

# Advancing Environmental Literacy in Schools: Success Stories across Colorado

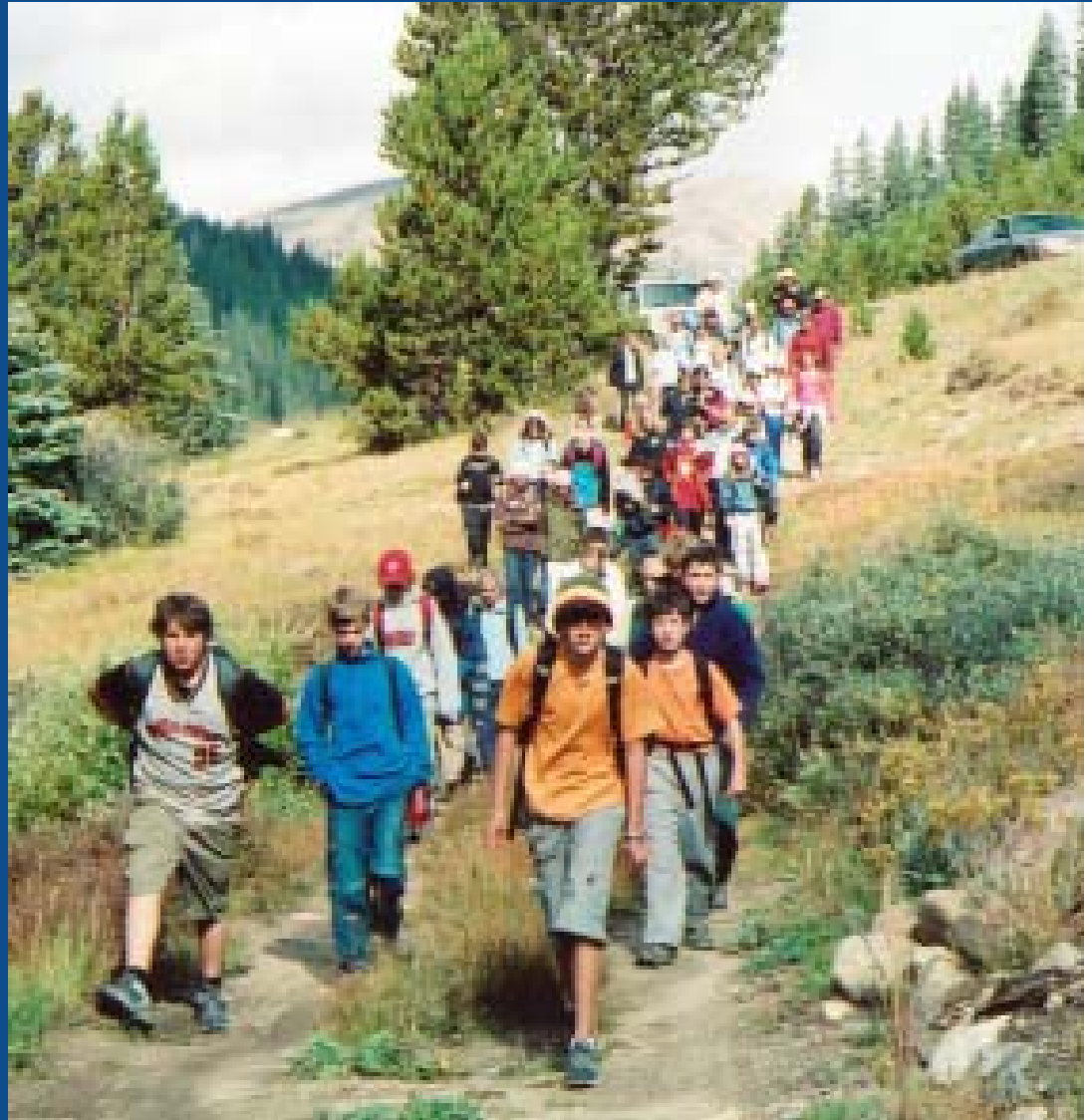


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Research by University of Colorado Denver

Graduate students:

Derek Jones, Erin Westmoreland-King, Cheryl Winston

Edited and Designed by Alliance for Sustainable Colorado Staff:

Janna Six and Kim Hughes

with support by Angelica Mecklenburg

August  
2012

# STATE OF COLORADO

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**OFFICE OF THE LIEUTENANT GOVERNOR**

130 State Capitol  
Denver, Colorado 80203-1792  
Phone: (303) 866-2087



May 15, 2012

Dear Reader,

*Advancing Environmental Literacy in Schools: Success Stories across Colorado* focuses on increasing environmental awareness through science-based and hands-on education. I believe this study will influence students and schools across the state in a most beneficial way leading to further Colorado success stories.

The 21st century has brought us many complex scientific issues that need forward-thinking and innovative problem solving. By directing education towards using place-based activities, environmental education can inspire students and schools to achieve academic goals and solve community problems.

The passionate teachers and inspired young learners who have invested their time to this project have been moving and exciting. Because of this, and the increased environmental awareness created by this report, I recommend *Advancing Environmental Literacy in Schools: Success Stories across Colorado* to school administrators, teachers, parents and community leaders. It will provide a model for successful environmental education across the state.

Sincerely,

A handwritten signature in cursive script that reads 'Joseph A. Garcia'.

Joseph A. Garcia  
Lieutenant Governor  
State of Colorado



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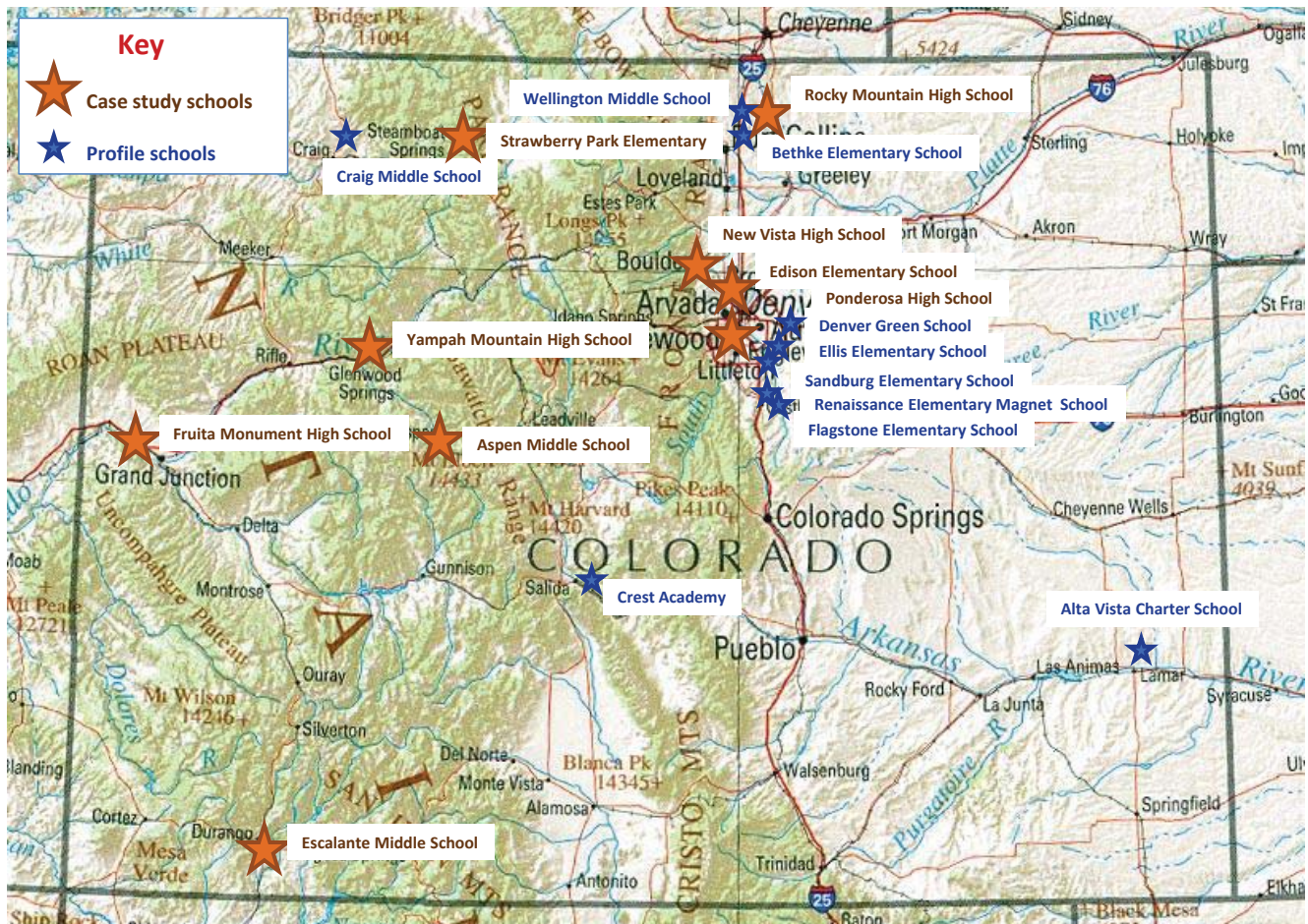
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## Summary: How schools are successfully integrating environmental education into the school culture

This report, *Advancing Environmental Literacy in Schools: Success Stories across Colorado*, documents how 19 public schools (grades pre-K–12) are successfully integrating environmental education into curricula and the school culture. Each school's story details how instruction and experiences are increasing students' environmental literacy while also successfully achieving academic goals, saving money, improving participation rates and helping students master 21st century skills.

Environmental literacy, developed through environmental education, is a vital proficiency for students as they graduate and enter the work force. The continued health of Colorado's environment, economy and communities depends on environmentally literate and active citizens.

Environmental education (EE) deepens knowledge about the environment and develops the skills and expertise necessary to address environmental challenges while fostering attitudes, motivation and commitment to make informed decisions and take responsible action.

Environmental education is not just focused on learning about the environment. It utilizes the school campus and surrounding community to help students construct their own outdoor learning experiences, producing richer, more effective learning for students. This type of learning is student-centered, engaging, place-based and creative, yet founded in scientific practices and collaborative in nature. Using this approach, students have shown improvements in reading, math, writing and social studies. More importantly, their levels of motivation and interest in science are enhanced.

The Alliance for Sustainable Colorado, the Colorado Alliance for Environmental Education and the University of Colorado Denver Wirth Chair for Sustainable Development collaborated on this research to bring you a comprehensive snapshot of successful environmental literacy efforts in Colorado.



# Success Stories

## Case studies

Nine representative public schools were selected for case studies from a pool of over 200 schools across the state which have implemented environmental education. The array of case studies features diverse rural, urban and suburban locales, a variety of economic and cultural drivers; and a range of political contexts. Each case study demonstrates how environmental education has been creatively and successfully infused into multi-disciplinary, multi-grade programs that have these elements in common:

- Utilize high quality EE resources (fair, accurate, of appropriate depth and meeting educational standards);
- Incorporate field experiences that connect students to their communities;
- Provide teacher training (professional development);
- Document benefits/gains;
- Found funding sources that are more or less sustainable;
- Implement core practices identified by the Green Schools National Network:
  - o Uses curricula that advances environmental literacy and sustainability
  - o Provides stewardship and service learning opportunities
  - o Incorporates sustainable facilities design and operation on the campus
  - o Offers health and well being programs
  - o Takes advantage of strong partnerships and networks

The case studies schools were also examined for particular research questions being investigated by students in the University of Colorado Denver Graduate School of Public Affairs:

- How school grounds are being used for EE (Erin Westmoreland-King)
- Partnerships with community and non-formal EE organizations (Derek Jones)
- Effective strategies that increase teacher efficacy in implementing EE programs (Cheryl Winston)

Site visits and data collection were completed by UCD graduate students during the spring of 2012. School administrators, faculty, staff and students contributed substantial time and information. The report was compiled by staff and volunteers of the Alliance for Sustainable Colorado.

## Profiles

One-page profiles of ten additional schools are featured in this report. These brief snapshots highlight what is possible in some of the most exceptional 'green schools' throughout Colorado.

# Findings

All across Colorado, kids, schools, families and communities are benefiting from integrating environmental education into curricula. Throughout the case studies and profiles, these benefits of environmental literacy programs were identified:

Teachers and administrators believe that high quality EE programs make a positive difference academically and in students' lives. Teachers witnessed benefits that indirectly boost test scores and improved attendance; promoted greater enthusiasm and participation (especially in "hard-to-engage" students); reduced discipline problems; and led to mastery of skills in citizenship, socialization, communication and research.

EE benefits career readiness and citizenship skills necessary to be successful in the 21st century. Attributes of EE activities — hands-on, place-based learning, overseeing projects from start to finish, etc. — enhance students' research and communication skills and provide real world experiences in grant proposal writing, business management, problem solving and decision making.

EE provides practical, hands-on application of science, technology, engineering and math concepts (STEM). Students learn to "do science" rather than just "learn about science." Although many of the EE champions in these case studies have backgrounds in science, EE is multidisciplinary. One EE activity or project is often used to meet goals in multiple subject areas — literacy, social studies, math and art.

## Keys to successful EE programs at case study schools

In each school, one or more "champions" emerge as the driving force behind a successful EE program. Champions range from young, energetic teachers to 25+ year veterans. Many have had meaningful, personal experiences in the outdoors or are passionate about science inquiry and want to pass on that spark to students. Others have caught the bug just by osmosis. These champions are creative and resourceful and are able to get things done.

Successful teachers: are given discretion to create classes and curricula, draw EE into subject areas other than science, network to make important community connections, choose and set up field trips and field work, sponsor or start student clubs, research and write their own grant proposals and seek out other funding sources, and select professional development opportunities to learn new things for students or to enhance personal development. This bottom-up, discretionary leadership is facilitated by principals' trust and empowerment of teachers and staff.

Support and coordination of EE at the school district level, especially through sustainability coordinators or energy managers, makes programs more successful.

Each school has a unique approach to EE influenced by local community values and resources. Collaborative partnerships with community organizations, parents' groups, businesses, nonprofits and government agencies have unlimited potential. Tapping local resources is essential in assisting with funding of programs, appealing to students with local concerns and providing real-world practice.

EE can be successful in quirky, old school buildings as well as in new, high-performance ones. In either situation, case studies and profiles provide examples of how teachers, administrators, facilities managers, staff and students have utilized the school building and campus as a learning tool.

## Recommendations

The goal for this report is to contribute toward building the EE roadmap for Colorado's future. It is intended as a useful tool to impart lessons about what's working in EE. The case studies give examples of best practices. The report also identifies obstacles and gaps in EE services. The editors encourage state agencies, districts, schools and community partners to make use of these valuable case studies and profiles. Key recommendations are:

### Educate school administrators about the benefits of EE.

As the findings demonstrate, support from school leadership is critical for success. Administrators and school leaders need to understand how environmental education can help students meet and exceed academic goals.

### Replicate successful models.

Don't re-invent the wheel. Begin by adopting one small EE program that's been proven successful elsewhere. Then weave that program into everything we do as teachers, administrators, parents, community members, business owners and governmental leaders.

### Develop tools and resources to measure success.

Schools across Colorado are anecdotally benefiting from EE. Shared evaluation and assessment tools are needed to more fully understand progress and success in environmental literacy and correlations to academic achievement.

### Create new opportunities for collaboration and networking.

High quality EE programs generally exist in isolation. Better coordination at the school district level and state level would give more teachers and students access to EE resources.

### Continue EE efforts at every level (pre K-12).

Classroom teachers are making huge strides and serving as EE champions in their schools. Efforts need to be made to ensure that success stories like these case studies, are occurring at every level: the classroom, school, district and statewide. There are schools and districts benefiting from EE in every corner of the state. Celebrate and build on the successes and benefits.

### Professional development in EE must be adequately supported.

The Colorado Environmental Education Plan, expected to be adopted in November 2012, should be fully staffed and implemented to engage partners, advance EE programs and provide teacher training. Principals can encourage professional development opportunities. Community organizations are available to provide locally appropriate, high quality training.

## In Summary

Preparing students as critical thinkers and informed decision makers about the environment is a collaborative effort. New Colorado content standards provide a rare opportunity to utilize environmental education programming as an effective way to meet Colorado's new academic goals.

# Nine Case Studies of Schools Advancing Environmental Literacy





# Aspen Middle School

*"The concept of sustainability is at the heart of Aspen Middle School's EE programs. It's not just environmental sustainability, but also economic, agricultural, emotional and educational sustainability. It's health... emotionally healthy and well-balanced kids will make good choices. Sustainability is important at the global level, and acting locally is global."*

— Principal



[Aspen Middle School](#)  
235 High School Road  
Aspen, CO 81611  
(970)-925-3760

Principal: Tom Heald  
Grades: 5–8  
Students: 450  
Free or reduced lunch: 8.44 percent

Awards:  
2007: LEED Gold Certification  
for New Construction

2006, 2007, 2011: John Irwin  
School of Excellence

## Background

Aspen is a small town in the central mountains of Colorado with only 6,000 permanent residents that has become a popular ski and cultural destination for affluent visitors. Outdoor and experiential education is an essential component of Aspen School District's grades K–12 mission to develop the whole child. At Aspen Middle School, physical activities and academics are integrated at all grade levels so that students gain life skills outside the classroom that will be remembered for years to come. This develops each adolescent's mind, body and spirit.

## Environmental education initiatives

The cornerstone of Aspen Middle School's environmental education efforts is the Outdoor Education Program. It dates back to 1967 with the first annual eighth-grade backpacking trip. After a story about the trip was published in *National Geographic* in 1971, the outdoor program took off. Now, each grade, 5th through 8th, goes on its own extended field trip with specific educational and personal growth goals and extensive preparation.

### Extended field trips

Fifth-grade students take a three-day trip to Arches National Park to learn about the Colorado Plateau through hiking, camping, group initiatives, and geology studies in the field. Students learn first-hand about the scientific concepts of geologic layering and the sensitive microbiotic crust. They also learn about resiliency and how to tread softly. Students' progress is assessed via nightly "circle-up discussions," reflective writing and written geology assignments.

The 6th graders take a four-day hut trip in the Elk Mountain and Holy Cross Wilderness area. They start at the top of Vail Pass and snow ski to the Shrine Mountain huts, where they learn about winter environments through mountain ascents, team building exercises, snow safety practices, indigenous tree studies and identification of different biomes. The science of snow, dust and solar radiation is covered, as is the “leave no trace” ethic. Evening circle-up talks and reflective writings are used again, as are indigenous tree projects and presentations.

Seventh grade takes students on a five-day rafting trip down the Colorado River. They learn about riparian habitats, river ecology and the whole river drainage mechanism. They build teamwork skills on the raft and are introduced to roped rock and canyon climbing. Discussions, writings and river ecology assignments are used to evaluate the trip’s success.



*“During the first week of school, instead of having traditional classes, we have a big prep meeting for the trips. Instead of talking about algebra, I talk about gear.”  
— 8th-grade algebra and integrated studies teacher*

The 8th-grade trip is a culmination of the Outdoor Education Program. They take a seven-day, 30-mile backcountry trip into the Maroon Bells/Snowmass Wilderness Area. Students learn environmental stewardship and recognize and value each other’s differences by demonstrating empathy and compassion. The trip challenges them to be outside their comfort zone and develops tenacity. Each student undergoes a 24-hour solo experience with no tent or food, just water, a signal system, and an assignment to think and write the entire time. Other parts of the trip include hiking high mountain passes, climbing, a high rappel and group initiative activities. A wide variety of science, writing, math, art and social studies curricular projects are used to assess the trip, as well as the nightly circle-up discussions.

## Environmental education is tied into all the classes

Teachers apply the experiences and sustainability ideas into art classes so students are better able to visualize the ways they are impacting the planet.

In art class, students collected all of the waste throughout the whole school after one day and dumped it out on a large tarp. They reflected on how much waste was generated by one school in one day.



In another art project called World Village, the students made a 40' x 20' map of the world. Students then stood on sections of the map, showing proportions of human population. They also divided up tokens representing wealth, trash, energy, gas, pollution and food based on percentages in the real world.

## Service learning

Service learning also plays a big role in students' education at Aspen Middle School. Students are organized into a number of multi-age groups called "base camps." At the end of every year, each of these base camps completes a service-learning project to see how they can have a positive impact in the local and global community. Students often drift towards environmental stewardship projects. One base camp group planted 191 trees on the grounds of the school. Others have collected trash, raised money for trail work, collected Pennies for Peace, and supported tsunami relief efforts in Japan.

## High performance building and operations

In 2007 the school moved into a new building, which is certified by the U.S. Green Building Council as Gold for Leadership in Energy and Environmental Design (LEED). The new school has more windows - and 90 percent of spaces have outdoor views. Sunlight brightens up the hallways, significantly reducing lighting costs. The building also contains more open, cooperative learning spaces.

Aspen Middle School's lunchroom procures local and seasonal food from a CSA (community-supported agriculture) membership that also has contracts with local farmers. The school also operates successful recycling and composting programs. Bins are placed in every classroom and the lunchroom. An "upcycling" program collects batteries and electronics that are sold to TerraCycle. A student audit calculated that they kept enough juice pouches out of the landfill to equal the weight of 75 Hummers since the program began.

## Drivers

Essentially, the school reflects the values of the community. People come to Aspen to enjoy the outdoors and want to preserve what exists for future generations. The principal pointed out, however, that a school that demonstrates exceptional leadership on environmental issues can also drive a community to embrace those values.

The principal promotes "transformational leadership" and empowers community members, staff, teachers and students to take leadership when an opportunity is presented. During outdoor education trips, patrol

*"I believe that kids in this day and age are very visual. They're attached to media, their cell phones, their iPods, their computers, their TV sets, so I teach them visually. By being visual and having children participate in public art, they have buy-in."  
— Art teacher*

*"Every classroom has bins for plastic paper, and then one for chip bags, wrappers, cell phones, batteries. We get money for it. We've raised about \$1,000 so far. I collect everything into a big tub and bring it into this room."  
— 8th-grade reading, language and integrated studies teacher*

*"Now [the building] is wide open and behavioral problems have really dropped off. In the old building I'd receive something like 100 behavioral referrals, and when we moved into the new building I have around 12."  
— Principal*



leaders are really just there to provide guidance and ensure safety. The students often create their own experiences.

## Community partners

Outside organizations offer leadership and services to the school. Aspen Ski Company is currently partnering with the school on ways to save money through energy conservation and efficiency in the building, while teaching students about energy conservation. Money saved will be spent on wish-list projects, like a garden.

The Aspen Center for Environmental Studies (ACES) sponsors over 330 field trips a year to schools in the area. At the middle school level, ACES programs include botany, winter survival skills, and ecology of the Rocky Mountain Region. Before the 6th grade backcountry trip, ACES sends staff into classrooms to teach about the different types of fauna they will encounter. ACES has also been consulted for the creation of the base camp curricula, such as tree planting.

Partners are critical for professional development at Aspen Middle School. The outdoor education trips require the experience and expertise of highly skilled patrol leaders. They must be knowledgeable not only about the science but also about expedition dynamics and outdoor safety. Rather than hire experts to lead field trips, the school trains its own staff by utilizing experts at White River National Forest, the Colorado Avalanche Information Center, Aspen Ski Company, Aspen Center for Environmental Studies and Colorado Mountain College. Teachers receive first aid training, wilderness first responder training, swift water training, and avalanche training. They learn critical pedagogies, teachable moments in the wilderness, and how to talk to kids outside of the classroom in a wilderness setting.

## Challenges

Funding is needed to ensure that every student at Aspen Middle School is able to go on the outdoor class trips. The trips are affordable because the school has established a steady stream of funding from an annual ski swap. Individuals bring old ski gear to sell and the school keeps 20 percent. Commercial vendors also donate some equipment to pitch in. Each year, the one-day fundraiser generates between \$25,000 and \$35,000. The money supports outdoor education scholarships, equipment, special recreation use permits and professional development training.

Another challenge to running an extensive Outdoor Education Program is complying with government regulations and bureaucracy. It requires coordination, planning and communication with agencies.

Aspen Middle School has a special recreation use permit with the state of Utah. This allows the school to more easily outline the specific activities and potential environmental impacts of a field trip to the appropriate agencies. The school has now developed relationships of trust and open communication with the agencies, making future coordination and compliance easier.

*"If you have ten million people stomping to the same neck of the woods, there have to be some regulations so that a level of stewardship is present for the woods to survive and provide for generations down the road."*  
— Principal

# Edison Elementary School

*"The teachers teach to the state standards, but our intent is to go one step further and have students not only learn those standards, but to undertake research and projects and learn about how science impacts their world."*

— Principal



Edison Elementary School  
3350 Quitman Street  
Denver, CO 80212  
(720) 424-7780

Principal: Sally Whitelock

Grades: PK–5

Students: 530

Free or reduced lunch:  
39 percent

Awards:  
2008–2012: Green Up Our  
Schools grants

## Background

Edison Elementary School is a 21st-century neighborhood school in 87-year old building in the West Highland area of northwest Denver. The school is a collaborative learning community where rigorous academics and character education ensure the development of the whole child. Learning experiences are designed to meet the unique learning needs of each student so that all children develop 21st-century skills: critical thinking and reasoning, information literacy, self-direction, collaboration and invention/innovation. The school celebrates curiosity and creativity in the development of life-long learners.

## Environmental education initiatives

Environmental education is part of the school culture. Edison is housed in a 1925 building and lacks some of the environmentally friendly upgrades of modern buildings, but the school has not held back in making environmental living a core component of the school values. In the past year, Edison teachers and administrators have made an effort to write EE into the curriculum. The principal has focused energy on this effort because it helps students understand the real-world application of a concept, especially in science. EE also contributes to developing the students' skills as 21st-century citizens.

The evolution of Edison's environmental education initiatives began with a "Learning Landscape" project in 2004. A student "Green Team" was formed and recycling was implemented in 2008 when Edison first received a grant from Green Up Our Schools. The garden was conceived the same year. Use of reusable silverware and trays in the school cafeteria started in the 2009–2010 school year. Commercial composting based in the cafeteria rolled out in 2010–2011 and extended to the bathrooms the following year. Textile recycling was introduced in 2010 as well.

## Student green team

Many EE programs at Edison were developed through a collaborative effort with the Green Team, composed of students, staff and parent volunteers. This extracurricular group, which meets biweekly, is now in its fifth year and involves over 30 3rd through 5th-grade students and two teachers. The students learn about water and air pollution, conservation, health and how to be better citizens from teachers and guest speakers and through hands-on activities.



The entire school benefits from the Green Team's leadership and support for environmental programs. Green Team students empty recycling bins, help train their classmates in composting, do an energy audit of the school and share ideas with the school and the wider community. In addition, the school's community garden is heavily supported by the Green Team.

The Green Team has become extremely popular at Edison, as evidenced by the fact that all 34 slots fill up right away. The 3rd-grade teacher who acts as the co-leader for the Green Team said, "I've had several comments [from parents] that it's one of the best thing that Edison offers."

Each year for Earth Day, the Edison student and parent Green Team hosts a parade through the neighborhood. In 2011, 150 students and parents participated, donning costumes made from recycled materials and carrying educational signs. Along the route, parade participants picked up litter and reminded neighbors to recycle. In 2012, students created and performed a skit about pollution and protecting the environment. The day concluded with an Edison Eco-Health Fair called "Healthy Planet, Healthy Body," connecting the importance of environmental literacy and health. Over 400 students and family members attended.

The greening of the lunchroom served as a valuable learning experience and accomplishment for the Green Team. The lunchroom features reusable silverware and trays, composting and recycling, and a salad bar with fresh produce from the school garden when possible. The composting program, run by Denver Recycles Food to Flowers Program at a cost of \$500 per year, has become a source of pride for the school.

*"Recycling is integral to how we operate."  
— Principal*

Now that recycling and composting are available throughout the school, the Green Team has helped educate and encourage the rest of the student body to participate. The students are now the experts in composting and they are now teaching their parents and the wider community how to compost. Students have written and published articles in the local newspaper about the ease and payback of composting and recycling, and have educated visitors through tours and artistic renderings.

Red Apple Recycling has set up a "little red school house" collection box on the Edison campus to receive donations of used clothing to be reused or recycled. This location is one of the most productive Red Apple textile recycling sites in the metro Denver area.



*"The Green Team, our kitchen manager and our facilities manager got these programs started....  
Now if you go down there at lunch those little kids are trained to compost."  
— 3rd-grade teacher*

## Community garden

A 2004 partnership with the Learning Landscape Program at the University of Colorado Denver College of Architecture and Planning helped transform Edison's school grounds into a rich learning environment. The campus now includes compost bins, plots for native grasses, perennials, herbs, irises, and daylilies, along with a bird house and pedestal, a windmill, a small orchard and irrigation and permeable walkways. Signage around the campus provides educational interpretation.

The community garden was created in 2008 when the Green Team received funding from Denver Urban Gardens (DUG) and the Gates Foundation. The garden has offered a bounty of educational opportunities for students, a spark for community involvement and a source of fresh produce for the lunchroom and local food pantries:

- DUG staff and volunteers assist with school gardening activities, provide a handbook with lessons to teachers and help teachers discover other ways to use the garden across the subject areas.
- During Edison's annual Field Day, students participate in activities for half of the day and spend the other half planting and harvesting the garden.
- During summer months when the school is closed, the plots are maintained by community gardeners. Community garden plots are leased for \$35 per year.
- Ongoing funding for Edison's community garden comes from grants solicited by parents and teachers, including awards from Denver Urban Gardens and DonorsChoose.org.

*"I like putting my hands in the dirt."  
— 3rd-grade student*



*"Many people in our neighborhood, whether they have children who go here or not, communicate to me that one of the things they like about this school is that there is a strong community feel. We support and foster that.. Passionate parents bring in other passionate parents to keep it going."  
— Principal*

## Environmental education through art

EE has been incorporated into the art curriculum through various projects:

- The art teacher at Edison has taken advantage of the community garden. Second-grade students study plants, and the art teacher takes students to the garden to draw and take close-up photographs of plants, looking specifically at the elements of line, shape, and color in the details of nature. A photography project takes place over the course of the year, allowing students to observe the changes over time in the garden and getting real-life exposure to the life cycle of plants.

- Students use art to connect to their community through service learning. In 2012, students designed artwork based on the importance of water in their lives.

*"The students are so enthusiastic about going into the garden and looking for new things and seeing something grow."  
— Art teacher*

A local hair salon auctioned the artwork to benefit Western Resource Advocates, a Boulder-based nonprofit that protects rivers, streams and wildlife habitat in Colorado and the region.

- Art class helps students avoid waste. The art teacher engages students in discussions about where materials such as clay and paper come from and how their use impacts the environment. Students have made their own paper out of recycled paper. Students are encouraged to use recycled materials as much as possible in their artwork, which, according to the art teacher, the students love.

*"We intuitively know that it is making an impact when students have a hands-on experience looking at a dragonfly to understand its structure, then figuring out how to draw it; or watching how a plant is growing over time."  
— Art teacher*

## Benefits

According to the principal, the more teachers provide instruction in a holistic way, the stronger and more applicable the instruction is for students. When students read about a concept in science and social studies, write about it, use technology and experience it first-hand, they will perform better on standardized tests. More importantly, the students take home this knowledge and apply it in their daily lives, teaching their families about the importance of leaving the world a better place.

*"When teachers make learning applicable to life, children are more engaged. Children see the purpose of the learning, and so they learn more."  
— Principal*



## Drivers

- The parents and teachers who are involved with the Green Team make EE a priority at Edison.
- The community garden has led to the development of important relationships with local organizations and individuals who rent plots. Many of the community gardeners are not parents of students, but have developed a connection to Edison Elementary through this program.
- Recycling and composting have had a positive quantifiable impact. Each fall and spring, Edison students conduct a waste audit to determine what percentage of the items in the trash should have been recycled. Since 2008, Edison has decreased that percentage from 78 percent to 8 percent. These kinds of results empower the Green Team and other students to do more.



## Lessons

To benefit from Edison's EE learning curve, a variety of lessons are offered to others:

- Activities on school grounds should be structured. Planting in the garden is more manageable with smaller groups.
- Nature activities can be more easily facilitated on the school grounds rather than off campus.
- Experience can help overcome barriers.
- Seek and rely on outside support and dedicated parents and community members who care and have the time and the energy to do things.
- If others step forward with good ideas that are safe and appropriate, permit them to be tried on a pilot basis. Checking in regularly ensures that programs continue to meet regulations and contribute to learning.
- Since there is no formal EE professional development program, teachers who get involved with the Green Team voluntarily pick up knowledge and materials through involvement and experience.
- Faculty, parents and community members who choose to engage in green activities strengthen the school environment and their positive attachment to an association with the school. This is the most powerful public relations campaign available.

## Funding

Edison does not have money set aside in the budget for EE activities. Instead, the school has been fortunate to have parents and teachers who seek dedicated outside funding which has come from many sources:

- <http://www.greenraising.com> — sends the school 25 percent of the proceeds from all sales by customers who identify Edison Elementary as the beneficiary.
- Green Up Our Schools — funded sustainable programs over the past four years.
- Denver Urban Gardens — helped fund and helps manage the community garden.
- DonorsChoose.org — teachers write proposals for small crowd-funded grants.
- Learning Landscapes — developed Edison's school grounds into a learning landscape
- Front Range Organic Gardens
- Chipotle, the Denver-based restaurant chain — donated a percentage of sales on Edison Elementary day
- Red Apple Recycling — provides support for projects that promote sustainability.

# Escalante Middle School

*"I think the outdoor education program does help with academic performance and the three R's: relevancy, relationships and rigor."*

*— Outdoor education & 8th grade social studies/language arts*



## Escalante Middle School

141 Baker Lane  
Durango, CO 81301  
(970) 247-9490

Principal: Tim Arnold

Grades: 6–8

Students: 481

Free or reduced lunch:  
41 percent

## Background

Escalante Middle School sits along the Animas River on the southern edge of the town of Durango, in the southwest corner of the state. The school takes advantage of its school grounds and the surrounding natural environment to provide hands-on education to students. In addition to the river path, the school has a ropes course, a greenhouse and garden, solar panels, and access to a prairie dog ecosystem. Nearby are Mesa Verde and the Southern Ute Indian Reservation. A significant number of students come from multi-generation farming and ranching families in the area and are involved in 4-H and other agricultural or outdoor programs. In 2012-13, Escalante will become a designated Expeditionary Learning School.

