

C'Waam and Koptu Lessons:

3rd Grade

*Lessons on the of life cycle of fish C'Waam
and Koptu fish of the Klamath Basin and
What an Incomplete Cycle Means*



C'waam and Koptu Lesson Content

- Introduction to the C'Waam and Koptu of the Klamath Basin
- Lesson Overview for Teachers
- Lesson 1: Life Cycles: Fish and Other Animals
- Lesson 2: Changes in Environment
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- Notes

Introduction to the C'Waam and Koptu of the Klamath Basin

The Klamath Tribes have always lived in and around the Klamath Basin. Long ago, our basin looked very different. Where there are now dry pasture and crop lands, there used to be lakes and wetlands. The marshes of the area were a stopping point for hundreds of species of birds on their long migration. The birds would eat and rest on the land. The wildlife was abundant. And the Klamath people lived off what was provided by the land. Foods that are traditional sources of nutrition for Indigenous people are called *First Foods*. One of the *First Foods* of the Klamath people is the sucker fish that are native to the Klamath Lake and rivers around it. These fish are the C'waam (pronounced tch-wom) and Koptu (Pronounced cop-tu). They were called Lost River Suckers and Short-Nose Suckers by the settlers to the region. And they are endemic species. The fish and the Klamath have lived here for *time immemorial*. These fish have adapted to live in this specific environment. However, the Klamath Basin has changed so drastically, that they are no longer suited to live here, and the fish are dying.

The Klamath Lake is the largest body of freshwater west of the Rocky Mountains. Before the land was converted to agricultural use, it was largely marshes and wetlands that covered much of the area. In 1902, President Theodore Roosevelt authorized the reclamation of swamps and lakes to increase land acreage available for agricultural use. Lakes and wetlands were drained for cultivation. This changed the ecosystem and has caused a steady decline in the health of the Klamath Lake and wildlife around it. Two species that have suffered to the point of almost certain extinction are the C'waam and Koptu fish. These fish are culturally significant to the Klamath people. And they are just one part of the natural habitat that has been devastated by the change in the land. The Klamath people have lost many other traditional first foods.

The goal behind this lesson is to teach students the changes that took place in the Klamath Basin and the impact it has had on the wildlife here, particularly the C'waam and Koptu fish. We want students and teachers to understand the importance of these fish to the Klamath people and surrounding community. Our C'waam creation story ties the health of these fish to the health and prosperity of our people. We believe that the fish are intricately tied to the health of our people. And we share this belief through the creation story. Indigenous people have long used stories to explain the world around them and recent studies have reinforced the importance of story in the learning process.

We hope this curriculum serves as a jumping off point for you and your students to talk about the environment and how important it is to protect it.



Lesson Overview for Teachers:

The first lesson dives into life cycles. The students will learn how all living things have life cycles. They can be very similar, or they can be very different. But they all have four things in common: birth, growth, reproduction, and death. Then they will learn about C'waam and Koptu and how their life cycle is cut short. The students will hypothesize what happens when the fish are unable to complete their life cycle.

The second lesson centers around the idea that when an environment changes, it hugely impacts everything that lives there. Some things will thrive, some will survive, and others will die. The students will learn about how the changes in the Klamath Basin have affected the animals that live there.

Finally, the third lesson explores the idea that the C'waam and Koptu fish dying are just the symptom of a much larger problem. And that is that the Klamath Lake is very unhealthy. Students will learn the history of the lake and how it became unhealthy. They will look at multiple perspectives on the problem and how different groups are affected by it. Hopefully, at the end of this lesson, students will have the capacity to articulate what happened to the lake, who the changes affected, and what might happen if nothing is done.

State Standards:

Science:

✓ 3-LS1, 3-LS4

Social Science:

✓ 3-18, 3-19

Essential Understandings:

Since Time Immemorial
Lifeways
History

Learning Outcomes:

- Students will be able to describe describe all four common stages of a life cycle.
- Students will be able to say what happens when a life cycle is cut short.
- Students will be able to describe why some traits are good for animals to have.
- Students will be able to say why some animals do not survive when an environment changes.
- Students will be able to explain why people should care that the C'waam and Koptu fish are dying.
- Students will be able to identify two perspectives of the problem of the unhealthy lake and three living things affected by it.

