Institute for Environmental Solutions

2016-2017 IES Wheat Ridge Kullerstrand Greenbelt Education and Environmental Restoration (GREEN) Project

Final Report
September 2017

THE TREE PROJECT
ENERGY • WATER • AIR • CARBON

KULLERSTRAND GREEN www.i4es.org

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Kullerstrand Elementary School staff members provided their support, dedication, and a willing group of students and teachers with which to share our project.

2. Executive Summary

This report documents the 2016-2017 *IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network* (GREEN) Project. The program took place in Wheat Ridge, Colorado at Kullerstrand Elementary School and in the Wheat Ridge Greenbelt, an urban open space. The Institute for Environmental Solutions (IES) and the City of Wheat Ridge Parks and Recreation Department (WRPRD) designed a program based on the 2015-2016 GREEN project and four previous successful planting projects in the Greenbelt. This partnership emphasizes sound ecological improvements to a cherished open space while providing local school children the opportunity for hands-on science education and community members the opportunity to actively participate in community improvement projects. The project was continued at the request of Kullerstrand Elementary School's psychologist.

This report describes the project's background, planning, implementation, and outcomes. The report and appendices document the project's organization, goals, objectives, evaluation, and its stakeholders and project contributors. The project's replicable design is described and documented so it can be used as a model for future IES and other community planting programs.

IES and the City of Wheat Ridge have worked together to restore, enhance, and maintain the Wheat Ridge Greenbelt since 2012. Margaret Paget, WRPRD Forestry and Open Space Supervisor, has been a vital project partner and has worked closely with IES to ensure project success and long-term care for all planting sites. The partnership includes projects: *Revive the Greenbelt (*2012-2013), *Preserve the Greenbelt Elementary Education Program* (2013-2014), *Growing the Greenbelt Education and Ecological Health Program* (2015-2016), and the first *GREEN* Project (2015-2016). All projects focused on improving the Greenbelt through environmental and green infrastructure improvements to improve the ecology, canopy diversity, slow erosion, and reduce stormwater runoff in Clear Creek.

GREEN 2017 was planned and developed to give students with specials needs and their general education peers access to effective and engaging hands-on science lessons, while providing the community the opportunity to actively improve the Greenbelt. Students participated in two modular-based classroom workshops to learn about planting, Colorado ecology, and how to care for plants. Community members participated in the IES Tree Stewards program, where they care for IES

IES Graduate Intern Elizabeth Angell and TRAILS student completing a scavenger hunt on planting day

GREEN group photo at planting day 2

planting sites and volunteer with students at planting events. IES continued its Tree Ambassador Program, where children from the Wheat Ridge Recreation Sun Camp cared for the new planting site under the supervision of IES Associates and Tree Stewards during the summer. The planting program design was taken from our 2016 GREEN project and adapted to address site challenges in 2017, such as a lack of irrigation and vegetation cover. Current survival rates at both the 2016 and 2017 planting sites are above 90%.

IES encourages comments and questions. Please contact IES at solutions@i4es.org or visit our website at www.i4es.org.

3. Introduction and Overview

Report Overview

This report summarizes the 2016-2017 *IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network* (GREEN) Project. This project was created by the Institute for Environmental Solutions' (IES's) Tree Project. Building on a multi-year partnership with the Wheat Ridge Parks and Recreation Department (WRPRD) and Kullerstrand Elementary School, the 2016-2017 GREEN Project focused on replanting native trees and shrubs along a recently constructed portion of the Clear Creek Trail in Wheat Ridge, Colorado in conjunction with a hands-on elementary environmental education program. The final report serves as documentation of the project's phases including development, planning, project implementation, outcomes, and evaluation. This report provides complete detailed information about all aspects of the GREEN project, including classroom workshops, planting events, and the Tree Steward maintenance program.

The Institute for Environmental Solutions

The Institute for Environmental Solutions delivers scientific solutions to improve our health and environment. The vision of IES is to create efficient ways of dealing with complex environmental problems. IES strives to prevent waste and unwanted side effects, provide opportunities to optimize environmental improvements, and reduce energy consumption and greenhouse gas emissions through a unique technical, multi-disciplinary approach. By engaging a broad spectrum of participants in examining these problems on a project basis, IES develops sound, cost-effective solutions.

Institute for Environmental Solutions

The IES Tree Project

The IES Tree Project is one of IES's primary continuing programs. The Tree Project is focused on environmental improvements to Colorado's urban areas through careful selection and strategic, scientific-based management. IES is successful due to its network of collaborative partners committed to the project's success. The Tree Project restores natural systems and green infrastructure in urban areas, educates both children and adults to develop environmental stewards, improves environmental community health, stimulates local economies, and maintains natural resources.

THE TREE PROJECT
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The IES Tree Project mission is to improve the environmental quality of Colorado cities by using tree science. Through multi-disciplinary partnerships and urban forestry programs we:

- Improve the environment, community health, and the economy through strategic tree planting
- Educate children and adults to develop environmental stewards
- Engage community members to rehabilitate, improve, and maintain urban natural resources

The Tree Project helps communities, businesses, and individuals achieve multiple environmental improvement goals using trees. The Tree Project focuses its projects on:

- Community tree-planting programs for environmental, human health, social, and economic improvement
- Climate change mitigation through urban forest carbon credits
- Workshops on the benefits of strategic forestry in urban environments
- Tree Science: research, independent scientific inquiry and analysis, education, and outreach for a greater understanding of urban forestry impacts

Previous IES Projects

The IES Tree Project has completed eight programs across the Colorado Front Range.

