Final Evaluation Report
California Environmental Education Foundation

2013 CEEF Teacher Institute: Best Practices of Environmental Education and Stewardship

Prepared by:
Evaluation and Training Institute
11500 W. Olympic Blvd.
Los Angeles, CA 90064 Suite 626
310.473.8367
www.eticonsulting.org
# Table of Contents

Executive Summary ........................................................................................................... 1

Introduction ....................................................................................................................... 3

Methods and Sample .......................................................................................................... 3
  Evaluation Approach .......................................................................................................... 3
  Institute-Based Teacher Surveys ....................................................................................... 4
  Instructional Practice Observations .................................................................................. 5
  Student Attitude, Knowledge, and Behavior Surveys ..................................................... 5
  Analysis and Reporting ..................................................................................................... 5

Findings: Teacher Institute Experience ............................................................................ 6
  Reasons for Participation ................................................................................................. 6
  Initial Practices and Attitudes ......................................................................................... 6
  Institute Day 1 .................................................................................................................. 7
  Institute Day 2 .................................................................................................................. 9
  Institute Day 3 ................................................................................................................ 11

Findings: Knowledge into Practice ................................................................................... 12
  Stewardship Projects ..................................................................................................... 12
  Environmental Education Activities ................................................................................. 14
  Instructional Practice Observations ................................................................................ 14

Findings: Student Impact .................................................................................................... 19
  Teacher Report ................................................................................................................ 19
  Student Assessment ......................................................................................................... 20
  Student Impact ................................................................................................................ 20

Findings: Stewardship for the Future ................................................................................ 26

Summary and Recommendations ....................................................................................... 27

Appendix A Institute Day 1 Tables .................................................................................... 1

Appendix B Institute Day 2 Tables ..................................................................................... 2

Appendix C Student Impact Tables ................................................................................... 3
  Grades 2 – 4 Student Impact ............................................................................................ 4
  Grades 5 - 6 Student Impact ............................................................................................ 6

Appendix D Institute Day 1 Survey ................................................................................... 9
  Day 1 Pre-Survey ............................................................................................................. 9
  Day 1 Post-Survey ........................................................................................................... 11

Appendix E Institute Day 2 Surveys .................................................................................. 15
  Day Pre-Survey ............................................................................................................... 15
  Day 2 Post-Survey .......................................................................................................... 18

Appendix F Day 3 Post-Survey ......................................................................................... 22
  Day 3 Post-Survey .......................................................................................................... 22

Appendix G Observation Protocol ..................................................................................... 29
Appendix H Student Attitude, Knowledge, and Behavior Surveys ...................................................... 34
Grade 2-4 ............................................................................................................................................. 34
Grades 5-12 ....................................................................................................................................... 36
Executive Summary

Introduction
In 2013, in partnership with the Santa Clara County Office of Education (SC COE), the California Environmental Education Foundation (CEEF) sponsored a three-day Teacher Institute designed for elementary and secondary teachers. The Evaluation and Training Institute (ETI) conducted an evaluation that focused on teachers’ experiences as well as the impact of the program on students.

Methods
ETI utilized a mixed-methods research design to capture both formative and impact feedback to present evaluation findings that focused on both teacher and student experiences. We examined the learning pathway beginning with 1) Professional development gained through the Institute focusing on Institute process and execution; 2) Teacher pedagogy and implementation of environmental education activities using knowledge of stewardship practices and skills learned through the Institute; and 3) Student impact as a result of teachers’ implementation of the lessons learned through the Institute.

We also focused on three main program components for both teachers and students:
- Ecological Understanding (Content)
- Stewardship of the Environment (Attitude)
- Environment-Based Practices (Behavior)

We used the following methods (described in detail below):
- Institute-Based Teacher Surveys
- Instructional Practice Observations
- Student Knowledge, Attitude, and Behavior Survey

Findings: Teacher Institute Experience
Participants attended for the professional development opportunities, to learn environmental education (EE) content, because of their interest in the topic, because the content aligned with their current curriculum, to network with other teachers and to expose students to the topic, among other reasons. Based on participants’ feedback, the Institute was successful in facilitating ecological content learning, teaching useful instructional strategies, and inspiring teachers to incorporate, plan, or implement environment-based content or projects.

Findings: Knowledge into Practice
In 2013, teachers reported designing a variety of different stewardship projects with students. Examples of projects included planting trees and vegetables, reducing the amount of CO2 in the atmosphere, increasing student awareness of environmental issues through activities such as posters and a Public Service Announcement (PSA), campus cleanups or recycling, trail restoration, and erosion abatement, among others. Through stewardship projects and environmental education lessons teachers demonstrated the following:
- Teachers engaged students with new information that connected to students’ lives.
- Students were given the opportunity to explore content through brainstorming and collaboration with other students leading to increased understanding.
- Students were given the opportunity to experience content through hands-on, experiential learning that included making observations and thinking in a critical way about environmental content, problems, and solutions.
- Teachers used multiple informal and formal assessment techniques, and students demonstrated increased knowledge of environmental topics.
Findings: Student Impact
After participating in the program students in all grade levels clearly indicated the following:

- Students learned about environmental problems and looked forward to exploring new topics.
- Students were able to think proactively about solving environmental problems.
- Students participated in positive conservation behaviors such as reusing things and recycling.
- Students cared about protecting their local environment and felt that it was their responsibility to contribute to doing this.
- Students encouraged their friends to recycle and reported that they were willing to engage in environmental behaviors with a far-reaching impact such as participating in a river cleanup or stopping use of an environmentally harmful product.
- As a result of participating in the program, students felt they could make a difference in the environment.

Findings: Stewardship for the Future
When asked to describe any next steps teachers planned to take regarding environmental education and stewardship with their students, teachers’ responses fell into three categories: 1) continue to implement stewardship projects; 2) incorporate environmental education into lessons and activities; and 3) conduct presentations/outreach to increase awareness and encourage others to incorporate stewardship.

Summary and Recommendations
The Institute was successful in increasing teachers’ knowledge about environmental topics and strategies for implementing those topics into the classroom. Through knowledge comes confidence, and teachers reported that their confidence and capacity also improved. It was clear through classroom observations that the materials engaged students and that teachers found innovative ways to structure their lessons and promote deep thinking about environmental topics.

Through survey measures we found that younger students (Grades 2-4) gained in environmental knowledge, had positive attitudes toward specific stewardship behaviors, and were willing to engage in these behaviors. We were able to administer more sophisticated instruments with students in Grades 5 – 12. These findings show that students experienced statistically significant impact in these areas after participating in the program. Students also demonstrated that they were able to think through an environmental problem by identifying the problem, cause, and solutions.
Introduction

The California Environmental Education Foundation (CEEF) is committed to providing professional development opportunities for teachers that promote ecological understanding, stewardship of the environment, and environment-based practices in the classroom and beyond. For 2013, in partnership with the Santa Clara County Office of Education (SC COE), the CEEF sponsored a three-day Teacher Institute designed for elementary and secondary teachers.

The Evaluation and Training Institute (ETI) is a non-profit research and consulting organization based in Los Angeles and specializing in educational program evaluation. ETI was contracted by CEEF to evaluate the Best Practices of Environmental Education and Stewardship Institute in both 2011 and 2013. The purpose of the 2013 evaluation was to measure the extent to which the program was successful in meeting the following goals:

- Provide three days of high quality professional development on best practices of environmental education (EE) and stewardship with five hours of individualized follow-up consultation with a CREEC network Regional Coordinator.
- Provide hands-on experience with research-based EE activities, and give sample curricula from Project Learning Tree, Project Wild Aquatic, and Project WET.
- Enable participants to gain ecological knowledge, enhanced pedagogic skills, and renewed passion for environmental stewardship.
- Provide teachers with the tools to successfully integrate environmental content and practices with their students.

The evaluation focused on teachers’ experiences as well as the impact of the program on students. This report includes the following sections: Introduction; Methods and Sample; Findings: Teacher Institute Experience, Knowledge Into Practice, Student Impact, and Stewardship for the Future, and Summary and Recommendations.

Methods and Sample

Evaluation Approach

We utilized a mixed-methods research design to capture both formative and impact feedback to present evaluation findings that focused on both teacher and student experiences. We examined the learning pathway beginning with 1) Professional development gained through the Institute focusing on Institute process and execution; 2) Teacher pedagogy and implementation of environmental education activities using knowledge of stewardship practices and skills learned through the Institute; 3) Student impact as a result of teachers’ implementation of the lessons learned through the Institute.

We also focused on three main program components for both teachers and students:

- Ecological Understanding (Content)
- Stewardship of the Environment (Attitude)
- Environment-Based Practices (Behavior)

The following research questions were used to guide the evaluation:

1. To what extent did teachers’ ecological understanding increase as a result of the teacher Institutes?
2. To what extent was the Institute and classroom component successful in increasing teachers’ commitment to stewardship?

3. To what extent have teachers’ environment-based practices in the classroom been affected (increased and improved) by the program?

4. To what extent have students’ sense of stewardship increased as a result of teacher-led environment-based lessons and activities?

5. To what extent have students’ environment-based practices and attitudes been affected as a result of teacher-led environment-based lessons and activities?

We used the following methods (described in detail below):

- Institute-Based Teacher Surveys
- Instructional Practice Observations
- Student Knowledge, Attitude, and Behavior Survey

**Institute-Based Teacher Surveys**

We used a pre-post-survey design to address research questions 1, 2, 3, and 4 through the three areas of inquiry. Seventeen teachers representing multiple subjects (various sciences, English, history, Spanish) and grade levels (2-12) completed the major course requirements. Not all teachers attended all Institutes however, and survey respondents varied from 10-21 depending on the Institute. See Appendix D-G for the evaluation instruments.

**Ecological Understanding**

Given that each day of the Institute focused on a different content set, we conducted a brief survey that was administered to teachers prior to the beginning of Institute Days 1 and 2. The purpose of the survey(s) was to establish teachers’ baseline level of content knowledge (pre-survey). A post-survey administered at the end of the Institute allowed us to gauge teachers’ understanding of program concepts gained as a direct result of the training.

**Stewardship of the Environment**

In our experience working with environment-focused programs we understand that the likelihood of program participants giving positive feedback about their environmental attitudes is very high both prior to and after participation. In order to mitigate this “ceiling effect” (initial positive responses leave little room for growth or change), we used a post-only approach to surveying teachers’ attitudes. We included both quantitative and qualitative items for teachers to report their attitudes toward stewardship of the environment. Stewardship items were included for post-surveys during Days 1, 2, and 3 of the Institute.

**Environment-Based Practices**

Based on the CEEF Teacher Institute’s program goals, we assessed how teachers’ classroom practices were influenced by the professional development trainings. We use the term classroom practices to include teaching strategies and lessons, assessment strategies, and any environment-based practices that have evolved as a result of the program. We collected this type of data through open-ended and close-ended survey questions across the three days of the Institute.

All teacher surveys were administered online via SurveyMonkey, our online survey provider.
Instructional Practice Observations

In order to better understand how teachers’ instructional practices were influenced by the Institute trainings, we conducted a series of school site observations for a sample of teachers (n=10). ETI designed this observation protocol, and environmental experts serving as Regional Coordinators in the California Regional Environmental Education Community (CREEC) conducted the observations. The observations also provided an opportunity to observe student behaviors firsthand. The observation protocol addressed the following:

- Highlights and challenges of instructional strategies and lessons
- Teaching strategies and behaviors
- Student learning and engagement

The protocol included open-ended and scaled items. Data were analyzed to present a profile of environment-based instructional practices as a result of teachers’ participation in the CEEF professional development (PD) Institutes. See Appendix G for a copy of the observation protocol.

Student Attitude, Knowledge, and Behavior Surveys

For the 2013 evaluation, we also conducted a student impact component. This piece of the evaluation was designed to directly examine the extent to which students’ behaviors and attitudes changed as a result of participating in stewardship projects, lessons with ecological content, and other activities teachers implemented as a result of participating in the CEEF Institutes. We developed two sets of similar measures tailored for Grades 2 – 4 and Grades 5 – 12. The Grades 2 – 4 survey asked students to provide feedback about their experiences at one point in time (post-program). The Grades 5 – 12 survey utilized a retrospective design, asking students to reflect on their attitudes, knowledge, and behaviors both before and after the program but administered at one point in time following completion of the program (see Appendix H). The survey content focused on the following:

- Ecological knowledge
- Environment-based practice and behavior
- Attitudes toward the environment

Student surveys were administered in both paper and electronic format and were completed by 363 students representing Grades 2 – 12.

Analysis and Reporting

We provided Institute survey results to the CEEF Executive Director and Institute Director on an ongoing basis following each professional development day. For the final report, ETI analyzed all student impact data, teacher data collected through the Institute surveys, and instructional practice observation data. Data were presented to provide salient feedback and outcomes achieved through each discrete program component. Quantitative data were aggregated and analyzed using descriptive analyses (frequencies and percentages) and presented in visual form (i.e., table, graph, chart) with an accompanying narrative to highlight relevant findings. Qualitative data were analyzed for salient themes and presented thematically.

Grades 5 – 12 surveys. To determine whether or not there were differences between student perceptions before the program versus after the program, we conducted a series of paired t-tests using
a statistical software program (Statistical Product and Service Solutions: SPSS). Items were considered significant when \( p < .05 \).  

