How to state a testable hypothesis

What is your scientific question?  
Do changes in stream flow impact groundwater levels in areas where groundwater drains (i.e. clear ditches) are in place? What is the relationship between surface water and groundwater?

Based on your observations and reading of the literature, what do you think the answer to the question is? Why is this happening? What is the driving mechanism? The answer is your hypothesis. It should contain your variables, which will be used to test it.

Answer: Groundwater levels are driven by stream flows through a strong, hydrologic connection, even when negatively impacted by drains.

Refine = hypothesis: When groundwater levels are lowered through drains (clear ditches), they are still fed by river flow, sustained through a hydrologic connection.

Based on your answer to the above questions (your hypothesis), what are your predictions? How will you test your hypothesis?

Prediction: If river flow is high, then groundwater levels will be higher than they are at river’s base flow.

(alternate prediction: Groundwater levels will correlate with fluctuations in river flow, independent of water level in the clear ditch/drain.)

Independent variable: river flow

Dependent variable: groundwater level

**“If …, then…” is not the proper format for a hypothesis. This is the prediction.**

**You can use “If …, then… because…” to get closer to your hypothesis. The “because…” portion is the hypothesis. This is what is driving the prediction.**

If river flow is high, then groundwater levels will be high because *there is a positive hydrologic connection between stream flow and groundwater; stream flow feeds groundwater levels, even at sites where groundwater is being lowered through drains*.

Now you can restate this with the hypothesis first, followed by predictions: *There is a positive hydrologic connection between stream flow and groundwater; stream flow feeds groundwater levels, even at sites where groundwater is being lowered through drains*. Therefore, if river flow is high, then groundwater levels will be high, and if river flow is low, then groundwater levels will be low.

Directions: Using the templates below and the example above, state three ***different*** testable hypotheses and the BEMP datasets (variables) that are needed to test each hypothesis. For each number below, state a distinct hypothesis, using the template to lead you to answer each of the questions (fill in each underlined blank). For the final hypothesis, you can use template 1 or 2, or just fill in the blanks.

**Hypothesis #1.**

What is your scientific question?

Based on your observations and reading of the literature, what do you think the answer to the question is? Why is this happening? What is the driving mechanism? The answer is your hypothesis. It should contain your variables, which will be used to test it.

Answer:

Refine = hypothesis:

Based on your answer to the above questions (your hypothesis), what are your predictions? How will you test your hypothesis?

Prediction:

Independent variable:

Dependent variable:

Why this matters (relevance):

**Hypothesis #2.** “If …, then…” is not the proper format for a hypothesis. This is the prediction.

You can use “If …, then… because…” to get closer to your hypothesis. The “because…” portion is the hypothesis. This is what is driving the prediction.

If , then because .

Now you can restate this with the hypothesis first, followed by predictions:

Hypothesis:

Prediction:

Independent variable:

Dependent variable:

Why this matters:

**Hypothesis #3.** You can use either one of the above templates or state a third hypothesis with the prediction and variables.

Hypothesis:

Prediction:

Independent variable:

Dependent variable:

Why this matters: