

Environmental Education Strategy

Introduction

Environmental education is an important tool in natural resource management. It can help improve people's understanding of ecological systems and U.S. Fish and Wildlife Service (Service) conservation efforts. It can also help people develop the skills, motivation, and commitment to help support and assist in these conservation efforts on a local level.

The Service Directorate officially made "Connecting People with Nature" one of the Service's six highest priorities in January 2007, and this decision was documented in Director Dale Hall's memorandum to all Service employees dated February 7, 2007. Working to connect people to nature, the Service also strives to help the public understand that they have a role in natural resource conservation. The Service recognizes that its commitment to connecting people to nature is critical to the future of both the agency and to the conservation legacy of the Nation's fish and wildlife resources. Therefore the initial focus for the Service's work in this area is to connect children with nature. Environmental education is one of several ways the Service commits to public service and the future, which also supports the Service's vision, conservation principles established in 2007.

The importance of environmental education in the National Wildlife Refuge System (Refuge System) is further underscored by the fact that it is one of the six priority wildlife-dependent recreational activities supported by the Refuge System Improvement Act of 1997. National policy has been developed to provide guidance to Service staff on environmental education. The Service's definition of environmental education for the Refuge System is...

...a process designed to teach citizens and visitors the history and importance of conservation and the biological and the scientific knowledge of our Nation's natural resources. Through this process, we can help develop a citizenry that has the awareness, knowledge, attitudes, skills, motivation, and commitment to work cooperatively towards the conservation of our Nation's environmental resources. Environmental education within the Refuge System incorporates on-site, off-site, and distance learning materials, activities, programs, and products that address the audience's course of study, refuge purpose(s), physical attributes, ecosystem dynamics, conservation strategies, and the Refuge System mission. (FWS policy 605 FW 6)

Environmental understanding develops as people are presented with multiple opportunities to learn throughout their lifetime through the media, schools, travel, Internet, and other avenues. As people learn about the environment, they often experience different areas of understanding: awareness, knowledge, attitudes, skills, and participation (*Tbilisi Declaration*, UNESCO/UNEP, 1978). Environmental education collectively across all of its efforts needs to address all of these learning areas in order to reach a goal of environmental literacy for citizens. The Refuge System provides a widespread network of federal public lands which link people and nature, supporting a broad movement to connect children with nature and build environmental literacy.

The Fergus Falls Wetland Management District (District) seeks to help build an aware, knowledgeable, and skilled citizenry which values and protects the prairie pothole ecosystem. The mission of the District's Prairie Wetlands Learning Center (PWLC) is:

To provide environmental education opportunities for students, private landowners and the general public, and to foster stewardship by demonstrating the methods for protection, enhancement and restoration of the prairie pothole ecosystem.

The PWLC's mission identifies three main audiences: students, private landowners, and the general public. The PWLC serves an important role in providing these audiences with education, information, communication, interpretation, and outreach. Although the theme and messages described in the remainder of this document pertain to all three audiences, the focus of this strategy is to guide environmental education for the PWLC's priority audience – the formal education community.

Through the PWLC, the District has offered environmental education services since 1994 based upon demand, agency initiatives, and available resources. The PWLC provides environmental education services primarily as an opportunity to help achieve the mission of the PWLC and the Service; thus all environmental education services will be relevant to these missions. Its primary role in serving formal education is to extend the preschool through post-secondary classroom to an outdoor classroom where an opportunity for applied learning in an authentic, local setting takes place. The PWLC's role is not to replace instruction provided in school classrooms but to enrich it and help students make real-world connections to their community.

In 2006-2007, PWLC staff worked together with the manager of the District and education partners to develop an environmental education strategy for the PWLC. The purpose of this document is to outline a strategy for future development and management of environmental education services offered by the PWLC to the formal education community. The most important means of delivering these services is through on-site and off-site field investigations.

