**Biological carrying capacities (BCC)**

***On cam Statement:*** Here’s a principal of biology. An ecosystem can only support a limited number of species before problems begin happen.

***On Cam Question:*** So how do scientists determine that number and what things can affect it?

Fish and wildlife biologists manage natural resources for the overall health of certain species and the ecosystem where they live. But sometimes a healthy ecosystem gets damaged when too many of a certain species eat all the food. Just imagine a swarm of locust eating all the vegetation in sight. Once an ecosystem gets that damaged, it can impact the health of everything that lives there. So what’s the right balance?

Biologists call the right balance the “biological carrying capacity”. It’s the capacity of an ecosystem to “carry” or support a healthy number of a certain species. For instance, if a forest type supports 2 healthy bears per square mile, what happens if 4 bears try to live there? They may eat all the available food and not find enough to remain healthy. Plus, if they eat all the fruit and nuts, they might damage the next generation of fruit and nut plants in the ecosystem.

So what variables can affect the biological carrying capacity of an ecosystem for a certain species?

1. The abundance of food sources
2. The sustainability of different food sources
3. Competition for food from other species

Here’s a good example. Sturgeon populations in Lake Winnebago are the highest in the world. So that probably means that the biological carrying capacity is really high considering those three variables.

A 200-pound sturgeon needs lots of food to grow that big. That’s a challenge for a toothless fish that simply sucks stuff off the bottom. Fortunately for the sturgeon, that’s where they find their two prime food sources.

Lake fly populations on Lake Winnebago are so immense that they show up on weather radar like a storm cloud during big hatches. These lake flies live most of their life on the bottom of the lake as larva and pupa. And that’s where sturgeon suck them out of the mud. But once they hatch and fly off as adults, they’re no longer available as a prime food source. So they’re “seasonally” abundant, but not “sustainable” as a food source throughout the whole year.

However, sturgeon aren’t the only fish eating the lake fly larva during times of plenty. Millions of Gizzard Shad also eat the insects there. And when the shad go through their annual cycle, many of them die and sink to the bottom where they provide another rich food source for sturgeon. So combined, the lake flies and shad help provide sustainable or lasting food sources for sturgeon. And that combination boosts the lake’s biological carrying capacity for sturgeon.

But what if too many sturgeon populated the lake and ate so many lake fly larva that the flies had trouble reproducing? Or, what if another fish species such as walleye ate too many of the shad? It’s easy to imagine how both of those variables might affect the lake’s biological carrying capacity for sturgeon.

So how can biologists manage Lake Winnebago for the optimum biological carrying capacity for sturgeon? Like most species of fish and wildlife, biologists help manage an ecosystem by regulating the number of species harvested. If there are too many sturgeon, they can issue more sturgeon licenses to reduce the population. If too many walleye could damage the shad food source, they can increase the catch numbers for walleye. So controlling species populations helps maintain a healthy ecosystem.

Now that you know about biological carrying capacity and what affects it, consider studying it for a species near you. It may be something as simple as the fish in your aquarium or robins in your yard. Choose a species that you can observe over time and make a list of variables that might affect the “biological carrying capacity” for a species. Then list how humans might manage those variables to affect the “biological carrying capacity”.