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Vocabulary:

C'waam and Koptu – Sucker fish that are endemic to the Klamath Basin.

Endemic Species – Species that only exist in one place in the world.

Life Cycle – A series of changes that happen to living things.

Offspring – The children or young of a living thing.

Reproduction – The process by which living things make new offspring.

Time Immemorial – For as long as anyone has a memory.

Step 1. Life Cycles PowerPoint

Review the Life Cycles PowerPoint with your students. You can refer to the notes section of the slides or the prompts are found below as well:

Slide 1: Let's talk about life cycles.

Slide 2: All living things go through a series of changes.

Slide 3: Some of the changes all living things go through are Birth, Growth, Reproduction and Death.

Slide 4: We call it a "cycle" because it repeats itself over and over. That is how there are always new baby sheep and cows in the spring. And why there are always bees even though they only live a few weeks.

Slide 5: Two adults make a baby; it is born and grows. Then it reproduces and makes more babies, and eventually it dies. But its babies live to make more babies.

Slide 6: A mouse is born as a live baby mouse, and a butterfly starts as an egg that develops into a caterpillar before becoming a butterfly. BUT, they all go through the four main stages: Birth, Growth, Reproduction, and Death.

Slide 7: Offspring are an animal's young. Some animals have lots of offspring. And some on have one or two.

Slide 8: C'waam and Koptu are fish that live here in the Klamath Basin. They have many, many offspring. Some lay over 20,000 eggs.

Slide 9: The C'waam and Koptu fish are sometimes called "sucker fish". They are endemic to the Klamath Basin. Does anyone know what endemic means? Endemic means they are only found in one place in the world. These fish have lived here for a very, very long time.

cont.

Step 1. Life Cycles PowerPoint

Review the Life Cycles PowerPoint with your students. You can refer to the notes section of the slides or the prompts are found below as well:

Slide 10: The C'waam are very important to another group who have lived here a very long time. The Klamath people. The Klamath people have lived here for Time Immemorial. When we say "Time Immemorial", we mean for as long as anyone remembers.

