COLORADO WATER CONSERVATION BOARD

WATER RESOURCE CONSERVATION PUBLIC EDUCATION AND OUTREACH GRANT APPLICATION FORM

Pilot Project to Develop Water Conservation Awareness through Inter-Curricular High School Programs (Water Resources Education Curriculum aka "The WRECing Crew Program")

Name of Water Activity/Project

$46,204 **Total Amount of Funds Requested**

Name and contact information of the entity seeking the grant.

1. Applicant Name(s): Colorado State University (through Colorado State University Extension and Colorado Water Institute)

Mailing address: Colorado State University
Southern Regional Extension Office
24 Club Manor Drive, Suite 201
Pueblo, CO 81004

Taxpayer ID#: 846000545 Email address: chris.carsten@colostate.edu

Phone Numbers: Business: (970) 491-1559

Fax: (970) 491-6147

Person to contact regarding this application if different from above:

Name: Perry Cabot (719) 334-2558 or perry.cabot@colostate.edu)

Position/Title Water Resources Specialist and Affiliate Assistant Professor

What type of entity is the Applicant?

	Covered entity[1]		State and/or local governmental entity[2]
XX	Public entity[3]		Private entity

[1] Means each municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total demand for such customers of two thousand acre-feet or more.

[2] Includes county, municipality, city and county, water district, water and sanitation district, metropolitan district that provides water services, water conservation district, water conservancy district, or water authority.

[3] Means any facility operated by an instrument of government for the benefit of the public, including, but not limited to, a government building, park or other recreational facility, school, college, university, or other educational institution, highway, hospital, or stadium

List of the organizations and/or individuals (including those hired or otherwise retained by the entity) that will assist in performing the "Project". Include a written statement of their role and contributions.

The proposed activities will be carried out by specialists from Colorado State University (CSU) Extension and the Colorado Water Institute. Together, these entities are working to simultaneously further the goals of increasing awareness of water conservation and expanding outreach regarding science, technology, engineering, and mathematics (STEM) careers. Our efforts, along with the numerous statewide benefits, would be greatly advanced by the approval of this funding request. Moreover, this project is particularly congruent with the stated mission of the Colorado Water Conservation Board (CWCB) to "conserve, develop, protect and manage Colorado's water for present and future generations." Firstly, one program outcome will be a physical water savings resulting from the water conservation strategies adopted by the pilot program schools, as well as the schools that are presumed to adopt this program as a result of its successes. These savings are predicted to result from passive conservation strategies such as irrigation scheduling, or more aggressive strategies such as the installation of moisture/wind sensors for automated shut-off. Secondly, the awareness that propagates from students and teachers to outlying communities falls into the paradigmatic shift in water management awareness needed to Colorado's future water demands. The "WRECing Crew Program" is focused on conservation in both the present and future. The program is intended for longitudinal stability, as the pilot participants are utilized to extend the program into their communities and also to train future participants.

Background and History. **CSU Extension** was originally authorized through the United States Congress by the Smith-Lever Act (1914) as the Cooperative Extension Service. The Cooperative State Research, Education, and Extension Service (CSREES) of the USDA administers supportive funding for Smith-Lever Act services (including Extension) under the auspices of state and county governments and each state's designated land-grant universities. Extension is a public educational entity for providing research-based outreach to solve problems and improve the lives of US citizens. More simply, *the purpose of Extension is to provide a link between the university and the citizens of the state*, and its philosophy is that the entire state is a campus, and its residents are students. CSU Extension has recently launched an initiate to promote science, technology, engineering, and mathematics (STEM) careers among K-12 students in Colorado, in response to statewide feedback from county commissioners.

The **Colorado Water Institute** (CWI), an affiliate of Colorado State University, exists for the express purpose of focusing the water expertise of higher education on the evolving water concerns and problems being faced by Colorado citizens. The Colorado Water Institute (CWI) is authorized and funded by Congress and the Colorado Legislature. The CWI is accountable to Congress via its annual appropriation, a required annual report, and a thorough congressionally mandated peer review conducted every five years under the auspices of the U.S. Geological Survey. CWI is operated, by law, as a state-wide water research institute, obligated to connect all water expertise in Colorado's higher education system with research and education needs of Colorado's water managers and users. Current areas of CWI focus include water conservation, water quality, and youth water education.

Project Personnel. The principal collaborators this project are Ms. Anne Casey and Dr. Perry Cabot. Other partners include Ms. Esther Worker (ESRI), faculty from Colorado State University-Pueblo and staff from Pueblo County School District 70. Upon receipt of funding, there will be two teachers hired in coordination with the project, and they will be paid a stipend for their participation. Student interns will also be recruited from CSU-Pueblo to participate in the project.

