N.C. Geographic Information Coordinating Council 2023 Annual Report

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NCGICC

Contents

Executive Summary

The North Carolina Geographic Information Coordinating Council (GICC) was established by the N.C. General Assembly in August 2001 and is supported by the N.C. Department of Information Technology (NCDIT). The N.C. Center for Geographic Information and Analysis (CGIA), housed within NCDIT's Government Data Analytics Center (GDAC), staffs the council.

North Carolina General Statute (N.C.G.S.) §143B-1421(g) requires the council to report annually to the Governor and the Joint Legislative Commission on Governmental Operations. The council submits this report to share its strategic focus on data-driven collaboration, outline priorities and challenges and update the Governor and the Commission on its Fiscal Year 2022-2023 accomplishments.

Over its 30-year history, the GICC has coordinated groundbreaking GIS framework datasets and served as a model for other states' programs. Council coordination for important framework datasets such as orthophotography, seamless parcels, road networks and addresses form the backbone of spatial analytics that support state, local and private sector initiatives. These mature datasets, supported by the work of the council, provide immense value to public and private programs.

The council coordinates to continuously improve data and services while supporting the people and governments in North Carolina. Geospatial data is the backbone for broadband expansion, regional planning, resource protection and economic development, and the council continues to coordinate projects that support a healthy North Carolina economy, environment and community. Support for Next Generation 911, a review of infrastructure data availability and security, and an update to AddressNC data are just a few examples of council coordinated projects that support a resilient North Carolina.

The council's work involves not only data and analytic tools, but also the state's GIS community. It is this dedicated GIS community that volunteers for council working groups and creates successful projects. Support for these GIS users included outreach meetings and the biannual NC GIS conference this fiscal year. The GICC's leadership and forward thinking support a strong GIS community, and Fiscal Year 2022-2023 continued these successful efforts.

Introduction

The N.C. Geographic Information Coordinating Council was established by the N.C. General Assembly in August 2001 and is supported by the N.C. Department of Information Technology (NCDIT). The N.C. Center for Geographic Information and Analysis (CGIA), housed within NCDIT's Government Data Analytics Center (GDAC), staffs the council.

The council is the state's central point for geospatial collaboration and mapping and supports local and state geospatial programs and services. The council serves to improve the quality, access and cost-effectiveness of geospatial resources for state, federal, local, academic and private organizations while promoting the value of geographic information.

North Carolina General Statute (N.C.G.S.) §143B-1421(g) requires the council to report annually to the Governor and the Joint Legislative Commission on Governmental Operations. The council submits this report to share its strategic focus on data-driven collaboration, outline priorities and challenges and update the Governor and the Commission on its Fiscal Year 2022-2023 activities.

About the Council

The council meets quarterly to consider policies, issues and initiatives. Council meeting dates for Fiscal Year 2022-2023 were August 17, November 16, February 8 and May 17.

The council is composed of a broad set of stakeholders representing perspectives from local, state and federal government, higher education and private business. The council's collaboration promotes better decision-making across all sectors in North Carolina. The council has three user-oriented standing committees: the Local Government Committee (LGC); the State Government GIS Users Committee (SGUC) and the Federal Interagency Committee (FIC). Two technical committees, the GIS Technical Advisory Committee (TAC) and the Statewide Mapping Advisory Committee (SMAC), address policy, guidance, standards and technical issues in collaboration with the user-oriented committees. Chairs of all five standing committees, as well as the council chair and council representative from the Office of State Budget and Management, comprise the Management and Operations Committee (M&O), which handles the council's business in between quarterly meetings.

Figure 1. GICC Members are appointed by a range of organizations to represent the entire GIS community in North Carolina.

GICC Committees

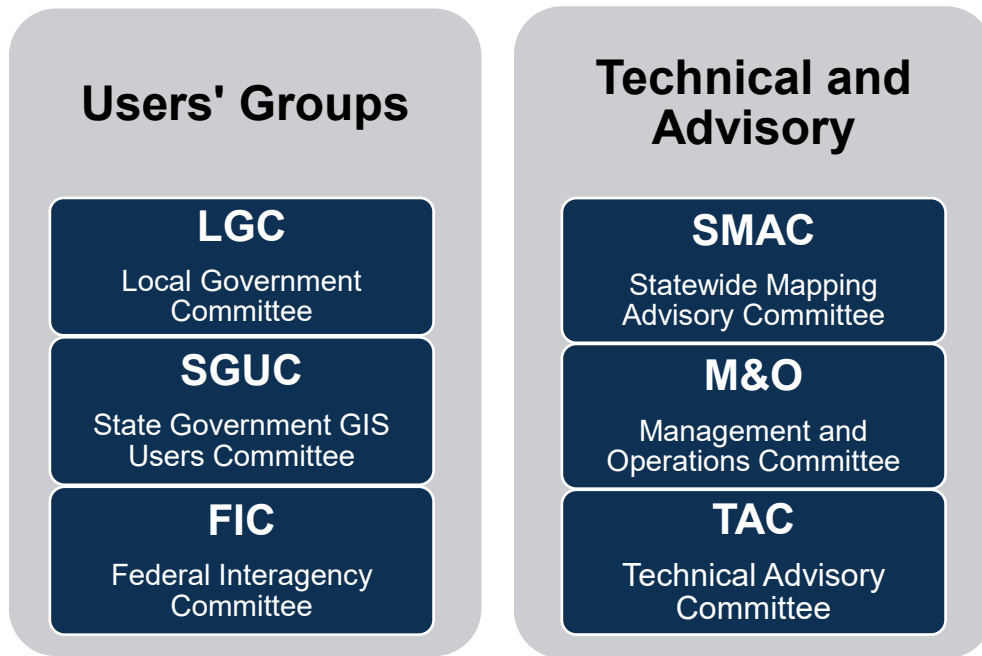| Users' Groups	Technical and Advisory
LGC Local Government Committee	**SMAC** Statewide Mapping Advisory Committee
SGUC State Government GIS Users Committee	**M&O** Management and Operations Committee
FIC Federal Interagency Committee	**TAC** Technical Advisory Committee

Figure 2. The Council and Statutory Committees

Committee members, the state's geographic information systems (GIS) community and the public used the council's website (it.nc.gov/gicc) and NC OneMap (nconemap.gov) to keep current on initiatives, meetings, opportunities and news about both entities.

What is GIS?

Often, GIS is understood as mapmaking or cartography, but what is missing from that simplified definition of GIS is the power of location-based, data-driven decision support. Geographic Information Systems, known as GIS, is a network of feature locations, feature information, software, databases, servers, mobile collection devices, sensors and analysis tools that support planning and decision-making. GIS is more than a static map; it is a powerful tool that ties together spatial and non-spatial data to support critical decisions and planning.

GIS data forms the foundation for daily decisions and is used by experienced GIS analysts as well as the general public, who may not even realize they are using GIS data. Addresses and street centerlines may be the two datasets most often used by the public, yet the coordination involved in collecting addresses and roads from local governments into a standardized, regularly updated, statewide database that is then used to better route a car in a phone app is invisible to most parents trying to find the right park for soccer practice. When these datasets are not complete or accurate, online purchases get delivered to the wrong location, households are missed during the Census, or emergency responders take longer to find the correct home. Without GIS, many of the tools we use daily would not exist.

Because of the critical importance of GIS to government functions as well as the private sector's reliance on accurate, well-maintained data, the council must include a wide range of stakeholders in its committees and working groups to ensure that geographic data produced in North Carolina meets the needs of our citizens. These local, state, federal, private sector and education stakeholders drive the data-driven collaboration necessary to meet the needs of North Carolinians now and in the future.
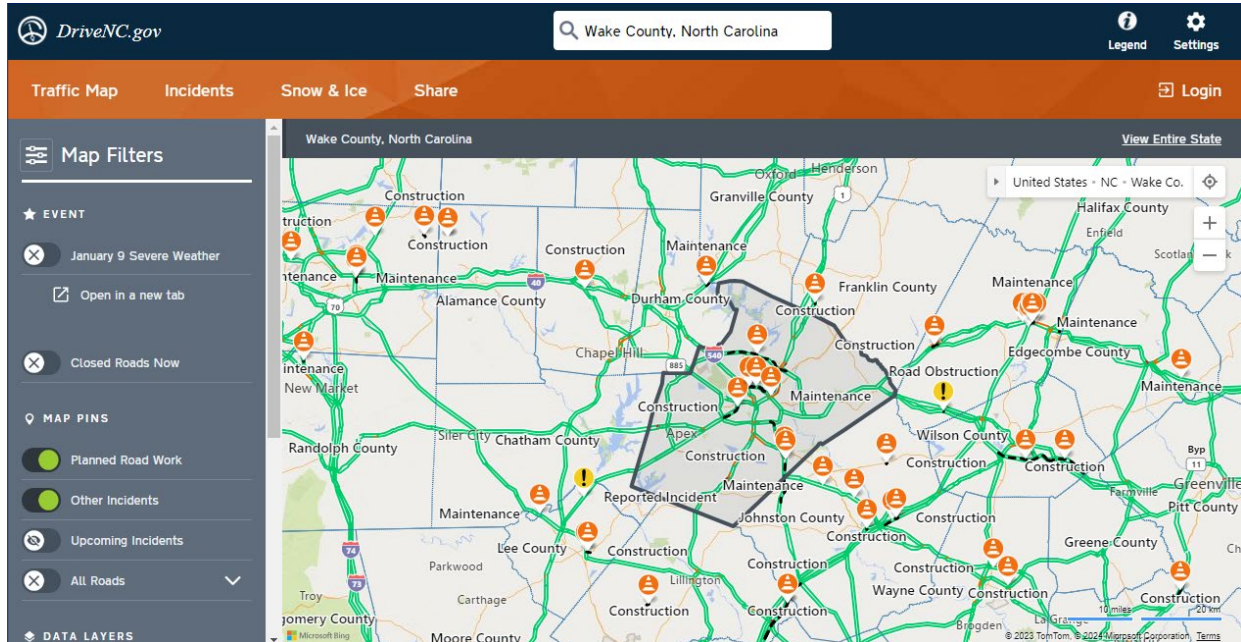
Figure 3. GIS is more than pretty maps! The public uses DriveNC.gov daily, and GIS data supporting this application is also consumed by commonly used navigation applications like Waze.

Fiscal Year 2022-2023 Council Highlights

Introduction

The GICC meets quarterly, and most meetings include a mixture of state project updates, discussions of issues or hurdles facing the GIS community, reviews of committee data specifications or recommendations and general information that needs to be communicated back to council member communities.

The past fiscal year included updates and discussions of GIS topics of great interest both to GIS professionals and much wider audiences. GIS data forms the basis for decisions made at all levels of government, and the GICC reviewed important updates and recommendations for building footprints, hydrography, municipal boundaries and more. Select highlights from council meetings can be found in this section,

Figure 4. State GIO Tim Johnson gives an update to the council on his office's progress.

while more detailed information about project progress and issues discussed both within the GICC and within its committees will be covered in the accomplishments section of this report.

Infrastructure Working Group

Infrastructure spatial data is important to many industries including economic development, emergency response and transportation planning. In 2019, the GICC noted that existing statewide infrastructure data layers for water and sewer produced by the NC Rural Center were over 20 years old, and there were no plans to update these data. This prompted more discussion about the value of infrastructure data for economic development and other important purposes.

Figure 5. GICC Council members from Duke Energy worked to develop and share transmission easements through NC OneMap

The council gathered information to decide on a course of action during the previous fiscal year. These conversations revealed the following key points regarding infrastructure data sharing:

- Data sharing practices vary widely across the state.

- Data providers have an obligation to protect their infrastructure and networks from intentional (e.g., bad actors) and unintentional (e.g., construction activities, digging, etc.) damage.

- Many local governments lack written data sharing policies and could benefit from templates or examples of existing policies.

- Access to infrastructure data is critical to emergency response and transportation planning.
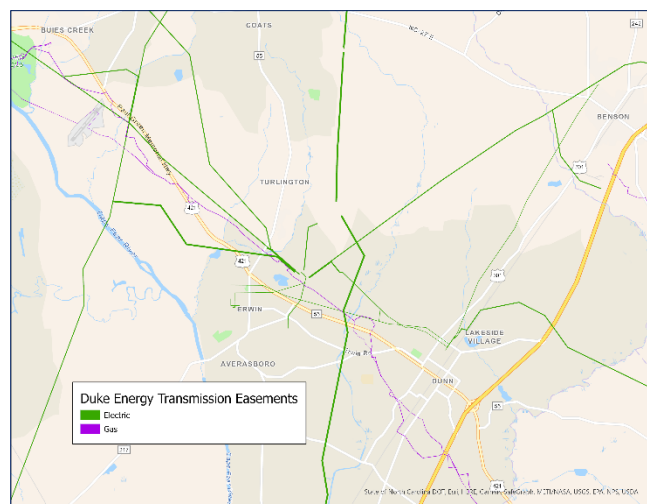
Based on these findings and council discussions, the council determined that additional investigation and documentation would assist both infrastructure data producers and consumers in understanding data sharing policies and best practices and assigned it to the Technical Advisory Committee (TAC). The TAC chartered the Infrastructure Working Group (IWG) to undertake the task.