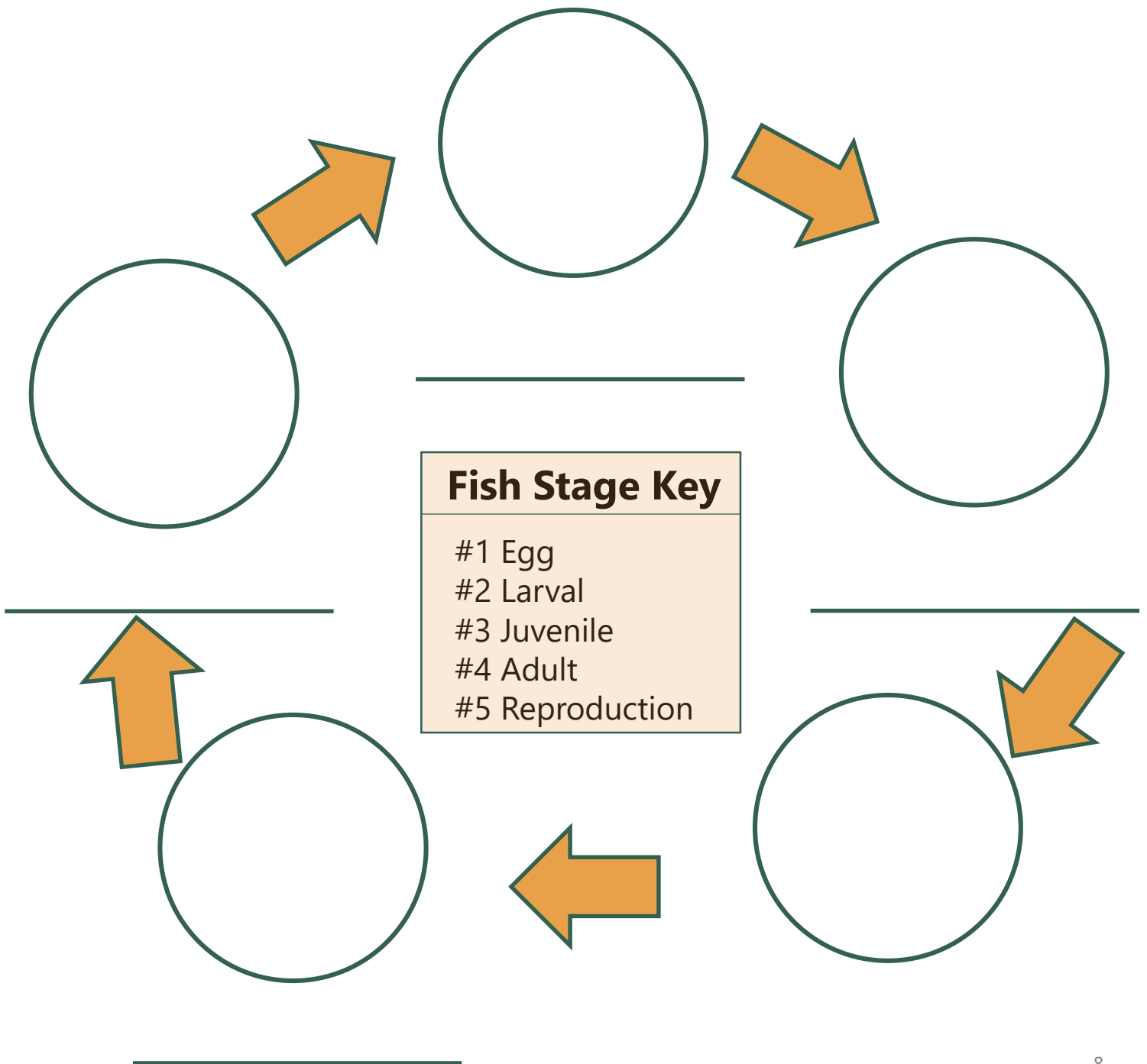
Slide 11: C'waam and Koptu (like most fish) start out as eggs. They then hatch and become larval fish. Next, they develop into juvenile fish who grow into adult fish. The adult fish then lay eggs and the cycle starts again. Let's look at each of these stages of the life cycle.

Slide 12: Over the past 30-40 years, the C'waam and Koptu haven't been able to complete their life cycle. The juvenile fish are dying because the Klamath Lake is so dirty. The dirty water is bad for the adult fish too, but the younger fish are more vulnerable. And the Klamath Tribes are very worried. Let's learn more about life cycles and what happens when a life cycle is stopped.

Life Cycle of a Fish

C'waam and Koptu, like many other fish, start out as eggs (Stage #1). The adult female fish lays many, many eggs. They are immediately fertilized by male fish. If the male fish didn't give the eggs his genes, the eggs would not develop into fish. Next, the eggs grows into larval fish (Stage #2). At this stage, the yolk sac from the egg stays attached. The larval fish is still using the yolk for nutrition. Once the larval fish sheds the yolk sac, it becomes a juvenile fish (Stage #3). The juvenile fish continue to grow and mature until they become adults (Stage #4). Adult fish can reproduce. Reproduce means to make young or offspring. The adult fish then lay and fertilize eggs (Stage #5), and the cycle starts again.

Draw and label the stages of the life cycle of a fish using the key.



A Fishy Hypothesis

The Klamath Lake has become very unhealthy for fish, people, animals, and plants. So much so, that the C'waam and Koptu fish are not able to complete their life cycle. When the juvenile fish swim down the river towards the lake in the spring, they find it to be dirty and unhealthy. The lake is unhealthy for all fish, but it is extra hard on the young C'waam and Koptu. They almost all die by the end of the summer. Their life cycle stops at the juvenile fish.

