

## **Partnerships in Communication: Recent Advances in Virtual Research Learning Centers**

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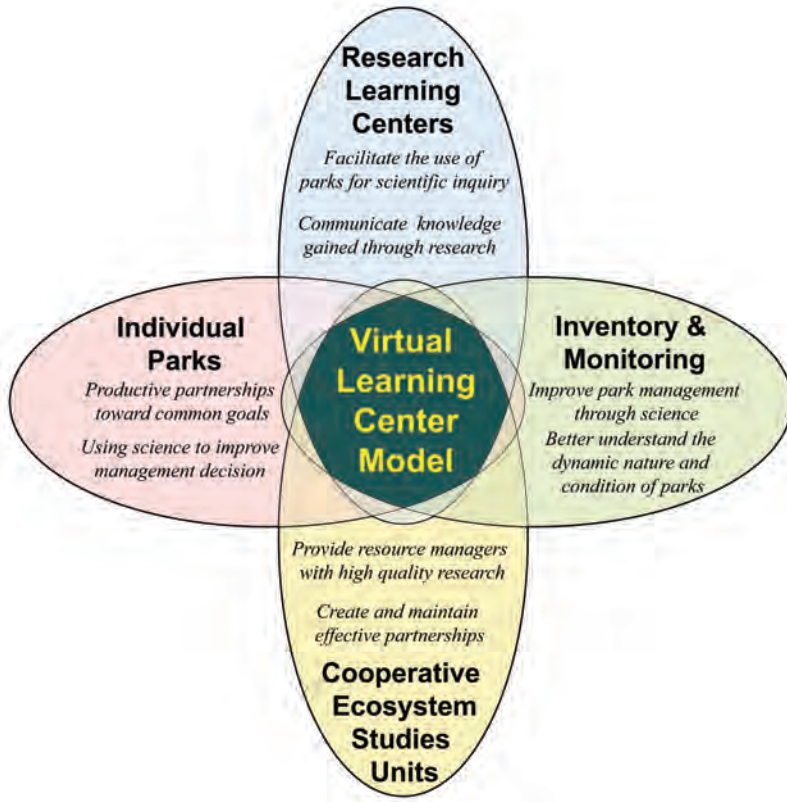
### **Introduction and background**

The Greater Yellowstone Science Learning Center (GYSLC; [www.greateryellowstone.org](http://www.greateryellowstone.org)) and Learning Center of the American Southwest (LCAS; [www.southwestlearning.org](http://www.southwestlearning.org)) are part of a national network of National Park Service (NPS) research learning centers established to facilitate research efforts, support science education opportunities, and transfer science information. Research learning centers are designed to meet the unique needs of their park units, resulting in a high degree of variation in facilities, staffing, and activities across the national network. As unfunded research learning centers within the Natural Resource Challenge (NPS 1999), the GYSLC and LCAS felt that web sites were a cost-effective use of available technology to share resource information with managers and the public.

Over the past three years, the GYSLC and LCAS have worked with many partners to develop web sites that fulfill their priority needs: science outreach and supporting science-based decision-making. Each partner brings its unique perspectives, needs, resources, and ideas. Partners help the GYSLC and LCAS meet funding needs, develop the structure of the sites, and contribute to related science outreach activities. Through a collaboration among 51 park units in five Inventory and Monitoring (I&M) networks, three Cooperative Ecosystem Studies Units, partner scientists, four nonprofit partners, and one corporate sponsor, these “virtual” research learning centers have leveraged partnerships and technology to make information and scientific results about natural and cultural resources accessible to a variety of audiences, primarily managers of protected areas and other resource specialists (Figure 1). The web sites are portals to integrated inventory, monitoring, and research information acquired through the collaborative efforts of other NPS Natural Resource Challenge programs (e.g., I&M networks, Cooperative Ecosystem Studies Units). Recent advances in development of the web sites have greatly enhanced their efficiency and potential for use.

