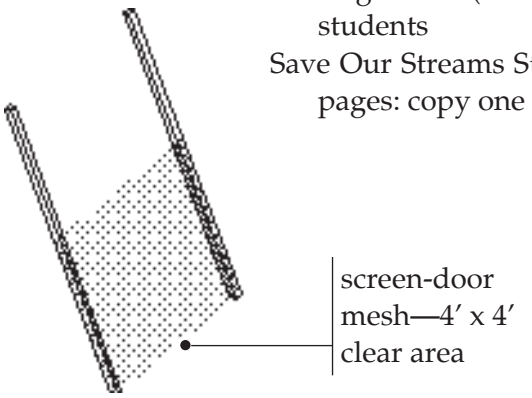
9. Kick-net Kritters

Description: Students collect and identify aquatic insects in ditches, drains,and low-flowing sections of the river. Teams of students kick the bottom of the channel upstream from a net which catches dislodged insects. Students use information on the kinds of insects they find to make general statements about the quality of the water they are sampling.

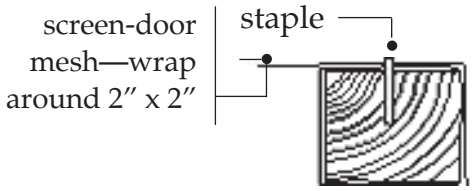
Objective: Students learn:

- that aquatic life found in a water body can indicate water quality conditions; and
- to identify aquatic insects from pictures.

Materials: For each kick-net:
two 2″ x 2″ x 4′ (5 cm x 5 cm x 1.2 m) boards for handles
screen-door mesh, metal or nylon, about 4′ x 3′ (1.2 m x 1 m) or 4′ x 4′ (1.2m x 1.2 m)
staple gun with staples
tweezers: one set per two students
white examining pans: one pan per three or four students
wading shoes (fishing waders or old shoes) for at least four students
Save Our Streams Stream Insects and Crustaceans identification pages: copy one set per two to four students



Kick-net



End Section of 2″ x 2″

9. Kick-net Kritters

Grades: 5–12

Time: 20 minutes for kick-net construction
45–60 minutes for kick-net collecting and identifying

Subject: science

Terms: *sediments, pollution, aquatic macroinvertebrate, organic material*

Background: Measuring water quality parameters like pH or dissolved oxygen is essentially like taking a "blood test" of the river. Water quality parameters tell us how "healthy" the river and its surrounding ecosystem are. Getting accurate measurements of water quality parameters is difficult, often involving expensive equipment and complex procedures. Another way to gauge the water quality in a waterway is to sample the aquatic life there. Water sample analysis describes conditions at one point in time for the waterway; the creatures found in the water reflect its long-term condition.

Scurrying along the surface, under rocks and across the bottoms of virtually every stream, river, ditch, or pond in New Mexico are a myriad of small insects and other invertebrates. These organisms are collectively known as "aquatic macroinvertebrates" because they are animals with exoskeletons who live in the water and can be seen without the use of microscopes.

To understand these animals, focus on their roles in the ecosystem, especially what and how they eat. In streams and rivers, there is a constant input of leaves, twigs, and other organic materials from surrounding vegetation. Aquatic macro-invertebrates thrive on this detritus, or dead plant material. Some animals, known as collectors, trap bits of organic matter such as leaf fragments, bacteria and other animal wastes upon which they feed. Some collectors are filter feeders like clams or blackfly larvae. Other collectors are scavengers like mayfly and caddisfly larvae and midges. Shredders cut up and eat leaves, aquatic plants and other larger materials. Some stonefly and caddisfly larvae, sowbugs and scuds feed in this manner. On rocks in rivers you can find scrapers. These insects hold on, despite powerful currents, to graze on algae attached to stones and other surfaces. Many of these organisms are flat to help them avoid being pulled downstream. Scrapers include water pennies, limpets and snails, midge larvae and certain mayfly larvae. All of these invertebrates fend off predators such as the dobsonfly larvae, dragonfly larvae or fish.