Ms. Anne Casey is a STEM (Science, Technology, Engineering and Math) Education Specialist with CSU Extension. She completed her Masters in Environmental Science at the University of Maryland. She taught high school math and science in the public school system before she joined extension. Ms. Casey will be responsible for scheduling and coordinating the overall program between CSU Extension, CSU-Pueblo, and the participating high schools. This will include supervision of teacher-partners and student interns, arrangement of field trip programs, and reporting to the CWCB at their request. She will also develop the curriculum and

student workbooks to be used by participating teachers and interns. Lastly, she will oversee the evaluation of the program, with the intention of developing a statewide model. (*Current Address: CSU Southern Region Extension, 24 Club Manor Drive, Suite 201, Pueblo, CO 81001; Phone Number: (719) 545-1845*)

Dr. Cabot is a Water Resources Specialist for the Colorado Water Institute and CSU Extension. He completed his Ph.D. in Agricultural Engineering and Land Resources at the University of Wisconsin. He is also an affiliate assistant professor of the CSU Department of Civil and Environmental Engineering and an adjunct professor at CSU-Pueblo. Dr. Cabot will be responsible for demonstrations pertaining to landscape irrigation and indoor water use audits, precipitation and flow monitoring, and analysis of the collected data (*Current Address: CSU-Pueblo, 2200 Bonforte Boulevard, 417 Chemistry Building, Pueblo, CO 81004; Phone Number: (719) 549-2045*).

Mr. Nolan Doesken is the State Climatologist for Colorado and has worked in that capacity since 2006. He will provide materials and offer presentations regarding the Colorado Agricultural Meteorological Network (CoAgMet) and the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) for the benefit of students, staff, and the general public. (*Current Address: Colorado Climate Center, Department of Atmospheric Science, 1371 General Delivery , Colorado State University, Ft. Collins, Colorado 80523-1371; Phone Number: (970) 491-8545*).

Ms. Esther Worker (ESRI Denver Education Account Manager) has also agreed to provide basic Geographic Information Systems (GIS) training for the program (*Current Address: 1 International Court, Broomfield CO 80021; Phone Number (303) 449-7779 ext 8216*).

2. For covered entities and state and local governmental entities …

   (Not applicable)

3. For public and private entities:
   a. Groups, individuals, organizations and/or institutions that will be included within the education and outreach efforts proposed as the Project.

      Project Managers.

      Colorado State University Extension (Ms. Anne Casey)
      Colorado Water Institute (Dr. Perry Cabot)

      Project Partners:

      Colorado Climate Center (*Mr. Nolan Doesken provided Letter of Support,*)
      Colorado State University at Pueblo (*Dr. Richard Kreminski, will provide Letter of Support*)
      Southeastern Colorado Water Conservancy District (*Mrs. Jean Van Pelt provided Letter of Support*)
      St. Charles Mesa Water District (*Mr. David Simpson provided Letter of Support*)
      Environmental Systems Research Institute (ESRI) (*Ms. Esther Worker, verbal commitment*)
      Pueblo School District 70 (*Mr. Tharyn Mulberry, Principal, Centennial High School, verbal commitment*)

   b. Identify the specific goals of the Project with respect to promoting the benefits of water resource conservation and water efficiency through education and outreach activities.

      This program is designed to achieve three primary outcomes:
      1. Efficient and reduced water usage at participating schools through: a) optimizing their landscape irrigation systems with the use of LISA (Lawn Irrigation Self Audit) Kits, irrigation scheduling, and precipitation monitoring; b) auditing indoor water consumption patterns with the intention of recommending active and passive conservation measures.

2. Availability of a tested and evaluated high-school curriculum to ultimately be used statewide in Colorado public schools. This curriculum will be designed to link STEM principles of measurement, analysis, and design to the actual problem of water supply availability in Colorado's arid climate.

3. Greater interest and excitement regarding future STEM careers towards the overall goal of increasing enrollment in university STEM majors and promoting STEM workforce development.

The intended target audiences of this program are high school administrations and student councils who wish to develop STEM curriculum while focusing on the practical problem of water conservation. The project contributes to the broad CWCB goal of conserving and managing Colorado's water, specifically by promoting a sustainable program that will empower large water users (i.e., school facilities) with the practical and educational means to audit their water consumption. Under the auspices of the Water Efficiency Grant Program, the project will help schools develop water conservation plans through the process of irrigation and water use auditing. The project will also contribute to the implementation of water conservation goals by offering solutions to indoor and outdoor water use problems or inefficiencies. Finally, by instructing and providing a curriculum to further instruct future generations of water users and managers, the project broadly contributes to public water conservation education.

c. Identify in detail the specific activities and tasks to be funded with the Water Efficiency Grant Program monies, including all meetings, workshops, fairs, printings, mailings and all other tasks and activities that will be used to promote the benefits of water resource conservation and water efficiency.

Table 1. Specific activities and tasks to be funded with Water Efficiency Grant Program monies