### **Resource-centric organization and content**

The GYSLC and LCAS web sites were developed in tandem, which allowed collaborators to share ideas and best practices with each other, and more efficiently produce and develop content. Throughout the partnership, the GYSLC and LCAS strove to agree on a level of



**Figure 1.** The virtual research learning centers leverage partnerships and present integrated resource information acquired through the collaborative efforts of other Natural Resource Challenge programs and individual parks.

consistency in order to make navigation of the sites easier for users, while maintaining the flexibility of the sites to meet the individual needs of each research learning center (Figure 2). An early product of this partnership-driven development process is the resource-centric organization of the web sites. To make science available and accessible to managers, the sites and communication products are organized around resources rather than the programs that guide management and research. This approach provides context and meaning to the separate pieces of data and information produced by these programs and builds on the work of staff and partner scientists. Resource topics are also navigable by park unit and searchable, including multi-faceted, full-text searches of documents posted on the sites, which provide users with choices in how they prefer to access information.

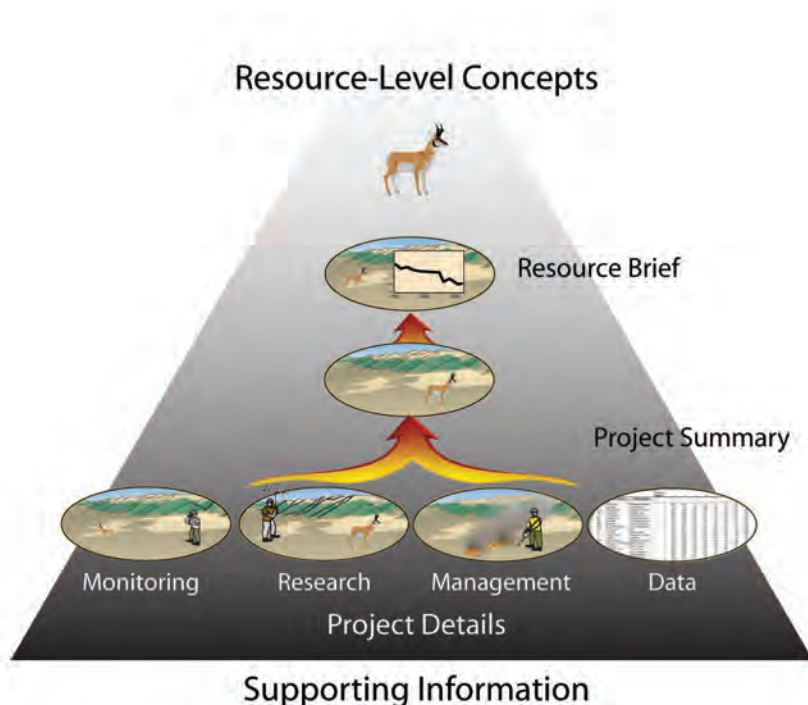
Partners also contribute to the development of the sites' organization and communication products, providing input on what information the content should include and how it should be presented. The sites take a "drill down" approach, presenting information in increasing detail from "wide lens" general concepts at the resource level to "narrow lens" supporting information that provides project-specific results (Figure 3). Each product presents a different level of detail about a resource or project.



**Figure 2.** The GYSIC and LCAS web sites were developed in tandem and share a similar navigation structure and products.

The core communication product of the web sites is the resource brief. This concise, plain English, one-page document explains why a resource is important to managers, its status and trend, and a discussion of the factors driving the status and trend of that resource or other management issues. The text is complemented by simple graphics and is based on data collected by NPS staff and research partners. The resource brief is a venue to put research into context for managers. Park managers within both of the virtual research learning centers find this product to be especially useful for quickly finding information about the status of a resource and tracking ecosystem health.

