

# Science Education, Outreach, and Citizen Involvement

National parks enjoy great public support and admiration, yet they can play an even greater and more meaningful role in the lives of Americans. One need is to expand the reach and relevance of national parks so that broader segments



of society can enjoy the outstanding values they offer. Moreover, engaging the public in exciting and motivating ways not only helps them form personal connections with the parks but also raises their awareness and appreciation of park purposes and stewardship.

Science education and public involvement in the scientific resource management

activities of the National Park Service are two important areas that address this need. This chapter discusses a variety of innovative programs

*“Parks generate passion for learning, with deep, personal, emotional connections born out of experience, and stimulate the curiosity that is the bedrock of science.”* — Gary E. Davis, David M. Graber, and Steven A. Acker

developed by the National Park Service and its partners for the public to learn about their national parks in the context of science and to participate directly in their care. Techniques vary from integrating principles of biology and physical sciences exemplified in the national parks into school curriculums to designing park management projects that give participants—often volunteers or students—practical experience in



resource restoration or data collection for resource inventory and monitoring. Some of the activities described herein reach out to new audiences; all extend opportunities for the public to establish or deepen their relationships with parks and develop a more sophisticated knowledge of park resources and their management. The results are stimulating, both for park managers who work to preserve national park values on a daily basis and for the public who ultimately decides their fate.



# Native American science students study camas lily at Nez Perce's Weippe Prairie

By Tom Rodhouse

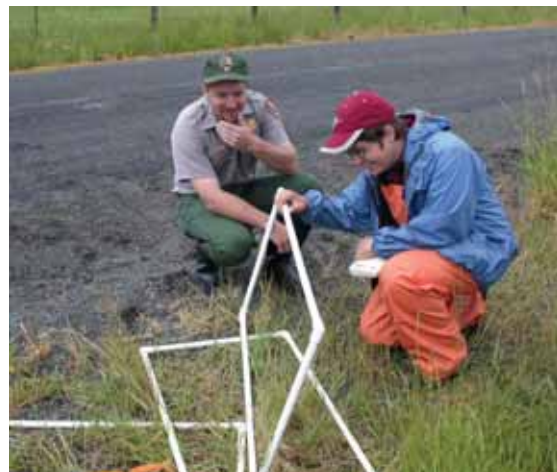
**NATIVE AMERICAN HIGH SCHOOL SCIENCE STUDENTS** participating in the Oregon Museum of Science and Industry's Salmon Camp program visited the Nez Perce National Historical Park in June 2005 to survey camas lily (*Camassiah quamash*), a plant of both cultural and ecological importance. The park is part of the Upper Columbia Basin Network, and together with the network's Inventory and Monitoring Program, has identified camas as a key park resource and high-priority vital sign, or indicator of ecosystem health, for long-term monitoring.

Camas, an ecologically significant wetland species, is historically one of the most widely used root crops of the Nez Perce people, and remains so for many tribal members today. It is also a focal resource at many historical events memorialized by the park. In September 1805, during the camas harvest at Weippe Prairie, located near Lewiston, Idaho, the Lewis and Clark Corps of Discovery first encountered the Nez Perce. The Corps had just completed the grueling journey over the Bitterroot Mountains and were out of food and exhausted. The Nez Perce fed them camas, among other foods, and many historians believe that the expedition would have failed without this assistance. Camas is therefore a central element of the cultural landscapes that the park seeks to interpret for the public, and its status as a focal cultural resource is one of the rationales for establishing a camas monitoring program.

Salmon Camp is a National Science Foundation-supported program designed to introduce Native American students to natural resource careers through the unifying theme of Pacific Northwest salmon conservation and recovery. Camas, like salmon, is also a culturally significant natural resource in decline throughout the region. In a natural extension to the salmon theme, students engaged in a "camas camp" and spent three days at the park site working with network and park resource staffs surveying camas and the invasive species sulphur cinquefoil (*Potentilla recta*). Park interpretive staff introduced the students to the cultural history of the site. Three student teams, each led by National Park Service staff, visited a set of sampling plots along a preestablished grid of transects and measured stem density and frequency of the two target plant species. They collected data that were stored in handheld computers (PDAs) with GPS and specialized GIS mapping software provided to the network by the Rocky Mountain Cooperative Ecosystem Studies Unit. The group spent their final afternoon together compiling and reviewing results, and discussed the significance of their findings for site management and long-term monitoring.