A **Hypothesis** is an educated guess about what will happen when a change occurs. You are going to make a hypothesis about the problem of the unhealthy lake. What do you think will happen to the the C'waam and Koptu fish when they aren't able to complete their life cycle?

I hypothesize that when the fish can't complete their life cycle, this will happen to the Koptu and C'waam:

I hypothesize that when the fish can't complete their life cycle, this will happen to the other animals and plants in the Klamath Lake:

Lesson 2: Thrive, Survive, and Die

Step One: Present the Thrive, Survive, and Die PowerPoint

Ask the students if they know what an environment is. Give them time to answer. You could write their answers or key words on the whiteboard, or just listen. One definition is “the surroundings or conditions in which a person, animal, or plant lives”. Ask the students what makes up their environment at school. Make a list on the whiteboard. Choose one of the (more important) items and cross it out. Ask them what would happen if it was no longer there. An example may be their books...it would make learning hard. Or their friends...that would make school less fun. Or possibly, you, the teacher...that would make learning REALLY hard.

Tell the students that you are going to learn about how the environment of the Klamath Lake has changed and how that affected the things living there.

There are notes accompanying each slide in the PowerPoint, but they are also included below.

Slide 1: When natural environments change, the living things in that environment will do one of three things: Thrive, Survive, or Die.

Slide 2: The Klamath Basin has not always looked the way it does now. It used to be full of Marshes and Wetlands. Marshes and wetlands are types of habitats. They contain a lot of water.

Slide 3: But much of that water was drained to grow food and raise cattle. This created new habitats called croplands and pasturelands, and they are some of the least biodiverse habitats. Biodiversity is the amount of different living things in a habitat. In general, the more biodiverse an environment is, the healthier it is.

Slide 4: Lakes that were here for many, many years no longer exist because they were drained to create this pasture and crop land.

cont.

Lesson 2: Thrive, Survive, and Die

cont.

Slide 5: Livestock, like cattle, produce nitrogen and phosphorus that get into the water. These are already found in nature, but animals produce them in very large quantities. And when they drain into the water around them, they make the water dirty. The same thing happens with crops. The drain off from the chemicals used to make the crops grow also make the water dirty.

Slide 6: Marshes and wetlands can help with the problem of dirty water. One of the amazing things that happen in wetlands is that the plants filter the water. They take the phosphorus and nitrogen out of it. But, many of the marshes and wetlands in the Klamath Basin have been removed to make way for agriculture. This means the water is getting dirtier with no way to clean it. And it is changing the environment of the Klamath Lake.

Slide 7: But much of that water was drained to grow food and raise cattle. This created new habitats called croplands and pasturelands, and they are some of the least biodiverse habitats. Biodiversity is the amount of different living things in a habitat. In general, the more biodiverse an environment is, the healthier it is.

Slide 8: These changes in the habitat of the Klamath Basin have changed the environment that many living things reside in. The environment is all the living and nonliving things that make up the space around you. The environment of the Klamath Lake has changed a lot since the habitats surrounding it have changed. And these changes have been hard on many living things.

Slide 9: When an environment changes drastically, some living things will thrive and do better, some will survive, and some will die. Let's look at some examples of each in the Klamath Basin.

Slide 10: Who thrives in this warmer lake with low oxygen levels and dirtier water?

cont.

cont.

Slide 10: Blue Green Algae does well in the new conditions. The warm, dirty water is the perfect place for it to thrive. The phosphorus in water from the croplands and pastureland around the lake is food for the algae. The lower water levels make the water the perfect temperature.

Slide 11: Fathead minnows are not naturally found in the Klamath Lake. However, they do quite well in the new environment. They tolerate warmer water and lower levels of oxygen that are found in the Klamath Lake in the summer.

Slide 12: Next, let's see who only survives in this warmer lake with low oxygen levels and dirtier water?

Slide 13: Redband Trout that are native to the Klamath Lake are surviving. They are nowhere as numerous as the fathead minnows, but they are still able to reproduce.

Slide 14: The American White Pelicans that long used the Klamath Basin marshes as a resting point on their migration path, still stop here. But there are not nearly as many of them as there used to be.

