

## **Carolina Vegetation Survey – Ecosystem Enhancement Program Collaboration**

### ***Executive Summary – March 3, 2010 v2***

**Background.** The Carolina Vegetation Survey (CVS) is a collaborative, multi-institutional program established in 1988 to document and disseminate information on the composition and status of the natural vegetation of the Carolinas for purposes of biodiversity inventory, monitoring of environmental impacts, assessment of conservation status, and restoration guidance. In 2005, CVS and the Ecosystem Enhancement Program (EEP) established a collaborative program to increase the efficiency and effectiveness of compensatory mitigation in North Carolina. The collaboration was designed to benefit EEP in two ways. First, EEP recognized that successful mitigation depends on access to a database of high-quality, quantitative data on site-specific reference conditions for natural communities. EEP began working closely with CVS to make more effective use of the existing CVS database on natural communities in North Carolina and to guide and assist CVS efforts to enhance the database. Second, EEP wanted a more effective, defensible, and efficient approach to monitoring the vegetation component of restoration projects and consulted with CVS about how this might be done. EEP then set monitoring standards, and CVS implemented those standards in an efficient sampling and data management system. CVS continues to provide newer, better, and more comprehensive tools to assist in all phases of EEP's mitigation program from project design to generation of reports for oversight groups.

**Vision.** The EEP-CVS vision is a collaboration that benefits the citizens of North Carolina in several ways.

- CVS provides tools for detailed, justifiable, and efficient generation of targets for restoration and management based on site-specific knowledge of the vegetation of the state. Development and application of the CVS North Carolina Vegetation Database to generate restoration targets will allow otherwise unattainable state-of-the-art predictions of the natural vegetation of a site that should satisfy the most stringent current and future restoration guidelines.
- CVS methods and tools reduce risk through demonstration of compliance with US-ACE requirements by tracking individual trees, greater likelihood of planting success through use of past species performance and site characteristics to guide plant selection, early detection of likely project failure so that prompt corrective action can be taken, and robust and documented planning that should be resistant to future litigation by diverse interest groups.
- Collaboration with CVS is leading to decreased costs and greater efficiency through optimized data collection procedures, use of previous monitoring data in resampling, automated analysis and report generation, automated evaluation of plans and reports, automated and transparent QA/QC on submitted data, improved ease of material selection by contractors, early detection of project problems, ability to determine when a project is going well such that less sampling is needed, greater likelihood of selected species survival, and application of a methodology that is scalable to more robust and challenging regulation.

**Accomplishments.** The following are a few of the significant accomplishments resulting from the CVS-EEP partnership.

- CVS developed a field monitoring protocol, instruction manual, custom datasheets, data entry and quality-control tools, and training activities that standardize and streamline data collection.
- CVS designed and constructed a data entry tool linked to a Microsoft Access database, with a data model consistent with new national standards for vegetation description (US-FGDC).
- CVS personnel have consistently managed restoration-monitoring data generated by EEP contractors, including quality control of data submitted and generation of reports needed for EEP to assess project success and report that success to other groups and agencies.

- CVS has collaborated with EEP to present annual workshops for introducing professionals in ecological restoration to the EEP-CVS field inventory protocol, data entry tool, and other techniques critical to documentation of planted and natural vegetation of restoration sites.
- CVS has conducted multiple vegetation survey events each year focused on poorly understood vegetation and wetland types. These events have provided detailed information on critical vegetation types and have provided opportunities for volunteers to learn the CVS protocol.
- CVS developed a website that EEP employees and contractors, among other, can use to assess the typical species composition and abundance of all natural vegetation types in North Carolina.
- During 2009 CVS used several EEP projects in a demonstration of how CVS tools can be used to create better restoration plans. The results of this exercise were used to develop a strategy for future partial automation of restoration target creation, which in turn should lead to reduced contractor costs and increased quality of work.

**Contractor Input.** In preparation for this meeting, contractors were polled as to their views of the EEP-CVS collaboration. Among the many useful comments were some common themes.

- Contractors generally appreciate the consistency and efficiency of data collection and reporting provided by the CVS methodology and data tools, but offered various suggestions for further improvement. CVS appreciates these suggestions and solicits suggestions regularly, especially in the context of the annual training exercise. This poll has encouraged us to more broadly solicit comments prior to the next training session and incorporate a usability analysis into the training session to further improve ease of use of our products.
- There is widespread uncertainty as to the value of collecting all the measurements required for individual stems when a subset might suffice. What is measured is mandated by EEP and not CVS. CVS provides efficient ways to collect, report, and analyze these data. There are good reasons for the EEP mandated measurements: 1) ACE mandates a certain survival rate of planted stems, so EEP must track individual planted stems, (2) by tracking the success of individual stems, CVS can inform EEP of the trajectory of a project (this is only now becoming possible as multiple-year datasets become available), and (3) success of individual stems of known attributes can inform restoration plans. EEP initially required many sorts of measurements because it was unclear which ones would be most useful in predicting stem success. As data are now available, it would be timely for CVS to reassess the value of the measured variables and make recommendations to EEP as to whether any should be dropped. In addition, CVS could develop a tool for projecting the trajectories of stems and projects.
- Contractors would appreciate tools for project design but want assurance that they will be more powerful than available information. We propose a set of such tools in our scope of work.

**Opportunities.** As a consequence of five years of collaboration with EEP, CVS has significantly increased the efficiency and effectiveness of EEP restoration planning and monitoring. A formal EEP cost-benefit analysis has projected a cost savings to EEP of \$200,000 per year starting in 2010. CVS is now on the cusp of being able to create a set of very powerful tools that would address the three components of the CVS-EEP vision: generation of optimal restoration targets, reduced risk of project failure, and greater efficiency and cost savings. In particular, we see seven opportunities that are only now available and that would allow the state to realize considerable additional savings that will directly result from its past investment in the CVS-EEP partnership.

1. We can provide web-based tools that allow better, cheaper and more defensible selection of restoration targets. These tools would provide a quick and highly effective alternative to searching out field reference sites.
2. We can provide an enhancement to our database system to automatically assess likelihood of project success or failure based on monitoring data, which in turn would allow adjustment of monitoring strategy and would allow early adaptive management of projects to minimize risk of failure.
3. We can provide a web-based service for contractors whereby they can determine how their projects are doing, the risk of failure of a project, the level of success of past projects in which they were involved, and the complexity of a project in which they might want to participate.
4. We can develop a tool that draws on our multiple datasets to aid in selection and evaluation of species for planting designs. This tool should be equally useful to contractors and to EEP staff, and it would maximize the transparency of the review process.
5. We can provide a service whereby we draw on past monitoring data to evaluate the success of plant materials previously used in restoration projects as related to species, sources, sizes and site conditions.
6. We can conduct a formal, quantitative review of the current EEP-mandated monitoring protocol to determine whether some of the measurements are redundant relative to EEP needs so that they might be dropped from monitoring requirements, thereby reducing monitoring costs.
7. We could plan regular four-way meetings with contractors, and staff from EEP, CVS and US-ACE, to assess what additional analyses and data services CVS might provide to increase efficiency and decrease costs for EEP and its contractors.

Such tools and services are available nowhere else in the country and should help make EEP a national model of efficiency and effectiveness. Were EEP not to pursue these opportunities at this time, key CVS staff could not be retained and the opportunity for providing these enhanced tools would likely vanish. Continuation of the CVS-EEP collaboration will also ensure ongoing maintenance and efficient use of the database of vegetation monitoring data from EEP-sponsored mitigation projects.