

# Prairie Science Class Evaluation Report

2005-2006

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ISD 544 and Prairie Wetlands Learning Center  
602 State Hwy 210 East  
Fergus Falls, MN 56537  
218-736-0938



## Program Summary

The Prairie Science Class (PSC) is a formal partnership between the U.S. Fish and Wildlife Service's (USFWS) Prairie Wetlands Learning Center (PWLC) and the Fergus Falls Independent School District 544 (ISD 544). Its mission is to use the local prairie wetlands ecosystem as an integrating and motivating context to engage 5<sup>th</sup> grade students in science, math, and writing through real world, field-based learning experiences. Program goals include developing knowledge and skills in math, writing, and science; increasing motivation toward learning; developing problem solving, critical thinking, communication, and technology skills; and fostering character skills and a stewardship ethic. The educational philosophy guiding the PSC is interdisciplinary, experiential learning through authentic, field-based experiences and constructivist approaches.

During the 2005-2006 school year, 100 fifth graders (two morning classes and two afternoon classes) were involved in the PSC, spending two hours each day at the PWLC. While at the PWLC, PSC teachers (two ISD 544 employees) and PWLC environmental education specialists provided field-based instruction in the curricular areas of science, math, and writing through a series of seasonal, integrated units based on the prairie wetlands ecosystem. Students spent the remainder of the school day at the Fergus Falls Middle School, where they received their reading, social studies, physical education, and health instruction.

(Visit <http://www.fws.gov/midwest/pwlc> for more information)



Students banded mallards during the fall migration unit, building math skills through weighing and measuring the ducks; students also learned wildlife management techniques and the importance of prairie wetlands to sustaining waterfowl populations.



Students worked in small groups to assist the USFWS with prairie restoration efforts. Students studied ecological concepts, such as biodiversity and native and non-native species, and practiced observation and classification skills.



Students conducted winter ecology research projects, presenting their results at a family day held at the PWLC.



## Evaluation Methodology

The purpose of this evaluation was to document program outcomes for stakeholder justification and to support decisions regarding program continuation, expansion, and replication. This evaluation was also used to identify areas where program improvement is needed and to assess the progress made toward program goals. Four questions guided this program evaluation:

1. Have the students attained grade-level proficiency in science, math, and writing?
2. Have the students' science process, problem solving, and their skills in working cooperatively and communicating with others increased?
3. Do the students have a more positive attitude toward learning, a more positive attitude toward the prairie wetlands environment, a stronger stewardship ethic, and a stronger sense of civic responsibility by the end of the school year compared to the beginning of the school year?
4. Did the Prairie Science Class meet the needs of the students and parents, the Fergus Falls School District, and the U.S. Fish and Wildlife Service?

To answer these questions, a variety of data collection instruments was used (see table page 4). The 100 students in the Prairie Science Class were the primary source of information for this evaluation. Parents of the Prairie Science Class students, the Fergus Falls Middle School Principal, the PWLC Supervisory Park Ranger, the USFWS Project Leader of the Fergus Falls Wetland Management District, and the Region 3 Chief of the National Wildlife Refuge System also provided information for this evaluation. All data collection took place over the 2005-2006 school year. The evaluation was implemented by ISD 544, with assistance from the USFWS in survey administration, data analysis, and report preparation.

### Summary of Data Collection and Analysis

Instrument	Instrument Description	Constructs Assessed	Information Source	Time of Implementation	Data Analysis
Measures of Academic Progress	Part of the educational accountability system in the Fergus Falls School District, Minnesota, and other states	Math and language usage achievement	PSC students (n=96); ISD 544 5 <sup>th</sup> grade students in traditional classrooms (n=106); 5 <sup>th</sup> grade students in the U.S.	October 2005 April 2006	Independent-samples $t$ test
Affective Self-Report	20-item survey; likert items on 5-point scale (strongly agree to strongly disagree)	Attitudes toward learning, attitudes toward the prairie wetlands environment, stewardship ethic, sense of civic responsibility	PSC students (n=87)	September 2005 (pretest) and May 2006 (posttest)	Dependent-samples $t$ test
Skill Self-Report	14-item survey; likert items of 4-point scale (not at all to very well); item format "How well could you do each of the following at the beginning of the school year? Now?"	Science process skills, problem solving skills, and skills in working and communicating with others	PSC students (n=95)	May 2006	Dependent-samples $t$ test
Student Interviews	15 minute interviews using a question guide	Cognitive and affective program outcomes; program satisfaction; areas for program improvement	PSC students representing range of achievement levels (n=20)	April 2006	Analytic induction and deduction
Parent Survey	13-item survey; likert items on 4-point scale (strongly agree to strongly disagree)	Cognitive and affective program outcomes; program satisfaction; areas for program improvement	Parents of PSC students (n=63)	March 2006	Descriptive statistics
Parent Focus Group	1-hour focus group using a question guide	Cognitive and affective program outcomes; program satisfaction; areas for program improvement	Parents of PSC students (n=13)	March 2006	Analytic induction and deduction
Stakeholder Interviews	Informal interviews via electronic mail	Program outcomes and impact; degree program supported agency/organization goals; areas for program improvement	Middle School Principal; Regional Chief of National Wildlife Refuges; USFWS Project Leader of the Fergus Falls Wetland Management District; PWLC Supervisory Park Ranger (n=4)	July 2006	Analytic induction and deduction



## Evaluation Results

### 1. Have the students attained grade-level proficiency in science, math, and writing?

- PSC students' growth in language usage and math as indicated in the Measures of Academic Progress was not significantly different than their peers in traditional ISD 544 classrooms ( $p = 0.05$ ).\*
- PSC students' growth in language usage and math was below the national averages on the Measures of Academic Progress. Their counterparts in traditional ISD 544 classrooms also scored below the national averages in math and language usage.\*
- According to the results of the student interviews, PSC students felt they learned science, math, and writing concepts and skills and described this learning as stronger than in previous school years. They attributed this to learning in an outdoor prairie wetlands environment, first-hand observation of what they are studying, the real-world applications of science, math and writing, and their enjoyment of this method of learning.
- Of the PSC parents who completed the survey, 93% felt their children learned science, math, and writing concepts and skills better than they would have in a traditional classroom. Results of the focus group support this finding, as parents attributed stronger learning in the content areas to the PSC's hands-on instructional strategy, the interdisciplinary nature, and the real-world applications using the prairie wetlands environment in an authentic and relevant way. Parents also felt the PSC worked well for students with a variety of learning needs and physical abilities.

\*Despite student growth in math and language usage being below the national averages, no significant difference was found between PSC students and their ISD 544 counterparts in the traditional classroom. Further, parents and students felt participation in the PSC led to growth and mastery in the traditional subject areas. This sense of academic self-efficacy is also an indicator of positive impact on learning and achievement, as academic self-efficacy has research-based links to academic achievement.

#### Student Voices

*"We learn all the kinds of birds and we do all kinds of neat experiments. You wouldn't think that this would help with those kinds of subjects, with outside and stuff. You wouldn't think that would go with math and stuff. But it does. I don't even realize it."*

*"I learned how to write even better than I used to because now I can write about what I've seen not just what I've heard about."*

*"It makes it a lot easier. It takes the things you do everyday like math and reading and language arts and it combines them into outside stuff and all kinds of prairie things. It's like trying to take a prairie and mix it, throw it in the blender with math and science and language arts."*

#### Parent Voices

*"Her grades, her report cards that have come back, there's no conflict between here and what she's getting at the school in town."*

*"I've read some of the reports that [my son] has written, and I don't know where they're coming from. He's never been expressive before and now I'm reading the stuff he's writing out here and it's blowing my mind."*

*"I know they get math back in the middle school, but I think the math they get here is more like applied math. Everything is applied. It's 'how many snow bugs did you see out there?' and then you graph it. So it's the practical side of these aspects that they get with the math, the science. That's what makes them learn it."*

**2. Have the students' science process, problem solving, and their skills in working cooperatively and communicating with others increased?**

- 🌍 On 11 of 13 items on the student skill self-report, data showed a positive, statistically significant increase ( $p < .001$ ) in students' assessments of their science process and problem solving skills, and their skills in working cooperatively and communicating with others (see table below).\*
- 🌍 According to the results of the student interviews, PSC students felt they improved in science, attributing this improvement to the opportunity to practice observation skills and make discoveries in an outdoor setting.
- 🌍 According to the results of the student interviews, PSC students felt they had become better problem solvers, attributing this improvement to their practice in "reading the land," learning in their outdoor classroom, first-hand observation of what they were studying, and their enjoyment of learning in this way.

**Summary of Average Responses on the Skill Self-Report**

How well could you do each of the following?	Beginning of School Year	End of the School Year
1. Make observations about the environment around me.	A Little	Very Well
2. Read the landscape.	Not At All	Pretty Well
3. Make a reasonable guess about why something in nature happens.	A Little	Pretty Well
4. Collect data to answer a research question.	A Little	Pretty Well
5. Find information from more than one place when working on a project or a report.	A Little	Pretty Well
6. Ask questions to find out more information.	Pretty Well	Pretty Well
7. Think about what I've done to help me learn.	A Little	Pretty Well
8. Use the internet (at school or home) to find information.	Pretty Well	Pretty Well
9. Work with others as a team or in small groups.	Pretty Well	Very Well
10. Use field equipment to gather information or data.	A Little	Pretty Well
11. Identify the plants and animals that live in the prairie wetlands.	A Little	Pretty Well
12. Share my ideas with others through speaking.	A Little	Pretty Well
13. Share my ideas with others through writing.	A Little	Pretty Well

\*Because this skill self-report was not given to a control class, it is difficult to know if this growth in skills was due to the PSC or to cognitive maturation over the school year. The results of student interviews suggest that skill growth was due to the PSC, as students attributed skill growth to instructional strategies - the field-based setting, for example - that are not a part of the traditional classroom experience. Further, perceived growth in these skill areas is important, as it indicates academic self-efficacy, which has research-based links to academic performance.

**Student Voices**

*"Going outside and just discovering things. That turns into science but you don't even notice it."*

*"Science is easier because it's funner than last year because all we did was read from a book and here we read from a book and we go outside and experience it."*

*"When they do problems including the field it makes it a little bit easier to work them because I see - most likely I've seen those things. So I can picture them in my head a little bit easier instead of saying like seven crayons, I'm like seven crayons? I've seen lots of crayons before but not just seven. But when they say like three geese flew north but one-third of them turned around half-way, I can picture that."*

*"I think the prairie's actually helped me with problem solving, and it should help me a little bit with what I want to do when I get older, which is be an investigator. Because Mr. Ellis is teaching us how to get the clues and get the, 'what do you think happened?' and everything that we've learned. It's really helped me a lot."*

*"There's a lot of things to experience and you learn a lot more than in a regular classroom so that way you can understand how to get things done and solve problems and stuff."*

*"First I'd always spot stuff but I wouldn't actually think that much about it. I'd say, 'Well a deer was here and I'm guessing it was eating it,' but I wasn't thinking why would it eat here and not somewhere where there's more food?"*

### 3. Do the students have a more positive attitude toward learning, a more positive attitude toward the prairie wetlands environment, a stronger stewardship ethic, and a stronger sense of civic responsibility by the end of the school year compared to the beginning of the year?

- Interviews indicate students felt the PSC helped them become more interested in school and learning. They highly attributed this to authentic learning in the prairie wetlands environment, integration of subject areas, instructor skill/staff support, and enjoyment. Students also applied what they learned in the PSC to other subjects and outside of school.
- Of the PSC parents who completed the survey, 98% felt their children were more excited about school because of the PSC. All of the PSC parents who completed the survey felt their children expressed a positive attitude toward the PSC and were interested in discussing what they were learning in the PSC at home. The results of the focus group support these findings, as parents described hands-on, outdoor learning in the PSC as motivating their children toward learning.
- Four of 20 pairings in the student affective self-report show a statistically significant positive change in students' attitudes from fall to spring towards the prairie wetlands environment, a stronger stewardship ethic, and a stronger sense of civic responsibility ( $p = 0.05$ ). The remainder of the pairings did not show a statistically significant increase in student attitudes; however students started the school year with overall positive attitudes in those pairings. Based on the results of the student interviews and parent focus group, students and parents unanimously felt the PSC helped develop an awareness of and appreciation for the prairie wetlands environment, and some felt it benefited already highly motivated learners, increasing their motivation. Interviews also indicate students felt the PSC had a positive influence on their actions in the environment.

#### Parent Voices

"I have three boys and I don't know if it's just boys or what but my kids never talk about school really, ever. But [my PSC child] has come home quite a few times and talked about something that's happened at the prairie. And so I think that's a huge deal because he is enthusiastic and actually talking about school. They just don't typically talk about it. I mean, "How was your day?" "Good." That's it, you know. I can hardly pull anything out. But he's offered way more than he ever has so that's a good sign, tagging or whatever they're doing."

"I think too from being out here and touching the birds and the butterflies and seeing the different animals that are out here, I think they go back out and they're more thoughtful about throwing garbage on the ground. ... I've seen my son walk over and pick something up that he didn't even throw on the ground because an animal might get it or something. I think they start to think more about that and they start to look around and see that they can change some things."

#### Student Voices

"Every day I look forward to find out what we're going to do in the field and what we're going to see."

"I used to think school was kind of boring but here it's more fun and then I learned that school isn't all bad. It can be fun, too."

"After the first two weeks of school I'm just like, well I didn't want to get the stuff done at the middle school, but if I keep getting this stuff done then I can go to the Prairie Wetlands and I can do the other stuff!"

"I've learned that we ourselves even as kids can do something to help there be prairies in the future because we do a planting thing where we pick seeds in the fall and then they burned part of the prairie. We take them out and go and plant them. ... I can't wait to come back in a year or two and see what it all looks like. ... We had lots of fun doing it, too"

"I think it's more important now like how we're running out of fossil fuels and they're using switch grass to help make E85. I think that's kind of neat. So we need the environment more than I thought we did before I came here."

#### Parent Voices

"It's just a natural, I mean we all know that breaking up your day, change of environment, getting out and getting some fresh air is going to make the rest of the day in the classroom back at the middle school go a lot smoother."

"It's wonderful to see how excited they are when they come back and just talk to us about it. Like you said, the poems and all the little detail that they talk about of what they see out here, they observe."

#### 4. Did the Prairie Science Class meet the needs of the students and parents, the Fergus Falls ISD 544, and the U.S. Fish and Wildlife Service?

- According to the results of the interviews, students described their PSC experience as positive and as something they would recommend to others. Students also expressed the desire to participate in the PSC beyond 5<sup>th</sup> grade and recommended that it should be expanded so that more students could participate.
- According to results of the parent survey, parents were overwhelmingly positive about their children's experiences with the PSC. All of the respondents had a positive impression of the effects of the PSC on their children, felt their children benefited in ways that could not be achieved through a traditional program, and would recommend the program to others. All of the respondents also felt the PSC should be continued. Ninety-eight percent thought the PSC should be expanded to include more students.
- Based upon an informal electronic mail interview and growing partnership support from ISD 554, the PSC continues to meet the needs of ISD 544. The school district believes the PSC provides more authentic instruction, brings the classroom to life, creates partners within the community, and lays a foundation for life-long learning. The school district successfully advocated for a \$2 million bonding bill through the state legislature which will fund building expansion and double attendance in the PSC. This year the PSC received a number of accolades including the Minnesota Rural Education Association's Award of Distinction, U.S. Senator Mark Dayton's award for Excellence in Education, and recognition by the U.S. House of Representatives Appropriations Subcommittee.
- Based upon three informal electronic mail interviews and growing support from the USFWS, the PSC continues to meet the needs of the USFWS. According to the results of the parent survey, 90% of respondents indicated that their child's involvement in the PSC motivated their family to visit the PWLC, creating return visits from the community. One hundred percent of respondents think the PWLC is an appropriate place for the PSC. This year, USFWS staff and partners from several National Wildlife Refuges in the Midwest met at the PWLC to experience the PSC and determine how it might be adapted to fit their field stations. The PWLC Supervisory Park Ranger visited Blackwater National Wildlife Refuge in Maryland to consult with them as they develop a program similar to the PSC.

##### Student Voices

*"It's fun to be outside because the kids at the middle school just get to go outside for recess. They don't get to discover things like we do out at the prairie."*

*"I really like it because when I'm outside I get fresh air, I get exercise, and it's just beauty I think. It's fun being outside. There's writing things. I didn't used to like writing but now writing is fine because I got used to it, writing all of the prairie things."*

*"And now I finally understand why we burn the prairie, to make new way for new plants. I'm amazed it got green this fast. The seeds get planted under during winter."*

*"This is a refuge for prairie. There's not that much prairie left anymore anywhere. If kids all around the world could come to one prairie in their town or something, they could learn a lot more and we could help animals."*

*"If I could, I'd stay on for three years."*

##### Parent Voices

*"I think it gets the kids and their families out here more, too. Being in the class, we've participated in a lot more activities that the Prairie's held that we would have ever in the past participated in. [Our son] would come home so excited about it; we'd all want to participate."*

*"I want all the kids who want this program ... able to get it. I still think there's kids; there's not enough room."*

*"Whatever we can get as far as money or funding, expand it, make it last longer. Offer it through high school. That would be great. Next year starting. No rush, but...! Next year would be good."*



Students monitor bluebird boxes near Adams Pond; they record data and identify and solve problems associated with box placement.



Students discover, examine, and identify submergent aquatic vegetation in Mallard Marsh and compare and contrast their findings to other local wetlands.



PSC students and partners accept an award from U.S. Senator Mark Dayton during his visit to the area to recognize successful education programs.

### Stakeholder Voices

*"This has been a tremendous option for our 5<sup>th</sup> graders to be involved in this program - we have heard numerous comments about how these PSC students so look forward to coming to school and the chance to learn in an outdoor environmental education setting. Staff and students appreciate the change of pace and using an outdoor setting. This program can easily be duplicated elsewhere - we are more than open to the idea of offering assistance to anyone that is looking to start a program similar to ours. What we have also appreciated from the school point of view is the availability of US Fish and Wildlife staff that are on site each day and willing to help with the program - we could not do this alone - it is a great example of a wonderful partnership."*

- Middle School Principal

*"The Prairie Science Class very much continues to help fulfill the mission of the U.S. Fish and Wildlife Service and exemplifies what can happen through the power of partnerships. Through this innovative approach, the PSC is leading the way in shaping how the Service approaches environmental education in the Midwest, and as word of this innovative partnership spreads it is beginning to have an impact beyond the Midwest. It is my sincere hope that other regions in the Service and other agencies who have a responsibility for environmental education will embrace the Prairie Science Class concept as a model and much needed paradigm shift for young people if we are indeed to instill in them the benefits and value of the natural world."*

-Region 3 Chief of the National Wildlife Refuge System

*"I believe stations with adequate space (i.e. a classroom) and a cooperative school district nearby can implement this program. The best way for other refuges to implement the program is to have their Public Use staff and possibly project leaders visit the PSC for several days. Programs such as these are a critical component in providing students with the tools they need to become informed and enthusiastic about the future of America's wildlife resources."*

-Fergus Falls Wetland Management District Project Leader

*"We are able to weave and interpret our mission on at least a weekly, if not daily basis to the future stewards and decision makers. The program can definitely be replicated - the model that is - at other locations. Each site will have to modify and tweak, but the basic concept of repeat visitation and using the environment as the context for learning can be applied elsewhere."*

- Prairie Wetlands Learning Center Supervisory Park Ranger



## Conclusion

This year's evaluation of the Prairie Science Class is the most comprehensive of the three years the program has been in existence. A full complement of instruments was used as in the first year but with twice as many students enrolled. Another change included using the Measures of Academic Progress instead of the Minnesota Comprehensive Assessment to document math and language usage growth. In addition, for the first time the question of longevity was examined through preliminary scoping (see addendum).

The results of this evaluation reinforce findings of the first and second years which suggested positive cognitive and affective outcomes, including concept attainment and skill development in science and math; growth in problem solving and skills in working and communicating with others; and positive influences on students' motivation toward learning, attitudes toward the prairie wetlands environment, and stewardship ethic. Further, both ISD 544 and USFWS stakeholders indicate the PSC is accomplishing their respective missions and goals in a meaningful, quality way. Given these findings, continuation of this program is appropriate.

Formative evaluation is an important tool for program advancement. This year's evaluation indicated recommended improvements from parents and students. Specific suggestions for improvements are described in the "Recommendations" section of this report.

These findings are also consistent with research on other educational programs that use the environment as an integrating and motivating context as specified in the PSC 2003-2004 Evaluation Report. A growing volume of additional new research may be accessed at [http://www.peecworks.org/PEEC/PEEC\\_Research](http://www.peecworks.org/PEEC/PEEC_Research), the Place-Based Education Evaluation Collaborative web site. Previous research and the findings from the three PSC evaluations demonstrate that integrated learning using authentic, field-based experiences makes sense, with positive outcomes for students and the partnering organizations.



## Recommendations

The data collection tools collectively generated several areas for potential program improvement. Students offered numerous specific suggestions which are summarized here: enhanced outdoor access with added facilities and acreage, more equipment storage space, expanded 5<sup>th</sup> grade and multiple grade level enrollment, more time at the PWLC or full day attendance in PSC, and offering a summer program. Students also suggested minor curriculum changes related to science, math, writing, reading, and art. They further suggested shorter indoor lessons, more time outside, smaller outdoor groups, providing information on 5<sup>th</sup> grade choices to 4<sup>th</sup> graders, and more involvement from PWLC staff.

Parents offered prolific, specific suggestions as well, summarized here: full support of timely building expansion, expansion of 5<sup>th</sup> grade and multiple grade levels in both directions, obtaining the adjoining fairgrounds property for a new high school that uses the PWLC, more time in PSC, less busing time, all day at the PSC with full integration around nature and alternating day schedule at middle school, providing physical education credit to balance budget cuts, continuing involvement of PSC in middle school lyceums, required participation, maintaining parent choice in participation, lighter loads physically for students to carry, PSC students leading public hikes at the PWLC, increased communication for prospective PSC parents and students, regular communication in the school district and elementary school newsletters, PSC student development of a web-based newsletter with elementary student access during computer lab, a PSC overnight at the PWLC, weekly PSC summer program, studying other ecosystems through field trips, and water quality studies.

Findings from this program evaluation also provided recommendations for future implementation:

- *Program expansion* - Students, parents, ISD 544, and the USFWS collectively agreed that the PSC should be expanded to provide more 5<sup>th</sup> grade students with the opportunity to participate and to accommodate growing parent and student interest in the program. Stakeholders need to come to a consensus as to how specifically the PSC will expand due to the forthcoming building addition funded by the state bonding bill earlier this spring. Stakeholders also need to determine how to minimize impact to natural resources once building and program expansion are complete.
- *Professional development of teachers*. Along with the administrative support from ISD 544 and the USFWS, PSC teachers played a key role in the success of the program. Through

development of a formal partnership with colleges, there is a continued need to train formal educators and environmental educators in integrated, field-based teaching methods if the PSC is to be replicated or adapted in other school districts and at other natural areas. There is also a continued need for internal education of other ISD 544 staff who are unfamiliar with the philosophy and operations of the PSC; ongoing, periodic in-service training would help address this need. In June 2006, PSC instructors and PWLC staff concurrently hosted a five-day "Summer Explorers Biology Camp" for 6<sup>th</sup>-7<sup>th</sup> graders with a "Teaching in the Outdoor Classroom" training for educators. Fifty-two students and teachers participated. A similar effort should be attempted in summer 2007 if funding permits.

- *Academic growth* - The Measures of Academic Progress indicate ISD 544 5<sup>th</sup> graders' growth in math and language usage is below the national average. School district staff should examine potential causes for this change and implement appropriate improvements.
- *Continue and update evaluation and monitoring of student progress.* Given a continued emphasis on educational accountability and limited financial and staff resources, evaluation still plays a role in justifying the effort and resources that are being expended. However, with three years of evaluation now completed and program success established, evaluation takes on a changing role. With a growing availability of data over time, careful development should establish a long-term evaluation plan which considers the feasibility of examining longevity of results and which addresses internal issues amongst some school district staff regarding use of a control group. That plan should include a cycle of evaluation which addresses management of a potentially large data set and how evaluation will be handled once building and program expansion are completed.



A PSC 5<sup>th</sup> graders uses his binoculars in reverse to closely examine the earliest blooming prairie plant, pasque flower.

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*This report was prepared by PWLC staff Molly Stoddard, Laura Bonneau, and Ken Garrahan with guidance from Dr. Julie Ernst, a former environmental education specialist for the USFWS. Evaluation questions can be directed to her at [jernst@d.umn.edu](mailto:jernst@d.umn.edu). General program questions can be directed to PWLC Supervisory Park Ranger Ken Garrahan (218-736-0938 or [ken\\_garrahan@fws.gov](mailto:ken_garrahan@fws.gov)) or Principal Dean Monke (218-998-0544 or [dmonke@fergusfalls.k12.mn.us](mailto:dmonke@fergusfalls.k12.mn.us)).*



## Addendum - 7<sup>th</sup> Grade

### **Program Summary**

Since 1998, the 7<sup>th</sup> grade life science curriculum has involved all ISD 544-7th graders in an important project called Ecosystem Experiences. The project begins with a classroom visit from a U.S. Fish and Wildlife Service employee to help students improve their observation skills. Students then make one fall visit to the PWLC to collect baseline data including completing site surveys comparing the oak savanna, prairie, and wetland ecosystems. They also visit once in winter to obtain more site survey data. This first part of the project is supported with a packet of worksheets that the students complete. Through the year students complete ecosystem journals independently. Starting in the spring trimester, they are organized into groups based on chosen ecosystems and start the process of following the scientific method. Together each group formulates a question, gathers information through research, creates a hypothesis, then designs and conducts an experiment at the PWLC during two spring field trips, generating data and results. Back in the classroom, they analyze the results and put together a presentation which they give to their peers and teacher in the classroom. All four field trip visits are supported by a PWLC employee who provides guidance and resource materials and equipment as needed. The 7<sup>th</sup> grade science teachers and the PWLC employee have all been involved with the Ecosystems Experiences project since its inception.

In the 2005-6 school year, Prairie Science Class students were part of the 7<sup>th</sup> grade program for the first time. These former PSC students were 45 of the 50 students who participated in the first year of the Prairie Science Class as 5<sup>th</sup> graders in 2003-2004. Their identity was not provided to teachers, and they maintained that anonymity through the school year with only a few minor exceptions. Having worked with the first year PSC, student identity was generally known to the PWLC employee but not communicated to teachers. There were a total of 251-7<sup>th</sup> graders in 2005-6.

In an effort to consider longevity of benefits to students from the Prairie Science Class, preliminary scoping took place in addition to the Prairie Science Class formative evaluation and is included here as a supplement to this evaluation report.

### **Summary of Data Collection and Analysis**

In May 2006, 10 randomly selected former Prairie Science Class students participated in 10 minute interviews using a question guide. In June 2006, both 7<sup>th</sup> grade science teachers participated in a 30-minute interview using a question guide. In July 2006, the PWLC employee who worked with the 7<sup>th</sup> graders participated in a 30-minute interview using a question guide. Constructs assessed in all interviews included long-term cognitive and affective program outcomes; program satisfaction; and areas for program improvement. Data from all interviews was analyzed using analytic deduction and induction.

## Results

- According to teacher and PWLC staff interviews, students did not exhibit different knowledge or skills in math, science, writing or problem-solving compared to previous years with minor exceptions of general familiarity or recollections of plant life, winter ecology, trails, and available equipment. The PWLC employee attributed this possibly to the experimental nature of the first-year PSC. No change in sophistication (level of inquiry or critical thinking) of experimental design or independent ecosystem journals was observed compared to previous years. Minor exceptions were noted but teachers hesitated to attribute them directly to involvement in the Prairie Science Class. Variables mentioned include previous field trips or visits with family made to the PWLC. Students interviewed felt in 7<sup>th</sup> grade they used some of the writing, science, math, and problem solving learned in the Prairie Science Class, especially in science and even more so in the Ecosystems Experiences project or independent journal.
- Teacher interviews indicate most seventh grade science students showed lower motivation for learning and academic weakness this year; teachers did not attribute this to the PSC but to poor group dynamics in part, noted to a smaller degree by the PWLC employee. The PWLC employee observed that former PSC students were more likely to approach her with questions and listen to her; and they had more questions. Both teachers agreed that students did not appear burned-out by their previous PSC experience. On the contrary, students showed greater enthusiasm to visit the PWLC compared to previous years, and teachers attributed this observation to the PSC or previous trips to the PWLC. The PWLC employee observed PSC pride and ownership in former PSC students. These observations help support the results of the student interviews which indicate that students feel more positive about school and learning because of the PSC.
- However, teachers and PWLC staff observed a difference in students' knowledge or attitudes towards nature, wildlife, or the environment in terms of vocabulary especially plant names, communication skills, and familiarity with PWLC as an outdoor classroom or site. They attribute these changes for the most part to the PSC. The PWLC employee did not see a difference because of an already high level of respect for the environment possibly due to previous programming with the PWLC. Students unanimously felt their thoughts and attitudes changed because of the PSC especially in terms of nature and stewardship.
- Both teachers identified the Ecosystems Experience project as a key part of the 7<sup>th</sup> grade life sciences curriculum and appreciation for support from the PWLC and the particular employee they have worked with each year. Repeat use of the PWLC facility by the same students helps meet the mission of the FWS and PWLC.

## **Conclusion**

Overall the results of this scoping are somewhat mixed. The most important cognitive benefits were not observed by teachers or PWLC staff. There does seem to be some long-term cognitive and certainly affective benefit of the PSC for 7<sup>th</sup> grade science students though. Students' positive sentiments echo some of the comments made by current-year PSC students and their parents. Numerous questions remain such as: Were the majority of apathetic 7<sup>th</sup> graders former PSC students, or were the minority of highly motivated ones in the PSC? Will subsequent years show a more dramatic result with 100 former PSC students in 7<sup>th</sup> grade instead of only 50? Is one year of non-traditional instruction and learning out of seven potential years enough to enable students to retain and apply knowledge and skills later during 7<sup>th</sup> grade science? Additional evaluation with 7<sup>th</sup> grade cohorts should be done to explore these questions.

## **Recommendations**

The data collection tools collectively generated two main areas for potential program improvement: teacher communication and student preparation. All of the suggestions made by the teachers relate to improving communications and curriculum coordination, including between life science teachers across multiple grade levels from 5<sup>th</sup> grade through high school. Improved curriculum coordination would better prepare students for 7<sup>th</sup> grade science particularly if considered with state and local academic standards.

The PWLC employee further recommends better preparation of students for 7<sup>th</sup> grade in the scientific method and independent thinking skills by adding a small research project to the end of the 5<sup>th</sup> grade PSC experience. This project should emphasize the importance of repeating experiments for increased validity, understanding the landscape as a whole with applications beyond the small research plot, and strengthening understanding of the purpose of research and related inquiry. She also recommends that the PWLC building expansion and subsequent PSC expanding enrollment include 6<sup>th</sup> grade instead of younger grades as a stepping stone between the 5<sup>th</sup> grade PSC and the 7<sup>th</sup> grade Ecosystems Experiences project. As a long-term evaluation plan develops during the 2006-2007 school year, longevity should be considered and potentially a pre- and post-test of knowledge of the scientific method added for all 7<sup>th</sup> grade science students.

To better prepare PSC students for 7<sup>th</sup> grade science, first-year PSC students interviewed recommend more time in the PSC, doing more math in the PSC, keeping the PSC the way it is by providing daily place-based learning opportunities, and giving students the opportunity to use the prairie as an outdoor classroom in any grade.