

Digital Earth Watch: *Measuring the Environment through Digital Images*

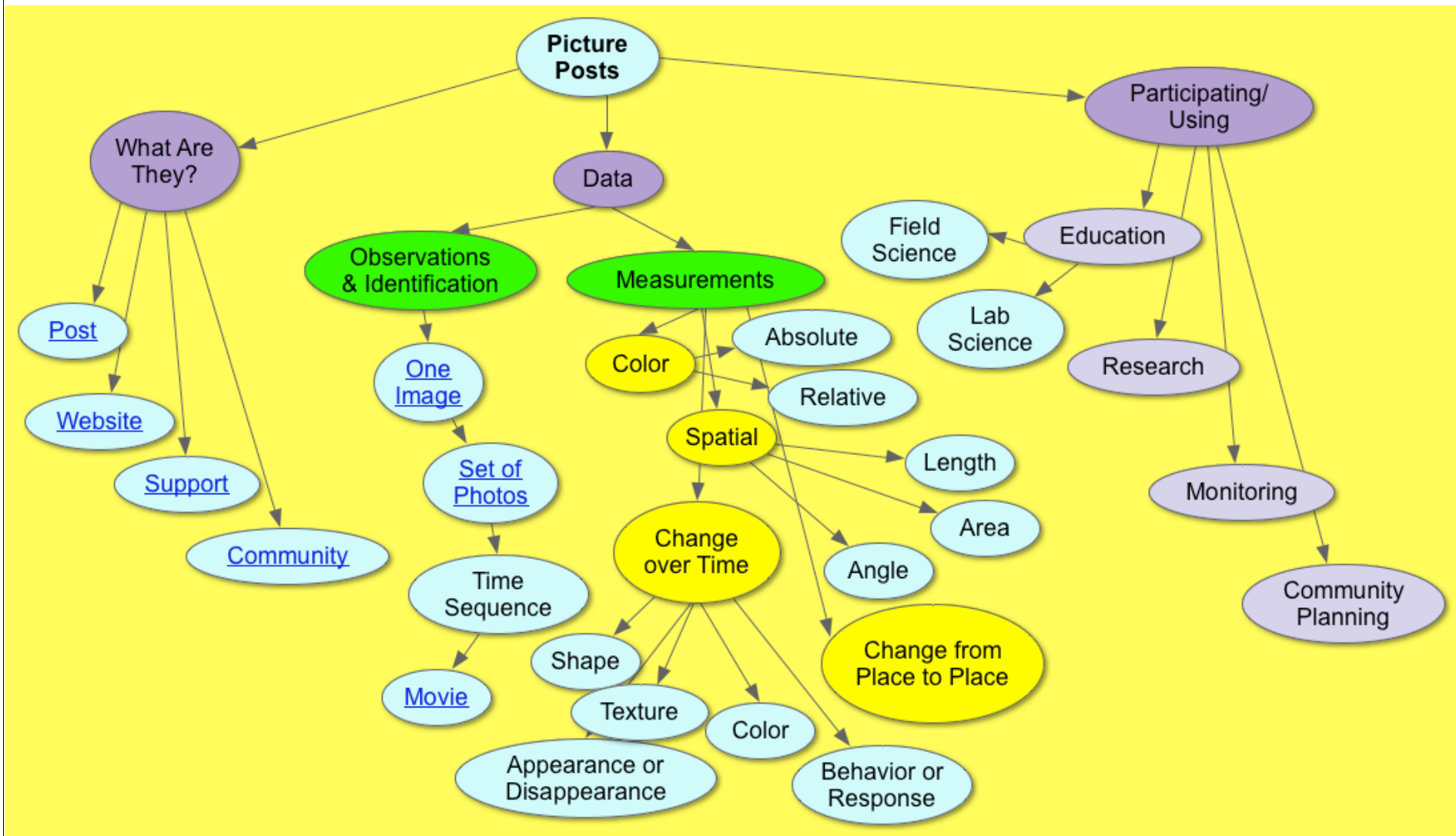
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Overview of PicturePosts