The *IES Trees for Healthy Kids and Community Project,* 2011, planted 40 trees at Mitchell Elementary School in Golden. These strategic plantings reduced air and noise pollution from the adjacent highway, controlled storm water flow, and ameliorated strong winds on the school grounds.

In 2011-2012, IES and the City and County of Broomfield partnered to implement the *Trees for a Healthy Community and Economy Project*. In a strategically planned tree planting project, IES and its partners in Broomfield added trees to the development of downtown Broomfield to improve the community, the environment, and commercial growth.

The Wheat Ridge Greenbelt has been the target of several IES projects prior to GREEN. In 2012-2013, the *IES Revive the Greenbelt*! Program began our partnership with the Wheat Ridge Parks and Recreation Department. Over 200 volunteers from across the community planted more than 200 native trees, shrubs, and grasses, and removed invasive plant species to restore the Greenbelt's riparian ecosystem and prevent erosion. At the end of the three-year maintenance period for the *Revive the Greenbelt!* Program, IES measured tree survival rates from the 2013 plantings at over 60% by the year 2016.

The *Preserve the Greenbelt Elementary Education Program* in 2013-2014 was the first project where IES partnered with Kullerstrand Elementary School. This project included both planting days and classroom workshops for 4th grade students at Kullerstrand and 3rd grade students at Mountain Phoenix Community School. Over 200 native trees and shrubs were planted by 120 students from both schools at different planting sites. The students also removed invasive plant species. *Preserve the Greenbelt* was awarded the Colorado Alliance for Environmental Education 2014 Environmental Educational Award for Excellence. IES estimates tree survival rates at these sites are over 85%.

The 2014-2015 *Growing the Greenbelt Education and Environmental Health Project* worked with students from Wheat Ridge High School's Career Exploration Class in classroom workshops and a tree-planting event in collaboration with community volunteers. Two workshops introduced students to science careers and planting and tree care instruction through hands-on activities. Students planted 15 native cottonwood trees and prepared the site for the volunteer planting day. After the student planting day, over 30 community members from the Girl and Boy Scouts, IES Tree Stewards, and members of the Wheat Ridge community completed the project by planting more than 140 native shrubs, trees, and grasses at the *Growing the Greenbelt* planting site. The one-year survival rate was over 85%. This project and all Greenbelt planting projects are supported by our partnership with the WRPRD and its employees.

In Sheridan, Colorado, IES has planned and implemented two environmental improvement projects, the *IES Sheridan*

Quincy Tree and Trail Projects. In the fall of 2015, Leadership class students at Fort Logan Northgate 3-8 School received leadership and science education and participated in planting 60 native trees on school property north of the Sheridan Quincy Trail. In 2016, the project extended for a second year into the *IES Sheridan Quincy Trail Project*. Students worked to improve the Sheridan Quincy Trail by planting shrubs, grasses, and wildflowers, helping to reduce erosion and manage stormwater runoff. The trail improvements also beautified the trail and made it a more inviting space for the community.

The 2015-2016 GREEN project marked the first year IES worked with the Teaching Responsibility and Independence with Learning Supports (TRAILS) students, shifting their focus from working with general education students to students with Severe Emotional Disabilities, who have less hands-on science education opportunities than their general education peers. This year, the GREEN project continues the partnership with Kullerstrand Elementary and the TRAILS students.

Kullerstrand Elementary School TRAILS Program

IES partners with students and teachers at Kullerstrand Elementary School to implement environmental education through classroom modules and hands-on planting events in the GREEN project. In the Teaching Responsibility and Independence with Learning Supports (TRAILS) program at Kullerstrand, students with emotional, behavioral, social, or learning disabilities benefit from hands-on learning opportunities, both indoors and outdoors, to increase socialization with community members and students from the general education population. Students in TRAILS are instructed in designated socially and emotionally disabled (SED) classrooms because of their emotional disabilities and social behavior needs. GREEN provides new opportunities for these students to learn about science and ecology while growing social skills through interaction in meaningful real-world social situations.

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Sun Camp and IES Tree Ambassador Program

City of Wheat Ridge

The IES Tree Ambassador Program is an opportunity for Wheat Ridge Recreation Sun Camp summer camp attendees to improve their environment and receive hands-on experience and science lessons. Approximately 30 Sun Campers watered, weeded, and mulched plants along the Greenbelt twice weekly as Tree Ambassadors during the summer. Once a month, students participated in tree measuring activities under the supervision of Wheat Ridge Parks and Recreation Department staff members.

Tree Stewards

Volunteers from the Wheat Ridge community are IES Tree Stewards, generously dedicating their time to nurture the IES Tree Project's plantings in the Greenbelt. Tree Stewards water, weed, and mulch planting sites as part of IES's three-year maintenance structure. Some stewards also volunteer with the Tree Ambassadors in the summer or at planting events. The Tree Stewards are a vital source of community participation that supports and maintains the tree planting sites. IES recruits, trains, and supports all Tree Stewards.

IES Tree Stewards volunteer at planting day to assist TRAILS students

Summary

The 2017 IES Wheat Ridge GREEN Project continued the restoration of the ecological health of the Wheat Ridge Greenbelt open space and improved storm water runoff, erosion, and water quality for Clear Creek, a major tributary to the South Platte Watershed. This year's project implemented a modular plan for classroom workshops to increase student interaction and participation. The project involved nearly 100 volunteers, provided outreach to countless community members, combined two interactive in-class workshops, two tree planting days, and a three-year stewardship program to promote tree survival. The 2017 GREEN Project is the third year that IES has partnered with Kullerstrand Elementary School and the fifth year of its partnership with the Wheat Ridge Parks and Recreation Department to plan and implement an ecological improvement and education program.

