



d.e.w.  
DIGITAL EARTH WATCH



A photograph of several bare trees against a clear blue sky. The trees have intricate, tangled branches reaching upwards. The lighting suggests it might be early spring or late autumn.

Get more out of those pictures!

## Mini-tutorial

Using Analyzing Digital Images software  
to highlight features in pictures:  
red vs blue color ratio



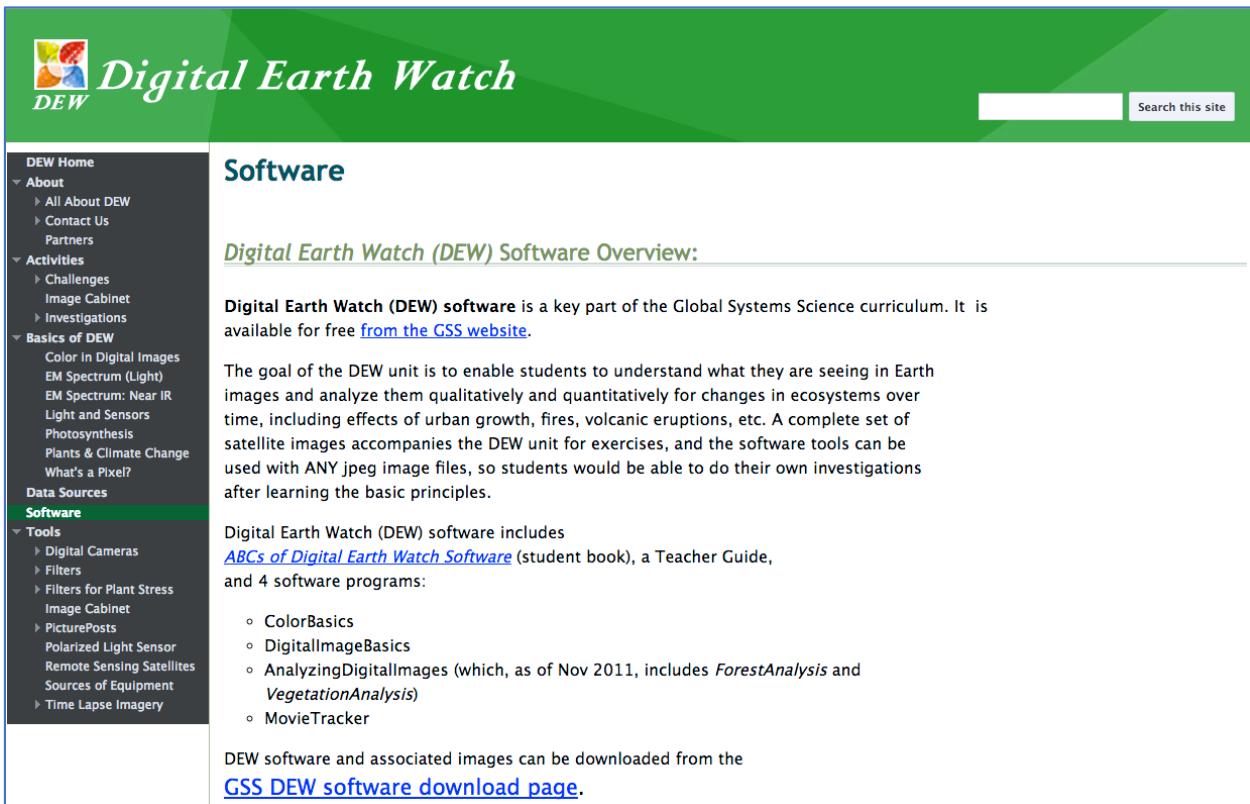
University of  
New Hampshire

Questions? Contact [Annette.Schloss@unh.edu](mailto:Annette.Schloss@unh.edu)

# Getting Started

Note: If you are not familiar with the Analyzing Digital Images (ADI) software, the link below takes you to the DEW introductory page. From there, you can download the software and view or download the handy guide, *ABCs of Digital Earth Watch Software*. ADI is available for free for both Mac and PCs.

[dew.globalsystemsscience.org/software](http://dew.globalsystemsscience.org/software)

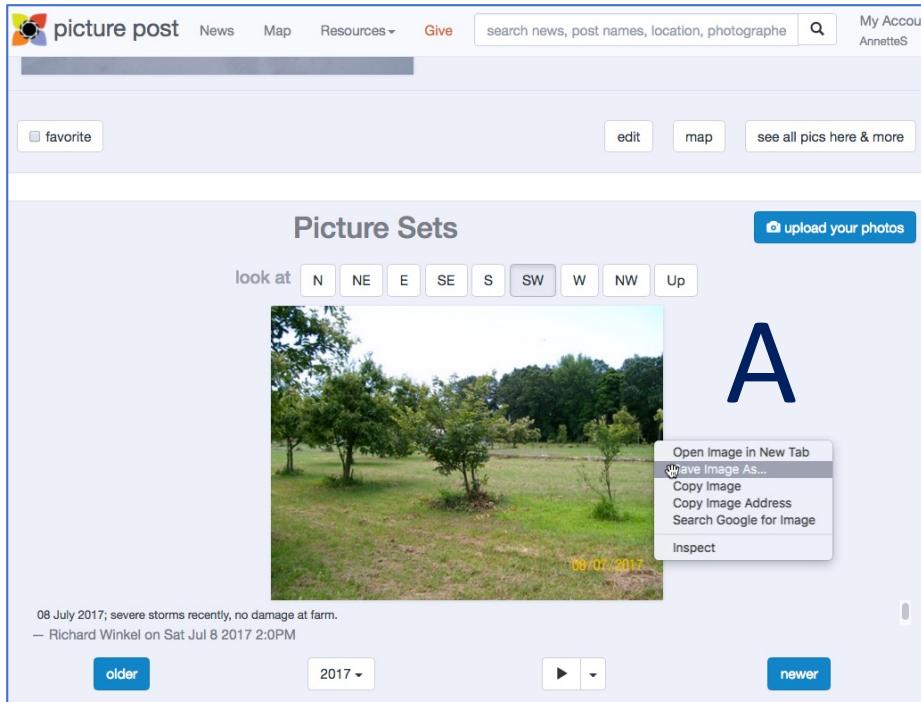


The screenshot shows the Digital Earth Watch (DEW) website with a green header. The header features the DEW logo and the text "Digital Earth Watch". On the right side of the header is a search bar with the placeholder "Search this site". The main content area has a white background. On the left, there is a dark sidebar containing a navigation menu with links to various sections like "About", "Activities", "Basics of DEW", "Data Sources", "Software" (which is currently selected), and "Tools". The main content area starts with a heading "Software" and a sub-section "Digital Earth Watch (DEW) Software Overview:". Below this, there is a paragraph about the software being a key part of the Global Systems Science curriculum and available for free from the GSS website. Further down, there is a detailed description of the software's goal, its components (student book, Teacher Guide, and four software programs), and a list of the four programs: ColorBasics, DigitalImageBasics, AnalyzingDigitalImages, and MovieTracker. At the bottom of the content area, there is a note about downloading the software and associated images from the GSS DEW software download page.

# Choose Your Pictures

Select your images on the Picture Post web site. You can right-click on the image to save the small version (**A**), or click anywhere on the image to load the full-resolution version in your browser, and then you can right-click to download the larger picture (**B**).

For this tutorial, we are using the larger version.



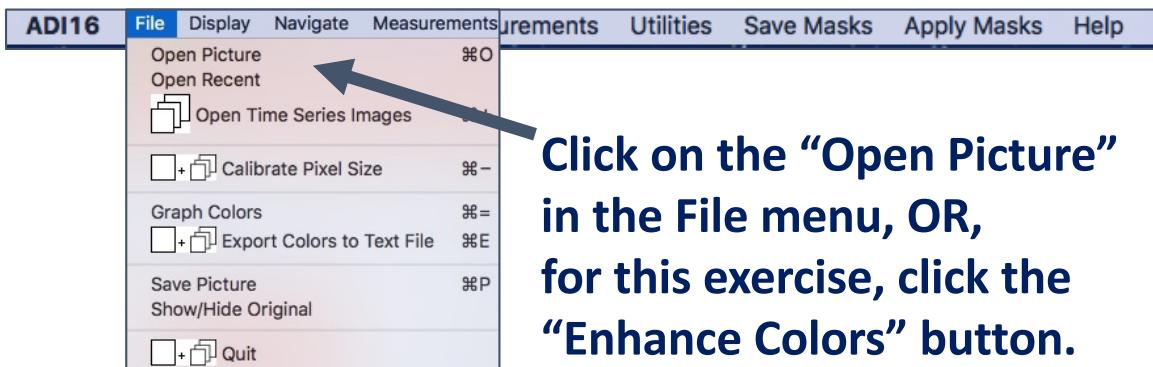
The screenshot shows a web browser displaying the Picture Post website. The main content area features a photograph of a grassy field with several small trees. A context menu is open over the image, with the letter 'A' overlaid on it. The menu options include "Open Image in New Tab", "Save Image As...", "Copy Image", "Copy Image Address", "Search Google for Image", and "Inspect". Below the image, there is a caption: "08 July 2017; severe storms recently, no damage at farm." and "— Richard Winkel on Sat Jul 8 2017 2:0PM". At the bottom of the page, there are navigation links for "older", "2017 ▾", and "newer".