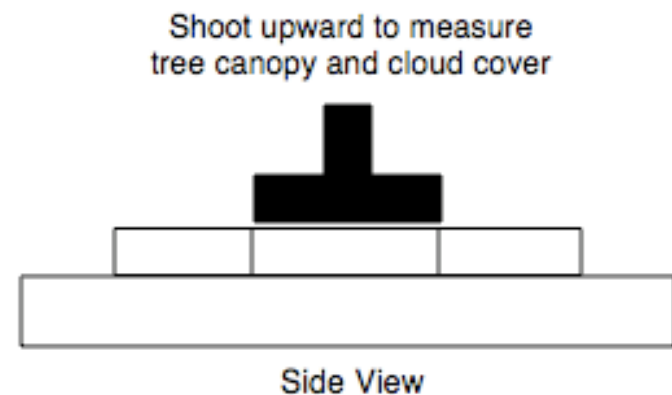
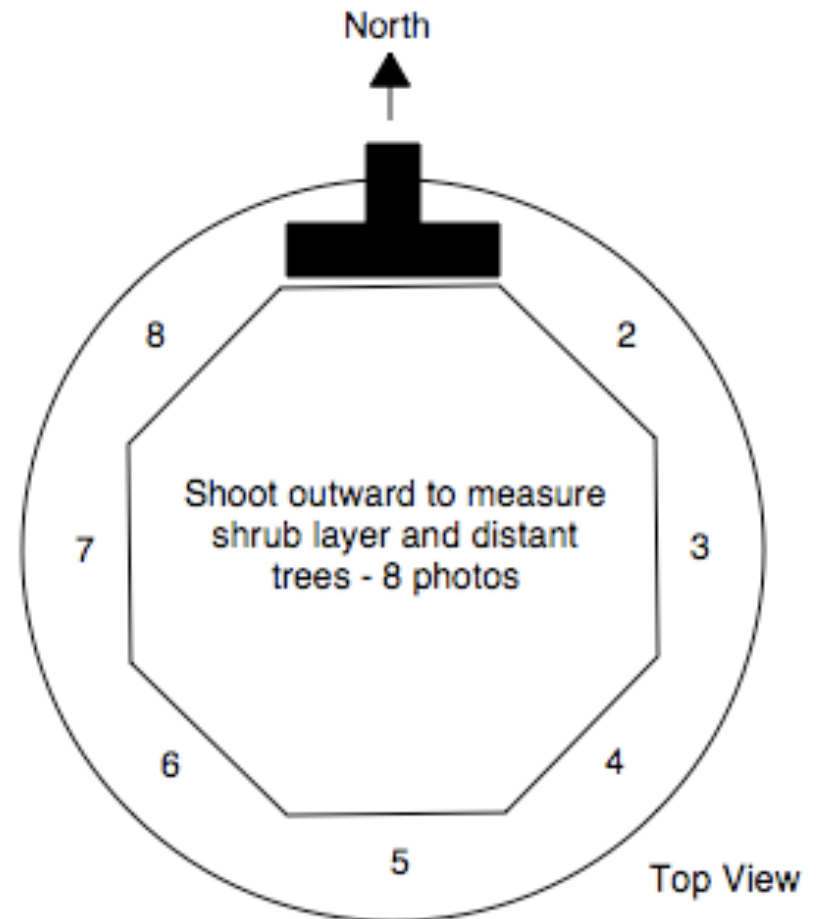
- Posts, Pictures, Website
- Citizen Science & School Network Support:
 - Environmental Monitoring
 - Education
 - Community Planning





PicturePosts: The Posts

- Octagonal center lying atop flat base & secured to post in ground
- Used to support & align camera to take “repeat” photographs of surroundings
- 8 pictures of landscape, 1 of sky/canopy cover
- Extra picture of watch and post information



