Introduction to Digiscoping: Still Image Capture

Robert C. Turner

The spotting scope (fieldscope) has long been known to be an indispensible tool for observing the behavior of wildlife in the field. However, even the best spotting scope is limited to viewing only, with no capability of capturing a permanent record. Coupled with a digital camera, either hand-held, or with an auxiliary attachment or dedicated adapter, a spotting scope allows subjects to be captured as digital files for documentation and scientific study. This article discusses the author's experience with a digiscoping system consisting of a Nikon fieldscope and a digital single lens reflex camera.

"Good ideas are not adopted automatically. They must be driven into practice with courageous patience."
Admiral Hyman Rickover

Introduction

From the time of photography's invention, numerous efforts have been made to adapt cameras to various other optical instruments. Cameras were first fitted to microscopes and telescopes in an attempt to capture images directly through these primary optical devices. Later, specialty scopes, particularly in medical specialties, were modified to accept cameras. These included endoscopes, ophthalmoscopes, otoscopes, and arthroscopes. These sophisticated optical systems were a result of careful planning, engineering, and experimentation. The same cannot be said, though, for the initial attempt to combine a spotting scope with a digital camera which occurred in a more serendipitous manner, and only a little over a decade ago.

Origin

In 1999 Laurence Poh, an expert photographer and birder and a member of the Malaysian Nature Society, was observing a rare hawk one day. The hawk sat atop a distant tree and Poh realized he would not be able to take a decent photo with his point-and-shoot camera (a Nikon CoolPix 959). In a moment of desperation he put his camera lens up to the spotting scope's eyepiece, focused on the hawk, and released the camera's shutter. The resulting photograph was later posted on the Internet, and shortly thereafter a French birdwatcher, Alain Fosse, dubbed the technique of placing a camera to the eyepiece of a spotting scope "digiscoping." The number and variety of scopes and digital cameras have increased exponentially since Poh first employed his makeshift method.

While some digiscopers still use the basic hand-held technique, spotting scope and camera manufacturers have produced a wide variety of brackets to hold point-and-shoot cameras and dedicated attachments for coupling digital single lens reflex (DSLR) camera backs to spotting scopes. One's own budget is really the only limiting factor in the selection of a digiscoping system.

Digiscoping Equipment

Selection of a digiscoping system begins with the scope. For the purposes of this article, the terms "spotting scope" and "fieldscope" are used interchangeably. The would-be digiscoper should be prepared to spend some time researching the various scopes and cameras before investing in a complete system. I highly recommend reviewing the findings of *Scope Quest 2008*, by Ken Rosenberg (see Bibliography), regarding the Cornell University Lab of Ornithology's evaluation of a cross-section of spotting scopes for the purpose of comparing their respective features. Other digiscoping resources can be found through the National Audubon Society and local birding groups. My own approach to the process of creating a digiscoping system was based on better than forty years experience with various Nikon cameras, close-up bellows units, macroscopic units, and numerous light microscope systems. In addition, I already owned a Nikon D300 DSLR camera with its default DX format, and had attended a number of birding field trips and birding conferences to get a feel for what equipment experienced birders were using. After careful review of the available equipment (and trying to keep within a reasonable budget) I purchased a Nikon 82mm ED-A Fieldscope with a zoom eyepiece MC II, 25-75x (Figure 1). This scope has a native focal length of 1000mm, and is relatively inexpensive compared to a conventional 1000mm photographic lens. The "A" in the scope's description refers to its 45º angled eyepiece compared to a typical straight scope. Ergonomically speaking,

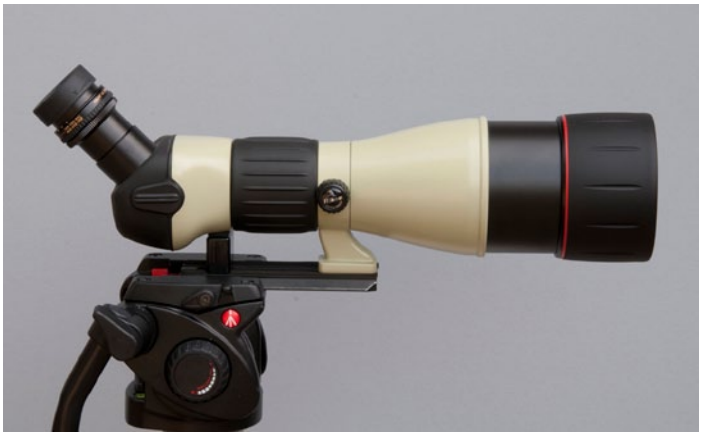

Figure 1. *Nikon Fieldscope ED82-A scope with 82mm objective, 1000mm focal length, all-metal, f/13 aperture lens, with sliding sunshade, 45˚ angled zoom MCII 25-75x removable (threaded) eyepiece. Custom acrylic & dense foam lens support was fabricated to help reduce vibrations.*

