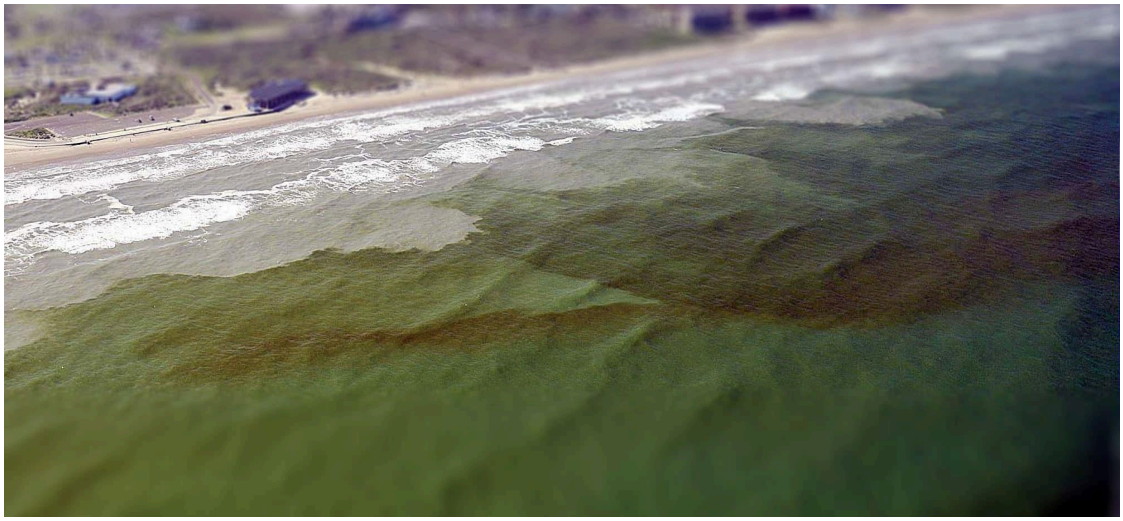
Source: NOAA

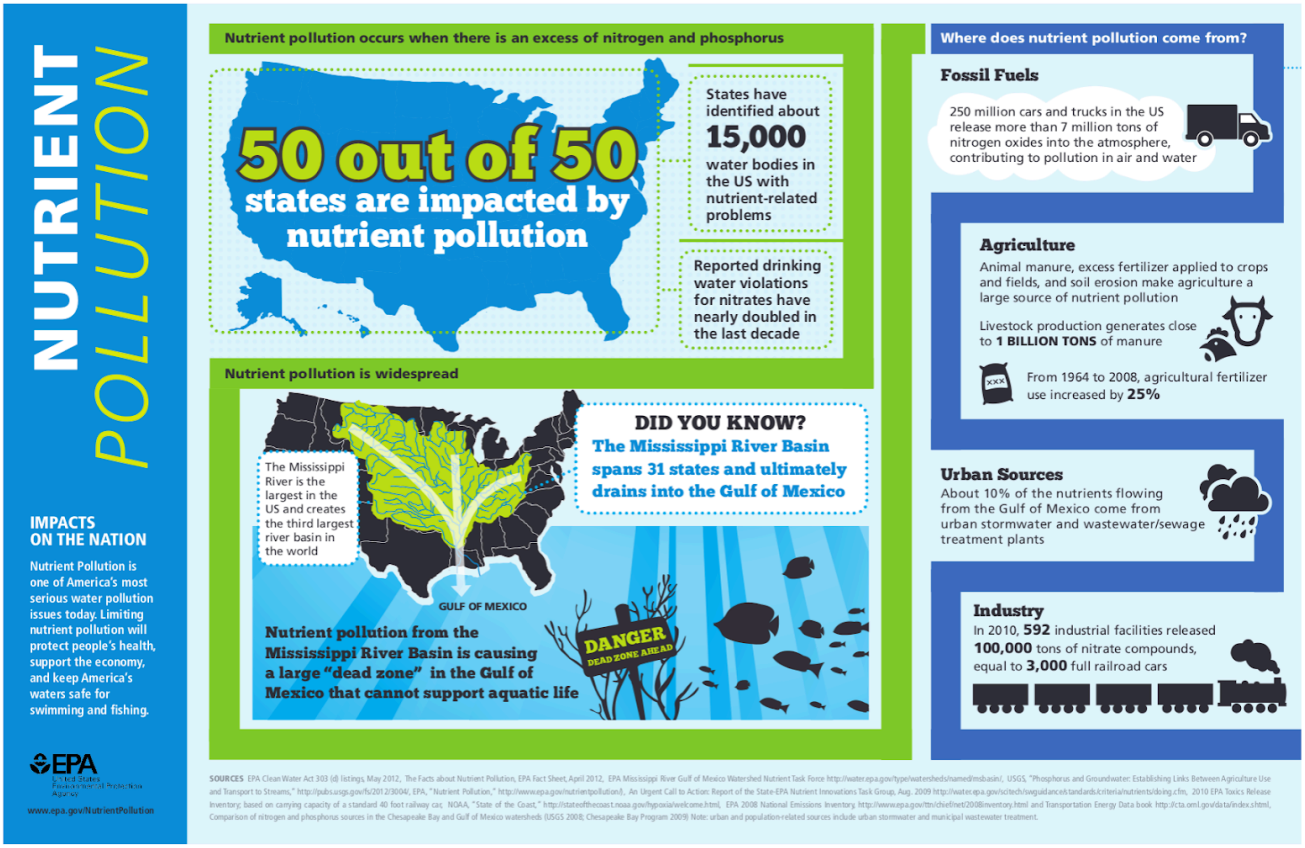


Source: NOAA

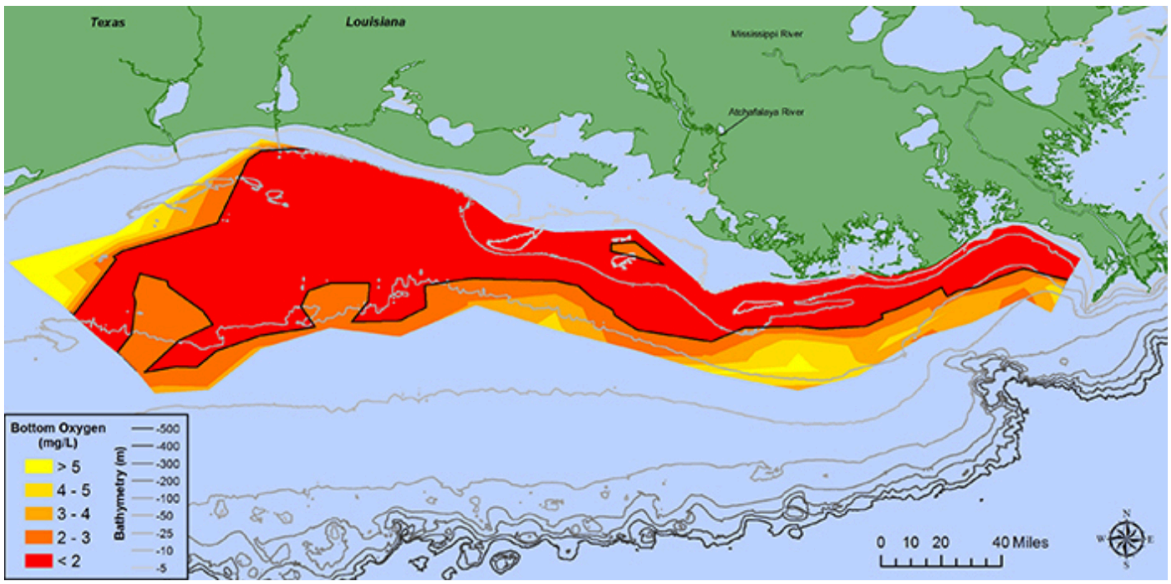
Source: USGS

Gathering Data

For a larger version of the Infographic go to What is Nutrient Pollution? (https://www.epa.gov/nutrientpollution/infographic-what-nutrient-pollution)



