
MEMORANDUM

TO: HANS NEUHAUSER, GEORGIA WETLAND TRUST FUND
FROM: KELLY SIRAGUSA, UGA ENVIRONMENTAL PRACTICUM
SUBJECT: MONITORING PROTOCOL FOR GEORGIA WETLAND TRUST FUND
DATE: 5/2/2007
CC: LAURIE FOWLER AND ENVIRONMENTAL PRACTICUM FACULTY

Background on Need

An agreement between the Georgia Land Trust Service Center (GLTSC) and the Savannah District of the U.S. Army Corps of Engineers (“the Corps”) established the Georgia Wetland Trust Fund (GWTF) in 1997 to provide in-lieu fee mitigation to Section 404 permittees who have met all requirement of avoidance and minimization and who are unable to provide mitigation through other mitigation approaches, such as mitigation banking or permittee-responsible mitigation. To date, GWTF has provided mitigation through preservation of 20 high priority conservation areas across the state. These sites are permanently protected through conservation easements and in the case of acquisition by the state, by designation as a Heritage Trust site.¹ These sites are under the ownership of private and public organizations, such as The Nature Conservancy and the U.S. Forest Service. All parties, including the Army Corps of Engineers, the Georgia Wetland Trust Fund and any other parties specified in the Letter Agreement, have the responsibility to assure “no net loss” of ecological functions and to assure proper management of these sites compliant with the Letter Agreements. Furthermore, the Letter Agreement grants the Corp and the GLTSC right of ingress and egress to inspect the properties. The Corps has recently asked that GWTF to establish a monitoring program by which GWTF staff can annually monitor all GWTF sites and systematically report conditions to the Corps.²

Development of the Georgia Wetland Trust Fund Monitoring Program provides an excellent opportunity to establish standard monitoring protocol for protected lands, particularly those sites serving as Section 404 mitigation. In Georgia, most monitoring protocols for conserved lands and mitigation projects have been developed on a case-by-case basis and undertaken by a variety of responsible parties. No standard monitoring protocol has been established to aid land trusts, state and federal agencies, or Section 404 permittees in appropriately monitoring mitigation and conservation sites. As a result monitoring is often inadequate.³ A standard monitoring protocol will increase the efficiency of agencies, such as the Army Corps of Engineers, who are responsible for reviewing monitoring reports and assuring compliance with Section 404 permit conditions.

¹ Description of the Georgia Wetlands Trust Fund. Georgia Environmental Policy Institute.
<http://www.gepinstitute.com/wetlands.paper.asp>.

² Letter Agreement Between U.S. Army Corps of Engineers, Savannah District, The Georgia Land Trust Service Center, and The U.S. Department of Agriculture, Forest Service for the Glover/Little Estate. April, 2004.

³ National Resource Council. 2001. Compensating for Wetland Losses Under the Clean Water Act. National Academy of Science.

Currently, the Savannah Standard Operating Procedures do not specify standards for monitoring due to the many variables that are involved in wetland and stream mitigation. However, my goal is to establish a simple monitoring protocol that is applicable to all mitigation sites, including preserved, created, restored, and enhanced sites. Furthermore, the Savannah Standard Operating Procedures do not specify the frequency and duration of monitoring. The streamlined nature of the proposed GWTF monitoring program makes it feasible for monitoring to be completed annually and in perpetuity. This provides assurance that GWTF mitigation sites will continue to provide their ecological functions. Because losses at Section 404 impact sites are permanent, it is essential that the ecological features replaced at the mitigation site continue to provide those functions in perpetuity to assure “no net loss” of wetland/stream functions.

Moreover, the monitoring program being developed can be applied to all protected conservation lands in the state, not just mitigation sites. Land trusts and government agencies often have difficulties adequately monitoring their easements, because of limited capacity and resources. This can be especially true in the case of local governments and is exacerbated by inexperience. With the increase in private land protection efforts and the increase in easements held by local governments due to the Georgia Land Conservation Program, the need for adequate monitoring of these sites is growing in importance. This monitoring protocol may serve as a model for the Georgia Land Conservation Program monitoring requirements, which are scheduled to be established.

Goals

My goal is to develop a means of rapidly assessing the state of protected properties through site visits, document review, and interviews with project sponsors. Each assessment would be completed in half a day. Monitoring will lead to one of three determinations regarding the quality of the site: (1) everything is satisfactory; (2) there are potential problems to be aware of; or (3) problems exist that need to be addressed. This monitoring protocol establishes only the components of the preliminary round of monitoring which will identify the need for follow-up and possible remediation.

