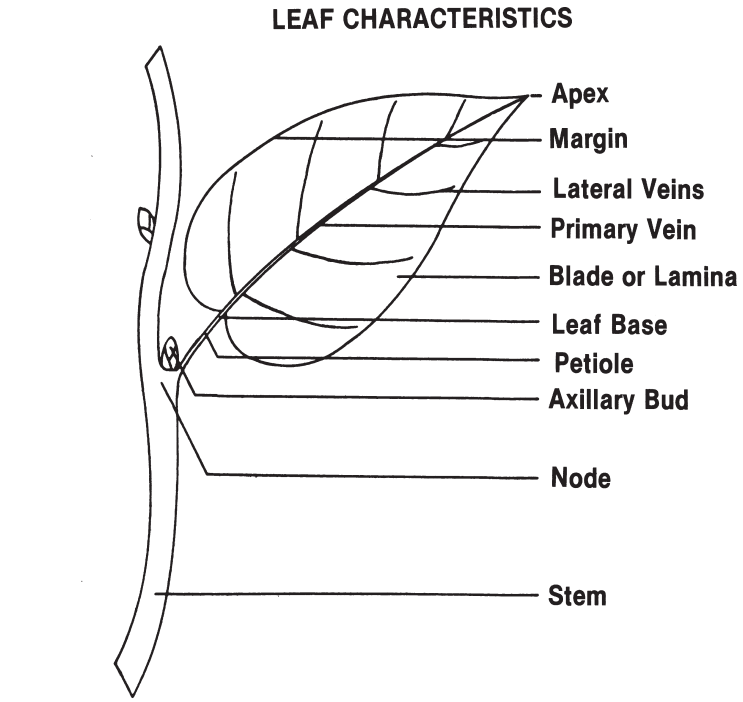
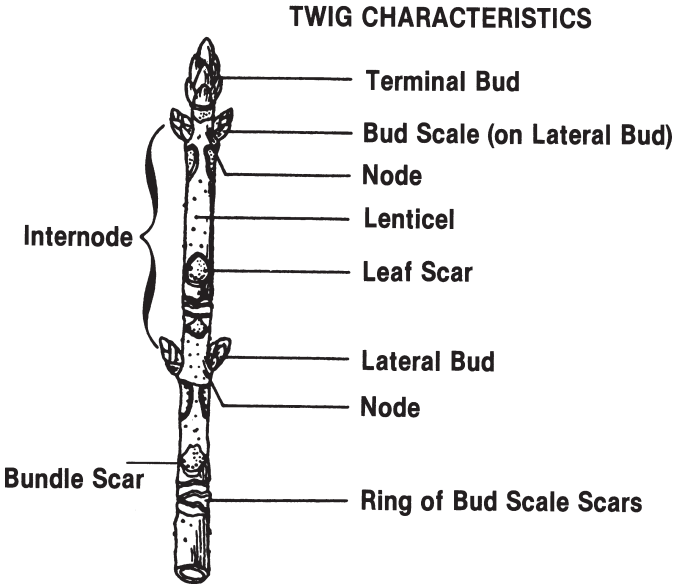
CLASSIFICATION

