Environmental Stewardship Project - Portfolio Scoring Rubric

(adapted by CPF Institute from eCyberMission)

Suggested file attachments: bibliography, experimental procedure, photos of experiment, data spreadsheets, charts, graphs, PowerPoint presentations if used as part of experiment Total maximum points in this section: 350

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
PROBLEM STATEMENT				
What problem or challenge did your team try to solve? Why is this problem important to your community? How does the problem relate to the environment or environmental quality?	Selected problem deals with an interesting or challenging community issue and has an environmental impact	15	0-3: Does not answer all 3 questions 4-6: Statement is provided but does not describe problem or does not reference environmental impacts 7-9: Statement describes a generic problem and impacts 10-12: Statement describes a specific, challenging problem 13-15: Statement describes a unique, place-based problem	
	Clear and concise question, thesis statement, or problem statement	20	0-5: Statement not responsive to questions (5) 6-9: Statement but is not a problem (6), or is vague 10-13: Statement is generic in nature and lacks detail OR statement is confusing and unclear 14-16: Statement is specific and mostly clear 17-20: Statement is specific, clear and concise	
Cite at least 5 resources you used to gather information about the problem and potential solutions including websites, professional journals, periodicals (print or online news articles), reference books, and subject matter experts. Use multiple types of info resources and do not limit yourself to only websites. The literature search was specific and divided the resources into four sections: Experts, Websites, Journals, and Reference Books.	Literature search is extensive and scholarly sources are reputable and varied	20	Add 1 point for each RESOURCE (up to 5 pts max) AND Add 1 point for each TYPE of resource (5 pts max) AND Add 5 pts for STUDENT-COLLECTED DATA (such as a relevant citizen science project) AND Add 5 pts for student-conducted FIELD INVESTIGATION or research (designed and conducted by students to gather data or other information and make sense of phenomenon or problem)	
Describe what you learned in your research.	Describes relevant information that relates to the selected Problem or Challenge	20	0-5: Does not respond (0) or answers are inappropriate 6-9: Statement does not relate research to problem 10-13: Statement is generic in nature, lacking detail 14-16: Statement relates relevant information to problem or challenge, but does not synthesize and analyze research 17-20: Statement is clearly states research findings and relates them to problem; analyzes relative merits of solutions used in other settings, as they apply to team's specific problem; and provides rationale for proposed solution or intervention	
			PROBLEM STATEMENT	**/75**
Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
PROBLEM RESPONSE AND PROJECT DESIGN				

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
Develop a Problem Response statement. Be sure to describe your approach to the problem and WHAT exactly you will do - or design and build - to address the problem. Do not describe HOW your response, intervention or device is going to do what it needs to do.	Develops a problem response statement that is logical based on an analysis of all research	15	0-3: Some or all of Problem Response statement is missing 4-6: Response statement is vague or does not address problem 7-9: Response statement describes what the intervention or device shoud do, in general, without connecting to research analysis 10 12 Response statement is detailed but lacks clear connection to research analysis 13-15: Response statement describes what the intervention or device should do and how this will address the problem. Response is logical; based on analysis of research; clear.	
How will you know if your project or device is successful? Identify and list criteria for a successful solution and identify constraints for project design, such as timeframe, budget, location, parameters related to size or performance, etc.	Criteria for success and list of constraints are valid, measureable, and address the response statement	15	Add 3 points: Lists criteria for success (what the project or device must do or accomplish to be considered successful (No list = 0, Minimal = 1, Missing some = 2, Lists all = 3) Add 3 points: Lists all project constraints (No list = 0, Minimal = 1, Missing some = 2, Lists all = 3) Add 1 point to EACH of the two categories above if very detailed info provided Add 1 point: If all success criteria + project constraints are valid Add 1 point: If all success criteria + constraints are measureable Add 5 pts: if all success criteria and constraints relate directly to the problem statement	
Before implementing your project or building your structure or device, design a test that includes changing an independent variable and measuring the resulting change(s) in dependent variable(s). For example, if you plan to change the design of a truss, how will you measure the difference in how much weight it will bear? Or if you plan to plant trees along a creek, how will you measure change in water temp?	Plan for testing an independnet variable is identified and a procedure identified for how resulting changes of dependent variables will be tested and measured	15	Add 7 pts: Identifies relevant independent variable to be tested (changed) BEFORE conducting project or building device Add 7 pts: Identifies method for measuring resulting changes independent variables Add 1 pt: Uses correct terminology for variables	
			PROBLEM RESPONSE AND PROJECT DESIGN	**/45**

