

CHAPTER 4: REFERENCES & RESOURCES

Resources

Citizen science groups, teachers/students, and other participants in the Rock Pack Experiment should utilize as much or as little of the activities and data sheets in the Rock Pack Manual. These are designed as guidelines to enhance participant connections to local streams and macroinvertebrates, specifically the net-spinning caddisfly.

HELPFUL WEBSITES:

- 🌀 The Leaf Pack Network®: <https://leafpacknetwork.org/>
- 🌀 Macroinvertebrates.org: <https://www.macroinvertebrates.org/>
- 🌀 WikiWatershed® Toolkit: <https://wikiwatershed.org/>
- 🌀 Dichotomous Key on the Leaf Pack Network website: <https://stroudcenter.org/macros/key/>

MATERIAL SOURCES:

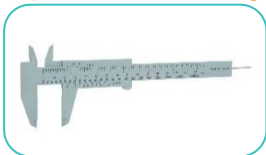
- 🌀 Leaf Pack Stream Ecology Kit (from the LaMotte Company):
<http://www.lamotte.com/en/education/macroinvertebrates/5882.html>



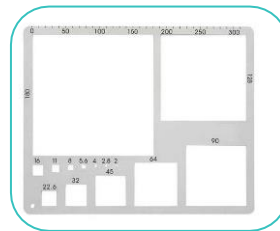
- 🌀 Luggage Scales: We like this one, as it has a hook for weighing the packs easily with the mesh bag and also has a measuring tape:
<https://www.youtube.com/watch?v=jCwD9d3UkWQ>



- 🌀 Calipers (digital, dial, or utility; Pittsburgh brand):
<https://www.harborfreight.com/search?q=calipers>



- 🌀 Gravelometer (Wildco brand): https://www.forestry-suppliers.com/product_pages/products.php?mi=22080&itemnum=53249&redir=Y



- 🌀 Waterproof tags – 2 example options:

- Rite in the Rain paper:
https://www.riteintherain.com/?gclid=EAlaIQobChMljtuh26j65wIVAobICh28ZqC6EAAYASAAEgJXg_D_B
- Tyvek Wristbands (difficult to find among online retailers): Simply write on these with the waterproof marker.



Glossary

bioindicator organisms: plants or animals that tolerate only specific levels of pollution and are used to indicate water quality

bedload: gravels and cobbles that are rolled, hopped, pushed, and pulled along the streambed during large flow events; these rocks are too heavy for the water to actually lift up into the flow for more than a few seconds

benthic freshwater macroinvertebrates: an organism that inhabits bottom areas/substrates (benthic) of freshwater systems like lakes, ponds, streams, or rivers (freshwater), is large enough to be seen with the naked eye (macro), and does not have a backbone (invertebrate)

biodiversity: different kinds of specialized organisms in a particular habitat or ecosystem

caddisfly: highly advanced and diverse group of insects from the Order Trichoptera that live in fresh water for part of their life cycle; these insects spend their larva stage in water (aquatic) before undergoing complete metamorphosis into a winged adult that lives on land (terrestrial); renowned for their silk production

- ☞ **case-building caddisfly:** variety of families within the Order Trichoptera that use silk to craft portable, protective cases from small rocks and detritus
- ☞ **net-spinning caddisfly:** Family Hydropsychidae within the Order Trichoptera that uses silk to create 1) fixed retreats constructed from organic and inorganic materials, and 2) catch-nets to trap fine particles from the water column for food; globally distributed group and the most abundant caddisflies in many parts of North America

caddisfly silk: protein emitted from specialized silk glands at the tip of the labium (mouthpart) that functions like sticky, stretchy, waterproof tape for the complex creation of cases, retreats, nets, and cocoons

complete metamorphosis: the process of completing a four-stage life cycle consisting of an egg, larva, pupa, and adult stage; examples of insects that undergo complete metamorphosis include caddisflies, true flies, beetles, and dobsonflies

dissolved oxygen: the amount of oxygen that is present in water and available to living organisms to use for respiration

ecology: the scientific study of the abundance, distribution, and interaction of organisms (plants and animals) on the earth

ecosystem: a community of interacting organisms and their physical environment

ecosystem engineers: animals or plants that maintain, modify, or create habitats

erosion: process of sediments being broken down by natural agents like water and wind

filtering collectors: organisms that feed by collecting and filtering small particles of organic matter, sometimes referred to as fine particulate organic matter (FPOM), found in the water column and bottom substrate of a stream; these specialized feeders include net-spinning caddisfly larvae

fluvial geomorphology: the scientific study of the physical shape of rivers and the processes that change them over time;

fluvial (processes associated with running water) +
geomorphology (processes that shape the Earth's surface)

functional feeding groups: method of classifying macroinvertebrates based on feeding adaptations and/or preferences

habitat: food, water, shelter, space; the natural home or environment of an animal, plant, or other organism

incomplete metamorphosis: the process of completing a three-stage life cycle consisting of an egg, nymph, and adult stage; examples of insects that undergo incomplete metamorphosis include mayflies, dragonflies, damselflies, stoneflies, and true bugs

leaf packs: naturally forming accumulation of leaves within a stream that provide habitat and food for aquatic organisms; can also be artificially created as mesh bags filled with leaves, grass, or other vegetation to simulate natural leaf packs

macroinvertebrates: an organism that does not have a backbone and can be seen with the naked eye

retreat: crude dwelling constructed by net-spinning caddisfly larvae from organic and inorganic materials (e.g., small rocks, detritus, leaf fragments) bound together by silk protein and adhered to rock surfaces or woody debris in the stream; utilized as habitat

riffle: the shallow area of a stream through which water moves swiftly and there are many rocks

rock packs: dry rocks in mesh bags that simulate the naturally available rock habitat found in a stream

species composition: the identity of all the different organisms that make up an ecological community

watershed: a land area bounded by a divide and draining to a particular body of water or watercourse

water quality: the overall health of a body of water, including the measured chemical, physical, and biological characteristics

References

NOTE: Some references are published in open-access journals and hyperlinks are below to access online the free pdf!

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