4. 2017 IES Wheat Ridge Kullerstrand Greenbelt Restoration and Environmental Education Network (GREEN) Project

This is the second year of the Greenbelt Restoration and Environmental Education Network (GREEN) project. IES has partnered with the WRPRD on several other educational and environmental improvement projects including *Revive the Greenbelt (2013), Preserve the Greenbelt Elementary Education Program (2014), Growing the Greenbelt Education and Ecological Health Program (2015*), and the *2016 GREEN project*. This report details the second year of the three-year GREEN program.

Jane Reuteler, school psychologist for Kullerstrand Elementary School, approached IES in 2015 because she wanted an outdoor education program for her Teaching Responsibility and Independence with Learning Supports (TRAILS) program students. These students are seriously emotional disabled, and need quality, hands-on ecological and environmental curriculum. With the guidance of Margaret Paget, Wheat Ridge Parks and Recreation Forestry and Open Space Supervisor, IES identified a new trail section of the Wheat Ridge Greenbelt that needed restoration. During the construction of this trail section, many trees were removed and replacements were needed to improve drainage, reduce noise, and restore the trail. IES and WRPRD saw an opportunity for IES to restore the trail and provide the hands-on education the TRAILS students needed.

Project Goals

The project goals for 2017 GREEN were:

- Improve the ecological and environmental health of the Wheat Ridge Greenbelt
- Bring together community members to restore a cherished space
- Provide education opportunity for students in Wheat Ridge

Project Objectives

The objectives for the 2017 GREEN project were:

- Special and general education students at Kullerstrand Elementary School learn about Colorado's ecology and practice their social skills in classroom workshops and field trips with general education students and Wheat Ridge community volunteers. This objective was designed to achieve the goal of providing educational opportunities for students in Wheat Ridge.

- Students planted native trees, shrubs, and grasses along the new Greenbelt trail. The second objective was designed to meet all three goals of the GREEN project.

- Plant native and shrubs and remove weeds from the Greenbelt ecosystem to improve air and water quality. This not only meets the goal of improved ecological and environmental health in the Greenbelt, but it also helps further the Tree Project's mission of improving the environmental quality of Colorado cities using tree science.

- Bring community members together through the three-year maintenance plan. IES Tree Stewards water and care for trees and plants, mulch and weed, and safeguard the health of the trees and plants.

- Evaluate the success of the program with a final report and present the project to the community with a project video. This evaluative documentation provides for the overall Tree Project goals of establishing IES as the leading organization for strategic, science-based tree planting in Colorado.

5. Project Organization and Community Collaboration

Community members and organizations in Wheat Ridge helped develop and implement the 2017 GREEN project. The collaboration from project stakeholders included valuable knowledge, experience, time, and materials for project events. Kullerstrand Elementary School staff members participated in approving education materials, two classroom workshops, and two planting days. WRPRD staff members provided expertise to help IES associates with the planting plan, educational modules, planting modules, and maintenance program. WRPRD provided planting materials and provided Sun Campers with hands-on science activities. IES Tree Stewards provided help during the planting days and summer Tree Ambassador program. The Wheat Ridge Recreation Center Sun Camp provided care for the site. These resources were vital for the success of the project.

Partnership Among IES, WRPRD, and Kullerstrand Elementary School

WRPRD Employees at GREEN planting event 1

The partnership among IES, WRPRD, and Kullerstrand Elementary School was the most important aspect of GREEN's success. The multi-year partnership plays a vital role in providing the project with multiple points of view, expertise, and leadership. 2017 GREEN marks the fifth partnership between IES and WRPRD, with successful planting and education programs in the Wheat Ridge Greenbelt starting in 2013. Past program successes are the result of IES's administration of program planning and development, and the dedication of WRPRD's Margaret Paget, Robin Rice, Susan Bennett, and all of the Forestry and Open Space staff members. Their in-kind and material support of the project included the education workshops, planting days, and summer watering program. Previous project successes in the Greenbelt include 2013 *Revive the Greenbelt,* 2014 *Preserve the Greenbelt Environmental Education Program*, 2015 *Growing the Greenbelt Education and Environmental Health Program*, and 2016 *GREEN Project*.

TRAILS students and a community outreach employee from Kullerstrand Elementary School at GREEN planting event 2

GREEN is the third partnership between IES and Kullerstrand Elementary School. The first partnership was the award winning 2014 *Preserve the Greenbelt Environmental Education Program*. GREEN is a continuation of a program designed in 2016 to give Kullerstrand TRAILS students and their general education peers the opportunity for multi-year, hands-on science lessons and outdoor community involvement. IES and Kullerstrand agreed that multiple years of science lessons and socialization opportunities benefit students more than a single-year project. Multiple years of interaction in their environment give students tangible lessons on the importance of continuing efforts in environmental improvement. Jane Reuteler, school psychologist, helped IES develop educational modules and planting day activities. The school hosted the classroom workshops and provided transportation for the students on planting day.

The IES Tree Project Steering Committee

The IES Tree Project Committee consists of dedicated local professionals that have volunteered to help the IES Tree Project develop projects. Their expertise guides Tree Project Associates and Interns through development and implementation.

IES Tree Stewards

The IES Tree Stewards are a dedicated group of community volunteers, recruited and trained by IES Associates and WRPRD staff. Don Mangus, IES Tree Stewards Coordinator, guides and supports the Tree Stewards by organizing site responsibilities, communicating with WRPRD when materials are needed for sites, and compiling watering and volunteer records. IES recruits tree stewards throughout the year by hanging posters at all planting sites and in Greenbelt trail kiosks. Once a steward volunteers, IES trains her/him at a planting site to properly water, mulch, and weed. Stewards work independently or in small groups to care for the sites. Stewards also volunteer their time and expertise at planting days, community events, and with the Wheat Ridge Sun Camp.