The availability and quality of infrastructure data has an impact on a wide range of disciplines; therefore, the IWG gathered stakeholders from rural, developing and metropolitan counties and cities as well as private developers, utilities, transportation professionals and land managers. The IWG's information gathering process was inclusive of most committees of the GICC, as the IWG actively sought use cases from the Local Government Committee, the State Government GIS Users Committee and the Federal Interagency Committee. The LGC assisted in additional ways through member surveys to provide data-sharing information and examples of data sharing agreements and data disclaimers.

The working group reported regularly to the council and presented a report of its findings and recommendations at the November 2022 quarterly meeting. The working group provided recommendations to both data providers and the GIS community through the GICC. Recommendations for data providers surround the central theme of data security. Security in this context extends from physical infrastructure to the completeness and accuracy of the data to written, defensible internal policies regarding data sharing.

The working group recommends that data providers begin with a risk assessment that includes an evaluation of existing written data sharing agreements, written internal data procedures, data disclaimers, geometric accuracy including completeness and positional accuracy, attribute accuracy and completeness, metadata completeness and the need for regional municipal data sharing. These recommendations are best practices that should be revisited frequently, as data, technology and physical infrastructure change and evolve.

The full infrastructure working group report including stakeholder surveys, sample data sharing agreements and sample disclaimers can be found on the GICC website.
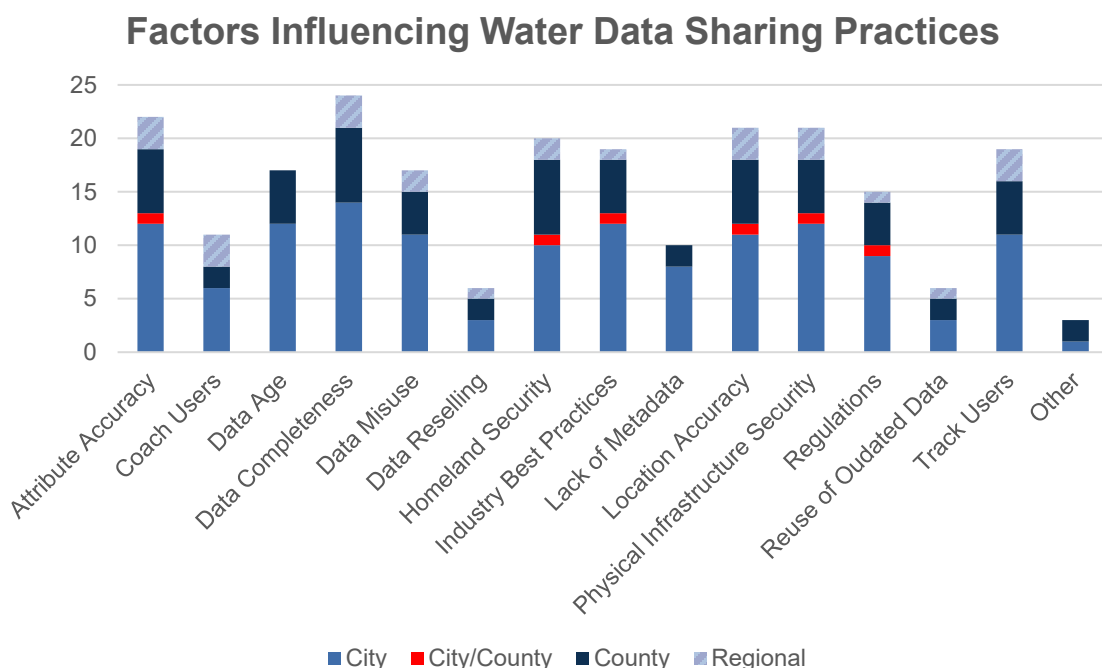

Figure 6. A survey of data providers showed that data completeness and attribute accuracy were the top two reasons influencing the way they shared their data. Homeland Security was the 5th most common factor despite being a commonly cited answer for withholding data, leading the committee to surmise that improving data quality could improve willingness to share data.

Broadband Expansion

Without the aid of foundational geospatial datasets, many programs within our state would not efficiently and effectively be able to plan and distribute resources. Broadband expansion is an excellent example of how GIS data is critical for state programs.

Angie Bailey, director of NCDIT's Broadband Infrastructure Office, presented at the August quarterly meeting on the importance of spatial data and analysis in achieving the mission of her office. Goals of NCDIT's Division of Broadband and Digital Equity, of which the Broadband Infrastructure Office is a part, include expanding broadband access statewide, building a sustainable team to deliver digital equity to North Carolina, leveraging data to identify and understand community needs, enabling more citizens to afford high-speed internet and increasing digital literacy among all North Carolinians.

Broadband information is on NC OneMap, and the Division of Broadband and Digital Equity and CGIA partner in data sharing, data collection and data analysis. The Growing Rural Economies with Access to Technology (GREAT) Grant Program provides grants to broadband service providers to build infrastructure in unserved locations (<25/3 Mbps). North Carolina has been working to improve baseline

data used to administer the grant program. Federal Communications Commission (FCC) data at the census block level does not provide the level of information needed to determine if all addresses within a block have adequate service so broadband survey data has been used to identify addresses in need of service. AddressNC data is used directly in the grant application to specify exactly which addresses would be included for new service.
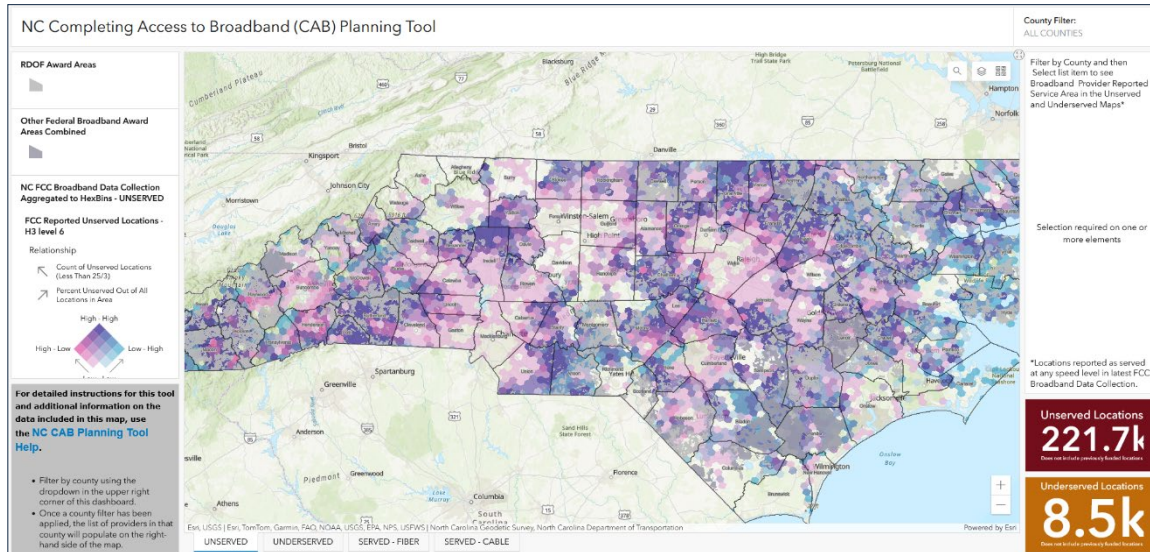

Figure 7. The Completing Access to Broadband tool is just one of many tools developed using GIS technology to support transparency and effective planning of broadband expansion funding.

The Division of Broadband and Digital Equity has a strong need for building level information for use in administering their programs. The GICC is addressing this need through the Building Footprint Working Group, which presented a business plan to update and maintain the existing decade-old dataset at the same August quarterly meeting. The division was a stakeholder in the working group along with North Carolina Emergency Management, which currently houses the statewide dataset. The council approved the building footprint business plan, but it is important to note that no regular funding source has been identified to support updates and maintenance.

Flood Resiliency Blueprint

In 2021, the N.C. General Assembly tasked the North Carolina Division of Mitigation Services with developing a Flood Resiliency Blueprint. This blueprint will facilitate the development and prioritization of flood mitigation and resiliency strategies statewide.

Elizabeth Christianson, senior policy advisor for NCDEQ, presented to the council about this topic. The blueprint will consist of an online tool to support the development of action strategies in each watershed across the state. Early stages will be centered around stakeholder engagement, process development, data review and online tool specifications to meet stakeholder needs. The goal is to develop a comprehensive blueprint that visualizes flood risks, considers different mitigation strategies and assesses the impacts and vulnerability of communities and infrastructure.
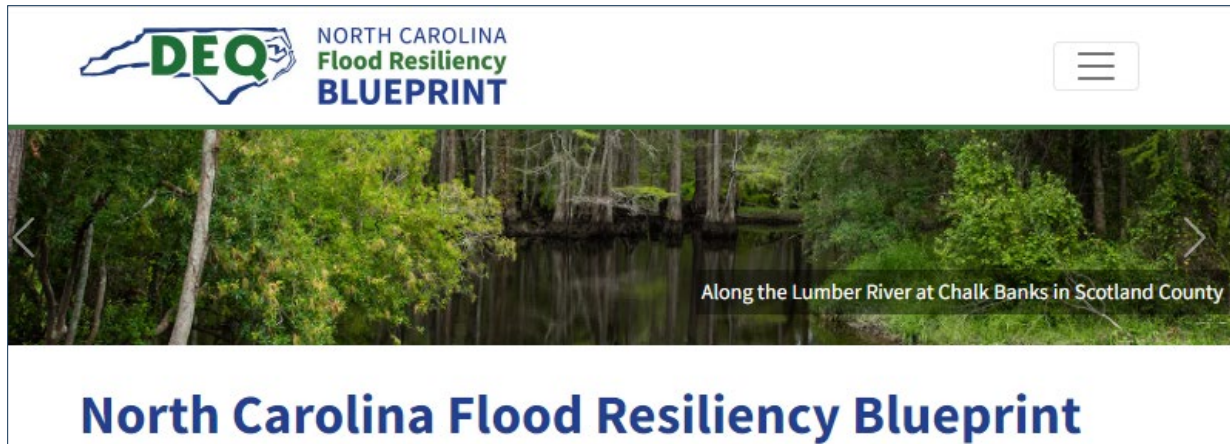
Figure 8. The Flood Resiliency Blueprint website provides information about project progress and will provide access to upcoming planning tools.

The blueprint relies on GIS data provided through NC OneMap. Without geospatial data to support analysis and decision-making, the blueprint would not be able to meet the requirements set forth by the General Assembly. Christianson discussed the blueprint process and expressed the need for the GICC to support data development and update projects necessary to support the blueprint. The blueprint will require updated lidar-based elevation data to support flood modelling, building footprint data to support building-level risk analysis, parcel and address information, critical infrastructure data development and other hydrographic and landscape data. Identifying regular sources of funding to update these framework datasets will be critical to the long-term viability of the blueprint and other statewide projects.

GICC Goals and Framework Dataset Updates

Every two years the GICC reviews its goals and priority datasets. The council's goals and priorities are led by community needs. Each user group committee, the LGC, SGUC and FIC, presented its members with an opportunity to comment on issues the council should consider during the following two years. The community feedback from outreach meetings and the N.C. Geographic Information Systems Conference Town Hall session heavily influenced the discussion of goals and priorities for 2023-2025. The final goals and priorities will be approved at the August 2023 meeting.

The working groups for the two remaining priority datasets, building footprints and hydrography, provided updates to the council at the fall 2021 meeting. The Building Footprint Working Group (BFWG) presented its draft business plan at the May 2022 meeting to receive feedback from council members in order to finalize its work for the next meeting. Critically important to both emergency management and broadband expansion, the

Figure 9. GICC Chair, Hope Morgan, leads a discussion during the NCGIS Conference Town Hall.

BFWG worked in record time to produce a business plan. Changing federal hydrography specifications and program plans required close coordination with federal partners at the U.S. Geological Survey (USGS), and the Hydrography Working Group (HWG) spent considerable effort in understanding the new requirements and in evaluating how North Carolina's dataset may contribute to a national layer.

