



Wisconsin State Cartographer's Office



Your resource for mapping and geographic information in the state of Wisconsin

January 2009

Digital Orthophotos

Introduction

A digital orthophoto is an aerial photograph that has been digitally processed to remove distortions due to camera tilt and terrain relief. Orthophotos are useful because they combine the image characteristics of an aerial photograph with the geometric qualities of a map.

Orthophotos are most commonly described by their resolution. Resolution refers to the linear ground distance represented by a single pixel in the digital image. For example, in a 1-meter resolution orthophoto image, each pixel represents a 1-meter by 1-meter square cell on the ground.

Applications

Orthophotos are used extensively as a base map in geographic information systems (GIS) because of the visual information naturally conveyed by an aerial photograph. Orthophotos are unique, however, in that they have the positional accuracy of a map.

In addition, orthophotos are commonly used to derive other datasets such as transportation routes, water features, field boundaries, and building outlines. They also serve as a base map for other data themes such as wetlands, soils, and forest inventories.

History

As a technology development, digital orthophotos began to appear in the late 1980s. The concept of a National Digital Orthophoto Program (NDOP)¹ was proposed in 1990 by the U.S. Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS), USDA-Farm Service Agency (USDA-FSA) and the U.S. Geological Survey (USGS). Technical specifications (quarter-quadrangle format, black & white images, 1-meter resolution) were soon established, and the NDOP began producing digital orthophotos in 1993 using National Aerial Photography Program (NAPP) imagery. The NDOP facilitated virtual nationwide coverage of the lower 48 states by 2002.

In the mid-1990s, counties in Wisconsin began to acquire their own digital orthophotos, usually at a resolution finer than one meter. Wisconsin Land Information Program funding supported many of these projects.

Today, most of the state's counties have acquired their own digital orthophotography at resolutions ranging from six to eighteen inches.