## Environmental education initiatives

### Raising roundtail chub

A year-long partnership with Durango Nature Studies (DNS) and the Colorado Division of Parks and Wildlife (CDPW) allows 7th-grade students at Escalante and other schools in the Durango School District to make a difference in saving a species of concern. With a grant from BP America Production, roundtail chub fish are raised in an aquarium in the classroom. Throughout the school year, science lessons are tied to the experience. In one recent lesson, a representative from DNS focused on responsible, environmentally aware fishing. With borrowed equipment from CDPW, students practiced catching plastic fish, demonstrated how to carefully handle a fish and determined if the fish was a species that could be consumed or needed to be returned to the river, as is the case with the roundtail chub.

At the end of the year, the students take a field trip to release the aquarium-raised fish into the Animas River. Students expand their science experience to language arts, writing reports on endangered species.

*"Studying the roundtail chub is fun. The activity outdoors gave me a break, and was educational and hands-on."*

*– 7th grade student*



## Outdoor education program

Escalante's Outdoor Education Program is offered as an alternative to traditional physical education. Funded through the school's budget and travel fees, the program focuses on team-building — trust, safety and respect. On the school grounds students learn how to fly fish on the Animas River, do small-scale climbing on the indoor bouldering wall, practice archery, and complete a ropes course (funded by Hershey). Students also take field trips to go camping, rappelling and rock climbing.

*"I am a firm believer that physical activity and being involved in and connected to a program at school, for example with the outdoor ed class, definitely has an impact on behavior and overall student achievement. The [EE programs] tend to be an asset and give students exposure to new things."*

— Principal

## Exploratory class

During "exploratory class" period at Escalante, four outdoor education classes are offered each year to 7th and 8th-grade students. This class allows students to develop an appreciation of and respect for the environment.

For example, at the end of the academic year, all 8th-grade students take a camping trip -- an interdisciplinary, service learning experience. The trip is funded by the school, planned by the students and supported by parents who volunteer as chaperones. Groups have visited locations such as Chaco Canyon, where the students built permanent shade shelters. Students experience the outdoors while giving back to the community. They also develop teamwork and cooperation.

## Greenhouse and vegetable garden

At Escalante, the greenhouse (operated by solar panels) and the surrounding vegetable garden have become valuable teaching tools. The 7th-grade language arts teacher offers gardening as an elective class. Students get hands-on experience in raising a substantial amount of produce used in the school cafeteria. Students learn about concepts ranging from vermicomposting to photosynthesis and respiration. In 2012–13, each grade level will receive a plot of land that they will be responsible for in the community garden.

Every October the school hosts a fundraiser called Empty Bowl. Students and staff make soup with ingredients from the garden while art students make the bowls. The proceeds from the event, which totaled \$2,500 in 2011, go to Manna Soup Kitchen in Durango.

*"Having the kids enjoy the environment helps them see it as a resource worth protecting. They'll see that human impacts are huge, and they'll keep in mind 'leave no trace' and those kinds of practices."*

— Outdoor education teacher

*"Any time you can get them out where they are engaged in their own surroundings and exercising at the same time, it's very healthy."*

— 6th grade science teacher



*"Gardening can be very therapeutic."*  
— 7th-grade language arts/gardening teacher

*"My favorite part of the class is feeling like I'm giving back to the school by growing food that could be used in the cafeteria."*  
— Student

Initial funding for the garden was raised by the 7th-grade language arts teacher from Hershey, La Plata Electric Association, BP, the local Rotary Club and the Durango Foundation for Educational Excellence. Continued funding has come from the school budget and fundraisers selling flower bulbs, flowers and plants.

The solar panels (1.8 kW system) help students better understand energy and electricity. On the school website students can track the electricity generated by the solar panels and are able watch the meter run backwards as surplus electricity is put back on the grid. Students learn how to calculate the total value of the electrical savings over the course of a year. In 2011, approximately \$1,000 was credited to the district, which is enough to power 50 of the school's computers, or the two drop-in labs, for the year.

## 6th grade science

The 110 6th-graders are outdoors as much as possible to investigate ecology. The students develop a comprehensive understanding of the water cycle by studying the Animas River. They identify biotic and abiotic elements of the landscape, examine the ecosystem of the prairie dogs and participate in games such as "Oh Deer" (Project Wild activity which emulates the rise and fall of the deer population based on access to food, shelter and water). Each of these illustrates a hands-on approach to meeting state standards and serves as a tool to connect students to the place where they live. The science teacher applies her training from the Bioregional Outdoor Educational Program and uses curriculum tools like "Water Education for Teachers, Discover Colorado River Watersheds" and "Project WET."

## Recycling

The 6th-grade science teacher started the recycling program at Escalante 11 years ago as part of the curriculum. Recently, the recycling program was incorporated into the "leadership class" curriculum as a service-learning project. Leadership students pass through the school every Thursday to collect and sort the recycling.

## After school programs

The counselor leads "Fishtails" by leading students to the river for fly fishing or hikes. The Bike Club takes off from the school and rides the river trail system just across the highway.



*"A lot of the standards that I teach lend themselves perfectly to my definition of EE: any kind of education [where] students become more aware of their surroundings; they observe their surroundings; they question it; they think about it. It's more engaging because they are outside, and this engagement is crucial to student learning."*  
— 6th grade science teacher

*"I wouldn't say the primary emphasis is environmental ed, so to speak, but I think all of [the after school activities] try to impart responsibility and stewardship and taking care of the place in which we live."*  
— Principal

## Benefits

The outdoor education program offers several benefits, beyond helping students appreciate the value of their natural environment. Students develop leadership and team building skills. They also make a stronger connection to their school through different kinds of relationship with the teachers.

*"Leaders emerge when I get [these 7th and 8th-graders] in a non-academic environment. I think that helps immensely. Then all of the sudden I have them in an academic class when they are in my 8th-grade class and I love it. They see me in a different light and have respect and trust to work with me in that way. I think that's super helpful."*

— 8th grade social studies/language arts teacher

## Drivers

At Escalante, the EE programs are really driven by passionate staff, particularly the greenhouse teacher and the science department team. The principal and the rest of the staff provide support.

*"My background is in conservation and natural resources when I was at UC Berkeley. That's always been my love — conservation and natural resources and gardening and now healthy lifestyles."*

— 7th grade language arts/gardening teacher

*"My role is to support people in risk taking. I don't even think it's risk taking, I think it's being creative – giving teachers the opportunity to address standards but doing it in a way that may be a little outside the box."*

— Principal

## Lessons

- Testing and other requirements of school curricula can distract teachers and administrators from environmental education, but by approaching EE as an enhancement to the curriculum, Escalante has been able to overcome this barrier.
- Short class periods can make programs, especially field trips, difficult to accomplish. By switching to the Expeditionary Learning model next year, class periods may be longer.
- Supervising and managing students outdoors can be more difficult than in the classroom and require additional support. By developing relationships with volunteers and partner organizations like Teach for America, teachers can more easily take advantage of the outdoor environment. Escalante also relies on high school students enrolled in a program called "Big Picture."



*"It's being creative and grabbing the stuff that you have to do [the standards], and finding ways to creatively meet those goals with field work... I see an opportunity to partner with Expeditionary Learning to help us do that."*

— Principal

- Liability is a major concern, especially when it comes to outdoor activities. Escalante takes students on outdoor trips under the supervision of a guiding company, working with the district's safety representative to follow all guidelines. Individual chaperones with backgrounds in outdoor education are assigned to student(s) about whom there are safety concerns.

- Escalante has been fortunate in being able to find money in the school budget to carry out programs. The school receives rental revenue from the use of the building by other organizations. The Durango Foundation for Educational Excellence funds some of the educational activities outside of the traditional curricular areas, such as a portion of the greenhouse. The local rotary club funded a bench outside the greenhouse. The district oversees all of the energy costs for each school, so Escalante does not directly see the financial impact or benefits from energy conservation efforts or the solar panels.

- EE requires extra effort by passionate teachers. Many EE programs, especially those outside the classroom, require extra time and resourcefulness by the teachers. Teacher training for EE is up to each individual.

*"I haven't quite found the solution to [managing students outdoors]. The big solution would be to have more supervision, more support. But that's hard. If you volunteer in this district you have to give a lot of personal information and get fingerprinted. Also, sometimes outdoor activities are last minute; you don't have time to plan ahead to have parents or volunteers there. Because of difficulties with the economy, there is just less and less and less support."*  
— 6th grade science teacher

*"I come in all summer long, which I don't get paid for, and I do all the weeding and I do all the irrigation. I'm a master gardener and try to get help from other master gardeners. I solicit help but I don't always get what I need."*  
— Gardening teacher



*"The teachers with the science and EE background are probably more comfortable and definitely do more lessons involving the environment."*  
— 6th grade science teacher

# Fruita Monument High School

*"My agriculture teachers opened my eyes. Agriculture is everywhere: in the food you eat and the clothes you wear."*

*— FFA student member*



## Fruita Monument High School

1815 Wildcat Ave  
Fruita, CO 81521  
(970) 254-6600

*Principal: Jan Keirns*

*Grades: 10–12*

*Students: 1,271*

*Free or reduced lunch:  
25 percent*

*Awards:*

*2012: EPA Energy Star  
Rating*

*2011: Colorado Legacy School  
Recognition for gains  
in AP achievement of  
over 47% from 2009  
to 2010*

*2009: Colorado Department  
of Public Health &  
Environment  
Recycling Resources  
Grant*

## Background

Fruita Monument High School (FMHS) sits 20 miles from the Utah border and 10 miles northwest of Grand Junction on Colorado's Western Slope. The region's vitality is centered on agriculture, oil and gas development, and outdoor recreation (biking, hunting, camping and climbing in public lands including the Book Cliffs range, the Colorado National Monument and the Uncompahgre Plateau). The school's mission is "to work within a collaborative and responsive learning community that empowers all to reach their potential." The school's culture is shaped by the rural nature of the surrounding community.

*"In a rural place like this, natural  
resources are everything."  
— Science teacher*

## Environmental education initiatives

### Agriculture education program

An extensive Agriculture Education Program at FMHS exemplifies a place-based approach to education – aligning the values of environmental education to the unique culture of the community. Seventeen courses along career pathways are offered in three areas: agricultural science, agricultural mechanics, and natural resources/sustainable agriculture. The program is successful in career preparation because the ag teachers are open to new ideas and curricula that meet the needs and passions of students.

One course, Greenhouse Management and Landscape Design, offers a unique opportunity for students to create and buy in to a low-priced cooperative (co-op) business. Students may purchase up to four \$5 shares. They learn to germinate, grow and transplant vegetables and flowers, and monitor insects. Students learn business skills when they sell the bounty to the public. Leftovers are donated to charity or planted around the school. Because students own shares, they show up to class to make sure their business thrives.

*"The co-op is tied to real-life; it's a business investment, and that investment could be good or could be bad. When [students] invest, they don't want to lose! Rarely do they."*

— Ag science teacher



A new wildlands fire class for 2012–2013 will focus on ecology, fire history and watershed impacts. Students will be able to become certified wildlands firefighters at age 18, offering them a good source of income.

Ag classes at FMHS are articulated with college programs at Colorado Mountain College and a new Ag degree program at Western Colorado Community College (WCCC). This allows students to apply for college credits by taking FMHS agriculture classes. The students can also concurrently enroll at Colorado Mesa University or WCCC to get a start on their general education classes.

## Clubs play an important role

FMHS teachers recognize that sponsoring clubs of current interest to students is an important way to make the school experience relevant. Among the 30 clubs at FMHS are the FFA chapter, Recycling Club, Composting Club, Archery in the Schools, the Outdoor Club and Interact Club (community service).

The FFA chapter (formerly Future Farmers of America) at FMHS is the largest Colorado chapter with 327 diverse members. Club areas of interest include livestock, farm management, soils, greenhouses and urban agriculture. Student members participate in activities ranging from dairy judging and debates to floriculture. They also cultivate useful skills for job interviews, college, business and customer service. Outreach to the community is a big component.

*"FFA is moving past a stereotype of 'plows, cows and sows.' It is becoming a leadership group."*

— Ag science teacher

The Recycling Club used a 2009 grant from Colorado Department of Public Health & Environment to purchase recycling bins and conduct a waste audit. The audit revealed that FMHS students were recycling 73 percent of plastic bottles and 30 percent of paper (24 percent of total waste stream), diverting over 10 tons of waste from the landfill each year. Students presented their findings to the school board, documenting the expansion of recycling because of the grant. Students learned that their dedication to recycling is making a measurable difference.

*"Beside the environmental education, the club provides really good leadership skills and teamwork. They're learning things that will go on with them and they'll use forever."*

— Science teacher





The Composting Club is a new group founded by 15 dedicated students. A local hardware store donated a rotating barrel composter and the students collaborated with peers in the Ag program to assemble it. Compost collection bins and signs have been installed in the cafeteria and elsewhere. The group is optimistic that next year's sophomores will join and the Composting Club will continue to grow.

### High-performance building features.

FMHS was a challenging school to make eligible for EPA's Energy Star Rating because the building is older and less energy efficient than any others in the Mesa County Valley School District. It also has the only swimming pool, which requires a great deal of energy to heat. The district installed a high tech pool cover which dramatically retains pool heat while reducing humidity levels in the room. A number of other retrofits, tune-ups and operational changes, including a "lights out" policy, have further reduced energy and water consumption.

## Benefits

### Energy and water savings.

By installing the pool cover and making other retrofits, the school is projected to reduce energy and water costs by 46.1 percent, or \$11,442 annually. Water consumption will drop by 65,991 gallons, or 52.8 percent annually.

### Interdisciplinary faculty and community collaboration.

Colorado Ag teachers from across the state share lesson plans on an internet web site. At FMHS, Ag teachers hold a weekly meeting with tech-ed, business and food science teachers and they convene regular advisory committee meetings with a veterinarian, Division of Wildlife officer, and others, to keep up-to-date.

Community partners facilitate EE in classrooms and on field trips. Numerous government, nonprofit, business, and academic organizations have set up educational and funding partnerships. For instance, there is a strong set of partners supporting courses in the Natural Resources and Sustainable Agriculture pathway including the Colorado State University Extension; Colorado Division of Parks and Wildlife; Parks & Recreation Departments of Grand Junction, Delta, and Rifle; U. S. Bureau of Land Management; U. S. Forest Service; Colorado Mule Deer Assn.; Colorado Sportsman's Wildlife Fund; Turkey Federation; Rocky Mountain Elk Foundation; and others.

*"It is important to try to build the groundwork for our students to better understand the environment and to be able to take care of it in a way that they can leave it to their children. By doing activities like the Compost Club and the Recycling Club, they're learning things they might not learn at home and they see how it's all connected and all related."*

— Assistant principal

*"The Agriculture-Science curriculum is working. Attendance is up! Now we have kids coming from far away to get into our program. Our scores are better. I'm getting three years of growth in a year with these kids!"*

— Science teacher



*"The Colorado Forest Service offered a teacher training workshop on global warming, beetle-kill, impact on Colorado's forests and wildfire. It was one of those courses where I could immediately bring activities, posters and all kinds of hands-on materials back to the kids."*

— Science teacher

## Drivers

- FMHS school administrators have embraced the value of EE, demonstrated leadership and made commitments to integrate EE and outdoor learning into the school's culture and curricula. EE content in classes and extracurricular activities has grown in response to a desire to provide a broad education, experiential learning future job readiness, and to bolster environmental stewardship. The Ag program has expanded its course content to reflect this. Core science teachers have continually been using field work to explore climate, pollution, biology and more.
- Mesa County Valley School District 51's mission and strategic goals are aligned with EE and allow teachers and students the freedom to implement changes that keep educational experiences relevant.
- Several key teachers are driving EE efforts. They've been empowered to reach out to the community, incorporate field activities, introduce creative electives and sponsor clubs. A common sentiment among administrations and teachers is that they see school as a place where they can encourage informative and non-adversarial dialogue. They're interested in helping students find common ground on environmental stewardship among "tree-huggers", hunters, ranchers and energy industry workers. The science teacher started the school's first environmental club 26 years ago and is still sponsoring clubs today. A biologist in his spare time, he routinely takes his classes into the field to offer expanded learning experiences. The environmental science teacher developed "Natural Resource Pathway," a guide to help students explore career opportunities in natural resources. He also created curriculum guides for environmental science, oceanography and other courses.

*"There are going to be a lot of opportunities for environmental science jobs in the future. I think that having more knowledge about renewable resources, more efficient energy, is going to be a larger part of the science field. The more we can offer our kids, the better prepared they'll be for careers of the future."*  
— Assistant principal

## Funding

To support teacher training, student field experiences and EE programs in classrooms, teachers have leveraged the support of a wide variety of community-based organizations and businesses. Other innovative funding solutions have been established:

- A science teacher started a 501(c)(3) nonprofit organization called Outdoor Education of Western Colorado to be able to accept donations. He garners cash and in-kind support from the community and especially from area sportsmen's organizations.
- Some clubs have received financial assistance from the school's booster club.
- Students raise bees and sell the honey.
- FMHS faculty take smaller groups from more specialized classes on field trips, rather than have large group field trips. To avoid liability risks, teachers become certified in CPR and other areas, often through their own initiative.

