

Nature's Restaurant – A Fish Food and Food Chain Outline

Suggested information to be presented at the Nature's Restaurant station — allow about 15 minutes to present the following information and 5 minutes for children to view fish and insects in the stream with aqua viewers

INTRODUCTION

Welcome to Nature's Restaurant !! My name is _____ and my partners name is _____. We're going to be your waiters today — so we'll start by showing you the menu for Nature's Restaurant. (here we use the flip-chart illustration showing the menus for Kokanee Salmon and for other species of trout).

At this station you're going to learn about all the different kinds of food that fish eat —and also what kinds of birds and animals eat fish. So you will be learning about Nature's Food Chains and Food Webs.

II. (Go to the flip chart entitled: Cool Beginnings) The Kokanee salmon that you will be seeing in the stream today have swum up here from the Wickiup Reservoir (lake) to lay their eggs in the gravel on the bottom of the creek. The tiny fish that hatches from the egg is called an ALEVIN, and its first food is gotten from a yolk sac that developed in the egg. This is what the ALEVIN looks like (pass around specimens in vials). The small yolk sac that you see provides the newly hatched alevin with a **sac lunch** provided by its mother. The alevin hide in the gravel on the stream bottom and grow larger as they use up the food in the yolk sac. (Because the alevin are so small and weak most of them are eaten by larger fish or they get trapped in the mud between the sand and gravel spaces at the bottom of the stream, and they die. Only about 10 or 20 out of a hundred will live to grow into a fry — Note: This info could be deleted if review indicates you might be short on time.)

THINGS KOKANEE FEED ON

As it uses up the food in the yolk sac the alevin grows a little bit larger and is called a **FRY**. With no more food in the yolk sac the fry must get their food from the water.

- The fry feed on tiny microscopic plants and animals that live in the water.
 - The things fry feed on are so small that we need to look at them under a **microscope** to see what they look like. (**pass around vials of preserved Plankton**). In these vials you can see the tiny size of the plants and animals that kokanee fry eat. (**Have children gently shake the vials so they can see how many tiny individual Plankton are in the vial**). — Next go to the flip chart showing enlarged views of a few Planktonic organisms (water fleas, copepod) — and say something like: This is what some Plankton look like when we see them under a microscope.
- (Hold up plankton net as a visual aid). Scientists (biologists) that study what the fry feed on pull nets like these through the water to learn what kinds of microscopic plants and animals are in the water. The water in streams and lakes has millions and millions of these microscopic organisms swimming and floating around in it.
- To learn what kinds microscopic plants and animals are eaten by Kokanee salmon biologists examine the stomach of dead fish.

- Something **important** to remember is: that Kokanee salmon can feed on such tiny plants and animals because, instead of using teeth to catch and eat their food, they have **special brush-like filters** inside their mouth.

EXPLAIN FILTER FEEDING

- As the fry face upstream or swim around in the water they open their mouth and use their collecting filters to strain microscopic plants and animals from the water.
 - Use a brush to explain how a filter functions.
 - Next: use a dead fish to show children where the long hair-like filaments that comprise the filters are located — and let the adventurous ones feel the filaments.
 - Note: Although I have not found a fisheries biologist who knows how the plankton get from the filaments to the stomach, or a textbook explanation, I tell the children that when the filter filaments are full of plankton the fish closes its mouth and sucks the plankton into its gut. You can demonstrate this with a large sucking sound
- When the fry grow to about the size of a person's finger we call them **Fingerlings**, and just like the tiny fry, the fingerlings and adult fish also are especially adapted to filter (or strain) microscopic plants and animals from the water. So even when the fingerlings keep getting bigger and swim downstream into the lake they can only filter microscopic plants and animals from the water — and even the fully grown adults that live in the lake can only feed on Plankton — and tiny insects that get caught on the filter filaments.

So, for all their lives the Kokanee salmon that you will see here today feed on different food than other fish in these streams and lakes. And because the microscopic plants and animals they feed on are so tiny, the big fish spend most of the time feeding — because it takes thousands and thousands of these tiny plants and animals to make a good meal.

- Remember now, the microscopic plants and animals that swim and float around in the water have a **special name** — Who remembers what that name is???
- **Plankton** — that's right !! way to go — everyone say it now . . .

Food of other fish in streams and lakes — **As you saw on the two menus**, The trout that live in the same streams and lakes as the Kokanee salmon eat **different types** of food than kokanee salmon The young rainbow trout, brook trout, bull trout and brown trout that live in streams feed on things like insects, scuds and worms — and as they grow larger they even feed on smaller fish fry and fingerlings — and the really big brown trout in lakes even catch and eat Kokanee and other trout that are smaller than themselves.

- Here you can see some of the kinds of insects that are eaten by other kinds of trout.
 - Up to this point, we keep the pans of live and dead insects covered and on the ground behind us — so they don't serve to distract the children, but now we uncover them.

- While some of the kids are poking around in the pans and asking questions we also pass around some vials of insects preserved in alcohol and explain what is in the vials — caddisflies and their cases, etc. this varies with the instructors at the station.
- After a couple of minutes:
- Remove the insect specimens from the table and go to the Predator flip chart.
 - The other kinds of trout that live in streams and lakes and feed on insects and worms are called **PREDATORS** — because they catch and feed on living animals that are usually smaller than they are. So — predators get all their food for energy and growth by eating other animals.

FOOD OF INSECTS IN STREAMS

Biology is the study of how plants and animals live in nature, and what different animals can eat is very important to biologists.

- Use flip-chart illustration of insects on a rock.
- This picture shows examples of how different kinds of insect collectors filter Plankton from the water.

