

# skylines



## Welcome to Chesapeake Conservancy's **Conservation Innovation Center's (CIC) Skylines** quarterly newsletter!

May is American Wetlands Month, a time to celebrate the vital role wetlands play in our lives. These remarkable places improve water quality, reduce flood risk, provide critical habitat for wildlife, and strengthen the resilience of Chesapeake Bay communities.

The Conservancy is committed to advancing technical tools that make wetland protection more precise with our innovative data analysis, mapping tools, and data science that improve decision-making. As we mark American Wetlands Month, I would like to thank the many professionals, partners, and organizations who work every day to protect, restore, and steward wetlands, turning conservation goals into real, measurable outcomes. Thank you for all you do to safeguard these precious habitats. Together, we can keep wetlands healthy and resilient for generations to come.

- Emily Beach, CIC Director

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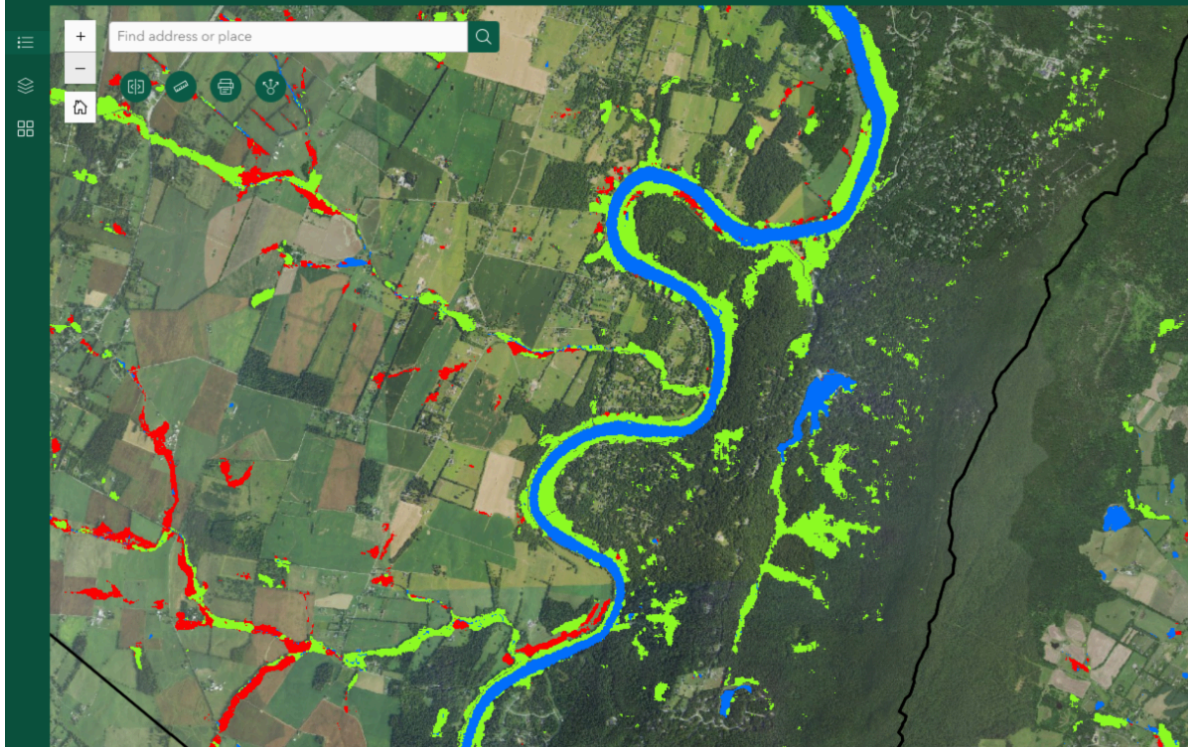
## Empower with Data

At the Chesapeake Conservancy's Conservation Innovation Center (CIC), we serve as a catalyst for change, leveraging cutting-edge geospatial data science, artificial intelligence and advanced analytics to tackle pressing environmental and conservation challenges in the Chesapeake Bay watershed.

Our goal is to transform data into precise and actionable insights that restore and sustain the Bay's health for current and future generations.

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## Featured Articles



## Precision Wetland Maps are Now Possible

The Chesapeake Conservancy's Conservation Innovation Center developed a cutting-edge deep learning (AI) model to address the critical need for accurate, up-to-date wetlands mapping across the Chesapeake Bay watershed. Leveraging freely available remotely sensed data such as NAIP, Sentinel-2 multispectral imagery, and LiDAR-derived elevation data, the model creates up-to-date, accurate maps of wetlands at 1-meter resolution. The convolutional deep-learning architecture captures the spatial context and complex relationships among environmental predictors of wetlands, resulting in an impressive 94% overall accuracy. This high-resolution, data-driven approach delivers the spatial detail and reliability modern environmental planning and conservation require.