Category and Description
TEACHER-PARTICIPANT STIPENDS ($9,000)
Teacher-Partners will be recruited from two (2) local high schools in Pueblo District 70. These partners will be paid at stipend in the amount of $1,500 annually for their participation during the three (3) year program. The total cost to CWCB for these participants will be $9,000. They will participate in the development of three (3) water resource education curricula ("WRECing Crew") for high-school freshmen, sophomores, and juniors. They will participate in three (3) professional development programs consisting of four (4) modules annually (total of twelve (12) programs over the 3-year program) during which they will learn to implement the water resource education curriculum.
INTERN SALARIES + FRINGE BENEFITS ($10,858)
Interns from CSU-Pueblo will be hired from and Education, Science, or Mathematics Program to assist with the implementation and deployment of the curriculum. There will be two (2) interns hired for Year 1, then four (4) interns hired for Year 2 and Year 3. These interns will be paid a starting salary of $10/hour (with increasing salaries based on inflation in Year 2 and Year 3) along with associated fringe rates. The interns will collectively work a total of 180 hours in Year 1, 360 hours in Year 2, and also 360 hours in Year 3. They will also participate in the professional development programs described above.
DOMESTIC TRAVEL ($1,688)
Travel budget will be used to allow one of the program managers (Casey or Cabot) to present and report on the the program to a larger audience in Colorado (i.e., CWCB) once per year. Additional travel funds are requested to pay for the Colorado State Climatologist to travel from Ft. Collins to Pueblo for an annual presentation.
MATERIALS/SUPPLIES ($13,559)
In order to carry out the program, it will be necessary to supply the two (2) high schools with measurement and analysis equipment customary to irrigation auditing programs and troubleshooting. Such equipment deemed as necessary includes raingages, pipe flow meters, graphing calculators, GPS units, GIS Software (ESRI), Lawn Irrigation Self Audit (LISA) Kits (e.g., catch cans, support stakes, stopwatch, anemometer, thermometer, tape measure, pressure gauge). The cost of printing fifty (50) teacher manuals and two hundred forty (240) student curricula is also included in this cost structure, along with the cost of conducting the professional development (e.g., refreshments).
OTHER DIRECT COSTS ($1,858)
Program monies will be used to assist students in attending three (3) field trips to: a) the Arkansas Valley Research Center (Rocky Ford, CO); b) Bent's Fort National Park, and; c) Lake Pueblo State Park. Funding is needed to offset park fees and provide food and drinks for participants. Providing food and drinks is necessary to the continuity of program delivery in order to maximize focus on the curriculum.

5. Description of the Project Scope of Work

Decreasing scores on international tests of science and math competencies (TIMSS and PISA) since the 1980's have spurred a number of efforts to improve education in the science, technology, engineering and math (STEM) fields among American students. Studies indicate that students learn and retain information longer when they are engaged in real world *experiential* activities. For instance, the propose program equips students with STEM capabilities to conserve water and realize monetary savings as an incentive. More broadly, concerns about increasing water consumption by a growing population require fostering new water consumption patterns in our communities. The Water Resources Education Curriculum ("WRECing Crew") Program for high schools provides a vehicle to accomplish both these objectives.

This pilot project will develop a 3-year sustainable program aimed at giving high school students the skills they need to audit the indoor and outdoor use of water on their campuses. Initially, the program will focus on two (2) high schools in Pueblo District 70, which is challenged by water shortages and a truncated school schedule. Designed as a weekly 1-hour series for 2 semesters, the program could be used by the Student Council, a science club, an afterschool program or even an enrichment project in a science classroom. As an inter-curricular program, it supports Colorado Academic Standards in Science, Math, English and History. During the course of the 3-year timeline, the program progresses from local water issues to global ones. The program also has the additional bonus of reducing the school's water bill, the savings on which the participating students will be given partial authority on how to re-allocate for other school purposes, such as water-saving appliances or fixtures. The nature of this funding reallocation will be developed in partnership with the student council, school administrative staff, and facilities managers.

Year 1. Freshmen entering the program will concentrate attention on their own campus exclusively. Using tools developed by CSU Extension Water Resource Specialists and Faculty, (e.g., Lawn Irrigation Self-Audit (LISA) Kits, Colorado Agricultural Meteorological Network (CoAgMet) and Community Collaborative Rain Hail and Snow Network (CoCoRaHS)), students will conduct audits by collecting and analyzing data on indoor and outdoor water use rates. For example, as the Year 1 program culminates, students will design, implement, and troubleshoot an irrigation scheduling regime using the online LISA tool recommend a more efficient water usage plan for their respective schools (LISA tool stored at http://tririver.mesacounty.us/IrrAudit/). The indoor water audit will expand on the concept of a household water audit, which they will be encouraged to use in their own homes, as well, and bring awareness of water issues to their neighborhoods.

Year 2. Sophomores resume water education by learning about the historical issues concerning water in Colorado and the Western Region of the U.S., including water diversion projects, dams and reservoirs and irrigation systems. Novel approaches to these advanced topics will be necessary. For instance, students will participate in facilitated discussions of historical fiction through movies like *Chinatown* (1974) or documentaries like *Blue Gold: World Water Wars* (2008) in order to convey pertinent contextual knowledge of Colorado and Western water resources overall. They will study the natural history of native plants and grasses and the ecosystems that depend on them, by participating in guided visits to the Xeriscape demonstration gardens or the Xeriscape tour sponsored through the Southeastern Colorado Water Conservancy District. They will also be discover the social history of water in Colorado through a facilitated tour of Bent's Old Fort National Historic Site where the westward expansion of the United States was entwined with the Arkansas River. This location is also dominated by native short grass prairie. Applying this knowledge to the campus landscaping will allow them to make good recommendations for water-wise plantings and turf grasses.

