

# Water Research Interpretation and Evaluation Template

## Purpose

- Research results are the consequence of decisions made by the researcher.
- Every piece of research has strengths and weaknesses.
- The Template helps in understanding the choices, consequences of choices, strengths, and weaknesses.

# Water Research Interpretation and Evaluation Template

## Using the Template

1. Use a separate copy for each study you wish to review.
2. Review the study and fill in fields that are relevant and helpful for you.
3. Compare the templates completed for multiple studies.

# Water Research Interpretation and Evaluation Template

## Template Components

1. Overall purpose and design of the study.
2. Specific research choices of the study.
3. Strengths and limitations of the study.
4. Study findings and discussion of findings.

# 1. Research Question

## 1. Research Question: Does the study seek to...

- a. Answer questions about the current conditions?
- b. Compare different sites or conditions?
- c. Answer broad questions that many basins/sites are asking?
- d. Answer narrow questions specific to one or more basins/sites?

### 1. Research Question: Does the study seek to...

Two studies on similar issues can take very different approaches to the issue depending on the research questions help to frame not only the outcome of the study, but also the types of data to be collected and many other study components. Consequently, it is important to identify the research question within a research report, but different types of research questions are not always stated clearly within a research report, but different types of research questions are reflected in the overall content of the report.

- a. **Answer questions about the current conditions?** Research questions on current conditions are often observational. They collect data on different conditions and may attempt to explain the differences. In contrast, a research question that seeks to predict future conditions will collect data on current conditions to explore the future.
- b. **Compare different sites or conditions?** Research questions comparing multiple sites are often comparative. In a study, yet findings are developed for each site separately, the study can be considered a

# EXAMPLE: 1. Research Questions

## 1. Research Question: Does the study seek to...

a. Answer questions about the current conditions?

b. Compare different sites or conditions?

c. Answer broad questions that many basins/sites are asking? What factors influence the survival rates of translocated trout?

d. Answer narrow questions specific to one or more basins/sites?

## 1. Research Question: Does the study seek to...

a. Answer questions about the current conditions?

b. Compare different sites or conditions?

c. Answer broad questions that many basins/sites are asking?

d. Answer narrow questions specific to one or more basins/sites?

Is a regional approach to monitoring, modeling, and managing Front Range drinking water reservoirs justified?

## 2. Research Design

### 2. Research Design: Is the research design...

- a. Point in time? (cross-sectional)
- b. Change over time? (longitudinal)
- c. Comparison? (quasi-experimental)
- d. Predicting future outcomes? (modeling)

### 2. Research Design: Is the research design...

In order to answer a research question, all studies have a research design, often as its own section in the report, the analysis of information. Different designs are suited to different questions, and often the information from a study compare to information from a study of another type.

- a. **Point in time (cross-sectional).** Studies that collect information about a single point in time, examining locations, are called cross-sectional studies. They are often used to answer questions about current conditions. Assessments are cross-sectional studies with specific locations of interest and a single implementation of the study.
- b. **Change over time (longitudinal).** Studies that collect the same information at multiple points in time are called longitudinal studies. They are often used to examine changing conditions. In a study of snowfall undercatch, data was collected at multiple sites to estimate actual precipitation levels. Among other things, the study was interested in how:

# 3. Stakeholder Involvement

## 3. Stakeholder Involvement

- a. Was there a stakeholder advisory board?

How were those with vested interests involved? (e.g.,

- b. helping with study design, helping collect data, interpreting results)

### 3. Stakeholder Involvement:

When key stakeholders participate in designing, implementing, or interpreting study results, the findings are more widely accepted by different interests in the water community. The participation of stakeholders in design studies that have appropriate measures, have findings that are the result of an appropriate decision-making processes. The participation of stakeholders with access to water facilities and equipment for timely data collection.

- a. **Was there a stakeholder advisory board?** Studies with stakeholder advisory boards involve all participants throughout the study. An advisory board may be specifically convened for the study or oversees the study during its implementation. For example, a subcommittee of the Council on Environmental Quality may serve as an advisory group to a study on instream flows. Some reports may not mention the board when one was convened while other reports may mention the board in the *introduction*.
- b. **How were those with vested interests involved?** Stakeholders can be involved in the study's social science component to the study with interviews, surveys, or focus groups of a

# 4. Sample and Site

## 4. Sample and Site

- a. Who is the study population? (the sample)
- b. Where was the research conducted? (the site)
- c. When was the information collected? (what years and what months?)
- d. Can the findings be generalized to other sites or are they context-specific?