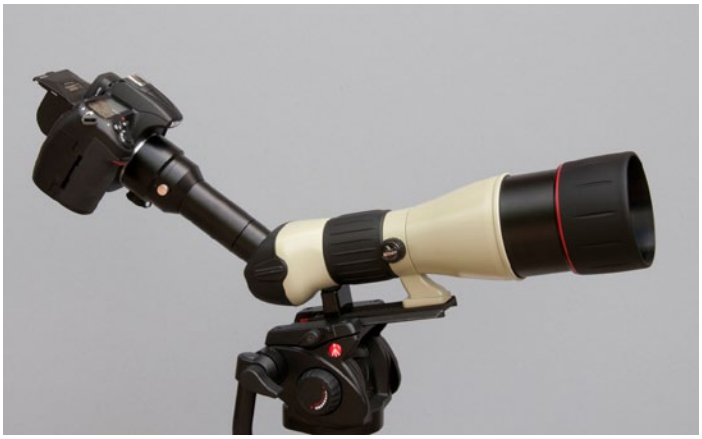

Figure 2. *Nikon Fieldscope ED82-A, with Digital SLR Camera Attachment FSA-L1, and Nikon D300 DSLR camera body, connected to Manfrotto 501PLONG Rapid Connect Plate, mounted on a Manfrotto 501HDV head, and Bogen/Manfrotto 3221W aluminum tripod.*

viewing and imaging alike is much easier for most applications with an angled scope. The scope's ED (Extra-low Dispersion) lens greatly enhances image sharpness, especially in low light conditions.

The scope was secured to a Manfrotto 501PLONG Rapid Connect Plate to help counterbalance the skewed weight distribution. The plate was attached to a Manfrotto 501HDV head (the unit was designed specifically for video use where smooth panning and tilting is needed.) The combined scope/plate/head was then secured to a Bogen/Manfrotto 3221W aluminum tripod. Later, a custom acrylic support with a dense neoprene cushion was positioned under the scope's body to help minimize vibrations. I also replaced the scope's eyepiece with a Nikon DSLR Camera Attachment FSA-L1 in order to couple the scope to my Nikon D300 camera body (Figure 2). Combining this native 1000mm scope and DX format camera back creates an

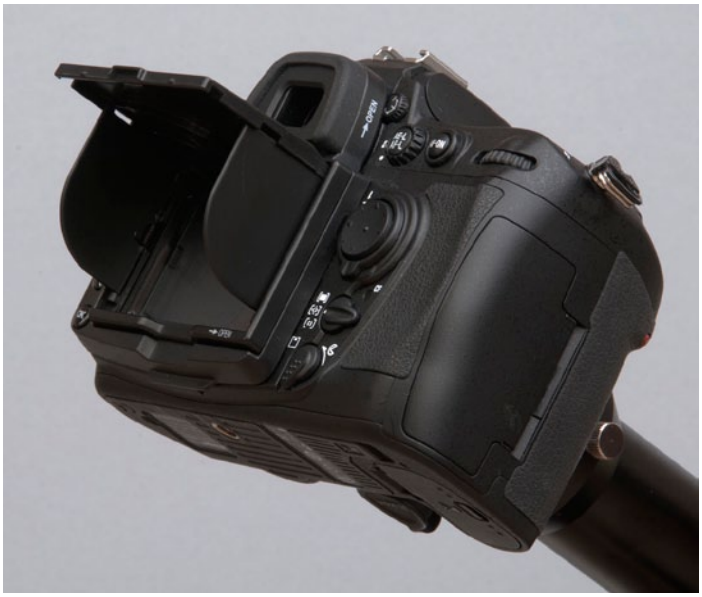

Figure 3. *Delkin Devices DVD300-P Hood attached to Nikon D300 body. The hood enhances the use of Live View mode as it helps prevent extraneous light from reflecting on the LCD panel.*