IES Tree Stewards at GREEN planting event 1

Collaborative Funding and the Importance of Stakeholder Involvement

The GREEN project used a collaborative funding model that included grants from foundations, and in-kind and monetary donations from project stakeholders. IES wrote multiple grant proposals to private and public foundations. Successful grant applications were submitted to the National Fish and Wildlife Foundation, Patagonia Denver, the Colorado Tree Coalition, and the Wheat Ridge Outside Agency Contribution Program. IES also sought and obtained contributions from our project stakeholders to provide matching funds required from project donors. WRPRD and Kullerstrand Elementary School donated in-kind hours to review and create project materials, and material donations in the form of educational supplies, planting materials, mulch and water.

IES projects rely on community members and organizations willing to participate in planning and implementing a project. Collaboration made GREEN a success, ensuring that students received hands-on science education, the Greenbelt received needed green infrastructure environmental improvements, and that community members received the opportunity to aid in the improvement of a cherished open space. The partnership among IES, WRPRD, and Kullerstrand Elementary School will continue to be strong for future projects.

Thank you from TRAILS students to Wheat Ridge Parks and Recreation Department for their support of the GREEN project

Project Plan

IES planned and implemented GREEN according to the timeline created in the 2017 IES GREEN Project Plan. The plan outlines the development of each stage of the project including initial planning stages, project implementation, evaluation and production of the Final Report and project video. The plan was prepared by IES Tree Project Manager John Kelly, and managed by Program Coordinator Patti Venneman. It was based on previous successful projects. Tree Project team members brainstormed project activities and reviewed the plan to ensure all project components were included. The Tree Project also presented the plan to the IES Tree Project Steering Committee for advice on components of the project. The plan can be found in Appendix C.

The project had eight major components:

- Project documentation
- Stakeholder identification and involvement
- Sponsor and community outreach/reporting/communication
- Funding: National Fish and Wildlife Foundation requirements and reporting
- Plan and implement classroom workshops
- Plan and implement ecological field trip
- Tree Stewards Program
- Project evaluation, Final Report, and video

Project video

IES hired local videographer Jesse Johnson of IOTK Media to record all project events and to produce a video to document the project. Mr. Johnson was present at both classroom workshops, both planting days, and a watering event with Sun Campers. John Kelly, IES Tree Project Manager, wrote a video plan to ensure that the video covered all aspects of the project. The video was reviewed by Margaret Paget of WRPRD and Jane Reuteler and Cheryl Clay (Principal) of Kullerstrand Elementary School.

IES Associates, WRPRD, Kullerstrand Elementary staff, and community volunteers were interviewed for the video during project events. Interviewees included John Kelly, Carol Lyons, Don Mangus, Jane Reuteler and Michelle Ray of Kullerstrand Elementary School, Robin Rice of WRPRD, IES Tree Stewards and volunteers. Several students were interviewed in the video, which allowed them to voice their opinions on the project and explain what the project meant to them. Mr. Johnson created a short promotional video that covered the most

TRAILS students preparing to dig a hole for a plant

important aspects of the project and a longer video that covered all project activities. The project video was distributed to all project stakeholders and partners, and can be found on the IES website and YouTube channel.

Project communication

IES announced the project to the Wheat Ridge community, and project stakeholders and funders through a series of press releases and with the IES quarterly newsletter. Press releases were sent to IES's media contacts and one was printed in the Wheat Ridge Connections Newsletter. IES provided updates through its quarterly newsletter, which can be found at the IES website.

6. Project Design and Events

Project planning

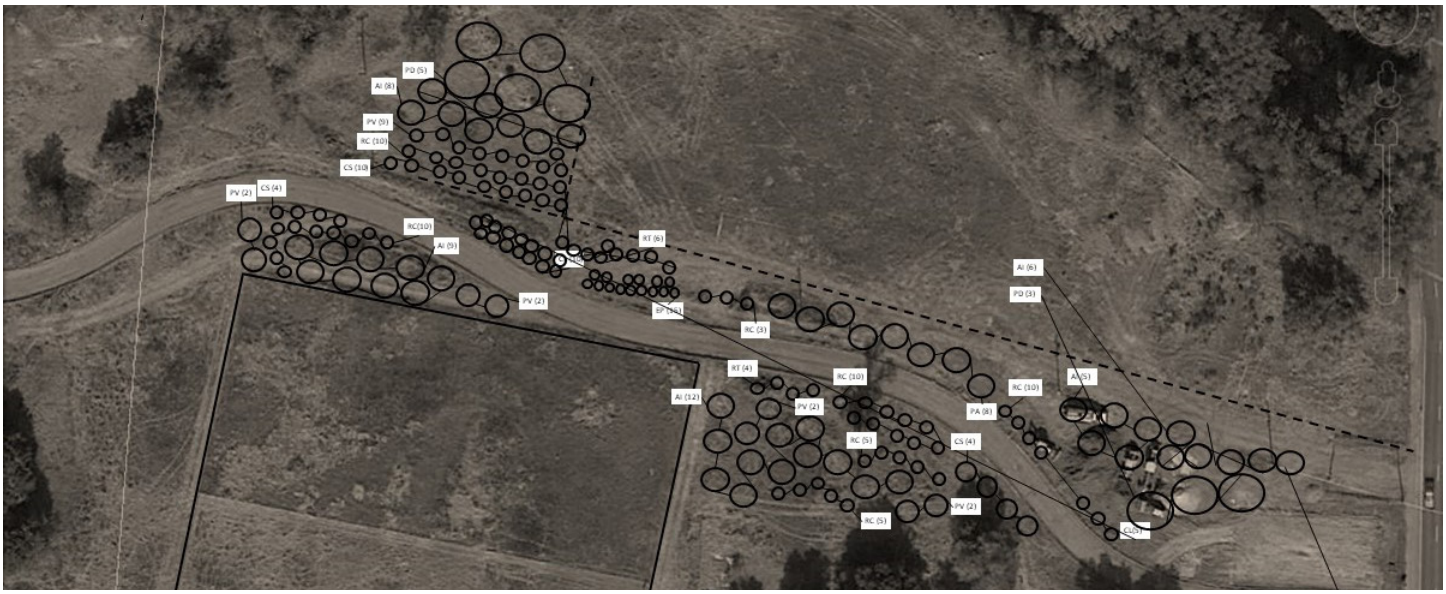
IES followed the project plan to implement all aspects of the project. The project plan included planning and implementing stakeholder meetings, creating a planting plan, developing and implementing two classroom workshops and two planting days, designing a program for local children to help maintain the planting site, and the IES Tree Stewards program for site maintenance.