**Grades 5 – 12 Environmental Thinking Problem.** Students provided open-ended responses to an environmental thinking problem designed to capture their ability to identify an environmental problem, cause, and solution. ETI developed a three-point rubric, and students’ responses were coded according to this rubric and presented as a mean and frequency.

### Findings: Teacher Institute Experience

In order to fully understand the success of the Institute, it was important to take note of the following: 1) why participants attended and what they hoped to gain; 2) participants’ current use of environmental content; and, 3) participants’ attitudes towards the importance of introducing environmental content to students. By understanding these three areas, we could look at the extent to which participants were in a position to meet the Institute’s goals and how much teachers’ grew professionally as a result of the program.

#### Reasons for Participation

Participants attended for the professional development opportunities; to learn environmental education (EE) content, because of their interest in the topic, because the content aligned with their current curriculum; to network with other teachers and to expose students to the topic, among other reasons. In two instances teachers indicated that they participated because they thought the project-based learning component would be engaging for students. Regarding **professional development opportunities**, teachers wanted the opportunity to learn teaching strategies, environmental education content, best practices in teaching environmental education, and, in one instance, how to integrate environmental content within other disciplines. Based on their responses, it was clear that the Institute’s curriculum aligned with participants’ reasons for attending.

Teachers hoped to come away from the Institute with lessons or curriculum to use with their students, ideas for developing lessons or programs, more connections, EE content knowledge, and teaching strategies. As noted by one teacher, “I hope to learn something I can use in my classroom, perhaps to tighten up some of my units. I am also interested in the support and motivation for doing a sustainability project with my students.”

#### Initial Practices and Attitudes

Teachers’ reports on their current-use of and confidence in implementing EE content in the classroom indicated that a majority of participants were in a position to experience improvement in both areas. A major goal of the program was to position teachers to increase the quality and frequency of environment-based activities implemented in their classrooms. **Prior to participating in the Institute** most teachers incorporated environment-based activities in their

---

1 In statistical significance testing the **p-value** is the probability of obtaining a test statistic at least as extreme as the one that was actually observed.
classrooms only occasionally or not at all (57%; see Table 1 below). Confidence levels also indicated room for growth with 38 percent of teachers reporting that they were “a little confident” and 38 percent reporting that they were “moderately confident.” The remaining teachers reported a high level of confidence.

Table 1
Pre-Institute Environment-Based Practice
N=21

<table>
<thead>
<tr>
<th>Please choose the statement that best reflects the extent to which you currently incorporate environment-based activities into your classroom practice.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Currently I don’t include these types of activities.</td>
<td>N=1</td>
</tr>
<tr>
<td>We talk about the environment in my classroom, but we don’t conduct activities.</td>
<td>N=3</td>
</tr>
<tr>
<td>I incorporate these types of activities occasionally.</td>
<td>N=8</td>
</tr>
<tr>
<td>I incorporate these types of activities frequently.</td>
<td>N=7</td>
</tr>
<tr>
<td>Other, please specify.</td>
<td>N=2</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Following the Institute, the majority of teachers (57 percent) reported that the information they learned inspired them “a lot” to plan and implement environment-based classroom projects (Table 2).

Table 2
Feedback about Institute Day 1
N=18

<table>
<thead>
<tr>
<th>To what extent . . .</th>
<th>Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the information you learned today inspire you to plan and implement environment-based classroom projects?</td>
<td>-- N=4</td>
<td>N=4</td>
<td>N=10</td>
<td></td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Institute Day 1

Institute Day 1

Experience

Based on participants’ feedback, the Institute was successful in facilitating ecological content learning, teaching useful instructional strategies, and inspiring teachers to incorporate, plan, or implement environment-based content or projects. For example, 50 percent or more of the teachers reported experiencing an increase of more

“I had never heard of a 5-E lesson before...I had to fight the urge to present the "lecture" portion first. I had the students brainstorm in groups, and then I set up hands-on stations. Only after that, did I show them a short video about plastic contamination in the oceans. I followed with a "segments of society" solutions brainstorming activity.”

“I have included more thought provoking questions for assessments instead of only using questions that just allow for memorization.”

“I have used some of the salmon, river activities in my after school program.”

2 N varies by number of participants responding to each question.

3 Other: Participants provided feedback that would indicate that they incorporated these types of activities occasionally.
than “a little” (above 2 on a 4 point scale) in the following four areas:

- Teachers increased their knowledge about preventing and managing forest fires
- Teachers were inspired to incorporate ecological content into classrooms
- Teachers were inspired to plan and implement environment-based classroom projects
- Teachers found the instructional strategies learned in Day 1 useful

For a full breakdown of response frequencies, see Appendix A, Table 1.

Following Day 1, teachers also reported increases in new ecological content related to forest fires, sedimentation and animal habitats with 56 percent reporting that they increased their knowledge “a lot” for forest fires compared to 39 percent who said the same for sedimentation and ecological habitats. In particular, teachers explained that they learned more about: “forest fire management”, “methods to prevent fire such as firescaping”, “silt and its effects on salmon and trout”, “where silt comes from, and how it can harm waterway and living things”, among others.

While teachers generally reported positive gains in ecological content knowledge, and felt inspired to implement environment-based projects, they were a little less sure about how to implement an environment-based project at this point in the Institute. For example, when asked if the Institute increased their knowledge of how to implement an environment-based project, only three reported their knowledge had increased by “a lot”. One teacher said s/he needed more hands-on learning opportunities or “chances to participate in activities/lessons that could be presented to kids.” Others reported that the Institute helped generate project ideas, such as one teacher who commented, “I have three simple ideas for lab style projects that second graders would benefit from,” but others felt they needed more time to work out the details before implementation.

Teacher Practice Follow-Up

Following Institute Day 1, 8 - 9 teachers indicated that they had used activities, resources, or strategies from Institute 1. As one teacher commented, “I did not include any activities from the first institute in my practice, but the reflections I did on the connections between different water ecosystems helped me to make those connections stronger for my students in leading up to their service project.” Specifically, teachers reported that they used 5E pedagogy techniques most often (n=4), followed by assessments (n=3), and implementing EE lessons/activities (n=2).

Their experience in the classroom resulted in the following outcomes (see Table 3):

- Positive increases in students’ ecological knowledge
- Provided an enriching experience for teachers
- Students’ increased sense of stewardship was mixed
- Teachers’ increased sense of stewardship was mixed

---

4 This number is unclear since the number of teachers who reported N/A-did not implement any activities varied by question.

5 These numbers were generated from open-ended responses to the question: “Please describe any activities based on what you learned in Institute Day 1 that you included in your instructional practice” (n=11). More than one type of activity may have been reported per person.
While most teachers felt that the activities were successful for increasing their students' sense of stewardship, two did not agree. One teacher felt that students were “already inclined toward stewardship” while another felt that the chapter he or she implemented on soil formation did not “make a personal connection.”

Table 3: Teachers’ Report of Practice since Institute Day 1

<table>
<thead>
<tr>
<th>N=11</th>
<th>Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>Very</th>
<th>N/A – Did not implement any activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>How successful were these activities for increasing your students' ecological knowledge?</td>
<td>--</td>
<td>--</td>
<td>N=6 55%</td>
<td>N=3 27%</td>
<td>N=2 18%</td>
</tr>
<tr>
<td>How successful were these activities for increasing your students' sense of ecological stewardship?</td>
<td>N=2 18%</td>
<td>--</td>
<td>N=4 36%</td>
<td>N=3 27%</td>
<td>N=2 18%</td>
</tr>
<tr>
<td>How successful were these activities for increasing your sense of ecological stewardship?</td>
<td>N=1 9%</td>
<td>N=1 9%</td>
<td>N=3 27%</td>
<td>N=3 27%</td>
<td>N=3 27%</td>
</tr>
<tr>
<td>To what extent did including ecological activities into your instructional practice enrich the teaching experience for you?</td>
<td>--</td>
<td>N=1 9%</td>
<td>N=2 18%</td>
<td>N=7 64%</td>
<td>N=1 9%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Institute Day 2

Institute Day 2 was intended to further prepare teachers for implementing EE activities and lessons, traditional and authentic assessments, and stewardship projects. Toward this end teachers participated in presentations, activities, and an introduction to useful resources. An overview of teachers’ feedback about these areas is included in this section in addition to Institute Day 2 highlights and recommendations.

Institute Day 2 Experience

Teachers experienced four EE activities and lessons during Day 2 of the Institute. Three sessions focused on ecological content and activities, and one focused on overcoming challenges to the stewardship project. The highest rated session that provided strategies and information useful to teacher’s instructional practice was the “Just Passing Through activity”, with teachers rating an average of 3.8 on a 4-point scale for usefulness. In addition, 70 percent of the teachers either “agreed” or “strongly agreed” that “the opportunity to share ideas with other teachers” helped increase their understanding of how to apply environment-based concepts with students. One of the three who was
undecided commented, “The opportunity to share ideas with other teachers…would have been REALLY helpful but didn’t really happen (hence my undecided above).” For a full breakdown of frequencies related to the activities see Appendix B, Table 1.

An assessment presentation was provided during Day 2 to help prepare teachers to evaluate their students’ ecological understanding. Based on teachers’ responses, the assessment presentation was at least “moderately” helpful for giving teachers evaluation ideas for 90 percent of the teachers. In addition, 80 percent of the teachers felt that they were prepared at least “moderately” to design their own authentic assessments and reported increased confidence towards using authentic assessment. For a full breakdown of frequencies related to the assessment presentation see Appendix B, Table 3. In open-ended responses, two teachers also mentioned assessment as a highlight of the Institute. One teacher developed a deeper understanding of the purpose and use of assessment.

A big focus of Day 2 of the Institute was to prepare teachers for implementation of the stewardship project with students. Toward that end, teachers listened to two presentations and participated in two activities designed to help them overcome potential challenges to implementation. Teachers were most likely to agree that the two presentations (compared to the activities) were slightly more effective in helping them understand how to implement the stewardship project with students. The majority of teachers (60 percent) agreed that these helped them better understand how to implement the stewardship project with students. This is compared to 30 and 50 percent for activities. Reflecting on the Institute overall, most teachers (90 percent) either “agreed” or “strongly agreed” that Day 2 provided “good ideas to address any challenges” with implementation of the stewardship project. For a full breakdown of findings see Appendix B, Table 5.

Teachers were given an introduction and access to three different resources during Day 2. Teachers found all three resources presented in Day 2 to be useful to their instructional practice. Both the NSTA Online Learning Center presentation and National Geographic Fieldscope platform had an average rating of 3.4. Responses for the usefulness of the National Geographic MapMaker kits averaged 3.1 on a 4-point scale (moderately useful). For a full breakdown of findings by resources see Appendix B, Table 4.

Highlights and Recommendations

The highlights of Day 2 for teachers included experiencing activities such as Project Wet and Just Passing Through (mentioned by 7 of 10 respondents), specific presentations such as the Gold Rush and National Geographic presentations (mentioned by 4 of 10 participants), and learning about helpful resources (mentioned by 3 of 10 participants), among others. Participants described the presentations as “interesting,” “excellent,” “effective,” or “easy-to-follow,” and described activities as “fun,” “cool,” and
providing “useful information.” Teachers also learned ecological content related to mining (6/10 mentions), including more information about mercury and arsenic pollution and how gold is mined. As described by one teacher, “Even though I worked in a trace metal lab in grad school and REALLY should have known this, I didn’t quite understand how mercury was involved in gold mining.”

While teachers noted that the Institute helped them learn ecological content in addition to providing positive feedback on the activities, presentations, and resources of Day 2, many teachers also felt the Institute could be improved in two key respects: pacing and the amount of information provided. In their recommendations for improvement, teachers most often said that parts of the Institute seemed rushed and that speakers did not have enough time to “fully address the information”. In other comments, teachers felt they were being given too much information, finding it to be “a lot to process in one day.” In other responses, two teachers did not find all the speakers engaging, with one teacher commenting that the speaker was “over the heads of 95% of the audience…it just disengaged people”.

Institute Day 3

The program model was designed so that during Institute Day 1 and Institute Day 2, participants would receive enough information, sharing opportunities, and materials to implement an EE lesson in their classroom as well as a stewardship project of their choosing with their students. While a few teachers had begun these activities following Institute 1, most teachers put into play the bulk of what they had learned prior to Institute Day 3. Day 3 of the Institute provided the opportunity for teachers to share their experience implementing the stewardship project with their students, and the majority of the day was spent listening to other teachers’ presentations on this topic. In addition to teachers’ presentations, Institute Day 3 included a web-based presentation and discussion focused on funding environmental stewardship projects.

Institute Day 3 Experience

With such a major focus in Day 3 on sharing stewardship project experiences, we asked teachers how useful they found this experience. The majority of teachers (57 percent) found the project presentations “very” to “extremely” useful (Table 4). These teachers felt that listening to other teachers was beneficial for generating “great activities and ideas to use for the next stewardship project.” A few teachers criticized the presentations for being too long, irrelevant, or not engaging. For example, one teacher recommended, “maybe have time cards flashed from the back.”