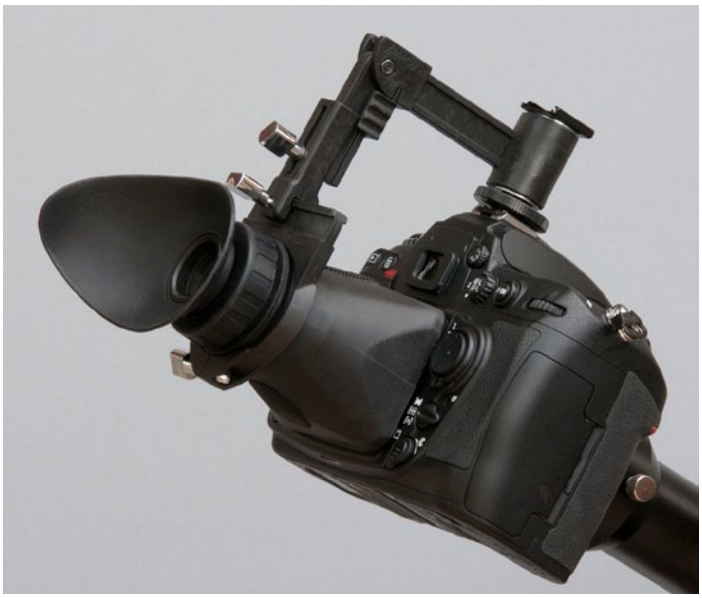

Figure 4. *Hoodman Hoodcrane and Lupe attached to Nikon D300. Similar in appearance to a video camera's eyepiece, the 8x lupe provides an excellent magnified view of the LCD's surface, in addition to preventing any light from reflecting on the LCD panel. Unit can also be retracted up from the LCD panel when not in use, or for cleaning the LCD panel.*

effective focal length of ~1,500mm. Additional refinements were made using either a Delkin Hood (Figure 3), or a Hoodman Crane & Lupe unit (Figure 4). A further enhancement was the addition of a Nikon DK-5 Eyepiece Cover, which prevents extraneous light from hitting the charged coupled device (CCD) and skewing meter readings, especially when metering via Live View (LV)

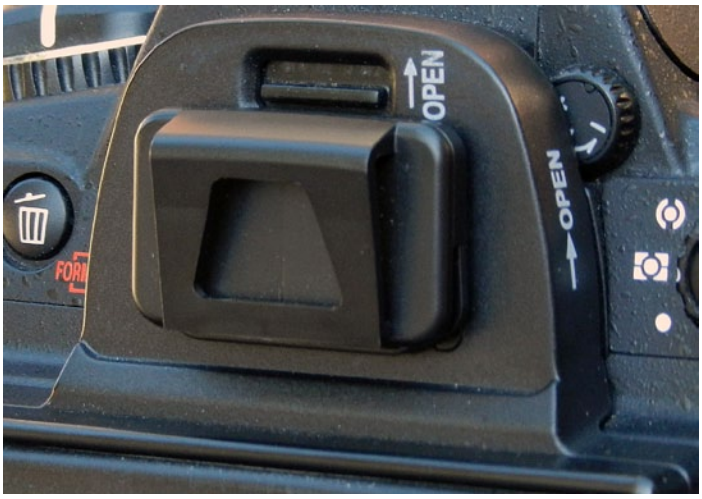

Figure 5. *Nikon DK-5 eyepiece cap attached to Nikon D300. Covering the eyepiece prevents any light from hitting the camera's CCD when shooting in Live View so exposure metering is not compromised.*

mode (Figure 5). Finally, a Nikon MC30 (electronic) Remote Cable Release was used to reduce shutter vibration (Figure 6).

Image Capture

In the process of purchasing all the necessary equipment I was forced to use the scope by itself, as the camera adapter was on back order. I took advantage of this time looking at various birds and animals and became very familiar with the scope's features and controls. Later, with the fully assembled system, I spent countless hours practicing in my backyard photographing local birds. I eventually developed a disciplined protocol for image capture similar to that used in photomicrography, wherein one needs to continually check the microscope's optical alignment to assure critical (Köhler) illumination. This same strict attention to detail must be used when digiscoping. The steps of panning and tilting, framing, final focusing, and shutter release need to become second nature, especially with a moving subject. Depth of field with spotting scopes is very limited, so one must constantly pay close attention to focus. Digiscopes have no aperture per se. The stated data from the manual for my camera attachment reads: "The camera attachment and fieldscope do not have an aperture as found in most cameras. Consequently, the composite f-number of the fieldscope and camera attachment is a fixed aperture of 13 regardless of the diameter of the objective lens." Aperture priority then is the default exposure mode since the scope essentially has a fixed aperture. In the case of the Nikon 82ED-A, f/13 is the default aperture.