Slide 15: Some plants and animals die in this new environment.

Slide 16: Wocus is a yellow water lily that used to be all over the marshes of the Klamath Basin. When they were drained, the wocus began to die. The wocus were a very important part of the Klamath peoples' diet.

Slide 17: The C'waam and Koptu who only live in the Klamath Basin die. This is remarkable because these fish have adapted over hundreds of thousands of years to this environment, and in just over 100 years, they are nearly extinct. Extinct means to be no longer found in nature.

Slide 18: The C'waam and Koptu fish have been around for a very long time. They are very resilient. Resilient means able to live in difficult conditions. If they are dying, this is the sign of a very unhealthy environment. It is likely that other living things will soon follow.

Lesson 2: Thrive, Survive, and Die

Step Two: Thrive, Survive, and Die Worksheet

Hand out the Thrive, Survive, and Die Worksheets. There are four (4) pages. Ask the students to recall the information from the PowerPoint as they fill out the worksheet.

The first part is simply just identifying which living things thrive, survive, or die in the new environment of the Klamath Basin. The second part, the students are asked to make a hypothesis about why the living thing thrives, is able to survive, or dies in the environment.

The third part (4th page) asks the students to think about what is significant about the C'waam and Koptu and other living things dying in a place where they have always thrived. This is a big critical thinking step. You can assist the students with thought sparking questions like "What would happen to all of the worms if suddenly there was no more water in the earth? Their skin would dry up and they wouldn't be able to survive. What would happen to the birds that rely on the worms for food?"

Potential answers for the question of "why it is significant that these fish are dying" could be that they may just be the first things to die and other things may die next. Or some other living things may depend upon the C'waam for survival and when the C'waam die, the other living things will too. Or it could be a sign that the lake is very, very unhealthy. Answers can also be more philosophical...All living things should be saved. C'waam and Koptu hold spiritual importance to the Klamath people. Feel free to explore the many ramifications of a species dying out.

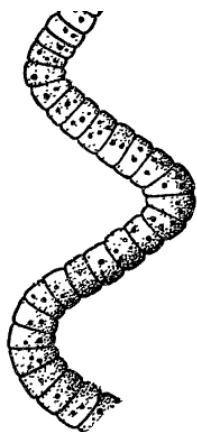
Have students break into groups to complete the worksheet. They may be able to produce more answers together than on their own. When the students complete their worksheets, assign each group an organism and have their group present their answers. You could ask the other groups if they had a different answer.

Survive, Thrive, or Die?

Look at the following images below. Decide if the living thing THRIVES, is able to SURVIVE, or DIES in the new environment of the Klamath Lake. **Circle** your answer. As a group make a hypothesis about why this might happen.

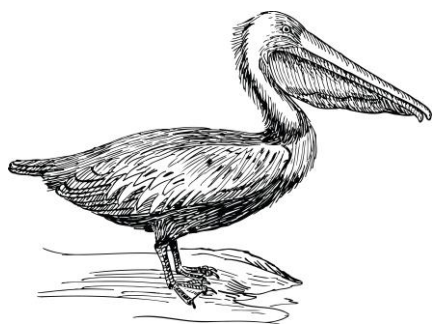
Organism

Why?



Blue Green Algae

SURVIVE THRIVE DIES



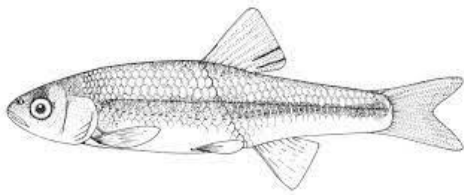
American White Pelican

SURVIVE THRIVE DIES

Survive, Thrive, or Die?

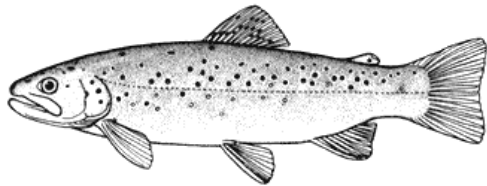
Organism

Why?