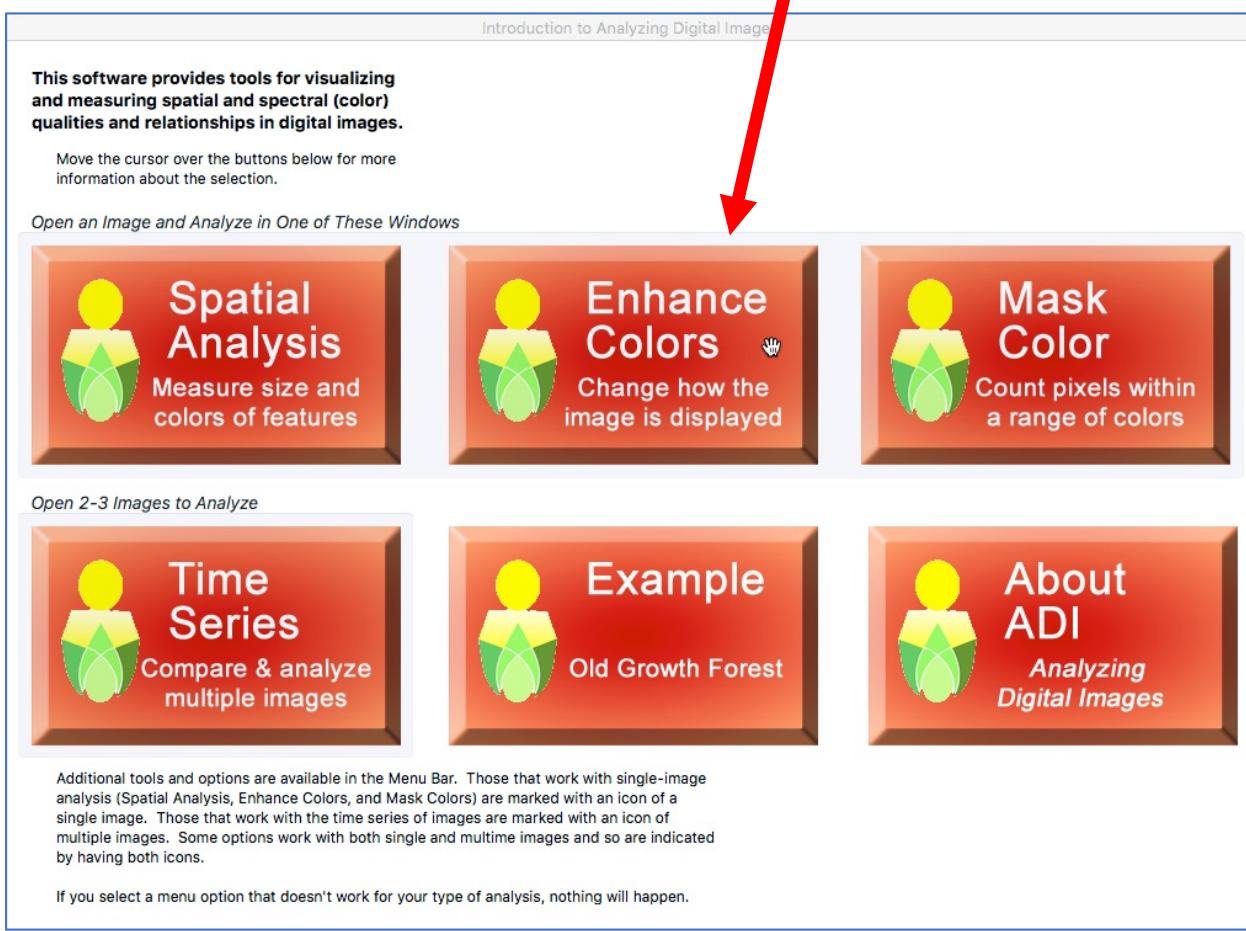
The screenshot shows a separate browser window displaying a larger version of the same field image. A context menu is open over the image, with the letter 'B' overlaid on it. The menu options are identical to the one on the Picture Post site: "Open Image in New Tab", "Save Image As...", "Copy Image", "Copy Image Address", "Search Google for Image", and "Inspect". The background of this window shows the full-resolution image of the field.