Stakeholder meetings

The IES Tree Project team met with project stakeholders during the planning process to discuss project plans, events and materials. The purpose of the meetings was to brainstorm and review the content of the plans and events, ask for a review from Kullerstrand Elementary School and WRPRD staff members on how to implement the classroom workshops and planting events, and to debrief in person with the Kullerstrand teachers after the project events. The in-person debrief with Kullerstrand teachers was a new part of the 2017 GREEN project, which IES implemented because of the limited usefulness of the evaluation from the 2016 project. Debrief meetings with the teachers were important to help IES gain critical insight on how to improve the 2017 GREEN project, and will be described in detail in the Project Evaluation chapter.

IES met with Margaret Paget, WRPRD, twice during the project planning period. On October 24, 2016, we discussed the initial steps in the project, including an update the planting plan proposed in 2016 and how WRPRD would participate in the classroom workshops. IES met with Ms. Paget and Robin Rice, WRPRD Forestry Assistant, on January 26, 2017 to finalize plans for the workshop modules, the planting events, and sourcing plants.

IES met with Jane Reuteler, Kullerstrand school psychologist and head of the TRAILS program, three times during the project. The first meeting, on November 7, 2016, was to discuss Kullerstrand Elementary's participation in the project and to agree on the number of workshops and planting events. The second meeting on January 26, 2017 was to discuss the learning modules for both the classroom workshops and planting events. On May 23, IES met with Ms. Reuteler and TRAILS teachers to discuss the project events and to elicit advice on areas that could use improvement for future projects.



IES 2017 GREEN Planting Plan

Planting plan

IES used the planting plan created by Andrew Rasmussen for the 2016 GREEN Project. Mr. Rasmussen's plan was prepared in spring 2016 and contained three years of planting plans. The 2017 layout was updated after walking the site with Margaret Paget in February, and checking the availability of plant species to use for the project with the Colorado State Forest State Nursery. Final changes to the planting plan occurred during the planting preparation day, May 2, where IES changed the location of certain species due to a new fence line for goat grazing along the trail section. The final plant totals were:

Thinleaf alder
(Alnus incana)
40

Native plum
(Prunus Americana)
8

Plains cottonwood
(Populus deltoids)
8

Chokecherry
(Prunus virginiana)
36

Red-osier dogwood
(Cornus sericea)
38

Lanceleaf coreopsis
(Coreopsis lanceolate)
15

Eastern purple coneflower
(Echinecea purpurea)
15

Wax currant
(Ribes cereum)
50

Three-leaf sumac
(Rhus aromatic)
10

Total 220

Workshop 1 design and event

The first 2017 GREEN workshop had two goals: to increase student knowledge about the Greenbelt's ecology and to prepare students for planting days. The workshop, March 14, 2017, consisted of four modules:

- How to plant a tree
- Parts of a tree
- Tools and safety
- Project workbook

TRAILS students brought a general education friend to the workshops to support socialization. The workshop was divided into two sessions, one with the kindergarten to second grade students, and one with the third through sixth grade students; each session lasted about an hour.

IES Executive Director Carol Lyons kicked off the workshop by introducing students to the IES Team and the project. Students were asked if they participated the previous year. We described what they would do during the first workshop. The outline for workshop 1 can be found in Appendix G.

In the How to Plant a Tree module led by Tree Project Manager John Kelly, students learned tree planting techniques. Students planted bare-root sized chokecherry and red-osier dogwood in small pots. They completed all seven steps during the module. After students planted their tree, they named it and left it to take home after school. The plan for the how to plant a tree module can be found in Appendix H.

The second module was the Tools and Safety module led by Carol Lyons. The objective was to teach students the safety rules for planting. The rules were illustrated by providing the opportunity to physically hold the tools. Ms. Lyons walked

Kullerstrand students learn about how to plant a tree

Kullerstrand students learn about tools and safety

Robin Rice of WRPRD teaches students about parts of a tree

students through the different tools they would be using during the planting events and how to use them safely. The plan for the safety and tools module can be found in Appendix K.

The third module was Parts of a Tree, where students learned about the ecology of a tree. Students were taught by Margaret Paget and Robin Rice why each part of the tree is important to the overall health of the tree. Students got to hold leaves, branches, and pieces of bark. The plan for the parts of a tree module can be found in Appendix J.