PicturePosts: The Pictures

- Data automatically recorded within photos:
 - Exif data: de & time, camera make & model, camera settings (white balance, focal length, aperture, shutter speed, etc.)
- Also know latitude, longitude, & camera orientation



PicturePosts: The Website

- URL: <http://picturepost.unh.edu>
- Free, unlimited downloading & browsing
- Login protected uploads
- Pictures saved in folders organized by post identification and camera orientation
- Provided low cost way to determine essential features of dedicated website
- Guides, activities, and tools

Featured Picture Post panorama: [Fairy Falls Farm.](#)



Use the navigation buttons on the left of the map to zoom. Click and drag to pan around.



Picture Post is a part of the Digital Earth Watch (DEW) network. DEW supports environmental monitoring by citizens, students and community organizations through digital photography and satellite imagery.

You can...

- contribute photographs to any Picture Post
- add your own Picture Post
- measure environmental change in your neighborhood, and
- contribute to science networks.

[Learn how!](#)



Click on one of the icons on the map to see pictures ...and more!

WE ARE PICTURE POSTS



Support Materials

- Build and install a PicturePost
 - Attach information to the post
- Taking pictures with the PicturePost
 - Example of picture sequence
 - Make a movie using images
- Uploading pictures to the website
- Using the website to view pictures
- Monitoring environmental change



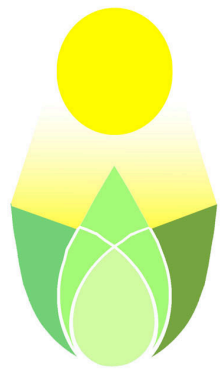
Environmental Monitoring

- Plants
 - Type, phenology, growth
- Land Surface
 - Erosion, land cover
- Water Levels
 - Tides, flooding, drought
- Sky
 - Cloud cover, air quality
- Building
 - Development, recovery from disaster

Education

- Monitor changes in schoolyards
- Prepare for and extend visits to parks
- See and measure nature change with seasons across the United States and the globe





Measuring Vegetation Health

- Supports PicturePosts
- 7 institutions developing formal & informal science education materials
 - Plants as Green Canaries
 - Earth Systems Science
 - Remote Sensing
 - Free image analysis software
 - Innovative technologies
- NASA funded
- <http://mvh.sr.unh.edu>



Color is everywhere, and we use it in so many ways. But how well do you understand it?

Have you noticed that when you mixed all of the paints in a paint set you get a very dark color? Yet mix a rainbow of colored light beams and you get white light.

Explore the concepts of color and develop and refine your skills to create and identify color.

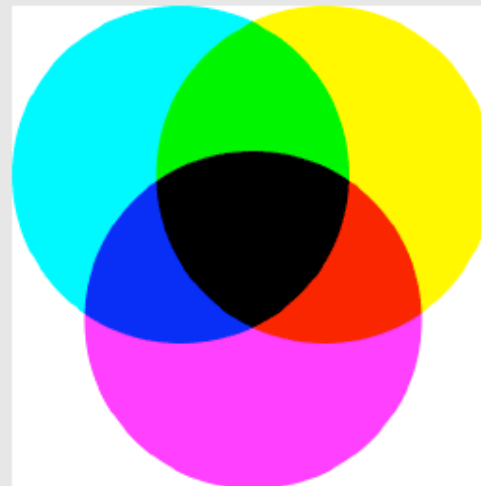
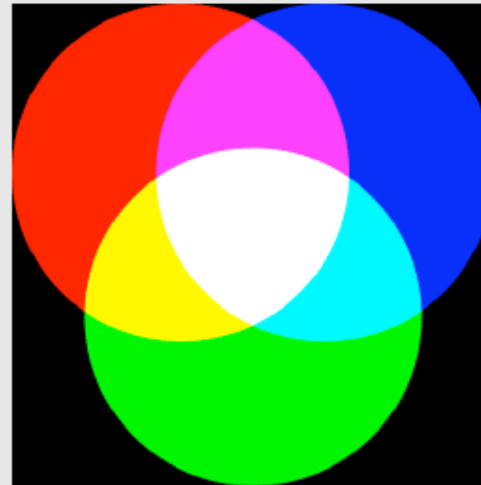
Begin with "Compare Colors" to see how colors mix with paint pigments and light beams.

Then select a color space to explore:

Red - Green - Blue (RGB),
Cyan - Magenta - Yellow (CMY), or
Hue - Saturation - Value (HSV).

"Make Colors" in the color space to look for patterns, "Play with Colors" to develop your skills, and finally "Test Yourself" to see how well you can manipulate the color space.

Details about color spaces are available at "Color Info". If you like to know where you are going before you do it, read this first. If you like to see how well you figured out what you've explored, read this last.



Information about Color Spaces

Intro

Pixels

Colors

Data in Images

False Color

Check Color

About

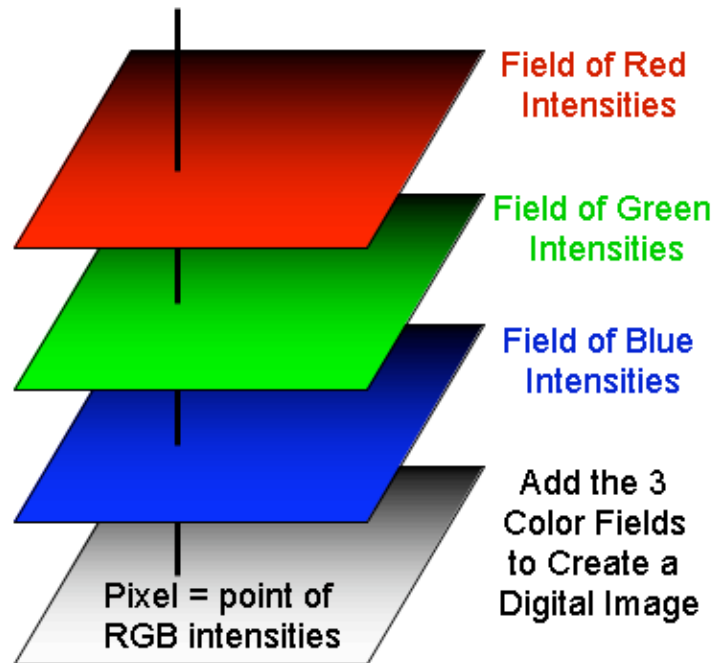
Digital images are valuable as art, memories, communications, documentation, and, something many may not realize, scientific data.

With a knowledge of color with light, familiarity with the basics of digital imagery, and software tools, you can use the data in digital images for a variety of scientific explorations.

The basics of digital imagery is divided into four parts:

- 1) pixels, or picture elements,
- 2) color,
- 3) data, and
- 4) false color.

At right is an illustration how a pixel relates to the color layers of a digital image.



Intro

Spatial Analysis

Enhance Colors

Mask Colors

Check Color Quality

About

Three buttons above have tools for visualizing and measuring spatial and spectral (color) qualities and relationships in digital images.

(1) Spatial Analysis tools measure size and colors of features. Spatial measurements may be saved to a text file for analysis with spreadsheet software.

(2) Enhance Colors tools let you change how the image is displayed.

(3) Mask Colors tool lets you count the number of pixels within a range of colors within the original or a color enhanced image.

Images transfer fluently to each toolset. Modified images may be saved or printed.

Two utilities are in the Utilities Menu:

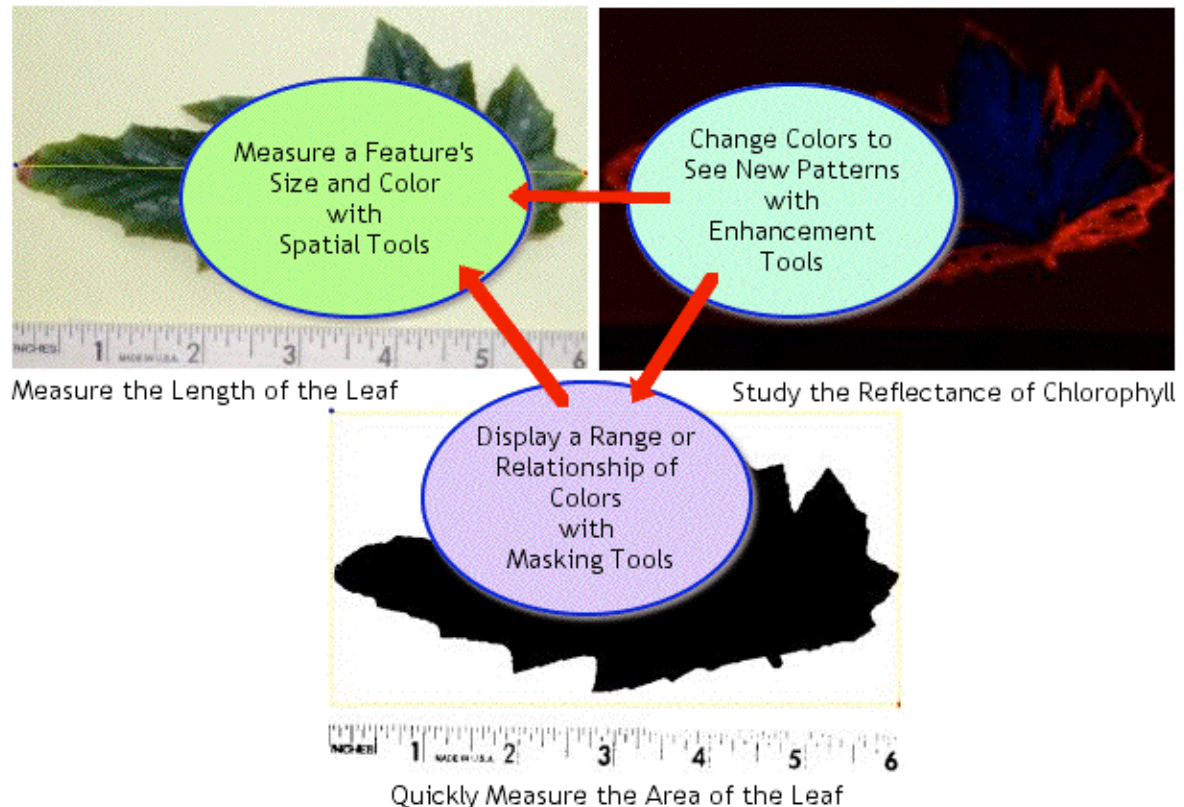
- 1) Trim images to speed up processing time, and
- 2) Combine two or more images into one for comparison (merge color layers from separate images, subtract images, or average images).

Other useful tools in the File Menu:

- 1) Color histogram of the whole image or selected areas
- 2) Color along Selected Line.

Although these tools were not designed to create artistic images, beautiful and exotic looking images are possible – so save and share!

Open a Picture



Flow diagram of how to use these tools with a digital image of a leaf.

