Surface-Water Hydrology Report Writing Template

A. TEXT

Style (2 pts)

The first two pages (maximum) of your report will be the text written in memo form having an Introduction, Materials and Methods, Results, and Discussion section. Assume your audience is your supervisor (me). Write the text in active voice because it is less wordy. The Introduction and much of the Discussion should be in the present tense, and the Material and Methods and the Results sections should be in the past tense. Format your text using 1.5 line spacing, 1-inch margins (0.5 on the top and bottom), and Times Roman 12 point font.

Introduction (2 pts)

The purpose of the introduction is to provide enough background detail to allow the reader to evaluate the results. Much of the introduction should be written in the present tense, because you will be referring to your work. Your Introduction section should:

- Clearly state the purpose of the project and report. What is the question or objective?
- Briefly discuss the background and significance of the problem.
- Briefly outline the scope of the project (how did you address your question?)

Materials and Methods (1.5 pt)

The Materials and Method section contains specifics about the methods that you revealed in the Introduction section. This section must provide enough detail about the procedures so a colleague can repeat you experiments and analyses. Because of the 2-page limit, briefly summarize the procedures and refer the reader to attached Project handout in Appendix B. Although the active voice is usually more precise and less wordy than the passive voice, the passive voice can function better in the Methods section. This section should also be written in past tense, as you describe what you did. Your Materials and Method section should:

- Describe the raw data (i.e., how, where, and when they were collected).
- Explain the methods used to analyze the data (e.g., statistical and modeling techniques).
- Provide details about software used in the analyses (e.g., Excel, GIS, R)
- Do not write equations in the test—refer the reader to Appendix A for equations.

Results (1.5 pt)

Summarize the results of your data analysis and ***observations*** about your data in this section. Write in the past tense. Be concise when citing figures and tables. Do not say “It is clearly shown in Figure 2 that rainfall increases with elevation in the Smith Creek basin.” Say “Rainfall increases with elevation in the Smith Creek basin (Figure 2).” Patterns in data may be cited, but leave the interpretations for the Discussion section.

Discussion (8.5 pts)

The earlier sections of your report (Introduction, Materials and Methods) describe why and how you got the results described in the Results section. The Discussion section is designed to inform the reader what they mean. Clearly discuss your ***inferences*** about the patterns and relationships you observe in the results. Some points to consider include the following:

- How do your interpretations address the objective or question stated in the introduction?
- What are the implications of your interpretations?
- Point out exceptions and describe possible sources of error.
- Concisely state your conclusions, i.e., answer the question in introduction.
- What do your results imply about the big picture (i.e., what determines the magnitude and timing of streamflow in the watertshed)?

References (0.5 pts)

When you use published material in your text, the reference should be properly cited in the text. Write, "A research-level distributed hydrology-vegetation model was developed by Wigmosta et al. (2006)." Or, Distributed hydrology models capture the spatial heterogeneity of watersheds (Wigmosta et al., 2006)." How one writes the reference in a list at the end of the text is journal specific. We'll use the format for *Water Resources Research.*

Wigmosta, M. S., L. W. Vail, and D. P. Lettenmaier (1994), A distributed hydrology-vegetation model for complex terrain, *Water Resour. Res.*, 30(6), 1665-1679.

B. SUPPORTING MATERIALS

Tables (1 pt)

When referencing tables in the text, capitalize Table (e.g., Table 27, not table 27). A rule of thumb is to ensure the table contains enough information such it can *stand alone* without referencing the text. The table below is an example of a well constructed table.

- Have a descriptive figure caption (i.e., what, where, when). Typically, the table caption goes above the table (the header). Do not make statements about the data in the caption.
- Parameters not identified in the table are summarized below the table (the footer). The footer is usually in a smaller font.
- All terms in the heading should be simple, and have UNITS.
- All parameters in the table are identified with the proper units.
- Place the independent variable (θ_0) on the left column and the dependent variables along the horizontal so the data read down, not across.
- Do not have multiple independent variables in a single table.
- Use two horizontal lines to separate the headings from the data and a horizontal line at the bottom. NO grid lines. Center the data in the columns.
- Learn how to create Greek symbols and to use superscripts and subscripts (e.g., θ_0 NOT theta0 and 1.0×10^{-4} NOT 1.0*10^-4).

Table 1. Green-and Ampt infiltration parameters after a 10 hour, 1.0 cm/hr rainfall in a silt loam having different initial water contents (θ_0).

