

# The Art of Science

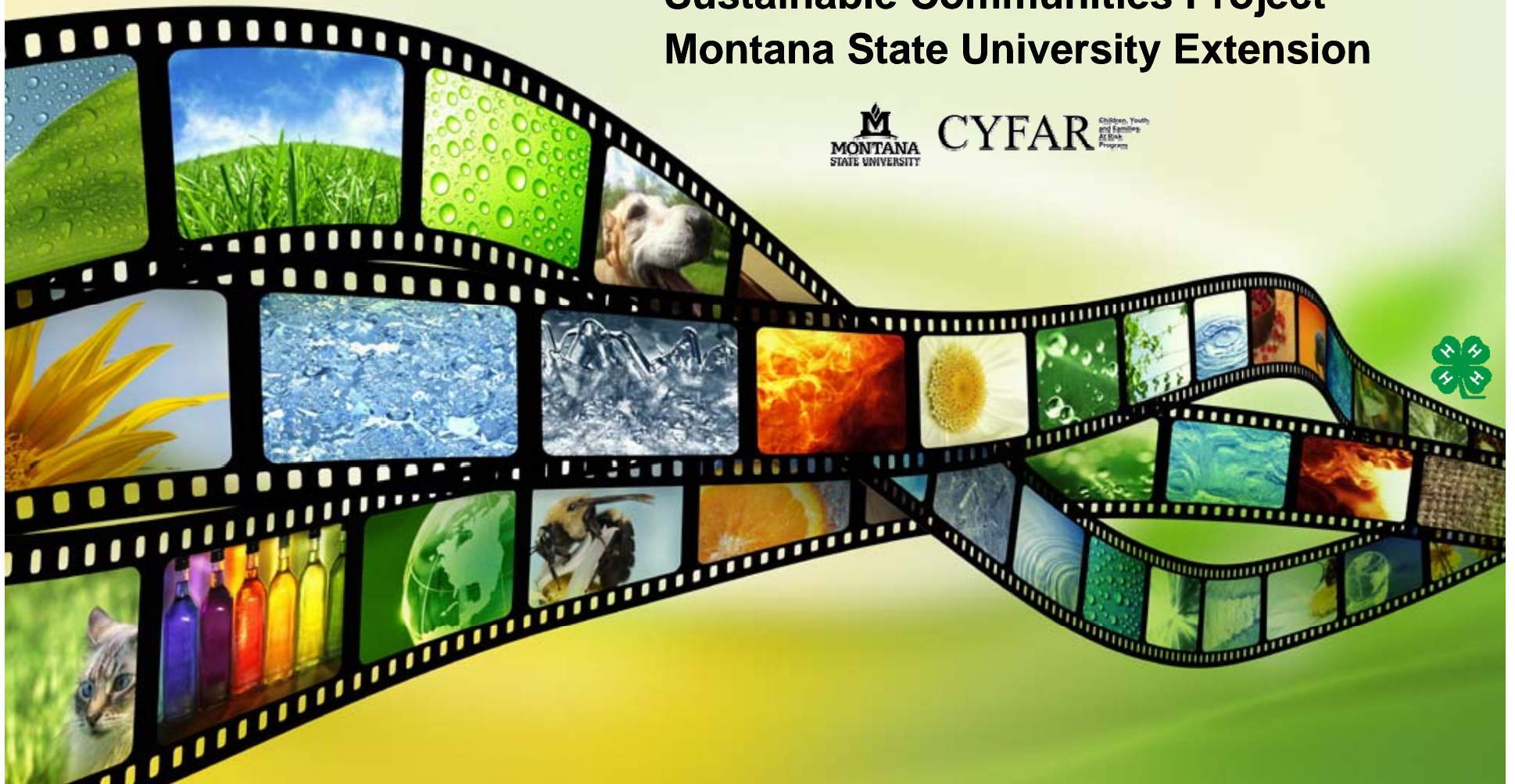
Sustainable Communities Project

Montana State University Extension



CYFAR

Children, Youth  
and Families  
All Star  
Program





# What is it?

We are teaching kids science using technology, specifically filmmaking and robotics.