Some aquatic macroinvertebrates can tolerate high levels of sediments and other pollution. Other aquatic creatures are quite intolerant to low levels of pollution. By collecting and identifying what aquatic life is present in the water, we can make some inferences on the quality of the habitat for that area.

The variety of insects present in a waterway varies with the depth, bottom materials, flow rate and other environmental factors. Many aquatic macroinvertebrates that live in "high quality" waters are found in small, clear mountain streams, and we would not expect to find them in the Middle Rio Grande, even before major human alterations. A valuable approach to interpreting aquatic macroin-

vertebrate studies on water bodies in the bosque is to compare results with various sampling sites and at various sampling times.

In order to compare results between sites, dates or groups of students, the method for collecting insects must be standardized. The following procedures outline the method used by many scientists, including middle school and high school students in New Mexico and Colorado who are active in year-round monitoring programs. If your class follows these directions, they can compare their results with other classes' findings.

Procedures:

1. Prior to going to the field, make the kick-nets. Staple the mesh screening to board. Each kick-net should be 1 meter (39.3 inches) wide, with a board (for a handle) on either end.
2. Select the sites to sample. You may wish to sample the river, a ditch, and a pond. Within a waterway you may sample different habitats such as near a sand bar, in a riffle area, and in a backwater pool.

SAFETY CONCERNS: Avoid quicksand. Never have students sample in water that is deeper than their knees.

3. Have two students stand in the water, stretching the kick-net between them. The bottom of the kick-net should be flush with the bottom of the river channel.
4. Have two other students kick the bottom of the channel upstream from the net for three minutes. If rocks are present, turn them over. The river may be stirred with a stick.
5. Remove the kick-net from the water and pick off insects for 30 person-minutes. Use tweezers to remove visible animals from the net. Place all collected specimens in the examining trays. If one person is collecting, they would continue for 30 minutes. If six students are collecting, they would remove insects from the kick-net for five minutes each.
6. Return any remaining material on the kicknet to the river to avoid detaining any "uncollected specimens."
7. Examine insects or other invertebrates in the trays.
8. Identify what you can from Save Our Streams card, and record the numbers of each type of animal you find. Record any animals you cannot identify as "unknown."
9. After invertebrates are identified and recorded, return them to the location where they were collected.
10. Repeat this procedure for other sampling locations.

11. Have students compare any differences in their collections between sites. Point out that the groups of insects on the Save Our Streams cards are listed by tolerance to pollution. What groups of insects are represented in the students' data?