*"We have a lot of community support. Occasionally people come and give us money unsolicited. We get a lot of product donations and discounts on materials. We work with other FFA chapters to order in bulk to save costs. Kids, especially in FFA, go out and find their own funding. That's good for public speaking and being able to talk to an adult, too."*

# New Vista High School

*"We really work hard on being part of the community, such as our partnership with the Cottonwood Institute. And, the district sustainability coordinator's role is really unique and a testament to the district's commitment to environmental action and education."*  
— Principal



## New Vista High School

700 20th Street  
Boulder, CO 80302  
(720) 561-8700

Grades: 9-12  
Classes are multi-grade  
Students: 320  
Principal: Kirk Quitter

### *Awards & Grants:*

- 2012: Colorado Alliance For Environmental Education's Award for Excellence to the Earth Task Force
- 2011: National Environmental Education Foundation's Green Prize in Public Education
- 2011: BVSD Annual Earth Day Superintendent's Honor Roll, Education category
- 2011: Center for Resource Conservation's Youth Conservation Reward, to the Earth Task Force
- 2011: BVSD "Green Month" third place award to the school
- 2010: Action Team Grant from the Alliance for Climate Education
- 2009: Green Schools Campaign Award from the Earth Day Network for solar panels
- 2006: Colorado Alliance for Environmental Education's Award for Excellence for the Community Adventure Program

## Background

New Vista High School (NVHS) is located in central Boulder, near the University of Colorado Boulder, the Colorado Chautauqua National Historic Landmark, many national government headquarters for scientific research and Boulder Open Space and Mountain Parks areas.

This small, innovative public high school was founded in 1993 and is housed in an older school building (circa 1950). Its mission is to promote a diverse, supportive and respectful community of learners. The school combines the creativity and commitment of teachers, parents and students with the resources of the broader community. New Vista creates an environment in which excitement about learning enables students to achieve high levels of skill and knowledge. The school's mission encourages and supports student self-determination and achievement within the school."

## Environmental education initiatives

New Vista High School has a supportive infrastructure that enables environmental education to thrive. This includes block scheduling, use of specialized curricula (e.g., AP Environmental Science, Community Adventure Program and other electives), community-based academic requirements (e.g., student action projects and community experiences), support for student clubs such as the Earth Task Force, and the establishment of cultural norms and traditions (e.g., community gatherings and weekly student and teacher assemblies).

## Community Adventure Program (CAP)

CAP is the first environmental education class of its kind offered for academic credit in the Boulder Valley School District (BVSD). It is operated by and through the nonprofit Cottonwood Institute (CI). CAP was begun in 2005 by former NVHS science teacher Ford Church, the founder and executive director of CI.



Up to 30 students in any grade (9–12) may register for this quarterly elective course. Students may repeat the course three times. In this class, students practice essential camping and wilderness survival skills and learn about pressing local environmental issues. Students explore how the issues are intricately connected to social justice, wealth inequities and personal choices. Course work consists of class research and planning, hiking, practicing nature awareness skills and meeting with local organizations. Field trips and weekend overnights are a key component.

CAP students also work with classmates to design and implement a student-directed Environmental Action Project each quarter on issues as diverse as energy efficiency awareness, healthy eating, school gardening or even bee keeping. At the end of each quarter CAP students do a three to five page reflection paper on their experience.

The CAP teacher's position is funded jointly by BVSD and CI. All outdoor excursions and activities are funded by CI through grants and donations. Students continually report that the program helps them in many ways.

## Earth Task Force

The ETF Club was founded by students who wanted to continue changing the world after completing their CAP class. ETF meets twice a week over lunch. It is mentored by a grant-funded mentor/CI employee, along with two NVHS science teachers.

The club, now boasting dozens of members, aims to develop and fund ways to reduce NVHS's environmental footprint. Its motto is, "We are determined SUPERHEROES: Students Understanding Personal Environmental Responsibility by Helping Educate and by Restoring Our Ecosystems through Sustainability."

The ETF has:

- Received a \$40,000 grant for solar panels to be installed at the school;
- Created the "Conscious Consumerism Guide" for restaurants in the area; and
- Presented on EE at the 2012 Green Schools National Conference.

*"When I heard about the Community Adventure Program I was interested in what they were doing, but unsure that they could do this at a public school... I have learned many things from this class, but most of all, that teamwork and to help the community and a fellow classmate is the best feeling to me."*  
— Student (courtesy of CI)

*"I am so glad that we learned about our ecological footprints and ways to reduce our consumption; otherwise I would have never known and couldn't have changed anything."*  
— Student (courtesy of CI)

*"Being able to share what I think is important with my community is really powerful to me... I guess I find a lot of issues around environmental stuff really depressing, and when I was little, I just thought 'out of sight out of mind. But then I finally realized there is something I can do about it and I can teach other people to be hopeful and have inspiration instead of instilling the fear in them, then we can do something about this."*  
— Student

*"The ETF was born out of the CAP. I had two really awesome, motivated students come to me at the end of the [CAP] class and say, 'This is a life changing experience for us, we want to do more at school. Can we start a club?' I think there had been some other clubs like hiking clubs or outdoor clubs. So I said, 'Yeah! Let's do it!'"*  
— ETF mentor

## NVHS community experience

This required course for every student involves a service learning or internship. Once a week, students volunteer in the community to better understand local issues, learn workplace skills and create positive partnerships between adults and high school youth.

Students have worked with the U.S. Geological Survey, Boulder Parks and Open Space, Thorne Ecological Institute, City of Boulder Parks and Recreation, Wildlands Restoration Volunteers, Women's Wilderness Institute, Growing Gardens / Cultiva, Cure Organic Farm, animal welfare organizations and more.

## Multi-Disciplinary curricular approach

NVHS offers classes with environmental themes in both the science department (AP environmental science, environmental science, ecology, marine biology) and social studies (world geography, environmental justice). Even the statistics class gets involved by analyzing the waste stream statistics at the Eco-cycle materials recovery facility.

*"We even have an agriculture unit as part of the AP environmental science course. We focus on pesticide usage, integrated pest management strategies, soil conservation, irrigation and salinity, also, CAFO's (concentrated animal feeding operations) versus organic agriculture. We're going to tour a local organic farm soon."*  
— Science teacher

*"One of our science teachers has piloted a course on natural disasters, a weather science class framed around natural disasters. Social justice is a thread. We have an Equity in the U.S. class with half language arts and half social studies instruction."*  
— Principal

Elective coursework varies from year to year. Past courses include Ecology, Energy & the Environment, Bio-Ethics, Environmental Issues, Environmental Science, Healthy Bodies Healthy Minds, Native Ecology, Rainforest Studies, Water, Environmental Movements, Applied Technology: Bicycles and the Environment, and Animal Behavior.

Through the Alliance for Climate Education (ACE), the school started a campaign every year to "do one thing." ACE representatives give a presentation that really inspire each student to choose and "do one thing" for the environment.

*"People are more aware -- it's in our lexicon now -- talking about energy vampires, reducing and reusing, knowing where our energy comes from and making good choices."*  
— Principal

Since NVHS made a 50-year old school building its home, it has been able to improve efficiency by adding add solar panels, low flow toilets and water conserving sinks. An energy use monitoring and feedback station in the library provides real-time feedback to students on their efforts.



## Benefits

### CAP and ETF programs

Both programs develop solid 21st century skills: browse a website and do internet research, make presentations to donors, or call an organization to research and request an appropriate speaker. These are basic adult skills.

CAP and ETF enrollment improves attendance. Some teens who struggle with personal problems discover that these programs give them a reason to come to school. They work with a team of peers, which motivates and excites them. They are also empowered by the work they do to improve their community.

Among the biggest benefits kids are getting out of these programs are developing interpersonal skills, learning to work within a group and knowing oneself in that group. Ripple effects reach homes and the community. By participating in a home-based conservation and energy audit challenge, the school was awarded a grant for documenting the amount of energy saved.

*"Programs like CAP and ETF benefit all students as well as students who might not be traditional learners. They suddenly find themselves leaders at school making a real difference to school culture, and academically excelling when they might not have otherwise."  
— Principal*

*"It's so important for teenagers to connect with nature, maybe more important, because they don't get out and get dirty anymore, at least not as much. A tough group with factions and cliques will start an overnight trip, but by the first night at the fire circle they're different kids. None of the clique stuff."  
— ETF mentor*

*"I'm teaching about the environment and what comes out of it are these incredible glimmers of self-knowledge."  
— CAP instructor*

## Drivers

- NVHS EE activities are supported from the top down by a district-level sustainability coordinator and an engaged principal who empowers teachers and staff.
- Teachers hold best-practices sessions at every other staff meeting to learn from each other and collaborate regularly.
- Weekly assemblies bring together the entire student body and faculty. The ETF frequently leads sustainability presentations and activities.
- A wealth of community resources (from the National Renewable Energy Lab to Eco-Cycle) facilitate the teaching of EE. Guest speakers are invited into classrooms or classes go on field trips.
- New Vista has worked hard on building relationships with all types of community organizations so students will feel like they're part of the community.



*"We try to do field trips as much as possible, usually using the RTD bus, because it's great to get kids out into the world. I think it's really important."  
— CAP instructor*

## Lessons

- Fundraising is a continual ordeal. To meet the challenge, teachers and students apply for grants and awards on their own time. District personnel have helped by addressing some fundraising complexities for time-constrained and busy teachers.
- There is a perceived lack of EE curricula for high schools. New Vista and CI have thus created their own. Grading or assessment of experiential EE can also be challenging. Teachers can begin by evaluating participation levels and more qualitative activities such as journal writing as opposed to more quantitative types of testing used in other subjects.
- Be creative in working around time constraints of the school schedule.
- Bring new ideas to the administrations' attention; they look for ways to say "yes" to teachers and programs and clubs.
- Create a team that really cares about EE. Don't do it by yourself. It's important for motivation and support, because when you have a group of students with adults to support them, then growth can occur fast. If you can fold in teachers, parents, administrators and community leaders, you have a really strong start.
- To overcome teen apathy and to continue to motivate kids, have a paid adult who can be there to support students and to sustain extracurricular clubs and activities. Empower students with responsibilities. Ask them what they need and let them take the lead, because they will. Then work with students, not over them. It's really important to let students try things for themselves. If or when they fail, then talk about that and learn from it. Continually reinforce sustainable behaviors and school traditions through assemblies, signs, role-modeling behavior and more.

*"I've been able to get a lot of funding on my own through outside organizations that can pay for that. I care about it so much, and I enjoy teaching it so much, that the extra work was to me well worth it to get kids outside and to see the benefit of it."*  
— Science teacher

*"Start in science, expand to other disciplines, get kids outside and provide some money."*  
— Science teacher

# Ponderosa High School

*"Most people think that being green or sustainable costs a lot of money. It doesn't.... At Ponderosa, they've saved more than \$320,000 over four years just doing energy management and the kids are learning about energy."*

*— Sustainability Manager for Douglas County School District*



Ponderosa High School  
7007 E. Bayou Gulch Road  
Parker, CO 80134  
(303) 387-4000

Principal: Charles Puga  
Grades: 9–12  
Students: 1,166  
Free or Reduced Lunch:  
8.4 percent

## Awards:

2012: Energy Star rating 71/100  
2009: PeaceJam Club given  
Global Explorers Citizens  
of the World Youth  
Service Project Award  
2009: Inaugural Winner of  
PeaceJam Foundation  
Global Call to Action  
Award for best national  
service learning project  
2008: Colorado Environmental  
Leadership Bronze Award  
Winner

## Background

Ponderosa High School was opened in 1983, when the town of Parker was first incorporated. This commuter town to the south of Denver now has 45,000 residents in pockets of development surrounded by open space. The Douglas County School District places great importance on ensuring that students graduate prepared to be engaged and responsible citizens. That philosophy supports the environmental education and sustainability activities which are totally student driven at Ponderosa. The cornerstone is the PeaceJam Club. A handful of students and sponsors created a cultural shift affecting the entire school district.

## Environmental education initiatives

*"When we started the PeaceJam group, students decided that Restoring the Earth's Environment (one of PeaceJam's Global Calls to Action) was what they wanted to focus on."*

*— PeaceJam Club sponsor and assistant principals' secretary*

## Recycling

When PeaceJam Club first started in 2006, there was no building-wide recycling effort. Students set up a small program using cardboard boxes and signs from the recycling company. The dedicated students were first mocked as tree huggers, but it didn't take long for this bias to change.

*"Once teachers and kids learned how much could be recycled they just went berserk with it. They didn't know they could recycle old text books, videotapes, notebooks, everything 'paper!'"*

*— PeaceJam Club sponsor and assistant principals' secretary*





By the end of the first year, no one wanted to be left out and recycling volume increased approximately 13 times. Teachers didn't want to have the only classroom without recycling bins, and students didn't want to be singled out for not recycling properly. The school is now recycling about 80 percent of its waste, reducing the number of trash dumpsters from seven to three. The program was started at essentially no cost, yet the school saw a big return on the effort.

*"It's about \$280 a month for the average eight yard trash bin for daily pick up. It's only \$33 a month for an unlimited number of recycle bins. The financial impact is immediate, putting money right back into the budget."*  
— Sustainability manager for Douglas County School District

## Energy management

The growing PeaceJam group tackled energy management next, in 2007. Students posted signs as reminders to turn off lights and computers whenever possible. Staff members were encouraged to remove individual appliances from classrooms. Audits were done periodically to keep track of their progress and the Club continually considered new ways to save more energy. Over the course of four years, Ponderosa reduced energy use by 31 percent and has saved over 2.5 million kilowatt hours of electricity and \$320,000 in energy costs.

People beyond the school started taking notice. The Ponderosa energy program became a model for the entire Douglas County School District. The district created an energy reduction incentive program so that a portion of money saved by each school's energy management efforts goes directly back to the school. Through this program, the district has saved over \$11 million in energy costs in five years.

## Wind turbine

In January 2011 the school installed a wind turbine, through a grant from the Wind for Schools Program, to generate electricity and to be used as an educational tool.

The students were involved from day one. To gain community approval, the students conducted a special public meeting and also presented their request to the county planning commission for approval. The commission unanimously voted to support the turbine. Students then worked with the maintenance team to install the turbine.

Wind for Schools provides a curriculum and a software tool that provides data on electricity generation. In physics and chemistry, students analyzed energy data from the turbine to calculate true kilowatt hours and make CO<sub>2</sub> emission comparisons. Science classes studied the mechanics of turbines. Other classes held debates about the benefits and potential impacts of wind.

*"It's a conservative county, but attitudes are changing. Students have had enough of an impact that the district is now talking about a district-wide PeaceJam and having a PeaceJam at every high school. These students are changing how an entire district wants to do business. The fact that a really small group of students were the agents of change is just amazing."*  
— Sustainability manager for Douglas County School District

*"[The planning commission] told me that they were more impressed with the students' presentation than ANY other presentation they had ever seen."*

— Sustainability manager for Douglas County School District



*"We want our students prepared for the new energy economy. They want to be prepared as well, and this is a way for them to see what it takes."*

— Sustainability manager for Douglas County School District

## Environmental science for all grade levels

Heavily based on inquiry, students investigate real-world problems without knowing the answers up front. The curriculum is based on national science standards, and more teachers have begun incorporating recycling, energy management, water conservation and even acid rain, into their lessons. Now that sustainability concepts have been included in the 2010 state standards, more teachers are in the process of adding environmental education to their courses. In English, students are assigned papers to write about the impact they're having on Ponderosa and on the community, and how they would want to expand that to a larger scale. In economics, they are looking at the costs of energy and recycling.

The shop teacher at the school is developing a power and energy curriculum supported by a STEM (science, technology, engineering, math) grant through Colorado State University Ventures Grant. Small wind turbines and solar panels will be placed on a modular building on the Ponderosa campus and used to power a golf cart. The students will keep the solar panels clean and monitor the direction of the sun and the gross output. They'll change the solar panels' inclination and declination to measure productivity. The shop teacher hopes to add a charging station where students pay a dollar to charge their phones and laptops with electricity produced by solar panels.

*"The green sector will be one of the biggest sectors in the future and it's important that students are prepared for jobs that will be available."*

— Student

## Community based programs

Castlewood Canyon State Park is the destination for science field trips each year. The students are guided through activities on the 2,000 acres by park naturalists. Teachers work closely with naturalists to develop appropriate lessons for each visit.

Alliance for Climate Education (ACE) is another resource that Ponderosa students enjoy. An ACE representative visits the school once each year and provides a no-cost multi-media presentation reaching the two thirds of students about climate science. Science classes discuss both sides of the climate change issue prior to and after the presentation. At the Alliance for Climate Education assembly, many students sign a DOT -- a pledge to Do One Thing to help the environment and cool the climate.

Students at Ponderosa have helped organize electronics recycling (E-Cycle) events. With support from the District Sustainability Manager, local government and private industry, they marketed and ran the first one-day event in 2007 at Douglas County High School. At the event, students greeted 1,200 cars which dropped off 147,000 pounds of electronics. Four more E-Cycle events have been held since then.

PeaceJam students are engaged in a number of other community-based activities, such as serving on the school district's sustainability committee, and do an annual service learning project. They present at conferences and are hosting a summit called Colorado SAVES (Students as Voices for Environmental Sustainability) for September 2012, open to students across the state.

## Building operations

Opened 30 years ago, Ponderosa is the second oldest high school in the district and was not designed for efficiency. However, it is now the top energy-saving school in the district. The occupants at Ponderosa have embraced simple behaviors that significantly reduce energy consumption, and the audits and monthly energy reports provide positive feedback.

*Scheduling.* The building engineer keeps close watch on the building automation system to run the heating, ventilation and air conditioning as efficiently as possible. The fact that there is such local control of a normally centralized system at Ponderosa means students can get involved in how the building is run.

*Delamping.* PeaceJammers worked with the building engineer to get rid of light bulbs and fixtures that were producing unnecessary illumination, relying instead on as much natural light as possible. This netted big energy savings, as well improvements in mood and health for staff and students. Too much light makes it harder to focus and has been tied to headaches, absenteeism, higher detention and disciplinary issues, and lower test scores.