Theme *The Prairie Pothole Region*

As identified by PWLC staff and in coordination with other visitor services provided by the District, the prairie pothole region serves as a broad, over-arching, and

comprehensive theme to the entire environmental education program. The prairie pothole region is defined geographically as the northern portion of North America's grassland biome. It covers approximately 300,000 square miles within five states and three Canadian provinces including Minnesota and Otter Tail County. Throughout the region, retreating glaciers left about 25 million depressions of various sizes in their wake, or about 83 potholes per square mile. This density of wetlands is unmatched on the continent. Prior to settlement, the prairie pothole region was a paradise for waterfowl, prairie chickens, whooping cranes, bison, wolves and other prairie wildlife. Changes to the landscape resulted in the loss of most native prairie and the drainage of over 80 percent of the small wetlands. Despite these losses, the prairie pothole region remains a critical waterfowl production and migration area, providing the highest waterfowl nesting density in Minnesota (3.5 nests per acre). The region's complex of wetlands and surrounding prairie produces more than 50% of ducks hatched in North America. The District restores grasslands and wetlands on privately owned property with landowners and preserves prairie wetlands complexes on 44,000 acres of Waterfowl Production Areas in western Minnesota.

Primary Environmental Education Message

The prairie pothole region is valuable and in need of restoration and protection.

The primary message stated in italics above is the main idea that underlies all environmental education programs and products offered by the PWLC. It is the big picture, take-home idea, in part or in its entirety depending upon the audience. It is consistent with the vision for Minnesota Wetland Management Districts and the missions of the Fergus Falls Wetland Management District and the PWLC. Three sub-messages are detailed below.

Sub-Messages

- *Wildlife: The prairie pothole region is home to a variety of resident and migratory wildlife.*
- *Habitat: The prairie pothole region is a unique and rare ecosystem.*
- *People: The U.S. Fish and Wildlife Service works with others to preserve, manage, and restore prairie wetlands in the prairie pothole region.*

These sub-messages align with issues identified in the Fergus Falls Wetland Management District Comprehensive Conservation Plan and the Minnesota Academic Standards for Science. This alignment helps address District issues through education. It also helps ensure that programs meet the needs of teachers and students, and that the content, objectives, and topic area for each program is age-appropriate. (Please see separate document called "Environmental Education Strategy Sub-Message and Audience Priority Matrix.") This Environmental Education Strategy and the matrix helps guide on-going curriculum revision (see page 5) to ensure the missions of the Service as well as the needs of school administrators, teachers, and students are addressed through the PWLC's educational programs.

General Performance Objectives

Environmental education services offered by the PWLC support one or more of the preceding sub-messages and one or more of the performance objectives below.

As a result of participating in environmental education services offered by the PWLC (depending upon the number of visits), students will be better able to do one or more of the following:

1. Explain the role of the U.S. Fish and Wildlife Service, the National Wildlife Refuge System, the Fergus Falls Wetland Management District, and the PWLC in conserving our lands and resources. (Wildlife, Habitat, and People)
2. Describe the importance of conserving the prairie pothole region to wildlife and people, both historically and presently. (Wildlife, Habitat, and People)
3. Use scientific methodology to explore the environment (ask questions, hypothesize, collect data, analyze data, form conclusions, make recommendations). (Wildlife and Habitat)
4. Describe and apply basic ecological concepts such as energy flow, community, biodiversity, change, interrelationships, cycles, and adaptations. (Wildlife and Habitat)
5. Identify the components and functions of a given ecosystem by observing, counting, and describing the animals and plants in that ecosystem. (Wildlife and Habitat)
6. Develop and present a land use or land management decision and judge the consequences of that decision. (Wildlife, Habitat, and People)
7. Understand and participate in restoration, enhancement, protection, and management methods of prairie and wetlands. (Habitat and People)
8. Value and affect the prairie wetlands environment through their stewardship ethic. (People)

Methodology and Relevance

There is a growing body of research and many anecdotal examples of activities that successfully help children connect with nature. Children appear to connect with nature when they get outside on a regular, sustained basis to discover and explore. Connections are made when children's exposure is experiential, using as many senses as possible. Activities that promote self-guided learning and exploration, rather than highly structured activities, may help children make stronger connections to nature. Rachel Carson told us 50 years ago, and subsequent research supports, that connecting with nature may not initially involve conveyance of facts or environmental concepts, but rather providing an opportunity to form an emotional attachment to nature, which forms the foundation for future learning and respect for nature.

The messages and general objectives expressed above are best conveyed through authentic, experiential, place-based learning experiences (on-site field investigations) using a constructivist approach. This progressive approach to education is different from a more traditional method where, for example, instructors front-load students with information through a lecture, and students listen and complete worksheets. Rather, teachers, students, and experts embark together on an outdoor discovery experience, and students readily claim and assimilate their new-found knowledge.

Four educational theories underlie this methodology:

- *Experiential education* is a philosophy and a methodology in which educators purposefully engage with learners in direct experience and focused reflection in order to increase knowledge, develop skills, and clarify values. Experiential learning occurs when carefully chosen experiences are supported by reflection, critical analysis and synthesis. Throughout the experiential learning process, the learner is actively engaged in posing questions, investigating, experimenting, being curious, solving problems, assuming responsibility, being creative and constructing meaning. (Association for Experiential Education)
- A *constructivist approach* to learning emphasizes real-life, challenging projects and problems that include collaboration among students, teachers and experts in the learning community. Knowledge is not a fixed object, but learners are active participants in building and connecting their current knowledge of the world to new knowledge over time and through experience, inquiry, and reflection. Learning is student-centered and student-driven with student participation in decision-making that shapes its course. Constructivist teachers are coaches and inquire about student understanding before sharing their own. Curriculum relies on primary sources of data and manipulative material drawn from the prairie wetlands environment. (University Texas at Austin, College of Education)
- *Place-based education* has many forms. The most critical aspect of it is the use of the local environment as an integrating context for experiential learning. The Environment as the Integrating Context for Learning model uses a community's natural local and social settings to engage students in schoolwork that they perceive as relevant to their daily lives, thus increasing their motivation for learning and academic achievement. (State Education and Environment Roundtable, Poway, California) The local outdoor prairie wetlands environment is the centerpiece context for learning at the PWLC. The foremost tools used are nature journals, naturalists, and phenological studies. Combined with place-based education, the PWLC refers to this foursome as "the compass," the major technique used for connecting children with nature in an outdoor classroom setting.
- In *developmentally-appropriate practice*, teachers use knowledge of child development to identify safe, healthy, interesting, achievable, and challenging activities, interactions, experiences, and materials for a specific age group. Students learn in a developmental sequence, progressing at their own pace. In a developmentally appropriate curriculum, all areas of development (physical, cognitive, social, and emotional) are addressed, and as often as possible, integrated into all activities. At the PWLC, curriculum is designed specifically for each grade level and is aligned with current academic content standards for each grade level, ensuring that student learning and participation is developmentally appropriate. This education theory may include several teaching strategies: active and relevant learning experiences, varied instructional strategies, a mixture of teacher-directed and student-directed activities, and integrated curriculum. (North Central Regional Education Laboratory, National Association for the Education of Young Children, and the Teaching Research Institute)

Priority will be given to the development and scheduling of such on-site, field-based experiences. Secondary instructional methods include indoor and outdoor demonstrations and presentations, teacher-guided research, and service learning projects. Indoor presentations may be developed and offered in partnership with other organizations. Indoor and off-site presentations are best scheduled for winter when demand for on-site experiences is lowest. More specifically, PWLC staff book on-site groups (and some off-site) based upon the following prioritization:

1. Prairie Science Class
2. Other environmental education partnerships (repeat, integrated, on- and off-site and schools partnering with other R3 field stations through PWLC)
3. Single, day use preK-6th grade visits
4. Other age groups
5. Any other groups

Key Prairie Science Class dates are booked by the end of the previous school year. After that point, the remaining categories of groups outlined above are booked in sequence until the visitor services manager deems that a particular week, month, or season is completely booked.

The primary purpose or topic of all environmental services supports the missions of the Service, the Refuge System, the District, and the PWLC. Priority is given to field investigations conducted on the most local context level and with relevance to the prairie pothole region.

- Example 1, Prairie and Wetland Field Studies: Highest priority will be given to field investigations at the PWLC since authentic, field-based learning experiences can be provided on-site or on other lands within the Prairie Pothole Region such as other Waterfowl Production Areas and National Wildlife Refuges, state lands, and private lands.
- Example 2, Rainforests and Oceans: Because on-site field studies about these topics cannot be conducted on-site, they will be given low or no priority.

Where some field-based learning experiences would not be possible but subject matter is relevant to the prairie pothole region, secondary methodologies such as distance education, on-line learning, or off-site presentations may be used.

Documentation and Academic Standards

Learning experiences offered by the PWLC are planned and documented in a consistent and comprehensive written format. To help educators prepare students and to seamlessly extend the learning experience back to the classroom, these lesson plans include suggested pre- and post-visit activities and are available on-line.

All learning experiences offered by the PWLC primarily help support current Minnesota Academic Standards in science and national science standards as well as other MN academic standards. Correlations are provided in written lesson plans.

Seasonality and Access

Field investigations are offered for each preschool and elementary grade and season; one fall, one winter, and one spring field investigation is offered. They build upon each other through the school year and through the K-12 learner progression.

Field investigations are booked on a first-come, first-served basis via telephone and email. Accommodations for persons with disabilities or special needs are queried during bookings to ensure that all students can participate. School districts typically provide needed services such as para-professionals to assist students with special needs.

Current Environmental Education Resources

Resources include *people, facilities, equipment, and funding* currently available for the PWLC's overall environmental education program operation.

➤ People: Staff and Partners

Currently three full-time, permanent employees are available to provide front-line environmental education services: one environmental education specialist and two instructional systems specialists. Each of these individuals can lead field investigations four days per week in spring and fall during the peak seasons for demand and as needed in winter and summer. Along with the visitor services manager, these employees also develop and provide environmental education products and projects in balance with other visitor services duties. Their specialized interests and knowledge include but are not limited to digital nature photography, hunting, natural resource management, prairie restoration, phenology, bird identification, bird banding, prairie and wetland ecology, conservation, the Refuge System, field-based learning, nature journaling, naturalists, and constructivism. The education staff may periodically include a seasonal Service employee participating in the Student Temporary Employment Program or in the Student Career Experience Program. The PWLC and the Friends of the PWLC partner with the Student Conservation Association to recruit and hire college graduates who augment the education staff as environmental fellows, 9-month positions during the school year in support of the PWLC and the Prairie Science Class. The PWLC also hires summer interns independent of those organizations.

Two more employees provide behind-the-scenes office and maintenance support for environmental education as well as other visitor services. Other field station staff may share expertise or host field trips from the Prairie Science Class. Of note, the Habitat and Population Evaluation Team helps provide field training and education opportunities for staff and Prairie Science Class students. A very small number of volunteers currently help with day use programs on an infrequent basis. Regional office staff provide environmental education consultation and publicity, evaluation support, and internal grants when available. Contractual services to Productive Alternatives meets cleaning needs for the dormitory as a result of residential visits. The PWLC serves as a host agency for training and working with older workers in exchange for federally subsidized hours of participation. Experience Works currently provides funding for one part-time employee who assists in maintenance needs at the PWLC.

The PWLC works closely with Independent School District 544 in the Prairie Science Class partnership. The University of Minnesota-Morris and the Minnesota State University-Moorhead also partner with the Prairie Science Class to periodically provide student teaching opportunities for pre-service educators

The Friends of the PWLC is a critical education partner for the PWLC, supporting programming with donations of funding. They play(ed) a key role in:

- Raising money to fund education interns and fellows since 2009
- Raising money to replenish the Yellow Bus Fund, paying costs to transport day-use students visiting the PWLC.

They have established a foundation administered for them by West Central Initiative to secure future funding in support of PWLC educational activities. Other past fundraising efforts have made construction of the new amphitheater and education wing possible.

Other private conservation organizations that partner with the PWLC include the Fergus Falls Fish and Game Club and the Fergus Falls Garden Club, providing funding and other support.

Government conservation agencies who have partnered with the PWLC include the University of Minnesota Extension and Master Gardeners. Other government agencies include the City of Fergus Falls and the State of Minnesota through their role in accepting and using state bonding funds for the benefit of the PWLC.

Other partnering groups include the Frank W. Vedeen Charitable Trust, the Mildred R. Thompson Family, Otter Tail Power Company, Otto Bremer Foundation, and the Donald M. Weesner Foundation, providing funding support of the Prairie Science Class and day use field investigations as well as support of outreach efforts to area schools through the NatureWorks project.

➤ Seasonal Natural Resource Events

Significant local natural resource events capture our attention and are a focal point of field investigations occurring seasonally.

Season	Events
Spring	Spring phenology; waterfowl, songbird, and raptor migration; waterfowl and songbird nesting; aquatic macro- and micro-invertebrates
Summer	Summer phenology, waterfowl and songbird nesting and rearing, aquatic plants and macro- and micro-invertebrates, prairie-wetlands insects, blooming plants
Fall	Fall phenology, waterfowl and songbird migration, aquatic macro- and micro-invertebrates, monarch migration, seeding plants
Winter	Winter phenology and ecology (snow crystals, meteorology, invertebrates, winter wildlife, etc.)

➤ Facilities: Outdoors and Indoors

Field investigations take place in the following outdoor facilities year-round:

Outdoor Facility	Examples of Activities
Amphitheater	Large group orientation and reflection, observation of Mallard Marsh, access to cattails and Mallard Marsh ice in winter for winter ecology studies
Pollinator garden	Plant, bird, and invertebrate studies, reading the land
Mallard Marsh bridge	Aquatic plant and invertebrate studies, bird and wildlife watching, cattail crawl and access to Mallard Marsh ice in winter for winter ecology studies
Adams Pond floating platform	Aquatic plant and invertebrate studies, bird and wildlife watching, cattail crawl and access to Adams Pond ice in winter for winter ecology studies
Six hiking trails totaling four miles in length	Discovery hikes, ecosystem studies, bird and wildlife watching, prairie seed harvesting, meter plot studies, prairie wetlands observations
Songbird mist-netting station	Mist-netting and banding of migrating and nesting songbirds for the Prairie Science Class in spring and fall as well as Biology Campers in summer

In spring and summer, users stay on the trails to minimize disturbance to nesting waterfowl and songbirds. In fall and winter, however, students may venture off-trail for an added prairie immersion experience. Impact on natural resources is reduced with Leave No Trace training in the Prairie Science Class and day-use visiting groups. Bus and other vehicle parking are readily available at the PWLC. Accessibility compliance for outdoor facilities needs to be addressed through a visitor services review.

Other local, related sites include Waterfowl Production Areas such as Nicholson and Agassiz Beachline, One-Mile Prairie, and the Fergus Falls High School's future prairie restoration site. PWLC staff will not provide field investigations in fall during hunting seasons on Waterfowl Production Areas, and self-guided use is strongly discouraged.

Several indoor building facilities are available for orientation, reflection, and in case of unsafe weather.

Indoor Facility	Capacity	Activities
Dining hall	177	Meals, large group orientation and reflection
Classrooms 1 and 2 – joined	49 total	Field investigation introductions and conclusions; severe weather activities
Classrooms – 3, 4, 5, and 6, joined in pairs	250	Prairie Science Class instruction
Greenhouse	40	Propagation of native plants for restoration and educational purposes, tours, student study and participation
Barn	106	Meals, aquatic labs, smaller group orientation and reflection

Sod house exhibit	25	Viewing of audio visual productions, smaller group orientation and reflection
Lounges – 3	25 each	Smaller group orientation and reflection

Indoor facilities may be used in combination with outdoor facilities to provide a consistent format: orientation to field investigation (indoors), field investigation (outdoors), reflection of field investigation (indoors), with students spending the majority of their time on-site in the outdoor setting. This format ensures appropriate use of the outdoor classroom, a resource not readily available at other community field trip sites or on school grounds.

Distance education technology is not available on-site but is available locally through the Lakes Country Services Cooperative and potentially through NW-LINKS.

Accessibility compliance for indoor facilities needs to be addressed through a visitor services review. The visitor PWLC has several accessible features including an elevator, wheelchair, and auditory and tactile exhibit features.

➤ Equipment and Materials

Available presentation equipment includes two laptop computers, one portable LCD projector, six ceiling mounted LCD projectors, two portable TV/VCR/DVD units, and portable and mounted projector screens. The best daytime space for presenting audio-visual productions is classrooms 1 and 2. The sod house theater darkens well but is limited in size to smaller groups and by acoustics issues with the dining hall. The dining hall does not darken (except naturally at night). In partnership with the Friends of the PWLC, the PWLC developed several movies about the prairie pothole region for use in the sod house as part of an installed exhibit. Various productions of the National Conservation Training Center and others are also available for viewing from the PWLC resource library.