Kullerstrand students complete the IES project workbook

The fourth module was the IES Project Workbook. This module, led by IES Graduate Intern, Maggie Michael, gave students the opportunity to complete coloring and games to learn about the flora and fauna of the Greenbelt. Activities included a word search, matching pictures to names, and coloring Greenbelt animals. At the end of the activity, students signed their names to a final page that certified them as Greenbelt Tree Stewards. The workbook can be found in Appendix I.

Planting days design and event

IES planned and implemented two planting events with WRPRD and Kullerstrand. The planting occurred along a trail section in the Wheat Ridge Greenbelt that was built in the spring of 2016. The planting continued the work started along the trail during the 2016 GREEN project, and occurred just west of the parking lot located north of 41st Avenue and Kipling Street. The planting plan was a revised version of part two of the three-year plan created by IES Associate Andrew Rasmussen, and consisted of 220 native trees, shrubs, and flowers. All plants were purchased from the Colorado State Forest Service Nursery. IES, with the help of IES Tree Stewards, and Robin Rice and Susan Bennett of WRPRD, prepared the planting site on Tuesday morning, May 2. The site was prepared for the two planting days; first day plantings were marked by orange flags and second day plantings were marked by red flags. Prior to the first planting day, IES delivered bright orange project t-shirts to Kullerstrand and asked students to wear them for both planting days. The bright orange color made it easier for adults to see where all the students were during planting.

IES Tree Stewards and Margaret Paget of WRPRD at the GREEN planting preparation event

The first planting was Friday morning, May 5. IES Associates and WRPRD staff members arrived at 8:30 am, where they were briefed about activities for the planting day and their roles supervising TRAILS students. IES provided breakfast, t-shirts, and ballcaps to all volunteers. T-shirts and ballcaps were used to help students identify which adults were leading planting modules and whom they should ask questions about any activity.

Students, teachers, paraprofessionals, and chaperones from Kullerstrand Elementary School arrived around 9 am. Students were introduced to the activities they would complete that morning and the volunteers that would help them during their activities. TRAILS students and their general education peers completed three planting modules between 9 am and noon.

The first module was planting, led by IES Tree Stewards

Two TRAILS students carrying a plant on planting day

IES Tree Stewards Coordinator Don Mangus showing TRAILS students how to plant a tree

IES Tree Steward and Kullerstrand student gather mulch for the 2016 GREEN planting site

Coordinator, Don Mangus, and supervised by IES Tree Stewards. Students walked through the same planting steps learned in the classroom through a planting demonstration. After the demonstration, students were given instructions to work in pairs, find a plant that needed planting, complete the planting steps, and plant four plants during this module. Students completed all these tasks before moving on to the next module. The plan for the planting module can be found in Appendix W.

The second module was watering, where students watered and mulched plants at the 2016 GREEN planting site. Students were instructed to work in pairs to fill small buckets and put two gallons of water on each plant, and to add a bucket or two of mulch. Students were supervised by IES Project Coordinator Patti Venneman and IES Tree Stewards.

Kullerstrand students participate in an interactive nature walk

The final module at the planting day was an interactive nature walk led by Susan Bennett, WRPRD. Students were guided on a walk near Clear Creek to learn about native flora and fauna. The goal was to bring the ecology lessons from the first workshop to life. Students saw evidence of a beaver dam, mature types of trees and shrubs that they were planting, and learned about the importance of species diversity. The plan for this module can be found in Appendix U.

The second planting was Friday morning, May 12. The plan for the second planting day was similar to first with students completing three modules. A weeding module replaced the watering module and a scavenger hunt replaced the nature walk. IES Associates, volunteers,

and WRPRD again arrived around 8:30 am to prepare for the students. Kullerstrand students, teachers, paraprofessionals, and parents arrived around 9 am. Students were again introduced to all volunteers and told about the activities they would be completing on that day. The planting module was the same as the first day, except that students were planting in a different area.

The second module for the second planting day was a weeding module. Students learned about invasive species and how to remove them properly. They were supervised by John Kelly and IES Tree Steward Betty Jo Page as they worked through the planting site from May 5. Students diligently removed species such as scotch thistle (Onopordum acanthium) and common mullein (Verbascum thapsus) during the module. The plan for this module can be found in Appendix X.

TRAILS students after removing weeds at the second planting event

The final module of the planting events was a scavenger hunt, led by IES Graduate Intern Elizabeth Angell. Ms. Angell created a scavenger hunt with eight questions. Students were led to the area where they completed their nature walk during the first day and then the hunt was distributed. Students worked through all the questions while exploring the Greenbelt. Activities on the scavenger hunt included: name and draw something in nature that is taller than you, name and draw an insect, draw two kinds of leaves, and name two kinds of birds you see. The scavenger hunt can be found in Appendix V.