*Plug load.* Electric consumption has been massively reduced in the building by unplugging lamps, popcorn machines, air fresheners and other personal electrical appliances in each classroom. Teachers are asked to share refrigerators and coffee makers.

*IT.* Management of IT equipment has reduced energy consumption by setting all computer systems to shut off at a certain time every day. The computers used to run 24/7.

*"IT load in most schools is 15–20 percent now, so imagine if you can cut that in half or by two-thirds. That's a lot of money. There's a lot of software that can do that now; the PeaceJam kids love this."*

*— Sustainability Manager for Douglas County School District*

*"When we first started this, teachers were skeptical. Teachers thought everyone would fall asleep with the lower lighting. Teachers later said that for the first time in years they didn't have a headache at the end of the day. It's affected the kids, too. I do all the disciplinary paperwork, so I know incidents are down."*

*— PeaceJam Club sponsor and assistant principals' secretary*

*"Since delamping, things have been quieter in the building. There has been less vandalism. We used to spend about \$20,000 a year dealing with that, if not more. In the last couple years, we've spent less than \$1,000 a year for that."*

*— Building engineer*

## Drivers

The PeaceJam Group was inspired by 13 Nobel Peace Laureates at an international PeaceJam Conference in Denver in 2006. Ponderosa students responded to the Global Call to Action, choosing to do service learning projects to address one or more of the 10 most pressing issues that are the root of much of the world's suffering.

Although PeaceJam was the primary impetus behind energy and waste reduction programs at Ponderosa, the programs wouldn't be successful if the entire student body didn't get behind them. The EE programs have two key attributes: they're used as teaching tools in multiple classrooms and they're based on competition.



*"[PeaceJam is important] because there's such a focus on issues in your local community, but at the same time it fosters global awareness because we work with Nobel Prize winners... We actually do programs that make a difference."*

— PeaceJammer



## Benefits

The most tangible benefit to the school so far has been financial savings. By reducing the district's energy costs, Ponderosa has received an influx of cash. Changes in attitudes and behavior have also been significant. It appears that adults and students are more aware of their behaviors and how they impact the environment. Negative attitudes about "being green" have totally flipped the other way and students are proud to display environmentally friendly behaviors. A drop in disciplinary incidents as well as health concerns may be related to reduced lighting and other student-driven EE activities.

*"It's been a healthy competition. When we see the monthly energy reports for all of the schools, and we see that some other school like Mountain Vista is getting close to us in energy savings, we ramp it up because we want to be the best at everything. It's really been a cool challenge for our kids and staff."*

— Principal

## Lessons

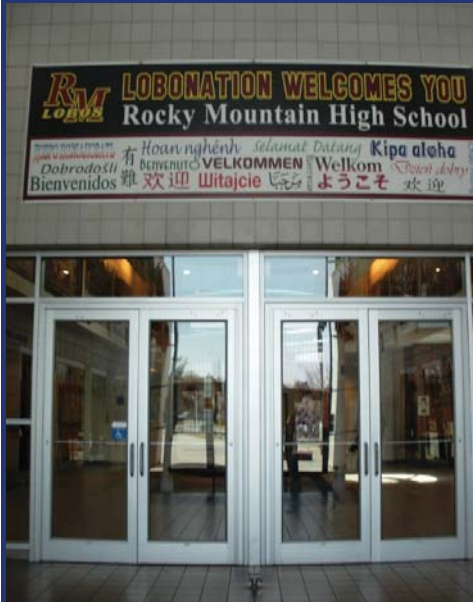
There were two main obstacles to getting Ponderosa High School's EE/sustainability programs to the point where they are now. The first was money. The second was selling the concept of sustainability to students and the district.

- Funding challenges can be overcome by initiating smaller but successful recycling and energy management programs that cost little or nothing. The financial savings from these modest programs led to school board support for bigger programs at Ponderosa.
- Start with something small that you can afford and actually accomplish. PeaceJam picks up one project at a time. They work on it until it is going well, and then they start work on something else.
- The second largest item in a school's budget is utilities. Share stories of how much money is saved by getting students and teachers involved in reducing waste (energy, water and materials). Schools can save 10 – 15 percent on their electric budgets by taking easy steps that don't cost anything, and up to 30 percent if bigger programs are implemented.
- Sell the concept of sustainability by simply breaking down and examining the economic, environmental and social benefits and impacts of each decision. The economic argument for Ponderosa was that students saved the high school more than \$300,000 by reducing waste and energy use. That also achieved environmental benefits. Teachers speak to the social benefits of the EE programs by pointing out how students are learning leadership and presentation skills and obtaining real-world job skills.
- The skills that students pick up when they're passionate about something drive the program. Find a few kids with enough passion and they can drive an entire district-wide program.

# Rocky Mountain High School

*"Kids aren't going to recycle because of 'recycling,' they'll recycle because, as a Lobo, this is what Lobos do. Recycling is not a function or factor separate from other existence, it is a fundamental aspect of the culture that I wanted to bring [to the school]."*

*– Principal*



Rocky Mountain High School  
1300 West Swallow Road  
Fort Collins, CO 80526  
(970) 488-7023

Principal: Tom López

Grades: 9-12

Number of Students: 1,996

Free or Reduced Lunch:

28.2 percent

## Awards

2007, 2009, 2010, 2011:

*Energy Star rating*

2010: *Healthy School*

*Champion by the*

*Colorado Department of Education*

2008: *City of Fort Collins'*

*Energy Rules Rebate*

2008: *E-Chievement Award*

*from Etown*

2005: *Larimer County*

*Environmental*

*Stewardship Award*

## Background

The rapidly growing city of Fort Collins along the north end of the Front Range is home to Colorado State University (CSU) and a number of high tech corporations and federal research facilities. The neighboring Rocky Mountains and the Cache La Poudre River offer abundant outdoor recreation experiences. The good jobs, natural amenities, and high quality schools convinced Money Magazine to declare Fort Collins the best place to live in 2006.

Rocky Mountain High School (RMHS) was established in 1973. In 1992 RMHS adopted a "4 X 4 block schedule," one of the first in the nation to do so. In 1995 the school building was remodeled and a new wing added to expand classroom and student spaces. Although this construction was not guided by efficiency standards, it influenced the Poudre School District to adopt high performance standards and a commitment to sustainability soon after.

## Environmental education Initiatives

Environmental education (EE) activities largely began at RMHS in the mid-1990s when the principal and the lead science teacher started the Environmental Club and a recycling program. Just after the 1995 school remodel, the Poudre School District adopted a commitment to sustainability. The initiatives at RMHS, combined with the district's new sustainability focus, has produced notable accomplishments – especially in energy savings.

*RMHS reduced its electricity use below that of the new US Green Building Council's LEED-certified high school in the district. The school's electricity consumption has been significantly reduced by changes in behaviors.*

The substantial energy savings in the older RMHS building caught the attention of Colorado State University sociology professor, Jennifer Cross, Ph.D. Her research team documented that the key driving element was the school's leadership -- creating a culture of conservation through

education, modeling, and communication about energy conservation.

The creation of a culture of energy conservation began in 2000 when the school principal took advantage of a free energy audit offered by the power company. More audits through the years tracked improvements. Monthly reports of energy consumption and costs were reported to teachers, staff, and students, so all could appreciate the costs of powering the school. The science teacher motivated Environmental Club members to lead student energy saving behaviors, while the head custodian led his staff in implementing operational changes. The continuous communication and feedback on energy consumption netted positive results. In 2005, 2006, and 2007, RMHS saw record reductions in electricity as well as reductions over several years in water and natural gas consumption.

To reach the next level of energy savings, newer more efficient equipment is needed in the school. In the summer of 2012, as the result of the passage of a school bond, the school will be able to make equipment retrofits, such as modernizing the heating, ventilation, and air conditioning system.

## Across the curriculum

Energy awareness and education on other environmental topics are now infused throughout all grades in multiple subject areas, although primarily in the science department through regular and AP environmental science classes. Field experiences and guest speakers enhance EE in classrooms and as extracurricular enrichment activities through school clubs. The 90-minute block schedule at RMHS facilitates off-site excursions to neighboring Rocky Mountains and the Cache La Poudre River.

## Community partnerships

The City of Fort Collins and CSU have provided expert speakers and scientific research opportunities for RMHS students.

CSU GetWET Observatory & Science Park is the only outdoor hands-on water education facility in the Rocky Mountain Region. RMHS students study interactions between the creek and the groundwater, examine water quality and quantity, and research water conservation and flooding. Since 2006, several hundred RMHS students have participated. A new Chronic Wasting Disease Project with CSU is collaborating with RMHS AP Environmental Science students to study how the disease spreads through the deer population. The CSU Engines & Energy Conversion Lab is a great resource for teachers and students, world-famous for its innovative thinking on bio-fuels research.

*"I'm proud to have an older school because I believe we're going to be the generation where our biggest problem is figuring out what to do with the already-built construction... figuring out how to re-purpose, re-use things. It's expensive to build buildings, so let's 'LEED certify' the buildings that are already there."*  
— Principal

*"Conservation even fits into poetry, for example, in a language arts class. Kids have written Haiku about the word 'conserve.' They've also looked at the root of the word, 'con= with' and 'serve'=servicio or sirva, for Latin'. That connotation means 'with service or support'."*  
— Principal

*"If kids didn't do field trips, I don't think that they would understand; they wouldn't have that first-person knowledge."*

— Science teacher

Teachers also utilize these community connections for professional development. In one instance, the RMHS world geography teacher was able to join a CSU ecologist in Africa for three weeks studying wildebeasts, while interacting with the Maasai people. She brought that experience back to her classroom.

## Student enrichment/club activities

Several of the 60 student clubs at RMHS offer outdoor or EE experiences. Environmental Club members have consistently been active at school and in the community. They coordinate the school-wide recycling effort and provide receptacles to collect beverage containers. The club estimates that 150 tons of materials have been diverted from the landfill over the past 20 years. Members have also raised awareness about energy use. From 1999 through 2004, RMHS recycling and conservation programs saved approximately \$30,000 in energy and waste disposal costs. Other accomplishments by the Environmental Club:

- Helped create the concept of commercial block wind power purchases from the City of Fort Collins. Beginning in 2005, and for several years following, the club purchased a 200,000 kilowatt-hour block of wind power to run the school during the months of April and May.
- Annually participates in the annual Rocky Mountain Sustainable Living Association's sustainable Living Fair, and volunteers to clean up open spaces in Fort Collins.
- Attends the Colorado Global Climate Conference for Colorado high school students in association with the Colorado State University Atmospheric Science Department.
- Hosted the Future Friday 2010 Environmental Film Fest, a series of nine films with environmental topics shown throughout the day. Proceeds from concession sales went to support the district's Future Friday in September, an environmental field day for all PSD high school students.

River Watch members monitor local water quality in Spring Creek and the Poudre River once a month, including summer. Students put on waders to collect river samples then take them back to school, where water quality tests are run. All data collected becomes part of a statewide water quality database for the Department of Wildlife. One of the science teachers who sponsors the club also volunteers with the statewide water quality monitoring group that tests water all year round. Recently, she received a \$10,000 grant for the school's outstanding work -- some of which went toward the purchase of new equipment.

*"I take [River Watch] students up to Rocky Mountain National Park as part of the AP Environmental Science class. We're studying the ecology and changes because of nitrogen deposition happening from pollution on the Front Range. I've been up there probably 30 times with students, anywhere from three to fifty kids in one shot."*

— Science teacher

*"On average, twelve kids participate in the Environmental Club each year. But we do programs for the whole school and the impact is big."*

— Science teacher



## The Bobcat Ridge Wildlife Camera Project

This club monitors wildlife capture cameras at nearby Bobcat Ridge Open Space. Once a month, the group collects data for the City of Fort Collins and the Rocky Mountain Cat Conservancy on the numbers and species of animals that are photographed by the cameras. Animals discovered using the open space trails include elk, deer, bighorn sheep, bobcats, mountain lions, foxes and turkeys.

The 2010 "Gas Out", sponsored by chemistry teacher, was a student-led event with prizes to encourage everyone to walk, bike or skate to school. The Gas Out featured an alternative fuels expo where businesses demonstrated non-motorized commuting options and emphasized the environmental benefits.

## Drivers

The drivers of EE at RMHS are a mix of (1) EE champion teachers, especially those in science; (2) strong interest by the principal and school district; (3) a sustainability-infused school culture that was begun in the 1990's; and (4) strong community partnerships that are utilized to facilitate delivery of much of the environmental education.

### Poudre school district —

Noted for its commitment to sustainability at each of its 50 schools. It has implemented a district-wide Sustainability Management System. Department representatives meet annually to review goals in areas of resource conservation, greenhouse gas emission reductions, sustainable education, transportation and other cost and resource saving operation activities.

### The principal —

He is in his ninth year in that position at RMHS and is a driving force in the school's culture of sustainability. He has deep community roots and close ties to the land upon which the school was built. The principal is dedicated to developing leadership, empowering teachers, and building an overarching school culture that he calls, "the Lobo Way" which encompasses not only sustainability but good citizenship and school pride.

### The lead science teacher —

He teaches Earth Systems Science, Astronomy, Environmental Science and AP Environmental Science. He also co-sponsors the Environmental Club, River Watch Program and Astronomy Club. Many of the other science teachers at RMHS take initiative to seek out learning opportunities in the field and seek grants to fund their activities.

### Mentors and community partners —

They provide expertise for student field work (as explained above). Representatives from local business, nonprofit, government and academia also become involved with students as mentors. This career-oriented partnership helps students link up with counterparts in a field of interest.

*"We're the only high school working on the Bobcat Ridge Project. We've been doing it for three years. Anywhere from one to nine kids participate."*

— Science teacher



*"We have students who have gone into ecological careers, and they come back and tell us it's because they got to have those experiences at school. Not every kid is going to do that, but when students look back at their high school years, they'll be surprised at how memorable those experiences were. Hopefully, their children will get to experience the same thing."*

— Science teacher



## Challenges

### School budgets are shrinking —

To save money, staff and students are encouraged to reduce consumption of energy, water, and materials. EE projects are supported by a blend of funding from the school district, foundations and government grants. Classroom teachers and club sponsors write the grants, including students in the process as a learning opportunity. The Poudre School Foundation has awarded SPIE and E3 Grants (Supporting Partnerships in Innovative Education and Encouraging Educational Excellence) to RMHS to align EE activities to state standards. The local Bohemian Foundation provides funding for field trips.

### Students reach a plateau in sustainable behaviors —

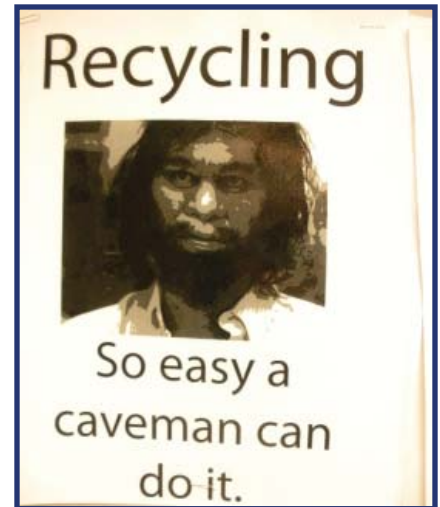
Regarding energy efficiency, only so much can be done without funding. Thanks to taxpayers, RMHS is now able to make investments in mechanical improvements to the HVAC systems. To increase recycling rates, placards have been placed on each lunch table that reads, "Lobos recycle!" More receptacles have been placed around the lunchroom and volunteers are on hand to help students sort their waste and recycling.

### No composting program is in place yet —

Supporters at RMHS are hoping to demonstrate that the culture is in place for everyone to participate. This way, the success of the program won't be shouldered by a single person / advocate.

### Some teachers may think that a science background is needed to teach EE —

Many sustainability concepts, such as "using less waste", are just common sense and can be rooted in all disciplines and classes.



*"PSD Foundation actually gives something called Spie Grants. I like these innovation grants because they award my students and staff for stepping out."  
— Principal*

*"I'm going to Alaska this summer, above the arctic circle, to research arctic food webs. I don't get paid, but I get the experience and I get to do something that I normally don't get to do. [CSU researchers and I] have ideas about how we can bring that experience back to RMHS, and are designing a course for next fall."  
— Science teacher*

## Lessons

RMHS administrators and staff offer these lessons from their EE experiences:

- Define the school's belief systems. Determine what set of precepts should guide and inspire behavior and actions. Belief statements are not only written for students but for everybody in the community.
- Empower others with the capacity to take on leadership roles.
- Make community connections. Many professionals want to share their experiences with youth.
- Go into a new EE program with an open mind. Take a chance! If after a year it doesn't work, change course. If it does work, look around for something else to do within it. Either way is a learning experience.

# Strawberry Park Elementary School

*"The new push by Colorado to incorporate environmental literacy in the standards becomes an important driver because this is something schools will be held accountable for. This is how they are going to be expected to do business. What I truly believe makes [environmental literacy] sustainable is to get it into the hands of the kids."*

*– Principal*



*Strawberry Park Elementary School*  
*39620 Amethyst Drive*  
*Steamboat Springs, CO 80477*  
*(970) 879-7550*

*Principal: Celia Dunham*  
*Grades: K–5*  
*Students: 521*  
*Free or Reduced Lunch: 16 percent*

*Awards:*  
*2011: Recycler of the Year award by*  
*Yampa Valley Recycles*

## Background

Steamboat Springs, in Routt County, Colorado, boasts a world-class ski area, many natural hot springs and more state parks than any other Colorado county. The Yampa River, a tributary of one of the state's largest watersheds, flows right through the heart of town. In addition to recreation and tourism, energy development and forestry attract people to the area.

