HFC *on*MEDIA

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The bright and shining faces of the future; a few of HFC's interns from the past year. (Left to right, top to bottom) Derrick Schultz, Cincinnati; Kristina Klein, Shepherd; Greg Koch, Cincinnati; Katrina Marhefka, Cincinnati; David Gagner, Humboldt State; Zach Norman, Cincinnati.

From the Manager

With the return of spring, I invariably find my thoughts turning to more than just the seasonal renewal that we are experiencing. Thinking of new approaches, new ways of looking at the routine, I am reminded of the interns that we have had over the last few years. Students have come to us from Humboldt State University, the universities of Cincinnati and Washington, and from our local neighbor, Shepherd University. We currently have a park ranger on a four-month detail from Pinnacles National Monument. Though these people come with varying skills and interests, they all come with great enthusiasm and look at our work with new eyes. Their questions about how we do our work are a constant reminder to us of how easily our assumptions become routine. We find that, as we work with them, we reconnect with our own original enthusiasms and are invigorated by that process. One of our designers said to me that she wasn't "sure who learns more, Harpers Ferry Center or the students." One of the benefits that interns bring to HFC is their knowledge of where technology is taking us—an invaluable asset. So as the days lengthen and the birds return, we look to these interns to be an important aspect of who we are and what we do as a Center.

— Gary Cummins

Take Your Best Shot
Selecting and Using the Right Digital Camera

Digital cameras are everywhere. They have taken the consumer electronics industry by storm. According to InfoTrends Research Group, worldwide consumer digital camera sales hit 53 million units in 2004, and are predicted to rise 15 percent annually over the next four years to 82 million units by 2008. With so many choices of makes and models, megapixels, and "must have" features, it has become more and more difficult to select the right camera. Once you choose a model, the next challenge is understanding how best to use it.

This article focuses on selecting the right digital camera for use in interpretive media, and capturing digital photos for use in such varied media as exhibit panels, print publications, wayside exhibits, and websites. Because so many park staff are now taking digital photos and trying to find ways to incorporate them into the interpretive media they produce – or that they ask Harpers Ferry Center to produce – it's vitally important to learn some basic rules about this powerful new technology.

Pixels, Megapixels, and Resolution
Pixels are the building blocks of all digital images. A digital photo is made up of rows of tiny squares (pixels) that make up a rectangular grid. An image on a web page, for instance, might be made up of 500 rows of pixels with 400 pixels across each row (for a total of 200,000 pixels). All digital camera photos begin life as RGB color images, where each pixel is either red, green or blue. Each pixel can also have a number of different brightness values, which directly affects the discreet levels of tonal change that can be captured in a digital photo. This amount, or depth, of information contained in each pixel is known as "bit depth": a pixel in an 8-bit image can have 256 discreet values, while a pixel in a 16-bit image can have 65,536 discreet values.

Because digital cameras routinely capture millions of pixels with each image, it's more useful to describe their sizes in terms of "Megapixels" (Mp), where 1 Mp equals 1 million pixels. A 6.3 Mp camera, for example, can capture a maximum of 6.3 million pixels in a single photograph. The number of pixels you need to capture in a digital photo, of course, depends on how you will use your pictures. The requirements for pictures used on a website differ greatly, for instance, from pictures used in a glossy publication or large exhibit panel.

Another part of the digital picture equation is image resolution. Resolution refers to the number of pixels represented in a given physical space – the density of information in the digital image. It is described alternately as pixels per inch (ppi) or dots per inch (dpi), which are both the same measure. The denser the pixels are in a given physical space, the larger the image file's size becomes. A web image that is 640 pixels x 480 pixels x 72 pixels per inch might be 300 kilobytes (kb) or smaller. Alternately, a photo that is 8 inch x 10 inch x 300 dots per inch might be 8 megabytes (MB) or larger! On the next page is a guide for typical image sizes.