The second core product is the project summary, a flexible, 1–2 page summation of the details of a project with contact information. The label “projects” is broad—it covers long-



**Figure 3.** The GYSLC and LCAS present resource information in increasing detail from general concepts (e.g., in a resource brief) to project-specific results (e.g., in a project summary).

term I&M network and park-based activities, graduate research, cooperators’ studies, educational programs—anything related to the study or management of a resource, regardless of agency or institution. The GYSLC and LCAS worked closely with the staff of their associated I&M networks in the development of the project summary and other products. The GYSLC and LCAS are comprised of the same parks as their associated I&M networks, which enables the research learning centers to maintain close working relationships between programs—this overlap in organization varies throughout the national research learning center network. This collaboration created some similar documents that met the needs of both I&M programs and research learning centers.

The web sites are also portals for the supporting information authors draw on to create the resource briefs, project summaries, and intervening products. This information from multiple agencies and organizations ranges from theses to management activities to I&M reports, such as annual reports and protocols. Individual, full-length documents, such as study plans, completion reports, reports to managers, or annual reports, which can often be obtained only by request from the author or a library, can be posted on the web sites. GYSLC and LCAS managers appreciate the convenience of quickly accessing park management information on the Internet. Documents on the web sites are always available and can even

be accessed by a manager's web-enabled cell phone while traveling. Posting documents on web sites resolves issues of the availability and accessibility of public documents, particularly paper copies, which may be filed in desk drawers or tucked away on unorganized shelves, and may be inaccessible when staff are working in the field or managers are working after hours. Electronic files of public documents on network and local computer drives subject to an individual's filing system are also often difficult to find, particularly when the file "owner" is no longer managing the files.

### **Interweave natural and cultural resources**

The flexible framework of the GYSLC and LCAS web sites allows resources to be viewed in a regionally holistic manner that extends beyond park boundaries and encourages exploration at multiple levels of scale and detail. This approach highlights the significance and connectivity of smaller parks with their larger neighbors and helps de-emphasize the artificial boundaries between "natural" and "cultural" resources. Because of this flexibility, the sites are able to interweave natural and cultural resources in new ways, report more fully on a resource, and show the interaction and interdependence of these resources.

The LCAS is finding interesting, new ways to present artifacts and archeological resources. Using videos and animation, artifacts can be examined in detail, which may reduce the need to travel to remote sites to access museum collections. The LCAS is also developing an interactive timeline piece that helps users understand the natural and cultural context of parks and their resources. The web sites are opportunities to creatively present and interweave resource information. In addition to presenting transcripts and videos of oral histories and other stories about our resources and heritage, this content may also include the stories of the people that contributed to their management, such as retiring NPS managers.

### **Opportunities to increase retention of institutional memory and outreach**

In addition to providing information to support science-informed decision-making, the sites are opportunities to share how resources are being managed. Managers can share successes and lessons learned and support the retention of institutional memory. The sites can be used to show how accomplishments were made or missed through case studies of management actions that document the process and techniques of a project. The GYSLC and LCAS sites may also show how science is applied in parks by sharing management plans and updates on the progress and strategies of programs like the Exotic Plant Management Teams. The LCAS is leading this effort and developing ways to document and share the restoration process of prairies in the southern Great Plains. These management "modules" promote transparency in and accessibility to the work of public land managers. This helps partners cooperatively develop the way science is effectively applied in park management. In Yellowstone National Park, managers are using the GYSLC site to help manage current projects and provide research permit and logistical information for scientists who want to conduct research in parks. The web site will be used to streamline the researcher check-in process and communication with park staff.

The research learning center web sites are also tools for communicating research needs



and gaps to an invested audience of multi-disciplinary researchers and the education community. The GYSLC and LCAS are just beginning to explore how the web sites may be used to connect students and educators at a variety of levels to research in parks. The web sites reach a committed audience and can be a forum for volunteer opportunities, field institutes, and announcements of scholarship and fellowship opportunities. The sites can be an outlet for the data that volunteers and students collect during bio-blitzes. Beyond making the data available to the partners involved in its collection, this accessibility enables the results to be used in a meaningful context, such as a classroom. Over time, citizen scientists could see the connections of their work to other research in communication products like a resource brief.