Collectors: Many kinds of insects that live in streams and rivers feed on the same kind of Plankton food as kokanee salmon. And like the kokanee salmon most of them use special filters that catch the kinds of microscopic plants and animals that float by them in the water. We call these **Collectors**. At the back of the rock you can see a black fly larvae extending its large mouth brushes that it uses to collect its food. When the mouth brushes are full of food particles the larva moves them over to its mouth and eats everything off the brushes. This is how a black fly larva feeds:

- demonstrate how the larva feeds -- extend your arms up and backwards over shoulders and wiggle fingers as you explain that fingers represent the mouth brushes.

When a mouth-brush is full of plankton the larva alternately brings one down to its mouth and eats everything off it and then brings the other one down to its mouth and repeats the process. It keeps feeding in this manner until it is full).

- Have the children do this with you.

Other insects that feed on microscopic plankton and tiny microscopic food particles that drift downstream in the flowing water sit on rocks and sunken trees and make nets that look something like spider webs. Here you see a net on the rock — and this is what it looks like from another view. This is the insect that builds the net. The nets act like filters and catch microscopic particles of food. The net makers usually hide in a crack near the edge of the net — and when the net has caught a lot of food, the net maker crawls out of its hiding place and eats all the microscopic food off the net. **BUT** — sometimes when a net maker sneaks out of its hiding place to eat food off their net it is seen by a larger predator --- like a large insect or trout ---- and what happens then????

That's right ! — it will be eaten by the predator!!

Shredders — Some insects that live in streams eat dead leaves, rotten wood and pieces of bark that fall into the water — and we call these shredders — because they tear up and eat all the dead plant material. Here's a shredder feeding on a dead leaf behind the rock. (explain that shredders mouthparts are used to rip and tear — something like shredding paper).

Scrapers — Other kinds of insects feed on the microscopic plants that grow on rocks and sunken logs. These insects have special kinds of hard mouthparts and teeth that allow them to scrape their food off the rocks and logs — so we call them scrapers. They feed on mosses, algae and diatoms. Here's a mayfly scrapper, and here is a caddisfly scrapping off its food as it crawls on the rock.

PYRAMID OF NUMBERS — FOOD CHAIN CONCEPT

One way biologists teach people about Nature's food chains and food webs is to show them a picture of a pyramid (use the flip-chart page here) — with a large base at the bottom and a small peak at the top. So when we think about the food chain in this stream its kind of like thinking of a mountain made up of plants and animals piled up on top of each other — with millions and millions of microscopic plants and animals at the bottom. The plants at the bottom are called the PRODUCERS --- because they produce the food for all the rest of the animals that live in the stream. At the next level up from the bottom there are fewer animals like insects and Kokanee Salmon that feed on Plankton, and snails and scuds that feed on plants. We go from millions and millions to many thousands at this level. And at the next level up there are even fewer animals (probably only hundreds). These are the larger fish predators that feed on insects, snails and scuds, and fish that are smaller than they are.

So, as we think about animals higher up the mountain or the pyramid, we learn that the higher up the food chain an animal lives, the fewer there are of them. But we also learn that animals that live higher up the mountain are bigger. So it takes all of the plants and animals below to support just one bear at the top of the food chain.

(You can also think of this as a biomass pyramid, with the animals at each upper level being larger and larger).

Review the Pyramid: When we study Nature's food chains we learn that: (1) small insects, scuds and snails eat microscopic Plankton, and that: (2) small insects, scuds and snails in turn are eaten by frogs, small birds and small fish, and that: (3) frogs and small fish are eaten by Big Fish, Big Birds and Big Animals (Kingfishers, mergansers, mink, otter) and that: (4) Big Fish are eaten by even Bigger Birds and Bigger Animals (Bald Eagle, Osprey, Bears & Humans). What would happen to this food pyramid if this stream became polluted or muddy, and all of the producers at the bottom of the pyramid died?? -- (that's right, everything would die — because none of the inhabitants would have any food!).

Before you leave Nature's Restaurant we want to tell you about another kind of **Food Chain** found in this creek. This last food chain starts with **dead** fish. After spawning, all of the large fish you see in the stream are going to die — and when this happens they will serve another **useful purpose** as a food source for many kinds of birds and animals that will find and feed on the dead fish. So, the dead fish become part of another food chain as they **decompose** - and this food chain is first dominated by microscopic organisms that are called decomposers. But probably the best known animals and birds that feed on dead fish are called **scavengers**. What kinds of birds and animals can you think of that would feed on dead fish? (Use flip chart to illustrate some scavengers that feed on dead fish).

In Nature, then, there is a continuous **recycling** of nature's food resources from one food chain to another, and dead, decomposing fish return valuable nutrients to rivers and streams to keep the cycle going.

Now, before you leave Nature's Restaurant you are going to use something called an aqua viewer to look under the water to observe the spawning Kokanee Salmon, and maybe some large insects on rocks. So, let's go look in the water!!

EQUIPMENT AND VISUAL AIDS NEEDED:

- Hinged “A” frames to attach flip charts to.
- Plankton net with collecting vial* --- to demonstrate how plankton are collected.
- Flip chart pages to show important illustrations (rock with insects, pyramid of numbers, pictures of fish predators & scavengers) diagrams and words like: Plankton, Alevin, Predator, Scavenger, etc.
- Containers (vials) of preserved specimens (alevin with yolk sac, plankton, insects).
- Large white pans for displaying insect specimens.
- Bristle brush to explain how kokanee filter plankton from the water.
- Net to collect dead fish to be used in illustrating the gill filament filtering system.
- Portable table to set specimens on.
- Station ID banner
- Aqua viewers*
- Plastic bags for dead fish
- Towel & soap (useful after handling dead fish!)
- Waders
- Name badge and COF cap
- Lunch

* We have been getting the Plankton net and aqua viewers from the USFS (Tom Walker probably will be the contact now that Tom Merritt has left for another position).