Image Dimensions *Pixels*	Image Size *Megapixels*	Display Size *72 ppi* *on Web page*	Exhibit Size *200 dpi* *for wayside exhibit*	Print Size *300 dpi* *for print publication*
640 x 480	.3 Mp	8" x 6.6"	3.2" x 2.4"	2.1" x 1.6"
1600 x 1200	1.8 Mp	22.2" x 16.6"	8" x 6"	5.3" x 4"
2400 x 1800	4.2 Mp	33.3" x 25"	12" x 9"	8" x 6"
3200 x 2400	7.5 Mp	44.4" x 33.3"	15.9" x 12"	10.6" x 8"

It's important to note that some digital cameras capture images at 72 ppi, while others save them at 300 ppi. As the chart above shows, the image size and pixel dimensions – *not the resolution* – are the important numbers when taking your pictures. The resolution becomes important only when the image is transferred to your computer and processed for use in a print publication, exhibit display, or website.

There is an inverse proportional relationship between the physical size of an image and its resolution. For example, if you have a 4 inch x 5 inch x 200 dpi image and you scale the image to double its size to 8 inches x 10 inches, the density of the pixels in the image will be spread out, resulting in a 100 dpi image – cutting the resolution of the original image in half. Conversely, if you reduce the image dimensions to 2 inches x 2.5 inches, you will double the image resolution to 400 dpi.

Image editing software does provide tools to resize both image dimensions and resolution independently, but beware. Trying to increase both the image dimensions and resolution (to "blow up" the image) usually results in unsatisfactory results. Because image editing software must create new pixels to meet the higher dimensions and resolution you've specified, the software ends up guessing what the color and brightness values of those new pixels should be (called "interpolation"), and image quality suffers.

Picking the Right Digital Camera
You should base your digital camera selection on what its primary use will be.

If you're maintaining a website or taking pictures only to document park resources, activities or events, and storing these images on a computer or printing them out on an office printer, a 2 Mp camera would be sufficient. If you're using your pictures for commercially printed brochures, reports, or site bulletins, you may want to purchase a 4.2 Mp or higher camera. Alternately, if you need larger pictures for full-page spreads in print publications, or for exhibit panels or wayside exhibits, you should use a 6.3 Mp or higher camera. A selection of good high-end digital cameras appears on page 4. These cameras range in price from $800 - $8,000.

Digital Picture File Types
Purchasing the right digital camera is an important step, but you also need to understand your options for capturing and saving digital images. Most digital camera users are probably familiar with JPEG (.JPG) format files. JPEG is both a file type and a method of data compression for digital images. Because image files contain large amounts of raster data (rows and columns of pixels), they tend to be very large, quickly filling up camera memory and causing problems for some types of uses such as website display or email transfer. JPEG compression can significantly reduce the file size of digital pictures, but beware. JPEG utilizes "lossy" compression, attempting to throw away pixels that are either redundant or very similar to adjacent image pixels. The more you compress JPEG images (typical options for image quality are low, medium, high, and

maximum), the more picture information is thrown away and the more visible image deterioration results. More importantly, *the lost picture information cannot be recovered*.

While JPEG compression is appropriate for images used on websites or transferred to colleagues via email, you should never use this type of compression for images that must reproduce at high quality. Additionally, the JPEG file format does not support 16-bit color, further reducing its suitability for high resolution image output.

The TIFF (.TIF) image format, on the other hand, is a "lossless" file format, which means that all the original raster data captured in the file is preserved. TIFF also supports 16-bit color, which better captures the subtle levels of tonal change in a digital image. These advantages, however, come at a cost: TIFF files are generally much larger than JPEG files.

While virtually all digital cameras sold today allow you to save your picture data in JPEG format, and many cameras also support TIFF, both file formats share a common disadvantage: the image data is "processed" by the camera as the data is saved to memory. The user has little control over this processing, which relies on standard data manipulation algorithms built into the JPEG and TIFF file formats, as well as on different features built into individual cameras by manufacturers.