GIS Community Outreach

Fiscal year 2022-2023 was a very busy year for the GICC in reaching out to the GIS community in North Carolina. Post-pandemic, there was a need to engage with stakeholders in person, and the GICC held statewide outreach meetings and relaunched the NC GIS Conference on location.

NC GIS Conference 2023

The NC GIS Conference is held every two years at locations across the state and is organized by the GICC. The conference attracts hundreds of GIS professionals and provides a major learning and networking opportunity for the community. The NC GIS 2023 conference, held in Winston-Salem on March 8-10, 2023, was attended by 560 participants. During the pandemic, the conference was held virtually, and this event was the first time the statewide GIS community gathered in person again for the GIS conference.

The conference featured NCDIT Secretary Jim Weaver, AppGeo's Bill Johnson and ESRI's Dr. Joseph Kerski as keynote speakers. Highlighting North Carolina's commitment to coordination with not only the state GIS community but also with adjacent states, North Carolina hosted Geographic Information Office leaders Adam DeMars from South Carolina, Susan Miller from Georgia, Dennis Pederson from Tennessee and Joe Sewash from Virginia for a session on regional coordination and data sharing.

The NC GIS Conference has a very positive reputation within the North Carolina GIS community, and strong attendance numbers demonstrate the benefit the GIS community finds in this event. Participants consistently praise the conference for its strong content, networking opportunities and sense of community.

Figure 10. The NC GIS Conference opening session included remarks from NCDIT Secretary Jim Weaver, GICC Chair Hope Williams, North Carolina's State Geographic Information Officer Tim Johnson, and Keynote Speaker Bill Johnson.

"I have been to state GIS conferences in more than 20 states in the past five years, and I can tell you with confidence that yours was exemplary in many ways. Great attendance (about 2x larger than most other state GIS conferences), very well-planned and all logistics were smooth. Everything was well thought through. All of the sessions I attended were on time, properly moderated and professionally presented. Most important to me is that the attendees were eager to learn and expand their personal networks by talking with colleagues, sharing ideas and experiences."
William Johnson, Carpe Geo

"It was especially good to have an in-person conference again."
Steve Maskol, City of Gastonia

"I am new to GIS, and this conference was very beneficial, and a great amount of knowledge was a huge takeaway."
Michael McLellan, City of Winston-Salem

Outreach Meetings

The Local Government Committee (LGC) and GICC hosted five regional meetings throughout the fall of 2022 to engage personally with GIS professionals across the state. All GICC committees participated by offering presentations at various locations to inform the community about their work and encourage new participants. Many working groups provided updates during these meetings, and the events allowed working group members to seek feedback and recommendations from a wider audience. GICC and LGC members were able to attend events in their local region to meet new GIS professionals, hear directly from the GIS community and answer their questions. Recommendations from the outreach meetings informed future GICC quarterly meeting discussions, NCGIS Conference topics and committee workplans.

NC OneMap Disclaimer

The NCDIT legal counsel asked the GICC to review the NC OneMap Disclaimer in relation to publicly available datasets, responsibilities per N.C. General Statues and the possibility of resale and commercial use of geospatial data. The council discussed the current disclaimer and the text of N.C.G.S. 132-10, which references multiple outdated data transfer technologies and does not mention open data as currently practiced. The council revised the disclaimer to reflect current governmental data transparency and NC OneMap's open data model. After a review by NCDIT legal counsel, the council adopted the new disclaimer for use at the November Quarterly meeting. The new disclaimer can be found on the NC OneMap website.

The NC Center for Geographic Information and Analysis (CGIA) is charged with the development and maintenance of NC OneMap and, in cooperation with partner organizations, is committed to offering access to current State geospatial information at no charge. By sharing their content, all partner organizations understand this free and unrestricted use policy. Although every effort has been made to ensure the accuracy of information, errors and conditions originating from sources used to develop the data may be reflected in the information supplied. The user must be aware of possible conditions and bear responsibility with respect to errors, collection methodologies, currency, and other conditions related to all data, web services or applications. While every effort has been made by data providers to ensure this information is accurate and reliable, there is no assumption of liability for any damages caused by inaccuracies in the data, web services or applications. There is no warranty, express or implied, nor does the fact of access or distribution constitute any such warranty. Written release agreements to authorize use of the geospatial data, web services, and applications found on the NC OneMap website are not required and will not be issued. The use of trade names or commercial products does not constitute their endorsement by CGIA or North Carolina State Government. Any sale of this data must not violate applicable state laws or regulations.
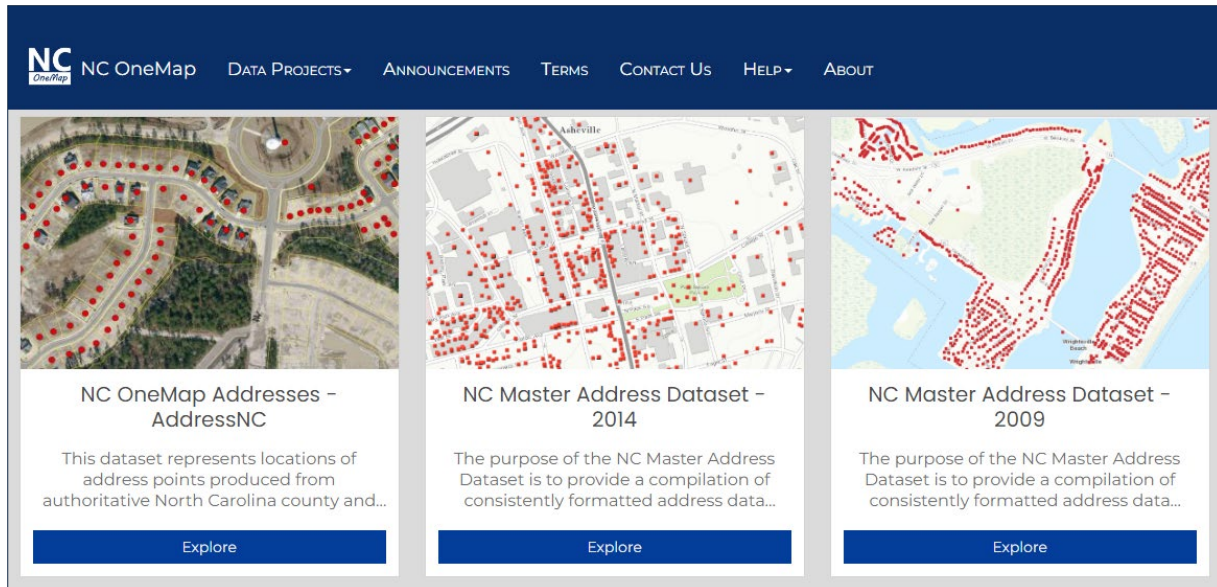
Figure 11. NC OneMap provides a portal to access historic and present NC Address layers.

Federal Coordination

Coordination with federal agencies benefits North Carolina and brings accurate and more complete data to federal datasets. The GICC's Federal Interagency Committee (FIC) is an important pathway to federal coordination, but it is not the only way that the state of North Carolina engages with federal agencies and coordinated federal efforts.

Gary Thompson, vice-chair of the council, is also chair of the National Geospatial Advisory Committee (NGAC). The NGAC is a federal advisory committee and is authorized under the Geospatial Data Act of 2018 to provide advice and recommendations on the management of federal and national geospatial programs and the development of the National Spatial Data Infrastructure (NSDI). It is also tasked with review and comment on geospatial policy and management issues and ensures that views of non-federal parties involved in national geospatial activities are conveyed to the Federal Geographic Data Committee.

Thompson provided the GICC with an NGAC update at the February quarterly meeting, and was joined by Bobbi Lenczowski, NGAC vice chair and John Mahoney, Federal Geospatial Data Committee (FGDC) senior policy advisor. The NGAC speakers informed the GICC about opportunities to comment on federal geospatial initiatives and sought feedback for specific federal working group topics including the Landsat program. Coordination with federal agencies has contributed in the past to the development of important framework datasets including hydrography, elevation and landcover. Within the past year, important updates from North Carolina have improved the National Address Dataset. The GICC serves an important role in facilitating cooperation.

Strategic Direction for the Council for Data-Driven Collaboration

Every two years, the council reviews its goals and priorities to plan its strategic direction for the coming two years. The council historically has not written a formal three-to-five-year strategic plan but has relied on a biennial planning process to remain nimble and respond more quickly to pressing needs and user priorities. The council's priorities and goals are a mixture of long-term and short-term projects, and this biennial process allows the members to more frequently assess progress, assign tasks and define new goals or priorities.

The goals listed below represent the 2021-2023 priorities for the council. New goals discussed and planned this fiscal year will be effective at the beginning of the 2023-2024 fiscal year.

Goal 1. Improve, expand and support statewide geospatial data and applications.

1.1. Promote free and open discovery of and access to geospatial data created and maintained by local governments.	
Need:	Actions Taken:
Accessible local data is essential for the success of most GICC initiatives.	NextGen 911 program data updates monthly. Municipal boundary website released by the MBWG. All counties contributed to AddressNC.

1.2. Research solutions that maintain data sharing security to aid discovery and ease of access to geospatial data.	
Need:	Actions Taken:
Emergency response, planning and development communities need a better understanding of security concerns for infrastructure data and better resources for how to request data and securely treat requested data.	TAC provided recommendations to the GICC. Template disclaimers, non-disclosure agreements, and data sharing agreements provided in final report.

1.3. Continue to support initiatives that compile and maintain statewide geospatial datasets that benefit the businesses and citizens of North Carolina.

Need:	Actions Taken:
Continuously improve existing datasets and compile new datasets as needed by stakeholders.	Municipal boundary data released and updates began. AddressNC data released. Federal/State coordination on hydrography standards. Building Footprint updates coordination between CGIA and NCEM. Transfer of lidar data to NC OneMap Cloud.

1.4. Find solutions to make data sharing local-to-state more efficient to meet the needs of multiple statewide datasets and not place undue burden on local geospatial data managers.

Need:	Actions Taken:
Eliminate duplication of effort and streamline data request processes for local government data to promote efficiency.	NC Roads and Parcels have achieved full participation by local governments. Municipal Boundary Working Group developed a streamlined process for boundary approval and annexation submittal. NextGen 911 data will directly supply addresses eliminating duplication.

1.5. Request all state agencies to make the council's priority geospatial datasets discoverable and accessible through the NC OneMap Geospatial Portal.

Need:	Actions Taken:
NC OneMap should serve as a single portal for state GIS data discovery.	The SMAC annually reviews datasets for new data needs. Elevation contour began to be copied to the NC OneMap cloud from NCEM to configure for service.

1.6. Promote geospatial metadata for standard documentation.

Need:	Actions Taken:
Metadata is essential to allow users to understand appropriate uses for data and should be promoted.	NC OneMap hosts the metadata standard, training materials and help documents.

Goal 2. Collaborate and conduct outreach for more integration of geospatial data in information technology for expanded benefits in the geospatial community in North Carolina.

2.1. Identify opportunities to collaborate on GIS solutions in state departments and divisions not directly represented on the council to add value to state business processes.	
Need:	Actions Taken:
Maintain a diverse and inclusive community of active stakeholders.	Outreach meetings brought new GIS professionals to participate in GICC working groups.

2.2. Identify opportunities to collaborate on geospatial data and technical solutions on a regional basis, engaging councils of government, educational institutions, metropolitan planning organizations and rural planning organizations.	
Need:	Actions Taken:
Eliminate silos and increase resources by working on a regional basis.	LGC and GICC members communicate to provide education and support regionally as needed.

2.3. Reach out to jurisdictions with the least resources to find ways to add value with geospatial data and applications.	
Need:	Actions Taken:
Provide education to the many small jurisdictions that lack GIS capability or expertise.	Education and outreach provided by the LGC targeted communities needing assistance with the Census Count Question Resolution (CQR). Efforts to increase LGC membership resulted in over 100 participants at each LGC quarterly meeting.

2.4. Increase awareness and adoption of council initiatives and priorities through outreach and education.	
Need:	Actions Taken:
Increase participation in working groups and increase awareness of existing GIS resources to avoid duplication of effort	Ongoing initiative- All committees and working group members have a charge to promote council initiatives within their organization and in their professional areas. Summaries of GICC meetings are sent to members soon after GICC meetings to allow them to distribute information to their organizations. The LGC changed the way it advertised quarterly meetings and doubled attendance.

Accomplishments 2022-2023

Sharing Information and Knowledge

NC GIS Conference

The NC GIS Conference is organized by the GICC and held every two years, providing an important networking and learning experience for GIS professionals. The conference encourages expansion of the profession by supporting opportunities for student presentations and awarding geography students for exemplary work. Thirteen graduate and undergraduate students from eight campuses across the state were awarded Herb Stout Innovative Student Paper Awards.

On the opposite side of the career spectrum, awards are given to those who have demonstrated a career long dedication to GIS data improvement or to advancing the profession. GICC Vice Chair Gary Thompson of the N.C. Geodetic Survey, Pam Carver of Henderson County, Silvia Terziotti of the U.S. Geological Survey and Art Rex of Appalachian State University were recognized for their contributions to the NC GIS community. G. Herbert Stout Awards are also given to local governments for outstanding and innovative GIS projects. Sallie Vaughn of Person County and the Forsyth CARES team that includes MapForsyth and the Town of Kernersville were recognized for their work in local government.

Figure 12. Herb Stout Innovative Student Paper Award winners.

Figure 13: (Left to right) Special recognition for contributions to the GIS profession: Pam Carver, Gary Thompson, Silvia Terziotti, and Art Rex with Tim Johnson and Lewanna Stout.

The NC GIS Conference program included 111 technical sessions and featured two sessions hosted by GICC committees. The LGC and SGUC each hosted a lightning talk-style program called "En-Lightning" Sessions. The local government session featured nine different local government projects, and the state government session featured 13 state government projects. Each session offered participants examples of the many ways GIS can be used in state and local government to bring efficiency, communicate more effectively, increase data transparency and provide valuable tools to citizens. These sessions were an excellent way for attendees to learn tips and tricks and discover new ways to bring the value of GIS back to their organizations.

NC GIS Town Hall Closing Session

The NC GIS Conference ended with a town hall-style meeting that focused on seeking feedback from the GIS community on what issues are most important to the community. The Town Hall Closing Session was included based on feedback from the fall LGC Outreach Meetings to facilitate discussion among GIS professionals and to review their needs and the ways the GICC might better serve them. Common topics mentioned by the community included the need for additional staffing, funding of GIS initiatives and salaries and executive support for GIS needs.

During the pandemic, GIS integration expanded because the technology has tools for seamlessly integrating fieldwork, office work, databases and public communication. As management saw the utility, more was asked of GIS professionals, more was delivered and more was expected. Many organizations, however, lack the needed staff to support the new demand, and those that do attempt to hire may not offer the salaries needed to attract highly qualified candidates that possess the variety of technical skills needed for the job. Staffing, funding and executive support comprised over 50 percent of the answers to the question "What are the barriers to our effectiveness?"

WHAT ARE THE BARRIERS TO OUR EFFECTIVENESS?
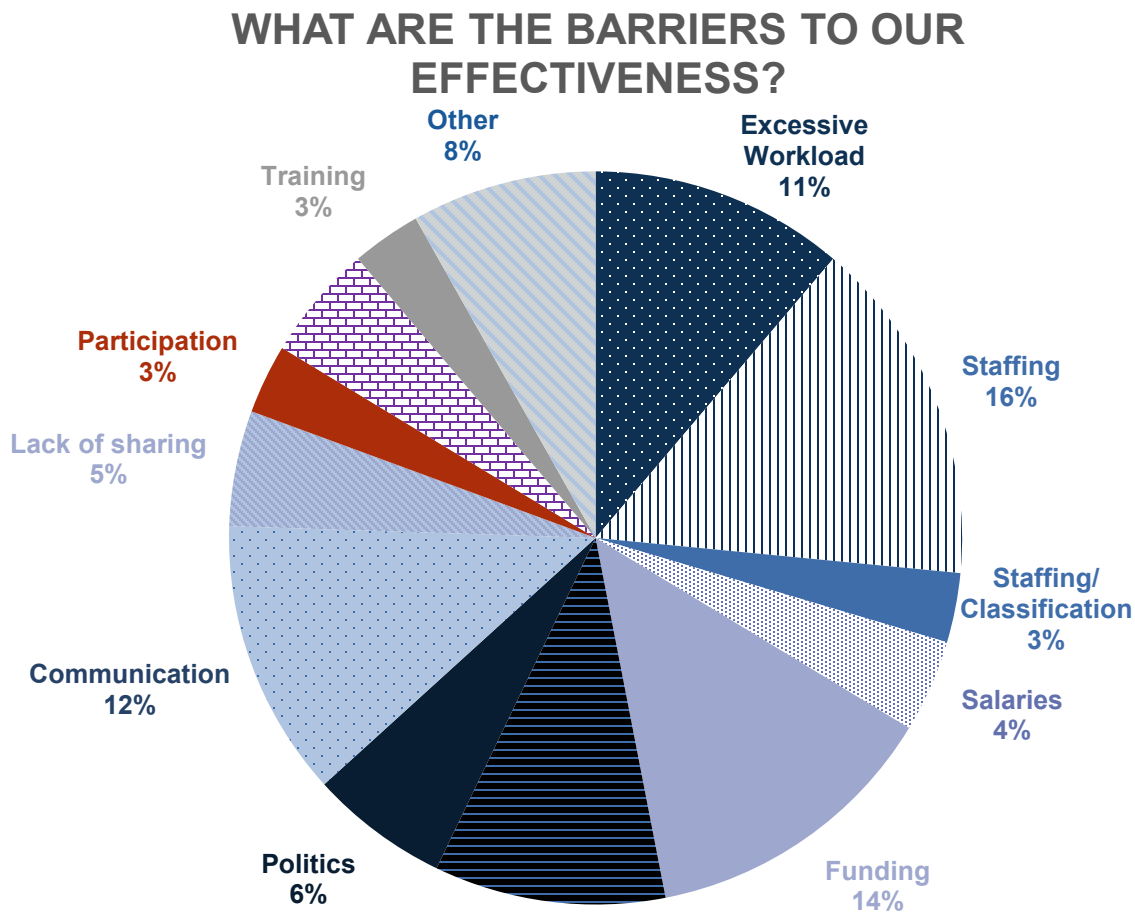
Figure 14 . Town Hall participants discussed barriers to effectively meet organization GIS needs. Staffing issues and funding for GIS support comprised nearly half of community responses.

GIS professionals are well aware of the efficiencies they can bring to their organizations, but they are limited in what they can do when they lack staff or funding to support initiatives. Lack of support included examples of executives not understanding the benefit-cost ratio of funding GIS, not supporting staffing or funding requests or not even understanding that GIS is far more powerful than just making paper maps. Many GIS professionals feel their immediate supervisor understands the value of GIS but feel that information is not being communicated to those who make funding decisions.

Funding is an issue not only with salaries but also with data development and maintenance. At all levels, from local to federal, creating, maintaining or updating datasets requires regular funding, and many

Figure 15. Indiscriminate county boundaries are a concern for the GIS community. The area between the yellow and blue lines is shown by both counties as being within their county boundaries. Addresses in areas like these are at risk of being improperly taxed or assigned to improper school or voting.

datasets lack this security. When organizations rely on data that is not being updated, organizations risk making important decisions using incomplete or out-of-date data. Data needs mentioned in the Town Hall included hydrography, building footprints, lidar, municipal boundaries and county boundaries, all of which are datasets that lack a regular funding source.

Attendees were asked what priorities the council should consider for the next two years. This question was designed to inform the council's upcoming goals and prioritization discussions. County boundaries, GIS funding, hydrography, staffing, building footprints, trails/greenways and lidar were top answers to needs not being fully met. The datum change was the top answer to what should be a priority during the next two years. More information on the datum change is available in the final section of this report.

The N.C. Geodetic Survey has the authority to survey county boundaries, but both counties with a shared boundary must first officially request a survey. Many boundaries in the state have not been recently surveyed, and adjacent counties may each keep their own version of the shared boundary which do not match. These unclear county boundaries have important implications for school assignment, voting districts and taxation. The council has discussed the question of indiscriminate county boundaries and the legal issues surrounding common practices when boundaries have not been surveyed by the N.C. Geodetic Survey.

Hydrography has been and continues to be a priority dataset for the council. This layer is in the process of being updated with significant progress made by the N.C. Department of Environmental Quality and N.C. Department of Transportation. However, the dataset requires more work to meet the needs of the community, which are unfunded at this time. The Building Footprint Working Group developed a business plan for building footprints, but this important dataset also lacks regular funding. 2023 was the Year of the Trail, bringing awareness to data related to trails and greenways. Additional local, state and federal coordination will be required to realize a comprehensive trail database. Finally, the SMAC is pursuing a business plan to fund regular elevation data collection and updates, but this also is an unfunded, yet critically important layer for many business cases. The council is actively working on these issues and will continue to pursue funding mechanisms to meet the needs of the community. Funding partnerships are important to support GIS-based decision making.

Figure 16. Natalie Walton-Corbett introduces the LGC EnLightning session at the NCGIS Conference. This session was included in the NCGIS agenda after well received similar session at the Raleigh outreach meeting.

Local Government Committee Outreach Meetings

The GICC responded to requests passed through the LGC that the community wanted more opportunities to learn about the GICC, its committees and the progress of GIS projects. The LGC and GICC coordinated five regional meetings throughout the state to meet in person with GIS professionals. Geospatial analysis was used to identify five locations that would serve all areas of the state with less than a two-hour drive. The LGC executive committee members worked to arrange meeting spaces at Councils of government, county, community college and State Library offices. The meetings were well attended by GIS professionals representing many types of organizations.

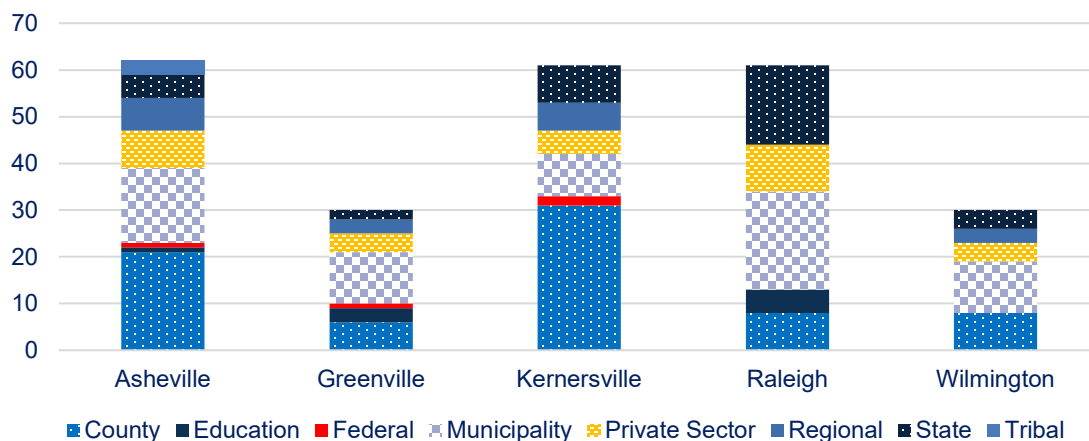

Outreach Meeting Registrations

Figure 17. Outreach meetings were well attended across the state with participants representing all areas of GIS users.

Topics differed at each outreach meeting to disseminate more content and to allow those participants who wished to attend multiple sessions to learn new information each time. Topics included an introduction to the GICC and its committees and working groups, a local government specific presentation, updates from GICC committees and updates on statewide projects including building footprints, hydrography, census, NextGen 911, AddressNC, seamless parcels, municipal boundaries and more. The outreach meetings facilitated an opportunity for statewide project working groups and teams to seek feedback about their projects and quantify specific data needs that must be incorporated into the project. This feedback informed data specifications and recommendations made to GICC committees. These meetings also afforded an opportunity for the GICC members to hear directly from local governments about how statewide coordination benefits them.

The outreach meetings were successful in many ways. The meetings allowed the GICC and LGC members to directly speak to local communities and make personal connections. New GIS professionals were afforded the opportunity to learn about the GICC and opportunities for participation in working groups and committees. At each meeting, working groups and committees expanded by

How does geospatial coordination at the state level impact your organization?

"Seamless data across county lines aids in regional planning efforts."

"Being in a small county, Madison, our budget would never allow us to be able to obtain our own aerial imagery."

"Data and documentation standards to facilitate data sharing and data aggregation."

"Advocate for dedicated funding to support data collection, management and distribution."

attracting new members to participate. The GICC and LGC members were able to hear directly from the GIS community about what they need and what issues they want the council to address. The NCGIS Conference Town Hall session was a direct result of the council's response to community requests. Each outreach meeting provided time for the participants to ask questions and suggest topics about which they would like to know more. These topics were added to LGC and GICC quarterly agendas. Finally, the meetings allowed the GICC to update local professionals on new data and new projects in development, while providing the opportunity for local governments to share projects and network

State Government GIS Users Committee

SGUC members identified lack of resources and lack of understanding of the importance of GIS at the department level as issues that needed to be improved. Historically, management exposure to GIS occurred in the form of maps provided in the context of reports. How the maps are produced, the work required to produce data for each layer and the infrastructure needed to support GIS databases are not often well understood outside the GIS profession.