Year 3. Juniors will continue to expand their research to include global solutions to water problems. They will study how other countries use water, meet their water needs, and what challenges they face. Their studies will focus on water-saving and cleaning technologies, how they have changed, and what is in store for the future. At this point they will be very familiar with their own campus and be able to perform cost-benefit analyses of using new technologies to enhance their school's environment and reduce water

consumption rates. Visits to local water resource projects such as Lake Pueblo (Frying Pan- Arkansas Project) and water purification industries (The Water Company in Pueblo, CO) will assist students in connecting classroom principles with the broader use of technology in government and industry.

Year X. After the primary financial and time investment in the program has occurred, successive years of "WRECing Crew" programming will involve the previously trained students being deployed to schools or other facilities. This will build a measure of sustainability into the program, for ongoing use and improvement.

The Water Resources Education Curriculum ("WRECing Crew") Program supports both water conservation goals and educational goals in science, technology, engineering and math (STEM). Through experiential, inquiry-based projects students will gain valuable analytical skills and develop an understanding of resource stewardship. This program is sustainable, replicable and community-based. The desired outcome of the program is to generate greater awareness of water resources issues at the high school level, which generating interest in STEM careers with links to water conservation, natural and water resources management, watershed studies, and climatology.

Description of the Project Scope of Work (Task Outline)

TASK 1 – Water Resources Education Curriculum ("WRECing Crew") Program Development

Detailed Description of Work Performed. The Water Resources Education Curriculum ("WRECing Crew") Program comprises 28 lessons per year taught in four (4) separate training sessions. There will be 84 total lessons to be implemented in twelve (12) training sessions over a 3-year period. The program will be applicable for use by a science or math teacher, afterschool program provider or student council sponsor. The Year 1 lessons will focus on how to improve water savings in the school through the use of basic auditing tools (e.g., LISA Kits), irrigation scheduling, and water management practices. The Year 2 curriculum will broaden the study of water to include Colorado's native ecosystems, their specific ecology with regard to the amount of rainfall they receive, and historical topics pertaining to water management in West. The Year 3 curriculum will present global water issues and the future of water technology, including water purification, hydroelectric energy, and irrigation.

Task Responsibility. Anne Casey (CSU Extension), Teacher-Partners

Method/Procedure. It is expected that the curriculum development process will begin in Spring 2011. Anne Casey, CSUE Regional STEM Specialist will research, develop and prepare the 3-year curriculum with input from math and science faculty at CSU, CSU-Pueblo and the participating high school teachers in Pueblo District 70. The curriculum will be developed to allow teachers incorporate it within the context of their current quarterly system and the Colorado Student Assessment Program (CSAP) schedule.

Funding Sources. Colorado Water Conservation Board, CSU Extension (in-kind match)

Deliverable. The primary output will be curriculum for water conservation that can be used at any high school, similar to other enrichment curriculum such as Project Wild (www.projectwild.org/) or the Jason Project (www.jason.org/). The Water Resources Education Curriculum ("WRECing Crew") Program, however, will promote the connection between water conservation and practical problems, such as water shortages and water quality, and equip students with the ability to offer substantive solutions. This output will include a published Teacher's Guide and a Student Workbook.

TASK 2 – Professional Development Sessions

Detailed Description of Work Performed. Starting in Summer/Fall 2011, we will hold four (4) professional development/training sessions each year to provide training and STEM enrichment lectures for school teachers and student teachers in the Pueblo City and County area. Refreshments and meals will be

provided during these sessions to maintain the continuity of program delivery. These sessions will be particularly geared toward the teacher-partners and student interns who will be tasked with presenting the next seven (7) water conservation awareness sessions (Task 1) for the upcoming quarter of the academic year.

Task Responsibility. Anne Casey (CSU Extension), Teacher-Partners, CSU-Pueblo Interns

Method/Procedure. Participants will help to improve curriculum by providing feedback from the previous quarter's experience. Participants will be trained in the use of tools that go along with the next session. They will receive pedagogical training in experiential learning and problem-based learning. They will also be required to attend a specified number of lectures on water-related issues that are being addressed at CSU-Pueblo. The understanding will exist that the stipend payments offered to the teacher-participants entails a commitment to provide feedback on the Water Resources Education Curriculum ("WRECing Crew") Program. Such feedback will be provided through web-blog communications and quarterly team meetings.

Funding Sources. Colorado Water Conservation Board, CSU Extension (in-kind match)

Deliverable. The primary output will be improving the quality of STEM teaching in public high schools and providing a forum for science teachers to contribute to the development of STEM curriculum, thereby making their jobs more meaningful and rewarding as recommended by Goals 1 and 3 in *Before It's Too Late,* the report by the National Commission on Mathematics and Science Teaching for the 21st Century.

TASK 3 – On-Site Program Delivery of Year 1, Year 2, and Year 3 Lessons

Description of Task. The first "WRECing Crew" will be formed in the Fall 2011 semester. The program is designed to be student driven to encourage students to take ownership of their campus and reap the rewards of the cost-savings realized through water conservation. One on-site teacher and one (Year 1) or two (Year 2 and 3) student teachers will facilitate the program to the students participating in the program. Year 1 will enroll 20 freshman students (10 students from 2 separate high schools). Year 2 will enroll 20 new freshman students, while matriculating the original 20 Year 1 students, who will participate in the sophomore-level module. Year 2 will involve participation of 40 students total. Year 3 will again enroll 20 new freshman students, while matriculating the original 20 students from Year 1 and the second 20 students from Year 2, who will participate in the junior-level and sophomore-level modules, respectively. Year 2 will involve participation, therefore, of 60 students total. Due to the number of students involved, a total of 2 student interns will be hired for Year 1, and an additional 2 will be hired to assist in Year 2 and Year 3.