"Digital raw capture" has become the latest buzzword – and feature – of higher-end digital cameras. The digital raw format is actually a general term for a variety of proprietary file formats – such as Canon's .CRW and .CR2, Olympus' .ORF, and the various flavors of Nikon's .NEF – that share important common features. These raw files record the *unprocessed data* captured by the digital

camera sensor. By shooting and saving your pictures in digital raw format, you get unparalleled control over the interpretation of the image. When you open the picture using image editing software that supports the camera manufacturer's digital raw format, you can control white balance, tonal response, color balance, color saturation, image sharpening, noise reduction, and for some digital raw files, you can even reinterpret the exposure compensation. Adobe Photoshop CS supports digital raw import for more than 70 different cameras. Adobe has also created a new Digital Negative (DNG) file specification in an attempt to standardize the various digital raw file formats now used by different camera manufacturers.

In Conclusion
As you might expect, digital raw files give graphic designers maximum control over the image when adapting it for use in print or large exhibit display. Harpers Ferry Center urges digital photographers to never sacrifice image quality when taking digital pictures for use in their interpretive media. Purchase as much camera memory as you can, always shoot at the camera's maximum image size, and save your images in digital raw format. Another important piece of advice is to always use a tripod when shooting at maximum resolution. If a tripod is not available, hold the camera up to your head and use the camera's eyepiece –not the LCD viewer – so that camera movement and vibration are kept to an absolute minimum when the shutter snaps.

Not only have digital cameras made picture-taking convenient, but the results from an assortment of high-end cameras have proved to be more reliable than film. How quickly times have changed!

Selected Digital Cameras
(6.3 Mp or higher)

Canon EOS-1D

Canon EOS-1Ds

Canon EOS-1D Mark II

Canon EOS 1Ds Mark II

Canon EOS 10D

Canon EOS 20D

Canon EOS 300D

Canon EOS 350D

Canon PowerShot G6

Epson R-D1

Fujifilm FinePix S2 Pro

Fujifilm FinePix S3 Pro

Kodak DCS 14n

Kodak DCS Pro 14nx

Kodak DCS Pro SLR/n

Kodak DCS Pro SLR/c

Konica Minolta Maxxum 7D/Dynax 7D

Leica Digilux 2 (5 Mp)

Nikon D70

Nikon D100

Nikon Coolpix 8400

Nikon Coolpix 8700

Olympus E-1

Olympus E300

Olympus C-8080 Wide Zoom

Panasonic DMC-LC1 (5 Mp)

Pentax *ist D

Sigma SD10

Sony DSC-F828

Sony DSC V3

Planning and Designing Right, So You Can Build it Right

It was one of those Eureka moments. Patti Reilly and Jeanette Parker of the National Parks of New York Harbor (NPNH) Education Center project were looking at plans and drawings for "Sentinels of Our Shore" workshop. "We were delighted to see the way the plans had turned out. Just as we had hoped, the layout and teaching aids suit the program perfectly." The plans and drawings they were reviewing had been prepared by Don Branch, exhibit designer, with contributions from Neil Mackay, exhibit planner, and Lakita Edwards, education specialist—all of Harpers Ferry Center.

The Education Center uses a mix of elements to engage students. The 19th century map of New York harbor was enlarged to become part of the Center's floor. Students use it as they figure out how best to defend the city. The reproduction cannon, besides having an amazing "wow" factor, is at the center of activities investigating the effects of more or less gunpowder, heavier or lighter cannon balls, and lower or higher firing angles.

The NPNH Education Center's overall goal is to stimulate inquiry and encourage visitors to make discoveries about their environment and the variety of resources around New York Harbor. Its programs target specific age groups—primarily school classes—to make use of the National Park Service's resources with National Park sites in the New York Harbor region and to meet the education standards for each grade group. The program development process the Center team has followed begins with a planning charrette involving content specialists, educators and NPS project team members. The team develops program activities, creates prototype teaching aids to support the activities, uses a pilot period to test approaches, and conducts focus discussions with educators to get feedback and evaluation. This process results in program revisions. Where is the best fit of park resources and school needs? How do national, state, and local standards play into the needs of all parties? These are the kinds of questions the staff and its partners routinely asked about their undertakings.

The "Sentinels of Our Shores" program was no exception. Reilly and Parker had been working on the Sentinels project—about New York Harbor defenses—with Elizabeth Hoermann of the Northeast Center for Education Services (NCES) and Dan Meharg of the NPNH Education Center for some time. The program is offered in the Coastal Defense workshop, one of several spaces within the Education Center. Having gone through their development process, they had reached the point where they needed to take the next step and bring in people who could take the concepts, mock-ups, working prototypes, and results from the pilot testing and transform these ideas into a robust, safe, and engaging physical space.

