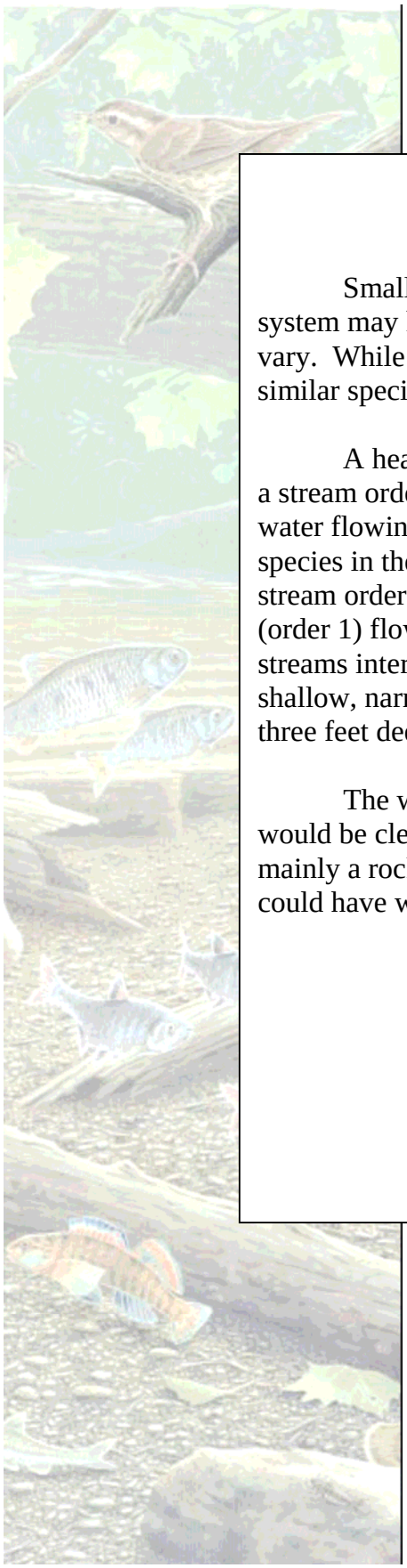
# Small Stream Ecosystem

**The information in this booklet was compiled by the Indiana Division of Fish and Wildlife Natural Resources Education Center**
**The poster above is the work of Rick Hill, artist for the Kentucky Department of Fish and Wildlife Resources.**

Provided by
Jefferson County Stormwater Management Division
725 Maple Street
Hillsboro MO 63050
636-797-6228

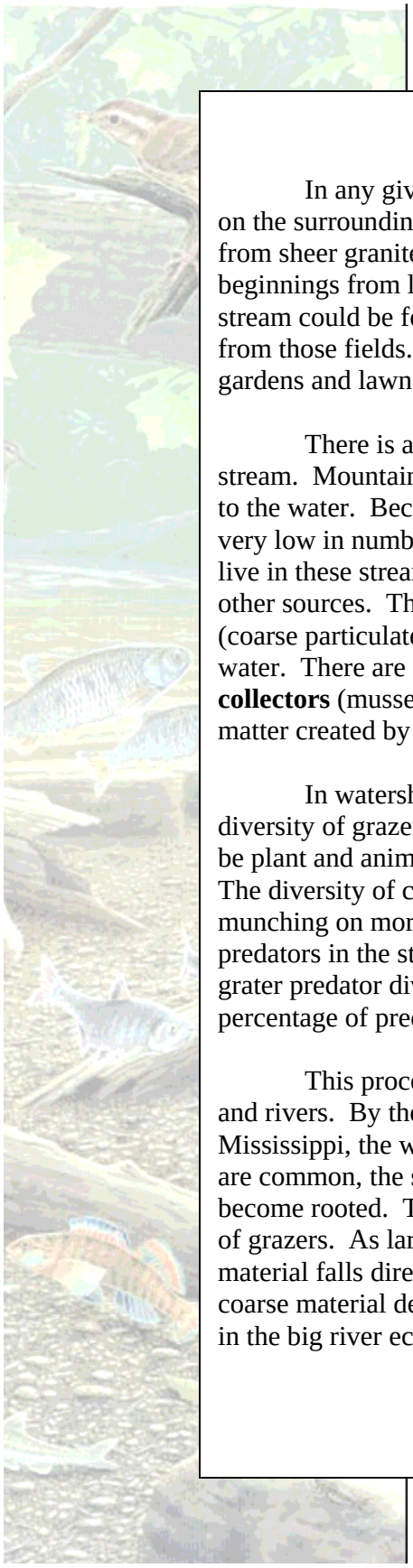


# INTRODUCTION

Small streams are unique and fascinating. Each major river system may have hundreds of feeder streams, and the animals in each one vary. While one species may be found in only one watershed, other similar species could be found over several states.