Task Responsibility. Anne Casey (CSU Extension), Perry Cabot (Colorado Water Institute), Teacher-Partners, CSU-Pueblo Interns, ESRI Denver Education, Colorado Climate Center

Method/Procedure. The teacher-partners will utilize the program they obtain from the professional development/training sessions to implement the program once per week. Each professional development session will contain seven (7) lessons, providing material for students to attend seven 1-hour programs each quarter, for a total of 28 lessons per year. This could work during the school day or after school or as a Friday program for schools with a four day school week (in the case of Pueblo District 70). The major task they will conduct in Year 1 will be an audit of the school water use. They will study the school's water bill with the facilities director to analyze where their campus is using water. Through the use of Lawn Irrigation Self Audit (LISA) Kits (purchased with CWCB funding), the students will perform high grade lawn audits and write irrigation water management (IWM) plans. The underlying principle is that a more efficiently irrigated landscape will reduce water waste, save the school time and money and potentially improve lawn quality. There will also exist the added incentive of reallocating funds from reduced water bills. The campus will become a member of CoCoRaHS (Community Collaborative Rain Hail and Snow Network), learn about and report weather in their part of Colorado, and participate in workshops by the Colorado Climate Center (Mr. Nolan Doesken). They will be exposed to technology such as GPS/GIS and utilize these tools at basic levels

for water supply management (Ms. Esther Worker, ESRI). Students will design experiments to audit water consumption with measureable activities and indoor fixtures such as water fountains, toilets, and cafeteria appliances. Using the information they collect over the course of the program the students will devise a water conservation plan, create a presentation for the school board and implement the plan. As an incentive to create the best plan, they will have input about how to spend the savings on the water bill. *For example, it may be desirable for the campus to invest in "smart" irrigation controllers that govern the system on the basis of soil moisture or wind speed.* They will take one field trip each year of the program to: The Arkansas Valley Research Station, Bent's Old Fort National Historic Site and Lake Pueblo in Year 1, 2 and 3, respectively. Students will be encouraged to extend the program into the summer by borrowing the LISA Kit and performing water audits in their neighborhoods to supplement summer incomes. Students will also be given the opportunity to develop their own "WRECing Crew" logo, complete with water saved, for printing on blank T-shirts supplied through the sponsors of the program (e.g., CSU Extension, Water Conservancy Districts).

In Year 2, students will learn about the historical issues concerning water in Colorado and the Western Region of the U.S., including water diversion projects, dams and reservoirs and irrigation systems. Novel approaches to these advanced topics will be necessary. For instance, students will participate in facilitated discussions of historical fiction through movies like *Chinatown* (1974) or documentaries like *Blue Gold: World Water Wars* (2008) in order to convey pertinent contextual knowledge of Colorado and Western water resources overall. They will study the natural history of native plants and grasses and the ecosystems that depend on them, by participating in guided visits to the Xeriscape demonstration gardens or the Xeriscape tour sponsored through the Southeastern Colorado Water Conservancy District. They will also discover the social history of water in Colorado through a facilitated tour of Bent's Old Fort National Historic Site where the westward expansion of the United States was entwined with the Arkansas River. This location is also dominated by native short grass prairie. Applying this knowledge to the campus landscaping will allow them to make good recommendations for water-wise plantings and turf grasses.

In Year 3, students will continue to expand their research to include global solutions to water problems. They will study how other countries use water and meet their water needs. Their studies will focus on water-saving and cleaning technologies, how they have changed, and what is in store for the future. At this point they will be very familiar with their own campus and be able to perform cost-benefit analyses of using new technologies to enhance their school's environment and reduce water consumption rates. Visits to local water resource projects such as Lake Pueblo (as part of the Frying Pan- Arkansas Project) and water purification industries (The Water Company in Pueblo, CO) will assist students in connecting classroom principles with the broader use of technology in government and industry.

In successive years, previous "WRECing Program" participants will be utilized for continual implementation. While there is no formal program for seniors, they will be expected to become teachers in the program and record keepers. In this way the program becomes self-sustaining. The intended development of this program will have prior participants carry out the program at other schools or facilities where their training in conservation measures and assessment can utilized. The likely adoption of the program will occur in schools that have not undergone rigorous irrigation audits or water use budgeting, as the "WRECing Crew" trainees will be qualified to conduct. As the relative merits of the program are evaluated, each successive WRECing Crew cohort will educate the incoming group. The program is designed to eventually be deployed with minor supervision (except for initial outlining) to future adopters. Obviously, there will be a hardened demand within each school's water consumption pattern, therefore the program cannot continue indefinitely, except to achieve more savings through more ambitious programs. At district-wide and regional scales, however, the goal of the program is yield a curriculum that is easily transferrable to other schools. Again, the documented merits of the program through water savings as well as its extra-curricular value will be used as justification for the small initial investment in student assistance for program guidance. Moreover, CSU Extension has made considerable investment in hiring STEM Specialists who will help disseminate the program beyond its southeastern Colorado origins.