North Carolina does not have a GIS position classification, partly due to the fact that GIS, as a profession, is incredibly diverse. GIS professionals may be classified as developers/programmers, environmental consultants, engineers, geologists, IT user support specialists or application systems specialists. Because of this, pay varies greatly from agency to agency.

GIS professionals are highly skilled, highly flexible employees due to the nature of GIS. GIS is a system, not simply mapping. GIS professionals often have experience in database design and management, scripting or programming skills, a strong aptitude for cartography, communication and design and a specialization in their business unit's mission that allows them to target geospatial databases and communication to the goal of the agency. They often must advise their own IT departments on infrastructure needs, installation and updates, and data storage requirements, as GIS requires unique configurations and specialized data access that are not well understood by typical IT support staff. Even though some GIS professionals have strong IT-related skills, in some departments there is a reluctance to be classified as IT because the existing IT classifications may result in them being pulled away from GIS tasks to perform pure IT tasks.

"I know some people are worried that reclassifying positions to GIS might result in IT taking the positions, and that would not be good for the work flow of the individual divisions."

GIS staff members may design a field application to allow staff to collect spatial data using a smart phone, write a script to automate database updates, create a dashboard to communicate the progress of field staff to management and design a real-time public web map for the public to view information collected in the field. The variety of skills that GIS professionals must master makes them so flexible that they are often pulled into so many projects within their business unit that classification becomes even more difficult. Compounding this is a misunderstanding among human resources staff as to what GIS professionals do. One agency that classifies GIS professionals at a lower pay scale than many other agencies recently questioned whether their GIS staff were classified at too high of a pay scale because they thought, "GIS only does data entry." Basic misconceptions such as these can have a great influence on pay, staff morale and retention.

"We have difficulty with HR not understanding GIS job postings."

SGUC members were alarmed at the difficulty in recruiting and maintaining GIS staff and began discussing whether a GIS classification could be a partial solution. The SGUC circulated a survey to review how staffing, pay and classification were affecting the mission of member agencies. Only 32 percent of respondents answered that they had sufficient GIS staffing to meet the needs of their agency. Eighty percent of respondents answered that low salary was a cause of staff loss, and 60 percent reported that loss of staff to higher paying state agencies was a problem.

"We could use more staff to develop additional data sets which would in turn help the Department make better decisions."

Recruitment suffers due to salary issues as well. Sixty-four percent of respondents reported a problem with recruits turning down job offers due to low salary. Forty-five percent of respondents reported that filling or increasing GIS positions was not a management priority, leaving them understaffed. Other respondents noted that the variety of skills necessary to fill a GIS role made finding experienced candidates extremely difficult. One agency noted their reliance upon contractors to fill GIS roles due to reallocation of in-house GIS positions was costing the agency more due to the contractor turnover. Finally, respondents noted that since GIS staff were classified in so many ways, there was often no path for advancement because their work responsibilities and skills were not the best fit for their existing classification.

After reviewing the results of the survey, the SGUC determined that the question of a GIS classification needed more review. It was also clear, however, that additional work was needed to raise the profile of the GIS profession within state government and within agency management, and this was a task that could be started immediately. The SGUC discussed various ways to educate management and the general public about the value of GIS to state agencies and the incredible benefits it brings to increasing efficiency, data transparency and decision making.

The committee decided that documenting the value of GIS to each agency would be a good starting point. Beginning in May 2023, a CGIA intern began interviewing GIS professionals from each agency and created a website to document how GIS brings value to their agency. The website will be completed during FY 2023-2024, but initial articles are already available on the North Carolina Value of GIS website.
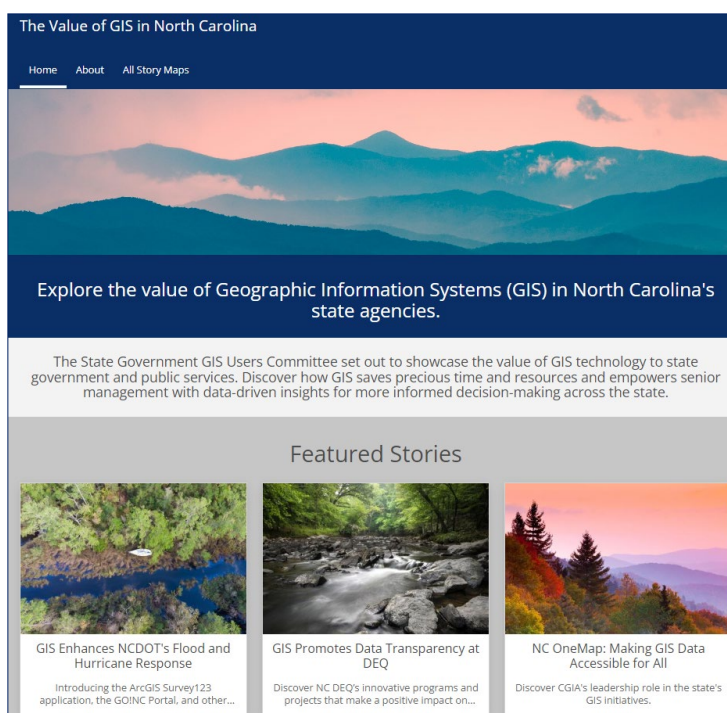

Figure 18. The NC Value of GIS website will highlight the importance of GIS to the mission of state agencies.

State and National Participation

The GICC and its CGIA support staff were busy during the 2022-2023 fiscal year sharing information about the council and its work with both state and national audiences. CGIA GIS Coordination Program Manager Colleen Kiley presented at the National States Geographic Information Council annual conference in Portland, Oregon, on the work the state undertook to understand infrastructure data sharing. Council Chair Hope Morgan, GIO Tim Johnson and CGIA Services Manager Matt McLamb also attended to coordinate with other states on national efforts such as broadband expansion.

Additional presentations on council priorities were made at NC ArcUsers Group (NCAUG) conferences by Darrin Smith on the AddressNC Program and Ben Shelton on the Statewide Orthoimagery Program and the NC Broadband Mapping effort.

The LGC outreach meetings and NC GIS Conference provided ample opportunities for sharing information about council initiatives. Next Generation 911, broadband expansion, municipal boundaries, the datum change and hydrography were just some of the many topics covered by CGIA, working group chairs and committee members.

Each summer the Office of the Secretary of State sponsors land records workshops across the state, providing an excellent opportunity to reach audiences that have limited capacity to travel to other meeting destinations. GICC presenters provided information on seamless parcels, AddressNC, municipal boundaries and building footprints.

> "The skill, expertise and dedication of GIS professionals across the state is helping North Carolina realize a huge return on its investment in geographic information systems and geospatial data."
> NCDIT Secretary and State Chief Information Officer Jim Weaver

North Carolina's geospatial programs and coordination are a model for other states, and CGIA's participation in NSGIC and other national organizations elevates our accomplishments and brings national attention to the successes achieved through effective local, state and federal coordination.

Collaboration for Data Governance and Consistency

Municipal Boundary Working Group Progress

The Municipal Boundary Working Group (MBWG) developed a website to allow local governments to keep their boundaries updated by submitting changes to a single portal. The MBWG was initiated at the request of the North Carolina Secretary of State Elaine Marshall.

Marshall updated the council on the problem her office was having in collecting annexation information. Local governments were forgetting to submit the information to her office, and this oversight was causing discrepancies between the data collected by the Census Bureau annually and her office, which is responsible for approving the annual Boundary Annexation Survey.

As the working group discussed the issue, it became clear that multiple agencies were collecting the same data, and none of the data consistently matched because none of the agencies were able to collect all annexations and boundary changes. The stakeholder agencies agreed that a single data layer should be shared by all parties, and they developed data specifications for municipal boundaries that were approved by the council in 2021.

Stakeholder agencies created a comprehensive municipal boundary layer and a website that allows users to update and correct their boundary. The website is available from NC OneMap and allows users to do

one of three things: approve a boundary, update a boundary or submit annexation information. If the boundary displayed on the website is correct and no changes have been made, municipalities can approve their boundary. This status will appear on the online map, so users know that a boundary has been verified as correct. If the boundary is not correct, municipalities can upload a new boundary file to the site. If the boundary needs to be updated with a new annexation, users can upload annexation information including a GIS file of the area to be annexed, a survey and a copy of the annexation ordinance.
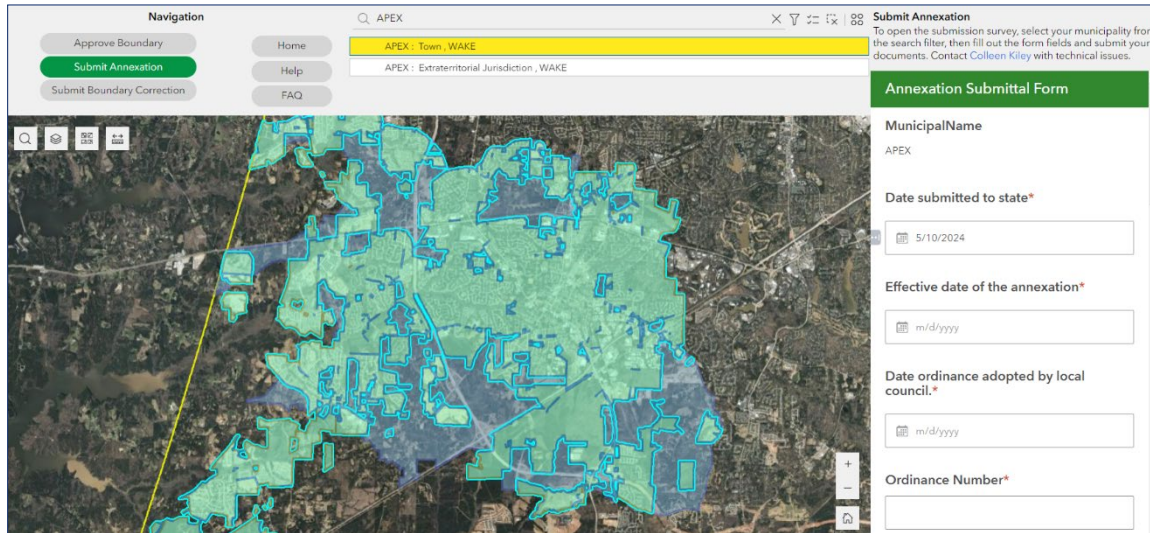

Figure 19. The municipal boundary application on NC OneMap allows users to review, approve and update their municipal boundaries.

The MBWG members worked throughout the fiscal year to inform municipalities who will use the site. The group gave presentations at the fall outreach meetings, the NCGIS conference, the NCAUG conference, the ESRI Southeast Regional User Conference and the summer property mappers workshops. Work is ongoing to encourage municipalities to review their boundaries, but the group believes that since the site will reduce the number of requests they receive for boundary data, they will see the benefit of a single portal to save them time.

Building Footprint Working Group

The Building Footprint Working Group was tasked by the SMAC with developing a business plan for the maintenance of a statewide building footprint layer. During the first six months of 2022, the working group met frequently to review use cases and the existing dataset and outline common needs and goals. A draft business plan was presented at the May 2022 GICC meeting and the final plan was approved at the August meeting.

Building footprint data exists in North Carolina and was developed by N.C. Emergency Management from imagery collected prior to 2015. Most data used to produce the existing layer is over a decade old. The dataset is critical to emergency response efforts and was first used during Hurricane Matthew to estimate extensive wind and flooding damage that was used to justify the fastest federal disaster declaration in the Federal Emergency Management Agency's history.

Also used in the N.C. Flood Inundation Mapping and Alert Network (FIMAN), the investment thus far has literally saved lives through early warnings. According to the 2020 U.S. Census, North Carolina's population has grown by 9.5 percent since the building footprint layer was first created, with new construction concentrated in urban areas.