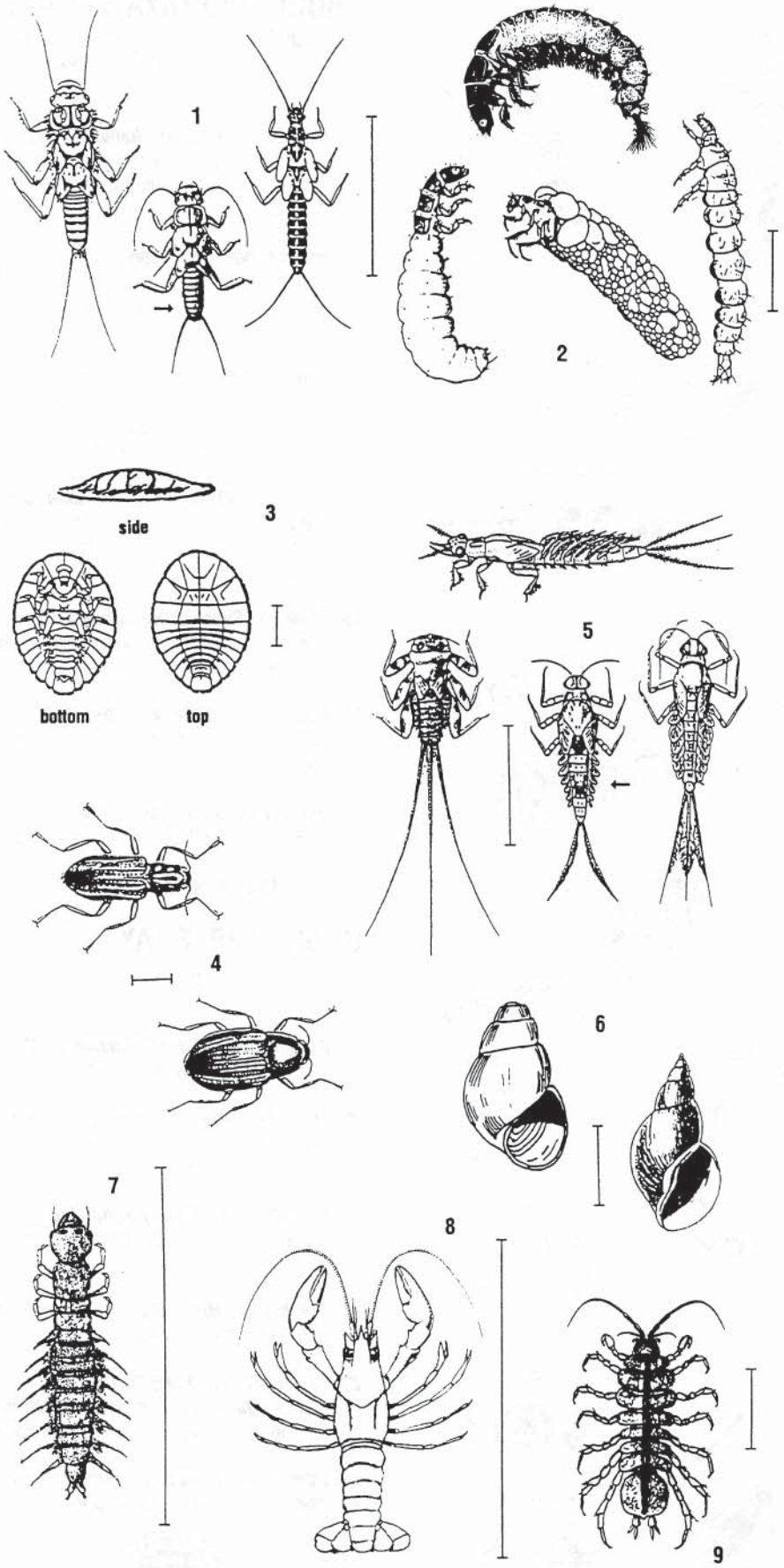
Extensions: Have students draw the creatures they observe. A good place for these drawings is a field notebook. See the activity "Naturalist Notebooks" in this chapter. Encourage students to research these animals' life histories.

Have students examine the macroinvertebrates under a field microscope or hand lens.

Because kick-nets can be difficult for younger students to handle, this activity can be done with students collecting macroinvertebrates with hand-held strainers.

References: For more information refer to the "Save Our Streams" program of the Izaak Walton League of America, 707 Conservation Lane, Gaithersburg, MD, 20878-2983, and the Adopt-a-Stream Foundation of Everett, WA.

Stream Insects & Crustaceans



Bar lines indicate relative size

GROUP ONE TAXA

Pollution sensititve organisms found in good quality water.

1 ***Stonefly: Order Plecoptera.*** 1/2" - 1 1/2", 6 legs with hooked tips, antennae, 2 hair-like tails. Smooth (no gills) on lower half of body. (See arrow.)

2 ***Caddisfly: Order Trichoptera.*** Up to 1", 6 hooked legs on upper third of body, 2 hooks at back end. May be in a stick, rock or leaf case with its head sticking out. May have fluffy gill tufts on underside.

