Annual Assessment Report

Environmental Science Major

2020-2021

I. *Program Assessment Meetings*

The annual Environmental Science (ENVR) assessment meeting took place via email exchange in May of this year. Numerous informal conversations and exchanges related to assessment also took place throughout the academic year.

This year we had the benefit of specific feedback received from EPC on both our assessment plan and last assessment report. We carefully reviewed the written feedback, discussed it with an EPC member, then worked to incorporate it into this year's assessment documents.

Niamh O' Leary and Jackie Schnurr are the principal drivers of assessment work in ENVR.

II. *Closing the Loop*

As a result of previous assessment work, Professor Jackie Schnurr made some changes to the BIOL 119L assignment in which students write a report in the standard style of such reports in the literature of ecology and evolution. In our last assessment report (2019) she described how students were not successful at the 70% C or above benchmark for this assignment, and described her plans to make some changes to address this, which included having students write and hand in each section of the lab report separately and allowing them to have a rough draft.

She made these changes when BIOL 119L was taught in fall 2020. In 2020 the students were assigned sections of the report to be submitted biweekly, and were also allowed to submit an optional rough draft of the paper. Table 1 compares the data from before (2018) and after (2020) the changes were made. In each year a substantial proportion of students - 6 out of 28 (21%) in 2018 and 11 out of 33 (33%) in 2020 - did not turn in the final report and received an automatic grade of F. These data are excluded from the analysis in Table 1.

Table 1. Breakdown of grades received on final report in BIOL 119L in fall 2018 (before changes were made) and fall 2020 (after changes were made). Data presented only for students who turned in the assignment.

	BIOL 119L – fall 2018 data Total Enrollment = 28 Number turned in = 22	BIOL 119L - fall 2020 data Total Enrollment = 33 Number turned in = 22
	Number (Percentage)	Number (Percentage)
Percent A's	7 (32%)	5 (23%)
Percent B's	1 (5%)	7 (32%)
Percent C's	2 (9%)	8 (36%)
Percent D's	3 (14%)	2 (9%)
Percent F's	9 (41%)	0 (0%)
% of students who turned in work earning C or above	46%	91%
Benchmark of 70% of students earning C or above met?	***No***	***Yes***

The changes improved outcomes as the benchmark was exceeded in 2020 after the changes were made. Thus requiring the individual sections improved student outcomes. Only 10 students submitted the optional rough draft, and all of those students received an 80% or better on the final draft. Moving forward Professor Schnurr will require a rough draft in the future, and will discuss the above data with the students so that they can see the value of doing the assignments.

III. *Examination of Data Collected for This Year's Targeted Learning Outcomes*

This year's targeted learning outcomes are nested in our assessment plan's GOAL 1: *Examine the nature of the Earth*. We analyzed two different objectives related to this across multiple courses as described below.

Professor Jackie Schnurr analyzed course objective #2 in ENVR 131. This course objective is *Understand Earth processes and their implications for the environment*. For this, the students were required to analyze the geologic history of our region after attending field trips throughout the region. Using geologic literature that she provided and based on their observations they needed to answer several questions about the geology of the environment (see Appendix 1 for assignment as presented to the students). For the most part the students did a great job: out of 8 students there were 5 A's, 1 B and 1 F for a student not submitting the assignment. This project was very successful and the students seemed to enjoy it as well. ENVR 131 is a course that serves a lot of non-majors

so the success criterion in our new (2021) plan is still a benchmark of 70% C or higher, which was achieved.

Professor Niamh O' Leary analyzed data from a stream bioassessment homework in ENVR 102L to target the learning outcome of our assessment plan's Objective 1.1: *Examine the nature of ecosystems*. For this assignment, the students calculate indices of benthic macroinvertebrate diversity at two sites in Salmon Creek, interpret results, and compare to historical data (See Appendix 2 for assignment as presented to the students). Student performance was as follows: 7 out of 11 students got A's (64%), 2 out of 11 students got B's (18%) and 2 out of 11 students got F's (18%). The students who received F's did not turn in the assignment at all. ENVR 102L is a course that serves a lot of non-majors so the success criterion in our new (2021) plan is still a benchmark of 70% C or higher, which was achieved.

IV. *Program Changes for the Upcoming Year (2021-2022)*

Data presented in III above indicate that benchmarks for success are being met and students are doing well. Thus no changes in these assignments are warranted based on these data.

V. *Action Plan for the Upcoming Year (2021-2022)*

In our 2022 assessment report we will assess data related to Objective 5.1: *Learn and practice quantitative skills*. We will assess outcomes in 2 classes, ENVR 101L and ENVR 340, thus capturing multiple courses, one introductory serving a lot of non-majors, and one upper level serving mostly ENVR majors.

VI. *The Updated Assessment Plan*

The updated 2021 assessment plan is submitted as a separate document, as is the updated curriculum map. Below are some changes made in the plan this year:

- We received EPC's feedback on the plan. We carefully reviewed the feedback, communicated with a member of EPC to provide clarification, and implemented the suggestions.
- We changed our success criteria in the plan to two tiers recognizing that the goals driving our assessment work were developed with ENVR majors in mind, but that courses in the program serve more and more non-majors. The classes with mostly majors now have higher success criteria than the classes that serve mostly non-majors.
- We updated the assessment plan to include the new course ENVR 204: *The Climate System* and updated learning goals in some courses.
- We updated the associated curriculum map to reflect the updated assessment plan.

APPENDIX 1

ENVR 131 Labs 1-5

Geologists use clues in the rock record to make a story of the history of a region. For the past 5 weeks we have been visiting local waterfalls and other geologic features to create a story of the regional formation of the Finger Lakes. Using your observations and whatever other materials you would like, tell me how the Finger Lakes were formed.

1. Document your observations from Fillmore Glen State Park, Salmon Creek Falls, Ithaca Falls, Taughannock Falls, Six Mile Creek and Clifton Falls. How you document is up to you: it could be in words where you tell me what you saw at each location, it could be through annotated diagrams and/or photos where you point out features that you want me to consider, it could be from readings and discussions with your classmates. (30 points)
2. Using the information presented above, what is the story of the formation of the Finger Lakes? How old are the rocks? Why are they here? Be creative, but make sure that you back up your creativity with your observations. (20 points)

DUE OCTOBER 9

APPENDIX 2

Stream Bioassessment Homework

Remember to Work Alone on this Assignment and Use Your Own Words

1. What kind of pollutants threaten Salmon Creek? Specifically refer to information from the Table below when answering this question. (Table is taken from a recent study in the region).

Table 6.1. Summary of Areas of Concern, Tributary Subwatersheds

Parameter	Location	Use Affected	Primary Cause	Potential for Improvement
Sediment	Fall Creek, Cayuga Inlet, Sixmile Creek, Yawger Creek, Cascadilla Creek	Fishing, fish propagation, water supply	Streambank erosion, agriculture, urban runoff	Moderate. Requires field investigations to identify causes and contributing factors. In some areas only viable solution may be riparian greenbelt to allow natural meanders. Requires watershed –wide commitment to land use and riparian zone management
Phosphorus	Salmon Creek	Water clarity, aesthetics	Agriculture	Moderate
Nitrate	Great Gully Paines Brook Salmon Creek Mack Br Williams Cr Indian Creek	Potential water supply	Agriculture	Unknown. Highly dependent on mix of agriculture and practices in watershed.
Petroleum products	Trumansburg Ck Cayuga Inlet	Benthos Fish propagation Fish tainting	Spills	Moderate – high (natural flushing and breakdown_
Pesticides	Salmon Creek, Paine Brook, Yawger Creek (other locations not surveyed)	Presently, none detected over limits of concern. Could affect drinking water use.	Agriculture	Highly dependent on mix of agriculture and practices in watershed.
Heavy metals in sediment	Fall Creek (confirmed) Cayuga Inlet (likely based on land use)	Chronic toxicity to vulnerable biota Bioaccumulation	Urban runoff	High. Controls on point sources (including air emissions) more stringent. Sedimentation buries more contaminated sediments
Pathogens and Indicators	Unknown	Water consumption, contact recreation	Stormwater, on-site systems	Unknown, likely moderate

2. Complete the Table below with the results of BMI sampling for the two sites we sampled in Salmon Creek.

	SPP	EPT	PMA	Biological Assessment Profile (BAP) Value	Water Quality
Site 1	( )	( )	( )		
Site 2	( )	( )	( )		

3. **Are the two sites we sampled impacted by pollution or not?** Refer to specific results in your Table in Question 2 above to support your answer.

4.
(i) Are the two sites we sampled **the same** in terms of water quality **or are they different?** Refer to specific results in your Table in Question 2 above to support your answer.

(ii) Speculate on why (or why not) differences were observed.

5. The Table below shows past results (~ 20 years old) for similar studies for sites on Salmon Creek and in other tributaries of the Cayuga watershed. Refer to the Table as you answer both parts of the question below.

Table 4.2.9. Summary of Macroinvertebrate Sampling of Tributaries

Stream	Investigator	Findings
Fall Creek in Ithaca	NYSDEC RIBS Program	Slightly impacted
Salmon Creek in Ludlowville	NYSDEC RIBS Program	Non-impacted
Big Salmon Creek in Genoa	NYSDEC RIBS Program	Non-impacted
Little Salmon Creek in Little Hollow	NYSDEC RIBS Program	Non-impacted
Cayuga Inlet	Dr. Barbara Peckarsky (Cornell University)	Impacted at fuel oil spill, recovery downstream and with time
Cascadilla Creek	Ichthyological Associates for Cornell University (Planning design and Construction)	Slightly impacted
Unnamed tributary downstream of Hillview Rd. Landfill (Cayuga Inlet drainage)	Tompkins County Solid Waste, various investigators	Slightly impacted in headwaters, non-impacted within short distance downstream
Paines Creek and Great Gully	Dr. Tom Vawter, Wells College and students	Seasonal and spatial variation in indices

(i) Does water quality in Salmon Creek appear to have changed over the decades? Compare the results we got in lab with the historical results shown in the table above.

(ii) Looking at the historical data in the Table above, does Salmon Creek appear to have generally better, generally worse, or pretty similar water quality compared to other tributaries of Cayuga Lake? Explain.

THIS IS THE END OF THE HOMEWORK