Ecosystem Interactions Teacher Guide

**Slide 1)** The lower Columbia River is a complicated ecosystem and has been for thousands of years.

**Slide 2)** The organisms here are all connected. For example the bald eagle is directly connected to the salmon and steelhead it eats and the black cottonwoods it nests in. But the connections don’t stop there. The bald eagle indirectly relies on the organisms those organisms rely on and so on and so on. The connections may even lead back to the original organism itself. 400 years ago the lower Columbia ecosystem was intact and in balance. Populations were stable and in balance with each other and with the people who lived along the river (Native American Tribes like the Chinook).

**Slide 3)** However, changes came when European fur trappers ventured across the continent to bring back furs that could be sold on the east coast and Europe. Intensive trapping of beaver lead to their extinction in many parts of the West until the demand for beaver felt hats subsided.

**Slide 4)** In 1866 the Hume brothers brought commercial fish canning to the Columbia. The ability to preserve salmon in a can gave canners the ability to ship their products as far as Australia and England. The industry boomed thanks to the huge runs of salmon. From 1889 to 1920, the average annual harvest of Chinook salmon from the lower Columbia River was 25 million pounds (that’s the weight of 65 blue whales!). Thanks to over fishing and habitat destruction the huge salmon runs eventually disappeared and with them the canning industry.

**Slide 5)** Logging has also left its mark on the Columbia River ecosystem. Extensive cutting over the last 200 years has cut all but 10% of the forests in the region. By 1970 sustainable practices were being prioritized because of lack of new forests to cut. Black Cottonwoods near the river became firewood for steam ships working on the river. Before roads and rails allowed better access to timber in the mountains the rivers were the only way to get timber to the mill. To do this splash dams were built on mountain streams. The timber upstream was cut and floated behind the dam. Then the dam was blown with dynamite and the logs rushed down steam to the mill. Movement of logs scoured out the river bottoms greatly disrupting salmon habitat.

**Slide 6)** How did these human actions affect the ecosystem?

* The lack of beaver affected predators like the cougar as well as animals that rely on beaver dams to create habitat like frogs and mosquitos.
* The decrease in salmon and steelhead affected birds of prey and other animals that feed on them.
* Logging of riparian trees affected a wide variety of animals that rely on them for shelter and nesting habitat.
* While the clearing of land for farms and homes hurt some species a few benefited. Raccoons found a new food source, human garbage, and deer found new grazing opportunities and a lack of predators like cougar that used to keep their numbers in check. Those species are now overpopulated.

**Slide 7)** Agricultural development has also affected the ecosystem. Livestock and farming near steams dumps sediment and animal waste into them which can pollute the water. Dams that are created to generate power and irrigate fields block fish passage and decrease the amount of water in streams making it harder for fish to pass obstacles.

**Slide 8)** Chemicals associated with agriculture and house cleaning can pollute water and cause problems up the food chain. DDT, a chemical to kills insects, was widely used between 1940 and 1970. Although it excelled at liking pests the poison accidentally wound up also killing animals higher up the food chain. Bald eagles and peregrine falcons were some of the most affected almost going extinct in the US. By 1972 DDT was banned leading to the recovery of many bird species. Today we don’t use DDT but we do use thousands of other pesticides which can be poisonous to the environment if not used properly.

**Slide 9)** Invasive species also affect the ecosystem. These plants were brought here by humans and edge out native species and keep them from growing. Himalayan Blackberry was originally brought over for farming but escaped. Scotch Broom has no natural predators because it is mildly poisonous. It seeds can live for 50 years so it is hard to remove without constant vigilance. Reed canary grass was brought over to feed cattle in waterlogged floodplains but instead grows in dense mats blocking Oregon ash seeds from growing. Animals can be invasive too like the bullfrog and red swamp crawfish.

**Slide 10)**

* Water pollution from farming has affected salmon and steelhead.
* Predators like the cougar and wolf have been killed. The cougar in particular has been hunted to local extinction in many areas.
* Mosquitos were killed as one of the intended targets of DDT but animals higher up the food chain like eagles were also killed.
* Invasive species were brought into the ecosystem and now compete with native plants for space and nutrients.

**Slide 11)** What can we do? We can cut back on water pollution by keeping pollution out of our waterways. One way to do this is to use bio-swales (plants) that catch and naturally clean water coming off of roads and farms before it goes into the stream or river. We can also do simpler things like not pouring chemicals down drains and recycling and throwing away trash that might go into the river.

**Slide 12)** We can also remove invasive species. By volunteering or working in our own yards and properties we can help stop the spread of some of the nastiest invasive species.

**Slide 13)** After the invasives are taken out we can plant native species that will provide better habitat for wildlife and shade and filter the water in our streams and rivers.

**Slide 14)** To control overpopulated species like deer and raccoons top predators that were hunted to extinction locally like the cougar and wolf can be introduced back into their native ranges.

**Slide 15)** These positive human actions have a big impact on the entire ecosystem helping to stabilize species that were on the brink. We may not be able to bring the ecosystem all the way back to where it used to be but we can ensure its stability and existence in the future.

**Slide 16)** What else can we do to help our ecosystem?

 Educate people, Volunteer, Use less water, Learn more!