A headwater stream is often envisioned as a trickle from a spring, a stream order 1, with very few aquatic organisms. However, with warm water flowing from the ground, this headwater stream may have many species in the winter. The stream depicted in the poster on the front is a stream order 2 or 3. That means two streams that initiated constant flow (order 1) flowed together forming an order 2 stream or two 2 order streams intersected for an order 3. The stream depicted would be a shallow, narrow stream with the deepest sections not more than two or three feet deep at normal flow.

The water depicted in this poster is clear. The illustrated stream would be clear, because it is depicted in a forested ecosystem and shows mainly a rocky bottom. The same size stream in an area of farmland could have water more clouded with silt.



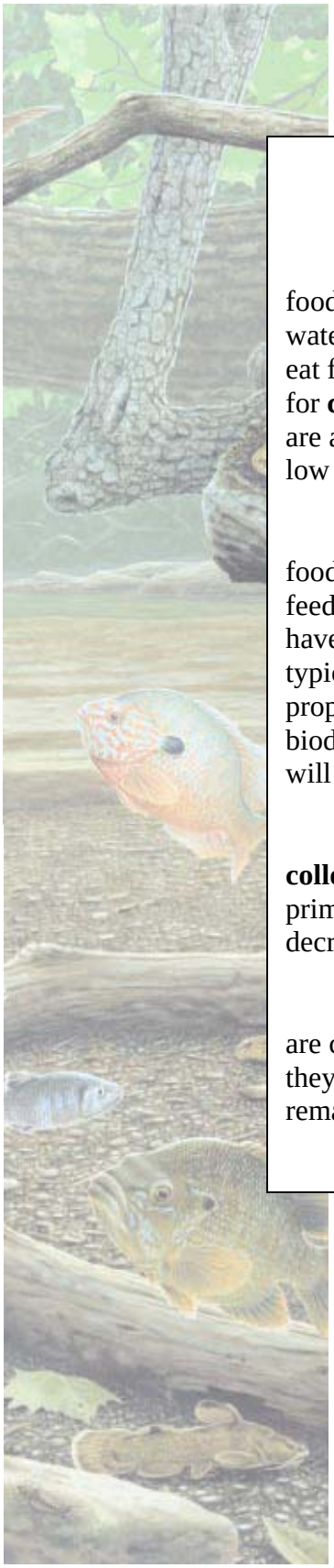
## WHO LIVES IN OUR STREAM?

In any given watershed, the plants and animals that are found are dependent on the surrounding land and corresponding land use. One stream may originate from sheer granite with few nutrients added from the rock. Another may have its beginnings from limestone springs with corresponding rich diversity of life. A third stream could be found in or near fertile farmland and receive abundant nutrients from those fields. Finally, in urban areas, streams may receive excess fertilizer from gardens and lawns.

There is a definite connection between water fertility and biodiversity in the stream. Mountain streams receive runoff from rock walls that do not lose nutrients to the water. Because plants need nutrients to grow, some mountain streams are very low in numbers of plants and animals or species diversity. The animals that live in these streams are primarily dependent on food that falls into the water from other sources. Therefore, most of the animals in these streams eat on large leaves (coarse particulate matter) or are **predators** on terrestrial insects that fall into the water. There are few **grazers** because few plants grow for them to eat. Some **collectors** (mussels or insects) live in these conditions and eat the fine particulate matter created by those eating the coarse material.

In watersheds with higher fertility, more aquatic plants grow, and the diversity of grazers grows. In streams with overhanging vegetation, there will still be plant and animal matter falling into the water, and animals will be there to eat it. The diversity of collectors will most likely increase as there are more animals munching on more diverse plants. With a higher diversity of plant eaters, the predators in the stream will adapt to the availability of prey, and we would expect grater predator diversity. However, because of the increase in all species, the percentage of predators remains the same.