### 4. Sample and Site:

Every study selects specific items of interest to study. In any study, a subset of all possible examples is selected in order to allow for a timely and manageable study. When comparing multiple studies, who and site can help in determining if the findings from the two studies should be compared to one another as included in the *research design* section of a report.

- a. **Who or what is the study population? (the sample)** The study sample represents the subjects of the study. For example, in a study exploring the role of fire on the structure and composition of wetland vegetation, a sample of vegetation monitoring plots that included three types of vegetation, selected for their range of hydroperiod tolerance. The sample included plots within and outside of the boundaries of



# 6. Measures

## 6. Measures

- a. What are the measures used to study the included factors?
- b. Do the measures directly measure the included factors or are they indicators of the factors? (proxy measures)
- c. What are the limitations of the measures?

## 6. Measures

Water issues can be measured in many different ways. Part of comparing multiple studies is understanding similar issues. The differences might be as simple as using a different unit of measurement, water use, versus gallons per capita per day when breaking down water use by population. Studies determine base numbers in different ways, such as relying on average base flow over the year versus measurements.

- a. **What are the measures used to study the included factors?** Most research reports *analysis* section of the report. For example, a study of Best Management Practices to : included a measure of eroded stream banks. The authors note that they chose to measure multiple locations, rather than over time, due to previous studies that did the same. 1

# 7. Analysis

## 7. Analysis

- a. How is the data analyzed?
- b. What are the limitations of the analysis?

### 7. Analysis

The analysis section of a research study is often the hardest to interpret. Many analysis approaches unfamiliar even to other researchers if they have not used the approach themselves. However, it is helpful to identify how the data was analyzed and consider if the studies used similar methods. If the data is analyzed in very different ways, it may help to explain different findings despite similar sites or samples.

- a. **How is the data analyzed?** In the *research design* and *findings* sections of a report the author provides a quick review of these sections will help in identifying the specific techniques by name as we

# 8. Causal Relationships

## 8. Causal Relationships

- a. If applicable, what is the cause-and-effect argument presented in the study?
- b. What measures are used to test the argument?

## 8. Causal Relationships

Many research studies go beyond describing a particular phenomenon and try to explain what aspects of the phenomenon may lead to future conditions. These cause-and-effect arguments are sometimes made based on previous research. Other times, they are made in the *conclusion* at the end of the report. After reading, it is helpful to know if different studies assume different causes lead to the same conditions or effects.

- a. **If applicable, what is the cause-and-effect argument presented in the study?** When reading a study, the reader can seek out predictive statements, discussions of driving forces, or other statements that suggest one factor is causing another.

# 9. Findings/Significance

## 9. Findings/Significance

- a. What are the major findings of the study?

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- b. Which of the findings are statistically significant?

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- c. Do the conclusions of the study logically flow from the findings?

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- d. How are the findings aligned with previous research?

## 9. Findings/Significance

The findings of a study are often the part that readers start with when comparing two studies. They often assume the studies are incompatible. As is clear from the discussion and examples above, the steps to compare different measures, different analysis techniques, or study different types of questions related to the findings is very important to being able to use the research in decision-making.

# 10. Limitations of the Study

## 10. Limitations of the Study

- a. Does the study identify any limitations?

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- b. How does the study propose to overcome the limitations?

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- c. Are there other aspects of the issue that might influence the findings, but have not been included in the study?

## 10. Limitations of the Study

Every research study has limitations. They are the result of the inability of any one study to cover all aspects of an issue. Limitations fall into many different categories including, but not limited to:

- o Generalizability: every study has limitations to how appropriate it is to generalize the results. A study of a water basin with a set of specific characteristics might be generalizable to many other basins.

# 11. Authorship and Sponsorship

## 11. Authorship and Sponsorship

- a. What are the credentials, institutional affiliations, and experience of the research team?
- b. Who sponsored the research study?

## 11. Authorship and Sponsorship

All research is limited by the biases brought to the studies by the researchers. The biases can be overt selection of measures to reach a desired outcome. More often, however, the biases in a study are the training, previous research, and expectations of the research team. In assessing the bias of a study, as helpful to know about the sponsorship and researchers involved.

- a. **What are the credentials, institutional affiliations, and experience of the research team** qualifications of a research team are to identify their credentials, such as degrees and certifications, university, a think tank or other research organization, or an advocacy group. Often this is