



IOWAVIEW 2018 - 2019

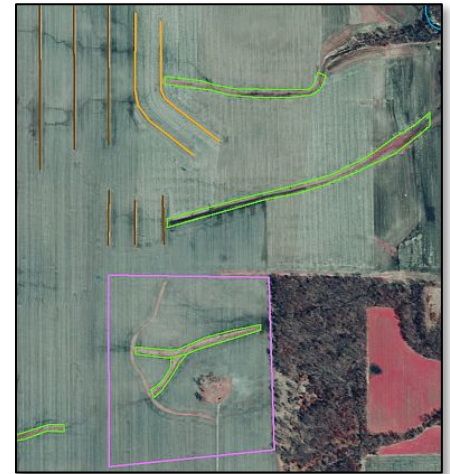


IOWAVIEW HISTORY AND SUCCESSES

Iowa Best Management Practices Inventory Dataset

In May 2019, the Iowa BMP Inventory Dataset was completed. The completion of this 4-year project provides the State of Iowa with a one-of-a-kind publicly available GIS dataset for locations of six commonly used NRCS conservation practices in every watershed in Iowa, with data from 2007-2010. This dataset was created to inventory and monitor conservation practices that could potentially meet nutrient reduction targets for Iowa watersheds. Student staff at Iowa State University digitized conservation practices in 1,711 watersheds; IowaView and Iowa DNR staff reviewed the data before making the GIS datasets public; visit <https://bit.ly/2v4jfyX> to read more about the project and download data. AmericaView funded portions of this work from 2015-2017.

After the baseline inventory dataset was created, there was interest to evaluate change over time. Using photography from the early 1980s, each practice in the baseline dataset was examined to determine if it existed in the earlier imagery. Spring and summer imagery from 2016-2018 were also reviewed to determine recent changes within a watershed. Funding allowed for an average of 25% of Iowa watersheds to have change mapping performed.



Fayette County, Iowa.
2010 Iowa DNR 0.6-meter spring color infrared aerial imagery showing WASCOS, terraces, contour buffer strip and grassed waterways.



Gregg Hadish presenting about the Orthoserver on Earth Observation Day at the Iowa State GIS Facility.

Outreach - Earth Observation Day

This is a high priority outreach event for the AmericaView organization. It provides the AV consortium with an opportunity to have a focused time of outreach across the nation to promote remote sensing and GIS. For Earth Observation Day 2018, IowaView invited Gregg Hadish, a staff member of ISU GIS Facility and Iowa NRCS, to be our featured speaker, presenting on the Iowa Geographic Map Server (<https://ortho.gis.iastate.edu/>). Gregg has been involved with the development of the Iowa Geographic Map Server for nearly twenty years. He provided a hands-on demo of the web-based interface. The presentation highlighted recent innovations to the map server including updated interface options as well as many new features and image services.



Cass County, Iowa. Spring 2018 color infrared aerial imagery.

Promote Iowa's Image Archive

The Orthoserver (<https://ortho.gis.iastate.edu>) has become a dependable resource for statewide imagery, elevation, and derived remotely sensed datasets such as land cover. Users from the ISU campus, public agencies, and private companies and individuals access the data with use growing each year. Data can be viewed in a browser or in GIS software. Keeping the data accessible and adding new datasets are important to enable continued research, analysis, discovery, and education for Iowans.

IowaView is a member of the AmericaView Consortium, a nationally coordinated network of academic, agency, non-profit, and industry partners and cooperators that share the vision of promoting and supporting the use of remote sensing data and technology within each state. AmericaView is funded by USGS grant agreement G18AP00077.



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IOWAVIEW 2018 - 2019 ACTIVITIES

Water quality issues are very important in the State of Iowa. For the last decade, research has been focused on meeting priorities set in the Iowa Nutrient Reduction Strategy. Cover crops have been identified as one potential solution for nutrient management. Cover crops are commonly planted in late summer or early fall around harvest time and terminated in the spring. The goal in planting cover crops is to protect exposed cropland from wind and water erosion during the months when cash crops are not growing.

There is a need by entities in Iowa, including current IowaView partners, to have recent and reliable cover crop data. The goal of this project is to create a repeatable and shareable process for detecting cover crops using publicly available imagery and data products. The first year of our research has focused on understanding the behavior of cover crops in Iowa, determining a methodology for distinguishing cover crops on the landscape, and developing a model for repetition.

Phenological cycles vary by region. Cover crop research in the Atlantic region of the United States documented much higher NDVI values for cover crops than is seen in Iowa; a previous study in Iowa gave a generalized NDVI range more in line with values calculated in our research. With this project we wanted to create a more detailed NDVI range based on phenological evidence of the state. To help with this calibration, specific data from rye cover crop research fields (cover crop planting, biomass sample dates, biomass weight, and date of cash crop planting) were used to better understand NDVI values.

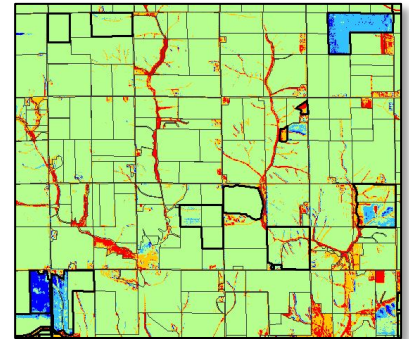
Another piece of this year's research focused on using different techniques to visualize the landscape change over time. Initially, researchers reviewed images from September to June of a growing season, then late March through early June. For the test site in south central Iowa, the most critical image dates were between mid-April and late May, the time between peak of the cover crop green up and cover crop termination before the seeding of the cash crop. It is best to have images with minimal cloud cover; however, spring in Iowa can be unpredictable which did pose a challenge to this method.

IowaView staff have looked at several different methods for visualizing the cover crop cycle over time. Two examples shown to the right: A) calculating difference in NDVI over two spring dates and B) using color band channels (RGB) to show different image dates over time. Additionally, to process images faster, a model was created that takes 4 bands of an image and then creates a file geodatabase from which it creates a Normalized Difference Vegetation Index (NDVI) image as well as using field boundaries (provided by the user) to create a statistics table including the average pixel value within the field boundary. Field boundaries were created using data available from the USDA and CropScape. Imagery inputs were from Landsat 8 and Sentinel 2, depending on which had an acceptable, cloud-free date of interest.

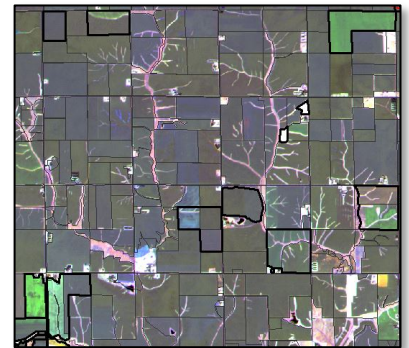
For the next year of the grant cycle we will refine the prediction process using three input dates to give a more accurate portrait of cover crop fields on the landscape. In addition, we will continue to produce cover crop existence data in additional watersheds across the state.



Locations of Project Watersheds



Method A: This image shows the calculated difference between two images NDVI images, 05/07/2018 and 4/29/2018. Areas in blue show the biggest negative change indicating a loss in NDVI (termination). Areas in red/orange show positive change (greening up). Areas in green were neutral or had minimal change over the time period.



Method B: This image is a composite of three images: image 1 (11/15/2017) in the red channel; image 2 (4/29/2018) in the green channel; and image 3 (05/07/2018) in the blue channel. Areas in bright blue/green show cover crops. Yellow is permanent vegetation. Pink/Red shows areas of spring emergence.

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