Name: _____ Date: _____

The Summer Dead Zone at a River's Mouth

Circle group

Where a big river meets the sea, the water often looks muddy and full of life. In some places, though, something odd happens each summer. In the lower layers of the water, oxygen gets so low that most fish and crabs cannot live there. This area is called a dead zone. Its story starts far upstream.

Rain washes fertilizer from farm fields and lawns into streams. Wastewater from towns adds more nutrients. The streams join the river, and the river carries it all to the coast. The nutrients, mostly nitrogen and phosphorus, are food for tiny floating algae. In the warm, sunny months, the algae grow into huge blooms.

Algae live a short time. When they die, they sink to the bottom. Bacteria feed on them there. The bacteria use up oxygen as they work. Also, fresh water from the river sits on top of the heavier salt water, like a lid. Warm weather makes this layering stronger. Little oxygen from the air can reach the bottom. The bacteria keep using oxygen, and soon it runs out.

Fish can swim away to better water. Clams and worms cannot move fast, so they may not escape. The causes are spread over a huge watershed, so the fixes must be too. Farmers can plant cover crops and leave strips of plants beside streams to catch extra nutrients. Towns can clean wastewater better. Where people have done this, the problem has sometimes eased.

Questions

1. What is a dead zone?

_____

_____

2. Which nutrients wash from farm fields and lawns into streams?

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_____

3. What do bacteria do after the algae die and sink?

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_____

4. What can farmers do to help?

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_____

5. Why does fresh water on top of salt water make the problem worse?

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_____

6. Why do clams and worms suffer more than fish?

_____

_____

7. Why must the fixes be spread over a whole watershed?

_____

_____

Words to know

fertilizer: a substance added to soil to help plants grow
algae: very simple plant-like living things that grow in water
bloom: a huge, quick growth of algae in the water
bacteria: tiny living things too small to see without a microscope
watershed: all the land that drains into one river

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Summer Dead Zone at a River's Mouth

Triangle group

Where a large river meets the sea, the water often looks muddy and full of life. In some places, though, a strange thing happens each summer: in the lower layers of the water, oxygen drops so low that most fish and crabs cannot survive there, an area that scientists call a dead zone, and its story begins far upstream.

Rain washes fertilizer from farm fields and lawns into streams, and wastewater from towns adds more nutrients before the streams join the river, which carries everything toward the coast. The nutrients, mostly nitrogen and phosphorus, act as food for tiny floating algae. In the warm, sunny months, the algae multiply into enormous blooms.

Algae live for a short time. When they die, they sink toward the bottom, where bacteria feed on them. These bacteria use up oxygen as they work. At the same time, the fresh water from the river lies on top of the heavier salt water, like a lid, and warm weather strengthens the layering. Little oxygen from the air can reach the bottom layer. As the bacteria keep breathing, the oxygen runs out.

Animals that can swim, such as many fish, usually escape to better water. Creatures that cannot move quickly, such as clams and worms, may not. Because the cause is spread across a huge watershed, solutions must be too. Farmers can plant cover crops and leave strips of plants beside streams to catch extra nutrients, and towns can improve how they treat wastewater. In places where such steps have been taken, the problem has sometimes eased.

Questions

1. What is a dead zone?

_____

_____

2. Which nutrients wash from farm fields and lawns into streams?

_____

_____

3. What do bacteria do after the algae die and sink?

_____

_____

4. What steps can farmers take to help?

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_____

5. Why does fresh water lying on salt water make the problem worse?

_____

_____

6. Why do clams and worms suffer more than fish?

_____

_____

7. Why must the solutions be spread across a whole watershed?

_____

_____

Words to know

fertilizer: a substance added to soil to help plants grow
algae: very simple plant-like living things that grow in water
bloom: a huge, quick growth of algae in the water
bacteria: tiny living things too small to see without a microscope
watershed: all the land that drains into one river

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

The Summer Dead Zone at a River's Mouth

Square group

Where a large river empties into the sea, the water often appears muddy and teeming with life. In certain places, however, a peculiar thing occurs every summer. In the lower layers of the water, the oxygen falls so low that most fish and crabs are unable to survive there. Scientists call such an area a dead zone, and the explanation for it begins far upstream.

Rainfall washes fertilizer from farm fields and lawns into small streams, and wastewater from towns contributes still more nutrients. The streams flow into the river, and the river carries everything toward the coast. The nutrients, mostly nitrogen and phosphorus, serve as food for tiny floating algae. During the warm, sunny months, the algae multiply into enormous blooms.

Algae live only briefly. When they die, they sink toward the bottom, where bacteria feed on them, consuming oxygen as they work. At the same time, the fresh water from the river rests on top of the heavier salt water like a lid, and warm weather strengthens that layering. Very little oxygen from the air is able to reach the bottom layer. As the bacteria continue to breathe, the oxygen is gradually exhausted.

Animals that can swim, including many fish, usually escape to better water. Creatures that cannot move quickly, such as clams and worms, frequently do not. Because the cause is scattered across an enormous watershed, the solutions must be as well. Farmers can plant cover crops and leave strips of vegetation beside streams to catch excess nutrients, and towns can improve the way they treat their wastewater. In places where such steps have been taken, the problem has sometimes eased.

Questions

1. What is a dead zone?

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2. Which nutrients are washed from farm fields and lawns into streams?

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_____

3. What do bacteria do once the algae die and sink to the bottom?

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4. What steps can farmers take to reduce the problem?

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_____

5. Why does fresh water resting on salt water make the problem worse?

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_____

6. Why do clams and worms suffer more than fish do?

_____

_____

7. Why must solutions reach across an entire watershed?

_____

_____

Words to know

fertilizer: a substance added to soil to help plants grow
algae: very simple plant-like living things that grow in water
bloom: a huge, quick growth of algae in the water
bacteria: tiny living things too small to see without a microscope
watershed: all the land that drains into one river

Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

For the teacher: The Summer Dead Zone at a River's Mouth

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

Circle: The Summer Dead Zone at a River's Mouth

Easier · 240 words · Flesch-Kincaid grade 4.6

1. An area of water where oxygen is so low that most fish and crabs cannot live.
2. Mostly nitrogen and phosphorus.
3. They feed on the algae and use up the oxygen.
4. They can plant cover crops and leave strips of plants beside streams.
5. It works like a lid, so little oxygen from the air reaches the bottom.
6. They cannot move fast enough to escape to better water.
7. The nutrients come from many places far upstream.

Triangle: The Summer Dead Zone at a River's Mouth

This passage · 260 words · Flesch-Kincaid grade 7.5

1. An area of water where oxygen is so low that most fish and crabs cannot live.
2. Mostly nitrogen and phosphorus.
3. They feed on the algae and use up the oxygen.
4. They can plant cover crops and leave strips of plants beside streams.
5. It acts like a lid, so little oxygen from the air reaches the bottom layer.
6. They cannot move quickly to escape to better water.
7. The nutrients come from many places far upstream.

Square: The Summer Dead Zone at a River's Mouth

Harder · 274 words · Flesch-Kincaid grade 8.5

1. An area of water where the oxygen falls so low that most fish and crabs cannot survive.
2. Mostly nitrogen and phosphorus.
3. They feed on the algae and consume the oxygen.
4. They can plant cover crops and leave strips of vegetation beside streams.
5. It acts like a lid, so very little oxygen from the air reaches the bottom layer.
6. They cannot move quickly enough to escape to better water.
7. The nutrients come from many places far upstream.