To do this, Reilly and Parker had decided to take this project to Harpers Ferry Center. They knew that because HFC is project funded, the park would have to pay HFC staff costs. Consequently, they built the funding into their overall project plans. They were eager to work with HFC's newly hired education specialist, as well as other veteran HFC designers. At the final meeting of educators and park staff, exhibit planner Neil Mackay and education specialist Lakita Edwards

from HFC joined the group so they could hear first-hand what the teachers, Parker, Reilly, and other members of the program project team wanted to achieve.

Over the next few months discussions continued about how the design could support the content. Ideas were fleshed out and developed into teaching aids and room exhibits appropriate for fourth-graders. Exhibit designer Don Branch began working with the Education Center staff, Edwards, and Mackay, learning from them what teachers needed while designing how the space would be organized to support the activities. An important goal in the work of Branch, Edwards, and Mackay was ensuring that the goals and objectives developed in the early meetings between park staff and teachers would translate into effective teaching tools. Branch's experience had taught him that teachers and designers approach problems from very different perspectives. The synthesis coming out of these different points of view creates an energy that results in a product that is far better than what either could have done independently. This is what Reilly and Parker were hoping for when they engaged Harpers Ferry Center. It was the attention to all these goals that led to Parker's and Reilly's reactions when they reviewed the plans.

Overriding everything was the idea that if a park and HFC could create a method for taking ideas and content and turning the entire project into a workshop, it could become a prototype for other education centers throughout the NPS. They hoped to do more than just solve their own problem of how to turn ideas for educational activities into a physical environment and tools for learning. So HFC is teaming up with NCES and the NPNH Education Center to develop a case study about this work in order to share results with other parks.

Collaboration with Harpers Ferry Center did not end with the review of the plans. Branch, Edwards, and Mackay worked with HFC's procurement office to find fabricators in the New York City area to keep shipping costs down. Knowing, too, that no matter how sturdy the activity installations were built, relentless use by 10-year-olds would result in considerable wear and tear. Having a nearby fabricator knowledgeable about the project would keep things running. And to return to the prototype idea, it was as much about creating a way of working as it was about making a product that could be used that was important.

The installation was completed in the spring of 2004. So far it has exceeded expectations. Typical of new concepts, a few glitches must be addressed, and ongoing maintenance is a fact of life. Later this year the park will conduct a formal evaluation. What can we say now in the final analysis about this collaboration? Cost was a factor, and involving HFC staff did add to the cost of the project. Return on the investment, however, is a very different matter, for the value that their work added far exceeded the actual costs. Perhaps the greatest value was the professional discourse that took place relating to design and education, and how that discourse applies to the entire National Park Service.

Students engage in hands-on learning with reproduction cannon.

The Second Bank Portrait Gallery

The Second Bank of the United States in Philadelphia, Pennsylvania, was built between 1819-1824 and served for 12 years as the nation's central bank. The National Park Service acquired the building in 1939 and in 1974 opened it as a portrait gallery featuring the paintings of the founders, patriots, and personages of the first years of the new republilc, by Charles Willson Peale and his son Rembrandt Peale. Two years ago the building closed for much-needed work on the structure's mechanical systems and for a refurbishment of the exhibits. Independence NHP Curator Karie Diethorn managed the complex task of fabricating and installing the exhibits with technical guidance and support by Harpers Ferry Center's PJ Lewis, Michael Paskowsky, Kim Strite, and Linda Thomas. Dave Gilbert assisted in the development and installation of an interactive computer catalog. The excerpt below comes from a review of the work in the *Wall Street Journal*, February 22, 2005. The author is Ada Louise Huxtable, architecture critic.