Components of the Monitoring Protocol

Monitoring will include the following components: assessment of Letter Agreement status, identification of changes to site features; identification of threats to ecological functions; and final determination of quality. Monitoring at each site should be performed during the growing season and at the same time each year. Identification of invasive species and stressed vegetation will be significantly easier during these times. Furthermore, comparison will be more accurate at the same time when made at the same time of year. The monitoring process will take place in a three phases: initial monitoring and determination of need for follow-up; follow-up monitoring and assessment; and remediation. This tiered process is to be completed each year. All components of monitoring will be recorded on a standard monitoring form to include instructions on investigation methods, minimum reporting requirements, and explanations of terminology.⁴ The information presented below is a comprehensive coverage of Phase I objectives. Its purpose is to provide a logical sequence for reporting all findings in a standardized format. The goal of the format is to facilitate review, evaluation, and approval of the Phase I report to be submitted to the Corps. Follow-up actions to Phase I and Phase II monitoring protocol are only briefly described below with some recommendations for their development. Most likely, any Phase II and Phase III monitoring or remediation will be site specific and based on issues identified during Phase I monitoring. An

⁴ ASTM International Standards E1527-00 and E-1528-00 Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process.

effective tool may be to create a menu of follow-up monitoring options and remediation actions with information on effectiveness and feasibility.

Monitoring Parameters

Both qualitative and quantitative methods will be used to monitor the sites. Qualitative monitoring allows for a quick assessment of the site and does not require a large amount of resources and data. Furthermore, qualitative monitoring can be performed quickly over large areas. Qualitative monitoring tends to be descriptive and relies on visual assessments. It allows for recognition of unquantifiable attributes. Quantitative monitoring provides many beneficial measures for comparison. However, many quantifiable methods are too cumbersome for the purposes of Phase I Monitoring and so have been limited to the simple approaches described below and in the attached Monitoring Form.

Monitoring Professional

Education and professional qualifications of the monitoring professional may need to be specified. The qualification of the monitoring professional may include, but are not limited to, educational and professional experience and credentials relating to ecology, wildlife biology, fisheries biology, and hydrology, as reasonable determined by the GWTF Director.

PHASE I: INITIAL MONITORING

The attached monitoring forms and the Quality Assurance Plan are to be used during the monitoring process. The Quality Assurance Project Plan describes the procedures for monitoring to ensure consistent and replicable methods for sampling. It provides guidelines for collection and analysis, data storage and management, as well as report preparation, in order to provide a quality of monitoring that is suitable for the project needs.⁵ Quality Assurance Plans are necessary to obtain a consistent standard of monitoring in perpetuity, as is the goal of protecting these sites. This is especially important considering the Monitoring Professional is likely to change over the life of the monitoring and since monitoring success is heavily reliant on identifying changes in community structure, hydrology, and water quality, without quantitative assessments. These sets of guidelines will be useful in determining degradation of ecological functions from year to year.

Various monitoring programs from across the nation were reviewed before development of the monitoring protocol. Review of these programs provided a comprehensive look into the type of monitoring being performed for Conservation Easements as well as for mitigated wetland and stream functions. Below is a list of some of the monitoring programs used:

- USDA Stream Visual Assessment Protocol⁶
- Wisconsin Department of Natural Resources Rapid Assessment Methodology for Evaluating Wetland Functional Values⁷
- Washington Department of Fish and Wildlife Integrated Streambank Protection Guidelines⁸

⁵ USEPA.2000. *Volunteer Wetland Monitoring: An Introduction and Resource Guide*. U.S. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds, Wetlands Division (EPA 843-B-0-001).

⁶ Bjorkland, R., C. M. Pringle, and B. Newton. 2001. A stream visual assessment protocol (SVAP) for riparian landowners. *Environmental Monitoring and Assessment* 68: 99-125.

⁷ Wisconsin Department of Natural Resources. 2001. *Rapid Assessment Methodology for Evaluating Wetland Functional Values*. Wisconsin Department of Natural Resources. 9 pp.

- US EPA Volunteer Wetland Monitoring Program⁹
- Maryland Citizen's Guide to Nontidal Wetland Mitigation Monitoring¹⁰
- Hearst Ranch Conservation Easement Monitoring Protocol¹¹
- A technique for the functional assessment of nontidal wetlands in the coastal plain of Virginia¹²

Obtain and Review Project History

One of the goals of the monitoring program is to insure that the Letter Agreements for each site is being met. While the Letter Agreement is specific to each site, common elements of the agreement are administrative tasks, such as recording the deed and providing copies to the GLTSC and the Corps Office of Counsel. Other requirements may be included in the Letter Agreement related to the management of the property, such as management for recreation or education.

