# Final Technical Project Report

**Cooperative Agreement Program Number:** 05HQAG0123

**Project Title:** Transitioning NC OneMap to a Statewide Host Site on The National Map

**Project Start and End Dates:** September 1, 2005 through August 31, 2007

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**Data Themes:**

The comprehensive list of data services available through the NC OneMap viewer is available at http://www.nconemap.com/datacatalog/

**Project Summary:**

The North Carolina Geographic Information Coordinating Council (GICC) and its staff agency, the North Carolina Center for Geographic Information and Analysis (CGIA), work towards improving the advancement of the coordinated use of geospatial technologies in North Carolina.

The GICC adopted a vision for statewide public-domain geographic information in early 2003; the initiative, NC OneMap, is closely aligned with *The National Map*. In the summer of 2004, CGIA in close partnership with USGS launched the NC OneMap Viewer. This viewer integrated datasets and hosted by over fifty (50) state agencies and local governments in North Carolina, as well as datasets from several large, national datasets hosted through the USGS Earth Resources Observation System Data Center (EDC). The first release of the NC OneMap Viewer was developed as part of the 2003 NC OneMap Regional Demonstration Site, created by USGS, CGIA, and a consortium of local and state government agencies, and hosted by EDC.

The goal of this CAP project is to transition the NC OneMap Viewer from the hosting site at EDC to infrastructure in North Carolina hosted by CGIA. CGIA's hosting environment and infrastructure was developed in close consultation with EDC, and was acquired and implemented in mid-2005 and early 2006.

The initial CAP project proposal identified a task list for transitioning the NC OneMap Viewer from EDC to EROS. These tasks included development of a transition plan, installation of the software packages and coding for the map viewer, and testing the installed application. These tasks were completed through early 2006, and culminated with a three day software transition in August 2006.

Through the transition planning process, CGIA and EROS concluded staff collaboration could be accomplished through conference calls and remote server access. As initially proposed, EROS staff was to travel to North Carolina for the technical transition. This resulted in a significant project cost savings that enabled CGIA to reallocate resources from the travel budget to additional CGIA staff effort.

The CAP proposal identified the need to acquire a metadata catalog server for meeting the technical requirements for *The National* Map. The transition planning process established the initial infrastructure capacity acquired by CGIA was sufficient to support the metadata catalog service without the additional acquisition of hardware. The resources dedicated to this acquisition were reallocated to additional CGIA staff effort.

The reallocation of staff resources supported the research and development of software components for implementing technologies to support the management of participating server clients. This service polls the availability of datasets hosted from distributed sites and displayed in the NC OneMap viewer. Currently, the NC OneMap Viewer makes data requests to all available datasets within a user's geographic viewer extent. When a service is not available from a particular resource, there is significant latency in the application performance. When fully implemented, the intelligence provided by the service checker components will enable the NC OneMap Viewer to only make data requests from services that have been verified in a the most recent check cycle. This will increase overall performance of the NC OneMap Viewer application and provide a resource for CGIA staff to efficiently identify broken links and other maintenance related issues within the network of participants.

In Spring 2007, CGIA system administrators identified technical issues with several of the servers involved with the NC OneMap application. The resolution of these issues required the complete rebuild of the server operating systems and reload of application software. Restoration from back-up tapes was not a viable option. This effectively removed the NC OneMap Viewer application from the system. Simultaneous to this rebuild, CGIA acquired a virtual server environment to support development and testing of application in an environment

independent of the production environment. In Spring and Summer 2008, this system has been installed and tested. CGIA is coordinating with EROS technical staff for installation of the NC OneMap Viewer in the virtual environment, followed by installation in the production environment. This is projected for completion by September 2008. With the installation of the viewer in the virtual application testing environment, the service checker components, and interface upgrades will be installed to update the original NC OneMap Viewer.

The NC OneMap Viewer is established as a general purpose viewer for integrating datasets served using the Open GIS Consortium (OGC) web mapping service (WMS) standard. The dedicated data catalog for the NC OneMap Viewer integrates WMS services hosted by EDC such as national boundaries, elevation, and historic orthoimagery. CGIA facilitates and hosts numerous datasets provided by state agencies and/or addresses a statewide scope. Regional governments, county governments, and municipal governments provide locally maintained Framework datasets as WMS services to the NC OneMap Viewer. The dynamic and comprehensive list of available WMS sources associated with the NC OneMap Viewer is available at http://www.nconemap.net/datacatalog/ Metadata records are a required element for inclusion in the NC OneMap catalog, and these metadata are harvested through the Geospatial One-Stop process. The GICC has adopted a list of thirty-seven (37) layers that have been determined as priorities in NC OneMap; this extended list of layers is meant to address the FGDC Framework layers, as well as other layers identified within the NC OneMap stakeholder community as essential data sources for business process and mapping applications.