"In the museum world, where size, hype and novelty compete for attention, it is easy for a small gem to slip under the radar. In the same week that the opening hoopla for the spectacularly expanded Museum of Modern Art in New York reached fever pitch, a trip to Philadelphia unexpectedly led to the serendipitous discovery of such a low-key treasure. This was also a reconceived institution, although any comparison of the suave, near-billion-dollar reconfiguration of MoMA and its new building and collections with the retrofitting and reinstallation of the landmark Second Bank of the United States, now the portrait gallery of Independence National Historical Park, stops before it starts. This modest museum reopened without fanfare on Dec. 1 after a two-year restoration and the complete reinterpretation of its displays. But what a rare experience of art, history and humanity this elegant work of architecture and its eloquent contents turned out to be."

Huxtable goes on to say, "there is an intimacy and authenticity to these portraits that is overwhelming. The setting expresses the period's highest aspirations of symbolism and style. The combination of place and people magically erases time, giving powerful presence and meaning to the past."

The Second Bank's exhibit galleries have been organized to explain key ideas of 18th-century Enlightenment. At left, these portraits illustrate the nature of period education and its importance to the young republic. Above, the newly accesible entrance to the Second Bank features cutout figures to populate the space and greet visitors.

The gallery at the bottom duplicates part of Peale's own organization for his museum in Independence Hall (as seen in his image on the large panel that welcomes visitors). Below, a page from the interactive catalog leads users into the riches of information about a specific painting in the park's collection.

Typography: Using NPS Rawlinson

In 2000, the National Park Service commissioned James Montalbano of Terminal Design to create a serif typeface for the new NPS Identity Standards. Based on NPS requirements and specifications, Montalbano created NPS Rawlinson. Rawlinson's letterforms, which are modeled after classic European typefaces, help to reinforce the National Park Service's rich graphic traditions. The type works well in a wide variety of applications, from park newsletters and publications to websites. A variation of NPS Rawlinson (NPS Roadway) has even been developed for maximum legibility when used on highway guide signs.

NPS Rawlinson is used by the National Park Service under license from Terminal Design. This licensing agreement is unrestricted, meaning that the NPS— or any entity working with or for the NPS —may use this typeface on any project benefitting the agency.

One of the most important things to remember when using NPS Rawlinson is that there are two distinct versions of the typeface: one includes old-style numerals, the other includes tabular numerals. The difference between these numerals is explained below and at right. As you will see, the version you choose is determined by your purpose.

Old-Style **Tabular**
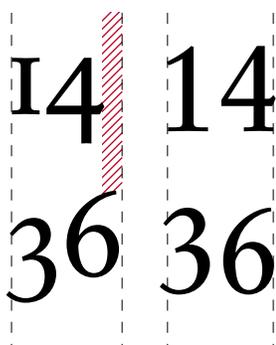
The red shaded area in the Old-Style example shows the space that is lost to mis-alignment when the numbers are stacked vertically. The Tabular numerals are flush with either side of the column.

NPS Rawlinson Old-Style

The old-style character set should be used whenever numbers will appear within a block of copy, as in a newsletter article. Old-style numerals are designed to have *ascenders* (portions that rise above the *x-height* of the other letters, as in the lower case letters b, d, f, h, k, l, and t) and *descenders* (portions that fall below the text baseline, as in the lower case letters g, j, p, q, and y). This feature allows the numbers to blend in with the rest of the text and not stand out like tabular numerals, which look like capital letters in the midst of the narrative.
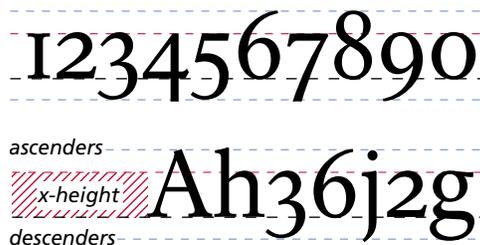
NPS Rawlinson Tabular

NPS Rawlinson tabular figures (which are identified by the letter "T" following the name of the font) should be used when numbers are to appear in a list, a spreadsheet, or a chart of some kind. In these cases, when numbers are not embedded in text, it is more comfortable for the viewer if every character is the same height and shares the same baseline. Additionally, each numeral in the tabular figure set occupies the same amount of horizontal space, so numbers align with those above and below in a column (see left).