LEAF AND TWIG CHARACTERISTICS





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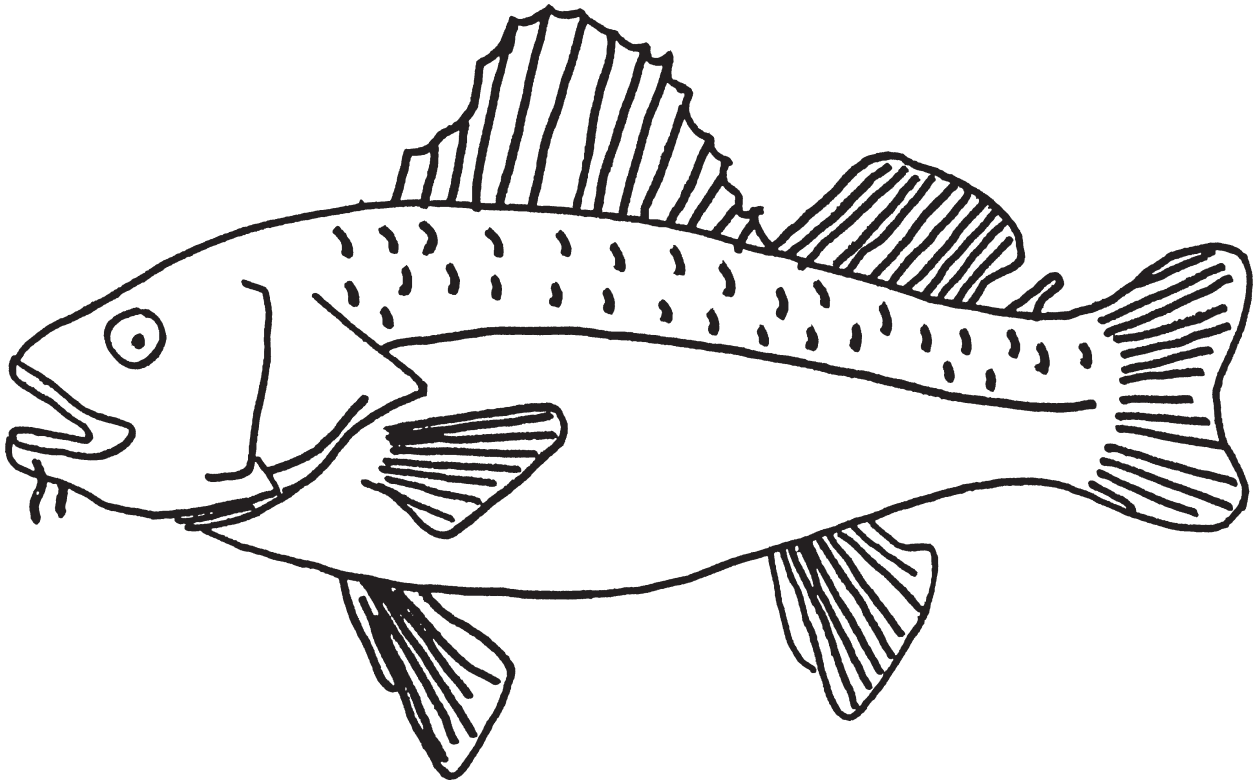
CLASSIFICATION

DIAGRAM OF TYPICAL FISH



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CLASSIFICATION

PROCEDURE FOR USING THE DICHOTOMOUS KEY WITH SOUTH CAROLINA FRESHWATER FISHES POSTER

1. Look over the key fish structures above.

2. Examine the attached diagram of the typical freshwater fish which has the major structures labeled.

3. Closely examine one of the numbered pictures of fish on the Freshwater Fish of South Carolina booklet.

4. Using your identification key, read both statements given under #1 of the key.

5. Decide which of these choices (characteristics) most closely describes your fish. It is important to note that the first characteristic stated is usually the most important one, with the second one next in importance, etc.

6. After you have selected the choice that best describes your fish, follow the statement all the way over to the right and read the new number given or the name of the fish.

7. If you find a fish name, then you have identified the fish.

8. If you see a number, go to the left side of key until you find that number.

9. Now read the next two choices.

10. Keep on following the numbers given on the right because they lead you to the numbers on the left. When you see the name of a fish at the end of the choice, you have identified the fish. You might want to check with your teacher to see if your identification is correct.

11. You might want to practice using the key to identify some of the fish. The teacher and class might work a few of the fish through the key together until the students understand.

12. See the example below for a more detailed explanation. This involves the actual identification of one of the fish.

CLASSIFICATION

PROCEDURE FOR USING THE DICHOTOMOUS KEY WITH SOUTH CAROLINA FRESHWATER FISHES POSTER - CONTINUED

EXAMPLE:

1. Select one of the two keys. Suppose you select the key developed by Holland and Donovan (KEY #2).

2. Take your "Freshwater Fish of South Carolina Booklet" and find fish #11.

3. Now look at the Holland & Donovan Key (#2).

4. Beginning with #1 on the key (on the left side) read both statements. This fish is obviously not elongated or snake-like. Therefore, we select this choice and look at the number to the right of the statement. You will see the #2.

5. Now go to the left side of the Key and look for #2. You will again see two opposite statements. Reading these statements and looking at fish #11, it is obvious that it has scales. Therefore, this choice tells you to go to #9. If you have difficulty identifying a structure of the fish, refer to the list of fish structures and definitions or the labeled diagram of the typical fish.

6. At #9 (the numbers on the left side), read the two choices. It is obvious that this fish has a single dorsal fin. The Key now directs you to move to #10 (on the left side of the KEY).

7. At #10 you again read the two statements. The dorsal fin is not elongated and the caudal fin is forked. This choice directs you to #11 on the Key.

8. At #11, you can see that the fish has a forked caudal fin. Therefore, it directs you to go to #13 on the Key.

9. At #13, you can see that dorsal fin is near the caudal and that fish #11 has a duckbill snout with canine-like teeth, therefore this choice directs you to #14.

10. At #14, you can clearly see that fish #11 has dark lines that form a netted pattern on the body. Therefore, you have identified fish #11 as the Chain Pickerel and that is correct.