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
MODEL				

MODEL, PROTOTYPE OR SMALL-SCALE TEST

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
BEFORE building a project model or prototype, make a sketch or map of your design or plan, and label it. List materials needed (for model and for actual project), including safety equipment, and provide costs and potential sources. Identify tools and technologies you will need (e.g., scientific equipment, internet resources, computer programs, etc.) and how you will obtain, borrow or gain access to any technology not available at school. Determine any skills you will need and make a plan for gaining those skills.	Plan or design is developed before model or prototype created. Safety and appropriate use of supplies, materials and technology are part of the design.	30	Add 0-10 pts: Sketch or map for design or plan is provided (5 pts)and well-labelled (5 pts) Add 0-10 pts: Materials list is complete and appropriate (3 pts), with safety equipment listed (2 pts), costs estimated (3 pts), and sources of supplies identified (2 pts) Add 0-5 pts: Technology and tools list is complete and appropriate (3 pts), with details about how students will obtain or gain access to items not available at school (2 pts). Add 0-5 pts: Recognition of skills needed to successfully make model / prototype and conduct project (3 pts) and identification of method(s) for gaining these skills (2 pts)	

		Max Points	Scoring Details	Score
BUILD a model or prototype for a planned device or structure; OR CONDUCT a lab or field test for a planned project; collect data to assess the effectiveness of the model / prototype or test; refine the design of the model /prototype or test based on the effectiveness of the first version; and build a second-iteration model / prototype or conduct a second-iteration test to see if it is more effective, accurate, or predictive.	**Use the iterative design process to design, build and refine a model or prototype; or to design and carry out a test of components of a field project**	25	Add 0-10 pts: Initial model, prototype or small-scale test of field project is completed and its effectiveness is assessed Add 0-10 pts: Model, prototype or small-scale test is refined according to assessment of initial version and second (or modified) version is created Add 5 pts: Effectiveness of second model, prototype or smallscale test is assessed to see if additional iterations are needed	
Explain how you built your prototype(s) or model(s), including each of the steps in your process and a description of how iterative versions were refined.	The prototype(s) or model(s) is(are) built sufficiently and is a valid test of the Problem Response (design) statement.	30	0-5: No design steps listed (0), OR up to 10 points for steps listed with no details given nor valid test of the Problem Response statement) 6-10: Not a valid test of the Response statement; or description steps of the model(s) or prototypes, lacks detail, missing many steps 11-15: A valid test of the Response statement, lists most steps, some a few steps missing and/or detail missing 16-20: A valid test of the Response statement 41-50: A valid test of the Response statement; results replicable by anyone using detailed procedure listed.	
	Use of an original, resourceful and novel approach to engineering design	20	0-5: Design not original, resourceful or novel (0) but may be effective (5) 6-9: Design is either original, resourceful or novel (only one) 10-13: Design is either original, resourceful or novel (only one but very detailed) 14-16: Design is original, resourceful and/or novel (2 of 3) 17-20: Design is original, resourceful and novel (3 of 3)	
			MODEL, PROTOTYPE OR SMALL-SCALE TEST	**/100**

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
RESULTS OF MODEL, PROTOTYPE OR SMALL-SCALE TEST				
Describe the data you collected and observed in your prototype testing or small scale investigation. Use of data tables, charts, and/or graphs is encouraged.	Sufficient and appropriate data is collected and well presented	30	0-5: Very minimal or no data presented 6-11: Data collected, appropriate data tables OR either display edas charts/graphs 12-18: Data collected, appropriate data tables AND either displayed as charts/graphs 19-25: Data collected from at least 3 trials, appropriate data tables OR displayed as charts/graphs 26-30: Data collected from at least 3 trials, appropriate data tables AND displayed as charts/graphs	
	Appropriate use of mathematical calculations	15	0-5: Design not original, resourceful or novel (0) but may be effective (5) 6-9: Design is either original, resourceful or novel (only one) 10-13: Design is either original, resourceful or novel (only one but very detailed) 14-16: Design is original, resourceful and/or novel (2 of 3) 17-20: Design is original, resourceful and novel (3 of 3)	

