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WHAT'S HAPPENIN'



The Iowa Geological Survey's Geographic Information Systems Bi-Monthly Section Newsletter

This month's edition of *What's Happenin'* focuses on wetlands and how GIS is being used by the DNR and others to detect, locate, monitor, restore and protect them. There is a brief discussion of wetland history in Iowa, and of federal legislation that have improved wetland restoration and preservation efforts throughout Iowa and the Nation. We then review two wetland projects the GIS Section has participated in recently. A discussion of how the Wildlife and Water Monitoring programs are integrating GIS into their efforts concerning wetland protection follows. Efforts are underway on many fronts in the DNR to address the sensitive and elusive wetland. The GIS Section has been and continues to be a partner in many projects to spatially track and record the characteristics of Iowa's wetland resources.



The USGS estimates that a little over 11 percent of Iowa's surface was covered with wetlands in 1850. Most were drained and by the 1980s, only about 11 percent of Iowa's wetlands remained, leaving just over 1 percent of Iowa's surface as wetlands.

Wetlands are defined by the Natural Resources Conservation Service (NRCS) as areas of predominantly hydric soils that can support a prevalence of water-loving plants, known as hydrophytic vegetation. Transitional between terrestrial and aquatic systems, wetlands are typified by a water table at or near the surface, or land that is covered by shallow water at least part of the year. Types of wetlands are distinguished by their hydrology (the frequency, duration, and depth of water storage) and their location in relation to upland areas and other waterbodies.

Wetlands have many benefits including wildlife and plant habitat, storage and conveyance of flood waters, and recreational opportunities. Perhaps the most important benefit of wetlands is their ability to filter water. Water that goes into a wetland is cleaned of sediment and much of the pollution that comes with it. Functioning like a kidney, the wetland removes impurities from water. The result: water exiting a wetland is much cleaner than when it entered.

Several federal programs have been implemented over the last twenty years that encourage landowners to protect existing wetlands and restore those which have been altered.

Swampbuster, a provision of the Food Security Act of 1985, discouraged the conversion of wetlands to cropland and was the first step toward restoring wetlands.

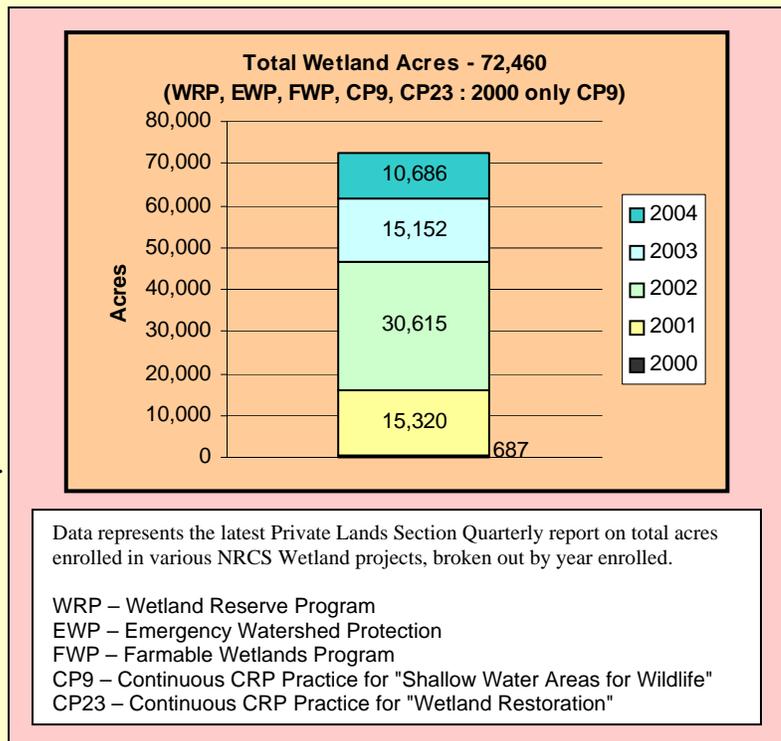
Under the Swampbuster Program, landowners could produce crops in wetland areas, but only if the water patterns, or hydrology, in these wetlands were not altered. Exceptions included conversions that began before December 23, 1985, conversions of artificial wetlands, crop production in wetlands that became dry from drought, and conversions that the US Department of Agriculture deemed to have a minimal effect on overall wetland values.

The **Wetlands Reserve Program** (WRP), authorized by the FACT Act of 1990, provided long-term protection of wetlands by requiring producers enrolling in the program to implement an approved wetland restoration and protection plan. Swampbuster provisions were later amended in the FAIR Act of 1996 to provide greater flexibility for producers and landowners and limited the enrollment of the WRP to 975,000 acres in the country.

GIS is being utilized by the DNR and other agencies as a method of tracking changes in wetland acres and to measure the characteristics of wetlands. The Private Lands section of the DNR's Wildlife Bureau is also using GIS to plan restoration projects funded by these federal programs.

By integrating soils data with CIR photography, private lands staff can show landowners what characteristics are shaping wetland restoration on their property. Staff can then work at their office with the landowner to determine the area that will be restored. Immediately the landowner can see the number of acres involved, what the CSR (Corn Suitability Rating) is on this land and estimate the soil rental rate for the particular NRCS program they are considering enrolling in. This has eliminated some of the "black box" aspect for landowners because they can see how payments are determined for these government projects. A result has been a higher level of trust from landowners as well as a higher participation rate.

Since 1986, over 900 previously drained wetland basins have been restored in Iowa. Many of these have been on land enrolled in the NRCS Farmed Wetlands (CRP) and WRP. Iowa landowners rank near the top in acres enrolled in the Farmed Wetlands program as well as for acres enrolled in WRP.





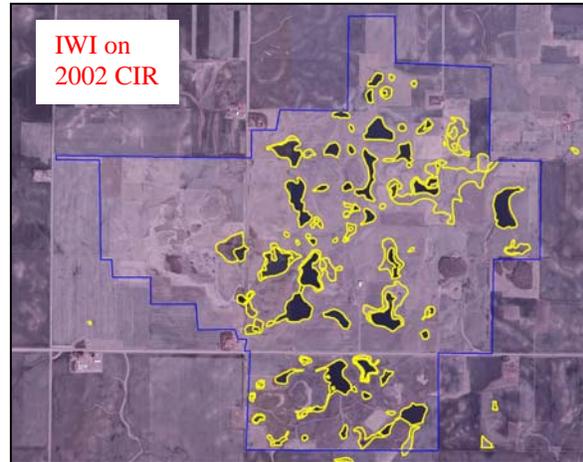
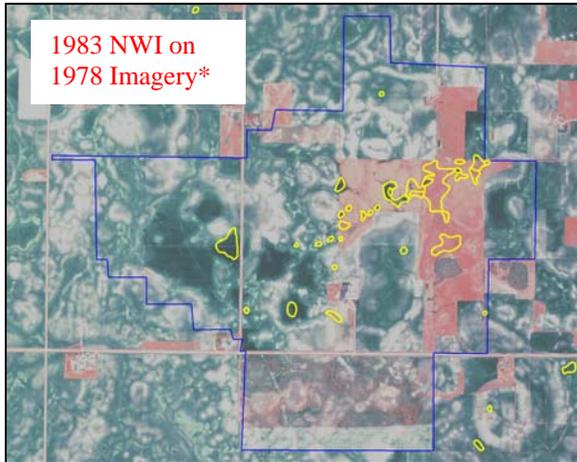
Along with the GIS section's initial work on the National Wetlands Inventory (NWI) there are two wetland projects that various divisions of the DNR, including its GIS section, have been developing to help monitor wetlands. They are the Iowa Wetland Inventory (IWI) and the Iowa Wetland Management Database (IWMD).

The **NWI Program** was launched nationally in 1975 and was designed to map the extent and status of all waterbodies, detect physical trends pertaining to these waterbodies, and identify sensitive areas subject to human actions. It is based on a hierarchical classification, called the Cowardin System, that defines a water body by parameters such as its depth, geomorphology, substrate, the duration it holds water, and soil types.

The initial wetland inventory for Iowa was conducted in 1985 by the U.S. Fish & Wildlife Service (FWS). They utilized CIR imagery captured in 1983-84 to produce paper maps. During 1994-95 the DNR received a digitized product from FWS. However, these digital maps had no spatial reference system. By 1997, the GIS Section had completed the transformation of the original data into a geographically referenced system. Because of this effort, Iowa was one of the first states to provide their NWI layers in a GIS format— a tremendous accomplishment when one considers that most of the country still does not possess their NWI data in this format. However, by the time this data was converted into a GIS format, it was nearly 15 years old. While still a useful product, much of this inventory was rapidly becoming obsolete. Natural resource managers were demanding an updated inventory in order to adequately respond to federal wetland legislation. It was at this point that the GIS Section and the DNR's ESD Nonpoint Source program began to develop an updated wetland inventory for Iowa.

The **Iowa Wetland Inventory** project began in 2002 with the completion of the 2002 color infrared (CIR) digital ortho quad (DOQ) project. This cooperative project led by the DNR includes participants from several state and federal agencies and non-profit organizations such as the Iowa Department of Transportation, Federal Emergency Management Agency, FWS, Prairie Pothole Joint Venture as well as the GIS, Wildlife and Water Monitoring Sections of the DNR. This project will provide a much needed update to Iowa's portion of the NWI.

There are several changes in the procedural aspects of this project. Improved imagery has minimized distortions. When the 2002 CIRs were being converted into a digital, spatially referenced format, a process called orthorectification was used to minimize distortions. These distortions are caused by the curvature of a camera's lens and by positive features (eg. hills) on the land's surface. These were prevalent in the first product and resulted in inconsistencies between linework and the imagery.



Union Hill Wildlife Management Area. In both sets of imagery, hydric soils and water bodies appear much darker than well drained areas. Recognizing this, one can compare the two wetland inventories and corresponding imagery to observe the improvements that have been made in wetland delineation, as well as 25 years of restoration efforts made by the public and private sector.

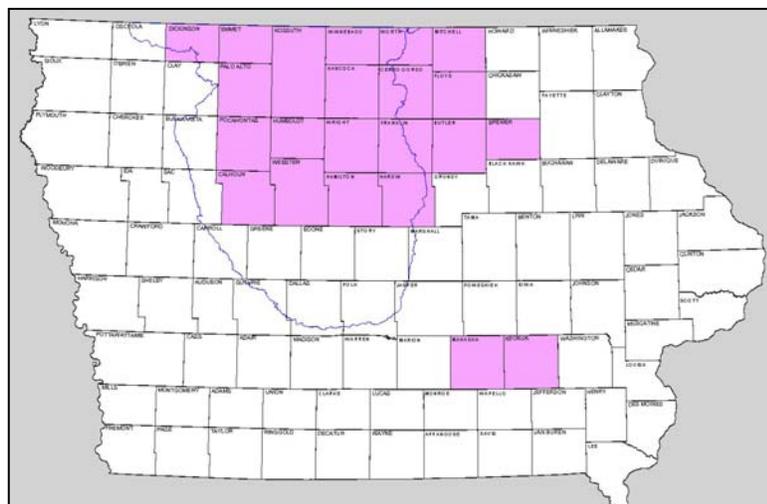
*1983 Imagery unavailable

The 2002 inventory also concentrated on consistently measuring the class of *farmed wetlands*. In the NWI dataset, this class was not a focus. The focus was, instead, on a general inventory of existing and potential wetlands. The updated inventory will allow a more detailed examination of these farmed wetlands.

The original inventory preceded most of the Federal and State wetland restoration programs (such as those initiated by the Food Security Act). Comparing the updated inventory to the original should provide a clear picture of where wetland acres have been gained and lost.

With a goal of completing this project by 2008, this cooperative wetland mapping effort will serve as a 17-year update to the existing NWI. The project is one of the first of its kind in the nation aimed at an updated statewide wetland inventory. Currently about a quarter of the state, primarily the Des Moines Lobe, has been completed. Using matched fund grants from the FWS through the Prairie Pothole Grant and State Wildlife Grant another 35 counties will be mapped in the upcoming year, thus completing the Lobe.

The 22 shaded counties have been received and are available on the NRGIS Library. Select the link ["Data available by County"](#) found under the heading "County-wide Data", then choose the desired county from the dropdown list and hit the button labeled "Retrieve County GIS Data". The update consists of two files; one shapefile uses lines to represent rivers and streams, the other uses polygons to estimate the extent of lakes, wetlands, and ponds. Both of these updated IWI files include the word "remap" in the filenames while the original NWI files derived from the '83-'84 imagery do not. The blue outline delineates the Des Moines Lobe.