Maintenance of the NC OneMap participant operational capabilities and datasets is a significant issue with local participants. Currently, many local governments support the concept of NC OneMap, although there is not a direct business link between maintaining the WMS connections conditional to participation and existing business processes or on-line applications within their jurisdictions. For many large GIS organizations, there is minimal overhead for including WMS maintenance with existing geospatial support; the demand for WMS support outside of the NC OneMap environment is negligible. Most mid-size and smaller local governments outsource the hosting and maintenance of spatial datasets and viewer applications. In these instances, the third-party providers develop dedicated mapping applications; the establishment of WMS services, although negligible in terms of server impact, is not included in most standard service contracts. Due to bandwidth constraints, cheap disk space, and the prevailing nature of GIS users to obtain a physical copy of datasets (regardless of size or on-going maintenance requirements), the access of datasets as a service has not been established.

The GICC was one of the first state coordination councils to sign a formal partnership agreement with the FGDC. The GICC and CGIA have devoted significant resources in support of the NSDI and initiatives related to *The National Map*. Follow-on activities related to the NC OneMap Viewer transition are envisioned to include:

- further development of the service checker components to alert CGIA staff and host participants when a WMS service is not accessible;
- exploring the development of service checker components to dynamically redirect service requests to secondary data service when a primary data service is not accessible;
- migrate the NC OneMap Viewer data catalog from the MySQL environment to CGIA's SQL Server database, providing a robust database environment for accessing and managing the data catalog;
- develop and execute an implementation plan to make the NC OneMap services infrastructure available in a 24x7 environment; and

- update the underlying NC OneMap Viewer application to take advantage of contemporary service capabilities, while maintaining backward compatibility with the current NC OneMap catalog and services infrastructure.

*Final Report Addendum: January 26, 2009*
CGIA technical staff and EROS Data Center (EDC) technical staff worked together over the course of two weeks in Fall 2008 to reestablish the baseline viewer application on CGIA hardware in both the test and production host environments. Included in this exercise was a series of e-mail exchanges and a conference call for CGIA staff to understand the future technical directions of The National Map Viewer. These discussions have proved useful in establishing the technical direction for the next steps of the NC OneMap Viewer development. In November 2008, CGIA implemented web site modifications to redirect NC OneMap website visitors the CGIA-hosted version of the application and EDC technical staff implemented a website redirection to ensure web users attempting to access the EROS-hosted viewer application are seamlessly forwarded to the CGIA-hosted version.

Since the completion of implementation and testing for the NC OneMap Viewer application, the CGIA technical staff has worked on a series of improvements to address the underlying architecture of the viewer applications. These upgrades have focused on centralizing the business data behind the viewer application and other tools used in managing NC OneMap. Specifically, the database of connections for tracking layers registered in the viewer has been migrated to CGIA SQL Server platform; this database was initially built by EDC technical staff using the MySQL database. The migration of the viewer databse to SQL Server allows the integration of this data with the database used to track, prioritize, and report the status and prioritization of managing external connections to the NC OneMap Viewer. Technical staff supporting the connection of a local government WMS service access a secure website for submitting and validating technical data about the connection. Before the transition, this information would have to be manually transferred from the SQL Server database to the MySQL database. All transactions related to managing a WMS service in the NC OneMap Viewer will be addressed in the same interface.

Another benefit to the database consolidation will be the implementation of the service checker technology, originally developed to be compatible with the MySQL version of the viewer application support database. By translating the business logic and functionality of the server checker tools, the next version of the application will have greater intelligence and better performance in not attempting to access external WMS services that are not available, and this status can be summarized and reported dynamically, increasing the possibility of finding and fixing these WMS services available through the NC OneMap viewer and NC OneMap users that use the WMS services independent of the viewer application.

Migration of the NC OneMap Viewer database to SQL Server also increases the opportunities for developing consumable extracts of the WMS database of links. This information can be presented for access to developers to support the development of viewer applications or application components that will be dedicated to the NC OneMap WMS services.