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
Analyze the data you collected and observed in your prototype testing. How does your data support or refute your Problem Response (Design) Statement? Explain your answer using this format: "Our data supports/refutes the design statement because . . ." Explain any sources of error and how these could have affected your results.	Explains how the data supports or refutes the design statement	15	0-3: Does not explain (0), or incorrect explanation used/does not use prompt (3) 4-6: Uses correct prompt, does not explain 7-9: Uses correct prompt, explains but very vague 10-12: Uses correct prompt, explains, lacks some detail 13-15: Uses correct prompt, explanation very thorough	
	Lists sources of error and explains how these could have affected the results	15	0-3: Does not list any errors (0), or incorrect explanation (3) 4-6: Lists sources of error only, no explanation 7-9: Lists sources of error, explains how affected the results, but vague 10-12: Lists sources of error, explains how affected the results, lacks some detail, includes data tables, charts and/or graphs 13-15: Lists sources of error, explanation very thorough AND includes data tables, charts and/or graphs	
	RESULTS OF MODEL, PROTOTYPE OR SMALL-SCALE TEST			**/75**

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score
CONCLUSIONS ABOUT PROJECT DESIGN				
Interpret and evaluate your results and write a conclusion statement that includes the following: Describe what you would do if you wanted to refine or further test your design. Evaluate the usefulness of your prototype, model, or small scale test. What changes would you make for the future, if any?	Description of how the team would retest or further their prototype	10	0-3: Does not describe (0), or incorrect description (3) 4-5: Describes how team would retest or further test, very vague 6-7: Describes how team would retest or further test, lacks detail 8-9: Detailed description for retesting or further testing their hypothesis 10: Detailed description for retesting or further testing their hypothesis, very thorough and clear	
	Evaluation of the usefulness of the prototype or model	15	0-3: Does not explain (0), or incorrect explanation used/does not use prompt (3) 4-6: Uses correct prompt, does not explain 7-9: Uses correct prompt, explains but very vague 10-12: Uses correct prompt, explains, lacks some detail 13-15: Uses correct prompt, explanation very thorough	
	Appropriate use of engineering and scientific terminology throughout "Problem Resolution and Project Design" section	10	0-3: Does not use at all (0) or very minimal (3) 4-5: Use of scientific and engineering terminology is limited 6-7: Uses some appropriate terminology, some inaccurate 8-9: Uses appropriate terminology throughout 10: Uses appropriate terminology throughout, also uses significant figures, units	
	CONCLUSIONS ABOUT PROJECT DESIGN			**/35**
PROJECT IMPLEMENTION & BENEFITS TO THE ENVIRONMENT				

Suggested file attachments: brochures, fliers, posters, website links
Total maximum points in this section: 180

Portfolio Questions and Answers	Judging Criteria	Max Points	Scoring Details	Score