# Using ADI

Start up the Analyzing Digital Images software and open a picture by clicking on one of two options.



**Click on the “Open Picture” in the File menu, OR, for this exercise, click the “Enhance Colors” button.**



This software provides tools for visualizing and measuring spatial and spectral (color) qualities and relationships in digital images.

Move the cursor over the buttons below for more information about the selection.

Open an Image and Analyze in One of These Windows

**Spatial Analysis**  
Measure size and colors of features

**Enhance Colors**  
Change how the image is displayed

**Mask Color**  
Count pixels within a range of colors

**Time Series**  
Compare & analyze multiple images

**Example**  
Old Growth Forest

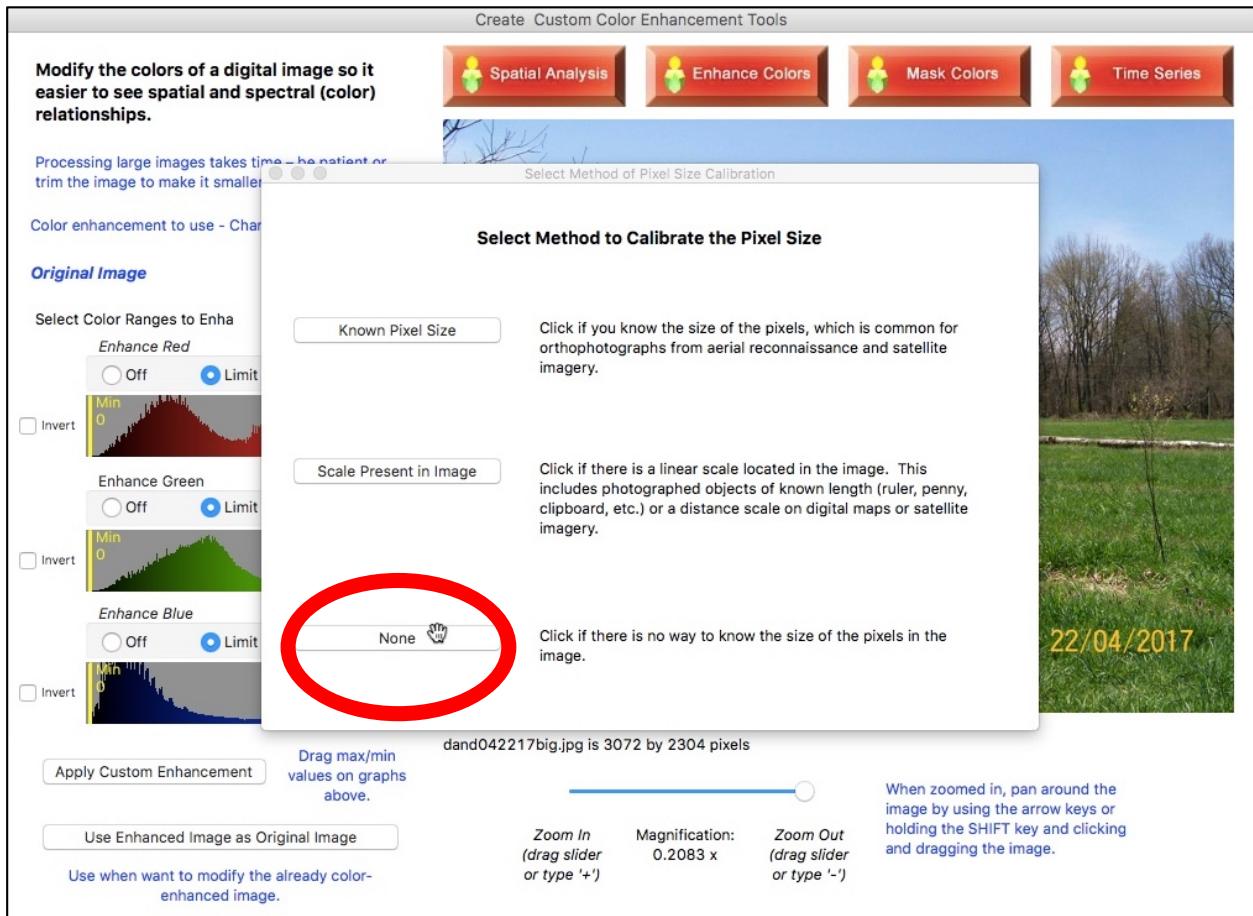
**About ADI**  
*Analyzing Digital Images*

Additional tools and options are available in the Menu Bar. Those that work with single-image analysis (Spatial Analysis, Enhance Colors, and Mask Colors) are marked with an icon of a single image. Those that work with the time series of images are marked with an icon of multiple images. Some options work with both single and multime images and so are indicated by having both icons.

