



BuffCAT: Tracking Water Quality in the Land of 10,000 Lakes

State of Minnesota – Minnesota IT Services

CATEGORY:

Digital Government: Government to Business

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EXECUTIVE SUMMARY

The Buffer Compliance And Tracking tool, also known as BuffCAT, was created to collect and track data for over 500,000 parcels of land for compliance with Minnesota's new buffer law.

A buffer is an area of land with perennial vegetation planted alongside a stream, river, lake or wetland to reduce the amount of phosphorous, nitrogen, and sediment from entering lakes and streams. In the Land of 10,000 Lakes, Minnesotans are serious about preserving and protecting the state's water quality.

With more than 40 percent of the Minnesota's waters polluted or impaired, Minnesota's Governor Dayton signed legislation in 2015 and 2016 that established buffers of up to 50 feet along our rivers, streams, and ditches to improve water quality statewide. Implementing compliance with the buffer law called for collaboration between: **businesses** [the Department of Natural Resources (DNR) and the MN Board of Water and Soil Resources (BWSR)]; **Information Technology** [Minnesota IT Services (MNIT), and MNIT's Geospatial Information Office]; and **stakeholders** [soil and water conversation districts (SWCD), and landowners].

BuffCAT is the result of that collaboration. The tool uses GIS mapping and a mobile data collector for the field work. It provides consistent, systematic compliance tracking and real-time reporting data for the state's soil and water conservation districts (SWCD), the compliance agencies (DNR and BWSR), and landowners. Using existing GIS tools, and identifying the datasets we already had and those we needed, we were able to quickly create a customized solution that saves an immense amount of administrative time and staff costs.

Two products of BuffCAT are: the DNR's [buffer protection map](#), which helps guide landowners, and the publicly-available [Buffer Compliance map](#), a visual representation of the counties in compliance.

By providing multiple layer options such as aerial overlays, parcel data, and LIDAR (Light Detection and Ranging), SWCD technicians are now able to determine compliance for nearly all their counties without having to step foot in the field. Landowners are able to get information and submit applications online.

Just one year into the project, the Board of Water and Soil Resources (BWSR) reports that statewide, 89% of parcels adjacent to Minnesota waters meet preliminary compliance with the law. Compiling that data and report would have taken years without help of technology. BuffCAT has given the state the ability to provide more flexibility, clarity, and transparency for Minnesotans.

BuffCAT is exceptional in that it is a valuable application of GIS technology. The local SWCDs who would use the application were engaged in the process early, and we used a prototype to help gather requirements, make design decisions, and get stakeholder buy-in. The ability to access this data in near-real time allows stakeholders and compliance agencies to effectively communicate progress towards the law's requirements and ensure that accurate, understandable information is added into the tool.

EXEMPLAR

With the help of the collaborating organizations, MNIT teams at BWSR and MNIT's GIS team used existing data and systems in a transformational way to develop a custom application that quickly met an urgent legislative compliance need. This required strong project management structures, creative problem solving, and extreme collaboration to accomplish this in only six months.

BuffCAT was designed to collect data systematically and consistently, to track progress towards compliance with the buffer law. To save time, the team used an iterative waterfall approach. They built a prototype and had stakeholders test it, resulting in features such as multiple layer options, aerial overlays, parcel data, and LIDAR (Light Detection and Ranging). Using those, SWCD technicians are able to determine compliance for nearly all their counties without having to step foot in the field. This greatly reduced the amount of time needed to establish compliance and identify areas that needed in-person reviews.

Landowners are able to get information and submit applications online. Two citizen-centric products of BuffCAT are the [DNR's buffer protection map](#) that helps users locate waters that require buffers, and the [Buffer Compliance map](#), a visual representation of the counties in compliance.

CONCEPT

The Business Problem

Minnesota established buffer laws in 2015 and 2016 to establish a vegetation buffer along lakes, rivers streams and ditches in an effort to improve water quality. Soil and water conservation districts (SWCDs) around the state are responsible for tracking progress towards compliance with the Buffer Law. BWSR has authority under 103F.48 Subd.8 to withhold funds from an SWCD who fails to implement the requirements of the Buffer Law.

This project's objective was to build a web-based data collection tool to track compliance progress, provide systematic and consistent collection of data, and report visualizations of results and areas affected by the Buffer Law. Project deliverables included:

- A web based tracking system
- A mobile collector application for offline use in the field
- Guidance and templates for alternate data delivery (data standards)
- Methods for maintaining data integrity (Data backups, monitoring, audit logs)
- User guidance (documents and videos)
- Long term support plan of the system (user administration, bug fixes, data management, and user training)

Costs

Because this was an in-house custom application, the costs were minimal and mostly staff time. The development and project team consisted of two MNIT staff at BWSR. They spent 261 developer hours and 120 project manager hours. (These staff hours do not include contributions from MNIT staff at DNR, MNIT's Office of Geospatial Information, BWSR staff, or SWCD staff.)