Strawberry Park Elementary sits in the center of Steamboat. It's mission is for all students to learn in a safe environment and be prepared for success in an ever-changing world. To that end, the school houses two multi-age Montessori classes in addition to traditional grade K-5 classes. For the past twenty years, Yampatika, a local non-profit organization whose mission is to inspire environmental stewardship through education, has partnered with Strawberry Park and other Routt County schools to deliver place-based, standards-driven environmental education.

*"Local is global. Place-based education should focus students on building their communities. Kids should deal with local issues so they can really connect."*

*— Principal*

## Environmental education initiatives

At Strawberry Park, all of the environmental education programs are a coordinated team effort. The school relies on partnerships between students, parents, faculty and community organizations to infuse the school curriculum with a variety of sustainability themes and activities at every grade level and across subject areas. Some themes are presented school-wide, while particular topics are grade-specific depending on core standards, academic requirements and interests of each class. The approach builds on previous learning and has a lot to do with repetition and reinforcement.

## Schoolwide activities

The *Green Team* is a group of student council members with support from parents and staff. Its mission is to promote sustainable practices and operations in the school and surrounding community.

In 2010–2011, the school dedicated the entire year to the theme “Go Green Strawberry Park Elementary.” Teams created an entire series of videos on what that meant.

In October 2010, the school district replaced styrofoam plates and plastic cutlery with biodegradable products that are now composted.

Last April, Strawberry Park participated in the first annual district-wide competition called the “Take Charge Challenge,” in which all schools compete to reduce energy use. The ultimate goal is for students to understand how energy is generated, how it can be conserved, what is renewable and non-renewable, and where resources come from.

Green Team members are encouraged to evaluate activities to make improvements and set new goals on how the school can become more environmentally responsible. The student council is often challenged to think of ways to make the school even more sustainable. For instance, they were asked to think about how energy reduction will not only save money, but how it impacts the world and their community. The Green Team now:

- Oversees the recycling and composting programs;
- Performs energy audits;
- Empowers “Energy Ninjas” to tour the school turning off lights, making sure shades were in the right position, shutting off power strips at night, and educating others about conservation and waste reduction;
- Participates in community-based environmental projects;
- Leads an anti-idling campaign “turn your key, be idle free” for vehicles waiting in the parking lot.

Most recently, various community partners have helped to broaden the school’s recycling program. Every single classroom now has bins. Students have been taught what goes where and what can and cannot be recycled.

*Strawberry Park Elementary received Yampa Valley Recycles “Recycler of the Year” award in part because “the school approaches conservation and recycling as a team — student council, parents, staff — everyone is putting their time into this.”*

—YVSC executive director/parent



*“The big picture is promoting sustainability. We started with recycling, the lowest hanging fruit, a keystone behavior. Recycling is a very simple way to get kids thinking about their waste and reducing it. Changing this behavior will have a domino effect.”*

— YVSC executive director/ parent

*“We try to touch on issues like recycling or composting three or four times a year. We’ll have teachers say something in their classes. Messages are also displayed outside the classroom. Some kids make a podcast or video to share with others, and information is also inserted in a ‘Toilet Time’ newsletter. They see the message over and over until the behavior becomes habit.”*

—YVSC executive director/parent

## Grade-specific environmental education

Based on Colorado Content Standards, teachers cover appropriate EE topics into each grade's curriculum. Yampatika is one group helping them to do that more seamlessly. In addition to the programs and resources traditionally provided to schools in Routt, Moffat and Jackson Counties, Yampatika has been working closely with Strawberry Park teachers and staff to develop and deliver programming for each grade level as part of its Environmental Literacy Program. Each lesson has three sequential steps: (1) introduction in the classroom; (2) a hands-on, field/place-based learning session at Yampatika's Legacy Ranch or other public land and (3) a service-learning component which ties together scientific components with community involvement. Pre- and post- evaluation surveys are administered as well to measure gains in environmental literacy. Preliminary results from 2011-2012 show improved academic acuity and critical thinking overall. Some EE topics covered:

- Kindergarten– observation and classification, using scientific tools, food, animals, weather, seasons, plants, healthy foods and insects
- 1st Grade– animals and their habitats, life cycles, animal adaptation, form and function, comparison of the arctic and Antarctica
- 2nd Grade– structure and function of plants and animals, weather, habitats, adaptation
- 3rd Grade– geology, landforms, water cycle, rocks and minerals, recycling, citizenship,
- 4th Grade– interdependence of living and nonliving: Colorado life zones and changes over time; animals of Colorado, electricity, and food
- 5th Grade– renewable and non-renewable energy and energy alternatives within a civics, economy and debate context, weather and ecosystems

Teachers have flexibility in choosing materials; they use web resources extensively. The school librarian assists by providing online and library reference materials. She has created class "wikis" or websites using design tools [TeacherWeb](#) and [PBWorks](#). Links, videos and Power Point presentations that correspond to lessons are posted on each class' web page.



*"I come across information and resources within the area of sustainability, so I built a website to help teachers find the resources they need."*  
— School librarian

## Green building features and operations

The school building is older and inefficient, so energy/waste reduction efforts are important. Facilities managers, partnering with the Colorado Energy Office, recently conducted a building audit and are now setting up an energy performance contract to finance lighting and window replacements that can be retrofitted now, then are paid back through annual energy savings. The focus of EE efforts is on green operations at the school, primarily run by students.

## Benefits

**Evaluation is an important component of EE.**

Yampatika is measuring gains in specific goals for each of its EE programs. The organization's pilot evaluation indicates an overall increase in environmental content knowledge for each grade; a positive change in attitudes toward being outdoors; increased interest in environmental issues; increased willingness to recycle and compost and willingness to volunteer.

*"Our goal is to challenge our kids to imagine what this community will look like in 10, 20, 100 years. How do we preserve what we value? What's important? We want to prepare them for the challenges of the future and teach them to be responsible."*  
— School librarian

*"There are quantitative [benefits] with energy use, but you're always going back to the large goal of awareness and change in behavior. We have indeed witnessed changes in awareness and behavior."*

— YVSC executive director/parent

### Students are empowered to save energy and reduce waste.

Their attitudes and behavior are changing dramatically. Once the infrastructure for each environmental program (e.g., recycle bins) is in place, students take over and begin to think of new, creative ways to make a difference.

### Students are becoming the teachers.

Students often correct and guide parents at home and teachers in school, especially with recycling questions.

### Immediate and tangible results are seen.

Through waste reduction, recycling and other activities, the school is saving money and energy and putting much less into the landfill.

*"Student council is so passionate about this right now, as is the Green Team. They're setting goals for themselves and following through, such as using energy and waste audits to decrease paper waste and energy use."*

— Principal

*"We saw increases in content knowledge, teamwork, understanding other people's opinions, interest in environmental issues, willingness to recycle and compost and willingness to volunteer time."*

— Yampatika program coordinator

## Drivers

### Community partnerships

At Strawberry Park, all EE programs are a team effort. The collaborative nature of the entire community and outside partners is key. Yampa Valley Sustainability Council (YVSC), Yampa Valley Recycles, Yampatika, school administration, students, parents, teachers and other community partners drive the programs. Leadership often comes from the community. The school librarian and a parent who is also the executive director of YVSC, also deserve credit for their leadership.

### Students

Once the students latch onto a program, they take off with it. This is apparent in student council meetings, where the environment and sustainability are prevalent topics. Students are eager to make a difference in their community.

In addition to Yampatika, partnerships of note include the Colorado State Forest Service, Sustainable Schools, Re-Tree Colorado (offering a service learning experience for students to plant trees in Routt County to raise awareness about and replace trees killed by the pine beetle epidemic), Colorado Parks and Wildlife, Project Learning Tree, Project Wild and The Nature Conservancy.

## Funding

In 1998, a Great Outdoors Colorado grant helped the City of Steamboat Springs purchase the Legacy Ranch. Since 2009, the Legacy Ranch has been home to Yampatika's Environmental Learning Center. Yampatika has secured grant funding to serve 42 classrooms with its environmental literacy program for the 2012-13 school year. A separate Legacy Education Fund has raised over \$1 million in grants to provide professional development for teachers and to give them access to funds to promote place-based education and service learning.

Partners have had to be creative in funding EE projects at Strawberry Spring Elementary. Current sources of support include the district's discretionary budget, Parent Information Committee, field trip fees, Education Fund Board (generated by a half cent sales tax), direct cash and in-kind donations, partnerships with and from local agencies and businesses, and volunteers. Students help out with a number of fundraisers, and the community steps in as well.

*"The whole focus we had was caring for the environment, but it was also service-based learning. The valley is huge and diverse, We've got very rural communities, and then Steamboat. We really wanted to get students out into their communities."*  
— Principal



## Lessons

- Service coordination among so many partners is challenging. Trying to coordinate classroom activities with outdoor learning exercises, service-learning projects and green operations at the school requires more planning and is difficult to fit into administrators' and teachers' busy schedules. However, bringing in community partners is worth it.
- Each school is unique. Programs and partnerships that work at one school may not fit the personality, culture or local resources of the next.
- Change takes leadership, time and persistence. Adults must modify their thinking and procedures to set up the infrastructure, perhaps inconveniencing themselves a bit, so that students can be empowered and benefit.
- It's important to document efforts. A key to Strawberry Park's success was to record programs and materials used so EE could be duplicated. The school tied EE to the new Colorado Content Standards.

*"In general, money is very tight and people have to be creative. It takes leaders who are committed. Partners also contribute. The savings from waste and energy reduction will certainly help. The kids do a lot of fundraising."*  
— School librarian

# Yampah Mountain High School

*" When students are doing hands-on projects -- digging in the garden or putting up solar panels -- they're really engaged. There are no discipline problems."*

— Principal



## Yampah Mountain High School

95 Red Mountain Drive  
Glenwood Springs, CO  
(970) 945-9463

Principal: Leigh McGown

Grades: 9–12

Number of Students: 135,  
plus 20 infants and toddlers  
of the moms in the Teen  
Parent Program

Free or reduced lunch:  
Approximately 70 percent

### Awards:

2010: North American  
Environmental  
Education  
Principal Award

2010: Richard C. Bartlett  
Environmental  
Education Award from  
the National  
Environmental  
Education Foundation

## Background

Yampah Mountain (YMHS) is a public alternative high school serving at-risk students within a 90-mile radius around Glenwood Springs on the Western Slope of Colorado. The area is known for its world class outdoor recreation: snow skiing, rafting, gold-medal fly fishing and world's largest natural hot springs pool. The area is also ground zero for oil and gas development.

There are four schools housed within one building at YMHS: the Alternative High School, Project Rebound (which serves students who are identified with emotional and behavioral challenges) the Teen Parent Program for high school-aged mothers, and the early childhood education program for the children of the students in the Teen Parent Program.

The school operates on a four-day school week, trimester system. The curriculum includes "interim programs" during the week between trimesters where students are given opportunities to pursue areas of interest more deeply. Environmental education (EE) activities are offered during the interim programs to motivate students and provide experiences in natural surroundings.

## Environmental education initiatives

YMHS focuses on developing real-world skills and engages students in a wide variety of multi-disciplinary, hands-on activities. All students are required to participate in service learning projects. Every year the school engages the entire student population in a school-wide project.

*"We're trying to teach kids 21st century skills,  
whether it's through energy or  
transportation. If we don't address sustainability,  
I think we'd be missing part of our mission"*

— Principal

## Hands on projects

### Solar panels —

In the 2008–2009 school year, a grant from the Strategic Environmental Project Pipeline (StEPP) Foundation funded the purchase of solar panels and a new high-efficiency boiler. The grant enabled two students and the science teacher to attend a two-week solar design and installation class at Solar Energy International. YMHS science students were able to help with the installation of the solar panels on the school greenhouse.

That same year, YMHS switched to a four-day week. The science teacher took advantage of these changes by having students conduct an energy audit of the campus. Students compared current data to an earlier energy audit and found that the school's use of natural gas decreased by 43 percent and the electrical use decreased by 29 percent. Not only did the audit demonstrate the financial value of activities, but it also contributed to development of students' skills in evaluation and assessment.

### The greenhouse —

In 2009 the school seized the opportunity to use the construction of a greenhouse as a multi-disciplinary school-wide learning opportunity. The YMHS science teacher secured \$10,000 from the National Environmental Education Foundation and \$5,500 from the Aspen Skiing Company Environment Fund for greenhouse materials. Globe Excavating donated services. Students were highly engaged in the planning, design, and construction processes, and continue to participate in the efficient operation of the greenhouse.

The greenhouse has been utilized for a variety of educational activities. One year a gardener in residence program was created so students could work alongside a professional gardener. They developed and implemented a business plan for growing and selling produce to local restaurants. Students learned business skills including a lesson about the importance of producing a reliable volume of produce to become commercially viable.



A sustainable science course was developed to utilize the greenhouse as a tool to learn about gardening and the concept of the 'global supermarket' (where food comes from and how food choices impact the planet). Some classes researched 'feeding a planet of 9 billion' discussing issues such as genetically modified organizations (GMOs) and fish farming. These lessons build students' critical thinking skills and an understanding of 21st century issues. The hands-on greenhouse component allows them to make real-life connections to the subject matter.



The agronomy class uses the greenhouse to analyze soil samples. Another class built and monitored worm composting bins and transferred the compost and worms to the greenhouse in the spring. The Teen Parent Program supplements its science curriculum with life skills activities in the greenhouse such as making pesto out of the fresh produce. YMHS gave students the opportunity to take plants home for the summer.

### Straw bale classroom

During the 1998/99 school year, YMHS students and teachers began a long-term project to design and build a 500 sq. ft. energy efficient straw bale classroom. Students participated in classes taught by Solar Energy International in Carbondale, CO to get a better grasp on how construction of a building involves the interaction of multiple systems: design principles for optimizing solar advantage, energy efficiency in building design, appropriate building materials and construction techniques. Students toured other building projects, volunteered on a near-by straw bale construction project, did site selection on the YMHS campus and drafted architectural plans for the straw bale classroom. Construction of the building began in February 2000. During the winter and spring of that year students completed the foundation and floor, post and beam timber framing, and roofing. Straw walls were installed in the fall of 2000, followed by two coats of stucco on the exterior. During the winter of the 2000/2001 school year students helped finish the building's interior straw walls, installed electric lights and outlets, and constructed a utility room to house pumps and a storage tank for the solar hydronic heat system. The strawbale building was completed in January 2002 and is used for academic and music classes.

### Making global and local connections

YMHS has made an effort to ensure that the science program and EE efforts are relevant to students by helping students make local connections to the real world locally and globally.

For example, "solar suitcases" were built by students in the Teen Parent Program for women in developing countries, partnering with Solar Energy International (SEI) and Women's Emergency Communication and Reliable Electricity (WE CARE) Solar. In 2010 and 2011 the students learned how photovoltaic panels work, then each built and wired a photovoltaic system inside a box. These portable solar energy suitcases were shipped to health clinics in developing countries to provide lighting and battery charging for communication devices. The project was meaningful to the young mothers because the clinics are often used for childbirth. YMHS hopes to offer another solar suitcase class in 2013.



*"This program is effective on multiple levels. The students think about solar energy (and are) drawn in and interested because they have a real connection to these other women. It's empowering for the girls."*

*— Principal*

The physical science class, affectionately named "Toast," gives students the opportunity to engage in hands-on experiences generating electricity. In one activity, students identify appliances that they want to operate then ride an energy cycle to generate that amount of power. Students study alternate ways to produce that power. How many pounds of coal it would require? Or, how many hours of sun on the school's solar panels would be needed? Students each create a short video to tell their energy story as a final project.

*"The concept of squeezing electrons through a very thin wire so we can turn bread crispy is an amazing metaphor for how we use electricity."  
— Science teacher*

## Interim programs

During the interim week in the middle of each trimester, students choose from locally based art programs, job internships or environmental activities. Some teachers and students choose to leave the campus for climbing, rafting or camping excursions. These programs are four days long and include weekly pre-trip planning sessions with students as well as follow-up classes where students produce a final project such as a slide show to share their experiences with the rest of the school. These experiences break down personality barriers and encourage interaction between cliques whom would not normally interact. To enhance environmental education, students may be accompanied on outdoor trips by a staff member of Aspen Center for Environmental Studies (ACES).

## Community service

Every YMHS student must complete 30 hours of community service in order to graduate. Projects frequently have a sustainability focus benefitting the community and the natural environment. Volunteering at the Rocky Mountain Permaculture Institute to learn organic gardening techniques is one popular example. Other students have maintained community gardens, built new garden beds, or constructed a bear proof composter.

## Community partners

Important local EE partners for YMHS include: Solar Energy International, the Aspen Center for Environmental Studies (ACES), Colorado Rocky Mountain Permaculture Institute and Rocky Mountain Institute. Field trips have been taken to Shoshone Hydro Generating Station and the Cameo electric generating station (owned by Xcel Energy). Students have visited orchards owned by Ela Family Farms in Hotchkiss, Colorado.

Students are partnering with Roaring Fork Outdoor Volunteers in fall 2012 on a trail building project near school, enhancing access to a nearby open space and trails system.

Funding partners include: the National Environmental Education Foundation (NEEF), the Strategic Environmental Project Pipeline (StEPP) Foundation, which redistributes the money from environmental fines back to the impacted communities, the Colorado Energy Office for Energy Efficiency Education and Solar in the Schools.