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Program



## How does it work?

- After-school, summer school, during school
- Partner with school districts, communities, University
- Primarily 3-8<sup>th</sup> grades
- Bring in technology specialists to work with on-site coordinators, teachers
- Conduct adult trainings
- Provide ongoing support
- Secure funding in order to purchase technology applications for sites
- Evaluate results
- Plan next steps



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# Livingston School District

- LINKS for Learning after-school program
- At-risk kids – free & reduced lunch
- Livingston's only afterschool location
- K-5 (we work with grades 3-5)

# Livingston Demographics

- Park County
- South-central Montana near Bozeman
- 60 miles from Yellowstone Park
- City population (2008): 7,500; County population: 16,200\*
- Median household income (2009): \$40,100\*
- Children living in poverty (2009): 511\*

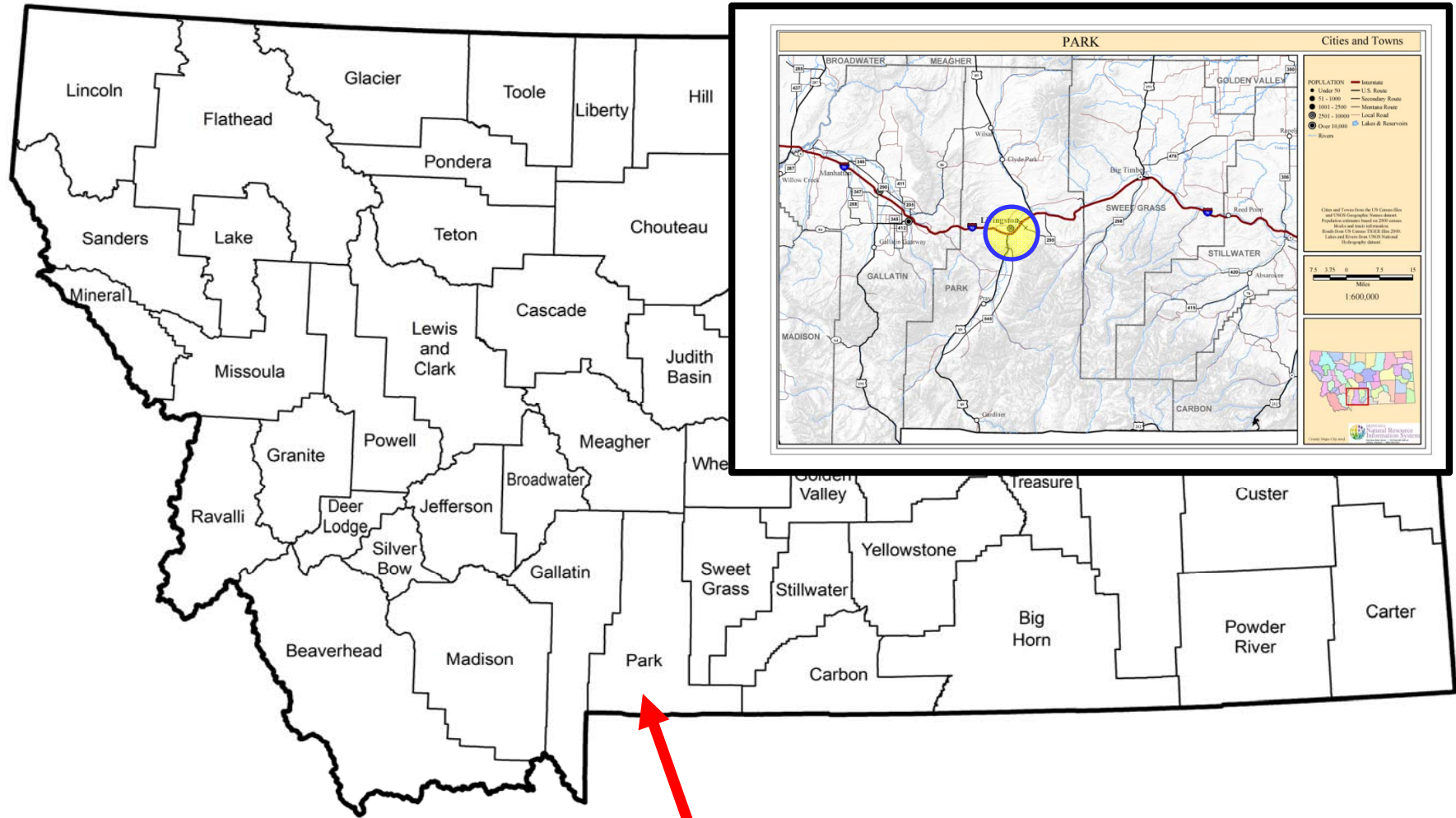
\*2009 Data  
Book Montana  
Kids Count



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# Montana Counties