Even more useful to teachers was the web-based presentation, “Funding Environmental Stewardship Projects”. Seventy-two percent of teachers found this presentation “very” to “extremely” useful. In their comments, teachers...
expressed excitement over the prospect of receiving funding for projects, and some mentioned that they would be using the site in the future. For those who did not find it as useful, participants reported that their schools weren’t eligible due to most of the funding being provided to the Bay area. Additionally, one participant found the information to be “a bit overwhelming”.

Table 4
Institute Day 3 Experience
N=14

<table>
<thead>
<tr>
<th>Please rate the extent to which . . .</th>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Very</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>You found the stewardship project presentations from other teachers useful.</td>
<td>N=1 7%</td>
<td>N=2 14%</td>
<td>N=3 21%</td>
<td>N=6 43%</td>
<td>N=2 14%</td>
</tr>
<tr>
<td>You found the panel presentation and discussion on the topic “Funding Environmental Stewardship Projects” useful.</td>
<td>--</td>
<td>--</td>
<td>N=4 29%</td>
<td>N=6 43%</td>
<td>N=4 29%</td>
</tr>
<tr>
<td>Institute Day 3 was inspirational to you.</td>
<td>--</td>
<td>N=4 29%</td>
<td>N=4 29%</td>
<td>N=3 21%</td>
<td>N=3 21%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Findings: Knowledge into Practice

This section includes a description of how teachers implemented activities with their students through stewardship projects and environmental education activities (including assessment). It includes teacher-reported feedback from Institute 3 and instructional practice observation analysis.

Stewardship Projects

A key component of the program was the stewardship project teachers implemented with students. This project gave teachers the opportunity to apply what they learned and students the opportunity to make a real-world difference through a project-based learning experience.

In 2013 teachers reported designing a variety of different stewardship projects with students. Examples of projects included planting trees and vegetables, reducing the amount of CO2 in the atmosphere, increasing student awareness of environmental issues through activities such as posters and a Public Service Announcement (PSA), campus cleanups or recycling, trail restoration, and erosion abatement, among others.

Teachers used a variety of resources as inspiration in order to develop and implement their stewardship projects. Approximately 5 out of 14 teachers reported that they used ideas and activities from the Institute, such as Project WILD. Five teachers also reported conducting online research, or using websites as resources, including: Indiegogo, TeacherDomain.com, STEP (salmon and trout education program), Acterra, brainpop, among others. Additionally, two teachers specifically mentioned online CREEC resources, which were used by one teacher to organize a field trip to Walden West Outdoor School.
In addition to the resources mentioned above, teachers listed a variety of specific materials or activities they used with students. Some examples of these were a “PBS Kids Loop Scoops” video and the “Vermi the Worm” game found on TeacherDomain.com, WattsUp meters, videos, webcams, and computers, among others. Several teachers also listed some unique resources. For example, one teacher noted “science teacher collaboration” as a resource and another reported using his or her “current location” which was nearby a polluted river.

A majority of teachers felt that the stewardship project was effective for increasing both their own and students’ knowledge of ecological concepts (see Table 5). Over 50 percent of the teachers reported that the stewardship project was “very” to “extremely” effective for increasing their or their students’ ecological concept knowledge. Of the ten teachers who provided related comments, five reported a high level of knowledge prior to the program. As described by one of these teachers, “My greatest learning was in terms of how to most effectively motivate the students…my content knowledge was relatively strong to begin with.” In their justification for their ratings on student knowledge gains, two teachers were unsure of the effectiveness of the project for increasing ecological content knowledge. As one of these teachers described, “My assessment was deeply informal; I know they had fun!” For more detailed information on student knowledge gains see the Student Impact section.

Teachers rated the stewardship project even higher for augmenting their own and their students’ sense of stewardship for the environment (Table 5). Sixty-four percent felt the stewardship project was at least “very” effective for increasing their sense of stewardship and 71 percent said the same for their students. Of the 10 teachers who provided related comments, many had positive student reactions to share.

While most reported positive student reactions to the project, one teacher noted that not all students were affected by the project, and another reported, “Their behavior changed temporarily and then they went back to regular old behaviors.” Another teacher reported that the impact varied by student commenting, “For some students, it was extremely effective and they rallied behind it. For other students, it seemed to have almost [no] effect.”

“The majority of them felt very empowered”

“They gained leadership skills and knowledge about gardening and composting that they never knew.”

“Many students really embraced the project.”

### Table 5
Stewardship Projects

<table>
<thead>
<tr>
<th></th>
<th>Not at all effective</th>
<th>Slightly effective</th>
<th>Moderately effective</th>
<th>Very effective</th>
<th>Extremely effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>The stewardship project was effective for increasing your knowledge of ecological concepts.</td>
<td>N=1 7%</td>
<td>N=3 21%</td>
<td>N=3 21%</td>
<td>N=5 36%</td>
<td>N=2 14%</td>
</tr>
<tr>
<td>The stewardship project was effective for increasing your students’ knowledge of ecological concepts.</td>
<td>--</td>
<td>--</td>
<td>N=6 43%</td>
<td>N=7 50%</td>
<td>N=1 7%</td>
</tr>
<tr>
<td>The stewardship project was effective for augmenting your sense of stewardship for the environment.</td>
<td>--</td>
<td>N=2 14%</td>
<td>N=3 21%</td>
<td>N=7 50%</td>
<td>N=2 14%</td>
</tr>
</tbody>
</table>
Please rate the extent to which . . .

<table>
<thead>
<tr>
<th>The stewardship project was effective for augmenting your students’ sense of stewardship for the environment.</th>
<th>Not at all effective</th>
<th>Slightly effective</th>
<th>Moderately effective</th>
<th>Very effective</th>
<th>Extremely effective</th>
</tr>
</thead>
<tbody>
<tr>
<td>--</td>
<td>N=1 7%</td>
<td>N=3 21%</td>
<td>N=9 64%</td>
<td>N=1 7%</td>
<td></td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Environmental Education Activities

In addition to a stewardship project focused on project-based learning, teachers also implemented an environment-based lesson. During the Institute teachers were introduced to different types of lessons they could use or adapt with their students. When developing their lessons, teachers used materials and activities from the Institute, such as Project Wild and Project Wet, in addition to the CREEC Network Resource Directory, Education and the Environment Initiative (EEI) curriculum, online research, and others.

While implementing an EE activity was a required component of the program, CEEF was also interested in understanding the value of these activities for both teachers and students. As depicted in Table 6, teachers felt that this was a very valuable experience, and slightly over 70 percent rated this experience as “very” to “extremely valuable” to their students. Similarly, over 60 percent of the participants rated the educational activity as “very” to “extremely” valuable.

Table 6

Environmental Education Activities

N=14

<table>
<thead>
<tr>
<th>Please rate the extent to which you feel that . . .</th>
<th>Not at all valuable</th>
<th>Slightly valuable</th>
<th>Moderately valuable</th>
<th>Very valuable</th>
<th>Extremely valuable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developing and implementing the environmental education activity was a valuable experience for you as an educator.</td>
<td>--</td>
<td>--</td>
<td>N=4 29%</td>
<td>N=7 50%</td>
<td>N=3 21%</td>
</tr>
<tr>
<td>The environmental education activity was a valuable experience for your students.</td>
<td>N=1 7%</td>
<td>--</td>
<td>N=4 29%</td>
<td>N=7 50%</td>
<td>N=2 14%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Instructional Practice Observations

In order to observe teachers putting their pedagogy into practice and students’ knowledge firsthand, ten classrooms were observed representing elementary grades (2,3,5), middle grades (6,7,8), and high school grades (9,10,11,12). We looked at teaching strategies, how students engaged with the content, lesson highlights, and areas for improvement. Key findings from the Instructional Practice Observations included the following:

- Teachers engaged students with new information that connected to students’ lives.
- Students were given the opportunity to explore content through brainstorming and collaboration with other students leading to increased understanding.
- Students were given the opportunity to experience content through hands-on, experiential learning that included making observations and thinking in a critical way about environmental content, problems, and solutions.

“Getting students up and moving with hands on activities gets them more involved and interested in a concept.”
Teachers used multiple informal and formal assessment techniques, and students demonstrated increased knowledge of environmental topics.

Observations varied in length from 35 to 150 minutes and captured EE lessons varying in content and source lesson. For example, teachers drew lessons from Project WET, the EEI, and Project Learning Tree (PLT). Content areas varied including lessons on watersheds and our human impact upon them; plant and animal adaptations and survival; healthy streams for steelhead trout and salmon; California’s water, vermicomposting; conservation methods; animal life cycle, and local energy sources. The sections below detail these findings by presenting mean ratings from across the 10 classrooms with examples drawn directly from observations.

Engage/Explain/Connect

Observers were asked to consider the ways teachers’ engaged students with new information and conversely, the extent to which students were receptive and engaged with the material. We considered strategies teachers used to provide new information, remind students of prior knowledge, and connect to students’ lives. Out of a 5-point scale, ratings were high in all areas with the highest indicating that teachers were successful in attempting to uncover students’ current knowledge about a concept or topic (mean 4.6). The examples below highlight what this looked like as well as other ways students engaged initially with the environmental content.

Table 7
Indicators of Engagement and Knowledge

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher . . .</td>
<td></td>
</tr>
<tr>
<td>Attempted to uncover students’ current knowledge about a concept/topic.</td>
<td>4.6</td>
</tr>
<tr>
<td>Engaged students</td>
<td>4.5</td>
</tr>
<tr>
<td>Encouraged students to explain concepts and definitions in their own words.</td>
<td>4.2</td>
</tr>
<tr>
<td>Used students’ previous experiences as the basis for explaining concepts.</td>
<td>4.0</td>
</tr>
<tr>
<td>Provided definitions or explanations of new words.</td>
<td>4.4</td>
</tr>
<tr>
<td>The students . . .</td>
<td></td>
</tr>
<tr>
<td>Appeared receptive to learning new environmental concepts and skills.</td>
<td>4.2</td>
</tr>
<tr>
<td>Appeared receptive to session materials.</td>
<td>4.2</td>
</tr>
<tr>
<td>Were engaged in the session activities</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Examples

- Using prior student knowledge, the teacher reviewed why drinking water is not abundant and available everywhere even though water covers most of the Earth’s surface. The teacher called on students to share their ideas and wrote them up on the board. (Grade 6)
- In small groups of four, students reviewed a previous lesson that introduced the term “adaptations.” Working in pairs in their groups they

---

6 In some cases, observers provided the rating N/A (did not apply to the session) as opposed to a “1” (did not occur in the session). N/A ratings were not included in mean scores.
used a question and answer format to answer the question “What is an adaptation?” One person from each group shared what others in the group said. Responses included “how it helps animals survive,” when an animal helps its environment by camouflaging or playing dead” and “when animals change over time like amphibians learn to live in water first and then land later.” (Grade 3)

- Small groups of students engaged in discussion of the initial question: “What do you know about the issue of plastics in the ocean?” Students shared in rotation. (Grade 7)
- Following a presentation of conservation posters by groups of classmates, students participated in a discussion of how they will conserve water at home. (Grade 5)

**Explore**

Observers noted the way that teachers encouraged students to explore and engage more deeply with material through inquiry-based learning, student debate/discussion, brainstorming, and project work. Observers also recorded the extent to which students engaged in these processes. The highest rating in this category indicates that student-to-student discussions were prevalent and successful (mean 4.7). The examples below highlight this and other learning exploration behaviors.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The teacher encouraged students to . . .</strong></td>
<td></td>
</tr>
<tr>
<td>Experience key concepts.</td>
<td>4.1</td>
</tr>
<tr>
<td>Discover new skills.</td>
<td>4.2</td>
</tr>
<tr>
<td>Examine their thinking.</td>
<td>4.6</td>
</tr>
<tr>
<td>Participate in student-to-student discussions.</td>
<td>4.7</td>
</tr>
<tr>
<td><strong>The students . . .</strong></td>
<td></td>
</tr>
<tr>
<td>Actively participated in asking questions, answering questions,</td>
<td>4.1</td>
</tr>
<tr>
<td>and classroom discussions.</td>
<td></td>
</tr>
</tbody>
</table>

**Examples**

- Small groups of students read different articles on water projects taking place at the Central Valley, state, and local levels. Through discussion, students compared the projects and answered a series of questions about all three projects. (Grades 9-12)
- Students worked in groups of 4-5 to develop a poster on the best way to conserve water. (Grade 5).
- Students worked in small groups to brainstorm solutions to the question: What can society do to address the problem of marine debris? Each student was assigned a role in society: government, business, scientific research, or citizen. Following the brainstorming session, they shared their ideas to the class. (Grade 7)

**Experience**

Observers considered the extent to which students were given the opportunity for experiential learning including research and hands-on learning. This type of learning affords the opportunity for students to engage in scientific or critical thinking, test solutions to a problem, make observations, and use prior experiences.
knowledge in new ways. While still high, the mean ratings in the experience section were the lowest of the observed behaviors. Although not as frequent as other observed behaviors, the examples below highlight opportunities students had to experience the lesson content on a deep level.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher encouraged students to . . .</td>
<td></td>
</tr>
<tr>
<td>Apply their new learning to new or similar situations.</td>
<td>3.9</td>
</tr>
<tr>
<td>The students . . .</td>
<td></td>
</tr>
<tr>
<td>Demonstrated an understanding or knowledge of concepts and skills.</td>
<td>3.7</td>
</tr>
</tbody>
</table>

**Examples**

- In an outdoor, full class, experiential lesson students mimicked water flowing through a stream. They moved at different speeds in different parts of the stream. They picked up debris (film canister lids) and dropped them at certain parts of the stream. They added plants and had them change the dynamic of when the debris was dropped. The teacher did not give them information ahead of time about what the debris represented or about what caused the different speeds. She asked them to make observations of what patterns they saw in the dropped lids and to come up with their own ideas of what it all represented. (Grade 6)

- Students participated in three different stations to explore the effects of plastics in the ocean. Station 1 Entanglement: Students trapped their own hand in rubber bands and tried to write. Station 2 Debris Size: Students looked at photos of collections of various sizes of plastic debris and thought about which sizes create the most problems for sea creatures. Station 3 Ingestion: Students investigate/dissected the contents of albatross bolus. (Grade 7)

**Reflect and Assess**

The opportunity to demonstrate knowledge gains was an important part of the learning process, and observers were asked to provide ratings and feedback about informal and formal learning strategies used to assess student learning. Informal assessment strategies that were observed including having students share in groups or to the class concepts they had learned. On a few occasions, students were asked to provide feedback to other students about their work. Formal learning strategies included pre- and post- tests as well as the development of rubrics. The examples below highlight some of these strategies.