This process continues as the water flows downstream into larger streams and rivers. By the time the water reaches the big river regime, such as the Mississippi, the water is highly fertile, but often laden with silt. While algae blooms are common, the sunlight cannot penetrate the cloudy water and plants seldom become rooted. Therefore, with lower diversity of plants, there is a lower diversity of grazers. As larger rivers are not covered by riverside vegetation, less plant material falls directly into the water, and the percentage of animals that eat the coarse material decreases. Therefore, the group with the greatest variety or diversity in the big river ecosystem is the collector group.



## INVERTEBRATES IN THE STREAM ECOCYSTEM

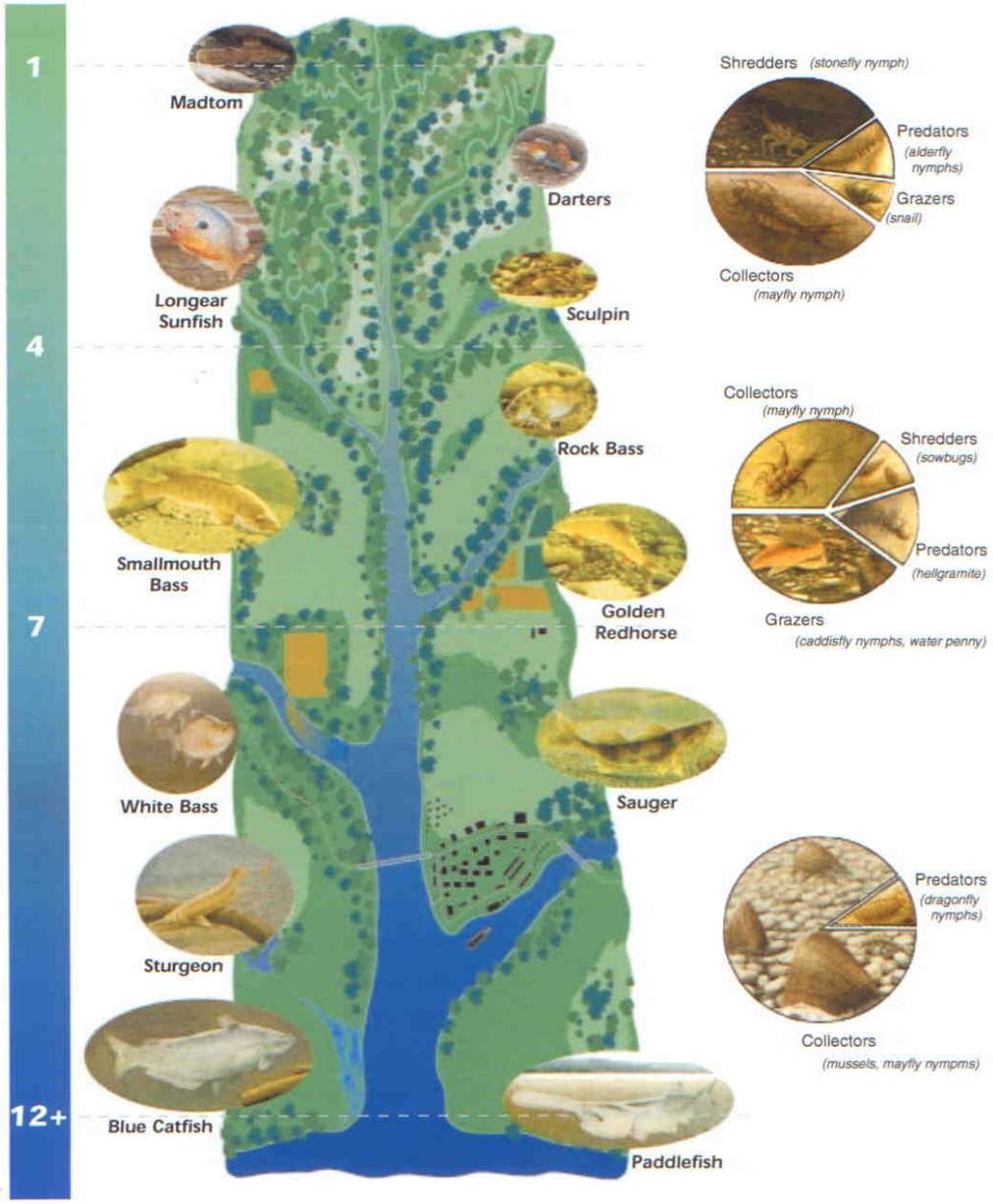
In stream order 1 – 3 streams, the invertebrates are adapted to the food that is available. As the primary food is the leaves that fall into the water, the first group of invertebrates that flourishes is **shredders.** They eat from the leaves and leave particles of dead plant material in the water for **collectors,** the second group that does well in this stream region. There are a few **grazers** and a few **predators,** but the biodiversity is comparably low for all invertebrates.