The *Iowa Wetland Management Database* is another wetland project the GIS Section has been involved with. The IWMD was cooperatively developed by the Water Monitoring, GIS, and Wildlife Sections of the DNR. Initiated by Water Monitoring to better organize its summer sampling of wetlands, this project cataloged information from Wildlife that was not part of the NWI. Due to restrictions stipulated while acquiring data, this dataset is available to DNR staff only. If you work for the DNR and have need for this data contact Todd Bishop.

For more information on these projects contact Chris Ensminger at Chris.Ensminger@dnr.state.ia.us (515)281-4216; or Todd Bishop at Todd.Bishop@dnr.state.ia.us (515)281-7127.



Efforts are underway in the DNR's Water Monitoring Section to initiate a wetland monitoring program. The ultimate goal is to provide quality information for the effective management and protection of Iowa's wetland resources. This monitoring will be useful for both water quality and conservation purposes. Water quality data will be used to characterize the degree of ecological disturbance of our wetlands, their role in improving water quality, wetland placement within watersheds for flood control and filtration, setting water quality standards, and assessing wetlands for the state's integrated surface water assessment report.

The results from monitoring may also be used in decision making for wetland wildlife habitat enhancement, restoration priority areas, and new federal/state conservation wetland projects. This wetland project will be linked to several other projects (some existing, some proposed) which, when taken in their entirety, will provide a monitoring program for all of Iowa's wetlands. The initial project will focus on permanent and semi-permanent wetlands. Wetland field sampling for the 2005 season will include two adjacent areas in north-central Iowa: the Winnebago River watershed and the upper portion of the Des Moines Lobe (Algona Advance) Region.

Monitoring wetlands in Iowa is a challenge because so many have been affected by drainage efforts. Wet and dry weather cycles also affect the amount of water in wetlands from year to year. Many previously drained wetlands are being restored through wildlife habitat projects and Farm Bill programs designed to restore, enhance, or create wetlands. Currently 16 other states have begun wetland monitoring programs. Most of these are working with the NWI maps circa 1980s.

The IWI and IWMD are GIS resources that will have several useful applications for wetland monitoring efforts. These include the following:

- The updated wetland inventory will be used in the random selection process to select a candidate wetland list for sampling areas this summer and for summers to follow.
- The metadata for the initial background work will be used to determine info/history for a particular wetland.
- The land-use composition around the sampled wetlands can be calculated as part of a landscape level assessment process.
- Maps from the inventory and CIRs can be produced for use in the field as a reference in locating, determining access, ownership, and initial site assessment for the wetlands.

The information available from GIS has already proven to be an extremely efficient tool in the wetland assessment process. The updated mapping inventory provided through the IWMD will be the foundation for developing the wetland monitoring program. States without this type of resource are struggling to maintain and build their wetland programs. This type of information is already helping to jump start several projects, resulting in better management and protection of our natural resources.

Future plans for wetland monitoring work include further GIS applications such as tracking the status and trends of wetland acres in Iowa, using available coverages (wetland census) to determine current net gains or losses, organization of a fen wetland database and updated coverage, building the wetland component into the DNR's watershed atlas, and linking wetland monitoring data.

Data that may be linked could include information collected for waterfowl conservation or wildlife habitat work. Coupling this with threatened and endangered species locations will help in prioritizing wildlife habitat and conservation work.

This article was submitted by Vince Evelsizer of the Water Monitoring section. For more information regarding these efforts contact him at vevelsizer@igsb.uiowa.edu , or by phone at (319)335-1574.

Updates and New Data

A listing of updates and new data added to the [NRGIS Library](#) in the last year can be accessed by clicking "*Updates*" in the upper left corner of the library website link. Or go to http://www.igsb.uiowa.edu/nrgislibx/updates_frame.asp .

Contact Us

If you would like to contribute to this newsletter by letting others know how your section uses GIS, or if you have questions, concerns, or suggestions regarding this newsletter contact:

Chris Kahle (ckahle@igsb.uiowa.edu) or Andy Asell (aasell@igsb.uiowa.edu).

GIS User Group Meeting

The GIS Section will host its next GIS Users' Group meeting on July 12, 2005 in Des Moines. Users' Group meetings are intended as a forum to share ideas and information among the GIS section and other GIS users in the DNR. Goals for these meetings include introducing new data and applications, identifying needs of users, and sharing of information. An agenda is currently being compiled and will be mailed towards the end of June.