Biodiversity

Learning Module #15

**Opening Activity**

Question 1:

Question 2:

Biodiversity

Learning Module #15

**Stream Biodiversity**

Question 1: Why is it important to maintain stream biodiversity?

*Brainstorm reasons with your group using this space:*

Question 2: What are threats to stream biodiversity?

*Brainstorm with your group using this space:*

Biodiversity

Learning Module #15

**Estimating Stream Biodiversity**

Simulation 1:

1. Press “Reset”
2. **Set pollution tolerance to “None”**
3. **Set sampling time to “100”**
4. Press “Go” and Click “Open Seine” (i.e., start the simulation)
5. Fill out/answer the following:

Total Species (aka Richness): \_\_\_\_\_\_\_\_\_\_\_\_\_

Total Catch: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sampling Time: \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **Macroinvertebrate** | **Count** |
| Caddisfly |  |
| Mayfly |  |
| Stonefly |  |
| Riffle beetle |  |
| Water penny |  |
| Gilled snail |  |
| Dobsonfly |  |
| Cranefly |  |
| Dragonfly |  |
| Crayfish |  |
| Sowbug |  |
| Worm |  |
| Blackfly |  |
| Midge |  |
| Leech |  |
| Lung snail |  |

What was the relative abundance of caddisflies in Simulation 1? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What was the relative abundance of worms Simulation 1?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Simulation 2:

1. Press “Reset”
2. **Set pollution tolerance to “None”**
3. **Set sampling time to “250”**
4. Click “Open Seine” (i.e., start the simulation)
5. Fill out/answer the following

Total Species (aka Richness): \_\_\_\_\_\_\_\_\_\_\_\_\_

Total Catch: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sampling Time: \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **Macroinvertebrate** | **Count** |
| Caddisfly |  |
| Mayfly |  |
| Stonefly |  |
| Riffle beetle |  |
| Water penny |  |
| Gilled snail |  |
| Dobsonfly |  |
| Cranefly |  |
| Dragonfly |  |
| Crayfish |  |
| Sowbug |  |
| Worm |  |
| Blackfly |  |
| Midge |  |
| Leech |  |
| Lung snail |  |

How did increased sampling time (compared to Simulation 1) time affect the total species? The total catch?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which macroinvertebrate taxon had the highest abundance in Simulation 2?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which macroinvertebrate taxon had the lowest abundance in Simulation 2?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Simulation 3:

1. Press “Reset”
2. **Set pollution tolerance to “None”**
3. **Set sampling time to “500”**
4. Click “Open Seine” (i.e., start the simulation)
5. Fill out/answer the following:

Total Species (aka Richness): \_\_\_\_\_\_\_\_\_\_\_\_\_

Total Catch: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sampling Time: \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **Macroinvertebrate** | **Count** |
| Caddisfly |  |
| Mayfly |  |
| Stonefly |  |
| Riffle beetle |  |
| Water penny |  |
| Gilled snail |  |
| Dobsonfly |  |
| Cranefly |  |
| Dragonfly |  |
| Crayfish |  |
| Sowbug |  |
| Worm |  |
| Blackfly |  |
| Midge |  |
| Leech |  |
| Lung snail |  |

How did increased sampling time (compared Simulations 1 and 2) time affect the total species? The total catch?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Based on this information, if you were sampling multiple streams for macroinvertebrates, do you think it’s important to sample each for the same amount of time? Why or why not?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Simulation 4:

1. Press “Reset”
2. **Set pollution tolerance to “Moderate”**
3. **Set sampling time to “500”**
4. Click “Open Seine” (i.e., start the simulation)
5. Fill out/answer the following

Total Species (aka Richness): \_\_\_\_\_\_\_\_\_\_\_\_\_

Total Catch: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sampling Time: \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **Macroinvertebrate** | **Count** |
| Caddisfly |  |
| Mayfly |  |
| Stonefly |  |
| Riffle beetle |  |
| Water penny |  |
| Gilled snail |  |
| Dobsonfly |  |
| Cranefly |  |
| Dragonfly |  |
| Crayfish |  |
| Sowbug |  |
| Worm |  |
| Blackfly |  |
| Midge |  |
| Leech |  |
| Lung snail |  |

How did the moderate pollution level (compared to no pollution in Simulation 3) time affect the total species? The total catch?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which macroinvertebrate taxa had the highest abundance in Simulation 4? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Did any taxa have 0% relative abundance in Simulation 4? If so, which taxa? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Simulation 5:

1. Press “Reset”
2. **Set pollution tolerance to “Severe”**
3. **Set sampling time to “500”**
4. Click “Open Seine” (i.e., start the simulation)
5. Fill out/answer the following

Total Species (aka Richness): \_\_\_\_\_\_\_\_\_\_\_\_\_

Total Catch: \_\_\_\_\_\_\_\_\_\_\_\_\_\_

Sampling Time: \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| **Macroinvertebrate** | **Count** |
| Caddisfly |  |
| Mayfly |  |
| Stonefly |  |
| Riffle beetle |  |
| Water penny |  |
| Gilled snail |  |
| Dobsonfly |  |
| Cranefly |  |
| Dragonfly |  |
| Crayfish |  |
| Sowbug |  |
| Worm |  |
| Blackfly |  |
| Midge |  |
| Leech |  |
| Lung snail |  |

How did the severe pollution level (compared to no pollution in Simulation 3 and moderate pollution in simulation 4) time affect the total species? The total catch?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Based on this information, how does water pollution affect macroinvertebrate species richness in streams?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

How does water pollution affect the total catch of macroinvertebrates in streams?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Did any taxa have 0% relative abundance in Simulation 5? If so, which taxa? What assumption could you make about these taxa’s abilities to tolerate pollution?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Which three taxa had the highest relative abundances in Simulation 5? What assumption could you make about these taxa’s abilities to tolerate pollution?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Write any other observations below:

Biodiversity

Learning Module #15

**Closing Activity**

Question 1:

Question 2:

Question 3:

Question 4: