



Wisconsin State Cartographer's Office



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

February 2008

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 Services 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.

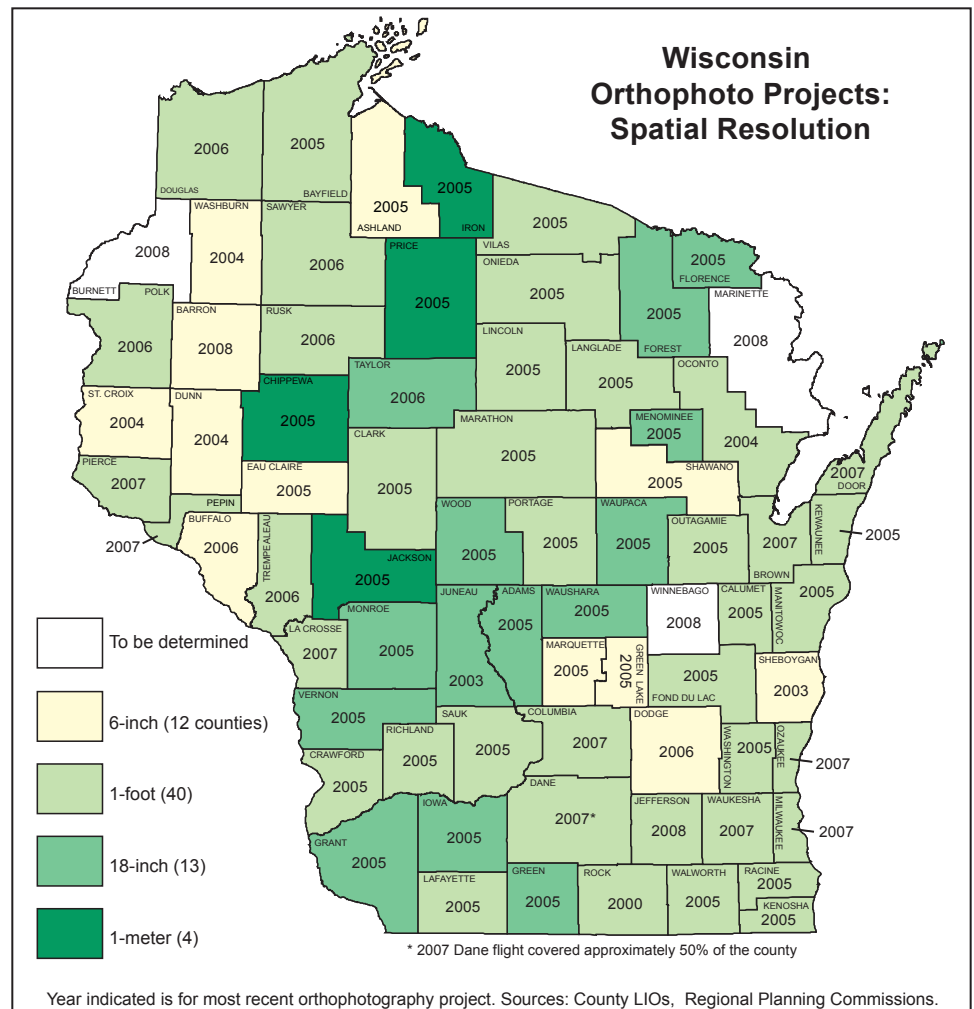
Current Status

During the past three 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) acquired statewide, 1-meter, color digital orthophotography during the summer of 2005 as part of their National Agriculture Imagery Program (NAIP). In the summer of 2006, the USDA-FSA acquired additional statewide color

imagery, but this time at a spatial resolution of two meters. Data from the Wisconsin NAIP projects are available through the Wisconsin-View 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 Madison-area imagery is available from the WisconsinView Data Portal at no cost. The Milwaukee-area project produced a 1-foot color product, and covered Milwaukee, Ozaukee, and Waukesha counties, plus a small portion of Washington County.



Oblique imagery gaining popularity

A total of 12 Wisconsin counties are at least partially covered by oblique ("Bird's Eye") aerial photography: Brown, Dane, Door, Kenosha, La Crosse, Milwaukee, Outagamie, Ozaukee, Racine, Rock, Washington, and Waukesha. Another two (Burnett and Jefferson) plan to acquire oblique imagery in 2008. Law enforcement and emergency management applications continue to drive the majority of oblique imagery acquisitions.

More imagery planned for 2008

Barron, Burnett, Marinette, Jefferson, and Winnebago counties all have orthophotography projects planned for 2008.

In addition, the USDA-FSA hopes to once again acquire 1-meter color NAIP imagery for the entire state during the summer of 2008, but as of January 2008, the availability of funding to complete the project is uncertain.

Finally, the Wisconsin DNR Division of Forestry³ will acquire color infrared (CIR) aerial photography in the northwest quadrant of the state during the fall of 2008. Although not orthorectified, the fall CIR photography gives foresters the best opportunity to differentiate hardwood species.