Tell whether your small-scale test, model or prototype was implemented in a real world project, outside the classroom. If yes, describe the PROCESS of conducting this project, with enough detail that someone else could replicate it. Quantify your EFFORTS (tell how the work you did can be counted or measured). Separately, describe quantifiable short-term effects or RESULTS of your efforts, in terms of benefits to the environment. Describe any LONG-TERM IMPACTS on the environment that you expect to see, and provide rationale. Describe any INCIDENTAL BENEFITS to students or the community. (EXAMPLES: 6 student-hours spent planting 22 milkweed plants to provide monarch butterfly habitat = EFFORT; 40 caterpillars observed on milkweed plants = RESULTS; contributing to increased numbers of monarchs by creating part of a habitat corridor = LONG-TERM IMPACT; and increasing student awareness of monarchs as a vulnerable species while transforming a construction area into a beautiful garden = INCIDENTAL BENEFITS to students and the community.	Student efforts produced results that made a difference in the real world and continue to benefit the environment	100	NOTE: The Benefits to the Environment section is only for responses regarding real-world projects in the community that actually benefit the environment (not models, prototypes or small scale projects that are not subsequently implemented outside the classroom). Add up to 20 points for each of the following (max total 100): - PROCESS: Complete step-by-step description of project implementation that could be used to replicate this work - EFFORTS: Student efforts are measured or counted. (Time spent on project may be recorded but work undertaken must also be quantified). - RESULTS: Short term impacts of student project that can be observed during same school year are documented and quantified. - LONG-TERM IMPACTS: Reasonable description of anticipated long-term impacts, with evidence-based rationale - INCIDENTAL BENEFITS: Description of benefits to students or the community (as opposed to benefits to the environment)	
REFLECT on the project you implemented, including its successes and failures, in the categories of process, work completed by students, short-term results, long-term impacts on the environment, and incidental benefits to students, school, or community. Tell what worked, what didn't work, and what you would do differently if you had the chance.	Students evaluate the effectiveness of a project that they conducted in the real world.	80	Add 0 - 25 points for a thoughtful reflection on what was **SUCCESSFUL** about the project students conducted to benefit the environment, in terms of the **process and procedures** students designed and followed (5 pts); **efforts made** or work completed (5 pts); short-term results (5 pts); **long-term impacts** (5 pts); and **incidental benefits** to students, school, or community (5 pts). Remember to tie the discussion back to the indicators of success Add 0 - 25 points for a thoughtful reflection on what was **UNSUCCESSFUL** about the project students conducted to benefit the environment, in terms of the process and procedures students designed and followed (5 pts); efforts made or work completed (5 pts); short-term results (5 pts); long-term impacts (5 pts); and incidental benefits to students, school, or community (5 pts). Add 0 - 30 points for a thoughtful reflection on what students would do differently to improve the project (10 pts); what new questions they wonder about (10 pts); and what additional action might be needed to address the environmental problem they set out to solve (10 pts).	
PROJECT IMPLEMENTION & BENEFITS TO THE ENVIRONMENT; REFLECTION				**/180**

TEAM COLLABORATION

Suggested file attachments: Breakdown of team responsibilities, team plan, experiment schedule
Total maximum points in this section: 50

Environmental Stewardship Portfolio	Judging Criteria	Max Points	Scoring Details	Score

Describe how your team used to implement your project and this Folder. sure to explain the role of each team member and how you shared and assigned responsibilities. Describe your team's process to ensure that assignments were completed on time and deadlines were met. *To ensure that project tasks were completed on time*	Team participates in planning and encouraging others	**10**	0-3: Does not describe (0), or incorrect description (3) 4-5: Describes how team would retest or further test, very vague 6-7: Describes how team would retest or further test, lacks detail 8-9: Detailed description for retesting or further testing their hypothesis 10: Detailed description for retesting or further testing their hypothesis, very thorough and clear
	Team members fulfill a broad range of responsibilities	**15**	0-3: Does not explain (0), or incorrect explanation used/does not use prompt (3) 4-6: Uses correct prompt, does not explain 7-9: Uses correct prompt, explains but very vague 10-12: Uses correct prompt, explains, lacks some detail 13-15: Uses correct prompt, explanation very thorough
	Each team member follows the team action plan and helps others stay on track	**15**	Add 6 points - Evidence of EACH team member followed the action plan/calendar (Add 2 more points if very detailed) Add 5 points - Evidence of EACH team member helped others stay on track (Add 2 more points if very detailed)

TEAM COLLABORATION   **/50**

Problem Statement	____ / 75
Problem Response & Project Design	____ / 45
Model, Prototype, or Small-Scale Test	____ / 100
Results of Model, Prototype or Small-Scale Test	____ / 75
Conclusions about Project Design (Response or Problem)	____ / 35
Project Implementation and Benefits to Environment	____ / 100
Reflection and Assessment	____ / 80
Team Collaboration	____ / 50

Environmental Stewardship Project Total Score

/560