

Hydroinformatics

Individual Learning Opportunity 9

Preparing data for input to a model

Due Date: November 20th

Learning Objectives

1. Manipulate data and transform it across file systems, flat files, databases, programming languages, etc.
2. Organize data in a variety of platforms and systems common in hydrology and engineering
3. Prepare data to support hydrologic, water resources, and/or water quality modeling

Computer and Data Requirements

1. The Water Evaluation and Planning (WEAP) software. Follow directions in the [WEAP Primer](#) to install WEAP. Use the license key posted in the November 5, 2012 Canvas announcement.
2. A zip folder containing the WEAP Area for the Lower Bear River ([LowerBearRiver-Hydroinformatics.zip](#)) and text file *P2009-T1.out* within the zip folder that contains head flow and reach gain/loss data for the model.
3. Python, R, or another program to automate the transformation of flow data contained in the text file to the CSV format WEAP can read.

The Problem

In the 1990s, the State of Utah allocated Cache County 60,000 acre-feet per year as part of the Bear River Development Act. Considering existing (higher priority) water uses and Bear River basin flows, the County wants to know the (i) reliability of Bear River water to meet the 60,000 ac-ft/year water requirements of future, new, urban Cache County users (reliability is the % of time the water requirements are satisfied). Additionally, the County wants to know (ii) what the annual firm yield to the new users will be (firm yield is the lowest annual delivery made under worst conditions), and (iii) how the reliability and firm yield of deliveries to the new users will change under a future warmer climate with reduced and time-shifted flows. For this analysis, you should use and simulate the monthly historical record of head flows and reach gains/losses available from October, 1996 to September 2006. You may assume reduced and time-shifted flows under warmer climate means all flow values will decrease by 15% from historical values and be shifted forward 1-month (i.e., May flow = 85% of historical June flow; April flow = 85% of historical May flow; December flow = 85% of historical January flow, etc.). Recommend whether and how the County should develop its Bear River allocation.

Deliverable

Submit a one-page briefing sheet that introduces the problem facing Cache County, presents how you prepared the flow data to use in WEAP, discusses your WEAP results, and recommends whether and how the County should develop Bear River water. Include two appendices to provide:

- A. Short answers to underlined, italicized questions in the WEAP Primer, and
- B. The code you used to transform the flow data and prepare it for use by WEAP.

Category (Max. Score)	No Evidence	Doesn't Meet Standard	Nearly Meets Standard	Meets Standard	Exceeds Standard	Self- Score	Instructor Score
Title (1)	Absent 0	Evidence of two or less 0	Evidence of three 0	Evidence of four 1	Title – can assess main point from title alone; Name, Instructor's Name, Course, Date, Neatly finished 1		
Introduction (3)	Absent, no evidence 0	There is no clear introduction or main topic. 1	Introduction states the main topic but either: 1. Does not give a full overview, Or: 2. Too detailed, leading to annoying repetition later. 2	The introduction states the main topic and previews the structure of the report. 2	The introduction states the main topic and previews the structure of the report. Good overview of the design and strategy. An effective summary. Gives enough detail to interest the reader. 3		
Organization and structural development of the idea: procedure, results, discussion (10)	Not applicable	Paragraphs fail to develop the main idea. No evidence of structure or organization. 1 – 5	Organization of ideas not fully developed. Paragraphs lack supporting detail sentences. No transitions. 6 - 7	Paragraph development present but not perfected. Each paragraph has sufficient supporting detail sentences. No transitions. 8	Writer demonstrates logic and sequencing of ideas in 1 page through well-developed paragraphs. Each paragraph has thoughtful, supporting detail sentences that develop the main idea. The first sentence of each paragraph is the summary sentence. Transitions enhance structure. 9 - 10		
Engineering Calculations and Design (70)	Design point(s) not addressed. 3 – 42%	The writer has no clue what they are talking about. 45 – 58%	Sketchy: left out required design points. Did not work on this as much as you should have, and it shows. Many important answers are incorrect. 61 – 79%	Discussion lacks adequate detail, but all the necessary points are covered and nearly all answers are correct. 82 – 88%	Provides what was explicitly asked for. The function of each piece is demonstrated to the reader in adequate, but not overwhelming, detail. Answers are correct and reasonable. 91 – 100%		
	a) Answers to questions in WEAP Primer (15)						
	b) Commented automation code (20)						
	c) Reliability and firm yield results under (i) historical flows, and (ii) with reduced, time-shifted flows (25)						
	d) Recommendation to Cache County regarding developing Bear River water (10)						

Category (Max. Score)	No Evidence	Doesn't Meet Standard	Nearly Meets Standard	Meets Standard	Exceeds Standard	Self- Score	Instructor Score
Word Usage and Format (10)	Not applicable	Numerous and distracting errors in punctuation, capitalization, spelling, sentence structure, word usage, significant figures, tables, and figures. Data vomited onto page(s). Unacceptable / unprofessional at the graduate level. <u>1 – 5</u>	Misspelled words, poor English grammar and word choice. Main body of report is either longer or significantly less than one page. Figures are too small and/or under-labeled, although they are usually of acceptable quality and focus. Tables incoherent or not cohesive. Bad font sizes. Too much or too little data in appendices. Could be improved by being more meticulous. <u>6 - 7</u>	Almost no errors in punctuation, capitalization, spelling, sentence structure, word usage, significant figures, and presentation of figures, tables, and appendices. Main body of report is one page or less <u>8</u>	Punctuation, capitalization, spelling, sentence structure, word usage, and significant figures all correct. Main body of report is one page or less. Clear, consistent fonts. Good word processing skills. Figures have adequate contrast. Informative figure and table titles and legends. Figures have appropriate axis tick spacing, labels, units, and legends. Table columns cohesive, labeled, and specify units. Document is stapled. Appendices, if provided, are separated by topic, and each have a title, discussion, and proper formatting and display of information <u>9 - 10</u>		
Conclusion (4)	Absent <u>0</u>	Incomplete and/or not focused. <u>1</u>	The conclusion does not adequately restate the main results. <u>2</u>	The conclusion restates the main results. <u>3</u>	The conclusion restates the main results, and is an effective summary. <u>4</u>		
References (2)	Absent <u>0</u>	With many errors, off-the- wall sources used. <u>0</u>	With some errors, appropriate sources were used. <u>1</u>	With few errors, good sources were used <u>2</u>	All cited works; text, visual, and data sources are done in the correct format with no errors. Uses innovative sources of information. <u>2</u>		
TOTAL (100)							