If you select a menu option that doesn't work for your type of analysis, nothing will happen.

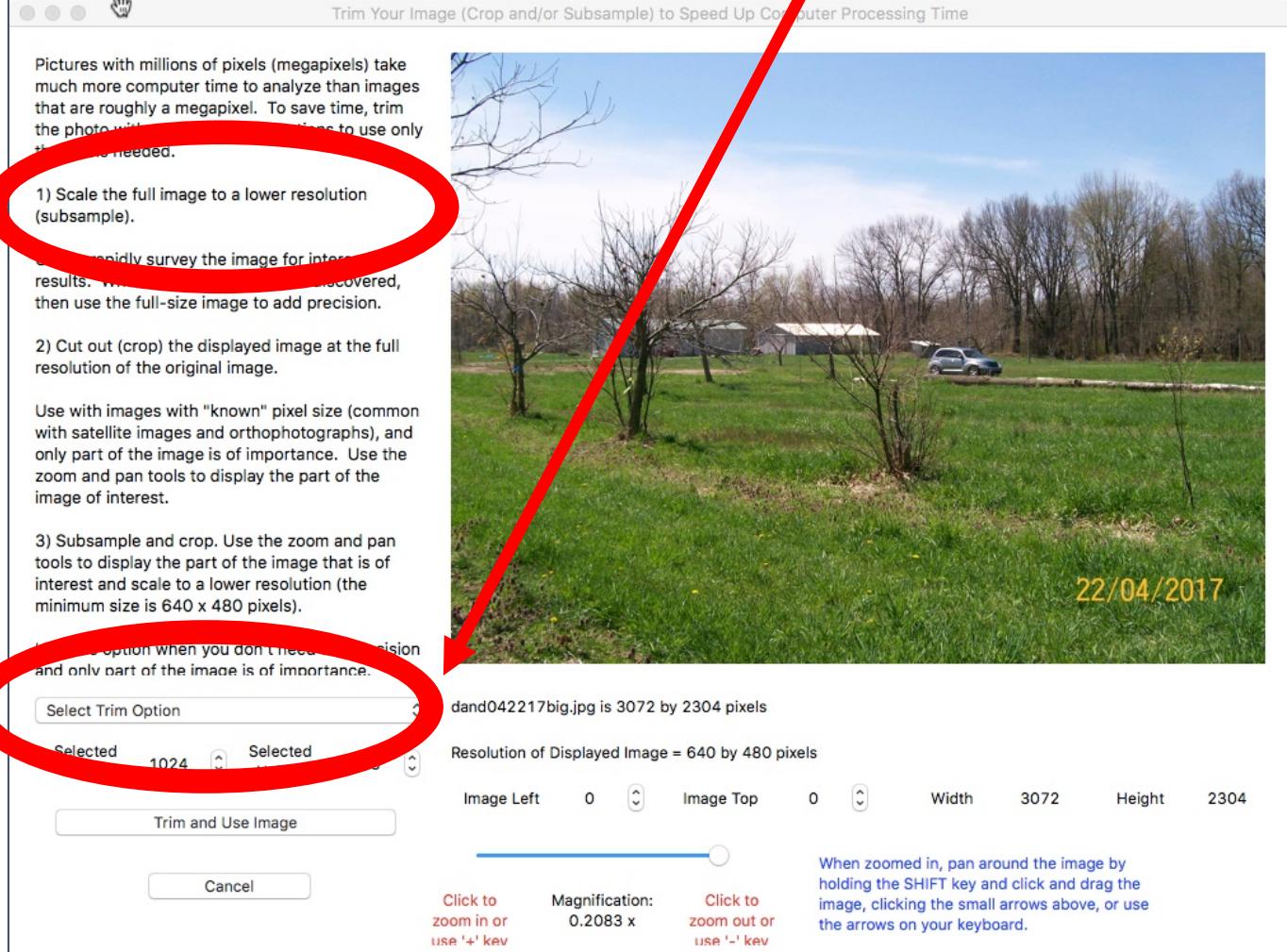
# Using ADI

Once you select your picture, you will be asked to choose a method to calibrate pixel size. For this exercise, choose “None”.