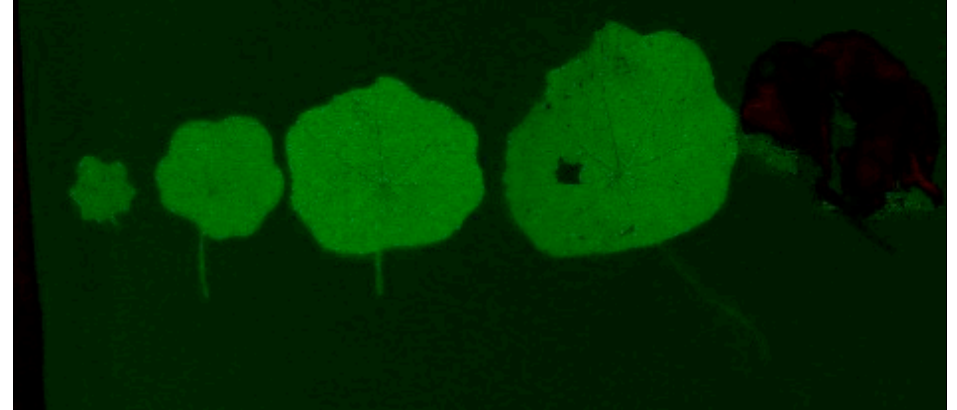
Enhancing Spectral Data in a Digital Photograph