I learned "how to edit, how to use a camera properly, how to interview, how to drag things, how to put music in." - Caleb

I learned "how to test water quality. We have these strips that turn different colors and you put them into the water you're testing to see if the water quality is good and good for fish." - Nick

# Livingston Film Project

## 2009-2010 (2<sup>nd</sup> year of grant)

- 5<sup>th</sup> graders made four films
- 4<sup>th</sup> graders made photo collages
- Middle school students made two films



# AQUATIC LIFE



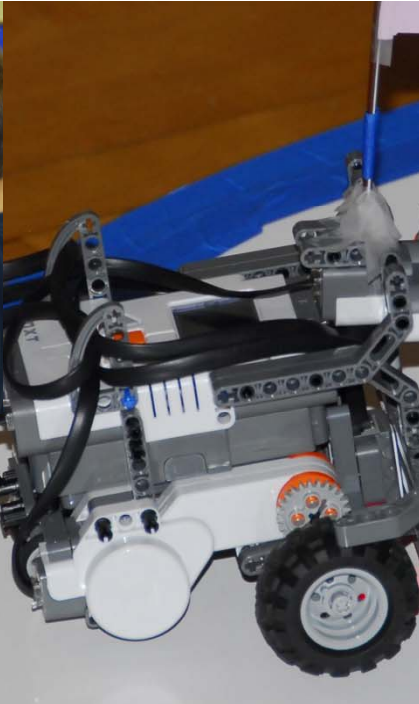
# Livingston Robotics Project

## 2009-2010 (introduced this year)

- 5<sup>th</sup> graders learned NXT robotics
- 4<sup>th</sup> graders learned WeDo robotics
- 6<sup>th</sup> graders learned robotics and filmmaking and participated in the First Lego League competition







# Pretty Eagle Catholic School

- K-8 (we work with 4-8 grades)
- Private school
- Very rural location on Crow Indian Reservation
- Part of St. Labre School District
- Kids from many area communities attend