θ_0	t_p (hr)	$z_f(t_p)$ (cm)	$F(t_p)$ (cm)	$z_w(t_w)$ (cm)	$F(t_w)$ (cm)
0.01	5.15	10.8	5.15	18.7	8.9
0.20	3.09	10.8	3.09	26.5	7.56
0.35	1.46	10.8	1.46	42.6	5.75
0.45	0.379	10.8	0.39	101.1	3.54

θ_0 = initial water content
t_p = time of ponding
t_w = rainfall duration
$z_f(t_p)$ = depth of the wetting front at the time of ponding
$F(t_p)$ = depth of water infiltrated at the time of ponding
$z_w(t_w)$ = depth of the wetting front at the end of the rainfall
$F(t_w)$ = depth of water infiltrated at the end of the rainfall (t_w)

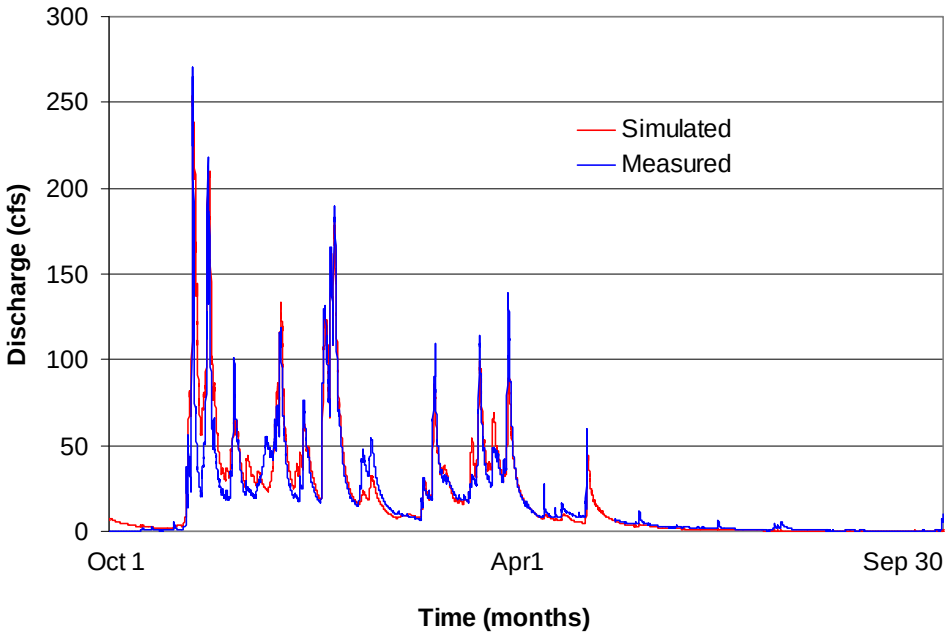
Source: Day R. A. and B. Gastel (2006) How to write and publish a research paper, 6th Ed., Greenwood Press, pp. 302.

Figures (1 pt)

When referencing figures in the text, capitalize Figure (e.g., Figure 16, not figure 16). If you use a location map, it is identified as a figure. A rule of thumb is to ensure the figure contains enough information such it can *stand alone* without referencing the text. The figure below is an example of a well constructed figure.

- Have a descriptive figure caption (what, where, when) that is placed below the figure. Do not make statements about the data in the figure caption.
- The axes are labeled and with proper units.
- The fonts for the text and numbers are small; therefore, the plot is the focal point.
- It has a white background (a "gray" background wastes printer toner).
- The plot is large enough so it is easy to interpret information.

.



.

Figure 1. Measured and modeled discharge for Austin Creek in the Lake Whatcom Watershed, Whatcom County, WA for the 2007 water year.

Appendix A (1.5 pt)

Equations that are used to manipulate data in the project should be described in Appendix A. Example calculations are necessary. Calculations should be presented in logical steps, paying special attention to dimensional analysis, units, and significant figures. For repetitive calculations or spread-sheet calculations, an example calculation is necessary to prove that the solution you get in Excel matches your hand calculation. The final solution should be boxed or underlined. A portion of an example Appendix A is given below—it was written in MathCad.

Appendix A

The procedures for this project are described in the project handout. See Geology 472, Project 2 Handout. Sample calculations for the three estimates for the average rainfall are given below. The data for the daily values of precipitation at each gauge, area of the watershed, area inside each Thiessen polygon, as well as the area of each isohyetal section was provided.

Sample Calculations

Arithmetic Average:

The arithmetic average of the data is determined by adding the total precipitation amounts for each station and dividing the sum by the number of stations considered.

Total Yearly Rainfall for the three stations in the watershed:

Brannian Creek	Geneva Intake	Smith Creek
$BC := 64.23 \ in$	$GI := 41.61 \ in$	$SC := 46.77 \ in$

Total yearly rainfall at the three stations:

$$T := BC + GI + SC$$

$$T = 152.61 \ in$$

Average Rainfall in the Watershed:

$$A := \frac{T}{3}$$

$$A = 50.87 \ in$$

Thiessen Polygon Method

For the Thiessen Polygon Method of determining the average yearly rainfall in the watershed, the watershed area is divided into sections which are associated with each gauge. Figure 5 shows how the watershed was divided up. It also gives the percentage of the area for each section.

Appendix B

Attach the project handout which describes the procedures.

C. REPORT ORGANIZATION (0.5 pts)

To save paper, you can print on both sides of a sheet. Staple them in the following order:
1) Text (2 pages of text, maximum)
2) References
3) Tables
4) Figures
5) Appendix A: equations and calculations
6) Appendix B: procedures
6) Any additional appendices

Memo

From: Your Name
To: Robert Mitchell
Date: October 15, 2007
Re: Project 1: Rainfall in the Lake Whatcom watershed

Introduction
Place text here.

Materials and Methods
Place text here.

Results
Place text here.

Discussion
Place text here.