### **Leveraging partnerships and technology**

Partners have helped the GYSLC and LCAS make leaps in enabling the web sites to creatively meet their research learning center's priority need, science outreach, both through the development of technical infrastructure and content. Through the process, the GYSLC and LCAS have shared information about NPS resources with their partners and the larger community.

With the help of partners, the GYSLC and LCAS recently made advances improving the web sites' accessibility, flexibility, and user-friendliness. Montana State University, a university partner, is helping "renovate" the "architecture" of the web sites. The new structure allows users to input products and other content with tags and metadata that indicate where it should appear on the site. The web sites now dynamically populate pages based on these tags and other metadata. The system dynamically produces or edits menus and pages based on an item's associations and the site will not display a menu that does not have content yet. This process is automatic with Drupal, the free and open-source content management system software used for the sites. The content management system also features a sophisticated and flexible taxonomy, meaning each resource can be listed under multiple categories and the products can be tagged to appear under multiple topics. The flexible taxonomy illustrates the intertwined nature of natural and cultural resources.

Authorized users also input metadata for products about the content, such as who helped produce it and when it was last updated. This information can be quickly called up with a content tracking system. These users also have the ability to access and upload content from any location with Internet access, allowing partners and parks to efficiently contribute to the site. With the searchable metadata, users can also track the production and review process for each product using the searchable and sortable metadata. This information strengthens the site's accountability and transparency.

An ongoing challenge for both the GYSLC and LCAS web sites is the production of new content. Many I&M products posted are created through the program's own reporting requirements and prepared for posting. Topics investigated and monitored by park staff or cooperating agencies may require more effort to produce. The GYSLC and LCAS have used park staff, university cooperators, seasonals, researchers, interns, and I&M staff to develop content. To simplify the content development process, the GYSLC and LCAS created product content guidelines to promote a reasonable degree of consistency among writers. There is also a review process in place that includes review and approval by experts and park staff

for sensitivity, accuracy, compliance with policy, and visual consistency. The approved content is posted by someone with access privileges and training. The GYSLC and LCAS attempt to keep our products up-to-date by reviewing and updating content annually or when critical information changes.

End-users of the web sites will benefit from recent advances that increase the functionality of project pages that include details of past and present activities related to resources. The pages are now sortable and searchable. The GYSLC and LCAS partners are also working on the development of templates of the web sites that are transferable to other research learning centers. Partners are also looking at ways to further integrate the Natural Resource Challenge programs and data and potentially display data from existing NPS databases such as NPSpecies, NatureBib, and DataStore on these web sites.

### **Conclusion**

The GYSLC and LCAS web sites are products of strong relationships with partners and highlight the truly collaborative nature of the research learning centers. This approach resulted in a venue to communicate integrated scientific results about the natural and cultural resources, and make science accessible to managers and the public in an efficient, accessible format. They are reflections of the collaboration between partnerships and programs, each of which bring their own perspective, needs, ideas, and resources. The GYSLC and LCAS web sites are opportunities to expand institutional memory by recording how a protected area accomplished something or might have done something differently, but also by capturing the intertwined stories of our natural and cultural heritage, and those of the people who managed them.

### **Acknowledgments**

We are grateful for the ongoing support by the Canon U.S.A., Inc. Eyes on Yellowstone program, who agreed to fund the prototype effort for the virtual research learning center web sites and continue to support the project. We also thank the Sonoran Institute, Yellowstone Park Foundation, Yellowstone Association, and numerous other partners who have generously contributed time and resources to this effort.

### **Reference**

NPS [National Park Service]. 1999. *Natural Resource Challenge: The National Park Service's Action Plan for Preserving Natural Resources*. Washington, D.C.: NPS. On-line at [www.nature.nps.gov/challenge/challengedoc/](http://www.nature.nps.gov/challenge/challengedoc/).