## Hardin Demographics

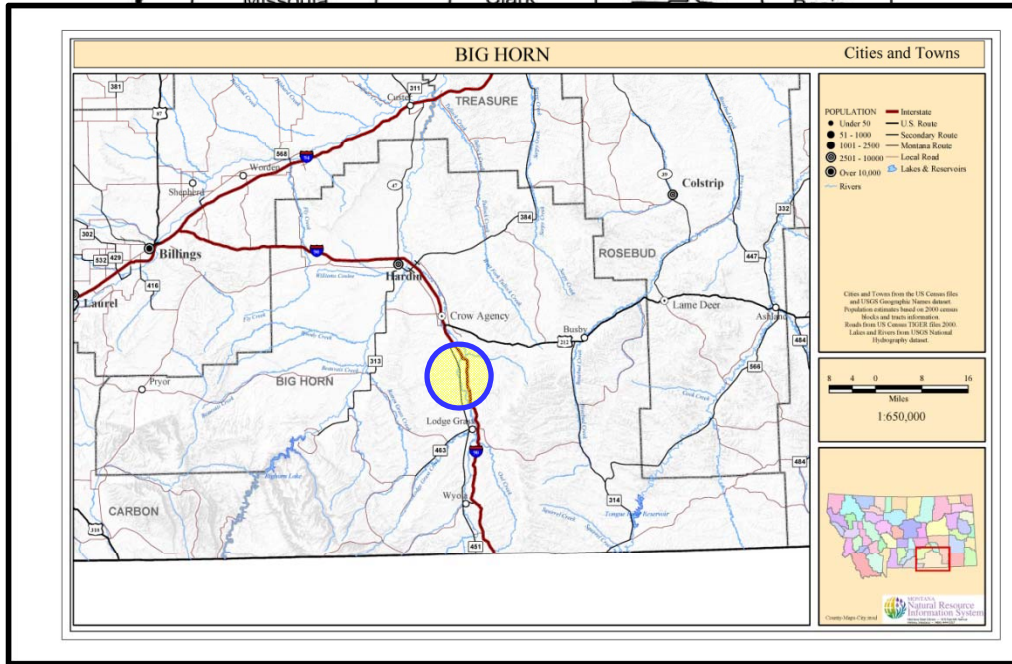
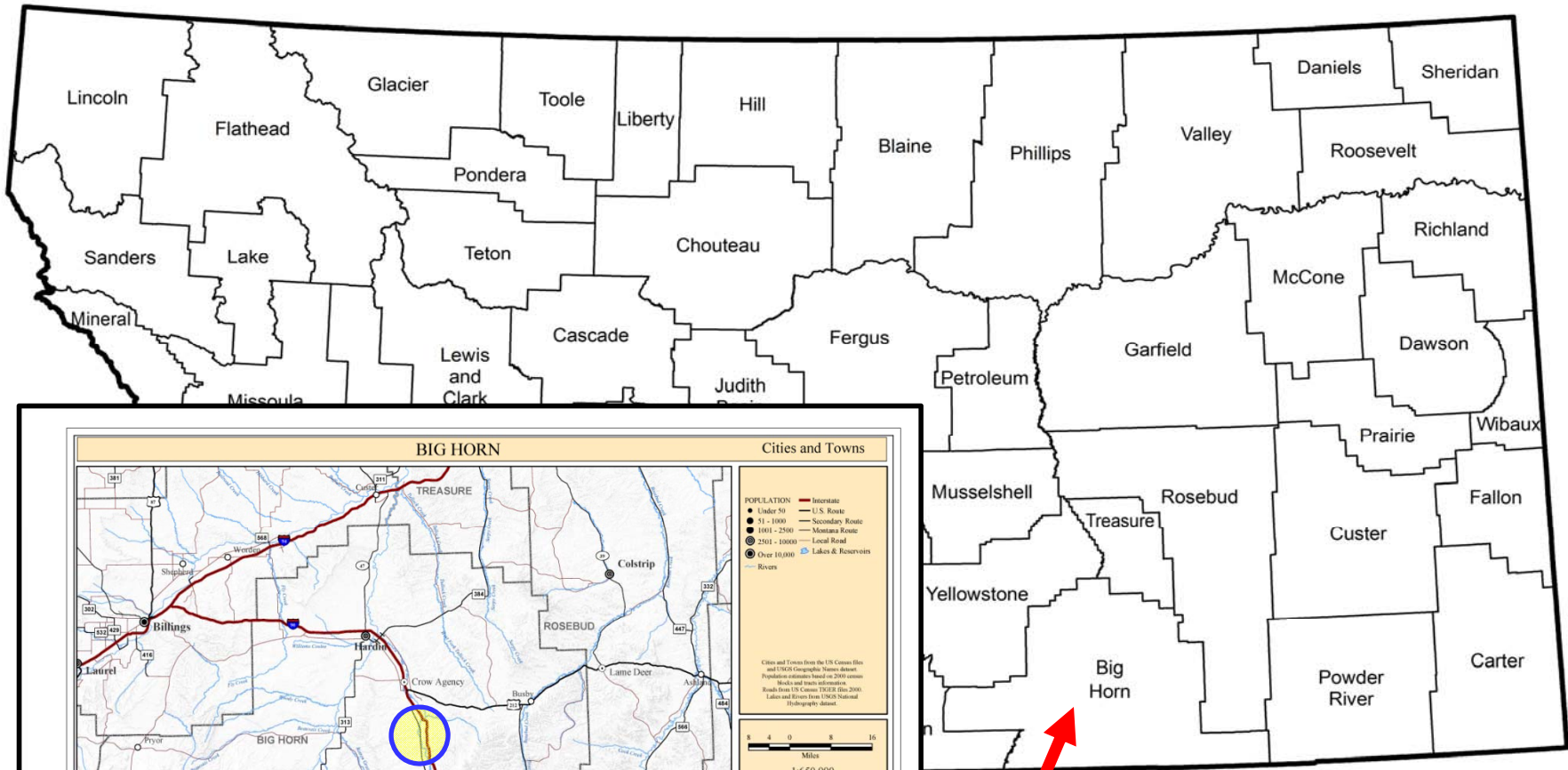
- Bighorn County
- Southeast Montana, 25 miles from school
- City population (2008): 3,400; County population: 12,800\*
- Median household Income (2009): \$33,000\*
- Children living in poverty (2009): 1,369\*