# Using ADI

If you are asked to Trim your picture, choose the  
**“1) Full image at selected resolution (RECOMMENDED)” option.**



# Using ADI

This is the Enhance Colors page. We will choose our color enhancement from the menu, as shown on the next page.

Modify the colors of a digital image so it easier to see spatial and spectral (color) relationships.

Processing large images takes time – be patient or trim the image to make it smaller.

Color enhancement to use - Change in Display Menu

**Original Image**

Select Color Ranges to Enhance

**Enhance Red**

Off    Limit    Stretch

Invert

Min 0   Max 100

**Enhance Green**

Off    Limit    Stretch

Invert

Min 0   Max 100

**Enhance Blue**

Off    Limit    Stretch

Invert

Min 0   Max 100

**Spatial Analysis**   **Enhance Colors**   **Mask Colors**   **Time Series**



22/04/2017

dand042217sm.jpg is 400 by 300 pixels

Apply Custom Enhancement   Drag max/min values on graphs above.

Use Enhanced Image as Original Image

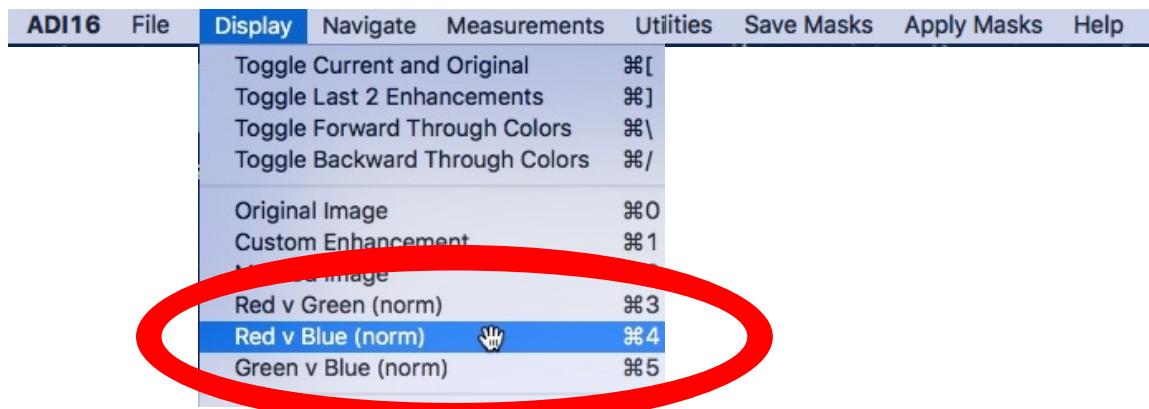
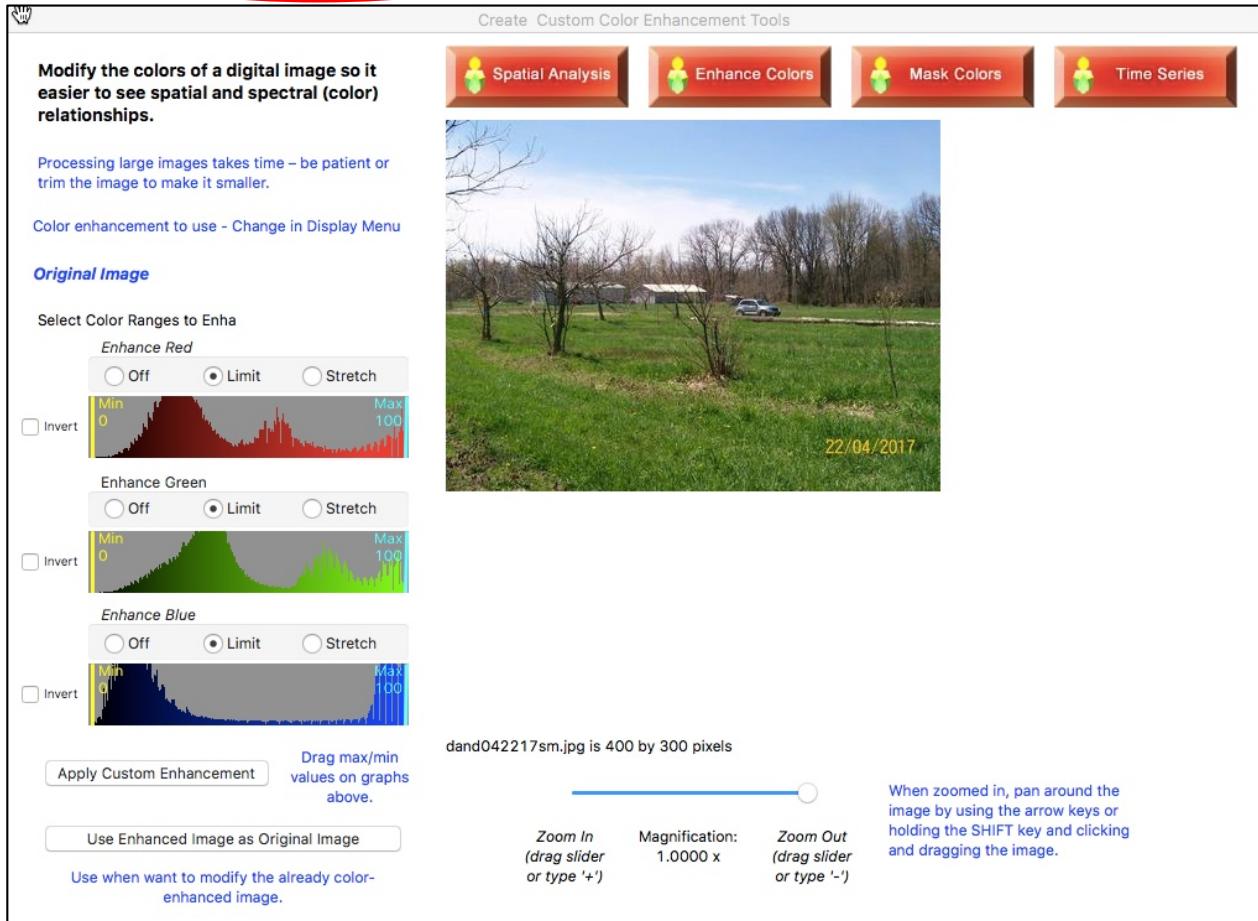
Use when want to modify the already color-enhanced image.