CLASSIFICATION

PROCEDURE FOR USING THE DICHOTOMOUS KEY WITH SOUTH CAROLINA FRESHWATER FISHES POSTER - CONTINUED

11. Now you know how to use the identification key. You should write the numbers that you followed in the identification so that you don't have to rely on memory and will be able to refer to it at a later date. Your teacher may require you to write the numbers and fish name down so that it can be checked and possibly graded.

12. An example of how your identification sequence should be written is given below.

    FISH #11 1-2-9-10-11-13-14 Chain Pickerel

13. If you already know the name of the fish, you can work backwards through the key to figure out the numbers.

14. Using the same Key or the other one by Woodward & Donovan (KEY #1), identify the other 36 freshwater fish of South Carolina. Good Luck!

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DICHOTOMOUS KEY #1 FOR SOUTH CAROLINA FRESHWATER FISHES POSTER

1. Body more or less covered with scales (e.g., fish 3, 13)	2
1. Scales lacking or too small to be seen (e.g., fish 9, 28)	30
2. Dorsal fin single, not spiny, continuous and long	3
2. Dorsal fin two or more, joined or separated, may have single anterior spine, or be long and continuous	11
3. Dorsal fin begins more than halfway or far back on the body	4
3. Dorsal fin begins near the middle of the body	7
4. Pectoral fin ventral; anal and dorsal fins directly opposite	5
4. Pectoral fin lateral; anal and dorsal fins not directly opposite	Mosquito Fish
5. Long snout, rounded caudal fin, dark spots on body	Longnose Gar
5. Pointed snout, mottled markings, notched caudal fin	6
6. Netted markings	Chain Pickerel
6. Vertical markings	Redfin Pickerel
7. Short wide anal fin, flared deeply notched caudal fin, pectoral fin lateral	8
7. Long anal fin, narrow caudal fin with shallow notch, ventral pectoral fin	Spotted Sucker
8. Streamer extension on dorsal fin, spot behind operculum	9
8. No streamer extension on dorsal fin, may or may not have spots on body	10
9. Somewhat rounded tips on caudal fin, short extension on dorsal fin (as long or shorter than dorsal fin length)	Gizzard Shad
9. Pointed tips on caudal fin, long thread-like extension on dorsal fin (longer than dorsal fin length)	Threadfin Shad
10. Spots form single horizontal line behind operculum	American Shad
10. Spots form a few horizontal lines behind operculum	Blueback Herring
11. Dorsal fin(s) joined or continuous	12
11. Dorsal fins separated	25
12. Body more than 3 times as long as broad	13
12. Body less than 3 times as long as broad	17
13. Spiny anterior and fleshy posterior portion to dorsal fin, spots form barred markings	15
13. Continuous dorsal fin, anterior and posterior portions not easily distinguishable, no or few lateral spots	14

CLASSIFICATION

DICHOTOMOUS KEY #1 FOR SOUTH CAROLINA FRESHWATER FISHES POSTER - CONTINUED

14. Rounded caudal fin, obvious posterior dot, dorsal fin on one level	Bowfin
14. Notched caudal fin, no posterior dot, dorsal fin on two levels	Carp
15. Posterior area of dorsal fin rounded	16
15. Posterior area of dorsal fin rectangular	Smallmouth Bass
16. Spots on base of caudal fin; pectoral and pelvic fins similar in size	Redeye Bass
16. No spots on caudal fin; pectoral fin considerably larger than pelvic fin	Largemouth Bass
17. Anterior and posterior dorsal fins recognized by a depression or notch between them and directed toward the body	18
17. Anterior and posterior dorsal fins continuous and directed away from the body; no notch; spines still evident	23
18. Very rounded, notched caudal fin	19
18. Slightly pointed to very pointed, notched caudal fin	20
19. Rounded pelvic fins; large spots forming wide vertical bars on body; large spots on caudal fin	Warmouth
19. Pointed pelvic fins; spots form thin horizontal lines on body; small spots on base of caudal fin	Spotted Sunfish
20. Hump above the eye	21
20. No hump or depression above the eye	22
21. Dark elongated operculum, rounded pectoral fin, vertical bars on body	Redbreast Sunfish
21. Short operculum, pointed pectoral fin, horizontal patterns on head	Pumpkinseed
22. Scattered spots forming mottled pattern	Redear Sunfish
22. Spots forming netted pattern	Bluegill
23. Pointed pectoral fin, dorsal and anal fins have dark tips, no spots on body	Flier
23.Rounded pectoral fin, no dark edge on dorsal and anal fins, scattered spots on body	24
24. Scattered spots form overall mottled design on body	Black Crappie
24. Grouped spots form vertical bars on body	White Crappie
25. Markings form large dark areas on body; vertical bars on the caudal fin; two dark spots in front of caudal fin	26
25. Markings are absent or horizontal; absence of dark spots in front of caudal fin	27