During the first year of the monitoring program, the monitoring professional determine the status of each requirement described within the Letter Agreement and note the current status of each in the monitoring report. Another critical document in the monitoring process in the Baseline Conditions Report. Each consecutive year of monitoring, the monitoring professional should use the project history as a guide for performing the monitoring. In the case of U.S. Forest Service lands, the monitoring professional would need to assure that management is in concurrent with National Forest System Lands.

The Baseline Conditions will either be included as a recital in the Conservation Easement or will be established during the first year of the monitoring. It describes the conservation values of the easement area, as well as the uses and state of improvements at the time of the transaction. It should be an integral resource in the monitoring process. Any departures from this original state should be noted year, even in consecutive years of observance, to allow for identification of trends and continued degradation to the site.

The status of any other uncompleted requirements, as well as the status and quality of any remediation actions previously performed, should be determined. All documents pertaining to the monitoring of a site and the project history will be stored at the Georgia Wetlands Trust Fund office on *Erler's LandSteward*, a software program available from the Land Trust Alliance.

Identifying Changes at the Site

The monitoring professional will perform a visual inspection of the property, including a thorough analysis of permanent photo reference sites. Ideally the site visit will be performed with the owner/manager/user being present to answer questions. A comprehensive photographic log of the

⁸ Saldi-Caromile, K., K. Bates, P. Skidmore, J. Barenti, D. Pineo. 2004. Appendix J: Monitoring. Stream Habitat Restoration Guidelines: Final Draft. Co-published by the Washington Departments of Fish and Wildlife and Ecology and the U.S. Fish and Wildlife Service. Olympia, Washington.

⁹ USEPA. 2000.

¹⁰ Maryland Department of the Environment. Citizen's Guide to Nontidal Wetland Mitigation Monitoring. <http://www.mde.state.md.us/assets/document/wetlandswaterways/monitor.pdf>

¹¹ Hearst Ranch. 2004.

¹² Bradshaw, J.G. 1991. A technique for the functional assessment of nontidal wetlands in the coastal plain of Virginia. VIMS Special Report No. 315 in Applied Marine Science and Ocean Engineering. Gloucester Point, VA. (www.vims.edu/GreyLit/VIMS/sramsoc315.pdf)

permanent reference points and other points requiring attention during monitoring should be created each year and accompanied by a description of the findings.

Identification of changes through visual assessment of property boundaries and permanent reference sites will be central to the monitoring process. In the first year of monitoring and in conjunction with establishment of the Baseline Documentation, permanent reference sites should be selected. These sites should represent the variety of environmental features located at the site. For example, on sites with streams, key reaches of streams should be selected and described in terms of bank and flow characteristics. It will be especially critical to identify any scouring that may occur due to changes in the hydrograph overtime. Invasive species within the permanent reference sites for riparian areas or forested uplands should also be thoroughly evaluated in the first year so that any changes in the abundance or frequency of invasives can be identified in subsequent years. Both natural and anthropogenic factors may affect the natural resources and functions of protected sites. For example, development of adjacent lands could alter the hydrology of a stream or lead to sediment deposition. Furthermore, aquatic resources are often subject to events such as floods, fires and ice storms which may significantly alter the appearance of streams and wetlands, even changing their position in the landscape¹³. While some disturbance events are natural and may not pose a risk to the site, it is important to note any and all changes observed at the site from each year to assure that a site is not experiencing continuous and cumulative degradation overtime.

Characteristics of effective photo reference site

The most easily recognizable changes to wetlands and streams will be at the margins. Photo reference sites should be selected to capture the margins of these sensitive areas. Photographs should be taken from several vantage points to be determined during baseline documentation. Each year, photographs should be taken at the same location with all the following conditions remaining constant: exact location, direction, height, zoom, and resolution. The photographic documentation protocol is described in the quality assurance plan.¹⁴

Identifying Threats to the Site

Trends in the surrounding area must also be taken into account as well as threats on the site. The watershed approach recommended by National Research Council (NRC) and proposed in the EPA/COE proposed rules for compensatory mitigation stresses the importance of landscape position and landuses on mitigation sites.¹⁵ Any threats from adjacent properties, evolving land uses in the region, or current use of property, in the case of public lands especially, should be identified through interviews with project sponsors, a boundary walk, and through review of records pertaining to the site and surroundings. As discussed above, both anthropogenic and natural disturbances can threaten the site. It is important to identify both classes of threats, even though some may be out of the realm of control.

Determination and Follow-up Recommendations

A one-page comprehensive written report will be prepared for easy review by Army Corps of Engineer officials. The report should briefly summarize the findings from the annual monitoring and

¹³ Army Corps of Engineers. 2004. Attachment F. Incorporation of the National Research Council's Mitigation Guidelines into the CWA Section 404 Program., Savannah SOP.

¹⁴ Interview with Bud Freeman. 23 February 2007.