Statewide project in 2010?

Momentum is building in Wisconsin toward a statewide orthophotography project in 2010. Based on a successful consortium led by several Regional Planning Commissions in 2005, the Wisconsin Land Information Association formed a task force in the spring of 2007 to examine the issues associated with a statewide project. The task force will release its final report in late February 2008.

In addition, 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

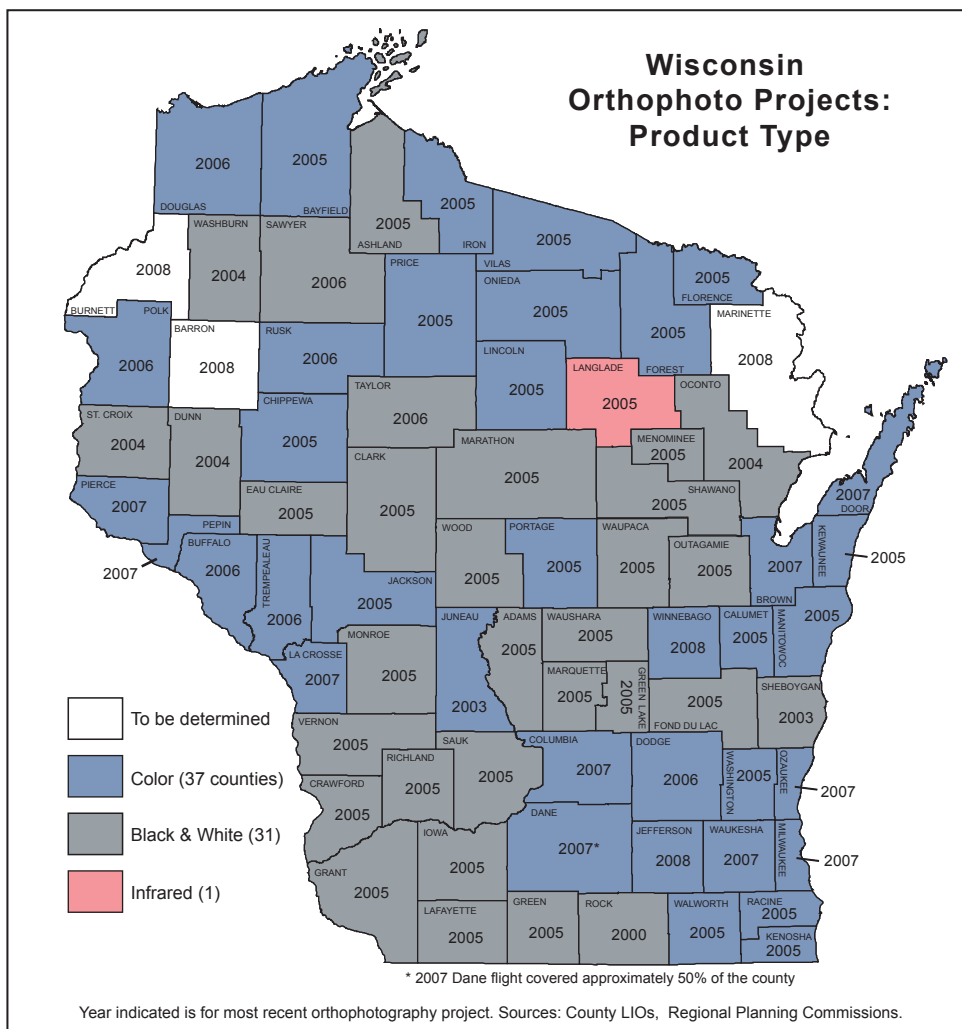
The most recent IFTN proposal calls for a 50/50 cost sharing agreement between states and the federal government. If implemented, the program will acquire 1-foot resolution color imagery once every three years for all states except Alaska, and allow local government "buy-ups" to 6-inch resolution imagery over urban areas.

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.

USGS Digital Orthophoto Quadrangles (DOQs) may be purchased from the U.S. Geological Survey.⁶ Purchase information and prices are available on the USGS Web site listed below.

Color NAIP imagery for 2004-2006 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.

State Cartographer's Office
550 N. Park Street
Rm. 384 Science Hall
Madison, WI 53706-1491
phone: (608) 262-3065
fax: (608) 262-5205

Web References

1. National Digital Orthophoto Program:
www.ndop.gov
2. WisconsinView Data Portal:
www.wisconsinview.org/form.php
3. Wisconsin DNR Aerial Photography
dnr.wi.gov/forestry/airphoto/
4. Imagery for the Nation:
www.nsgic.org/hottopics/imageryforthenation.cfm
5. Wisconsin County Land Information Officers:
www.wlion.org/lios.asp
6. U.S. Geological Survey:
edc.usgs.gov/products/aerial/doq.html