Funding Sources. Colorado Water Conservation Board, CSU Extension (in-kind match), Pueblo School District 70 to provide meeting locations and buses (for field trips)

Deliverable. The primary outcome will be a decrease in the water usage at the school campus as measured by water bills before and after implementation of water conservation plan. The other outcome will be increased student competency in STEM topics. We hope to increase the number of students who choose to go to college and major in STEM areas and the number of university students who consider pursuing math and science public school teaching careers.

TASK 4 – Evaluation and Reporting

Description of Task. Use evaluation tools to assess the change in both student STEM competency and student attitudes toward STEM topics. Timely reports will be issued to CWCB in accordance with grant requirements.

Task Responsibility. Anne Casey (CSU Extension), Teacher-Partners, Interns, School District Input

Method/Procedure. The evaluation metrics are considered in two components. First, for the purpose of participant knowledge development, we will use "retrospective evaluation tools" that have been developed by the National 4-H Council. This evaluation is completed by participants after each session (or content-driven phase) to measure changes in knowledge, attitudes and intentions of participants. There is a unique evaluation form used during this process. Secondly, an exciting aspect of this program is that measurable changes from a historic baseline will be quantifiable. The program will be able to measure its own "effectiveness" through particular metrics, such as: 1) volumetric quantities of "saved water" against a historic baseline; 2) changes in irrigation cycles, and; 3) financial expenditures on irrigation water. The approach to evaluating and measuring water savings will start with a review of the historic totalized water consumption, standardized water consumption (on an areal basis or as a percentage of total school budget, for instance.) This information will be readily available from the billing authority (e.g. St. Charles Mesa Water District, Pueblo West Metropolitan District, Pueblo Board of Water Works, etc.). Monetary allocations will be adjusted for inflation, within the timeline of available data. Once the "average historic" rates of water application and opportunities for budget savings are determined in the Fall 2011, the WRECing Crew will begin their treatment of the situation by determining strategies for conservation. Therefore, the effects of "treatment" entailing passive and aggressive conservation measures should be evident in 2012, especially along the aforementioned standardized metrics.

Funding Sources. Colorado Water Conservation Board

Deliverable. The primary output will be data about the effectiveness of experiential learning and the ability to change attitudes about water consumption through campus improvement projects. Further deliverables will include suggestions for modifying the program to achieve statewide application. An additional outcome of the project will be a small "summit" that will be conducted locally (perhaps in coordination with local water festivals or water forums) that will allow the separate "WRECing Crews" to showcase their results, savings, and recommendations for prospective participants.

Detailed Project Budget

Table 2. Complete Itemized Budget (includes adjustments for 4% annual inflation)

Category	Year 1	Year 2	Year 3	Total
PERSONNEL SALARIES				
Intern (High School #1)	$ 900	$ 1,872	$ 1,947	$ 5,034
Fringe Rate (14.80%)	$ 133	$ 281	$ 296	$ 710
Intern (High School #2)	$ 900	$ 1,872	$ 1,947	$ 5,034
Fringe Rate (14.80%)	$ 133	$ 281	$ 296	$ 710
TOTAL SALARY:	$ 1,800	$ 3,744	$ 3,894	$ 9,438
TOTAL FRINGE:	$ 266	$ 562	$ 592	$ 1,420
TOTAL PERSONNEL:	**$ 2,066**	**$ 4,306**	**$ 4,486**	**$ 10,858**
DOMESTIC TRAVEL (see Table 7 below):	**$ 322**	**$ 670**	**$ 696**	**$ 1,688**
MATERIALS/SUPPLIES (see Table 8 below)	**$ 7,930**	**$ 1,820**	**$ 1,936**	**$ 11,686**
OTHER DIRECT EXPENSES (see Table 9 below)				
Field Trips (Fees, Food, Drink), Prof. Dev.	$ 850	$ 1,269	$ 1,612	$ 3,731
TOTAL OTHER DIRECT:	**$ 850**	**$ 1,269**	**$ 1,612**	**$ 3,731**
PARTICIPANT STIPENDS				
Teacher-Partner (High School #1)	$ 1,500	$ 1,500	$ 1,500	$ 4,500
Teacher-Partner (High School #2)	$ 1,500	$ 1,500	$ 1,500	$ 4,500
TOTAL PARTICIPANT STIPENDS:	**$ 3,000**	**$ 3,000**	**$ 3,000**	**$ 9,000**
TOTAL DIRECT COSTS:	**$ 14,168**	**$ 11,065**	**$11,730**	**$36,963**

Table 3. Simple Budget Breakdown.

Category	Total Direct	Indirect (Overhead Rate	Indirect (Overhead Cost	Project Total Cost
Colorado State University	$ 36,963	20.0 %†	$ 9,241	$ 46,204
Colorado State University (Salary Matching Contribution + Fringe + Indirect Costs)	$ 20,047	26.0 %‡	$ 5,212	$ 25,260
TOTAL:	**$ 57,010**		**$ 14,453**	**$ 71,464**
Colorado State University (Salary Matching Contribution + Fringe + Indirect Costs) – Table 2 (above)				$ 25,260
TOTAL MATCHING CONTRIBUTION (see Table 4 below)				**$ 25,260**
TOTAL FUNDS REQUESTED from CWCB (TOTAL minus MATCHING CONTRIBUTION)				**$ 46,204**
Matching Percentage (Matching Contribution/Total) must be minimum 25%				35.0 %

† Percentage of **Total Costs** (Maximum allowable Indirect Cost Rate for Colorado Water Conservation Board)
‡ Percentage of **Total Costs** for CSU Matching Contribution (Facilities & Admin)

Table 4. Matching Contributions (salary adjustments are based on assumed 4% annual inflation).