CLASSIFICATION

DICHOTOMOUS KEY #1 FOR SOUTH CAROLINA FRESHWATER FISHES POSTER - CONTINUED

26. Wide notched caudal fin, markings form bars near dorsal surface, faint "eyespots" near caudal fin, somewhat pointed anal and dorsal fin	Walleye
26. Narrow caudal fin, two very obvious "eyespots" near caudal fin, more rounded anal and posterior dorsal fin	Sawcheek Darter
27. No horizontal markings on body; very curved lateral line	White Perch
27. Horizontal markings on body; somewhat straight lateral line	28
28. Faint horizontal spots behind pectoral fin not running entire body length	White Bass
28. Dark horizontal markings/spots running entire body length	29
29. Body with very dark continuous horizontal lines; caudal fin with deep notch	Striped Bass
29. Body with broken, wavy, horizontal markings; caudal fin with slight notch	Hybrid Bass
30. Body elongated and snakelike; dorsal, anal, and caudal fins continuous; no barbels present	American Eel
30. Body not elongated and snakelike; dorsal, caudal, and anal fins separate; adipose fin present	31
31. Barbels present; head large and broad	32
31. Barbels absent; head not large and broad	35
32. Wide anal fin	33
32. Narrow, rounded anal fin	Flathead Catfish
33. Head blunt, pectoral fin lateral, caudal fin rounded and slightly notched	Yellow Bullhead
33. Head tapering, pectoral fin ventral, caudal fin pointed	34
34. Spots on body, notch on back side of anterior dorsal fin	Channel Catfish
34. No spots on body, no notch on back side of anterior dorsal fin	Blue Catfish
35. Clear horizontal band along side; spotteddorsal, adipose, and caudal fins	Rainbow Trout
35. No horizontal band along side, spotted dorsal fin only	36
36. Small adipose fin, netted pattern on dorsal fin, spine projecting from anal fin	Brook Trout
36. Large adipose fin, spotted pattern on dorsal fin, no spine from anal fin	Brown Trout

Created by Carol Woodward, Biology Teacher, Byrnes High School, Duncan, SC and Dr. Ed Donovan, Director, USCS/Spartanburg County Science Education Center, Spartanburg, SC during Summer, 1991 (revised 10/4/91, 5/20/93, and 6/2/94).

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CLASSIFICATION

FISH IDENTIFICATION KEY #1 ANSWERS FOR SOUTH CAROLINA FRESHWATER FISHES POSTER

created by
Carol Woodward and Ed Donovan
September 12, 1991

1. 1-2-3-4-5-6 Redfin Pickerel
2. 1-2-3-7-8-10 American Shad
3. 1-2-3-7-8-9 Gizzard Shad
4. 1-2-3-4-5 Longnose Gar
5. 1-2-11-12-13-14 Carp
6. 1-30-31-32-33-34 Blue Catfish
7. 1-30-31-32 Flathead Catfish
8. 1-30-31-32-33 Yellow Bullhead
9. 1-30-31-32-33-34 Channel Catfish
10. 1-2-11-25-26 Walleye
11. 1-2-3-4-5-6 Chain Pickerel
12. 1-2-11-12-13-14 Bowfin
13. 1-2-3-7 Spotted Sucker
14. 1-2-11-12-13-15-16 Redeye Bass
15. 1-2-11-12-17-18-20-22 Bluegill
16. 1-2-11-12-17-18-19 Spotted Sunfish
17. 1-2-11-12-17-23 Flier
18. 1-2-11-12-13-15-16 Largemouth Bass
19. 1-2-11-12-13-15 Smallmouth Bass
20. 1-2-11-12-17-18-19 Warmouth
21. 1-2-11-12-17-18-20-21 Pumpkinseed
22. 1-2-11-12-17-18-20-22 Redear Sunfish
23. 1-2-11-12-17-18-20-21 Redbreast Sunfish
24. 1-2-11-12-17-23-24 Black Crappie
25. 1-2-11-12-17-23-24 White Crappie
26. 1-2-11-25-27-28 White Bass
27. 1-2-11-25-27 White Perch
28. 1-30-31-35-36 Brook Trout
29. 1-30-31-35-36 Brown Trout
30. 1-2-3-7-8-9 Threadfin Shad
31. 1-2-3-7-8-10 Blueback Herring
32. 1-2-3-4 Mosquito Fish
33. 1-2-11-25-26 Sawcheek Darter
34. 1-30 American Eel
35. 1-2-11-25-27-28-29 Striped Bass
36. 1-2-11-25-27-28-29 Hybrid Bass
37. 1-30-31-35 Rainbow Trout