[View the Data](#) - view sample counties across the Chesapeake Bay watershed.

[Read More](#). This groundbreaking work has been recognized by the scientific community and published in the journal *Science of The Total Environment* (February 2023).

[Learn More](#)

### Meet the CIC Staff Dr. Michael Evans

Deputy Director and  
Lead Data Scientist

Dr. Mike Evans applies geospatial data science to help make conservation decisions more effective and focused. He is best known for his work on AI wetlands data, solar array predictive mapping and his collaborative efforts with the USGS on land use change forecasting at the Chesapeake Conservancy.

Before joining the Conservancy, Mike worked as a senior conservation data scientist at Defenders of Wildlife, where he used geoinformatics to help shape federal conservation policy. He earned his Ph.D. in natural resource management from the University of Connecticut, his M.S. in ecology, evolution and behavior from the University at Buffalo, and his B.A. in biology from Oberlin College.



## **What made you decide to map wetlands using Artificial Intelligence (AI)?**

Wetlands are among the most important ecosystems around - in terms of supporting biodiversity, sequestering carbon, and improving water quality. So they are critical to protect. Yet we hear over and over again from different stakeholders that the existing data on where wetlands are located are inadequate for regulatory enforcement, conservation planning, and impact mitigation. Simply put, we need better maps to effectively protect and restore wetlands. We decided to use AI to solve this challenge because previous approaches to automatically mapping wetlands were not sophisticated enough to capture how different wetlands can look from place to place and through time. The system we developed creates precise, up-to-date maps in an automated framework that can be repeated across space and through time.

## **How did you validate the model's predictions against field-verified wetland data?**

We've been working with Ducks Unlimited to compare the model predictions against wetland boundaries that are hand drawn by their experts using aerial imagery. These intensively curated data are considered authoritative and used to enforce legal wetland protections. We also have staff trained in Army Corps of Engineers wetland delineation procedures. This summer, we'll delineate wetlands on the ground providing us with the most accurate, up-to-date representation of wetlands to compare with model performance.

## **Can you retrain the model for new geographies, and what amount/type of local data is needed to achieve comparable performance?**

This is one of the most exciting possibilities for the wetland mapping system we've developed. Because we intentionally trained the model to use free, publicly available data to make its predictions, our method can be applied anywhere in the country. Using it to map wetlands in new geographies does require a small amount of new training data from that location to capture the local 'flavor' of wetlands - a process known as fine-tuning the model. Our experiments show this takes much less data and training time than building and training a model from scratch. We've been able to achieve comparable performance in geographies as diverse as Lancaster County Nebraska, and Mille Lacs County Minnesota, as we have within the Chesapeake Bay watershed.

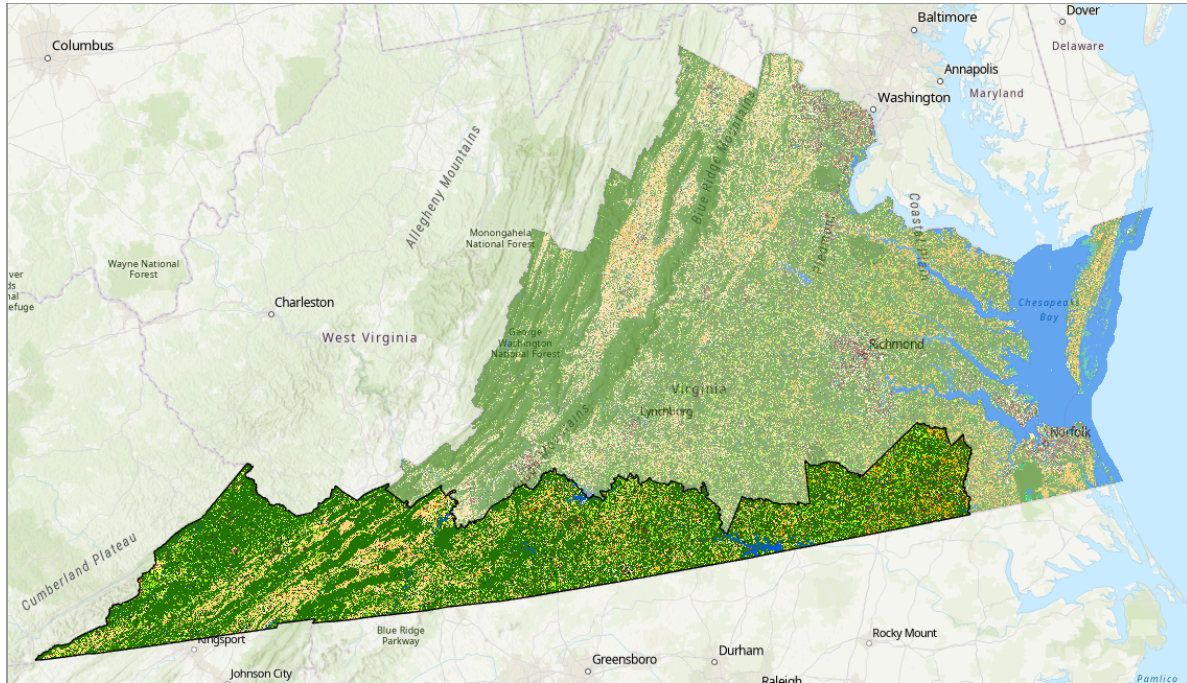
## **How do you recommend integrating model outputs into decision-making workflows (permitting, restoration planning, monitoring)?**