Workshop 2 design and event

The second workshop occurred on Tuesday, May 16. Its goals were to teach TRAILS students about tree care, thank project

TRAILS students worked together to complete the scavenger hunt during the second planting event

Group photo after the first planting event

TRAILS students playing a matching game at workshop 2

TRAILS students learning about how to care for trees with a board game at workshop 2

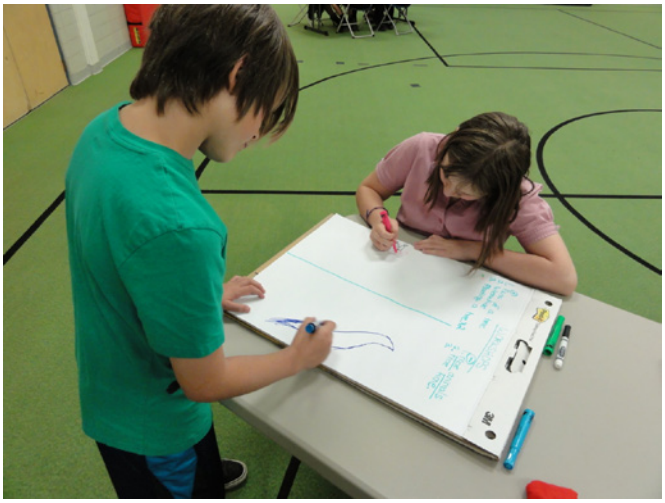
TRAILS students creating a special thank you poster for our project sponsors

sponsors, and receive student feedback. The structure of the workshop was similar to the first; there were four modules conducted during two sessions consisting of the younger and older classrooms, with each session lasting about one hour. Each module was run by a different member of the IES team. The plan for the workshop can be found in Appendix L.

The first module was a matching game run by Patti Venneman. Ms. Venneman gave the students the instructions for the game and supervised as students played the game. One at a time, students flipped over two cards to try to match animals or plants. When students correctly matched species, they would describe how that species interacts with others in the Greenbelt. Students completed the game when all matches were found. If there was extra time, Ms. Venneman asked students questions about the ways species interact in the Greenbelt. The outline for this module can be found in Appendix M.

The second module was a tree care board game. This module, led by John Kelly, was designed to help students understand some positive and negative things that can happen to trees over their lifetimes. Students were instructed that each would have one turn, and during that turn they would draw a card, read the card out loud, explain why the description on the card was either good or bad for a tree, and then move their piece accordingly. Examples of game cards included: “Someone put a fence around you when you were young to protect you (move ahead 3 spaces)” and “You were pruned at the wrong time of year and got a disease (move back 2 spaces).” The game was complete once all students had reached the end of the board game.

The third module was a thank you module run by Maggie Michael. Students reviewed the parts of a tree, explained why those parts were important, and then signed their name to a thank you poster for each of the project sponsors. Ms. Michael asked students about parts of the tree and why they were important. When the student answered correctly, they would draw that part of the tree on a poster, place their fingerprint in paint as a leaf on the tree, and sign their name. Pictures of all thank you posters can be found in Appendix R and the outline of the module can be found in Appendix Q.


Students drawing what their favorite part of the GREEN project

Tree Ambassadors mulching with IES Tree Stewards Coordinator Don Mangus

Tree Ambassadors learn about measuring trees with WRPRD employees Susan Bennett and Robin Rice

The final module of the workshop was a project review led by Carol Lyons. During this module, students were asked what their favorite parts of both the planting days and workshops were, and what they learned from the project. While responding to these questions, Ms. Lyons asked students to draw their favorite parts about the project. Drawings from students included pictures of planting trees and animals that they observed in the Greenbelt. Student pictures can be found in Appendix P and the outline for the module can be found in Appendix O.

Tree Ambassador Program

GREEN marked the second year of the IES Wheat Ridge Tree Ambassador Program. The program started as a partnership among IES, WRPRD, and Wheat Ridge Recreation Sun Camp in summer 2016. Sun Campers worked throughout the summer 2016 to care for the first GREEN planting site. Due to the success of the program, the Sun Camp and IES wanted to continue the partnership in 2017.

For the 2017 Tree Ambassador Program, Sun Campers visited the site on Tuesday and Friday mornings to water, till, and mulch newly planted trees under the supervision of IES Associates, Tree Stewards, and WRPRD employees. Once a month, Sun Campers under the supervision of Robin Rice and Susan Bennett of WRPRD, completed hands-on science lessons to measure the growth of newly planted trees and the proper way to record data for evaluation. Sun Campers also received hands-on ecology lessons at the 2016 and 2017 planting sites, including exploring native fauna from Clear Creek. The Tree Ambassador program occurred from early June to mid-August, and was key part of GREEN's success.

IES Tree Stewards site maintenance

The IES Tree Stewards volunteered their time to help plant and care for the GREEN planting site. Tree Stewards participated in supervising TRAILS students during the planting events, including the planting, watering, and weeding modules. Tree Stewards also volunteered during the Tree Ambassador program to supervise Sun Campers during site visits. However, the Sun Camp students only cared for about half of the newly planted plants. The other half was cared for by Tree Steward volunteers. After the Tree Ambassador program ended in August, the entire planting site was switched to Tree Stewards' care. Stewards have contributed hundreds of hours of volunteer work for the GREEN project and have been vital for the survival of plants at the planting site.

7. GREEN Project Evaluation

This section discusses the outcomes and lessons learned from the 2017 GREEN project.

Project evaluation: Meeting objectives

The first objective was that special and general education students at Kullerstrand Elementary School learn about Colorado's ecology and practice their social skills in classroom workshops and field trips with general education students and Wheat Ridge community members.

Accomplishments

- Implemented a modular educational model to promote replicability. This resulted in smaller groups were the IES leader and teachers could provide more immediate feedback to students.
- Workshops were interactive and the students had more opportunities for hands-on learning.
- New to this year's project were a nature walk led by a WRPRD Environmental interpreter during the first planting day and an outdoor scavenger hunt led by an IES Associate and WRPRD Environmental Interpreter during the second planting day.
- Feedback from students and teachers showed a high rate of satisfaction with the modular format because they had more opportunity for hands-on education and personal attention.

Challenges

- TRAILS students range in grades from kindergarten to sixth and have a wide range of abilities. What might be challenging for younger students would be too easy for an older student.
- The "How to Plant a Tree" module was very messy due to the materials needed for the module.