3 ***Water Penny: Order Coleoptera.*** 1/4", flat saucer-shaped body with a raised bump on one side and 6 tiny legs and fluffy gills on the other side. Immature beetle.

4 ***Riffle Beetle: Order Coleoptera.*** 1/4", oval body covered with tiny hairs, 6 legs, antennae. Walks slowly underwater. Does not swim on surface.

5 ***Mayfly: Order Ephemeroptera.*** 1/4" - 1". brown, moving, plate-like or feathery gills on sides of lower body (see arrow), 6 large hooked legs, antennae, 2 or 3 long, hair-like tails. Tails may be webbed together.

6 ***Gilled Snail: Class Gastropoda.*** Shell opening covered by thin plate called operculum. When opening is facing you, shell usually opens on right.

7 ***Dobsonfly (Hellgrammite): Family Corydalidae.*** 3/4" - 4", dark-colored, 6 legs, large pinching jaws, eight pairs feelers on lower half of body with paired cotton-like gill tufts along underside, short antennae, 2 tails and 2 pairs of hooks at back end.

GROUP TWO TAXA

Somewhat pollution tolerant organisms can be in good or fair quality water.

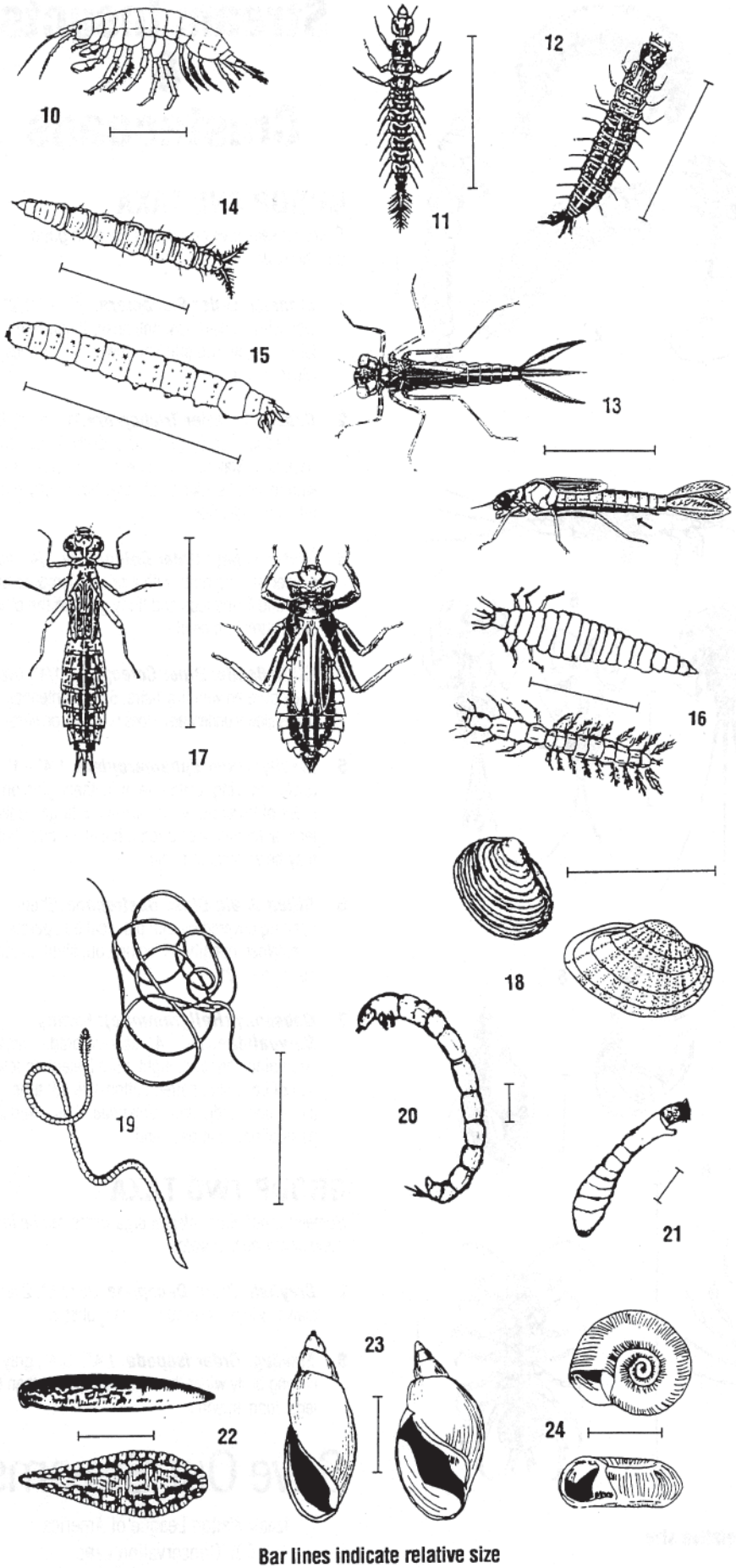
8 ***Crayfish: Order Decapoda.*** Up to 6", 2 large claws, 8 legs, resembles small lobster.