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Mean Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>The teacher assessed students through the use of . . .</td>
<td></td>
</tr>
<tr>
<td>Informal assessment throughout the session (e.g., asking students to reflect, review concepts, respond to or critique each others’ work).</td>
<td>4.1</td>
</tr>
<tr>
<td>Formal assessment for documentation of student learning such as tests, rubrics, or performance-based assessment.</td>
<td>4.6</td>
</tr>
<tr>
<td>The students . . .</td>
<td></td>
</tr>
<tr>
<td>Were able to successfully complete the activities required during the session.</td>
<td>4.2</td>
</tr>
</tbody>
</table>
Examples

- Students completed a pre-assessment test on the subject Healthy Streams Healthy Fish. (Grade 8)
- Student groups took turns presenting posters on conservation behaviors. When they were done the class voted on the one they liked the best. The class debriefed the process using the guideline “Notice, Wonders, and Thoughts.” They explained why they chose the one they did. (Grade 5)

Highlights

Observations surfaced several highlights including effective teaching strategies; content that resonated with students, and critical thinking opportunities for students. A sample of classroom highlights is included below.

Students made sense of their own ideas. In one class the teacher had a very high tolerance for giving the students time to make sense of their own ideas, which led to a successful watershed definition in spite of the disconnect between different parts of the lesson. This teacher’s ability to allow students to think for themselves and grapple for a (what for many would be an uncomfortably long) length time was what enabled the students to actually make some progress in learning about the concept. (Grade 6)

Environmental integration techniques were creative. In one class example, the teacher used creative methods to integrate environmental content into a Spanish elective class. (Grades 9-12)

Students got a chance to grapple substantively with the material. In one example, students were asked to make their own investigations and use critical thinking skills to fill out a worksheet with detailed responses. Students got to examine real samples of ocean plastics retrieved from inside animals; to simulate animal entanglement in plastic; and to brainstorm potential solutions from the viewpoints of different community groups. (Grade 7)

The content and presentation were relevant to students’ lives. One teacher used the EEI “Water for Life” map to illustrate the problems of water in northern and southern California. It set the stage for students to understand the problem. When she had them read and discuss the three water projects, they were able to understand what was being done to solve the problem. It was especially relevant to the students’ experiences because both the Central Valley and the State Water Projects began in their town. (Grades 9 - 12)

The activity configuration promoted fruitful student interactions and understanding. Students were organized into three groups for an initial article reading on water projects and then changed seats to discuss and make comparisons of the three projects. (Grades 9-12)

The lesson was age-appropriate and effective. The lesson content and activities were age appropriate. Teaching strategies varied to include full group, pairs, small groups, teacher-led, student sharing, etc. to keep the students very engaged throughout. There was excellent organization and flow—this teacher knew how to refocus her students in a positive way and keep them engaged. (Grade 2)

The lesson was organized and implemented effectively. Two teachers organized and co-taught a scavenger hunt to bring in relevant examples of where energy is used. There was strong organization of the lesson between the two teachers. The format allowed students to use their observation skills. (Grades 11 - 12)
Areas for Improvement

There were a few instances where areas for improvement were highlighted by observers. These included the following:

- **Learning objectives were not clearly identified**, thus contributing to an overall learning experience that was not as effective as it could have been.
- **Timing or pacing was an issue.** In one instance, a class did not have time to reflect on an activity they had started. In another, logistics took an inordinate amount of lesson time.
- **Students were distracted from environmental content** in one class where the content had been integrated into a very different subject.
- **Students** received valuable information but **did not have the opportunity to experience the content firsthand** in one class when learning about composting bins.

Findings: Student Impact

Ultimately the purpose of the Institute was to provide teachers with the skills and knowledge that would directly benefit students. For students, the goal was to promote positive gains in understanding ecological content, attitudes and behavior toward the environment. This section includes findings from ETI-designed student surveys and teachers’ reports of student learning based on their overall perceptions and teacher-designed assessments.

Teacher Report

Based on teachers’ responses to the questions listed in Table 11 below, all teachers saw at least slight evidence that students had increased their ecological content knowledge. In fact, on the teacher survey over half of the teachers rated this item a 4 or 5 on a 5-point scale. An even higher percentage of teachers thought students had increased their interest in environmental topics. Sixty-five percent indicated that students’ interest had increased “very much” to “extremely.” One teacher provided a specific example of students’ change in behavior, explaining, “Students are stopping to pick up garbage when they used to just walk by it and ignore it. The students also provided excellent work on a PSA project to identify sources of pollution and ways to prevent/eliminate it.”

Table 11
Student Assessment
N=14

<table>
<thead>
<tr>
<th>Please indicate your response to the following statements:</th>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Very much</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>Since participating in the CEEF Institutes, I have seen student evidence of increased ecological content knowledge (e.g., through tests, classroom discussions, reports, etc.).</td>
<td>--</td>
<td>N=2</td>
<td>N=4</td>
<td>N=7</td>
<td>N=1</td>
</tr>
<tr>
<td></td>
<td>14%</td>
<td>28%</td>
<td>50%</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>As a result of participating in the CEEF Institutes my students’ interest in environmental topics in my classroom has increased.</td>
<td>N=1</td>
<td>N=2</td>
<td>N=2</td>
<td>N=5</td>
<td>N=4</td>
</tr>
<tr>
<td></td>
<td>7%</td>
<td>14%</td>
<td>14%</td>
<td>36%</td>
<td>29%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.
Student Assessment

In addition to teachers’ overall perceptions of the program’s impact on students, teachers were trained and required to develop their own student assessments. Assessments are important tools teachers can use to identify the extent to which student learning occurs. Both traditional and authentic assessment enables teachers to identify areas where students excelled and/or areas that need improvement.

All 14 teachers reported conducting some form of student assessment with their students. As presented in Table 12 below, 93 percent of the teachers said they have a better idea of how to assess students in the area of environmental education as a result of their participation in the Institute. Teachers described using pre-and-post tests most often (8 of 14 teachers). Student reflections, surveys or tests were also used to assess students. In addition, some teachers used performance-based assessments that included videos and photography to capture and share project work and detailed rubrics to evaluate student learning and development. Based on the varying types of assessments they administered, all teachers reported increases in students’ knowledge following participation in the EE lessons and stewardship project.

Table 12
Student Assessment
N=14

<table>
<thead>
<tr>
<th>Please indicate your response to the following statements:</th>
<th>Not at all</th>
<th>Slightly</th>
<th>Moderately</th>
<th>Very much</th>
<th>Extremely</th>
</tr>
</thead>
<tbody>
<tr>
<td>As a result of participating in the CEEF Institutes I have a better idea of how to assess students in the area of environmental education.</td>
<td>N=1 7%</td>
<td>N=3 21%</td>
<td>N=5 36%</td>
<td>N=3 21%</td>
<td>N=2 14%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Student Impact

ETI also designed student growth and learning measures to capture the impact of the program on students. Our goal was to create instruments that would be sensitive enough to register changes in environmental behaviors, attitudes, and knowledge as a result of the program while being relevant for students in multiple grade levels, classrooms, and participating in lessons that ranged widely in environmental content and implementation style.

After participating in the program, students in all grade levels clearly indicated the following:

- Students learned about environmental problems and looked forward to exploring new topics.
- Students were able to think proactively about solving environmental problems.
- Students participated in positive conservation behaviors such as reusing things and recycling.
- Students cared about protecting their local environment and felt that it was their responsibility to contribute to doing this.
- Students encouraged their friends to recycle and reported that they were willing to engage in environmental behaviors with a far-reaching impact such as participating in a river cleanup or stopping use of an environmentally harmful product.
- As a result of participating in the program, students felt they could make a difference in the environment.

Students were also asked to respond to questions about the stewardship project that they did with their class (Tables 13-14). Students across grades indicated positively that they learned new information, were motivated to do new projects exploring different topics and came away from the project with a sense of empowerment to help the environment.
Table 13
Overall Stewardship Project Experience (Grades 2-4)
N=79

<table>
<thead>
<tr>
<th></th>
<th>SD*</th>
<th>D</th>
<th>SWD</th>
<th>SWA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>The stewardship project taught me new information about environmental problems.</td>
<td>N=4</td>
<td>N=3</td>
<td>N=2</td>
<td>N=16</td>
<td>N=17</td>
<td>N=37</td>
</tr>
<tr>
<td>I would like to do another stewardship project on a different topic.</td>
<td>N=4</td>
<td>N=2</td>
<td>N=7</td>
<td>N=17</td>
<td>N=12</td>
<td>N=37</td>
</tr>
<tr>
<td>The things I learned from my stewardship project made me think that I can make a difference in the environment.</td>
<td>N=3</td>
<td>N=4</td>
<td>N=4</td>
<td>N=18</td>
<td>N=14</td>
<td>N=36</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Table 14
Overall Stewardship Project Experience (Grades 5-12)
N=357

<table>
<thead>
<tr>
<th></th>
<th>SD*</th>
<th>D</th>
<th>SWD</th>
<th>SWA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>The stewardship project taught me new information about environmental problems.</td>
<td>N=13</td>
<td>N=11</td>
<td>N=18</td>
<td>N=78</td>
<td>N=144</td>
<td>N=93</td>
</tr>
<tr>
<td>I would like to do another stewardship project on a different topic.</td>
<td>N=30</td>
<td>N=28</td>
<td>N=35</td>
<td>N=113</td>
<td>N=94</td>
<td>N=57</td>
</tr>
<tr>
<td>The things I learned from my stewardship project made me think that I can make a difference in the environment.</td>
<td>N=13</td>
<td>N=18</td>
<td>N=26</td>
<td>N=90</td>
<td>N=122</td>
<td>N=88</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

**Grades 2–4 Impact**

Students in Grades 2 – 4 were asked to think about their stewardship projects and lessons on the environment and then answer a set of questions, rating them on a six-point scale ranging from NO WAY!! to DEFINITELY YES!! Figure 5 below presents the items grouped together in scales representing behaviors, attitudes, and knowledge to show the composite impact in these areas. All areas represented positive feedback from students, indicating the program helped impart environmental content knowledge, positive affect towards the environment, and a positive change in their behavior toward the environment. See Appendix C (Table 1 and Figures 1-3) for a full breakdown of students’ responses to individual survey items.

7 SD = Strongly Disagree; D = Disagree; SWD = Somewhat Disagree; SWA = Somewhat Agree; A = Agree; SA = Strongly Agree
Grades 5–12 Impact

Students in Grades 5 – 12 were asked similar survey items to students in younger grades, but the format of the survey was slightly different and designed to capture change. Although the survey was administered at one point in time, this retrospective design asked students to reflect on their attitudes, behaviors, and knowledge before and after the program to get a sense of how much the program had impacted students. Survey items have been included in a scale (e.g., behavior, attitude, and knowledge items were all grouped together) to show the composite impact in these areas (Figure 6 below). Environmental behaviors, attitudes, and knowledge all showed positive change for students, and all individual survey questions were statistically significant (Table 15 below).

---

Figure 5
Grades 2 – 4 Scaled Items

Environmental Behaviors
(6 items)
N=80

Environmental Attitudes
(3 items)
N=80

Environmental Knowledge
(2 items)
N=80

---

8 Note: This type of survey was not administered to younger students because we have found from experience that the type of thinking involved in this approach is not appropriate for most young students.
Grades 5 – 12 Critical Environmental Thinking and Problem Solving

Through participating in activities and lessons designed to encourage students' insights into the state of the environment and ways they can act on a sense of stewardship, we anticipated that following program participation students would have gained the skills to think through an environmental problem including 1) identifying a problem; 2) identifying the cause of a problem; and 3) identifying ways to solve the problem. The majority of students across Grades 5 – 12 were able to satisfactorily identify an environmental problem, cause, and solution.

Students were presented with a set of three open-ended questions. To analyze their responses we rated their responses on a three-point scale using the following rubric:

- **1 Point**: Student provides no answer or unacceptable answer.
- **2 Points**: Student identifies problem, cause or solution in a satisfactory way.
- **3 Points**: Student identifies problem, cause or solution and adds additional details or specific examples that further illuminate the source of the problem, its ramifications, and/or its solution.