Fathead Minnow

SURVIVE THRIVE DIES



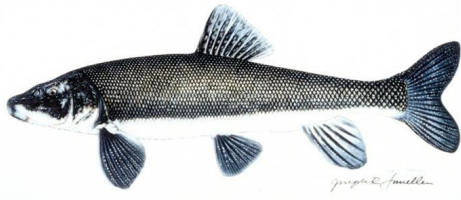
Redband Rainbow Trout

SURVIVE THRIVE DIES

Survive, Thrive, or Die?

Organism

Why?



C'waam

SURVIVE THRIVE DIES



Wocus

SURVIVE THRIVE DIES

Lesson 3: The Problem of the Unhealthy Lake

Step One: The Problem of the Unhealthy Lake PowerPoint

Go through the slideshow of the The Problem of the Unhealthy Lake. The PowerPoint has notes, but they are also provided below:

Slide 1: The fact that the C'waam and Koptu are dying is just part of the problem. They are more of a warning to us of the huge problem. The bigger problem is that the Klamath Lake has become incredibly unhealthy.

Slide 2: When the land in the Klamath Basin was changed, it resulted in a very unhealthy lake and ecosystem. An ecosystem is a community of living things that interact with each other and their physical environment. Some of the results of the change are: Low Water Levels, Warmer Water, Neurotoxins in the Water, Low Oxygen Levels, and Lots of Phosphorus.

Slide 3: The water level in Klamath Lake has been drastically decreased. There is less water to start with in the lake because the amount of rain and snow have decreased over time. Additionally, water is taken from the lake to irrigate agricultural land. Every year, about 75% of the water in the lake is removed. The already low water levels decrease an additional 7-8 feet. Every year, there is less water to go around. Farmers and ranchers need water. The Klamath Tribes need water to protect the wildlife in and around the lake. There is simply not enough.

Slide 4: Imagine if you had a fish tank. And every year for a few months, you took out $\frac{3}{4}$ of the water. What would happen? (The water would get dirty faster. The fish might get sick. It would be harder for the fish to spread out.) This is what happens every year in the Klamath Lake. There is a lot less water, so the water becomes dirty faster.

Slide 5: Less water, means the lake will heat up more quickly as the days get warmer.

Slide 6: The warmer water makes a nice home for blue green algae. Blue green algae is okay in small quantities, but too much of it makes the lake unhealthy. When the algae dies, it is decomposed by bacteria. Decomposed means broken down. It's like when plants die, they slowly get turned back to soil. But when algae dies, the bacteria breaking it down makes neurotoxins.

Slide 7: Neurotoxins are chemicals that are harmful. When they are in the lake, they make it really unsafe for people and animals. The neurotoxins in the lake come from the blue green algae being broken down.

Lesson 3: The Problem of the Unhealthy Lake

Slide 8: Besides producing neurotoxins, the bacteria that break down blue green algae use a lot of oxygen in the process. This decreases the amount of oxygen in the lake. Without oxygen, some of the fish and water insects living there suffocate and die.

Slide 9: Imagine being in an underground room. And the air from outside was cut off. Eventually, it would become harder and harder to breathe. That is what it is like for fish and underwater insects.

Slide 10: Everyone poops. Even cattle. And their poop has a lot of phosphorus in it. When they do it in or near the water, it makes the water full of phosphorus. Phosphorus is a mineral that we all need. But when there is too much of it in the water, it makes the water unhealthy. One thing that phosphorus does is increase how fast blue green algae grows.

Slide 11: This is one reason why there is so much of the algae in Klamath Lake. Cattle are allowed to get in and really near the water. This increases the amount of phosphorus in the water. And the amount of blue green algae. And the breakdown of that algae uses the oxygen out of the water.

Step 2: Brainstorm

Using a whiteboard to record the ideas, have your students make a list of the living things that are affected by the unhealthy lake. (Klamath people, farmers and ranchers, people living in the Klamath Basin, future generations of people, animals living in and around the lake, birds who use the land as part of their migratory path.)

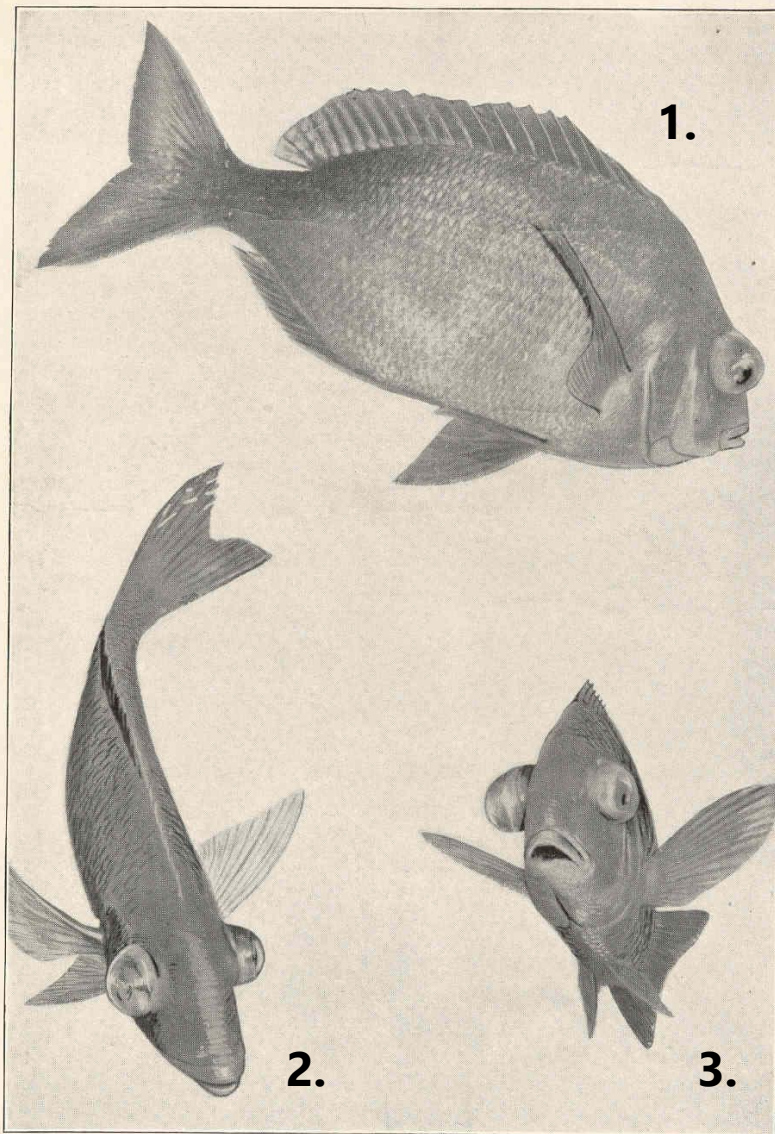
Step 3: Point of View Worksheet

On your whiteboard, make four columns. The first is labeled "Whose Point of View", the second "Results of No Change", the third "Change Desired" and the fourth "Results of Change". Divide the class into groups, equally distributing learning levels. Have each group choose a perspective to take from the list you made. Have students reflect and complete their worksheet as a group. The groups will present the problem from the perspective of their choice to the entire class. At the end of each presentation record their answers on the columns on the whiteboard.

Lead a discussion with the class about why this is such a hard problem. (Different perspectives have different values, not everyone can get what they want, etc.)

Points of View

Every problem can be looked at multiple ways. The way you look at something is called your point of view. When we try to solve problems, it is important to look at the problem from other peoples' points of view to get a better idea of the whole problem. Look at the picture of the fish below. All three images are the same fish, but they look very different.



SCUP (*Stenotomus chrysops*). Three views of the same fish taken while alive in the aquarium of the United States Fish Commission at Woods Hole, Mass.

If you only saw the fish from the first point of view, how would you describe the fish?

If you only saw the fish from the second point of view, how would you describe the fish?

If you only saw the fish from the third point of view, how would you describe the fish?