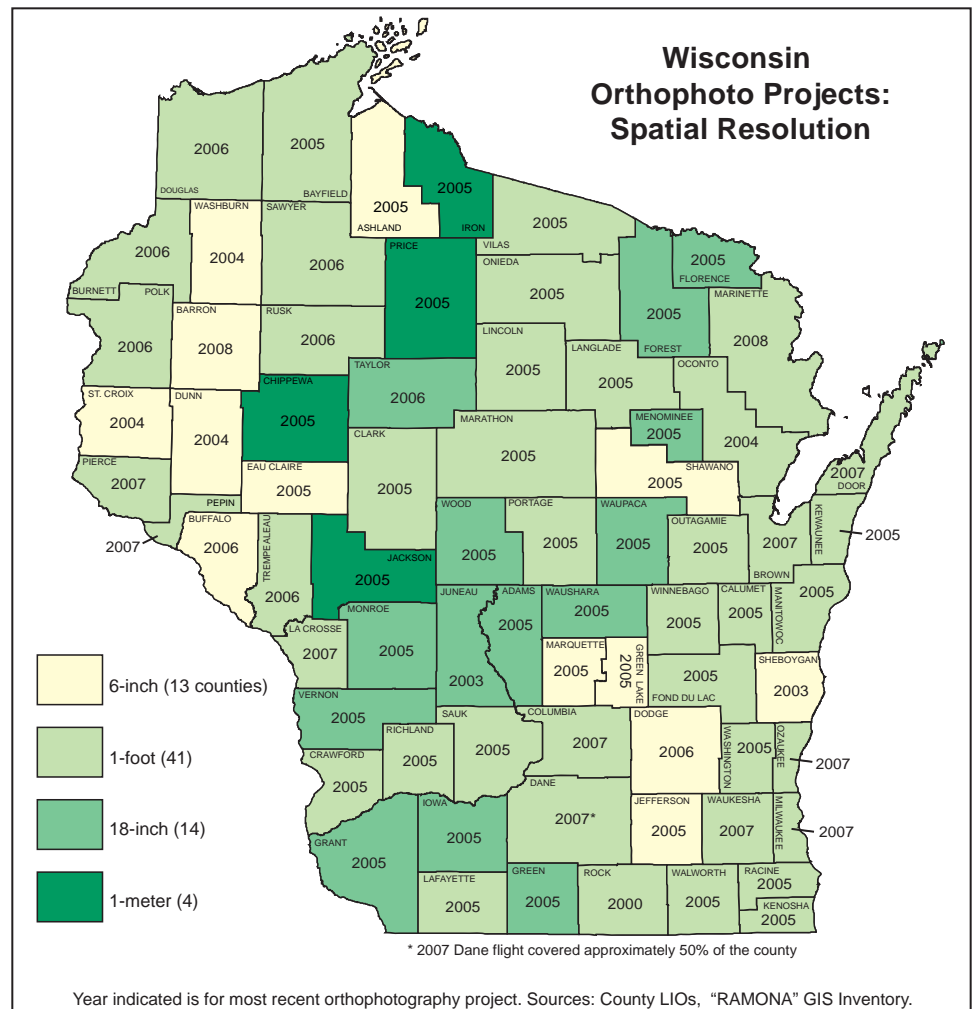
Current Status

During the past four years, county, state, and federal government organizations have acquired a significant amount of new aerial photography in Wisconsin. Spatial resolutions for these projects have ranged from six inches to 2-meters.

In addition to a large number of county and municipal-sponsored projects in 2005, the U.S. Department of Agriculture Farm Service Agency (USDA-FSA) sponsored statewide imaging projects in 2005, 2006, and 2008 as part of their National Agriculture Imagery Program (NAIP). USDA-FSA acquired 1-meter, color digital orthophotography during the summers of 2005 and 2008, and

2-meter resolution imagery in the summer of 2006. Data from the Wisconsin NAIP projects are available through the WisconsinView Data Portal.²

The National Geospatial Intelligence Agency (NGA) funded projects in the Milwaukee and Madison metropolitan areas during the spring of 2007. The Madison project, which covers roughly 50% of Dane County, resulted in 1-foot color imagery. The Milwaukee-area project produced a 1-foot color product, and covered Milwaukee, Ozaukee, and Waukesha counties, plus a small portion of Washington County. Both sets of imagery are available from the WisconsinView Data Portal at no cost.



Oblique imagery gaining popularity

A total of 13 Wisconsin counties are at least partially covered by oblique ("bird's eye") aerial photography: Brown, Dane, Door, Jefferson, Kenosha, La Crosse, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Washington, and Waukesha. Law enforcement and emergency management applications continue to drive the majority of oblique imagery acquisitions.

Wisconsin Regional Orthophotography Consortium

Most upcoming orthophotography acquisitions in Wisconsin are related to the Wisconsin Regional Orthophotography Consortium (WROC).³ Led by several Regional Planning Commissions (RPCs), WROC builds upon momentum gained in 2005 from a nearly identical initiative led by the same RPCs. In most cases, counties and municipalities will

contract directly with the service providers pre-qualified by the Consortium. The Consortium is seeking partners to share acquisition costs with county and municipal governments.

As of January 2009, it is too early to predict exactly how many organizations plan to acquire imagery in 2010, or the specific products they will purchase.

2010 and beyond

In an effort to offset local government costs for the 2010 WROC initiative, the Wisconsin Department of Military Affairs (DMA) submitted an \$800,000 grant request to the U.S. Department of Homeland Security in the spring of 2008. Despite very favorable reviews by a national review committee, DMA's request for aerial photography funding was ultimately denied. DMA intends to re-submit a similar proposal in 2009, again with the goal of offsetting local government costs in 2010.

Looking further ahead, the USDA-FSA hopes to again acquire 1-meter color NAIP imagery for the entire state during the summer of 2011, but these plans could change depending upon the availability of funding, and proposed changes to NAIP.