In stream order 4 - 6 streams, the plants offer a greater variety of food, and the invertebrates adapt. There is a higher percentage of **grazers** feeding on those plants growing in the water. Again the collectors will have a high variety of dead plant material in the water and they will typically be well represented. The number of shredders will decrease proportionately. The number of **predators** will increase somewhat, but as biodiversity of all invertebrates has increased, the proportion of predators will remain about the same.

In stream order 7 – 8 streams, creeks or rivers, the **grazers and collectors** continue to dominate with slightly more collectors. This is primarily due to the decrease in rooted vegetation. Shredders continue to decrease and predators remain constant in proportion.

A stream order 9 – 12 would be considered a river. Here **collectors** are clearly dominant. While there could be a few shredders and grazers, they would be much less evident in a given sample. Predators again would remain reasonably constant in their representative proportion.

# STREAM ORDER



# Small Stream Ecosystem Legend

# Species List

1. Damselfly
2. Boxelder
3. Yellow-throated warbler
4. Sycamore
5. Acadian flycatcher
6. Copes gray treefrog
7. Mayfly
8. Louisiana waterthrush
9. Southern two-lined salamander
10. Mink
11. Spotted sandpiper
12. Southern leopard frog
13. Alderfly
14. Queensnake
15. Creek chub
16. Striped shiner
17. Longear sunfish
18. Smallmouth bass
19. Alderfly larva
20. Greenside darter
21. Gilled snail
22. Crayfish
23. Damselfly larva
24. Redfin shiner
25. Green sunfish
26. Johnny darter
27. Caddisfly larva
28. Bluntnose minnow
29. Soubug
30. Fantail darter
31. Central stoneroller
32. Fingrnail clam
33. Scud
34. Silverjaw minnow
35. Rainbow darter
36. Mayfly larva
37. Brindled madtom
38. Stonefly larva

Each facet of the stream ecosystem is important. When any species or genetic strain is lost, the picture is incomplete. Life in the stream is unbalanced and unhealthy for survival.

One important section is streamside vegetation. Trees at the stream's edge provide shade to cool the water, roots to hold the soil and leaves or seeds which fall in the water to become food for certain organisms. Further, terrestrial insects that feed in the trees fall into the water to become part of the food chain. Trees also serve as perches for birds. When snags are left, woodpeckers search for insects in the dead wood, and later wood ducks nest in the woodpecker holes.

Streams are forever connected to other similar streams or major rivers and each has related forests, fields or urban area. If streams are to remain healthy, all ecosystems within the landscape must also be maintained.

The single pollutant that most greatly affects flowing rivers and streams is sediment from agriculture and urban development. The animals that suffer most from human intervention are those dependent for some portion (or all) their lives on stream bottom habitat. This could mean any stream creature that hides, feeds or builds a nest on the stream bottom. Their habitat and food source is smothered by sediment that fills the stream bottom. These "benthic organisms" are known to be declining.

## Glossary

**Biodiversity**

*Species diversity* – The number of species found. Normally when more species are present, ecological systems are more stable based on interactions between species.

*Ecosystem diversity* – Within each ecosystem there must be diversity of habitat features to provide the needs for the species present.

**Collectors** – Animals in the aquatic environment that bring water into their body and strain it to remove food particles. (mussels)

**Grazers** – Animals that eat vegetation (plants) that is growing in their environment. (crayfish or insects)

**Predators** – Animals that kill and eat other animals. (fish)

**Riparian Zone** – The area next to a river where the plants take up pollutants and hold the soil so streams remain "clean".

**Shredders** – Aquatic life creatures that eat leaves or seeds that fall into the water.