Altogether the teams completed measurements at 177 plots along 16 transects. Preliminary results suggest a negative correlation between camas and sulphur cinquefoil, in which camas is more frequent and abundant in areas with less cinquefoil. This is encouraging

Nez Perce National Historical Park resource manager Jason Lyon helps a Salmon Camp student assemble sampling frames for use by Native American science students in the camas field surveys. Camas (below) is a significant cultural and ecological resource at the park, where it has been selected for long-term monitoring as a vital sign, or indicator of park ecological health.



## Successful partnership with The Nature Conservancy fosters corps of volunteers to tackle nonnative plants in Potomac Gorge

By Mary Travaglini



Salmon Camp students look for camas and sulphur cinquefoil inside a 5.4-square-foot (0.5-m<sup>2</sup>) sampling frame. Over two days they measured stem density and frequency of the two plant species at 177 plots.

news to the park resource staff, who is conducting an active invasive species control program at the site. Encouraging results were also obtained from a preliminary calculation of required sample size for detecting change in the frequency of these plant species over time. If these data are representative of the entire site over subsequent years, it appears likely that a cost-effective and efficient camas monitoring program can be conducted at the site. A monitoring program will provide park resource staff with a direct measure of the camas population in addition to that of threatening invasive weeds.

The Upper Columbia Basin Network is focused on developing a camas monitoring protocol that will accommodate citizen scientists such as Salmon Camp students and others like them. As a means of stretching limited dollars and providing state-of-the-art science education, the network hopes to develop citizen science components of several of its monitoring efforts. The experience of the 2005 Salmon Camp program at Weippe Prairie clearly demonstrates that with proper training, clearly defined objectives, and detailed protocols, this can be done. The network plans to test a fully developed monitoring protocol for camas with Salmon Camp students at Weippe Prairie again in 2006. ■

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**EACH YEAR THE EXOTIC PLANT MANAGEMENT TEAMS** (EPMTs) of the National Park Service tackle thousands of acres of invasive nonnative plants threatening natural resources around the country. The expanding problem with nonnative plants in the national parks, though, is beyond what these teams alone can manage. Through a partnership among two national parks, the National Capital Region Center for Urban Ecology, and The Nature Conservancy, volunteers from local communities in Washington, DC, Maryland, and northern Virginia have been mobilized to respond to the problem. They contributed more than 2,000 hours of service in 2005 to control invasive nonnative plants in the Potomac Gorge, a 15-mile (24 km) river corridor that includes parts of two national parks: the George Washington Memorial Parkway and Chesapeake and Ohio Canal National Historical Park.

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*Weed Warrior and Weed Buster volunteers have assisted the National Park Service in the control of 19 invasive plant species.*

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The Potomac Gorge, a 9,700-acre (3,929 ha) conservation area in Maryland, Virginia, and the District of Columbia, is one of the most biologically significant natural areas in the eastern United States, with occurrences of 134 rare plant species and five globally rare plant communities. Yet, more than 130 nonnative invasive plants threaten the diversity of life in this short stretch of river valley.

Invasive nonnative plants have been identified by the National Park Service, The Nature Conservancy, and the States of Maryland and Virginia Natural Heritage Programs as one of the greatest threats to rare plants and communities in the Potomac Gorge. Through a Cooperative Conservation Initiative grant from the National Park Service and matching funds from The Nature Conservancy and other partners, The Nature Conservancy has enlisted more than 300 volunteers in a series of supervised "Weed Buster" volunteer workdays and trained 30 volunteers as "Weed Warriors" to combat nonnative plants in the gorge.

Volunteers in Parks (VIPs) have been invaluable in helping the National Park Service accomplish numerous essential activities, but volunteers are often ephemeral or lack the training to do delicate resource protection tasks. The Nature Conservancy assisted the National Park Service by developing a 10-hour training for Weed Warriors so that they can confidently, professionally, and independently control nonnative plants on NPS lands in the Potomac Gorge. The training details the identification and mechanical control methods of 13 nonnative plants, protection of park resources, park visitor education, safety, and emergency management. After an introduction to their adopted area, Weed Warriors head out as NPS VIPs, armed with orange vests, clippers, and saws, and work whenever it best suits their schedules. After each visit, they return an "action report," including details on what plants they treated, treatment methods used, interactions with visitors, and plans to return.

In addition to the successful Weed Warrior program, The Nature Conservancy has worked with both park units in the gorge to organize