*"The community is big – lots of community resources, expertise and grant money. There's so much [environmental education] going on here that it's just sort of infectious."  
— Science teacher*

## Lessons

### Build student engagement.

Attendance is generally a problem for students who have typically struggled in a traditional school setting. When students make a connection to a topic or think it's important, however, they come to class and are more engaged. Student behaviors and attitudes improve. EE projects help students connect to the school and community, provide important real world lessons, while helping to develop a sense of place.

Student engagement, particularly for students with emotional disabilities, increases when the students participate in hands-on projects. There are fewer behavioral problems. In addition, when students feel like they're doing something important and valuable, they are more engaged and have higher rates of success.

### Enhance the curriculum.

The entire school science curriculum is taught by one teacher so all YMHS students are exposed to environmental education throughout science. A sixteen-year veteran at YMHS, the science teacher always makes a point to take advantage of real-world experiences to engage students in science and contribute to students' environmental literacy. She supplements activities provided in the school's curriculum with materials and activities she has devised.

Science classes are tied to state standards using an 'understanding by design' framework that utilizes backwards design--identifying learning goals and standards, then creating a course plan to meet those goals. A variety of assessments measure students' mastery of concepts, from hands-on projects, dialog, worksheets, and in-class participation.

The science teacher has also introduced National Wildlife Federation's Eco-Schools Program to the school. During the 2011-2012 school year YMHS was a pilot school for the Green Education Foundation's Green Building Curriculum. This fits right into earth science class unit on green building and the physical science classes focus on energy production and use.

For professional development, YMHS teachers have the flexibility to choose on training to enhance the school's environmental education. For example, the advisor for the Teen Parent Program completed a horticultural program in order to support the school garden. The science teacher is able to count time spent on grant writing as professional development.

*"It's time consuming to figure out EE activities that truly meet all the state science standards."*

— Science teacher

*"They'll show up for the classes they like."*

— Science teacher

*"In those kids who find their passion, you'll see their behavior improve. Sometimes the students with emotional disabilities have behaviors that are discipline issues. I've always been impressed how engaged that particular population gets when we're actually doing a hands-on project. They're probably the most engaged out of the whole student body. It always makes me step back."*

— Principal



# Brief Profiles of Exceptional Green Schools in Colorado



# Alta Vista Charter School

Overlooking the farm fields and wind turbines on the Eastern plains of Colorado is Alta Vista Charter School in Lamar. The historic school was built in 1917 and has educated over five generations of families. Rather than close the school in 1998 because of decreasing enrollment, Alta Vista took an alternative approach and became a K–6 charter school. It kept many of the old traditions as a community hub and started new ones. The number of pupils steadily increased.

In 2010–2011 the school embarked on a 23,000 square foot building addition and renovation of the original building to create a high performance learning environment. Alta Vista received a grant from the Colorado Department of Education’s Building Excellent Schools Today (BEST) program and additional funding from the Gates Family Foundation. The new structure was designed by SLATERPAULL Architects and constructed by JHL Constructors with the goals of preserving and restoring the historic school, improving the quality of the learning environment and facilities available to the growing student body, and significantly increasing long term energy efficiency.

The renovation earned the Alta Vista Charter School, a Verified Leader Certification from the Collaborative for High Performance Schools (CHPS) as a healthy, high performance, green school. Similar to the U.S. Green Building Council’s LEED certification, CHPS provides a regional focus for sustainability efforts in an educational setting. Alta Vista is the first project in Colorado to be awarded this designation.

New features at the school reduce energy consumption by 54 percent as compared to an average school, with significant financial savings. High performance features include:

- geo-exchange ground source loop heating and cooling system
- tubular daylight devices which focus and reflect the sun’s rays into the classroom
- sloped ceilings reflect exterior light from the windows into the classroom
- daylight sensors to automatically reduce artificial light when enough natural light is present
- solar-ready roof structure
- occupancy sensors turn off lights and heating/cooling systems if a room is vacant
- building materials that are low in volatile organic compounds and high in recycled content
- water efficient plumbing fixtures
- natural vegetation, drip irrigation, and a small artificial turf play area

These features help create a healthy learning environment, fostering increased student productivity and higher test scores.

Alta Vista Charter School

8785 County Road LL

Lamar, CO 81052

(719) 336-2154

Administrator: Talara Coen

Grades: K-6

Number of students: 131

Awards: 2011 First Collaborative for  
High Performance Schools (CHPS)

Verified Leader in Colorado



Bethke Elementary School  
5100 School House Drive  
Timnath, CO 80547  
(970) 488-4300  
Principal: Ann Alfonso  
Grades: K-5  
Number of students: 460



# Bethke Elementary School

Bethke Elementary school has taken many steps to reduce or eliminate environmental impacts:

- Teachers, students and faculty save energy by turning off lights when they're not in use and use low energy light bulbs. The school installed 127 Solatubes to bring natural sunlight into classrooms.
- The restroom fixtures are water-efficient and the irrigation system is automated.
- Bethke has a weather station on-site.
- There is a student-led recycling initiative.
- Over 60 percent of students walk, ride their bikes or carpool to/from school.
- Each grade level has environmental learning goals integrated into its science curriculum.

Bethke Elementary uses its building as a sustainable teaching tool in many ways:

- 5th-grade study of plants — Students examine environmentally friendly landscaping on school grounds.
- 4th-grade electricity unit — Students study the energy savings of Sylvania Supersaver Eco logic three low-lead light bulbs.
- 4th and 5th-grade — Students are being trained on the sustainability features of the school so that they will be able to give school tours.
- 3rd-grade ecology unit — Students analyze the benefits of renewable vs. non-renewable energy sources. They also evaluate the school's recycling program while studying the effects of non-recyclable materials on the earth.
- Bethke has a "teaching wall" where students can see insulation, light switches, pipes, vents and the insides of the school.
- The Environmental Club is creating a series of videos that teach others about how Bethke Elementary's school building is becoming more energy efficient and sustainable.

Additional efforts that Bethke has made within the school's built and natural environment promote health and wellness:

- Staff coordinates with local businesses to put on a "wellness day" for students each fall.
- The school participates in the Schools on the Move program each year, organized by Healthy Kids Club and Poudre Valley Hospital. Many Bethke clubs encourage movement and fitness.
- The wellness committee, parents and teachers, have written wellness policies and activities for the school. These include "Food Free Birthdays" and "Lettuce Be Healthy."
- The school's Lego Robotics Club is focusing on sustainability with a project called "The Green City Challenge".

# Craig Middle School

Craig Middle School selected hands-on, place-based projects that are sensitive to rural ranching and mining culture of the region.

The *River Watch Program* started in 1992 in partnership with the Colorado Division of Wildlife. Students apply to work on the *River Watch Program* just like they would apply for a job. Led by the science teacher, the dedicated students monitor eight stations year-round and six others twice a year. They collect and analyze water quality data. The closest station is on the school campus and the farthest is 98 miles away on the Green River in Browns Park on the Colorado/Utah border.

Students provide water data to the Colorado River Watershed District. Students collect and analyze water samples for hardness, alkalinity, pH, dissolved oxygen, flow and temperature. For the Colorado Division of Parks and Wildlife, they collect samples for heavy metals, nutrients and phosphates. They also collect macroinvertebrates as water quality indicators and help tag and monitor northern pike in the Yampa Basin.

Because of the *River Watch Program*, students are more aware of endangered species in the Yampa River. Students are learning about the importance of water conservation.

Students participating in the *GO<sub>3</sub> Global Ozone Project* collect ozone and weather data from all over Moffat County in all types of weather. The international Global Ozone Project (GO<sub>3</sub> project) was created for students to apply their interest and skills in science, technology, engineering, mathematics (STEM) by focusing on air pollution and ground level ozone. Craig was selected by the GO<sub>3</sub> headquarters because Craig is the home of a coal fired power plant, meaning the data recorded will help show the effect of power plants on the atmosphere. Data collected by Craig Middle School students is added to GO<sub>3</sub> data from all over the world — from Jakarta, Indonesia to Boston, Massachusetts.

Craig Middle School also has a student-driven recycling/composting program. The school received a grant in 2011 for recycling and composting student lunches. All students and faculty also participate in paper recycling. Staff members volunteer weekly to take recycling materials to the bins.

The school operates a vegetable garden on the campus. Staff and community members have become very involved, donating pots, potting soil, tools and planters. During the summer, staff, students and community volunteers work in the garden in their free time. Some of the produce is sold at the farmers market.

## Craig Middle School

915 Yampa Ave, Craig, CO 81625

(970) 824-3289

Principal: Julie Baker

Grades: 6–8

Number of Students: 486



Crest Academy  
220 12th St, Salida, CO 81201  
(719) 539-2977  
Principal: Karen Lundberg  
Grades: 5-8  
Number of Students: 28



# Crest Academy

At Crest Academy, administrators, teachers, staff and students try to integrate environmental consciousness into the fabric of the school, from greening its operations to teaching environmental education in classrooms.

## On a daily basis at Crest Academy:

- Students are encouraged to compost.
- A worm-bin is available so students can use worm castings as fertilizer in the greenhouse.
- Washable hand towels and rags are available.
- Paper, glass, aluminum and plastics are recycled.
- Everyone prints on both sides of paper and reuses blank sides before recycling.
- The heat in the building is turned down at night and on the weekends.
- Teachers model environmental awareness, for instance by riding bikes to school.

## Teaching about food production:

- Students raise chickens and are responsible for cleaning, feeding and collecting eggs.
- Students grow vegetables in a local green house. Last year students created a small business with a "CEO," "a marketing team," etc., selling spinach and other vegetables to Crest Academy families and a local grocery store. Profits went back into the greenhouse.

## Environmental awareness and action:

- Bottle bill: In 2010-2011, Crest Academy students worked with State Representative Dan Pabon and State Senator Gail Schwartz on a bottle deposit law in Colorado. Students started researching in September, educating themselves about the harmful effects of plastic, learning how a bottle deposit law works, contacting other states, and figuring out how a bill is actually passed. In February students went to the Capitol during the legislative session and several students testified before the House committee. Though the bill did not pass, Crest students learned invaluable lessons about participating in government.
- Bag fee: In 2011-12, students attempted to pass an ordinance that would put a 5-10 cent fee on single-use plastic bags in Salida stores. Students researched the harmful effects of plastic bags in the environment, learned about the process of passing an ordinance, met with city council members, petitions signed and are educating the public. Students are currently distributing rearview mirror hangers that say "Got Bags?" They are also holding a cloth bag drive and sewing cloth grocery bags to distribute to those who need them. They are making a used plastic bag chain with over 15,000 bags that will wrap around Salida, hoping to get in the Guinness Book of World Records to promote awareness.

## More environmental education:

- Students participate in a weekly class that provides a range of hands-on experiences, such as working in the greenhouse and environmental restoration.
- Students participate in a "camp" each year, where environmental education is a priority.



# Denver Green School

Denver Green School (DGS) opened its doors in August 2010 as a Denver neighborhood school with innovation status. DGS occupies a school building that had been empty for the previous three years because it had been low performing. Neighbors welcomed DGS and embraced its mission. About 70 percent of students live within the school boundary and for the 2012–2013 school year there are wait lists for every grade level.

As a national beacon for real-world learning, DGS provides a practical hands-on, brains-on experience that fosters leadership skills in students. Sustainability issues — from personal, community, national and global perspectives — are integrated throughout the curriculum.

DGS works with the Cloud Institute for Sustainability Education. Aligned to national and state educational standards, each EfS standard has a set of indicators to guide educators as they infuse the school culture, curriculum, instruction and assessment practices with sustainability. By meeting and exceeding these EfS standards, students are being prepared to participate in, and ultimately lead, the shift toward a sustainable future.

A block of time each afternoon is dedicated to “Educating for Sustainability” (EfS) activities from the Cloud Institute with the DGS building and grounds functioning as living, learning laboratories. Here are some snapshots:

- In 2011, 2nd graders conducted a school-wide light and energy audit. They counted every light fixture in the school, then (using light meters) determined that 50 percent of the light bulbs could be removed. They made a presentation to the school administrators and received permission to work with the facilities manager to remove the excess bulbs. Their project now saves the school \$1,500 per year.
- In 2012, while the school’s 6th grade class began a school-wide water audit, the 1st graders began a school-wide Terra Cycle project. Terra Cycle generates funds through the collection and up-cycling of all used glue sticks, candy wrappers and juice bags.
- The school’s 98 kilowatt rooftop photovoltaic solar array provides 47 percent of the school’s electricity and gives the students web-based, real time tools to monitor and check on energy production and carbon savings.
- High efficiency plumbing fixtures have been installed throughout the school.
- The school garden and one-acre farm use one million gallons less water per year than the turf it replaced.

Denver Green School has the first sanctioned farm-to-cafeteria program in Colorado. During harvest season, 150 pounds of fresh, organic produce is wheel-barrowed every week to the cafeteria. Pre-purchased farm shares provide over 60 community families with weekly vegetables over the summer. The school farm and garden, as well as an active PTA, make this school very community oriented.

## Denver Green School

6700 E. Virginia Ave.

Denver, CO 80224

(720) 424-7537

Grades: K–4, 6–8

Number of Students: 350

Lead Partners: Mimi Diaz,

Craig Harrer, Frank Coyne

National Green Ribbon School

Award Winner, 2012



## Ellis Elementary School

1651 S. Dahlia St.

Denver, CO 8022

(720) 424-7700

Principal: Khoa Nguyen

Grades: PK-5

Number of Students: 587



# Ellis Elementary School

Since Ellis Elementary's Green Team applied for and received a Green Up Our Schools grant, students have been implementing many strategies to reduce waste in the school. Green Team activities include:

- Putting composting bins in the cafeteria and bathrooms. Students bring classroom compost to the cafeteria bins after daily snacks;
- Setting up scrap paper trays in every classroom to reduce paper waste;
- Conducting waste assessments periodically to ensure that items are being placed into the proper receptacles;
- Beginning a "light saver" campaign to turn off classroom lights and computers when they are not in use;
- Placing stickers on all paper towel dispensers to encourage conservation.

Ellis Elementary partnered with the American Lung Association and Denver's Environmental Health Department to implement the Clean Air for Schools: Engines Off (CASEO) program. This program encourages parents to turn engines off instead of unnecessarily idling their vehicles during school drop-off and pick-up. The American Lung Association provided parents with letters and pledge forms that went home with the students. Signage discouraging idling has been installed in the parking area, reminding drivers that students need to breathe clean air.

Other environmental education features at Ellis are:

- Two gardens on campus used as outdoor classrooms to teach students about local farming and food sustainability;
- Energy and lighting surveys conducted by students and the Denver Public Schools Sustainability Team which help students learn about energy sustainability;
- Solar panels which are used as teaching tools;
- Signs in the cafeteria, bathrooms, and hallways explaining how and why to compost, recycle, and reduce waste.

Ellis Elementary has been a Colorado Environmental Leadership Program Gold Leader since 2009, through the Colorado Department of Public Health and Environment. The school collaborates with Front Range Earth Force on high quality service learning programs in the community that promote environmental education.

# Flagstone Elementary School

Flagstone Elementary has turned to energy management as a viable means saving money by setting up an incentive program whereby the school earns a portion of the money saved in energy conservation.

The school formed a student team, Helpful Energy Resource Officers (HEROs), to collect data and monitor habits. They began by ridding classrooms of refrigerators and unnecessary lamps and setting guidelines for the laminating machine. HEROs perform weekly audits and are currently running a contest to see which classrooms most consistently and effectively manage their energy use. The HEROs have reduced the school's energy usage by 27 percent, earned the school thousands of dollars in district pay-back money. They were chosen as finalists in the Siemens "We Can Change the World" contest in 2011. The school's Energy Eco-Team is also working with district personnel to conduct more in-depth building audits. Other students are counting bulbs, calculating energy costs and starting a "Lights-out Lunch" program to save energy during high demand hours.

The student recycling team started six years ago by recycling paper in classrooms. In 2012, students audited and weighed the waste stream to learn if the school was recycling all acceptable items. They discovered that Flagstone throws away about 185 pounds of trash every day. By looking at Flagstone's waste stream, the school discovered that, even though many classes had recycling bins, students and teachers were throwing away recyclable materials. A 6th grade team found much of the school's waste comes from food. As a result, 3rd grade students researched composting and set up bins to test how to reduce waste by composting with worms.

The Consumption and Waste Eco-Team has made re-usable snack bags to reduce plastic waste. Flagstone's art and science programs also incorporate the use of recyclable materials in projects. One of the obstacles facing Flagstone Elementary is its location: they want to start a zero-waste lunch room but are 15 miles outside the pick up range of the nearest organics composting company. They are looking into solutions, like giving compost to local farmers.

Flagstone has been approved for a Wind for Schools turbine installation to further reduce energy costs and to teach students about renewable sources. The school received grants to start a garden and the Eco-Team has been growing plants in preparation. The school will have traditional vegetable garden beds as well as vertical gardens. Nutrition Services is working with master chefs to further improve cafeteria offerings and promote healthy eating which includes produce from the garden.

Teachers are creating about incorporating EE programs into their monthly service learning projects. The 4th grade is doing a yearlong project to collect and recycle newspapers. The 2nd grade is working with Red Apple Recycling to recycle textiles. One week a month students can select an elective science class that focuses on the future of energy and sustainability.