9 ***Sowbug: Order Isopoda.*** 1/4" - 3/4", gray oblong body wider than it is high, more than 6 legs, long antennae.

Save Our Streams

Izaak Walton League of America
707 Conservation Lane
Gaithersburg, MD 20878-2983
1(800)BUG-IWLA

1/95



Bar lines indicate relative size

GROUP TWO TAXA CONTINUED

10 ***Scud: Order Amphipoda.*** 1/4", white to grey, body higher than it is wide, swims sideways, more than 6 legs, resembles small shrimp.

11 ***Alderfly Larva: Family Sialidae.*** 1" long. Looks like small hellgrammite but has 1 long, thin, branched tail at back end (no hooks). No gill tufts underneath.

12 ***Fishfly Larva: Family Corydalidae.*** Up to 1 1/2" long. Looks like small hellgrammite but often a lighter reddish-tan color, or with yellowish streaks. No gill tufts underneath.

13 ***Damselfly: Suborder Zygoptera.*** 1/2" - 1", large eyes, 6 thin hooked legs, 3 broad oar-shaped tails, positioned like a tripod. Smooth (no gills) on sides of lower half of body. (See arrow.)

14 ***Watersnipe Fly Larva: Family Athericidae (Atherix).*** 1/4" - 1", pale to green, tapered body, many caterpillar-like legs, conical head, feathery "horns" at back end.

15 ***Crane Fly: Suborder Nematocera.*** 1/3" - 2", milky, green, or light brown, plump caterpillar-like segmented body, 4 finger-like lobes at back end.

16 ***Beetle Larva: Order Coleoptera.*** 1/4" - 1", light-colored, 6 legs on upper half of body, feelers, antennae.

17 ***Dragon Fly: Suborder Anisoptera.*** 1/2" - 2", large eyes, 6 hooked legs. Wide oval to round abdomen.

18 ***Clam: Class Bivalvia.***

GROUP THREE TAXA

Pollution tolerant organisms can be in any quality of water.

19 ***Aquatic Worm: Class Oligochaeta.*** 1/4" - 2", can be very tiny; thin worm-like body.

20 ***Midge Fly Larva: Suborder Nematocera.*** Up to 1/4", dark head, worm-like segmented body, 2 tiny legs on each side.

21 ***Blackfly Larva: Family Simulidae.*** Up 1/4", one end of body wider. Black head, suction pad on other end.

22 ***Leech: Order Hirudinea.*** 1/4" - 2", brown, slimy body, ends with suction pads.

23 ***Pouch Snail and Pond Snails: Class Gastropoda.*** No operculum. Breathe air. When opening is facing you, shell usually opens on left.

24 ***Other Snails: Class Gastropoda.*** No operculum. Breathe air. Snail shell coils in one plane.

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