

# Marvelous Mud

Featured scientist: Lauren Kinsman-Costello from Kent State University

## Research Background:

The goopy, mucky, (sometimes stinky!) mud at the bottom of a wetland or lake is a very important part of the ecosystem. Mud is basically wet soil, but because it has different properties than soil because it is wet most of the time. Mud is usually dark brown because it contains partially decomposed plants, called **organic matter**. Dead organic matter tends to build up in wetlands. Organic matter decomposes more slowly under water than on land. This is because underwater microbes do not have all the oxygen they need to break it down quickly.

Under the right conditions, mud can act like fertilizer for a wetland. Nutrients, such as **phosphorus**, tend to build up in mud. This makes mud an important source of the phosphorus that algae and other plants need to grow. As a graduate student at Michigan State University, scientist Lauren was interested in what helped phosphorus stick to mud. She also wanted to know why phosphorus builds up more in some wetlands than others.

Although *most* mud is high in organic matter and high in nutrients, all mud is not created equal! The amounts of organic matter and nutrients are different from one ecosystem to the next. How quickly these materials enter or leave the mud may also change across ecosystems. Even within the same ecosystem mud can be very different from place to place. The molecules in organic matter could be a major source of phosphorus in mud. This would mean that wetlands with more organic matter would have more phosphorus.



You can tell that the mud in this picture is high in organic matter because it is dark brown and mucky (in real life you'd be able to smell it, too!)



Scientist Lauren holding a successful mud core. You can see that the tube has mud, as well as some water.

Scientist Lauren measured organic matter and phosphorus in mud from 16 ecosystems (four lakes, five ponds, and seven wetlands). She wanted to determine if there was a relationship between the amount of organic matter and the amount of phosphorus in mud.

Scientific Question: Is organic matter an important source of phosphorus in mud?

What is the hypothesis? Find the hypothesis in the Research Background and underline it. A hypothesis is a proposed explanation for an observation, which can then be tested with experimentation or other types of studies.

Scientific Data:

Use the data below to answer the scientific question:

Ecosystem	Ecosystem Type	Organic Matter (%)	Total Phosphorus (ug P/g d.w.)
Wintergreen Lake	Lake	24%	528
Douglas Lake	Lake	55%	523
Jackson Hole	Lake	5%	105
Whitford Lake	Lake	1%	28
Pond 9	Pond	21%	556
Pond 18	Pond	24%	512
Pond 10	Pond	17%	537
Pond 23	Pond	19%	366
Pond 6	Pond	6%	177
Loosestrife Fen	Wetland	40%	773
FCTC	Wetland	80%	1441
Osprey Bay	Wetland	8%	167
Turkey Marsh	Wetland	15%	459
Sheriffs Marsh	Wetland	30%	1909
Brook Lodge	Wetland	18%	443
Eagle Marsh	Wetland	4%	130

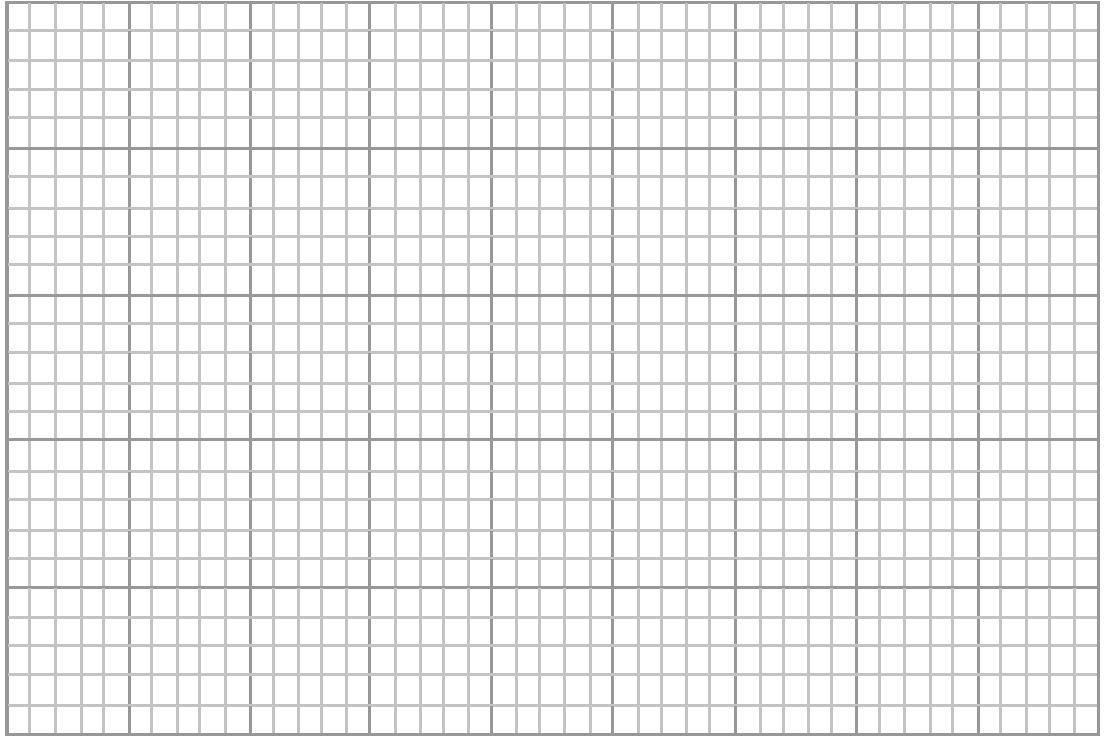
What data will you graph to answer the question?

Predictor variable: \_\_\_\_\_

Response variable: \_\_\_\_\_

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Draw your graph below:



Interpret the data: Make a claim based on the evidence that helps answer the original research question. Connect the pattern in the data to a pattern in the natural world. Justify your reasoning using data.



*Your next step as a scientist:* Science is an ongoing process. Did this study fully answer your original question? What new questions do you think should be investigated? What future data should be collected to answer them?