\*2009 Data  
Book Montana  
Kids Count





# Montana Counties



# Pretty Eagle Film Project

## Film project

5-8th grade youth made two films

6-7th grade girls made four films

6-8th grade boys made four films





# Arrow Throwing Science





# ANTLERS VS HORNS



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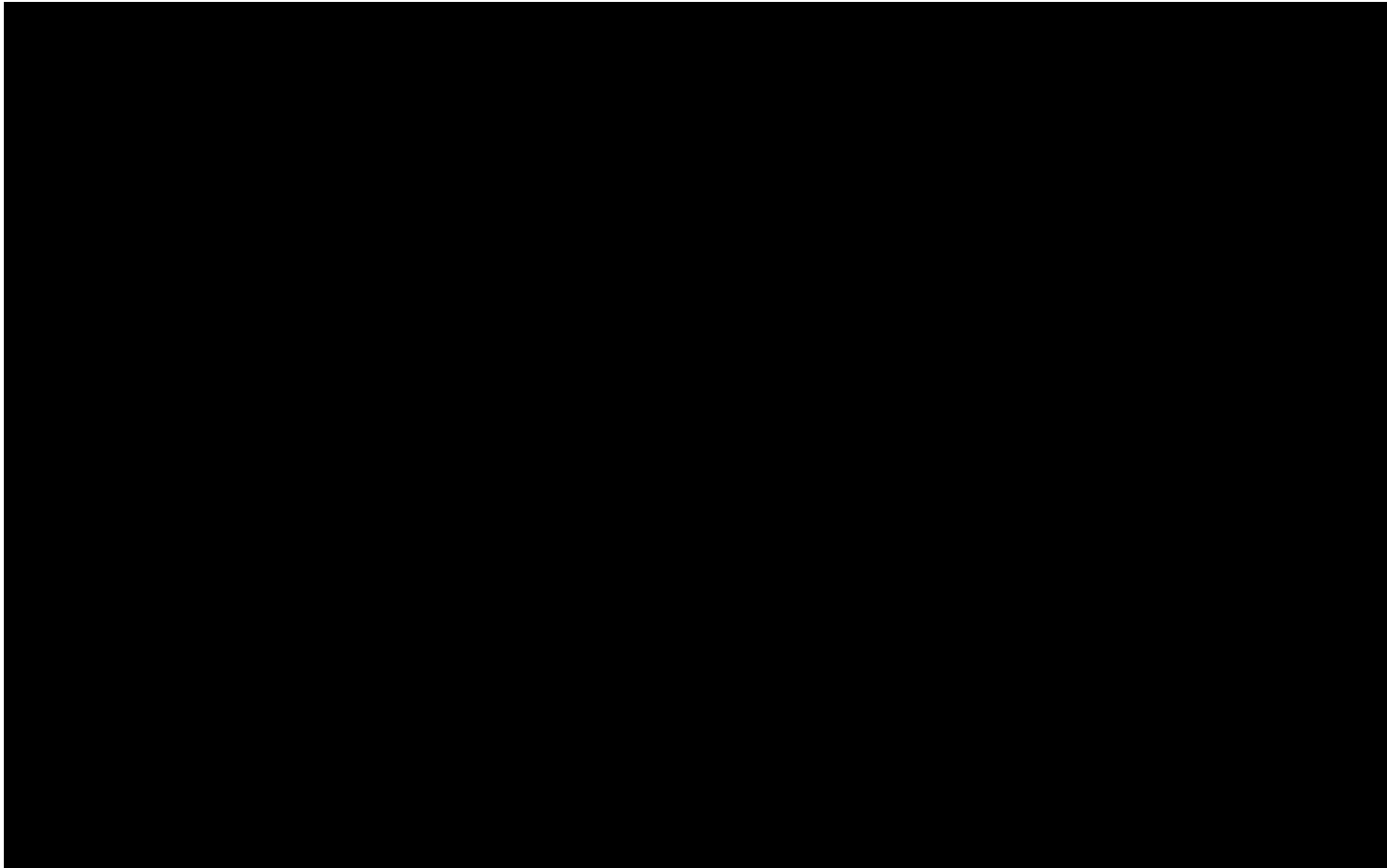
# Pretty Eagle Robotics Project

4<sup>th</sup>-5<sup>th</sup> graders learned NXT robotics after-school and in the classroom

6<sup>th</sup> & 7<sup>th</sup> grade boys initiated the water quality project using robotics and film

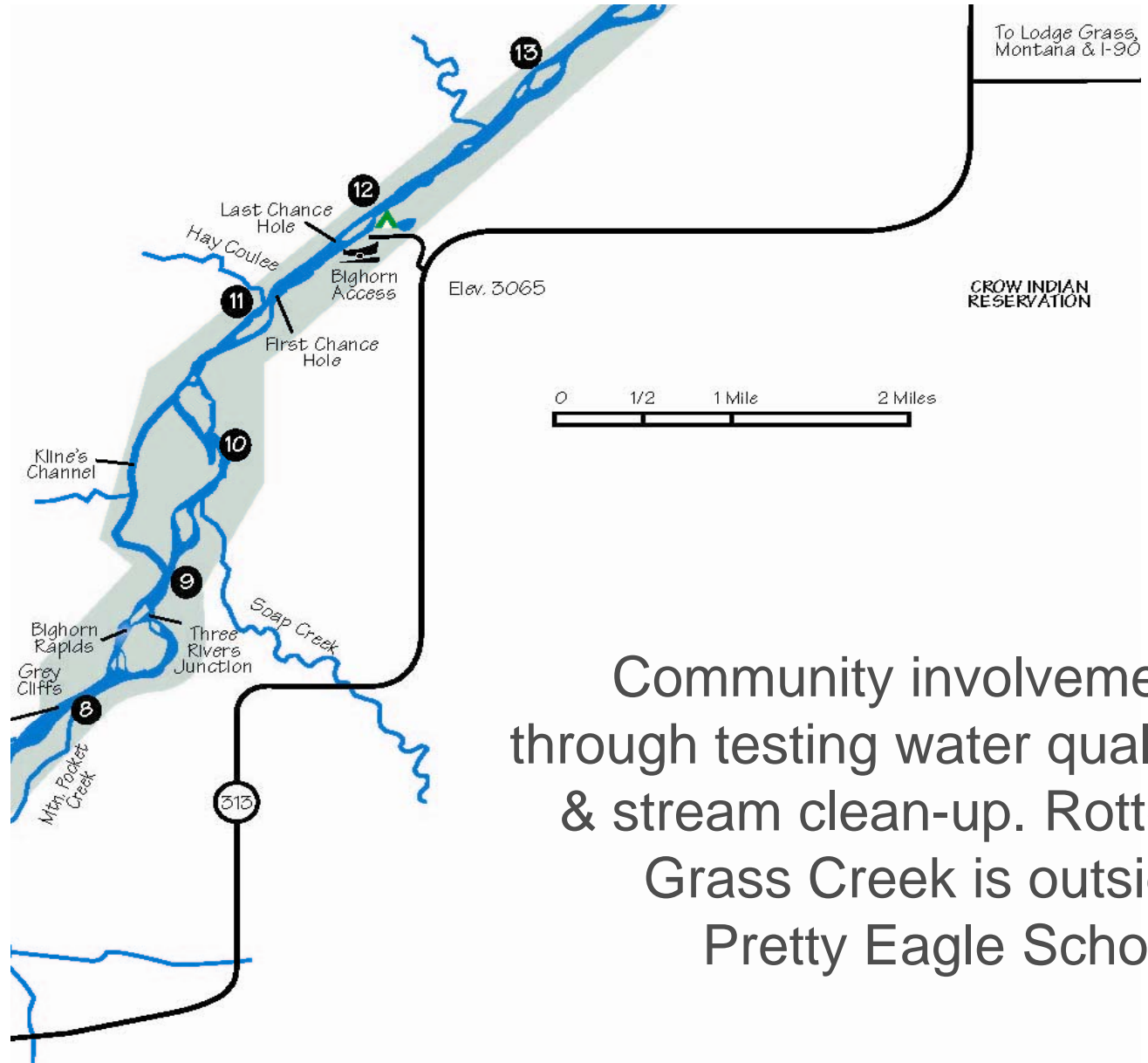
*The best part about this project was "programming (the robots) and having them go pick up the cows."  
- Shelbie*