Updated wetland data can help improve several important processes. The first is environmental compliance. Federal and state laws protect wetlands by requiring people to minimize and offset any impacts. Advanced wetland maps help permit applicants understand the work needed to identify wetlands and meet legal requirements. This information can guide site selection with fewer impacts. Regulators who review projects and set mitigation criteria will also benefit from this information. Second, wetlands play a big role in the Chesapeake Bay Programs water quality models that are used to monitor and regulate practices that affect the health of the Chesapeake Bay.

## **Other than the wetlands mapping project, what's another exciting project you're working on?**

We have some very exciting and ambitious plans to fundamentally change how the natural environment is protected. For too long, conservation efforts have responded to threats like habitat loss after the damage is done. We believe it is much more effective to protect things before they are lost than to try to restore degraded ecosystems. So we are developing innovative new tools that will move conservation from reactive to proactive. These include an AI system that more accurately forecasts where land use conversion is likely to happen, and an early alert system that identifies where planned development may conflict with important environmental areas. I'm really excited about the potential for these capabilities to align a diverse variety of stakeholders around common incentives

to avoid the costs that can occur when development conflicts with environmental protection. Not only can this proactive approach transform conservation in the watershed, but it can serve as a model that can be replicated across the globe.



## Virginia's Statewide Land Use Land Cover Data **NOW AVAILABLE**

Newly updated high-resolution land use/land cover (LULC) and LULC change data is now available statewide for the entire Commonwealth of Virginia. Previously, this level of detail was only available for areas within the Chesapeake Bay watershed.

This enhanced dataset is the result of a collaborative effort among Virginia Department of Environmental Quality, Virginia Department of Conservation and Recreation, U.S. Environmental Protection Agency, Chesapeake Conservancy, University of Vermont's Spatial Analysis Laboratory and Hampton Roads Planning District Commission. The Land Use/Land Cover dataset includes 56 distinct land use categories at a 1-meter resolution, derived from 2021 imagery. This update strengthens the ability of state and local governments to support planning, improve water quality and make more informed decisions. Data is available based on imagery from 2014 and 2021 and land use change and change matrix summaries for 2014 to 2021.

"We're really pleased to see this data live and available for all Virginia localities. The data produced through the Chesapeake Bay Program's efforts is first-class and we were happy to facilitate these partnerships," said KC Filippino, Hampton Roads Planning District Commission Senior Water Resources Planner.

Virginia Geographic Information Network hosts the data, providing reliable, centralized access for users across the Commonwealth and beyond.

[View and download the data](#)

### VA LULC Data Key Points

The latest groundbreaking high-resolution land use data for Virginia supports:

- Zoning and land use planning
- Flood risk and resilience modeling

- Infrastructure planning
- Environmental compliance
- Urban growth analysis

At 1-meter resolution, the dataset can help answer key questions such as:

- How much impervious surface has been added in the last five years?
- Where should tree planting or buffers be prioritized?
- What areas contribute the most to runoff?

## Reach Out!

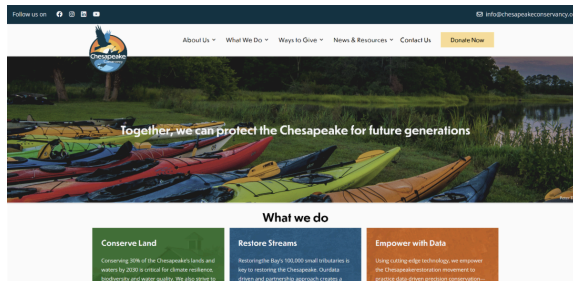
To learn more about how we can help you drive change through innovative technology or if you need a decision support tool to guide your next strategic vision, contact us at:

[cic@chesapeakeconservancy.org](mailto:cic@chesapeakeconservancy.org)

(443) 321-3610

[Find out more about what we do](#)

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Visit our website and follow us on social media!

<http://www.chesapeakeconservancy.org/>



## Support our innovative work at the Conservation Innovation Center

Your donation empowers us to leverage cutting-edge technology and data-driven strategies to address the critical challenges facing the Chesapeake Bay watershed.

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