		Direct Costs			Indirect (Overhead)			
Category	Name	Affiliation	Quantity	Sub-Total	Rate	Costs	Total Match
Salary Match	Cabot, Perry	CSU	$5,025/mo @ 0.40 mo/yr (Year 1)	$ 2,010	26%	$ 523	$ 2,553
Fringe Match	"	"	$1,271/mo @ 0.40 mo/yr "	$ 509	26%	$ 133	$ 642
Salary Match	"	"	$5,226/mo @ 0.40 mo/yr (Year 2)	$ 2,090	26%	$ 543	$ 2,633
Fringe Match	"	"	$1,343/mo @ 0.40 mo/yr "	$ 537	26%	$ 140	$ 677
Salary Match	"	"	$5,435/mo @ 0.40 mo/yr (Year 3)	$ 2,174	26%	$ 565	$ 2,739
Fringe Match	"	"	$1,413/mo @ 0.40 mo/yr "	$ 565	26%	$ 147	$ 712
Salary Match	Casey, Anne	CSU	$5,167/mo @ 0.60 mo/yr (Year 1)	$ 3,100	26%	$ 806	$ 3,906
Fringe Match	"	"	$1,271/mo @ 0.60 mo/yr "	$ 784	26%	$ 204	$ 988
Salary Match	"	"	$5,226/mo @ 0.60 mo/yr (Year 2)	$ 3,224	26%	$ 838	$ 4,062
Fringe Match	"	"	$1,343/mo @ 0.60 mo/yr "	$ 829	26%	$ 216	$ 1,045
Salary Match	"	"	$5,435/mo @ 0.60 mo/yr (Year 3)	$ 3,353	26%	$ 872	$ 4,225
Fringe Match	"	"	$1,413/mo @ 0.60 mo/yr "	$ 872	26%	$ 227	$ 1,099
TOTAL:				**$ 20,047**			**$ 25,260**

Table 5. Labor/Personnel Costs (associated with Water Resource Education Program request)

	Personnel					Total
Task	*Description*	*Labor Rate*	*Inflation*	*Fringe*	*Commitment*	*Labor Cost*
Task 1. Curriculum Development	Student Interns	$10/hr	4%	14.8%	0 hours	$ 0
Task 2. Professional Development	Student Interns	$10/hr	4%	14.8%	90 hours	$ 1,086
Task 3. On-Site Program Delivery	Student Interns	$10/hr	4%	14.8%	720 hours	$ 8,686
Task 4. Evaluations	Student Interns	$10/hr	4%	14.8%	90 hours	$ 1,086
TOTAL:					**900 hours**	**$ 10,858**

Table 6. Project Costs (associated with Water Resource Education Program request)

	Labor/ Personnel	*Teacher Stipends*	*Travel Mileage*	*Materials and Supplies*	*Other Direct Costs*	*Indirect Costs*	*Total*
Task 1. Curriculum Development	$ 0			$ 2,842		$ 711	$ 3,553
Task 2. Professional Development	$ 1,086			$ 1,049	$ 1,873	$ 1,002	$ 5,010
Task 3. On-Site Program Delivery	$ 8,686	$ 9,000	$ 1,688	$ 7,795	$ 1,858	$ 7,257	$ 36,284
Task 4. Evaluations	$ 1,086					$ 271	$ 1,357
TOTAL	**$ 10,858**	**$ 9,000**	**$ 1,688**	**$ 11,686**	**$ 3,731**	**$ 9,241**	**$ 46,204**

Table 7. Travel Schedule Breakdown (based on $0.45/mile State of Colorado mileage rate and 4% inflation per year)

Meeting Title	*Destination*	*Traveler*	*Year 1*	*Year 2*	*Year 3*	*Total*
Extension Presentation	Denver/Ft. Collins, CO	Anne Casey	$ ---	$ 335	$ 348	$ 683
Extension Presentation	Pueblo/Ft. Collins, CO	Nolan Doesken	$ 322	$ 335	$ 348	$ 1,005
TOTAL			**$ 322**	**$ 670**	**$ 696**	**$ 1,688**

Table 8. Materials and Supplies Breakdown.