The PWLC has a wide array of hands-on and demonstration materials including mammal pelts, animal skulls and bones, mounted bird specimens, and the EnviroScape watershed model. Observation and collecting tools include binoculars, spotting scopes, telescopes, microscopes, hand lenses, loupes, butterfly and aquatic nets, bug containers, dish pan tubs, magnifying bug boxes, hand trowels, and a plankton net. Some materials have been centralized into educational kits available for free loan to educators, hunter safety instructors, and landowners: the Growing Native Trunk, the Suitcase for Survival, the Songbird Blues Trunk, the Tallgrass Prairie Discovery Trunk, the All About Hunting Deer Trunk, the Shorebird Trunk, and the Invasive Species Trunk.

Among personal staff collections and the PWLC's robust resource library, numerous curriculum guides, field guides, dichotomous keys, and other reference books are available as on-site resources and for field use. The PWLC does not offer a collection of its own lessons in a printed guide; however seasonal lesson plans to guide field investigations for visiting preschool through 5/6th graders are published on the PWLC's web site.

➤ Funding

Long-term financial development and support of the PWLC's overall environmental education program, its staffing, facilities, and equipment is provided through:

- the Service's annual operational, maintenance, and visitor services budgets;
- fees charged for residential visits;
- support from the Friends of the PWLC; and
- donations from private individuals, businesses, and other organizations.

Future Environmental Education Resources

The following list includes some of the ways the PWLC expects to enhance and improve its environmental education resources:

- Develop a visitor services plan for the new property addition south of the boundary of Townsend Waterfowl Production Area to accommodate growing use by school groups
- Add an auditorium to the visitor PWLC to accommodate large sized groups
- Upgrade the visitor PWLC's weather station with webcams
- Implementation of digital nature photography curriculum as a University of Minnesota-Duluth graduate research project with the Prairie Science Class
- Construct an additional aquatic study platform or boardwalk
- Design and construct a scenic overlook in the Mallard Marsh oak savanna

With partnership support, these and other projects will increase the quality of environmental education services provided by the PWLC.

Curriculum Enhancement, Evaluation, and Modification

On-going curriculum enhancement focuses on:

- supporting current Minnesota academic science standards with the addition of language arts standards;
- new evaluation results of the Prairie Science Class and other environmental education programs using a filtering process as part of a long-term evaluation plan (see also Evaluation and Modification, below); and
- new and innovative outside sources of environmental education curricula.

In partnership with the University of Minnesota-Duluth, the PWLC developed a long-term evaluation plan for the Prairie Science Class and for day-use and residential field investigations. This plan will continue the Prairie Science Class' formative evaluation which took place from 2003-2006 and expand the PWLC's existing use of Level 1 evaluation (Donald L. Kirkpatrick, Evaluating Training Programs, the Four Levels) to provide a sustainable, valid system of obtaining, managing, and interpreting data. Evaluation will provide a mechanism for regular program modification and improvement. This Environmental Education Strategy is considered a living document and will be modified accordingly as needed.

Resources

For additional information, please refer to the following Internet resources.

Connecting People with Nature

<https://intranet.fws.gov/nctc/childrenandnature/outreachttools.html>

Constructivism

<http://www.funderstanding.com/content/constructivism>

<http://viking.coe.uh.edu/~ichen/ebook/et-it/constr.htm>

Place-based education

<http://www.seer.org>

<http://www.peecworks.org/default.shtml>

Experiential learning

<http://www.aee.org>

Developmentally-appropriate practice

<http://www.ncrel.org/sdrs/areas/issues/methods/instrctn/in5lk5.htm>

<http://www.naeyc.org> (enter “developmentally appropriate practice” in the search bar)

Inquiry-based learning

<http://www.thirteen.org/edonline/concept2class/inquiry/index.html>

<http://www.teach-nology.com/currenttrends/inquiry/>

Academic standards

<http://education.state.mn.us/mde/index.html>

<http://www.educationworld.com/standards/> (copy and paste this one into your browser)

Nature deficit-disorder; Children and Nature Network

<http://cnaturenet.org>

Prairie pothole region

<http://www.fws.gov/midwest/HAPET>

<http://www.epa.gov/owow/wetlands/types/pothole.html>

<http://www.usgs.gov/ecosystems/environments/wetlands.html>

U.S. Fish and Wildlife Service

<http://www.fws.gov>

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