A business plan to define needs and funding was necessary to maintain this critical resource. The business plan identifies 17 organizations including private enterprises and state, federal and local governments that benefit from this dataset. Each of their use cases was documented and includes time-sensitive needs such as broadband expansion, disaster relief and recovery assistance and election confidence and voter information. The Federal Communications Commission (FCC) Broadband Serviceable Location Fabric (Fabric) is a dataset of buildings where fixed broadband internet exists or is needed. The state has a limited time frame to submit challenges to the Fabric, and building footprints are crucial to identifying areas where the Fabric has missed North Carolina buildings in need of broadband.
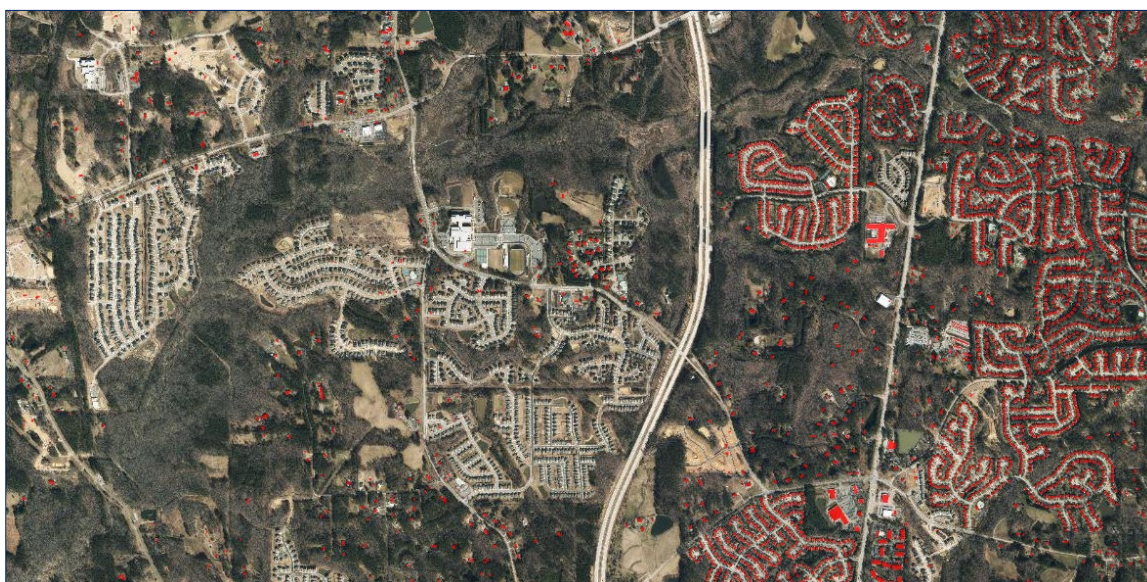

Figure 20. New construction must be captured in building footprint updates. This image shows an example of an area where new homes (left side of the image) built after the NCEM building dataset was created must be added to the red existing building footprints (right side of image) to maintain accurate data.

The draft business plan recommends updating the building footprints dataset using Statewide Orthoimagery Program data collected during the most recent four-year cycle and then updating each part of the state flown by subsequent orthoimagery collections. Attribution of the new and changed buildings will require data from the Seamless Parcels Program, AddressNC and county tax offices. Funding needs for an initial update followed by maintenance are outlined in the business plan. However, it is important to note that to date, no funding source has been allocated for regular maintenance of this dataset, yet this dataset is fundamental to core business needs and public safety.

AddressNC: Building Upon Next Generation 911

Address data is closely tied to parcel and building footprint data, and the three datasets, when combined, form a solid foundation for powerful analysis and decision support tools. In 2018, legislative funding was provided to update the dataset in preparation for the 2020 Census, but the effort was placed on hold because the GICC identified a more efficient and sustainable update model. The council saw an opportunity to continually update the dataset rather than rely on a one-time update as had occurred in the past.

Figure 21. AddressNC compiles a statewide address layer from Next Generation 911 data, producing a dataset that is constantly updated to provide accurate address locations for many applications.

Address data is a continuously changing dataset and updating it once or twice a decade leaves the data lacking information, especially in rapidly developing areas of the state. In keeping with the GICC's goals of collaborating to eliminate silos and duplication of effort, the AddressNC steering committee developed a plan to maintain the data using monthly updates from Next Generation 911.

Throughout fiscal year 2021-22, the AddressNC team at CGIA developed update tools, data standardization tools, error reporting and process workflows to support the project. As data became available through Next Generation 911, address points were added to the AddressNC database and quality checked for future publication. This fiscal year, the project met the milestone of publishing data from all 100 counties. The team worked closely with counties to assist them with their address data, while simultaneously providing outreach and updates to the GIS community about the upcoming data release and importance of data maintenance.

In addition to serving the address data through NC OneMap, a geocoding tool was published that allows users from multiple platforms to locate addresses. Local stakeholders have been asking for a more complete address location tool than common tools like Google or Apple maps. These commonly used address datasets are not updated as frequently as NC OneMap, so NC OneMap now provides a more frequently updated alternative for package delivery and other location services.

Collaboration for Public Access to Geographic Information

NC Broadband Expansion

Broadband expansion relies on solid geospatial data for planning, program management and grant tracking. NC OneMap and NCDIT's Division of Broadband and Digital Equity have a close partnership to support this important service for the citizens of this state. GIS data supports critical decisions for the program and has been instrumental in bringing additional grant funding to the state.
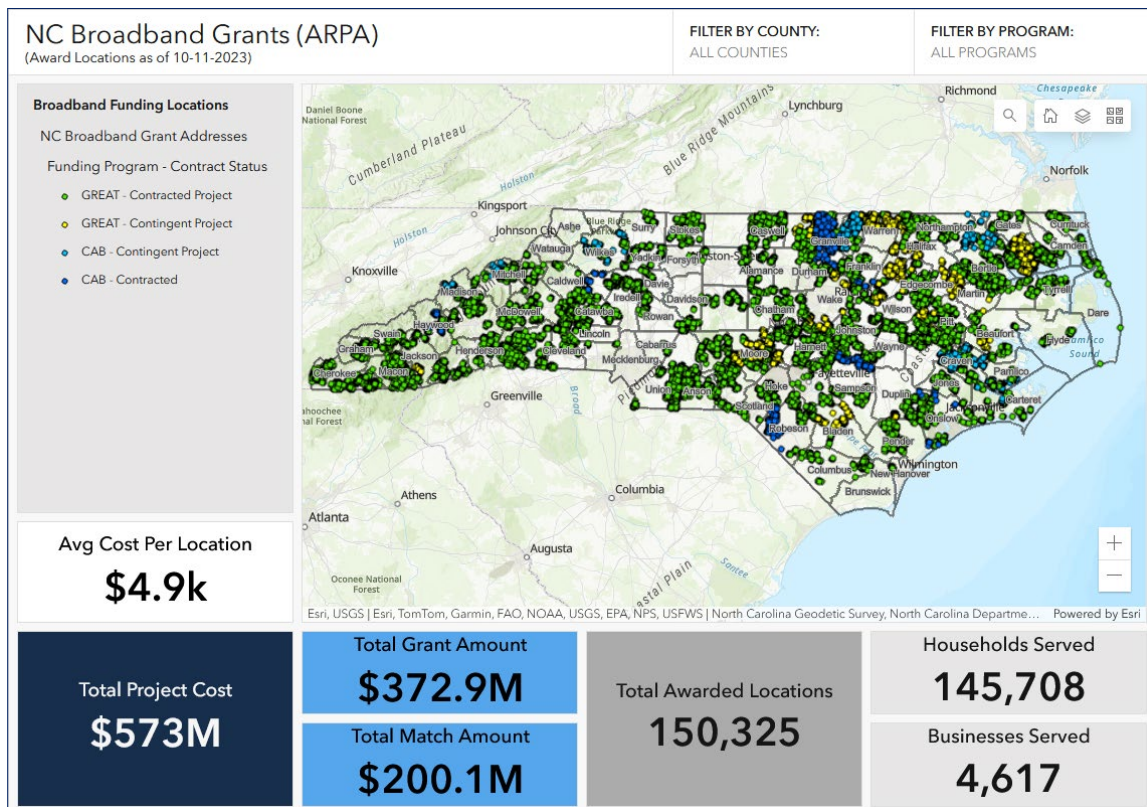
Figure 22. NC OneMap provides access to many tools for broadband planning, grant tracking, and data transparency including this grant tracking dashboard.

The existing building footprint data, though dated, combined with excellent address and seamless parcel information proved an excellent example of the power of GIS and the return on investment from decades of GIS data development. The FCC released their Fabric data, which will be used to allocate grant money to all states for broadband expansion. If a home needing broadband is missing from the FCC data, the state will not qualify for grant money for that location. Because North Carolina was able to prove, through well-developed datasets, that locations were missing from the federal dataset, its challenges to the FCC data surfaced 115,000 additional North Carolina homes and businesses that do not have access to high-speed internet, more than any other state in the country. These additions increased North Carolina's funding allocation from the federal Broadband, Equity, Access and Deployment program and will connect more North Carolinians to high-speed internet.

Orthoimagery Program: A Success Story

The Statewide Orthoimagery Program, funded by the N.C. 911 Board, delivers a consistent and current visual reference for emergency communications and serves as a foundational layer for most online mapping in the state. The program updates a quarter of the state's counties each year on a rotating basis with high-resolution, consistent and accurate orthoimagery. The imagery is available to state, local, federal and regional government agencies, as well as the private sector, the academic community and private citizens as map services and downloadable files from NC OneMap.

The northern piedmont and mountains project (phase 3) was collected in early 2022 and delivered in the last half of the same year. The southern piedmont and mountains project (phase 4) was collected in early 2023. The first delivery of imagery that includes the addition of a color infrared (CIR) product occurred in 2020, and the new product continues to be collected with each new phase. Because the internal cell structure of healthy plants reflects the near infrared wavelength, CIR imagery is useful in monitoring plant and crop health. With the southern mountain area collection, the CIR product will be available statewide in the fall of 2023.

The current orthoimagery program continues to provide a high-quality product to support emergency response and communications at a substantial savings from previous collection methods and serves as a model to other states.
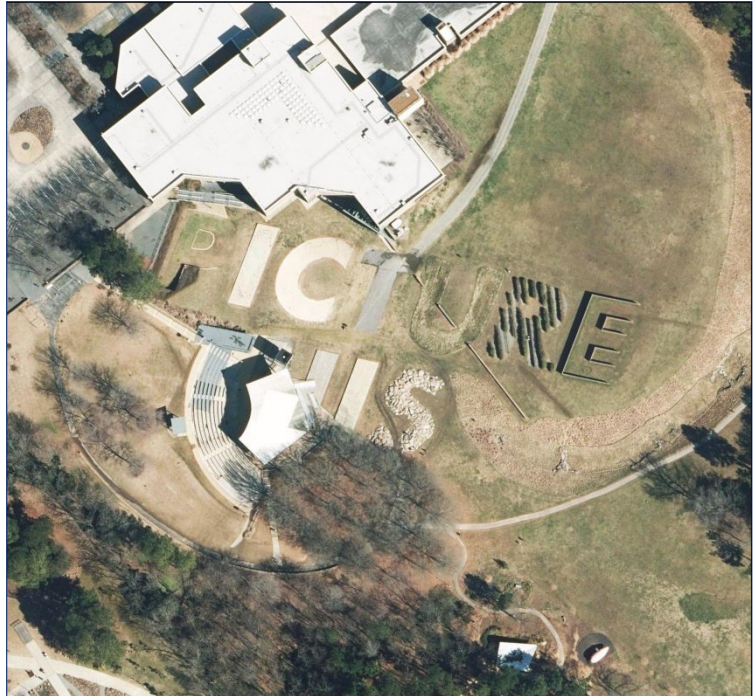
Figure 23. Picture This: The 2021 Orthoimagery Program captured this image of a large art installation on the N.C. Museum of Art grounds.

NC OneMap

NC OneMap is an award-winning GIS data clearinghouse used as an example of governmental excellence across the country. It is heavily used to discover and consume geospatial data. CGIA began a migration to the cloud in 2021 to provide elasticity and ensure a consistent experience during times of heavy use to protect this vital resource. The migration of services to Amazon Web Services provides a more stable platform while preserving all the benefits of NC OneMap.

Figure 24. NC OneMap provides access to a host of GIS tools including Broadband, Municipal Boundaries, AddressNC, Orthoimagery, and elevation data.