When you look at the fish from all points of view, you know that the fish is broad, but skinny, and not very tall. His eyes bulge and he has six fins. He has scales and gills.

Points of View

Think about the problem of the unhealthy lake. Fill out the worksheet from the point of view that your group choose.

Point of View:

What happens to this group of people/animals if nothing changes?

What is a possible solution that would help this group of people/animals?

What would the result of this solution be?

Who is affected by this solution?

Additional Resources for Teachers

Below are links to additional resources that will deepen your understanding of the material, if you choose to view them.

A River Between Us - <http://www.ariverbetweenus.com>

A documentary of the water crisis in the Klamath Basin. The film captures the issues at hand and key players in the crisis. It investigates the relationships that were built between the Klamath Tribes and local farmers and ranchers.

Killing the Klamath Documentary on PBS –

<https://www.pbs.org/video/killing-the-klamath-53mgh2/>

Another documentary produced by the Klamath Tribes. This 21-minute film focuses on the crisis of the endangerment of the C'Waam and Koptu fish and the effects on the Klamath people.

Klamath Tribes - <https://klamathtribes.org/restoring-fish-and-a-dying-lake/>

US Fish & Wildlife Services -

<https://www.fws.gov/nativeamerican/pdf/why-save-endangered-species.pdf>

Oregon Wild Webcast -

https://www.youtube.com/watch?v=C3mRjKwF_p4

Notes

Overview of Who Makes up the Klamath Tribes

Today it is common to say that the Klamath Tribes include the Klamath and Modoc Tribes and the Yahooskin Band of Paiute Indians. But this is a *colonial simplification*.

Today's "Klamaths" were once many villages of maqlaqs (people) scattered across Upper Klamath Lake (ews), Klamath Marsh (ewkshi), the Williamson River (ya?aga), the Sprague River (plaikni goge), and others on the Wood River including: e'okak, e'ukwa'lksi, and kowac'di. The villages were distinct entities, had headmen, and were often matrilocal (husbands moving to wives' villages). Modern Klamaths refer to themselves collectively as: ewksiknii or people of the waters. Traditional foods included: lilhanks (deer), c'wam, koptu, and as many as ten other distinct varieties (of suckers), ipos (roots), meYas (trout), and c'iyaaals (salmon).

Today's "Modocs" were many bands before contact with European Americans, including: Hat Creek, Hot Creek, Cumbutwas, and Lost River. Their villages surrounded Tule Lake and massive Lower Klamath Lake. The former was greatly reduced in size by encroaching Americans, who also drained the latter completely in the early 20th century for agriculture. The result is the continuing destruction of many of the Modoc bands' traditional food sources, which included: wocas (lily pod seeds), tmo (grouse), kay (rabbit), and cew (antelope). At one time, before the coming of the whites, the Modoc and Klamath were one people. They spoke different dialects of the same language—which is fundamentally different from the languages of all neighboring peoples.

Today's Yahooskin Paiutes are the Numu (people) whose traditional lands are to the east of the Klamaths and northeast of the Modocs. Their name (Yoo'hoo) comes from the Paiute word for grease, which was used by their ancestors to repel insects. Before the colonizers, their bands were pockets of families, including: Chocktoot, Paulina, and Winnemucca. Their hunting and gathering range was immense. Traditional foods include: tihikya (deer), kammi (jackrabbits), pihi (geese), toisabui (chokecherries), and tuyu (wild plums). As traditional enemies of the Klamaths, the early years on the reservation were difficult. Yainax Agency on the eastern side was established in 1870 to minimize conflicts with the Klamath. The Paiute language is wholly different from both Klamath and Modoc. Reducing this complexity to "tribes" was a political act of the United States to facilitate treaty making. It was also a function of 19th century anthropologists' prejudices. After 140 years of living together on the same reservation, many of today's members trace their lineage to more than one of the three "tribes."

*Written by Clayton Dumont, Klamath Tribes General Council -Member at Large,
Written in collaboration with Clay Chocktoot, Steve Weiser, Christine Allen, Debbie Riddle,
Kya Jackson, and Buzz Kirk*