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# Pretty Eagle Water Quality Project



Community involvement through testing water quality & stream clean-up. Rotten Grass Creek is outside Pretty Eagle School.



# Pretty Eagle Water Quality Project

- 1) Test Rotten Grass Creek (it does not support many fish and we don't know why)
- 2) Test temperature, ph, dissolved oxygen, flow rate and turbidity
- 3) Pretty Eagle film students will produce a film documenting the project
- 4) Tribal College Natural Resources researcher will present the final film to district schools (impacts)





# Water Quality Robot

Portable ~12 Inches Tall



Water Sensor  
(Temperature, pH, DO)

Motorized Sensor Arm

Fan or Stir Mechanism

Cables connecting  
motors and sensors  
to the brain

"Brain" runs program  
and logs data





# Evaluation

- Life Skills – communication, problem-solving, decision-making, critical thinking
- Technology skills
- Science skills
- Community engagement





# Evaluation

Combination of qualitative and quantitative methods

Instruments:

- 1) Interviews
- 2) Observation
- 3) Competencies
- 4) pre-, post-tests





# Evaluation

Preliminary Findings:

- 1) Increase in understanding of how to use technology
- 2) Increase in communication skills
- 3) Increase in students' ability to articulate science concepts





# Ingredients to start your own project

- Community and school partnerships
- Committed onsite staff, teachers, continuity
- Ongoing technology support
- Using experts to train the adults and youth, ongoing partnerships with people that are in the field
- Ability to access equipment, software – purchase or loan
- End of project celebrations
- Community connections
- Making a connection about the relevance of the project in real life
- Funding





# What's Next?

- Continue with filmmaking/community projects/service-learning
- Continue with robotics/FLL competition
- Use robotics to engage younger kids (WeDo)
- Look for additional partnerships to expand scope of project
- Water quality/film project
- Add Global Positioning Systems (GPS)



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# Who's Involved?

- Carol Benesh, Principle Investigator, MSU
- Stephanie Davison, Project Director, MSU
- Gregg Switzer, Technology Specialist, MSU
- Matt Smaglik, Film Student, MSU
- Julie Hancock, Director, LINKS for Learning, Livingston School District
- Terri Hartly, Science Teacher, Livingston School District
- Lori Chapman, Science Teacher, Livingston School District
- Garla Williamson, Principal, Pretty Eagle School
- Carrie McCleary, Project Director, Pretty Eagle School
- Jack Joyce, Middle School Science Teacher, Pretty Eagle School
- Carol Siegle, 4<sup>th</sup> Grade Teacher, Pretty Eagle School
- Sheila Pickett, Teacher's Aide, Pretty Eagle School
- Matt McClellan, Extension Agent, Bighorn County
- Maryann Keyes, Extension Agent, Park County



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