Table 15
Environmental Scales (Grades 5-12)
N=361

<table>
<thead>
<tr>
<th>Environmental Scales</th>
<th>Before</th>
<th>Now</th>
<th>Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Knowledge</td>
<td>4.08</td>
<td>4.97</td>
<td>.89*</td>
</tr>
<tr>
<td>Environmental Attitudes</td>
<td>4.10</td>
<td>5.06</td>
<td>.96*</td>
</tr>
<tr>
<td>Environmental Behaviors</td>
<td>3.72</td>
<td>4.50</td>
<td>.78*</td>
</tr>
</tbody>
</table>

*p<.01

*Delta signifies the difference before and after program.*
Findings below are presented by one mean rating averaged across all student scores and are also broken out by the number of students who received a 1, 2, or 3 for each question.

**Identifying an Environmental Problem**
The majority of students (75 percent) were able to satisfactorily identify an environmental problem. Students identified problems ranging from the very specific and geographically personal to broader issues. Common problems cited included littering, water pollution (with rivers, creeks, and oceans specified by some students), and air pollution. In a few instances, students cited environmental problems interfering with native plants and animals. Examples of broad issues included “littering,” “using too much plastic,” “soap down storm drains,” and “air pollution.” More specific examples indicated that students were paying attention to their immediate surroundings and thinking about them in environmental terms. Examples included the following:

- “Trash goes into the ocean because we are so close and it hurts the animals. Also the sand hills near my neighborhood are being invaded by invasive species.”
- “Islais creek has been mostly diverted and the wildlife in the canyon are suffering.”
- “Our local creek has been polluted by fertilizer and runoff from local farms causing creek pollution.”
- “There are many invasive species around the Presidio Federal Park, and they are choking the native marsh species and the native plants.”

**Table 16**

<table>
<thead>
<tr>
<th>Student Question</th>
<th>Rubric Rating</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your neighborhood environmental problem?</td>
<td>1</td>
<td>58</td>
</tr>
<tr>
<td>Mean 1.9</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>274</td>
</tr>
<tr>
<td></td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td>8%</td>
<td></td>
</tr>
</tbody>
</table>

**Identifying a Cause**
The majority of students (63 percent) were able to satisfactorily identify a cause giving simple answers that traced the problem to apathy, lack of education, or negative environmental practices of individual people. Examples included the following:

- “Pollution, people not knowing the outcome of washing their cars in the street.”
- “The cause of the problem is us humans throwing our trash on the ground instead of putting it in the trash or recycling.”
- “People not caring about the environment.”

A few students described slightly more complex causes suggesting a chain of events or multiple factors. For example, in response to the problem of “air pollution,” students attributed the cause to the fact that “Motored vehicles produce CO2 getting into our atmosphere” and “California is highly populated and people use cars a lot.” One student attributed ocean pollution to “People leaving trash on the streets that is getting washed down storm drains.” Another student provided a clear rationale for local waterway pollution explaining, “Our local creek has been polluted by fertilizer and runoff from local farms causing creek pollution.”
Some Things We Can Do

The majority of students (69 percent) provided competent solutions to environmental problems with most focusing on education, awareness, and small-scale action. A few representative responses suggested we do the following:

- “Go to the car wash and wash it there instead of washing it in your driveway”
- “Take shorter showers, or baths, and use less water overall”
- “Throw away your trash and if you drop it pick it up”

A few students described specific, detailed plans that could potentially be put into action and indicated a deeper level of reflection about the students’ immediate surroundings. Examples included the following:

- “We could start events like neighborhood litter pickups that had barbecues or a pool party afterward, so it would be like a neighborhood get together.”
- “I think that we could put more trash cans on the sidewalks and in parks so people drop “things” in the trash instead of leaving them on the ground.”
- “We can educate people about the problem and then they would know to recycle, compost, and put their trash in the trash bin. We can also do litter pickups.”
- “Glen Canyon wildlife support group, cleaner practices at SOTA.”

Table 17
Student Rubric Ratings for Question 2
N=363

<table>
<thead>
<tr>
<th>Student Question</th>
<th>Rubric Rating</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are some things we can do to help solve the problem? How would they help?</td>
<td>1</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>228</td>
</tr>
<tr>
<td>Mean = 1.7</td>
<td>3</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 18
Student Rubric Ratings for Question 2
N=363

<table>
<thead>
<tr>
<th>Student Question</th>
<th>Rubric Rating</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are some things we can do to help solve the problem? How would they help?</td>
<td>1</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>251</td>
</tr>
<tr>
<td>Mean 1.8</td>
<td>3</td>
<td>21</td>
</tr>
</tbody>
</table>
Findings: Stewardship for the Future

This section includes teachers’ final reflections about how their attitudes, practice, and knowledge have changed as well as their plans for the future.

**Overall Institute Experience**

While each day of the Institute focused on slightly different learning objectives, each day was designed so that upon completion of the Institute teachers would have gained an assortment of knowledge and skills that would directly translate into their classroom instruction. As part of this process teachers were expected to gain both confidence in their ability to implement environmental activities/content and develop plans to incorporate more of these activities. The following section includes teachers’ feedback about the overall impact of the Institute.

As noted in the section on teachers’ motivation for participation, many were already committed to teaching some form of environmental education prior to attending the Institute. However, a majority of teachers reported that they were either very (43%) or extremely (43%) more likely to include an ecological component into their classroom curriculum as a result of the Institute.

Based on teachers’ responses, the Institute successfully helped a majority of teachers to increase their ability to teach ecological concepts/activities (Table 19). Over sixty percent reported that their ability increased either “very much” or “extremely”. In a similar question, teachers reported increased confidence teaching ecological concepts with 58 percent reporting their confidence increased either “very much” or “extremely”. Highlights of the Institute for teachers included the excellent speakers and presentations (n=4), opportunities to interact with other teachers (n=4), learning about the materials and resources (n=2), and motivation/inspiration (n=1).

**Table 19**

<table>
<thead>
<tr>
<th>Overall Institute Experience</th>
<th>N=14</th>
</tr>
</thead>
<tbody>
<tr>
<td>Please rate the extent to which . . .</td>
<td>Not at all</td>
</tr>
<tr>
<td>As a result of participating in the three-day Institute, I am more likely to include an ecological component into my classroom curriculum.</td>
<td>N=1 7%</td>
</tr>
<tr>
<td>As a result of participating in the CEEF Institutes my ability to teach ecological concepts/activities has increased.</td>
<td>--</td>
</tr>
<tr>
<td>As a result of participating in the CEEF Institutes my confidence in teaching ecological concepts/activities has increased.</td>
<td>--</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.
When asked to describe any next steps teachers planned to take regarding environmental education and stewardship with their students, teachers’ responses fell into three categories: 1) continue to implement stewardship projects; 2) incorporate environmental education into lessons and activities; and 3) conduct presentations/outreach to increase awareness and encourage others to incorporate stewardship. Of the 14 teachers who described their future plans, implementing stewardship projects were mentioned most frequently (n=7; 50 percent). Plans to incorporate environmental education lessons/activities were mentioned four times with teachers describing that they planned to “incorporate more EE activities.” Similarly, outreach/presentations were also mentioned in four cases. One of these teachers thought it was important to recruit teachers, and described his or her goal to “get more teachers to incorporate stewardship”. Another teacher related plans to present at a leadership meeting while still another noted, “My students will be presenting their activities to the school as a whole.”

Summary and Recommendations

Through this 2012-2013 evaluation we were able to examine the arc of the program including teacher professional development, practice resulting from this training, and student impact. This final report was designed to provide detailed information for program improvement in the area of the Institute implementation; a profile of the practice resulting from the Institute to demonstrate teacher impact and help with decision-making about support and program implementation in the future, and student impact to highlight ways in which students experienced growth. Overall, the program was successful in all three areas.

Professional Development

The Institute was successful in increasing teachers’ knowledge about environmental topics and strategies for implementing those topics into the classroom. Through knowledge comes confidence, and teachers reported that their confidence and capacity also improved. While teachers largely found the Institutes to be successful, some recommendations for the future included the following:

- Consider ways to improve the timing of the program including length, dates, deadlines, and pacing of the course even if this means including less information
- Allow time for teacher collaboration and networking within the Institutes
- Clarify goals and expectations of program
- Find ways to promote the program so it is available to more teachers

The most frequently cited recommendations by teachers were related to the timing of the program (n=9/12). Teachers provided the following comments about this and other topics related to the above recommendations:

- “I would recommend that the dates be changed. Some people could not attend because one of the dates was during spring break. I think there is too much work.”
- “More collaboration time, time so that we’re not always behind, a more strict time limit on the presentations.”
• “Keep the deadlines more flexible to accommodate the deadlines of the schools.”
• “A little more clarity about the individual requirements & expectations...some things felt unclear and therefore felt like they were "sprung" on me.”
• “Get the word out! More teachers would and could use this! Try to get districts on board so it’s more readily available.”

Knowledge into Practice

It was clear through classroom observations that the materials engaged students and that teachers found innovative ways to structure their lessons and promote deep thinking about environmental topics. Through the sessions students demonstrated a solid grasp of environmental concepts in alignment with the goals of the Institute. For example, students gained in their understanding of the concept of adaptation; watersheds; the impact of plastics on ocean animals; water quality and habitat parameters for salmon; water conservation methods; water use and management, and life cycles. Students demonstrated increased understanding through sharing following small group work, building upon each other’s ideas in discussion, and presenting project work. In addition, students had the opportunity to engage with the material in a multi-faceted way through substantive discussion or hands-on activities where they could experience the material firsthand to draw their own conclusions. Through a review of best practices, classroom highlights, and areas for improvement, we have the following recommendations for continued success:

➢ Provide students with the opportunity for experiential learning so that they may engage with the materials in a hands-on and multi-faceted way
➢ Connect the materials to students’ lives and immediate surroundings
➢ Provide opportunities for inquiry-based learning in order to promote critical and in-depth thinking about environmental topics

Student Impact

This evaluation provided a unique opportunity to directly examine the impact of the program on students. Environmental attitudes, knowledge, and behaviors can be difficult to measure because people largely have positive attitudes associated with the environment even when they lack the knowledge or motivation to act on these attitudes. Through survey measures we found that younger students (Grades 2 – 4) gained in environmental knowledge, had positive attitudes toward specific stewardship behaviors, and were willing to engage in these behaviors. We were able to administer more sophisticated instruments with students in Grades 5 – 12. These findings show that students experienced a statistically significant impact in these areas after participating in the program. Students also demonstrated that they were able to think through an environmental problem, identifying the problem, cause, and solutions.

Next Steps

It is clear that since our work with CEEF began in 2011 the Institute has grown in scope and impact. We look forward to working with CEEF in future endeavors to design an evaluation that effectively captures the trajectory and goals of the program.

Prepared by Evaluation and Training Institute
### Table 1
Feedback about Institute Day 1

<table>
<thead>
<tr>
<th>To what extent . . .</th>
<th>Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the Institute increase your <strong>ecological content</strong> knowledge about preventing and managing forest fires?</td>
<td>--</td>
<td>N=5 28%</td>
<td>N=3 17%</td>
<td>N=10 56%</td>
</tr>
<tr>
<td>Did the Institute increase your <strong>ecological content</strong> knowledge about sedimentation and animal habits?</td>
<td>--</td>
<td>N=6 33%</td>
<td>N=5 28%</td>
<td>N=7 39%</td>
</tr>
<tr>
<td>Did the information you learned today give you ideas for incorporating <strong>ecological content</strong> into your classroom?</td>
<td>--</td>
<td>N=4 22%</td>
<td>N=7 39%</td>
<td>N=7 39%</td>
</tr>
<tr>
<td>Did the information you learned today inspire you to incorporate <strong>ecological content</strong> into your classroom?</td>
<td>--</td>
<td>N=3 17%</td>
<td>N=6 33%</td>
<td>N=9 50%</td>
</tr>
<tr>
<td>Were the <strong>instructional strategies</strong> you learned today useful?</td>
<td>--</td>
<td>N=3 17%</td>
<td>N=9 50%</td>
<td>N=6 33%</td>
</tr>
<tr>
<td>Were the <strong>assessment strategies</strong> you learned today useful?</td>
<td>N=2 11%</td>
<td>N=8 44%</td>
<td>N=3 17%</td>
<td>N=5 28%</td>
</tr>
<tr>
<td>Did the Institute increase your knowledge of how to implement an <strong>environment-based classroom project</strong>?</td>
<td>N=1 6%</td>
<td>N=5 29%</td>
<td>N=8 47%</td>
<td>N=3 18%</td>
</tr>
<tr>
<td>Did the information you learned today inspire you to plan and implement <strong>environment-based classroom projects</strong>?</td>
<td>--</td>
<td>N=4 22%</td>
<td>N=4 22%</td>
<td>N=10 57%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.*
**Appendix B Institute Day 2 Tables**