NC OneMap's resources are used across all levels of government, the private sector and the educational community. Standards for data quality, documentation and distribution provide users with the confidence that the data discovered through NC OneMap is authoritative and trustworthy. The site provides i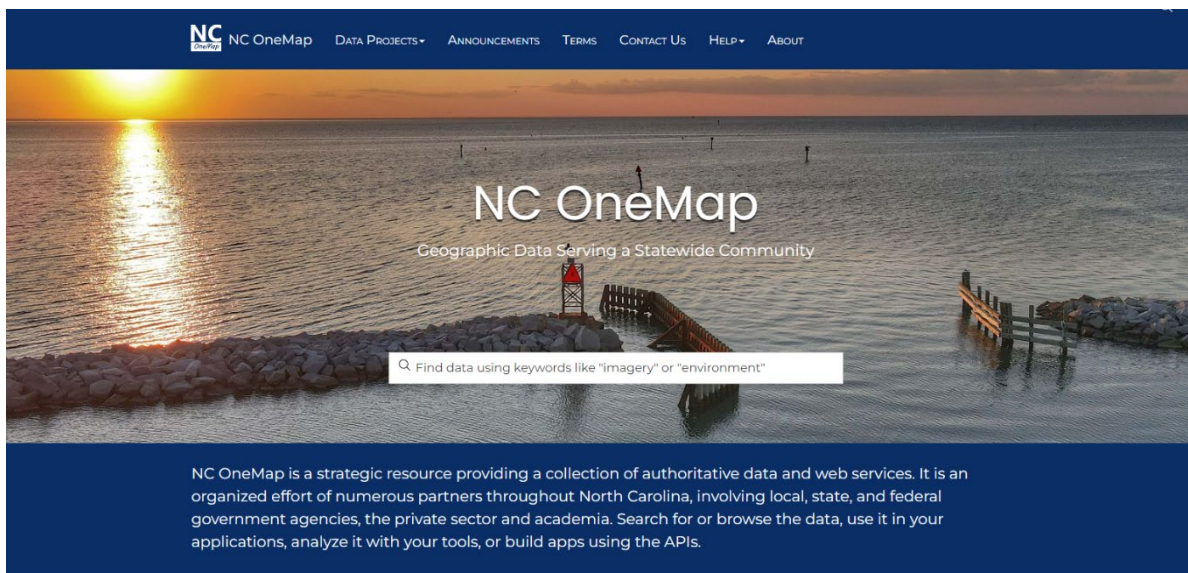nformation and resources for GICC initiatives such as AddressNC, municipal boundaries, seamless parcels and broadband. New updates for this fiscal year included the addition of a municipal boundary landing page, major updates to AddressNC and its tools, historical data downloads, updated broadband expansion tools and an update to the data terms of use.

Infrastructure Working Group

The Infrastructure Working Group (IWG) presented its recommendations to the council in November 2022. The IWG began its work in 2020 by outlining the tasks passed down from the GICC:

1. Document commonly produced infrastructure data layers for five infrastructure categories.

2. Document data layers that can and cannot be shared.

3. Investigate industry security concerns, regulations, policies and best practices related to data sharing.

4. Collect use cases from data producers and data consumers.

5. Review existing data layer security practices and data consumer needs to identify potential layers that, if generalized, would address security concerns while still meeting consumer needs (e.g., easements, buffers, service areas, etc.). If layers are identified, investigate and document the feasibility of producing these layers.

6. Collect example documents that data providers can use to document proper data handling and sharing.

After determining a course of action, the group reviewed existing infrastructure data and focused on five categories that were not well documented and were not commonly available. These included electric, water/sewer, stormwater, natural gas and telecommunications. All five categories are related to recent news, including broadband expansion, lead service line replacement, stormwater related flooding and incidents of electrical infrastructure damage.

Data providers have an obligation to protect their infrastructure and networks from bad actors as well as an obligation to share limited data to protect their infrastructure from unintentional damage from construction or digging, and the manner in which they approach data sharing varies widely across the state. These two obligations both require sharing data and protecting data and present unique problems for data providers. Lack of clear guidance specific to geospatial data at the federal level and within industries results in confusion among data providers about what it is safe to share and how. The working group reviewed data sharing policies and reported preliminary findings about data sharing policies, practices, and concerns to the GICC.

Infrastructure Working Group: Select Preliminary Findings

Decisions regarding what data to share, how to share it and how to communicate with those that need data are individual management decisions based on perceived risk, organizational risk tolerance and an evaluation of other factors and circumstances that may outweigh risk factors. Every organization has unique factors that inform this decision.

Policies and practices regarding data sharing vary by industry and by provider. While industries have many resources devoted to assisting providers in evaluating physical and cybersecurity risk, in general, most industries do not provide explicit policies or recommendations on how to share spatial data representations of infrastructure.

The IWG did not concentrate on the subject of cybersecurity because the mechanisms currently utilized for sharing geospatial data do not provide a direct avenue for cyberattacks on utility networks and computer systems. However, the IWG did consider the relationship between cyberattacks and spatial data. Geospatial data shows a physical location that can be accessed if someone plans an attack, but an attacker must take the additional step of gaining access to a network or physical location.

Large private companies or populous cities with a tax base that can support dedicated and specialized utility staff have more resources to devote to data development, documentation and sharing than smaller communities or private companies. This disparity leads to a difference in data availability and documentation that places smaller utilities at a higher risk than those with more resources.

Surveys of data providers showed that data quality is a factor in whether they share their data openly or by request only. Poor data quality can be a factor in making it more difficult to obtain data, while good data quality can be a factor in a decision to share data publicly.

Recommendations

The IWG provided two types of recommendations to the council. One set focused on data providers, and the other set focused on the GICC and GIS community, categorized as "state recommendations."

Write a data sharing agreement.

Data sharing agreements offer a framework for proper use of the data, as well as limits to sharing and use, and allow the data provider to formally document any disclaimers and limitations placed on the data. Sample agreements were included in the report for reference in creating agreements.

Write internal data maintenance and sharing procedures.

Within organizations, different departments may be responsible for different aspects of data maintenance. Writing internal data maintenance and sharing procedures can allow an organization to protect data integrity and ensure it is not exposed unnecessarily. This process may also serve the benefit of revealing institutional silos, bottlenecks or duplication of effort.

Write data disclaimers for webservices and metadata.

Data providers may be more hesitant to share data when older infrastructure is not accurately represented in the data out of concern for damage. Examples were provided in the report to aid data producers in creating disclaimers.

Evaluate and update geometric accuracy and completeness.

Protecting infrastructure requires knowing its location. Data providers may be more hesitant to share data when older infrastructure is not accurately represented in the data out of concern for damage. Accurate geometry builds confidence. Data producers can be more confident in sharing data, and data users can be more confident that plans made from data will not result in damage or project delay.

Evaluate and update attribute accuracy and completeness.

Just as accurate geometry builds confidence, so too, does the accuracy of feature attributes. It is important to ensure that attributes are complete, standardized, and accurate.

Complete metadata.

All GIS data should be protected with metadata. The IWG survey revealed a need for tools and resources to assist providers in completing metadata. Providers should review existing metadata to make sure it is current and create metadata where it does not exist.

Develop secure regional data sharing partnerships.

The inability to access current infrastructure data from neighboring jurisdictions was a recurring topic in IWG interviews and discussions.

Recommendations for the GICC and GIS community are heavily influenced by requests made by stakeholders and unanswered questions that the IWG was unable to explore. The IWG state recommendations are meant to offer avenues of additional research and opportunities for new projects.

Revisit this topic periodically.

The essential nature of infrastructure data to emergency response, development and community services indicates that the GICC should periodically revisit this topic to assess changes in the availability of data layers, ways to share data securely, industry standards and management risk tolerance.

Engage industry professional and organizations.

Gaining the trust of the community through outreach and education could lead to more assistance in obtaining standards, best practices and guidance documents, as well as lead to a more open discussion of infrastructure data.

Task the GICC Metadata Working Group with creating an infrastructure template.

The IWG survey revealed that metadata was not being fully implemented for all geospatial infrastructure data. The IWG recommends that the Metadata Working Group work with industry representatives to tailor a template for utilities.

Monitor funding opportunities.

Funding opportunities exist from state and federal sources, and the council could coordinate with those granting awards and those receiving them to support good spatial mapping practices.

Intergovernmental Collaboration for Efficiency

Hydrography Working Group Collaboration

Hydrography data represents the spatial distribution of streams, rivers and waterbodies, and includes database records describing each feature, such as length, type of feature, area, name, state protection designation and state assessment information. The Hydrography Working Group (HWG) has been working for many years to develop an updated hydrography dataset for North Carolina. The national authoritative dataset, the National Hydrography Dataset (NHD), will be replaced by the U.S. Geological Survey with the 3D Hydrography Program, an elevation derived hydrography dataset based on 3D Elevation Program data. North Carolina's vision of a local to state to federal data pathway was a focus of HWG work during FY 2021-22. The USGS reached out to states to provide feedback on the new program, and HWG submitted comments through a NSGIC organized national review of the 3DHP. CGIA, through its membership in NSGIC participated in focus groups and workshops to bring HWG concerns and needs to the attention of the USGS.
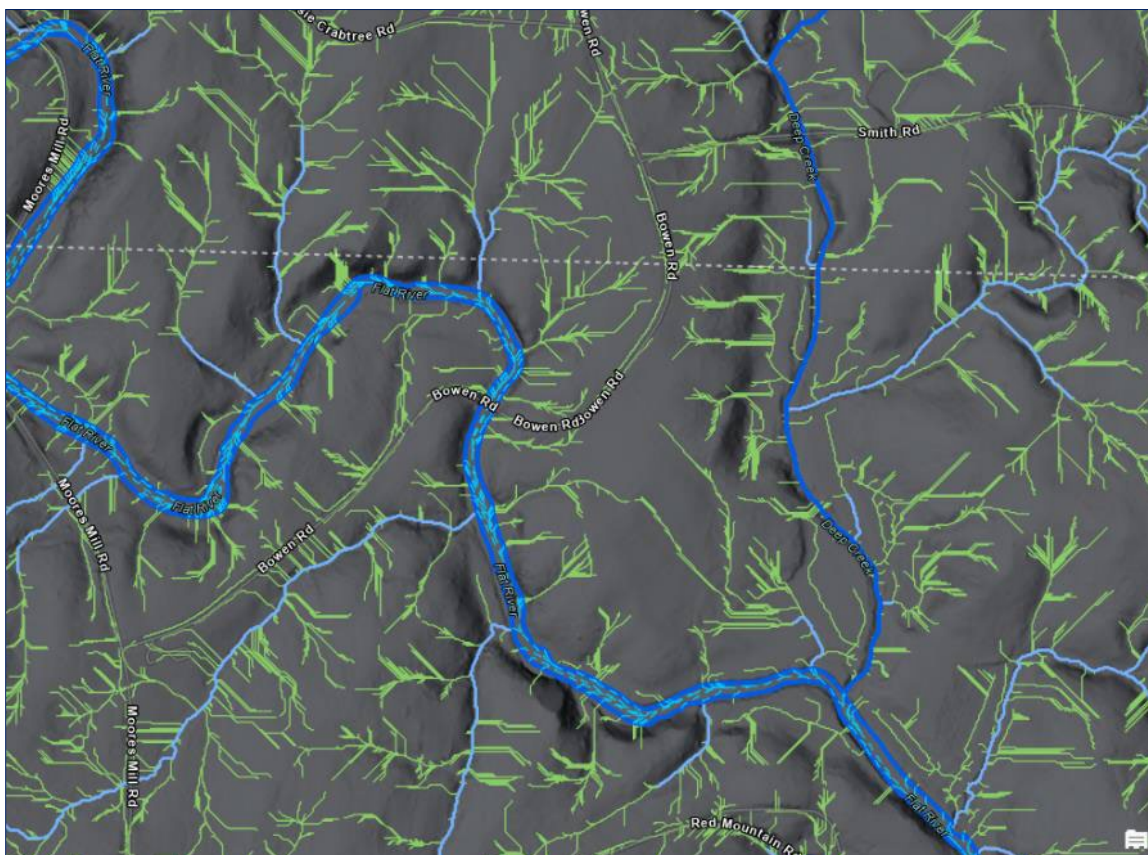
Figure 25. The Headwater Stream Spatial Dataset developed by DWR is a more accurate representation of the stream network shown here in blue and water preferential flow shown here in green.

HWG member Silvia Terziotti wrote the specifications for the 3DHP and serves as a valuable resource in helping the HWG understand the new program and data format. She facilitated a meeting with Becci Anderson, USGS National Geospatial Program Hydrography Management and Planning Lead so the HWG could ask direct questions about the new program and better understand if and how North Carolina's hydrography dataset may someday contribute to the federal dataset.

While the HWG concentrated on understanding federal data requirements, the N.C. Division of Water Resources (DWR) was developing hydrography data from the state's elevation data to support the N.C.