¹⁵ NRC, 2001. and Federal Register. Vol. 71, No. 59. March 28, 2006 Proposed Rules.

present the determination of whether follow-up actions may be required. The monitoring professional will make one of the following three determinations:

1. **Everything is satisfactory.** Phase I monitoring has determined that the site is in satisfactory condition and that no follow-up monitoring or remediation is required.
2. **There are potential problems to be aware of.** Phase I monitoring identified some potential problems that require follow-up monitoring to determine if remediation is needed.
3. **Problems exist that need to be addressed.** Phase I monitoring identified some potential problems that require follow-up. Remediation is likely to be needed.

PHASE II MONITORING

The properly executed Phase I report advised the Phase II monitoring. Phase II monitoring might consist of: physical sampling of the site, additional visual analysis of site, interviews with the owner/manager/user of adjacent properties, and identification of potential remediation. Phase II monitoring will build on the recommendations of the Phase I report.

A comprehensive written report detailing the rationale for the sampling that took place, the sampling protocols and procedures employed, an explanation of the analytical results, and, if necessary, a description of the recommended remedial action needed to restore the site to its original condition will be developed as a result of Phase II monitoring.

PHASE III: REMEDIATION

Based on the Phase II report, Phase III will consist of the design and implementation of remediation of the site. Remediation might include eradication of invasive species or bank stabilization in the case of hydrologic systems.

Other Technical Considerations

Following the initial year of monitoring, it is proposed that the program be evaluated for its ability to meet project goals. During that time it may be determined that additional monitoring equipment is required and beneficial to the project. Currently, the program proposal only specifies use of a GPS unit and the *Erlers LandSteward* software. Below are several recommendations for efficient and cost-effective means of assessing water quality, hydrology and community structure that could be incorporated into Phase I or II of the monitoring, if deemed appropriate.

Color aerial photograph for interpretation of natural resources and land uses. The color aerial photograph coverage included in the Baseline Conditions should be of sufficient resolution, at least one inch=831 feet, to allow detection of plant community geographic changes over time, erosion, fire, vegetation community trends, and any other Conservation Easement infrastructure changes such as roads. One potential requirement may be for aerial photography to be replicated every five years.¹⁶ Aerial photography should be used to classify land use surrounding each site to determine the proportion of land uses in each sub-watershed, such as forested/"natural", agricultural (pasture and crop land), residential (<4 houses/acre), commercial/industry/urban land, lakes or permanently

¹⁶ Hearst Ranch Conservation Easement Monitoring Protocol. 2004.
http://resources.ca.gov/hearst_docs/Monitoring_Protocol_-_Exhibit_D_to_WCB_Grant_Agreement.pdf

flooded wetlands. Dramatic changes in land-uses in the sub-watershed may signal threats from runoff and habitat fragmentation.¹⁷

A **hydrograph meter** can be easily constructed from a PCP pipe. Holes drilled along the side allow water flow freely through the device. A floating object placed within the pipe would rise with water level and remain at the highest point of it reaches in the pipe, thus providing a record of the highest flow occurrence¹⁸. A similar method exists using a PCP pipe with holes and a floating dye, which acts as an indicator of different flow heights. Darker lines should appear where flows have been sustained.

A **simple turbidity** test can be conducted by capturing water in containers and allowing sediment to settle out for 24 hours and then measuring sediment deposition. A large amount of sediment can be an indication of a disturbance upstream or of bank erosion. In pristine, headwater streams you would expect to find little or no sediment¹⁹. It would be necessary to tease out natural fluctuations in turbidity.

Simple **handheld meters** can be purchased to read dissolved oxygen levels, pH, and conductivity of stream for around \$800. ⁷ These devices require calibration before each use and may not provide information that can be reliably compared from year to year because of natural variability. Furthermore, testing would be effected by the length of time since rain events.²⁰

Quadrants or circular plots and transects can be used to identify the abundance and occurrence of plant species. Quadrants should be about 1 square meter and circular plots should have a 6 foot radius. A random pattern should be used to position the quadrants or circular plots along a transect across the property. Within the plots, plants can be identified and counted to obtain a fairly comprehensive picture of the community composition as a whole on the site. Diameter Breast Height of trees may also be recorded.²¹

It may be desirable to measure flow height in streams during site visits. This can be accomplished using a **measuring pole** equipped with a flat one-foot diameter mesh or plastic disc support to prevent the pole from sinking into the wetland substrate.

Streambank erosion may be tracked by installing **bank pins**.²²

¹⁷ Bradshaw, J.G. 1991.

¹⁸ Interview with Ron Carroll. 7. February. 2007.

¹⁹ Carroll. 2007.

²⁰ Freeman 2007.

²¹ USEPA 2000.

²² Freeman 2007.