Zoom In (drag slider or type '+')   Magnification: 1.0000 x   Zoom Out (drag slider or type '-')

When zoomed in, pan around the image by using the arrow keys or holding the SHIFT key and clicking and dragging the image.

# Using ADI

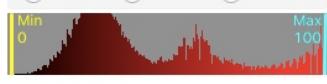
Choose “Red v Blue (norm) from the “Display” dropdown menu.

The screenshot shows the ADI16 software interface with the 'Enhance Colors' button highlighted with an orange box. The interface includes sections for 'Original Image', 'Select Color Ranges to Enhance', and 'Apply Custom Enhancement'. A preview image of a landscape is shown with a timestamp of 22/04/2017.

**Original Image**

Select Color Ranges to Enhance

**Enhance Red**  
 Off    Limit    Stretch  
 Invert   

**Enhance Green**  
 Off    Limit    Stretch  
 Invert   

**Enhance Blue**  
 Off    Limit    Stretch  
 Invert   

Apply Custom Enhancement   Drag max/min values on graphs above.

Use Enhanced Image as Original Image   When zoomed in, pan around the image by using the arrow keys or holding the SHIFT key and clicking and dragging the image.

Zoom In (drag slider or type '+')   Magnification: 1.0000 x   Zoom Out (drag slider or type '-')

dand042217sm.jpg is 400 by 300 pixels

## Enhancing Features

We want to highlight spring leaf-out of a Silver Maple tree in the NW viewpoint at the Winkel Chestnut Farm Picture Post.



This tree is being observed as an indicator of the early growing season for chestnuts on the farm.



The Picture Post News June 2017 article gives more detail about this exciting idea!  
<http://bit.ly/2tEWCB4>

29/04/2017

## Enhancing Features

We used the red vs blue color enhancement over three dates to “see” when the Silver Maple tree begins to leaf out.



This tree is very visible as red color by April 29.



If we zoom in, we can see the tree beginning to green up in the April 22 picture.





# Zooming In

The effect is subtle, but clearly visible!

File Create Custom Color Enhancement Tools

Modify the colors of a digital image so it easier to see spatial and spectral (color) relationships.

Processing large images takes time – be patient or trim the image to make it smaller.

