

SCHOOLYARD WETLANDS: CREATING AQUATIC SPACES FOR LEARNING

C. A. Cole

Penn State University

cac13@psu.edu



PA Academic Standards – Environment and Ecology

- Environment and Ecology is grounded in the complexity of the world we live in and our impact on its sustainability. The human interactions with the ecosystem and the results of human decisions are the main components of this academic area. Environment and Ecology examines the world with respect to the economic, cultural, political and social structure as well as natural processes and systems. This integration across systems is what sets this academic area apart from all others.
Environment and Ecology places its main emphasis in the real world. It allows students to understand, through a sound academic content base, how their everyday lives evolve around their use of the natural world and the resources it provides. As we move into a more technologically driven society, it is crucial for every student to be aware of his/her dependence on a healthy environment. The 21st century will demand a more sophisticated citizen capable of making sound decisions that will impact our natural systems forever.
- Academic Standards for Environment and Ecology, 22 Pa. Code, Ch. 4, Appendix B Final Form January 5, 2002

Academic Standards for Science and Technology

What Is Science? Any study of science includes the search for understanding the natural world and facts, principles, theories and laws that have been verified by the scientific community and are used to explain and predict natural phenomena and events.

Acquiring scientific knowledge involves constructing hypotheses using observation and knowledge in the content area in order to formulate useful questions that provoke scientific inquiry. As a result of repeated, rigorous testing over time and applying multiple perspectives to a problem, consistent information emerges. A theory describes this verifiable event or phenomena. Theories are powerful elements in science and are used to predict other events. As theories lose their ability to predict, they are modified, expanded or generalized or incorporated into a broader theory.

Knowledge of what science is incorporates carefully developed and integrated components:

- **Nature of science** -- the ways in which scientists search for answers to questions and explanations of observations about the natural world; includes process knowledge of observing, classifying, inferring, predicting, measuring, hypothesizing, experimenting and interpreting data
- **Unifying themes of science** -- concepts, generalizations and principles that result from and lead to inquiry
- **Knowledge** -- facts, principles, theories and laws verifiable through scientific inquiry by the world community of scientists; includes physics, chemistry, earth science and biological sciences
- **Inquiry** -- an intellectual process of logic that includes verification of answers to questions about and explanations for natural objects, events and phenomena
- **Process skills** -- Recognition by students how knowledge is acquired and applied in science by observing, classifying, inferring, predicting, measuring, computing, estimating, communicating, using space/time relationships, defining operationally, formulating hypotheses, testing and experimenting, designing controlled experiments, recognizing variables, manipulating variables, interpreting data, formulating models, designing models and producing solutions.
- **Problem solving** -- application of concepts to problems of human adaptation to the environment that often leads to recognition of new problems; has social implications and leads to personal decision-making and action; a process which forms the link for interactions between scientific and technological results or findings; involves operational definitions, recognizing variables, formulating models and asking questions
- **Scientific thinking** -- the disposition to suspend judgment, not make decisions and not take action until results, explanations or answers have been tested and verified with information.

How to connect kids with wetlands?

- PA academic standards have a wetlands unit

Academic Standards for Environment and Ecology



Pennsylvania Department of Education

22 Pa. Code, Ch. 4, Appendix B

Final Form

January 5, 2002

Academic Standards for Environment and Ecology

X. TABLE OF CONTENTS

Introduction.....	XI.	
<u>THE ACADEMIC STANDARDS</u>		
Watersheds and Wetlands	4.1.	
A. Cycles		
B. Role of watersheds		
C. Physical Factors		
D. Characteristics and functions of wetlands		
E. Impacts of watersheds and wetlands		
Renewable and Nonrenewable Resources	4.2.	
A. Uses		
B. Availability		
C. Management		
D. Environmental Factors		
Environmental Health	4.3.	
A. Environmental Health Issues		
B. Human Actions		
C. Biological Diversity		
Agriculture and Society	4.4.	
A. Society's Needs		
B. Agricultural science		
C. Agricultural Systems		
D. Technology		
E. Management	4.5.	
		A. Effects, Benefits and Impacts
		B. Health Risks
		C. Management Practices
Ecosystems and their Interactions	4.6.	
A. Living and Nonliving Components		
B. Cycles		
C. Change over Time		
Threatened, Endangered and Extinct Species	4.7.	
A. Diversity		
B. Adaptation		
C. Management Strategies		
Humans and the Environment	4.8.	
A. Societal Needs		
B. Sustainability		
C. Human Impacts		
D. Supply and Demand		
Environmental Laws and Regulations	4.9.	
A. Environmental Laws and their Impact		
Glossary.....	XII.	

Watersheds and Wetlands

- A. Cycles
- B. Role of watersheds
- C. Physical Factors
- D. Characteristics and functions of wetlands
- E. Impacts of watersheds and wetlands

Appendix B

Final Form

January 5, 2002

Schoolyard Wetlands

- The State College Area School District has their own wetland curriculum.
- All schools were making multiple visits to a local wetland during their k-5 years.
- Some schools were developing their own wetlands on school grounds.
- I chanced into this setting.

Schoolyard Wetlands

- Objectives
 - Looking for a way to get kids into learning about wetlands
 - Trying to bring wetlands into their lives at school
 - Looking to bring actual wetland data into the curriculum in some way
 - Trying to automate some of this so that they can see what's happening on a day-to-day basis.
 - Let's start with the weather and see how it relates to wetlands. Thus Weather stations.

Davis Vantage Pro 2



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PFE

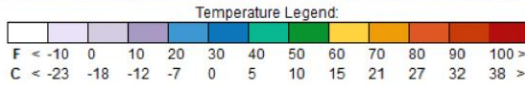
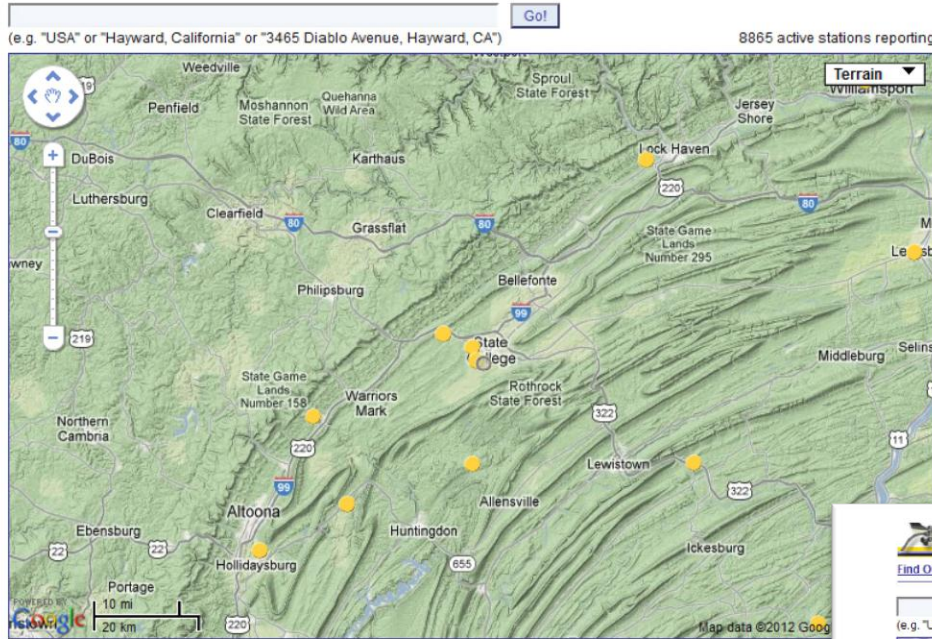
64°	HIGH 65°F at 10:04 AM
	LOW 60°F at 12:03 AM
Wind	NE 1 Mph High Gust 4 Mph at 5:03 AM
Humidity	92% Feels Like 65°F
Rain	0.27" Seasonal Total 22.66"
Barometer	29.80" Falling Slowly

Current Conditions as of 2:54 PM Monday, May 21, 2012
Vantage Vue data via WeatherLinkIP

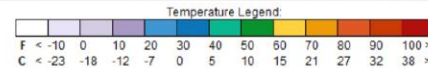
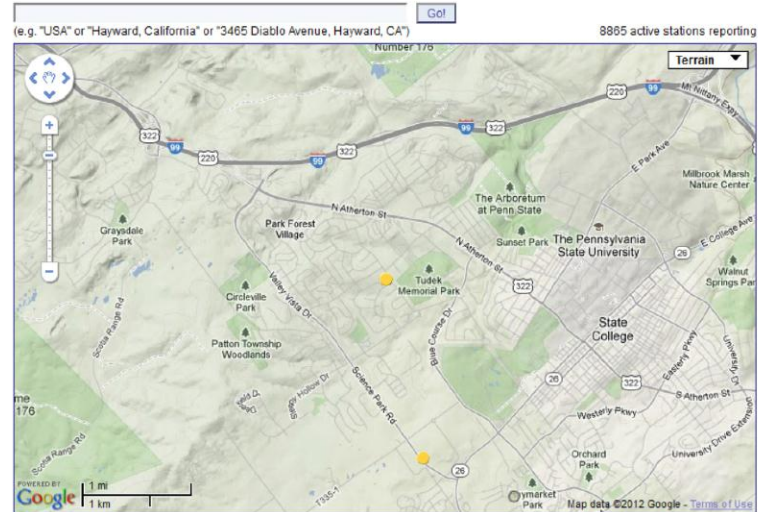
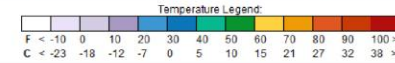
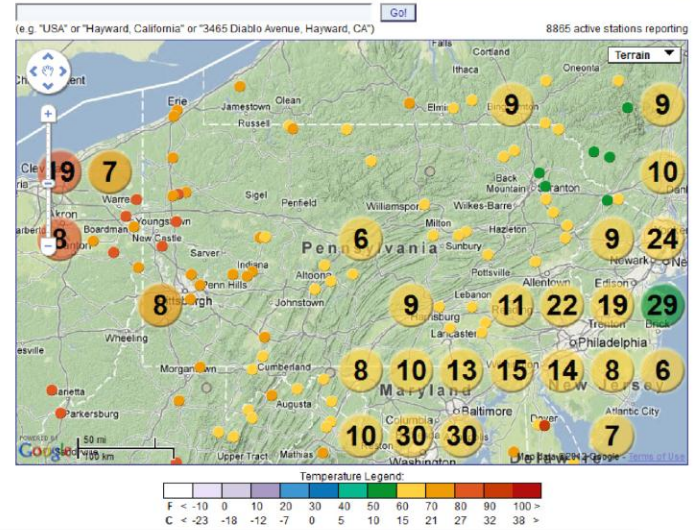
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WeatherLink Stations



Data to be collected at each site:

- Daily weather
 - Rainfall, humidity, temperature, wind...
 - Soil moisture and temperature
 - Plant community structure
 - Wildlife use
- Kids will also be able to collect data over time and document site changes.

Rainfall data:

- Current Conditions - PFE

As of 12:02 AM Monday, May 21, 2012

Forecast: Partially Cloudy

Outside Temp: 64.8 F
High Outside Temp: 84.8 F at 12:35 PM
Low Outside Temp: 53.3 F at 3:25 AM
Outside Humidity: 56%

Inside Temp: 78.5 F
Inside Humidity: 38%

Heat Index: 63.0 F
Wind Chill: 65.0 F
Dew Point: 49.0 F

Barometer: 29.918" and Steady

Wind Speed: Calm
Wind Direction: SSE
High Gust: 10.0 Mph at 9:33 AM
10 min Avg Wind: Calm

Rain Rate: 0.00"/Hour
Day Rain: 0.00"
Storm Rain: 0.00"
Month Rain: 4.66"
Year Rain: 22.39"

Rain data

Date	Time	Temp Out	Hi Temp	Low Temp	Out Hum	Dew Pt.	Wind Speed	Wind Dir	Wind Run	Hi Speed	Hi Dir	Wind Chill	Heat Index	THW Index	THSW Index	Bar	Rain	Rain Rate
1/1/2012	12:00 AM	4.9	5.1	4.9	86	2.8	0	N	0	6.4	NNE	4.9	4.8	4.8	---	759.7	0	0
1/1/2012	12:30 AM	4.8	4.9	4.8	88	3	0	NNW	0	3.2	NNE	4.8	4.7	4.7	---	759.4	0	0
1/1/2012	1:00 AM	4.6	4.8	4.6	89	3	0	NNW	0	1.6	NNW	4.6	4.6	4.6	---	759.3	0	0
1/1/2012	1:30 AM	4.6	4.6	4.5	88	2.7	0	NNW	0	4.8	WNW	4.6	4.5	4.5	---	759	0	0
1/1/2012	2:00 AM	4.8	4.8	4.6	86	2.6	0	NNW	0	4.8	WNW	4.8	4.7	4.7	---	759.3	0	0
1/1/2012	2:30 AM	4.8	4.8	4.7	85	2.5	0	NNW	0	6.4	SW	4.8	4.7	4.7	---	759.2	0	0
1/1/2012	3:00 AM	4.7	4.9	4.7	85	2.4	0	N	0	4.8	NW	4.7	4.6	4.6	---	759.1	0	0
1/1/2012	3:30 AM	4.6	4.8	4.6	86	2.4	0	NNE	0	1.6	NNE	4.6	4.4	4.4	---	758.8	0	0
1/1/2012	4:00 AM	4.4	4.6	4.4	87	2.5	0	NNW	0	1.6	NE	4.4	4.3	4.3	---	758.9	0	0
1/1/2012	4:30 AM	4.6	4.6	4.4	86	2.4	0	E	0	3.2	E	4.6	4.4	4.4	---	758.7	0	0
1/1/2012	5:00 AM	4.5	4.6	4.5	86	2.4	0	SW	0	1.6	NNW	4.5	4.4	4.4	---	758.5	0	0
1/1/2012	5:30 AM	4.3	4.6	4.2	86	2.1	0	SE	0	3.2	SSE	4.3	4.2	4.2	---	758.3	0	0
1/1/2012	6:00 AM	4	4.2	4	88	2.2	0	ESE	0	1.6	ESE	4	3.9	3.9	---	758.3	0	0
1/1/2012	6:30 AM	3.2	4	3.2	89	1.5	0	SE	0	1.6	ESE	3.2	3.1	3.1	---	758	0	0
1/1/2012	7:00 AM	3	3.2	2.9	90	1.5	0	SE	0	1.6	WNW	3	2.9	2.9	---	757.8	0	0
1/1/2012	7:30 AM	2.6	2.9	2.6	91	1.3	0	SE	0	1.6	SSW	2.6	2.6	2.6	---	757.5	0	0
1/1/2012	8:00 AM	3.2	3.2	2.6	89	1.5	0	SSE	0	4.8	S	3.2	3.1	3.1	---	757.2	0	0
1/1/2012	8:30 AM	4.1	4.1	3.2	86	2	0	SE	0	4.8	ESE	4.1	4	4	---	757	0	0
1/1/2012	9:00 AM	5.1	5.1	4.1	84	2.6	1.6	SSE	0.8	11.3	S	5.1	4.9	4.9	---	756.4	0	0
1/1/2012	9:30 AM	6.1	6.1	5.1	81	3	1.6	SE	0.8	16.1	ESE	6.1	5.9	5.9	---	756	0	0
1/1/2012	10:00 AM	6.5	6.5	6.1	79	3.1	3.2	SE	1.61	12.9	N	6.5	6.3	6.3	---	755.5	0	0
1/1/2012	10:30 AM	7.2	7.2	6.5	77	3.4	3.2	SE	1.61	11.3	ESE	7.2	7	7	---	754.8	0	0
1/1/2012	11:00 AM	7.9	7.9	7.2	76	3.9	3.2	SE	1.61	17.7	ESE	7.9	7.7	7.7	---	753.9	0	0
1/1/2012	11:30 AM	7.6	8.1	7.6	78	4	3.2	SSE	1.61	14.5	ESE	7.6	7.4	7.4	---	753.5	0	0
1/1/2012	12:00 PM	7.2	7.6	7.2	80	4	1.6	SE	0.8	9.7	WNW	7.2	7.1	7.1	---	752.3	0	0
1/1/2012	12:30 PM	6.7	7.3	6.7	85	4.3	1.6	SE	0.8	9.7	NNE	6.7	6.6	6.6	---	752	0.51	5.1
1/1/2012	1:00 PM	6.5	6.7	6.5	86	4.3	1.6	ESE	0.8	8	ESE	6.5	6.4	6.4	---	751.5	0.25	1

Park Forest Elementary- State College



**PFE “Penguin Puddle”
Planting May 2009**





Fall 2009 – planted spring 2009



Ferguson Township Elementary







Planted fall 2011



Radio Park Elementary





Mount Nittany Elementary



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 STATE COLLEGE, PA 16801

New Construction Project of:
 Panorama Village Elementary School
 Brandwine Drive
 State College, PA 16801

#	REVISION TYPE	DATE

DATE: 08 SEPT 2009
 PROJ. NO.: 08 017

Drawing Title:
SITE PLAN

Drawing Number:
 SCHEMATIC DESIGN

Millbrook Marsh



Image USDA Farm Service Agency

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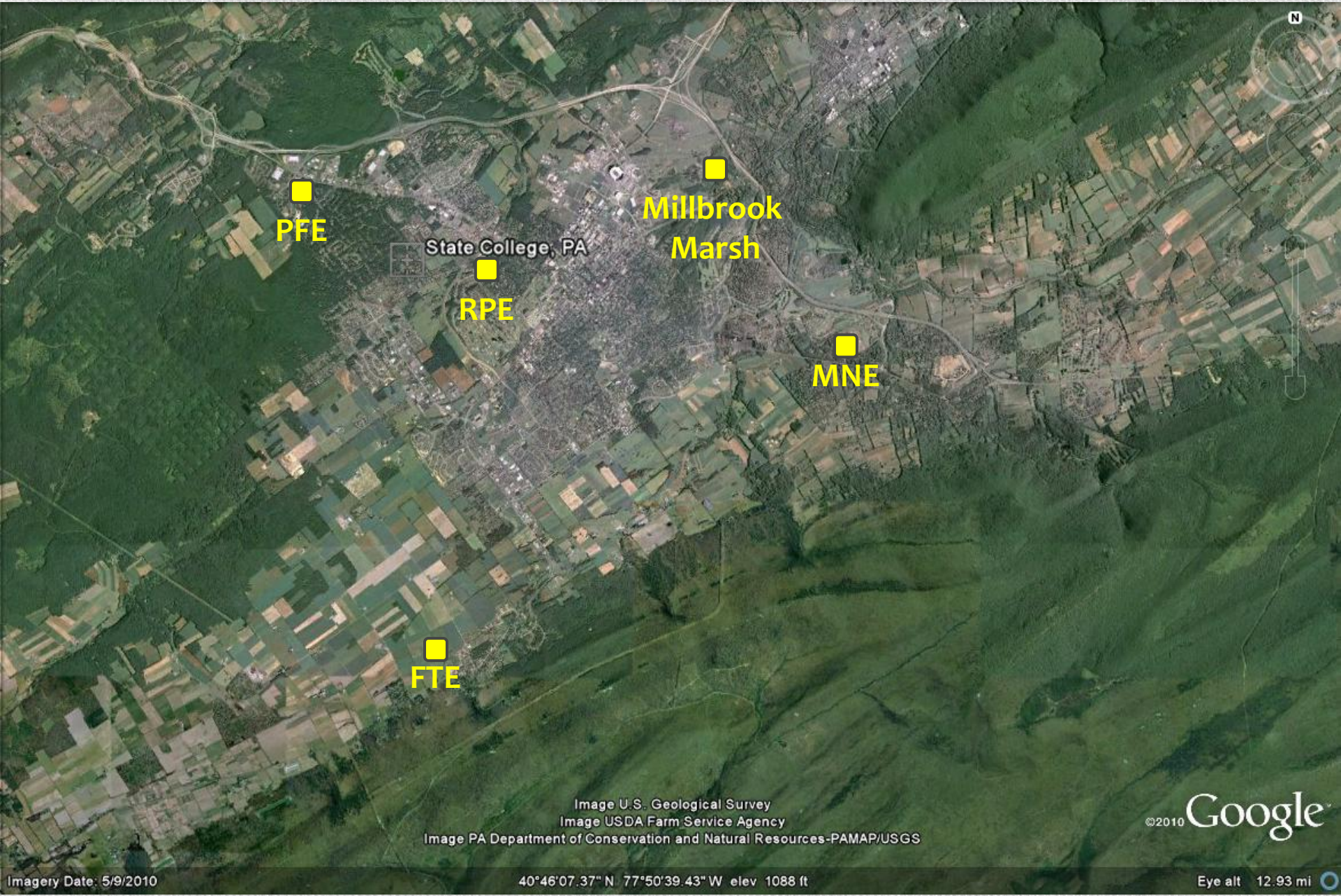
Imagery Date: 5/9/2010 1994

40°48'39.51" N 77°50'03.52" W elev 961 ft

Eye alt 12860 ft



PFE kids on annual trip
To Millbrook Marsh - 2011



PFE

State College, PA

RPE

Millbrook
Marsh

MNE

FTE

Image U.S. Geological Survey
Image USDA Farm Service Agency
Image PA Department of Conservation and Natural Resources-PAMAP/USGS

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Other things going on.

- Working with the Department of Architecture to build a “Water Shed” at the PFE wetland.





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This is the first slide's caption 1

This is the first slide's caption 2



Welcome to Schoolyard Wetlands



Schoolyard Wetlands is a website created by the Pennsylvania State University under Dr. Charles Andrew Cole. The site offers a central location for students to access data from four different wetland sites located around Central Pennsylvania. The data can then be used to create graphs, charts and other educational tools to learn about the different aspects of wetland and what makes

Getting out in the field!





School 1

School X is located in small town usa and has a wetland the size of a wetland. School X has a very unique wetland with many different species of birds, salamanders and frogs.

[Click to read more](#)



Healthy School

School 2

School X is located in small town usa and has a wetland the size of a wetland. School X has a very unique wetland with many different species of birds, salamanders and frogs.

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Healthy School

School 3

School X is located in small town usa and has a wetland the size of a wetland. School X has a very unique wetland with many different species of birds, salamanders and frogs.

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Healthy School

School 4

School X is located in small town usa and has a wetland the size of a wetland. School X has a very unique wetland with many different species of birds, salamanders and frogs.

[Click to read more](#)



Healthy School

Going Forward

- If anyone is interested in helping to develop this network across states, please let me know.
- The goal is to have one location where kids can look at other schoolyard wetlands, as well as natural wetlands, and get some real data to work with.
- Contact: Andy Cole cac13@psu.edu