		Year 1		Year 2		Year 3		
Item Description	*Price*	*Qty*	*Cost*	*Qty*	*Cost*	*Qty*	Cost	*Total*
PROFESSIONAL DEVELOPMENT								
• Teachers Manual	$ 20	10	$ 200	20	$ 416	20	$ 433	$ 1,049
CURRICULUM DEVELOPMENT								
• Books (Year 1)	$ 20	40	$ 400	80	$ 832	120	$ 1,298	$ 2,530
• Publish Notices	$ 100	1	$ 100	1	$ 104	1	$ 108	$ 312
PROGRAM EQUIPMENT								
• CoCoRAHS Raingages	$ 30	20	$ 600	3	$ 94	3	$ 97	$ 791
• Flow Meters (for zonal assessment of irrigation rates/volume)	$ 180	10	$ 1,800	2	$ 374	0	$ ---	$ 2,174
• Graphing Calculator	$ 100	10	$ 1,000	0	$ ---	0	$ ---	$ 1,000
• Additional Hardware	$ 200	2	$ 400	0	$ ---	0	$ ---	$ 400
• GPS Unit	$ 350	4	$ 1,400	3	$ ---	0	$ ---	$ 1,400
• GIS Software (ESRI)	$ 500	2	$ 1,000	0	$ ---	0	$ ---	$ 1,000
• Lawn Irrigation Self Audit Kits (LISA)								
○ Catch Cans	$ 3.50	140	$ 490	0	$ ---	0	$ ---	$ 490
○ Support Stakes	$ 2.00	70	$ 140	0	$ ---	0	$ ---	$ 140
○ Stopwatch	$ 25.00	2	$ 50	0	$ ---	0	$ ---	$ 50
○ Anemometer/Thermometer	$ 150	2	$ 300	0	$ ---	0	$ ---	$ 300
○ Tape Measure	$ 25.00	2	$ 50	0	$ ---	0	$ ---	$ 50
TOTAL								**$ 11,686**

Table 9. Other Direct Costs (Annual Field Trip Expenses).

Item Description	*Year 1*	*Year 2*	*Year 3*	*Total*
FIELD TRIPS				
• Food & Drink (Arkansas Research Center)	$ 250	$ 260	$ 270	$ 780
• Food & Drink (Bent's Old Fort National Historic Site)	$ ---	$ 260	$ 270	$ 530
• Food & Drink (Lake Pueblo)	$ ---	$ ---	$ 270	$ 270
• Park Entry Fees (Bent's Old Fort National Historic Site	$ ---	$ 125	$ 130	$ 255
• Park Entry Fees (Lake Pueblo)	$ ---	$ ---	$ 23	$ 23
• Food & Drink (Year 1) – Teacher Prof. Development Workshops	$ 600	$ ---	$ ---	$ 600
• Food & Drink (Year 1 & 2) – Teacher Prof. Development Workshops	$ ---	$ 624	$ 649	$ 1273
TOTAL	$ 850	$ 1,269	$ 1,612	**$ 3,731**

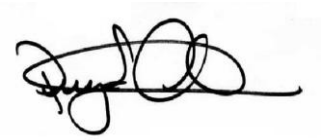
SCHEDULE

Table 10. Project Timeline for WE Project

OBJECTIVES and TASKS	2011 J	F	M	A	M	J	J	A	S	O	N	D	2012 J	F	M	A	M	J	J	A	S	O	N	D	2013 J	F	M	A	M	J	J	A	S	O	N	D	2014 J	F	M	A	M	J
Task 1. Curriculum Development (Anne Casey)																																										
Year 1 (freshmen) curriculum - water savings, LISA, etc.				■																																						
Year 2 (sophomore) curriculum - nat. history, water issues, ecosystems)						■	■																																			
Year 3 (junior) curriculum - global issues, water technology																			■	■																								
Curriculum Feedback, Modification, Improvement					■	■											■	■											■	■												
Final Curriculum Product																																							■	■			
Task 2. Professional Development/Training Sessions																																										
Recruitment of Teacher-Partners and Student Interns				■										■																													
Year 1 Training (August, September, October, March) – 4 total				■	■	■								■																												
Year 2 Training (August, September, October, March) - 4 total																■	■	■		■																								
Year 3 Training (August, September, October, March) - 4 total																						■	■	■																■				
Task 3. On-site Program Delivery																																										
Collaboration with two (2) Pueblo District 70 High Schools				■																																						
2 Teacher, 2 Interns, 20 Students (7 lessons/quarter; 28 lessons/yr)					■	■	■	■																																		
2 Teacher, 4 Interns, 40 Students (14 lessons/quarter; 56 lessons/yr)																■	■	■	■	■	■																							
2 Teacher, 4 Interns, 60 Students (21 lessons/quarter; 84 lessons/yr)																												■	■	■	■	■	■									
Field Trips (AVRC, Bent's Fort, Xeriscape Garden, Lake Pueblo)															■												■																
Task 4. Evaluation and Reporting																																										
End of academic year evaluation/reporting of water usage														■												■														■				
End of academic year evaluation of STEM competencies and attitudes														■												■														■				
50% Progress Report submission																■																												
75% Progress Report submission																												■																
Final Report submission																																									■				

7. The signature of an individual with the authority to commit the resources of the entity seeking the Grant program monies.

The above statements are true to the best of my knowledge:



Signature of Applicant:

Print Applicant's Name: Perry E. Cabot

Project Title: Pilot Project to Develop Water Conservation Awareness through Inter-Curricular High School Programs (Water Resources Education Curriculum aka "The WRECing Crew Program")

Return this application to:

Colorado Water Conservation Board
Attn: Veva Deheza, Deborah Burrell
1313 Sherman Street, Room 721
Denver, CO 80203