## Flagstone Elementary School

104 Lovington St.  
Castle Rock, CO 80104  
(303) 387-5225

Principal: Dan Streeter

Grades: PK-6

Number of Students: 672



## Renaissance Magnet School

3960 Trail Boss Ln.

Castle Rock, CO 80104

(303) 837-8000

Principal: Deborah Lemmer

Grades: K-6

Number of Students: 410



# Renaissance Magnet School

Renaissance is an Expeditionary Learning Outward Bound (ELOB) school. This means that environmental education (EE) is embedded into the school's culture and the curriculum in Science and Adventure Education program during and outside of class periods. The school's goals are to enhance and sustain the area surrounding the school and to be stewards in the broader community.

**Curriculum:** As an ELOB school, some of the EE is embedded in science. Students study the environment in natural areas rather than in classrooms, resulting in a greater appreciation and a commitment to stewardship as measured by student reflections and journal entries. Often, EE is found in service projects,

such as student-run recycling programs, student-maintained gardens, and, in the future, student-led community forums around topics such as pine beetles.

"Adventure education" enhances outdoor or environmental education. Adventure education uses cooperative games, trust building activities, problem solving initiatives and high adventure activities to meet educational goals. It allows teachers to adjust the challenge to meet students' abilities. As part of the adventure education program, students learn stewardship, "leave no trace" principles and experience the idea of a small footprint first hand.

## Enhancing and sustaining the environment in and around the school

The school was built with a standard public school playground. After reading *Last Child in the Woods* by Richard Louv and checking into some other examples of outdoor learning environments, the staff and community decided to grow their own outdoor learning environment. They wanted a place for service learning possibilities and a natural schoolyard. The campus now offers outdoor classroom space, two gardens and multiple unique places to play. Coming soon is an expanded garden space with raised beds and a place for musical exploration through the use of instruments made from recycled materials designed by 3rd grade crews. Everyone, students included, devote some Saturdays to upkeep and expansion of the campus.

## Stewards in the broader community

Renaissance School participates in Parks, Open Space, Trails (POST), a Town of Castle Rock volunteer program, and recruits student volunteers to maintain the public park next to the school. The 5th grade crews participate in the Colorado blue bird trail project, building bird boxes to promote nesting. The 2nd grade crews help with the pre-summer cleanup at the Florissant Fossil Beds as part of their service-learning project. Students are learning first hand about care, maintenance and sustainability of natural resources. Staff are learning the importance of walking the talk and authenticity of experience when it comes to changing perspectives that encourage life-long commitments to sustainability. The school has benefitted by getting parents and the community involved in school projects and events.

# Carl Sandburg Elementary School

Carl Sandburg Elementary School  
900 S Elizabeth St.  
Centennial, CO 80122  
(303) 347-4675  
Principal: Marj McDonald  
Grades: Pre-K to 5  
Number of students: 557



Staff and students at Sandburg Elementary are active participants in extensive recycling and repurposing programs:

- Sandburg partners with Waste Management to recycle all paper, cardboard, glass, aluminum and accepted plastics.
- The Dream Machine Recycle Rally (partnership with Waste Management, Pepsico and Terracycle) supports Sandburg's recycling of aluminum cans and plastic beverage bottles.
- Terracycle repurposes more than 30 items collected at the school, such as candy wrappers, toothbrushes, cookie packaging, chip bags, etc.
- King Soopers partners with the school to recycle all plastic bag materials.
- The school has four "worm factories" that compost food waste from the cafeteria.
- In 2012, Sandburg prepared four garden areas with a permaculture base using organic mulch and compost and recycled cardboard and newspapers.
- Staff and students repurpose paper and other items for art and science related projects.
- They repurpose plastic sheets and plastic containers from local hospitals for art instruction and to cover book cases over the summer, thus keeping these items out of the landfill.
- During the summer, Sandburg Elementary provides special bins so that collection of recyclable items can continue at three area swimming pools.
- They accept items at the school curbside year round in two heavily-used community recycling bins on school property.

The school is working closely with the school district to identify ways that it can actively measure and further increase sustainability and reduce the school's usage of electricity, water, and materials.

For example, all print options are set with black ink defaults and staff are asked to utilize the district print shop to reduce wasteful printing. Areas for future consideration at Sandburg Elementary are the installation of wind and solar energy, and using recycled paper products that are cost effective. The age of the school building creates challenges as well as opportunities for Sandburg.

## Sandburg's other local partnerships

Whole Foods, Xcel Energy, Repurposed Materials, Staples, Kaiser Permanente, DirecTV, Pearson E-College, the Denver Museum of Nature & Science, Carson Nature Center, Colorado Department of Wildlife and the Denver Audubon Society.

# Wellington Middle School

Wellington Middle School  
4001 Wilson Avenue , PO BOX 440  
Wellington, CO 80549  
(970) 488-6600

Principal: Dr. Alicia Durand  
Grades: 6–8

Number of students: 386  
2012 National Green Ribbon School  
by U.S. Dept of Education  
2010 Wind for Schools Project  
2008, 2009, 2010 & 2011 ENERGY  
STAR



Wellington's goal is for all students to have a knowledge base that allows them to be environmentally literate and understand the importance of sustainability -- whether or not they go into a STEM related career field (science, technology, engineering, math). Interdisciplinary learning is teaching students about the key relationships between dynamic environmental, energy and human systems. Environmental and sustainability concepts are integrated throughout the curriculum and are included in classroom based and school wide assessments.

**The Eco-Club students conduct campaigns aimed at conserving energy and materials school wide.**

Students in the club learn how to perform energy audits at school and then audit their own homes. The Eco-Club also leads a building-wide recycling program and has diverted 60 percent of its waste.

The school has eliminated Styrofoam and other disposable trays and utensils in the lunch room. They set up policies to purchase durable products rather than disposables to reduce consumption; use paper that is 40 percent post-consumer recycled content; and reduce copier settings to reduce the amount of printing ink used.

**The school participates in the Colorado Safe Routes to School Program.**

To reduce harmful transportation impacts on health and the environment, Wellington has a well-publicized no idling policy that applies to all vehicles, including school buses. Vehicle loading areas are at least 25 feet from building air intakes, doors, and windows.

**Wellington encourages fitness, good nutrition, and spending time outdoors**

The school is an active participant in in the National Football League's campaign –Fuel Up to Play– to encourage kids to be active for 60 minutes a day in order to help reverse the trend of childhood obesity. Wellington participates in the USDA's Healthier School Challenge nutrition program and utilizes local food in the cafeteria.

**Wellington Middle School was one of the first schools to be a 'Wind for Schools' site.**

Invaluable partnerships with the National Renewable Energy Lab, the Department of Energy and the Wind Application Center at Colorado State University helped to secure a grant to install a wind turbine which pumps energy into the school and data into computers measuring energy produced and carbon emissions reduced. All 386 students at Wellington analyze this data to understand the impacts of onsite green energy production as it relates to the whole building.

Wellington hosts an annual physics fair at the school for all students, created by the Little Shop of Physics, a Colorado State University community outreach project. The Science Adventures class, and other classes, arrange opportunities for learning in the field with community partner organizations.

Athman, Julie & Monroe, Martha (2004) The effects of environment-based education on students' achievement motivation. *Journal of Interpretation Research*, 9(1): 9-25. Greater achievement motivation is associated with greater cognitive engagement in schoolwork, which improves academic performance. In 11 Florida high schools, 400 9th and 12th grade students took part in a comparison of achievement motivation in classrooms using the environment as an integrating concept and in traditional classrooms. Students filled out a 20-item Achievement Motivation Inventory and selected teachers and students in the participating programs were also interviewed. Controlling for grade point average, gender and ethnicity, environment-based education significantly raised 9th and 12th graders' achievement motivation in comparison to the control groups. Students and teachers attributed increased motivation to the use of the local environment, teachers' ability to tailor learning experiences to students' interests and strengths, and the application of learning to real-life issues and problems, which often enabled students to present their work to community audiences beyond their teacher.

Bartosh, O., Ferguson, L., Taylor, C. & Ferguson, L. (2006) Improving test scores through environmental education: Is it possible? *Applied Environmental Education & Communication*, 5(3), 161-169. doi: 10.1080/15330150600912937. This study investigated the impact of environmental education (EE) programs on student achievement in math, reading and writing by comparing student performances on two standardized tests in schools with EE and schools with traditional curriculum in Washington state. The study indicates that schools with integrated environmental education programs consistently outperform comparable "non-EE" schools on the tests.

Schelly, C., Cross, J., Franzen, W., Hall, P. & Reeve, S. (2012) How to go green: Creating a conservation culture in a public high school through education, modeling and communication. *The Journal of Environmental Education*, 43(3), 1-19. doi: 10.1080/00958964.2011.631611. This case study examines how energy conservation efforts in one public high school contributed to both sustainability education and the adoption of sustainable behavior within educational and organizational practice. Individual role models, school facilities, school governance and school culture together support both conservation and environmental education, specifically through the application of principles from behavior theory, including modeling commitments, values, expectations, and 20 behaviors. In addition, role models with the traits of charismatic leaders can be especially instrumental. In this school, communication is the thread connecting the multiple aspects of modeling, helping to create the synergistic relationship between conservation efforts and environmental education. This study demonstrates that conservation efforts, when modeled successfully in a public school setting, can simultaneously and synergistically meet the goals of conservation and sustainability education.

Danforth, P. (2005) An evaluation of National Wildlife Federation's Schoolyard Habitat Program in the Houston Independent School District. Unpublished Master's Thesis, Texas State University, San Marcos, TX. This study compared 3 pairs of Houston schools, matched by demographics. The treatment group included a total of 306 4th grade students whose teachers were implementing National Wildlife Federation's Schoolyard Habitat Program (SYH). The control group consisted of a total of 108 4th grade students whose teachers used a more traditional curriculum.

Measures included standardized test scores (Texas Assessment of Knowledge and Skills), as well as attendance and demographic data. Changes were measured between students' 3rd grade data and their 4th grade data from the subsequent year. Results showed that SYH students increased math scores significantly more than peers with a traditional curriculum. Reading scores were slightly negatively correlated with SYH participation, though the author argued that the curriculum was more directly connected to math than reading.

Duffin, M., Powers, A., Tremblay, G., & PEER Associates. (2004) Place-based Education Evaluation Collaborative: Report on cross-program research and other program evaluation activities, 2003-2004. This evaluation study reports survey results from 338 educators spanning 55 schools and four different place-based education programs. Positive, statistically significant correlations were found between the amount of participant exposure to the program and nearly all desired outcomes, such as educator engagement/personal growth, ability to meet curricular goals, use of local resources for teaching, adult reports of student engagement in learning and academic achievement, and student reports of attachment to place, time spent outdoors, and environmental stewardship behavior, among others. Additionally, survey results suggested that these place-based education programs seed lasting change in a school's culture.

Emekauwa, E. (2004) They remember what they touch: The impact of place-based learning in East Feliciana parish. Rural School and Community Trust. [http://www.pecworks.org/PEEC/PEEC\\_Research/S0179ABE5-0179ABE9](http://www.pecworks.org/PEEC/PEEC_Research/S0179ABE5-0179ABE9). In 1999–2000, the East Feliciana parish in Louisiana began Project Connect, a district-wide place-based math and science initiative, in an attempt to reform its poor academic performance. The district includes five elementary/ middle schools and over 2000 K-8 students, 80% of whom are African American, and 85% of whom receive free lunch. Fifty-two different teachers participated in one or more of three consecutive summer trainings on place-based learning. This study investigated 4th grade English Language Arts, Math, Science, Social Studies scores on Louisiana Educational Assessment Program (LEAP 21) from 1998 through 2002, comparing the district to the state for a percentage of students at "unsatisfactory" level. The performance gap between the district and state decreased for all subject areas. Further, the greatest individual school success occurred at Slaughter Elementary where three of the district's place-based leadership teams teach.

Ernst, J.A. & Monroe, M. (2004) The effects of environment- based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research*, 10(4), 507-522. doi:10.1080/1350462042000291038. This study examined the relationship between environment-based education and high school students' critical thinking skills and attitudes. Ninth and 12th grade students from 11 Florida high schools participated in the study. When controlling for pretest score, grade point average (GPA), gender and ethnicity, environment-based programs had a positive effect on 9th grade students' critical thinking skills. When controlling for the same factors, environment-based programs significantly raised students' scores on the Cornell Critical Thinking Test at both grade levels, and at the 12th grade level, significantly raised scores on the California Measure of Mental Motivation.

Glenn, J.L. (2000) Environment-based Education: Creating High Performance Schools and Students. National Environmental Education and Training Foundation, Washington, DC. Retrieved from <http://www.neefusa.org/pdf/NEETF8400.pdf>. This report presents case studies of five schools, a model program, and an analysis of a statewide program, all of which have incorporated



environmental education as a primary focus of their curriculums. The results indicate that EE has a tremendous impact on learning outcomes such as improved reading and math scores and better performance in science and social studies.

Hungerford, H.R. & Volk, T.L. (1990) Changing learner behavior through environmental education. *The Journal of Environmental Education*, 21(3), 18-21. Also available in H. Hungerford et al (Eds.), *Essential Readings in Environmental Education*. (1998, 2001, 2005), pp. 313-328. Champaign, IL: Stipes Publishing Company. This study analyzes the effectiveness of environmental education in promoting responsible citizen behavior. The authors develop a model of environmental citizenship behavior and present some goals for effective EE instruction. The authors identify ways educators can have the most impact on learners' behavior such as the suggestion that the person who has an internal locus of control is more likely to report having a higher environmentally responsible behavior because their behavior is reinforced by success.

Leiberman, G. A., & Hoody, L. L. (1998) Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning. San Diego, CA: State Educational and Environment Roundtable (SEER). This report looked at "Environment as an Integrating Concept" (EIC) programs in 40 schools in 12 states (California, Colorado, Florida, Iowa, Kentucky, Maryland, Minnesota, New Jersey, Ohio, Pennsylvania, Texas, Washington) and found that the EIC framework improved achievement in math, science, social studies, writing and reading.

Lieberman, G.A., Hoody, L.L., & Lieberman, G.M. (2000). California student assessment project - The effects of environment-based education on student achievement. San Diego, CA: State Education and Environment Roundtable (SEER), March, 2000. Researchers compared "Environment as an Integrating Concept (EIC)" with non-EIC (traditional educational methods) and found that EIC students scored higher in overall assessments for all subjects and had a higher attendance rate.

Monroe, M. C., Randall, J., & Crisp, V. (2009, revised) Improving student achievement with environmental education. University of Florida, Institute of Food and Agricultural Sciences (IFAS) Extension. Gainesville, FL. A Florida study demonstrated that environmental education (EE) lessons designed to meet state curricular goals can improve achievement on state achievement tests. This study of 132 students in grades 9 and 10 in Gainesville looked specifically at writing skills. When combined with a science or EE topic, researchers found measurable improvement in the FCAT rubric writing scores.

National Environmental Education Training Foundation (2000) Environment-based Education: Creating High Performance Schools and Students. Washington, DC: Retrieved July 12, 2011 from [http://www.peecworks.org/PEEC/PEEC\\_Research/01795C0D-001D0211.17/NEETF%202000.pdf](http://www.peecworks.org/PEEC/PEEC_Research/01795C0D-001D0211.17/NEETF%202000.pdf). "Seven case studies of schools using EIC approaches showed improved scores on reading and math assessment tests, better performance in science and social studies, and declines in discipline problems."

Stapp, William B., et al. (1969) The Concept of Environmental Education. *Journal of Environmental Education*. Vol. 1, No. 1, 30-31. Retrieved from [http://www.hiddencorner.us/html/PDFs/The\\_Concept\\_of\\_EE.pdf](http://www.hiddencorner.us/html/PDFs/The_Concept_of_EE.pdf). This paper outlines some environmental problems and why we need an environmentally literate population in order to deal with them. The article provides the definitive definition of environmental education.

# About the Collaborators



## Alliance for Sustainable Colorado

[www.sustainablecolorado.org](http://www.sustainablecolorado.org)

The Alliance for Sustainable Colorado is a nonprofit organization dedicated to advancing sustainability through collaboration among nonprofits, government, business and education. The organization operates three integrated program areas: Alliance Center, Public Policy, and Education & Outreach. The Alliance Center is a century-old, converted warehouse which now houses over 35 nonprofit tenants all working on some aspect of sustainability. It was awarded two Leadership in Energy and Environmental Design (LEED) certifications from the U.S. Green Building Council, and is recognized nationally as a leader in sustainability design and high performance buildings. In addition, the Alliance for Sustainable Colorado advocates for policy change across Colorado by energizing coalitions, sharing information, initiating legislation, and arranging expert testimony. The organization also provides education programs and outreach opportunities to an extensive network of community leaders and decision makers focused on sustainability.



## Colorado Alliance for Environmental Education

[www.caee.org](http://www.caee.org)

As a professional organization for environmental educators, the Colorado Alliance for Environmental Education (CAEE) facilitates communication, cooperation, collaboration and coordination among the varied environmental education programs in the state. CAEE was incorporated as a 501(c)(3) non-profit in 1989 to serve the shared interests of public agencies, businesses, teachers, community organizations and individuals distributing and using environmental education materials and programs. It is a neutral and objective source of information related to environmental education in Colorado, and a voice for EE's important role in the balance between societal needs and environmental quality.



## The Wirth Chair in Sustainable Development– The University of Colorado Denver

[www.wirthchair.org](http://www.wirthchair.org)

The Wirth Chair is committed to helping governments, businesses, non-profit groups and community organizations form sustainable development partnerships that carefully balance economic, environmental and expanded social welfare objectives and strategies.