Department of Transportation's ATLAS planning tool. This preliminary dataset, the Headwater Stream Spatial Dataset (HSSD), was completed in the summer of 2022, and the HWG collected user needs during the fall LGC outreach meetings and by surveying the user community in 2023. The HWG is developing a proposed schema to support stakeholder hydrography needs using this feedback and is preparing a gap analysis that will outline the progress made and future needs. The DWR dataset, while statewide and more extensive than anything created to date, will require significant work and investment to meet the needs of the wider stakeholder community. The HWG expects to have the gaps documented and available for the GICC early in fiscal year 2023-2024.

Initial funding to support ATLAS was provided by NCDOT, but funding to bring the dataset to a more widely useful format does not currently exist. The grading scale for the NSGIC Geospatial Maturity Assessment (GMA) for framework datasets considers maintenance funding in the grading process because accurate data must be maintained to remain useful. North Carolina's lack of regular funding contributed to it scoring in the bottom 24 percent of states graded during the GMA in 2021, a stark contrast to its performance in all other areas.
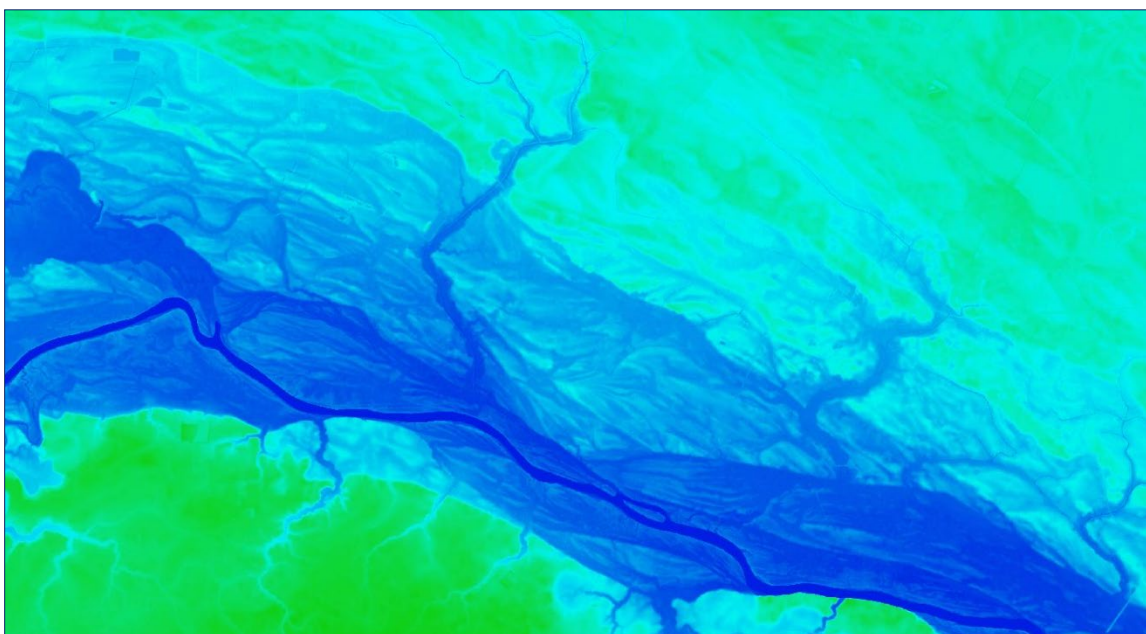
Elevation Data

Figure 26. Lidar-derived digital elevation model showing a river floodplain. This data is used to model flood risk and help warn residents when flooding may threaten property and lives.

Elevation data including high-quality updates of the coastal plain and bathymetric data for near shore areas of Pamlico Sound and the Outer Banks were collected in 2020 by the USGS. Due to COVID-19-related delays, the data delivery was delayed and was released in sections throughout this fiscal year. The FIC and the Working Group for Orthoimagery and Elevation (part of the Statewide Mapping Advisory Committee) were updated on project progress for this important dataset and coordinated data distribution.

Light Detection and Ranging (lidar) data is a 3D scanning technique that uses light pulses to map elevation. Essential to the production of accurate flood risk models, the N.C. Floodplain Mapping Program has been using lidar data to more accurately depict flooding risk for residents and emergency response. This data is used during flooding events to warn residents of impending flooding and target evacuations. The N.C. Department of Transportation uses the data to determine which roads may overtop during flooding. Quite simply, lidar data has saved lives.

Figure 27. Example of LiDAR point data that has been colorized using NC orthophotography. In this 3D image, notice that LiDAR technology captures not only buildings and vegetation but utilities such as power lines shown in the left forefront. Data visualization by ESRI

In addition to its application to emergency response and early warning, lidar data is used by a range of stakeholders that include the development community and precision farming. The USGS conducted a study last fiscal year to outline mission critical uses for lidar across the country. The report was released this fiscal year and included 275 pages of information outlining the users and their requirements for lidar data in North Carolina. To the basic map or application user, lidar data may not be an obvious part of their user experience. However, this often invisible dataset forms the backbone of mission critical activities and needs wider recognition of its benefits and value to users. The USGS study reported an estimated gain of $61.1 million in annual benefits to state, regional, local, educational and non-governmental organizations participating in the study. Geologic assessment, hazard mitigation, flood risk management, coastal zone management, and infrastructure and construction management accounted for over 50 percent of the estimated total benefits.

Lidar data provides a more accurate representation of the ground surface and features such as roads, buildings and vegetation. North Carolina has approximately 80 percent of the state mapped with higher-quality lidar, leaving only the central piedmont, including the Triangle and Triad, still to be mapped with higher-quality data. Due to the rapid development in these areas, it will be important to collect updated high-quality data, but an ongoing funding source is not available. Partnerships and funding sources will continue to be a focus as stakeholders seek to fill this data gap. The Lidar Working Group of the SMAC will be working on a business plan during the next fiscal year to address the lack of a consistent funding model for this critical dataset.

NOAA Land Cover Pilot

Land cover data provides the spatial extent of over twenty types of features covering the earth including open water, forest, cultivated land, impervious surfaces, buildings, wetlands, or developed open space. Through the FIC, the National Oceanic and Atmospheric Administration (NOAA) provided North Carolina with updates on a new high-resolution land cover and change product planned for U.S. coastal areas. A pilot of this Coastal Change and Analysis (C-CAP) Program was conducted in Brunswick and New

Hanover counties. Nationally, coastal areas including North Carolina will receive a one-meter resolution product containing three categories of land cover: impervious surface, tree canopy and water. Opportunities exist for partnerships with NOAA to produce an enhanced product with the potential for applications in land cover change analysis and updated wetlands mapping. The state continues to coordinate with NOAA to monitor the progress of this program and to discuss opportunities for enhanced landcover mapping.
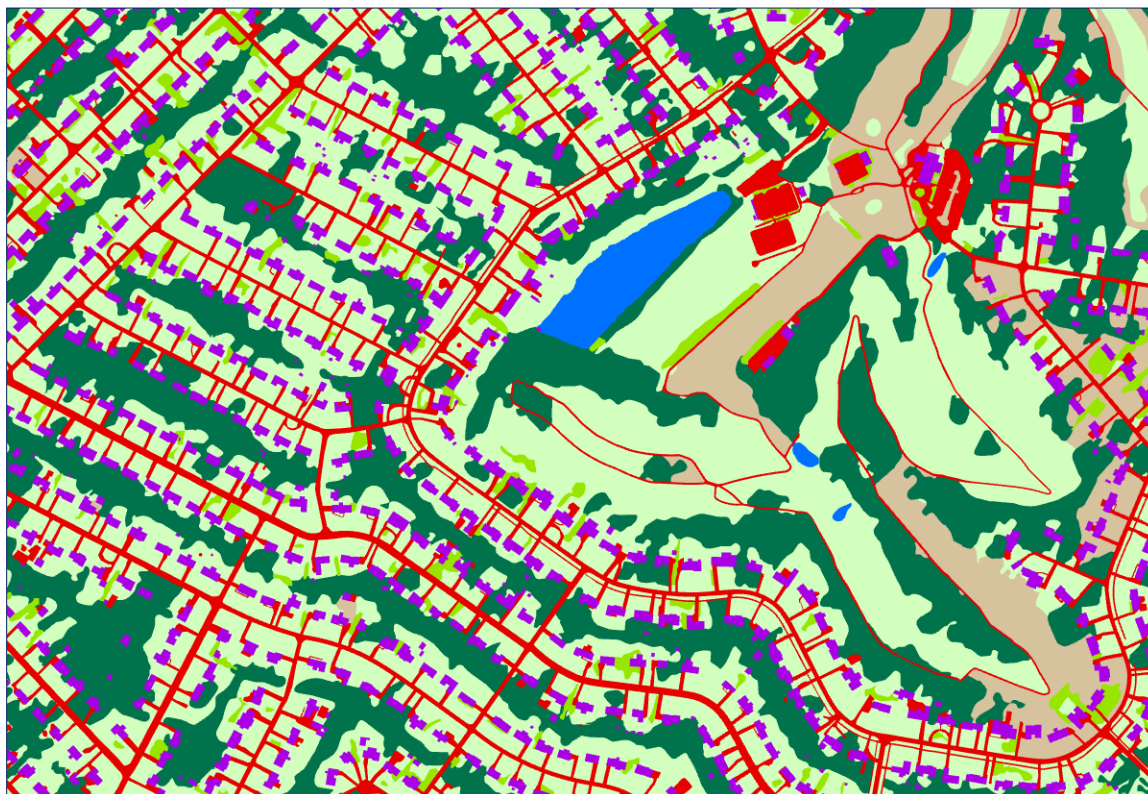

Figure 28. One Meter landcover data shows a detailed representation of impervious surfaces, buildings, water and vegetation in this golf course community.

Datum Change

The National Geodetic Survey (NGS) will be replacing the datums currently used in North Carolina and across the nation with new reference frames. A datum serves as a reference surface for measuring height above sea level and location. The older datum NAVD88, was made with standard leveling and surveying techniques that have been in use for decades. The new datum will use satellite and gravity measurements to calculate more precise vertical heights. This new datum will be more accurate and provide a better vertical height information critical to flood modeling and construction planning.

North Carolina Geodetic Survey Chief Gary Thompson has been updating the council on this important change. The original release date for the new datum was originally scheduled for 2022, but it has been moved to at least the 2024-2025 timeframe. Mr. Thompson has been updating the GIS community to prepare them for the change. Since all GIS data is referenced to a datum, users must be aware of how introducing a new reference frame will affect their work. Thompson presented information on the change to the Local Government Committee and hosted a question-and-answer session for local governments to learn more about this topic. He continues to provide national and state updates to the council.

Figure 139. The Continuously Operating Reference Station (CORS) network supports global positioning and navigation.

Future Priorities

The council's priorities for the future remain centered around data-driven collaboration and continual improvement of access to data products. Fiscal year 2022-23 priorities cover adoption of new federal standards, Census support, emergency coordination and improving access to data that will save time, money and lives.

Data Improvement

- Coordinate with local municipalities to approve municipal boundary data in a statewide authoritative source.

- Begin statewide AI-based building update.

- Release AddressNC update data.

- Review 2018 landcover recommendations and current landcover options.

Community Coordination

- Update NC OneMap to enhance data access and GIS community engagement.

- Complete Value of GIS website.

Standards Development

- Develop standards for statewide hydrography and evaluate methods for more accurate stream data.

- Finalize new attribute standards for Seamless Parcels.

- Create a business plan for elevation data acquisition and maintenance.

Business Needs

Elevation

Value: A USGS Lidar study reported an estimated gain of $61.1 million in annual benefits to state, regional, local, educational and non-governmental participating organizations. Geologic assessment, hazard mitigation, flood risk management, coastal zone management and infrastructure and construction management accounted for over 50 percent of the estimated total benefits.

Need: The Lidar Working Group of the SMAC will produce a business plan during the next fiscal year to define funding needs and potential funding models to achieve the goal of a regularly funded update cycle for this critical dataset.

Building Footprints

Value: The SMAC Building Footprint Business Plan identified 17 local, state, federal, and private sector critical uses of building footprint data. Building footprint data contributed to increased federal broadband funding directed to North Carolina.

Need: CGIA and NCEM partners will collaborate to test automated feature extraction methods for more efficient dataset updates and continue to seek a recurring funding source to protect this important asset.

Hydrography

Value: Stream and waterbody data is one of the most important datasets needed for transportation and development planning and forms the framework for many state databases including water quality, recreation, and drinking water availability.

Need: The Hydrography Working Group of the SMAC will identify the steps needed to meet the business needs of all stakeholders and provide the GICC with a plan to complete the dataset. The GICC will coordinate with DOT and DEQ to identify potential funding sources for regular data updates.

For more information about the council, including the latest meeting information and contact information for council members and staff, please visit https://it.nc.gov/gicc.