### Table 1
**EE Activities and Lessons**

<table>
<thead>
<tr>
<th>To what extent did you find the strategies and information in the following sessions useful to your instructional practice?</th>
<th>Not at all useful</th>
<th>A little useful</th>
<th>Moderately useful</th>
<th>Very useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>The “Geology of the Mother Lode and Environmental Consequences of the California Gold Rush lesson”</td>
<td>--</td>
<td>N=1 10%</td>
<td>N=3 30%</td>
<td>N=6 60%</td>
</tr>
<tr>
<td>“The Unattended Water Sensor” lesson</td>
<td>N=3 30%</td>
<td>N=5 50%</td>
<td>N=1 10%</td>
<td>N=1 10%</td>
</tr>
<tr>
<td>The Environmental Education Activity: “Just Passing Through”</td>
<td>--</td>
<td>--</td>
<td>N=2 20%</td>
<td>N=8 80%</td>
</tr>
<tr>
<td>The “share sheet” challenge activity</td>
<td>N=1 10%</td>
<td>N=4 40%</td>
<td>N=4 40%</td>
<td>N=1 10%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

### Table 2
**Overall Institute Day 2 Feedback**

<table>
<thead>
<tr>
<th>Please rate your level of agreement to the following statements:</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The opportunity to share ideas with other teachers increased my understanding of how to apply environment-based concepts with students.</td>
<td>--</td>
<td>--</td>
<td>N=3 30%</td>
<td>N=6 60%</td>
<td>N=1 10%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

### Table 3
**Assessment Activities**

<table>
<thead>
<tr>
<th>To what extent . . .</th>
<th>Not at all</th>
<th>A little</th>
<th>Moderately</th>
<th>A lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was the assessment presentation helpful for giving you new ideas to use to evaluate your students in the area of ecological understanding?</td>
<td>--</td>
<td>N=1 10%</td>
<td>N=4 40%</td>
<td>N=5 50%</td>
</tr>
<tr>
<td>Did the assessment presentation prepare you to design your own authentic student assessments?</td>
<td>--</td>
<td>N=2 20%</td>
<td>N=4 40%</td>
<td>N=4 40%</td>
</tr>
<tr>
<td>Did the assessment presentation increase your confidence towards using authentic assessment with students?</td>
<td>N=1 10%</td>
<td>N=1 10%</td>
<td>N=5 50%</td>
<td>N=3 30%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.*
Table 4
Resources for Instruction
N=10

<table>
<thead>
<tr>
<th>To what extent did you find . . .</th>
<th>Not at all useful</th>
<th>A little useful</th>
<th>Moderately useful</th>
<th>Very useful</th>
</tr>
</thead>
<tbody>
<tr>
<td>The “Build Your Science Content Knowledge through the NSTA Online Learning Center” presentation useful to your instructional practice?</td>
<td>--</td>
<td>N=1 10%</td>
<td>N=4 40%</td>
<td>N=5 50%</td>
</tr>
<tr>
<td>The National Geographic MapMaker kits useful to your instructional practice?</td>
<td>N=1 10%</td>
<td>N=1 10%</td>
<td>N=4 40%</td>
<td>N=4 40%</td>
</tr>
<tr>
<td>The National Geographic FieldScope platform useful to your instructional practice?</td>
<td>--</td>
<td>N=2 20%</td>
<td>N=2 20%</td>
<td>N=6 60%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

Table 5
Stewardship Activities
N=10

<table>
<thead>
<tr>
<th>Please rate your level of agreement to the following statements:</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Undecided</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>The “Water Stewardship Projects in School and Community Settings” presentation helped me better understand how to implement the stewardship project with my students.</td>
<td>--</td>
<td>N=1 10%</td>
<td>N=3 30%</td>
<td>N=5 50%</td>
<td>N=1 10%</td>
</tr>
<tr>
<td>The “Exploring Environmental Education and Stewardship with National Geographic” presentation helped me better understand how to implement the stewardship project with my students.</td>
<td>--</td>
<td>--</td>
<td>N=4 40%</td>
<td>N=4 40%</td>
<td>N=2 20%</td>
</tr>
<tr>
<td>The “share sheet” challenge activity helped me better understand how to incorporate environmental stewardship in my lessons.</td>
<td>--</td>
<td>N=3 30%</td>
<td>N=4 40%</td>
<td>N=3 30%</td>
<td>--</td>
</tr>
<tr>
<td>The “Brainstorm Solutions to School-site Challenges” activity helped me feel more prepared to implement the stewardship project with my students.</td>
<td>N=2 20%</td>
<td>N=1 10%</td>
<td>N=2 20%</td>
<td>N=5 50%</td>
<td>--</td>
</tr>
<tr>
<td>The content covered in Institute Day 2 gave me good ideas to address any challenges to implementing the stewardship project with students.</td>
<td>--</td>
<td>--</td>
<td>N=1 10%</td>
<td>N=7 70%</td>
<td>N=2 20%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.
## Appendix C Student Impact Tables

## Grades 2 - 4 Student Impact

### Table 1

**Overall Stewardship Project Experience (Grades 2-4)**

<table>
<thead>
<tr>
<th>N=79</th>
<th>SD</th>
<th>D</th>
<th>SWD</th>
<th>SWA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>The stewardship project taught me new information about environmental problems.</td>
<td>N=4</td>
<td>5%</td>
<td>N=3</td>
<td>4%</td>
<td>N=2</td>
<td>3%</td>
</tr>
<tr>
<td>I would like to do another stewardship project on a different topic.</td>
<td>N=4</td>
<td>5%</td>
<td>N=2</td>
<td>3%</td>
<td>N=7</td>
<td>9%</td>
</tr>
<tr>
<td>The things I learned from my stewardship project made me think that I can make a difference in the environment.</td>
<td>N=3</td>
<td>4%</td>
<td>N=4</td>
<td>5%</td>
<td>N=4</td>
<td>5%</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.*

*Note: SD = Strongly Disagree; D = Disagree; SWD = Somewhat Disagree; SWA = Somewhat Agree; A = Agree; SA = Strongly Agree*

### Figure 1

**Grades 2-4 Knowledge Items**

- **In my class, I learned many ways to solve environmental problems, like air pollution and litter in our oceans.**
  - Level of Agreement: 4.70

- **The things we learned in class taught me what’s good and what’s bad for the environment.**
  - Level of Agreement: 5.09

* N=80
Figure 2
Grades 2-4 Attitude Items

I care about protecting environments near my neighborhood and school. 4.98

It is my responsibility to do things to help the environment. 5.04

I like learning about the environment in class and how to protect it. 4.99

Figure 3
Grades 2-4 Behavior Items

I would stop using a product I liked (like a certain kind of soap or laundry detergent) if it caused environmental problems. 4.34

I would be willing to pick up trash along a creek or river on a weekend. 4.59

I encourage my friends to recycle. 4.41

I would be willing to give some of my own money to help the environment. 4.46

I recycle my cans and bottles. 4.99

I look for ways to reuse things instead of buying something new or throwing things away. 4.79
# Grades 5 - 6 Student Impact

## Table 2
**Environmental Knowledge (Grades 5-12)**

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>Now</th>
<th>Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>I think I know what’s good and bad for the environment.</td>
<td>4.31</td>
<td>5.23</td>
<td>.92*</td>
</tr>
<tr>
<td>I can think of several ways to solve environmental problems like air pollution and litter in our oceans.</td>
<td>3.89</td>
<td>4.89</td>
<td>1.00*</td>
</tr>
</tbody>
</table>

*Change is considered significant when the p-value is <.01

## Table 3
**Environmental Attitudes (Grades 5-12)**

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>Now</th>
<th>Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>I like learning about the environment and how to protect it.</td>
<td>3.94</td>
<td>4.82</td>
<td>.88*</td>
</tr>
<tr>
<td>It is my responsibility to do things to help the environment.</td>
<td>4.11</td>
<td>5.05</td>
<td>.94*</td>
</tr>
<tr>
<td>I care about protecting environments near my neighborhood and school.</td>
<td>4.19</td>
<td>5.04</td>
<td>.85*</td>
</tr>
</tbody>
</table>

* Change is considered significant when the p-value is <.01

## Table 4
**Environmental Behaviors (Grades 5-12)**

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>Now</th>
<th>Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>I look for ways to reuse things instead of buying something new or throwing things away.</td>
<td>3.92</td>
<td>4.84</td>
<td>.92*</td>
</tr>
<tr>
<td>I recycle my cans and bottles.</td>
<td>4.91</td>
<td>5.40</td>
<td>.49*</td>
</tr>
<tr>
<td>I would be willing to give some of my own money to help the environment.</td>
<td>3.21</td>
<td>3.95</td>
<td>.74*</td>
</tr>
<tr>
<td>I encourage my friends to recycle.</td>
<td>3.67</td>
<td>4.43</td>
<td>.76*</td>
</tr>
<tr>
<td>I would be willing to pick up trash along a creek or river on a weekend.</td>
<td>3.18</td>
<td>4.09</td>
<td>.91*</td>
</tr>
<tr>
<td>I would stop using a product I liked (like a certain kind of soap or laundry detergent) if it caused environmental problems.</td>
<td>3.45</td>
<td>4.31</td>
<td>.86*</td>
</tr>
</tbody>
</table>

* Change is considered significant when the p-value is <.01
Table 5
Environmental Scales (Grades 5-12)
N=361

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>Now</th>
<th>Δ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Knowledge</td>
<td>4.08</td>
<td>4.97</td>
<td>.89*</td>
</tr>
<tr>
<td>Environmental Attitudes</td>
<td>4.10</td>
<td>5.06</td>
<td>.96*</td>
</tr>
<tr>
<td>Environmental Behaviors</td>
<td>3.72</td>
<td>4.50</td>
<td>.78*</td>
</tr>
</tbody>
</table>

* Change is considered significant when the p-value is <.01

Table 6
Overall Stewardship Project Experience (Grades 5-12)
N=357

<table>
<thead>
<tr>
<th>Statement</th>
<th>SD*</th>
<th>D</th>
<th>SWD</th>
<th>SWA</th>
<th>A</th>
<th>SA</th>
</tr>
</thead>
<tbody>
<tr>
<td>The stewardship project taught me new information about environmental problems.</td>
<td>N=13</td>
<td>N=11</td>
<td>N=18</td>
<td>N=78</td>
<td>N=144</td>
<td>N=93</td>
</tr>
<tr>
<td>I would like to do another stewardship project on a different topic.</td>
<td>N=30</td>
<td>N=1</td>
<td>N=1</td>
<td>N=6</td>
<td>N=6</td>
<td>N=6</td>
</tr>
<tr>
<td>The things I learned from my stewardship project made me think that I can make a difference in the environment.</td>
<td>N=13</td>
<td>N=18</td>
<td>N=26</td>
<td>N=90</td>
<td>N=122</td>
<td>N=88</td>
</tr>
</tbody>
</table>

*Percentages were rounded to the nearest whole percent.

*Note: SD = Strongly Disagree; D = Disagree; SWD = Somewhat Disagree; SWA = Somewhat Agree; A = Agree; SA = Strongly Agree

Figure 4
Environmental Knowledge Items Grades 5 - 12
Figure 5
Environmental Attitudes Grades 5 - 12

- I care about protecting environments near my neighborhood and school.
  - Before: 4.19
  - Now: 5.04

- It is my responsibility to do things to help the environment.
  - Before: 4.11
  - Now: 5.05

- I like learning about the environment and how to protect it.
  - Before: 3.94
  - Now: 4.82

Figure 6
Environmental Behavior Items Grades 5 - 12

- I would stop using a product I liked (like a certain kind of soap or laundry detergent) if it caused environmental problems.
  - Before: 3.45
  - Now: 4.31

- I would be willing to pick up trash along a creek or river on a weekend.
  - Before: 3.18
  - Now: 4.09

- I encourage my friends to recycle.
  - Before: 3.67
  - Now: 4.43

- I would be willing to give some of my own money to help the environment.
  - Before: 3.21
  - Now: 3.95

- I recycle my cans and bottles.
  - Before: 4.91
  - Now: 5.40

- I look for ways to reuse things instead of buying something new or throwing things away.
  - Before: 3.92
  - Now: 4.84
Welcome to the Best Practices of Environmental Education and Stewardship evaluation! Your responses are very important for understanding how successful the Institutes are for your classroom practice. All responses are confidential. Please take a few minutes to complete the questions below.

**Tell us about you**

**Question 1 - Open Ended - One Line**

Please enter the first two letters of your first name and the first two letters of your last name. Example: Jane Smith would be JASM

**Question 2 - Open Ended - One Line**

Please enter your birth month and date using four digits. Example: October 8 would be 1008

**Question 3 - Open Ended - One Line**

What grade level(s) do you teach?

**Question 4 - Open Ended - One Line**

What subject(s) do you teach?

**Question 5 - Open Ended - Comments Box**

Why did you decide to participate in the Institute?

**Question 6 - Open Ended - Comments Box**

What do you hope to gain from the Institute?

**Question 7 - Choice - One Answer (Bullets)**

Please choose the statement that best reflects the extent to which you currently incorporate environment-based activities into your classroom practice.
Currently I don’t include these types of activities.  
We talk about the environment in my classroom, but we don’t conduct activities.  
I incorporate these types of activities occasionally.  
I incorporate these types of activities frequently.  
Other, please specify

Question 8 - Choice - One Answer (Bullets)
Please rate your current level of confidence toward incorporating environment-based activities into your classroom practice.