Accessibility and Security

Security standards were met: Hosting was done in the secure ESRI cloud; no non-public data was used; access was controlled by authentication and user request/approval process; and the system tracks all edits to data for audit trails.

Assessing Success

The true success of the application is measured by the percentage of compliant parcels. Just one year into the project, the Board of Water and Soil Resources (BWSR) reports that statewide 89% of parcels adjacent to Minnesota waters meet preliminary compliance with the law. Compiling that data and report would have taken years without help from technology. BuffCAT has given us the ability to provide more flexibility, clarity, and transparency for Minnesotans.

SIGNIFICANCE

Project Scope and Stakeholders

Stakeholders include BWSR, as the agency responsible for tracking compliance with the Buffer Law, the DNR, technicians in SWCDs, and landowners.

The phased project enabled a small, cross-functional, self-managing team to deliver first a prototype, then the final product in just six months. The scope of the project and milestones include:

- Phase 1 April-May 2016: Design and prototype collector application
- Phase 2-June 2016: Test prototype and research datasets.
- Phase 3-July-August 2016: Develop application
- Phase 4-September 2016 through operational: Test and deploy application; operationalize
- Phase 5-October 2016 through operational: Create maintenance plan and operationalize

BuffCAT is exceptional in that it is a valuable application of GIS technology and data. The local SWCDs who would use the application were engaged in the process early, and MNIT's team used a prototype to help gather requirements, make design decisions, and get stakeholder buy-in. The ability to access this data in near-real time allows the compliance agencies to effectively communicate progress towards the law's requirements and ensure that accurate, understandable information is added into the tool.

Alignment with the Larger Picture

This project meets two areas of [MNIT's Vision](#):

Modernization: Empower Our Business Partners through Technology. Take inventory, analyze, and map the problem. Transform from "Current State" to "Future State."

Deliver Value: Provide Excellent Customer Service: MNIT must make decisions at every level of our organization with our customers in mind. We will leverage the state's information technology portfolio, take into account industry best practices, and promote enterprise business and technology solutions where we can provide excellent customer service to both solve business needs and maximize the benefits of shared services.

BuffCAT meets Governor Dayton's initiatives. On August 18, 2016, [Governor Dayton kicked off a "Year of Water Action"](#) at the headwaters of the Mississippi River in Itasca State Park. Governor Dayton called on Minnesotans to work together to find solutions to keep Minnesota's water clean and accessible to everyone. The project also meets legislative compliance needs for MNIT's agency partners. In 2015 and 2016, Minnesota's Buffer Law was enacted and compliance was required.

BuffCAT is a modern digital compliance and reporting application that can be used for years to come. For the compliance agencies, BuffCAT met a business and regulatory compliance need. For MNIT staff, it was an opportunity to help agency business partners to meet their missions. And it is also a source of pride—BuffCAT is the recipient of a 2018 Esri Special Achievement in GIS Award, honoring a select group of organizations around the world for exceptional applications of geographic technology.

IMPACT

Before BuffCAT, compliance reporting for the buffer program did not exist. Reporting similar to this has historically been done on paper, or in various inconsistent electronic formats. Now, the state has an application that provides compliance tracking, real-time reporting, and information for stakeholders and the public that is transparent, accurate, and timely.

The benefits and impact for all the collaborating partners are summed up best by the comments of the conservation technician for the Carlton Soil and Water Conservation District. She said, "The BuffCAT application was extremely user friendly. By providing multiple layer options such as aerial overlays, parcel data and LIDAR (Light Detection and Ranging), I was able to easily discern 99% of my counties' compliance without having to step foot in the field. Communication between BWSR and the Soil and Water Conservation Districts was key in the BuffCAT's success. BWSR and MNIT did a truly great job in communicating maintenance schedules as well as thoroughly and promptly answering any questions that arose. In my experience, the IT behind the program did, and is doing, a truly great job. Very personable and helpful."

Primary cost savings were realized through providing a single, state-wide consistent reporting method for SWCD users, and for BWSR quickly turn around reports using metrics provided by the application to

the Governor's buffer team. SWCDs didn't have to invest time, effort, or licensing costs in their own reporting systems. The benefit for BWSR is that compliance reporting is standardized instead of in 87 different varieties (one for each county!) which would require a lot of time and effort to sort, analyze, and compile a report.