<- Healthiest to Stressed ->



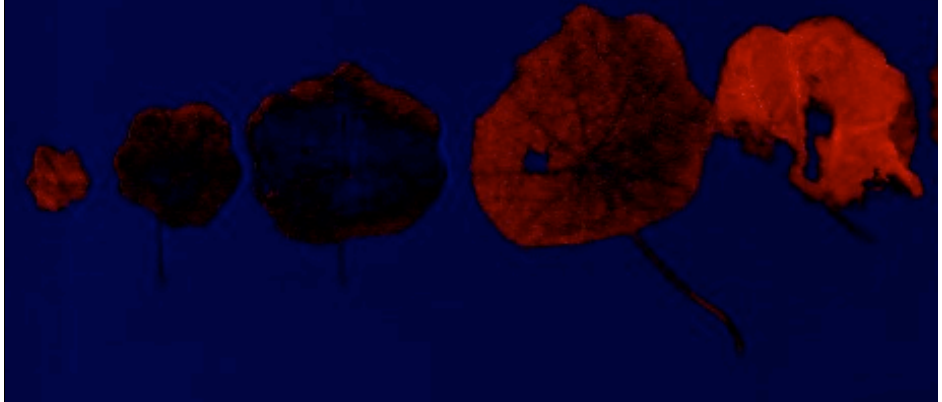
RGB

<- Healthiest to Stressed ->



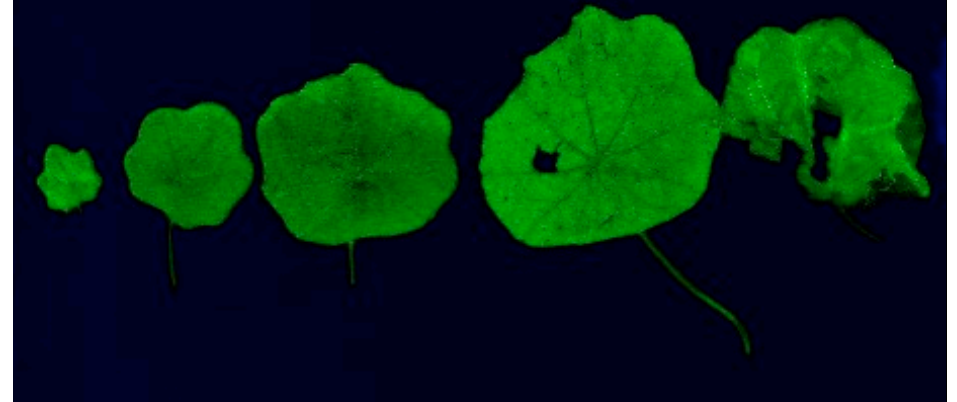
Red versus Green

<- Healthiest to Stressed ->



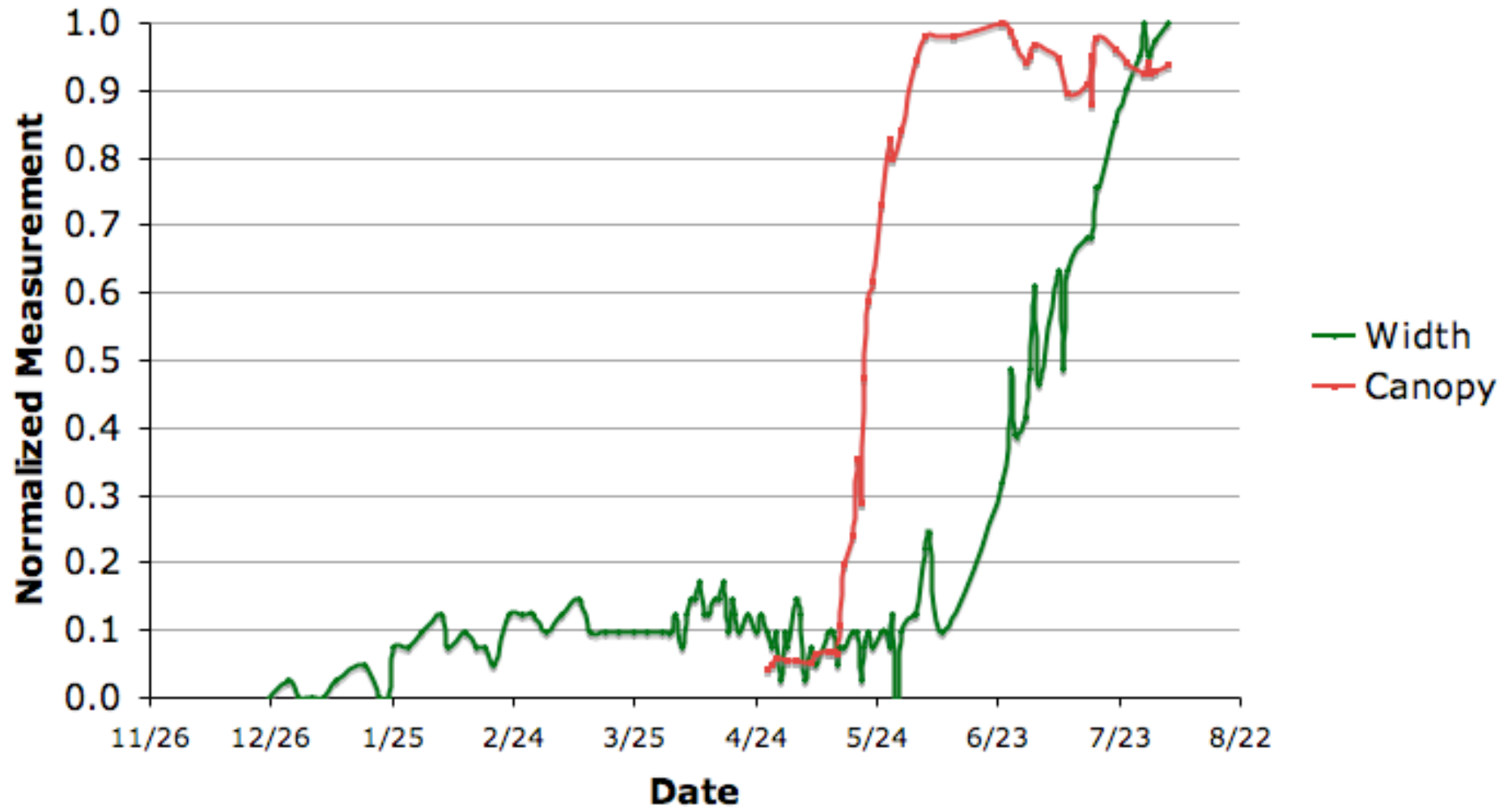
Red versus Blue

<- Healthiest to Stressed ->



Green versus Blue

Concord Academy, Concord, MA 2007-08 Width of Trunk and Canopy Cover





Community Planning

- Document state of parks, school yards, other community assets
- Monitor response of community to development, recovery, greening & sustainability efforts

Land Cover, Flooding, Phenology



Canopy & Sky Cover



Water Level & Quality, Ice Cover