- Not at all confident  
- A little confident  
- Moderately confident  
- Very confident

Question 9 - Open Ended - Comments Box
How do you think including environment-based activities into your classroom curriculum can enrich the learning experience for students?

Question 10 - Open Ended - Comments Box
How do you think including environment-based activities into your classroom curriculum can enrich the learning experience for you?

Thank You Page
Thank you!
**Day 1 Post-Survey**

**Page 1 - Heading**

Now that you've participated in Institute Day 1, we would like to hear from you again! Please complete the questions below so that we can understand how successful the Institute was in conveying specific ecological concepts and instructional strategies. In addition, we would like to hear about your overall experience. Please take a few minutes to complete the questions below.

**Page 1 - Heading**

Tell us about you

**Question 1 - Open Ended - One Line**

Please enter the first two letters of your first name and the first two letters of your last name. Example: Jane Smith would be JASM

---

**Question 2 - Open Ended - One Line**

Please enter your birth month and date using four digits. Example: October 8 would be 1008

---

**Page 2 - Heading**

Tell Us What You Learned

**Question 3 - Open Ended - Comments Box**

Please describe any ways that your ecological understanding increased today, e.g., something you learned that you didn’t know or a subject you learned more about.

---

**Question 4 - Choice - One Answer (Bullets)**

To what extent did the Institute increase your ecological content knowledge about preventing and managing wildland fires?

- [ ] Not at all
- [ ] A little
- [ ] Moderately
- [ ] A lot
Question 5 - Choice - One Answer (Bullets)

To what extent did the Institute increase your ecological content knowledge about sedimentation and animal habitats?

- Not at all
- A little
- Moderately
- A lot

Question 6 - Choice - One Answer (Bullets)

To what extent did the information you learned today give you ideas for incorporating ecological content into your classroom?

- Not at all
- A little bit
- Moderately
- Very much so

Question 7 – Open-ended (Comments Box)

Please explain your response (optional).

-------------------------------------------------------------------------------------------------

-------------------------------------------------------------------------------------------------

-------------------------------------------------------------------------------------------------

Question 8 - Choice - One Answer (Bullets)

To what extent did the information you learned today inspire you to incorporate ecological content into your classroom?

- Not at all
- A little bit
- Moderately
- Very much so

Question 9 – Open-ended (Comments Box)

Please explain your response (optional).

-------------------------------------------------------------------------------------------------

-------------------------------------------------------------------------------------------------

-------------------------------------------------------------------------------------------------
Question 10 - Choice - One Answer (Bullets)

To what extent were the instructional strategies you learned today useful?

- Not at all
- A little bit
- Moderately
- Very much so

Question 11 – Open-ended (Comments Box)

Please explain your response or describe any instructional strategies that were particularly useful (optional).

Question 12 - Choice - One Answer (Bullets)

To what extent were the assessment strategies you learned today useful?

- Not at all
- A little bit
- Moderately
- Very much so

Question 13 – Open-ended (Comments Box)

Please explain your response or describe any assessment strategies that were particularly useful (optional).

Question 14 - Choice - One Answer (Bullets)

To what extent did the Institute increase your knowledge of how to implement an environment-based classroom project?

- Not at all
- A little
- Moderately
- A lot

Question 15 – Open-ended (Comments Box)

Please explain your response (optional).
Question 16 - Choice - One Answer (Bullets)

To what extent did the information you learned today inspire you to plan to implement environment-based classroom projects?

- Not at all
- A little bit
- Moderately
- Very much so

Question 17 – Open-ended (Comments Box)

Please explain your response (optional).

Question 18 - Choice - One Answer (Bullets)

What is the likelihood that you will use what you learned today with your students?

- Not at all likely
- A little bit likely
- Probably
- Definitely

Please explain your response (optional).

Question 19 - Open Ended - Comments Box

Please describe any highlights of the Institute today (optional).

Question 20 - Open Ended - Comments Box

Please describe any recommendations you have for the Institute today (optional).

Thank you!
Appendix E Institute Day 2 Surveys

Day 2 Pre-Survey
Welcome to the Best Practices of Environmental Education and Stewardship evaluation! Your responses are very important for understanding how successful the Institutes are for your instructional practice. All responses are confidential. Please take a few minutes to complete the questions below.

Background

1) Please enter the first two letters of your first name and the first two letters of your last name. Example: Jane Smith would be JASM

2) Please enter your birth month and date using four digits. Example: October 8 would be 1008

Follow-Up from Institute Day 1

Please tell us about your experience implementing ecological activities since participating in Institute Day 1.

3) Please describe any activities based on what you learned in Institute Day 1 that you included in your instructional practice.

4) How successful were these activities for increasing your students’ ecological knowledge? Please choose one.
   • Not at all successful
   • A little successful
   • Moderately successful
   • Very successful
   • N/A Did not implement any activities

5) Please explain your response (Optional).

6) How successful were these activities for increasing your students’ sense of ecological stewardship (extent to which they feel responsible for the environment)? Please choose one.
   • Not at all successful
   • A little successful
   • Moderately successful
   • Very successful
   • N/A Did not implement any activities

7) Please explain your response (Optional).
8) How successful were these activities for increasing your sense of ecological stewardship (extent to which you feel responsible for the environment)? Please choose one.
   - Not at all successful
   - A little successful
   - Moderately successful
   - Very successful
   - N/A Did not implement any activities

9) Please explain your response (Optional).

10) To what extent did including ecological activities into your instructional practice enrich the teaching experience for you? Please choose one.
   - Not at all
   - A little
   - Moderately
   - A lot
   - N/A Did not include any activities

11) Please explain your response (Optional).

**Institute Day 2**

12) What do you hope to gain from Institute Day 2?

13) Please select the answer that best describes the current status of your efforts to develop an environment-based student assessment for the Environmental Education Activity:
   - I have not thought about how I want to assess my students.
   - I have some ideas for student assessment, but haven’t started developing any yet.
   - I am in the process of developing student assessments.
   - I have a draft of my student assessment instrument.
   - I’ve finished developing my student assessment instrument.
   - Other (Please explain).

14) Please rate your current level of confidence toward including student assessment of environment-based activities in your instructional practice.
   - Not at all confident
   - A little confident
   - Moderately confident
   - Very confident

15) Please rate your current level of confidence towards implementing environment-based lessons and activities.
   - Not at all confident
   - A little confident
   - Moderately confident
   - Very confident
16) Please rate your current level of confidence towards facilitating an environment-based stewardship project with your students.
   • Not at all confident
   • A little confident
   • Moderately confident
   • Very confident

Thank you!
Day 2 Post-Survey
Now that you’ve participated in Institute Day 2, we would like to hear from you again! Please complete the questions below so that we can understand how successful the Institute was in conveying specific ecological concepts. In addition, we would like to hear about your overall experience. Please take a few minutes to complete the questions below.

Background

1) Please enter the first two letters of your first name and the first two letters of your last name. Example: Jane Smith would be JASM

2) Please enter your birth month and date using four digits. Example: October 8 would be 1008

Tell Us What You Learned

3) Please describe any ways that your ecological understanding increased today, e.g., something you learned that you didn't know or a subject you learned more about.

EE Activities and Lessons

4) To what extent did you find the strategies and information in the following sessions useful to your instructional practice?
   a. The “Geology of the Mother Lode and Environmental Consequences of the California Gold Rush” lesson
   b. “The Unattended Water Sensor” lesson
   c. The Environmental Education Activity: “Just Passing Through”
   d. The Environmental Education Activity: “Snapshot in Time and Macroinvertebrate Mayhem”
   e. The “share sheet” challenge activity

Please choose one.
   • Not at all useful
   • A little useful
   • Moderately useful
   • Very useful

5) The “share sheet” challenge activity was useful for teaching me how to apply the instructional strategies I learned with my students.
   • Strongly Disagree
   • Disagree
   • Undecided
   • Agree
   • Strongly Agree
**Assessment Strategies**

6) To what extent was the assessment presentation helpful for giving you new ideas to use to evaluate your students in the area of ecological understanding?
   - Not at all
   - A little
   - Moderately
   - A lot

7) To what extent did the assessment presentation prepare you to design your own authentic student assessments?
   - Not at all
   - A little
   - Moderately
   - A lot

8) To what extent did the assessment presentation increase your confidence towards using authentic assessment with students?
   - Not at all
   - A little
   - Moderately
   - A lot

**Stewardship**

Please rate your level of agreement to the following statements:

9) The “Water Stewardship Projects in School and Community Settings” presentation helped me better understand how to implement the stewardship project with my students.
   - Strongly Disagree
   - Disagree
   - Undecided
   - Agree
   - Strongly Agree

10) The “Exploring Environmental Education and Stewardship with National Geographic” presentation helped me better understand how to implement the stewardship project with my students.
    - Strongly Disagree
    - Disagree
    - Undecided
    - Agree
    - Strongly Agree
11) The “share sheet” challenge activity helped me better understand how to incorporate environmental stewardship in my lessons.
   - Strongly Disagree
   - Disagree
   - Undecided
   - Agree
   - Strongly Agree

12) The “Brainstorm Solutions to School-site Challenges” activity helped me feel more prepared to implement the stewardship project with my students.
   - Strongly Disagree
   - Disagree
   - Undecided
   - Agree
   - Strongly Agree

**Resources**

13) To what extent did you find the “Build Your Science Content Knowledge through the NSTA Online Learning Center” presentation useful to your instructional practice? Please choose one.
   - Not at all useful
   - A little useful
   - Moderately useful
   - Very useful

14) To what extent did you find the National Geographic MapMaker kits useful to your instructional practice?
   - Not at all useful
   - A little useful
   - Moderately useful
   - Very useful

15) To what extent did you find the National Geographic FieldScope platform useful to your instructional practice?
   - Not at all useful
   - A little useful
   - Moderately useful
   - Very useful

**Overall Impressions**

Please rate your level of agreement to the following statements:

16) The opportunity to share ideas with other teachers increased my understanding of how to apply environment-based concepts with students.
   - Strongly Disagree
   - Disagree
   - Undecided
   - Agree
   - Strongly Agree
17) The content covered in Institute Day 2 gave me good ideas to address any challenges to implementing the stewardship project with students.

- Strongly Disagree
- Disagree
- Undecided
- Agree
- Strongly Agree

18) Please describe any highlights of the Institute today (optional).

19) Please describe any recommendations you have for the Institute today (optional).

Thank you!
Appendix F Day 3 Post-Survey

Day 3 Post-Survey

Now that you’ve participated in Institute Day 3, we would like to hear from you! Please complete the questions below so that we can understand your experience in Institute Day 3, as well as your experience with the “Best Practices of Environmental Education and Stewardship” professional development institute overall. Please take a few minutes to complete the questions below.

Background

1) Please enter the first two letters of your first name and the first two letters of your last name. Example: Jane Smith would be JASM

2) Please enter your birth month and date using four digits. Example: October 8 would be 1008

Your Experience Today

3) Please rate the extent to which you found the stewardship project presentations from other teachers useful.
   • Not at all useful
   • Slightly useful
   • Moderately useful
   • Very useful
   • Extremely useful

   Please explain your response (Optional).

4) Please rate the extent to which you found the panel presentation and discussion on the topic “Funding Environmental Stewardship Projects” useful.
   • Not at all useful
   • Slightly useful
   • Moderately useful
   • Very useful
   • Extremely useful

   Please explain your response (Optional).
5) Please rate the extent to which Institute Day 3 was inspirational to you.
   - Not at all
   - Slightly
   - Moderately
   - Very
   - Extremely

**Stewardship Projects**

6) Please briefly describe and quantify (if applicable) the benefit(s) to the environment that resulted from the stewardship project you implemented with your students (e.g. planted 10 trees).

7) What resources did you and your students use to develop the stewardship projects (e.g., CREEC online resources, ideas from CEEF institutes)?

8) Please rate the extent to which the stewardship project was effective for increasing your knowledge of ecological concepts.
   - Not at all effective
   - Slightly effective
   - Moderately effective
   - Very effective
   - Extremely effective

Please explain your response. *(Optional)*
9) Please rate the extent to which the stewardship project was effective for increasing your students' knowledge of ecological concepts.
   - Not at all effective
   - Slightly effective
   - Moderately effective
   - Very effective
   - Extremely effective

Please explain your response (Optional).

10) Please rate the extent to which the stewardship project was effective for augmenting your sense of stewardship for the environment.
   - Not at all effective
   - Slightly effective
   - Moderately effective
   - Very effective
   - Extremely effective

Please explain your response. (Optional)

11) Please rate the extent to which the stewardship project was effective for augmenting your students' sense of stewardship for the environment.
   - Not at all effective
   - Slightly effective
   - Moderately effective
   - Very effective
   - Extremely effective

Please explain your response (Optional).
Environmental Education Activities

12) What resources did you use to develop your environmental education activity (e.g., CREEC online resources, ideas from CEEF institutes)?

13) Please rate the extent to which you feel that developing and implementing the environmental education activity was a valuable experience for you as an educator.
   - Not at all valuable
   - Slightly valuable
   - Moderately valuable
   - Very valuable
   - Extremely valuable

Please explain your response (Optional).

14) Please rate the extent to which you feel that the environmental education activity was a valuable experience for your students.
   - Not at all valuable
   - Slightly valuable
   - Moderately valuable
   - Very valuable
   - Extremely valuable

Please explain your response (Optional).

