



FISHERIES MANAGEMENT INDOOR LAB TEACHER'S GUIDE

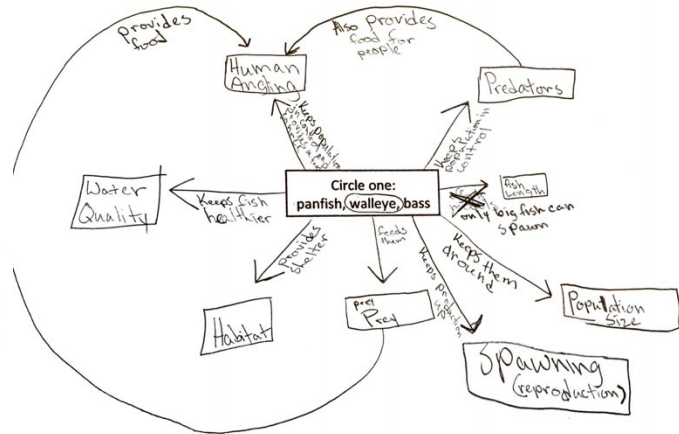
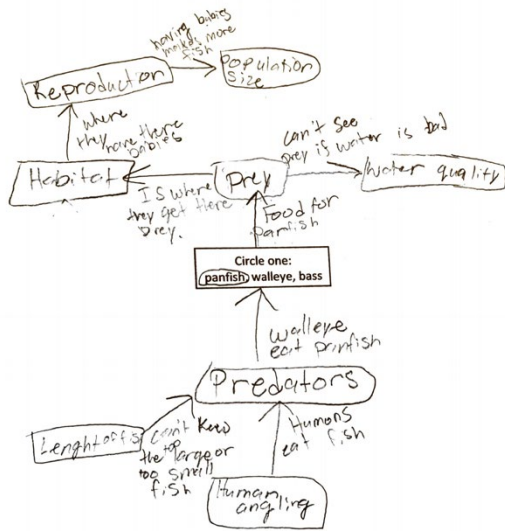
Learning Goal: Learners will understand how complex ecological dynamics affect fish populations and how ecosystem balance is imperative for sustainable fisheries management. They will explore various fisheries practices and examine two case studies to compare differences in ecology and resulting management decisions.

Objectives:

- Understand the role of fisheries managers and the importance of population monitoring.
 - Explain the different functional groups of fish and their role in lake food webs.
 - Illustrate important ecological relationships using a conceptual model.
 - Use the provided case studies to compare and contrast fisheries management strategies.
 - Discuss fisheries regulations and the circumstances they are used to balance fish populations and ensure sustainable harvest.
1. Introduce the guests in the room.
 2. Write on board “Why do some lakes have different management regulations than others?” This will be the main driving question for the lesson.
 3. Ask students what they think fisheries management means? You can break it down by asking “what does fisheries mean? and then ask “what does management mean?” Make sure you draw out responses and lead students to understand that fisheries management is used to take care of fish populations for today and for the future. For long-term sustainability and human use, we need to balance how our interactions affect lake ecology.
 4. Ask students why it is important that fisheries managers monitor fish populations. Key points are: to document the abundance and diversity of fish species, to track migration and movement of fish, determine which habitats are being used, and to document where and when fish are breeding. Importantly, fish play crucial roles in lake food webs.
 5. Have students examine the table with two lake case studies. The table shows the regulations for 2019 for three groups of fish. Allow students to review the table and discuss with a partner. Tell them they should be looking for differences in the regulations for the two lakes and be brainstorming why those differences might exist. Wander around the classroom drawing out explanations as groups are discussing. Intuitively, students will come up with key factors such as the population size, how big the fish are in the lake, the size of the lake, and how many people like to fish at each location. After about five minutes, have a group discussion about

what they learned. Ask students how heavily-developed lakes would differ from wilderness lakes in terms of habitat availability and effects on species and abundance of fish in the lake.

6. These conversations bring out key ideas about appropriate sizes of fish populations. Next have students consider what would happen if too many fish were removed from the lake or if there were too many living in the lake?
7. Then have students consider factors that affect fish populations. Make a list on the board as students offer their ideas. Key factors to draw out include: human angling, reproduction, predator/prey relationships, food availability, population size, the size and age distribution of fish in the population (are they mostly old, mostly young, big, small, etc.), habitats that are available.
8. Each student will now be making their own conceptual model linking all of these ideas together. Explain that these are all things that fishery managers need to consider when making decisions about regulations. Conceptual models are meant to illustrate connections and relationships between different factors. It is important to emphasize that there is no right or wrong conceptual model and everyone's model will look different. Each student has the opportunity to illustrate their individual thoughts (perspectives) and how they organize their understanding of the key interactions in the system. This task is meant to be open to creativity, but should be scientifically sound.
9. To start the students off, begin with an example conceptual model. Select one of the fish species as the center (focus) of the model. The goal is for the students to incorporate each of the terms on the right-hand side of the handout into their model. Start with an easy one (like prey). Write prey below the focal fish (we used panfish). Describe how you draw an arrow from the focal species to the box with the word "prey" in it. Terms will be surrounded by boxes, but the arrows will describe the interaction between the two terms. The arrow here could be labeled "energy for panfish." Emphasize that each term should be connected to something. The arrows can be any direction and go to any other term in the model as long as they are labeled with the reasoning behind the interactions.



10. Have students work through their conceptual model and when they are done, they can share with their partner.

11. Finally, explain how different regulation types are put into place depending on the circumstances of the lake being managed.

- Bag limits – limits the number of fish you can take home
- Size limits – limits the size of fish you can take home
- Open seasons – limits the time of the year when you can fish for that species
- Catch and release – when a species can't be removed from the lake. You can remind students that there are ethical ways to catch fish and release them to ensure survival and reduce harm.

12. In the lab manual, section 3 lists several regulation types and management strategies. The students should draw a line from the regulation type to the management strategy for that regulation. Correct answers below:

- Bag limits – limits the number of fish taken out of a lake. Keeps population numbers at a good level.
- Size limits (you can only keep big fish) – reduces the number of big fish in the lake. Could be used if there are too many fish in the lake.
- Size limits (you can only keep small fish) – keeps larger fish in the lake to reproduce.
- Open seasons – makes sure that fish aren't being caught or disturbed during the months that they reproduce.
- Catch and release – allows anglers to catch fish, but the fish can continue to grow and reproduce in the lake.