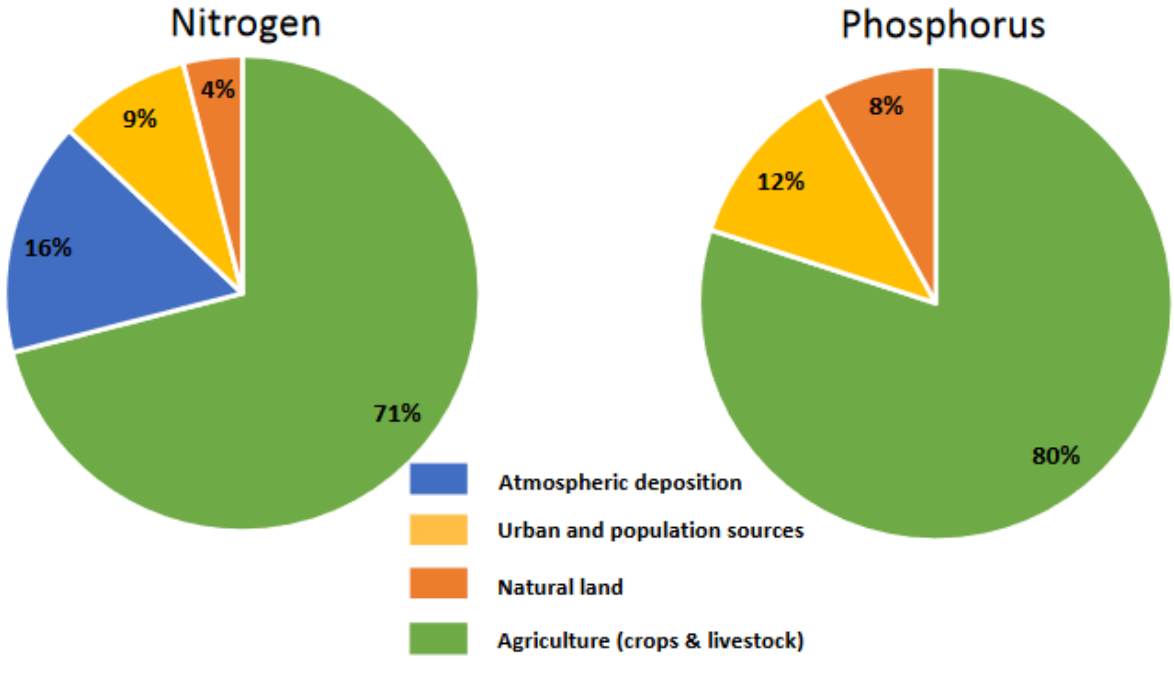
Source: EPA



Gulf of Mexico dead zone in July 2017. At 8,776 square miles, this year's dead zone in the Gulf of Mexico is the largest ever measured.

Source: EPA

Sources of Nutrients Released into the Gulf of Mexico



Source: "Nutrient Pollution: EPA Needs to Work With States to Develop Strategies for Monitoring the Impact of State Activities on the Gulf of Mexico Hypoxic Zone" https://www.epa.gov/sites/default/files/2015-09/documents/20140902-14-p-0348.pdf

Point out that many of the questions are about the relationship between fish and algae in the (Gulf of Mexico) ecosystem. Ask students to work independently to document what they know about fish and algae, then identify what fish and algae have in common. Students can create a Venn diagram or use a three-column table (like the one shown below) to help organize their thinking.

Additional Guidance. The use of a thinking tool (e.g., Venn diagram, table) can help students narrow their focus on a small part or subsystem of a larger system.

Example of a Student's Completed Table

What I know about **algae**	Things **fish and algae** have in common	What I know about **fish**
Live in water Is a plant* Makes its own food Needs carbon dioxide Releases oxygen	Live in water Oxygen and carbon dioxide are exchanged (but opposite) Need food	Lives in water Eats plants and/or animals Needs oxygen to survive Releases carbon dioxide

*This is a common misconception. Algae are not plants but do carry out photosynthesis.

Assign students to small groups and instruct them to collaboratively develop a model that explains the relationship between the algae and the fish phenomena. Encourage students to use words, pictures, symbols, colors, etc., to communicate their thinking.

Student models will vary and could represent different relationships between the fish and the algae. For example, some students may develop a model that includes the fish living because they ate the algae, while others may represent the algae as the cause of fish dying. Do not correct inaccurate ideas. At this point in the lesson, the class is still gathering ideas to explain their observations of the phenomena shown in the photos.