Assessment and Student Impact

15) Please briefly describe any assessment you conducted with your students.
16) Please indicate your response to the following statement: As a result of participating in the CEEF institutes I have a better idea of how to assess students in the area of environmental education.
   - Not at all better
   - Slightly better
   - Moderately better
   - Very much better
   - Extremely better

Please explain your response (Optional).

17) Please indicate your response to the following statement: Since participating in the CEEF Institutes, I have seen student evidence of increased ecological content knowledge (e.g., through tests, classroom discussions, reports, etc.).
   - Not at all
   - Slightly
   - Moderately
   - Very much
   - Extremely

Please explain your response. (Optional)

18) Please indicate your response to the following statement: As a result of participating in the CEEF institutes my students’ interest in environmental topics in my classroom has increased.
   - Not at all
   - Slightly
   - Moderately
   - Very much
   - Extremely

**Overall Institute Experience**

19) Please rate the extent to which the CREEC coordinator provided helpful mentorship support.
   - Not at all
   - Slightly
   - Moderately
   - Very much
   - Extremely
Please explain your response (Optional).

20) As a result of participating in the three-day Institute, I am more likely to include an ecological component into my classroom curriculum:
   • Not at all more likely
   • Slightly more likely
   • Moderately more likely
   • Very much more likely
   • Extremely more likely

Please explain your response (Optional).

21) Please indicate your response to the following statement: As a result of participating in the CEEF institutes my ability to teach ecological concepts/activities has increased.
   • Not at all
   • Slightly
   • Moderately
   • Very much
   • Extremely

22) Please indicate your response to the following statement: As a result of participating in the CEEF institutes my confidence in teaching ecological concepts/activities has increased.
   • Not at all
   • Slightly
   • Moderately
   • Very much
   • Extremely

23) Please describe any next steps you will take in the future with regard to environmental education and stewardship with your students.
24) Please describe any highlights of the Institute overall.

25) Please describe any recommendations you have for the Institute overall (Optional).

Thank you!
Appendix G Observation Protocol

**Directions:** Please use the observation protocol below to record details and feedback about the lesson you are observing. Please record as much detail as possible. The information collected below will only be used to better understand how teachers are using what they have learned through the Institutes and to gain insight into how students are engaging with the material. Teachers will not be identified individually. Thank you for your help with this evaluation!

**Session Observation Protocol**

Name of Observer: _____________________ Observation Date: _____________
Observation Start Time: ____________ Observation End Time: _____________

**General Information**

1. Name of School: _______________________
2. Name of Teacher: _______________________
3. Grade Level(s): ____________
4. # of Students: __________
5. Name of Activities/Lesson (Please get a copy of lesson if available):
   - PLT: “Living with Fire”
   - WILD: “Silt: A Dirty Word”
   - WET: “Just Passing Through”
   - Other? (Name of Curriculum/Lesson title): ___________________________________

**Session Overview**

6. If the lesson is part of the environmental stewardship project, which stage or stages best describe(s) the focus of the observed lesson? (check all that apply)
   - Brainstorming
   - Planning
   - Implementation
   - Evaluating the Project

7. What does the goal of the lesson appear to be? (Example: students work in small groups to plan stewardship project details).

8. Please use the table below to provide a narrative description of what occurred during the lesson. Please record as much detail as possible including the length of time each activity takes, student responses, classroom dynamics, specific teaching strategies, and the configuration of the activity (example: students work in pairs; teacher lectures; whole class discussion) and any other relevant details.
<table>
<thead>
<tr>
<th>Activity Time</th>
<th>Activity Description &amp; Narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example: 11:00-11:30</td>
<td>Example:</td>
</tr>
<tr>
<td><strong>Activity Description:</strong></td>
<td>Students brainstorm strategies to minimize their environmental footprint.</td>
</tr>
<tr>
<td><strong>Activity Configuration:</strong></td>
<td>Students work in small groups of 3-5.</td>
</tr>
<tr>
<td><strong>Activity Narrative:</strong></td>
<td>- <em>Students break into small groups to discuss ways they can contribute to protecting the environment.</em></td>
</tr>
<tr>
<td></td>
<td>- <em>Teacher moves from group to group to listen to discussion and ask probing questions:</em></td>
</tr>
<tr>
<td></td>
<td>- <em>Student: I could ask my family to take their own bag to the grocery store.</em></td>
</tr>
<tr>
<td></td>
<td>- <em>Student: That’s a good idea. We already do that.</em></td>
</tr>
<tr>
<td></td>
<td>- <em>Teacher: How could this help protect the environment?</em></td>
</tr>
</tbody>
</table>
Session Implementation:

9. Please complete the following tables, which are based on the 5 E’s instructional strategy included in the Institutes. We are interested in understanding which of the strategies, if any, teachers employed and to what extent. On a scale of 1 – 5, where 1=“never”, 2 = “rarely”, 3 = “occasionally”, 4 = “a moderate amount”, and 5 = “a great deal,” please rate the extent to which each description was observed. In some cases the behaviors listed below might not apply to the session. If you find that this is the case, please mark “N/A” and note your reasoning in the comment section.

**Engagement**

<table>
<thead>
<tr>
<th>The teacher…</th>
<th>Rating or N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. attempted to uncover students’ current knowledge about a concept/topic.</td>
<td></td>
</tr>
<tr>
<td>b. engaged students.</td>
<td></td>
</tr>
</tbody>
</table>

**Examples/Comments:**

**Exploration**

<table>
<thead>
<tr>
<th>The teacher encouraged students to…</th>
<th>Rating or N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>c. experience key concepts.</td>
<td></td>
</tr>
<tr>
<td>d. discover new skills.</td>
<td></td>
</tr>
<tr>
<td>e. examine their thinking.</td>
<td></td>
</tr>
<tr>
<td>f. participate in student-to-student discussions.</td>
<td></td>
</tr>
</tbody>
</table>

**Examples/Comments:**

**Explain**

<table>
<thead>
<tr>
<th>When a teacher explained a new concept, to what extent did the teacher encourage students to…</th>
<th>Rating or N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>g. explain concepts and definitions in their own words.</td>
<td></td>
</tr>
<tr>
<td>h. use students’ previous experiences as the basis for explaining concepts.</td>
<td></td>
</tr>
<tr>
<td>i. provide definitions or explanations of new words.</td>
<td></td>
</tr>
</tbody>
</table>

**Examples/Comments:**
Extend/Elaborate

The teacher encouraged students to...

j. apply their new learning to new or similar situations.

Rating or N/A

Examples/Comments:

Evaluate (Assess)

The teacher assessed students through the use of . . .

k. informal assessment throughout the session (e.g., asking students to reflect, review concepts, respond to or critique each others’ work).

l. formal assessment for documentation of student learning such as test, rubric, performance-based assessment.

Please describe both informal and formal assessment techniques: Collect any assessment instruments available in handout form.

Student Behaviors

10. Please rate the extent to which the following student behaviors and attitudes are demonstrated during the observation using a scale of 1-5 where 1 is “not at all” and 5 is “extremely.” Please provide relevant comments to support the rating. In some cases the behaviors listed below might not apply to the session. If you find that this is the case, please mark “N/A” and note your reasoning in the comment section.

Please rate the extent to which students…

<table>
<thead>
<tr>
<th>Rating or N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Appear receptive to learning new environmental concepts and skills.</td>
</tr>
<tr>
<td>b. Appear receptive to session materials (if applicable).</td>
</tr>
<tr>
<td>c. Are engaged in the session activities.</td>
</tr>
<tr>
<td>d. Actively participate in asking questions, answering questions, and classroom discussion.</td>
</tr>
<tr>
<td>e. Demonstrate an understanding or knowledge of concepts and skills.</td>
</tr>
<tr>
<td>f. Are able to successfully complete the activities required during the session.</td>
</tr>
</tbody>
</table>

11. What concept(s)/knowledge did students learn or come to understand as a result of this lesson?

12. What evidence illustrates student learning or understanding resulting from this lesson? Please provide specific examples.
Lesson Debriefing

13. Please include any other comments, describe any highlights or describe obstacles of the lesson experienced by teachers or students. Consider:

- Teaching strategies
- Lesson content or activities
- Classroom logistics and implementation (i.e. flow of the lesson, level of organization and coordination of activities, etc.)
Appendix H Student Attitude, Knowledge, and Behavior Surveys

Grade 2-4

Instructions:

For each sentence, please select the word that best describes how much you agree or disagree. There is no right or wrong answer, so please take your time and answer honestly.

Let’s try some practice questions:

Pizza is one of my favorite foods.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

I like to do chores at home instead of playing.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

Let’s turn the page and get started!
Tell us about you

1. What grade are you in? _______ grade
2. What is the name of your school? ____________________________
3. What is the name of your teacher? ___________________________

Tell us what you think

Think about your class stewardship project and lessons on the environment. Then select the word that tells us how much you agree or disagree with each sentence.

4. I liked learning about the environment in class and how to help it.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

5. The things we learned in class taught me what’s good and what’s bad for the environment.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

6. In my class, I learned many ways to fix environmental problems, like air pollution and litter in our oceans.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

7. The things I learned in class showed me that it is my responsibility to do things to help the environment.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

8. I care about protecting environments near my home and school because of the things I learned in class.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

9. I look for ways to reuse things I have because of what we learned in class.

| NO WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |
10. I recycle my cans and bottles because of what we learned in class.

| No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

11. I would give some of my own money to help the environment because of what we learned in class.

| No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

12. I tell my friends to recycle because of what we learned in class.

| No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

13. I would pick up trash along a stream on a weekend because of what we learned in class.

| No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

14. I would stop using a product I liked (like a certain kind of soap or laundry detergent) if it was bad for the environment because of what we learned in class.

| No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

**Tell us about your stewardship project**

15. For this next set of questions, please let us know what your current thinking is by choosing the option that best describes how much you agree or disagree with each statement.

| The stewardship project taught me new things about the environment. | No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |
| I would like to do another stewardship project in class. | No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |
| The things I learned from my stewardship project made me think that I can make a difference in the environment. | No | WAY!! | NO! | no | yes | YES! | DEFINITELY YES!! |

16. Thinking about the in-class environmental activities and the stewardship project, tell us about one thing you liked or learned.

**Grades 5 - 12**
Instructions:

For each sentence, please circle the word that best describes how much you agree or disagree BEFORE doing your Environmental Stewardship Project and how much you agree or disagree NOW after doing your Environmental Stewardship Project. There is no right or wrong answer, so please take your time and answer honestly.

Here’s an example:

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly Disagree</td>
<td>Disagree</td>
<td>Somewhat Disagree</td>
<td>Somewhat Agree</td>
<td>Agree</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>I like going to the beach. Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>

I didn’t like visiting the beach before I started my Stewardship Project, so I chose “Disagree”. After finishing my project, I love the beach and would like to visit it every weekend, so I chose “Strongly agree”.

Okay, turn the page and let’s get started!

Tell us about you

1. What grade are you in? ______ grade
2. What is the name of your school? ________________________________
3. What is the name of your teacher? ________________________________
4. What did you do for your stewardship project?

Tell us what you think

For each sentence, please choose the option that best describes how much you agree or disagree BEFORE you completed the stewardship project and what you think NOW after completing the stewardship project.
<table>
<thead>
<tr>
<th>5. I like learning about the environment and how to protect it.</th>
<th>Strongly Disagree 1</th>
<th>Disagree 2</th>
<th>Somewhat Disagree 3</th>
<th>Somewhat Agree 4</th>
<th>Agree 5</th>
<th>Strongly Agree 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>6. I think I know what’s good and what’s bad for the environment.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>7. I can think of several ways to solve environmental problems, like air pollution and litter in our oceans.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>8. It is my responsibility to do things to help the environment.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>9. I care about protecting environments near my neighborhood and school.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>10. I look for ways to reuse things instead of buying something new or throwing things away.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>11. I recycle my cans and bottles.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>12. I would be willing to give some of my own money to help the environment.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>13. I encourage my friends to recycle.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>14. I would be willing to pick up trash along a creek on a weekend.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>15. I would stop using a product I liked (like a certain kind of soap or laundry detergent) if it caused environmental problems.</td>
<td>Before (B)</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Now (N)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
Tell us about an environmental problem

Describe an environmental problem that exists in your neighborhood. Use a new problem that you didn’t work on in your class stewardship project. What is the cause of the problem? What are some ways that we can solve the problem? Please write your answers in the space below.

a) What is your neighborhood environmental problem?

b) What’s the cause of the problem?

c) What are some things we can do to help solve the problem? How would they help?

Tell us about your stewardship project

For this next set of questions, please let us know what your current thinking is by selecting the option that best describes how much you agree or disagree with each statement.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree 1</th>
<th>Disagree 2</th>
<th>Somewhat Disagree 3</th>
<th>Somewhat Agree 4</th>
<th>Agree 5</th>
<th>Strongly Agree 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The stewardship project taught me new information about environmental problems.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>2. I would like to do another stewardship project on a different topic.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>3. The things I learned from my stewardship project made me think that I can make a difference in the environment.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

4. Thinking about the in-class environmental activities and the stewardship project, tell us about one thing you liked or learned about your environmental lesson unit.

Thank you for completing our survey!

Prepared by Evaluation and Training Institute