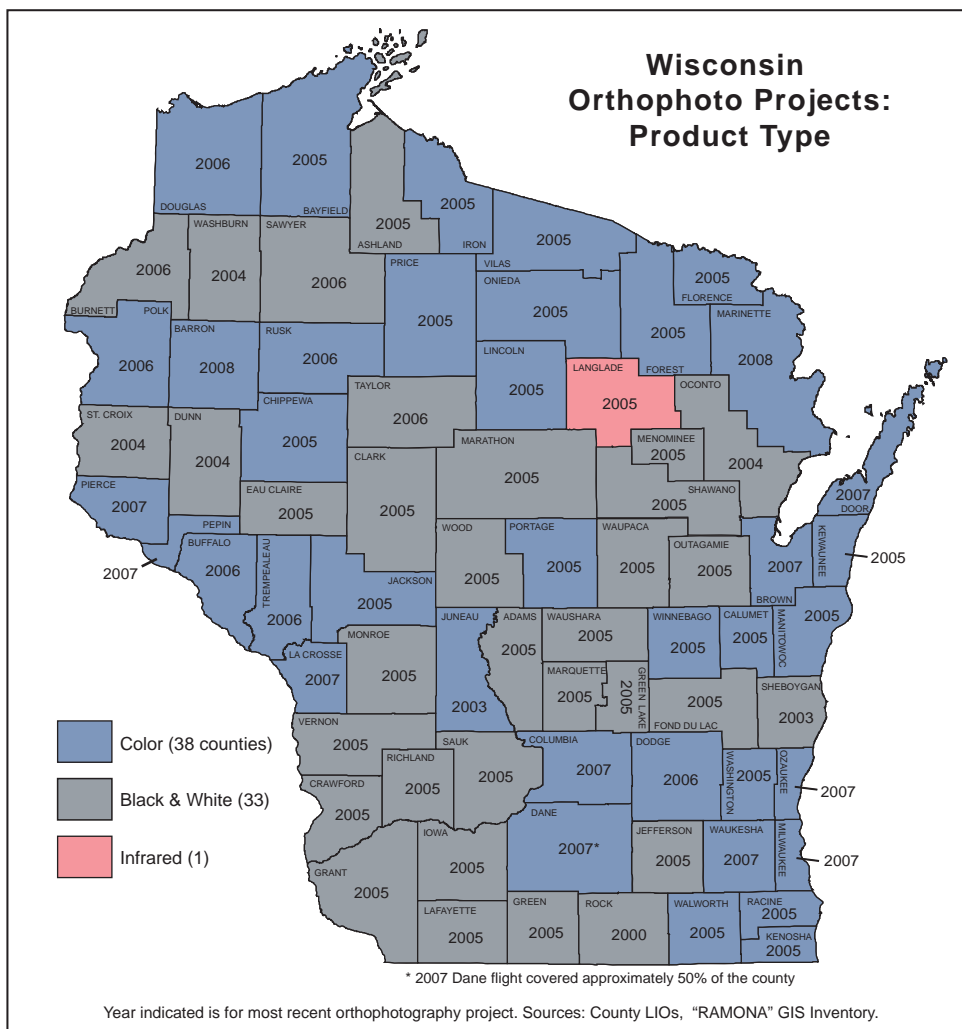
Finally, the National States Geographic Information Council (NSGIC) continues to promote the concept of a national digital orthophoto program called Imagery for the Nation (IFTN).⁴ The original IFTN concept has undergone considerable changes during the past year. The proposal now calls for the federal government to fully-fund NAIP, allowing the normal repeat cycle to move from every three years, to a yearly "leaf-on" coverage. The ability for state and local governments to "buy-up" to higher-resolution products as part of IFTN is uncertain at this time.

Where to obtain

Orthophotos generated as part of a high-resolution county project are typically obtained directly from the county Land Information Office.⁵ For municipal projects, contact the local planning or engineering office. Cost and distribution policies vary significantly.

All Wisconsin NAIP imagery is available from the WisconsinView Data Portal² for free.

**For more information
on orthophotography, visit:**
www.sco.wisc.edu/ortho/



www.sco.wisc.edu

The State Cartographer's Office has been Wisconsin's source for information about maps and geographic data for over 30 years. Located in Science Hall on the UW-Madison campus, the SCO maintains a large and diverse Web site including an online newsletter, catalogs, calendar, contact lists, and background information on mapping topics. Our staff presents educational programs and workshops, and participates in a wide range of organizations.

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Web References

1. National Digital Orthophoto Program:
www.ndop.gov
2. WisconsinView Data Portal:
www.wisconsinview.org/form.php
3. Wisconsin Regional Orthophoto Consortium
www.ncwrpc.org/WROC/
4. Imagery for the Nation:
www.nsgic.org/hottopics/imageryforthenation.cfm
5. Wisconsin County Land Information Officers:
www.wlion.org/lios.asp