Color enhancement to use - Change in Display Menu

**Red vs Blue =  $(R-B)/(R+B)$**

Select Color Ranges to Enhance

Enhance Red

Off    Limit    Stretch

Invert

Min 0 Max 100

Enhance Green

Off    Limit    Stretch

Invert

Min 0 Max 100

Enhance Blue

Off    Limit    Stretch

Invert

Min 0 Max 100

Apply Custom Enhancement

Drag max/min values on graphs above.

Use Enhanced Image as Original Image

Use when want to modify the already color-enhanced image.

Create Custom Color Enhancement Tools

Spatial Analysis   Enhance Colors   Mask Colors   Time Series

Trimmed big0422.jpg is 1024 by 768 pixels

Zoom In (drag slider or type '+')   Magnification: 1.5385 x   Zoom Out (drag slider or type '-')

When zoomed in, pan around the image by using the arrow keys or holding the SHIFT key and clicking and dragging the image.



# Zooming In

By the April 29 picture, the tree is quite green (but the effect is shown as red because of the color enhancement we did).

Create Custom Color Enhancement Tools

Modify the colors of a digital image so it easier to see spatial and spectral (color) relationships.

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Color enhancement to use - Change in Display Menu

**Red vs Blue =  $(R-B)/(R+B)$**

Select Color Ranges to Enhance

**Enhance Red**

Off    Limit    Stretch

Invert

Min: 0   Max: 100

**Enhance Green**

Off    Limit    Stretch

Invert

Min: 0   Max: 100

**Enhance Blue**

Off    Limit    Stretch

Invert

Min: 0   Max: 100

**Apply Custom Enhancement**

Drag max/min values on graphs above.

Use Enhanced Image as Original Image

Use when want to modify the already color-enhanced image.



Trimmed big0429.jpg is 1024 by 768 pixels

Magnification: 1.3158 x

Zoom In (drag slider or type '+')   Zoom Out (drag slider or type '-')

When zoomed in, pan around the image by using the arrow keys or holding the SHIFT key and clicking and dragging the image.



# Enhancing Features

As a bonus, we were able to highlight dandelions in the field. The appearance of the flowers is an indicator that pollinators will be coming around, too.

Modify the colors of a digital image so it easier to see spatial and spectral (color) relationships.

Processing large images takes time – be patient or trim the image to make it smaller.

Color enhancement to use - Change in Display Menu

**Red vs Blue =  $(R-B)/(R+B)$**

Select Color Ranges to Enhance

**Enhance Red**

Off    Limit    Stretch

Invert

Min: 0   Max: 100

**Enhance Green**

Off    Limit    Stretch

Invert

Min: 0   Max: 100

**Enhance Blue**

Off    Limit    Stretch

Invert

Min: 0   Max: 100

Apply Custom Enhancement

Drag max/min values on graphs above.

Use Enhanced Image as Original Image

Use when want to modify the already color-enhanced image.

Create Custom Color Enhancement Tools

Spatial Analysis   Enhance Colors   Mask Colors   Time Series

## Going Further

There are a number of color enhancements ready-to-go in the ADI software package. The method for calculating the enhancements is shown once an enhancement is chosen. It is easy to toggle through the enhancements on the dropdown menu.

By playing around with this feature in ADI, what can be highlighted in your pictures?

Future tutorials will explore quantitative methods for making measurements.

Check out the e-book, All About DEW, to learn more about manipulating digital images!



The screenshot shows a green header bar with the 'Digital Earth Watch' logo and a search bar. The main content area has a white background. At the top right, it says 'All About Digital Earth Watch'. Below that is the 'd.e.w.' logo. To the left is a sidebar with a navigation menu:

- DEW Home
- About
- All About DEW
  - 00. Contents
  - 01. Introduction
  - 02. Making Images
  - 03. Kite Photography
  - 04. Internet Images
  - 05. Simple Software
  - 06. Advanced Software
  - 07. Investigations
  - 08. Picture Post
  - 09. GSS
  - 10. Forest Watch
  - 11. Concept Mapping
  - 12. Formative Evaluation
  - 13. Program Evaluation
  - 14. The Future
  - DEWImages Outline
- Contact Us
- Partners
- Activities
  - Challenges
  - Image Cabinet
  - Investigations
- Basics of DEW

At the bottom of the sidebar, there's a note: 'This online book is complete as of January 2012, and a PDF version generated 2012 Feb 28.'

On the right side of the main content area, under 'Co-Authors:', are listed: Annette Schloss, University of New Hampshire; Alan Gould, University of California, Lawrence Hall of Science; Jeffrey S. Beaudry, University of Southern Maine; and John Pickle, Concord Academy.