Recommendations

- Have two workbooks or worksheets for students; a simple one for younger students, and a more challenging one for older students; or revise the current workbook for all students with easier material in the beginning and harder material in later pages to address the differentiation in grade levels.
- Put loose materials for "How to Plant a Tree" and similar modules in smaller, rigid containers. This would allow the materials to be closer to the students, and promote cleanliness.

The second objective was the students plant native trees, shrubs, and grasses along the new Greenbelt trail.

Accomplishments

- The students planted 246 native trees and shrubs during two planting days.

Challenges

- The soil was compact, which made digging holes challenging.
- Students with severe emotional challenges do not always have the cognitive tools to react appropriately to certain situations, and volunteers are not trained in adaptations for special needs students. This can lead to

miscommunication between the students and volunteers and students experiencing distress and acting out on the distress.

Recommendations

- Arrange for WRPRD to pre-dig holes for the students. WRPRD can either completely dig the holes, or loosen the dirt so the students will get the experience of digging holes for their plants.
- There needs to be better communication with the volunteers regarding the emotional challenges of the students. Volunteers should be briefed that they need to follow the cues of the teachers, and that the teachers are responsible for student discipline.

The third objective was to plant native trees and shrubs and remove weeds from the Greenbelt ecosystem to improve air and water quality.

Accomplishments

- There were 240 native trees and shrubs planted in the Greenbelt.
- IES, Kullerstrand students, WRPRD, and volunteers removed invasive species from the planting site.

Challenges

- Low survival of bare-root plants and some trees due to poor soil and distance of the plants to the watering tanks based on evaluation of last year's planting program.

Recommendations

- Plant bare-roots closer to water tanks, and make watering them a priority.
- Reduce use of bare-root plants.
- Add soil amendments when planting.

The fourth objective was to bring together community members and care for the newly planted plants in the Greenbelt through a three-year maintenance plan.

Accomplishments

- IES recruited and trained Wheat Ridge community members to become Tree Stewards.
- Old and new Tree Stewards worked together to maintain old and new planting sites. Generous giving of their time has been key to the GREEN project success and over all plant survival in the Greenbelt.
- This was the second year of the partnership between IES and the Wheat Ridge Sun Camp Tree Ambassador program, where Sun Campers watered and mulched twice a week during the summer break from June to mid-August. New this year was a hands-on ecological education program led by a WRPRD Environmental Interpreter.

Challenges

- Children from the Sun Camp became bored with summer care tasks they did not enjoy. Some prefer to water, and some prefer to weed. This means that not all plants get the same amount of water, lowering survival rate
- WRPRD loses seasonal staff in the later summer, so there is only one part-time person available to fill water tanks.

- IES needs to recruit more Tree Stewards.

Recommendations

- IES, WRPRD, and the Sun Camp provide bi-weekly prizes such as stickers or ice cream treats to raise the children's excitement about coming to the site throughout the summer.
- Have certain groups do the same task for one week or multiple weeks and then switch the tasks.
- Train Sun Camp counselors on proper watering and mulching techniques, and ask them to work with the children, breaking them down further into smaller groups and helping the children ensure all plants are watered.
- Make sure newer sites have filled tanks. Older, shadier sites should be more stable and in need of less water.
- Recruit more Tree Stewards.

The fifth objective was to evaluate the success of the program with a final report and present the project to the community with a project video. IES accomplished this by receiving stakeholder and student feedback. Evaluation was ongoing through the program to make immediate adjustments as needed. IES hired Jesse Johnson of IOTK Media to record and edit a final video. This final report also fulfills the requirements of the fifth objective.

Evaluation: Other

Stakeholders

Accomplishments

- IES has a very strong relationship with our stakeholders.
- Stakeholders are receptive to ideas and readily provide feedback. They are an excellent of source material and expertise.

Challenges

- No identified challenges.

Recommendations

- Maintain strong relationship with stakeholders.
- Continually ask for feedback from stakeholders and make adjustments as necessary.

Funding

Accomplishments

- Due to a large grant and subsequent smaller grants, GREEN was completely funded.
- The National Fish and Wildlife Foundation grant was the Tree Project's largest grant to date. We met the detailed reporting requirements.
- We continued our funding relationship with Patagonia Denver.
- Wheat Ridge has furthered its buy-in of the GREEN program by providing funding through the Wheat Ridge Outside Agency Contribution.

- The Colorado Tree Coalition provided grant money, continuing its positive relationship with the Tree Project.

Challenges

- Detailed reporting for NFWF required IES to submit two budget amendments, requiring a large amount of time.

Recommendations

- Have a clear and workable budget template that can be updated during the project as needed.
- Create and maintain detailed model for record keeping.

8. Conclusion

The 2017 IES GREEN project was a success. It was made possible thanks to generous funding from the National Fish and Wildlife Foundation, Patagonia Denver, the Colorado Tree Coalition, and the City of Wheat Ridge. We are grateful for the extensive support and contributions from our stakeholders: Wheat Ridge Parks and Recreation, Kullerstrand Elementary School, and the Wheat Ridge Sun Campers. We look forward to our continued partnerships. Thank you to the terrific IES Tree Stewards who donated valuable time to ensure the high survival rate of the trees and shrubs planted in the Greenbelt.

IES welcomes comments, suggestions, and questions about our programs and our report. Please contact IES at Solutions@i4es.org.

9. Plans for Printing, Binding, and Distribution of the Final Report

The final report will be available electronically on our website: www.i4es.org. We also print a limited number of reports. If you would like a printed copy, please email IES at Solutions@i4es.org.