Vibration can be minimized by using a higher ISO, which in turn allows the use of faster shutter speeds; this is especially important under low light conditions. In addition, using the Live View (LV) option with the Nikon 82ED-A causes the camera's mirror to be locked up, which helps reduce vibration during exposure. Plus, LV mode presents a much larger image on the LCD screen as compared to viewing through the camera's

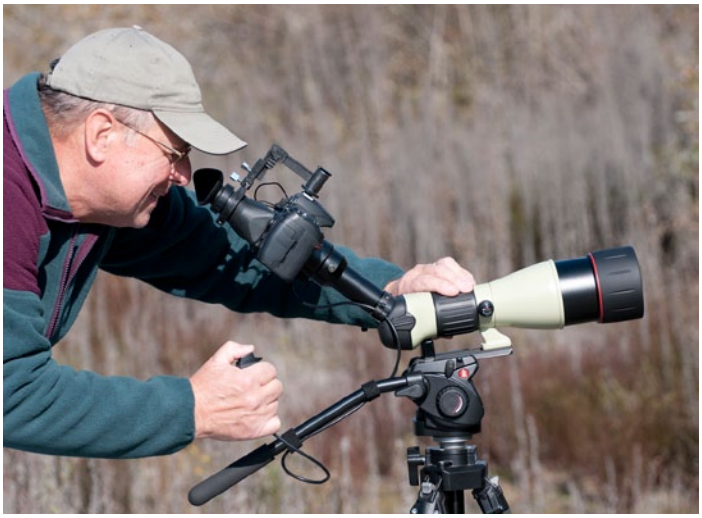

Figure 6. *Author focusing scope and preparing to press electronic shutter release (Nikon MC30 Remote Cable). Developing a strict shooting protocol: "pan/tilt….focus….shoot" is necessary in becoming a successful digiscoper. (Photo by Thomas S. Merrill.)*

standard eyepiece. Setting the camera's file format to RAW will produce a superior image file over other formats (i.e. TIFF, JPEG, etc.). RAW files provide more data to work from after being downloaded to a computer to create the final image. All these factors are integrally critical to success with a digiscoping system. Finally, the digiscoper (like any wildlife photographer) must be *very* patient when working in the field. In addition to the technical issues, one must be willing to deal with potentially extreme weather conditions, variations in wildlife migration patterns, and simply a lack of luck. But, all of this aside, and once you become familiar with your digiscoping system, capturing an elusive natural science image can be very rewarding!

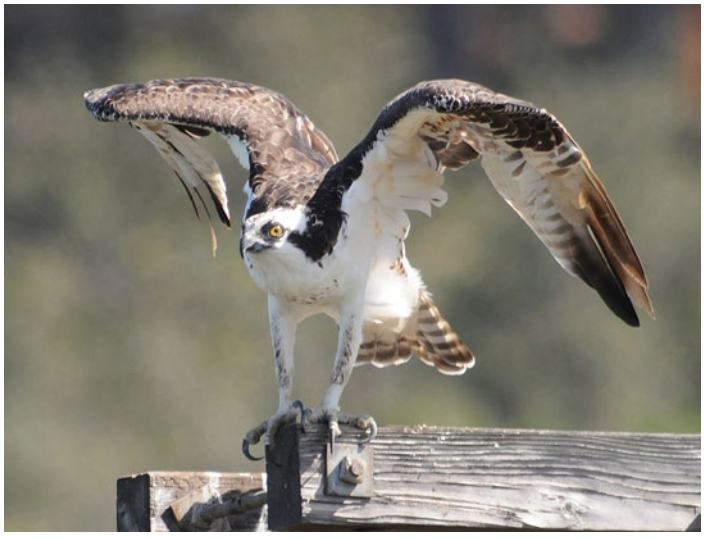

Figure 7. *Osprey (Pandion haliaetus), image was captured in Del Mar, California, and was accepted for display, BCA's BioImages Salon 2010.*

Conclusion

Digiscoping is a relatively new technology, which allows digital image capture through a spotting scope. Embarking on digiscoping is not something to be taken lightly. Investments of time, money, and effort are absolutes for new digiscopers. If you enjoy the challenge of capturing wildlife and natural science images, especially from afar, then consider digiscoping. First though, research the various scopes and attachments/adaptors, and talk with local birders about their systems, experiences, and recommendations. Most recently, Nikon has introduced a new series of fieldscopes that include vibration reduction (VR) that will be a true "game changer" for digiscoping. VR is most advantageous in providing sharper images, the goal of all digiscopers. Figures 7-11 represent just a few examples of images from the author's forays with digiscoping equipment. For a truly exceptional display of digiscoping images, log on to "Digiscoper of the Year 2011" (see Bibliography). You can then decide for yourself whether digiscoping is a viable and useful technique and something you might want to consider pursuing.

Figure 8. *Fighting Snowy Egrets (Egretta thula), image was captured at Cardiff-by-the-Sea, California, and accepted for display, BCA's BioImages Salon 2010.*

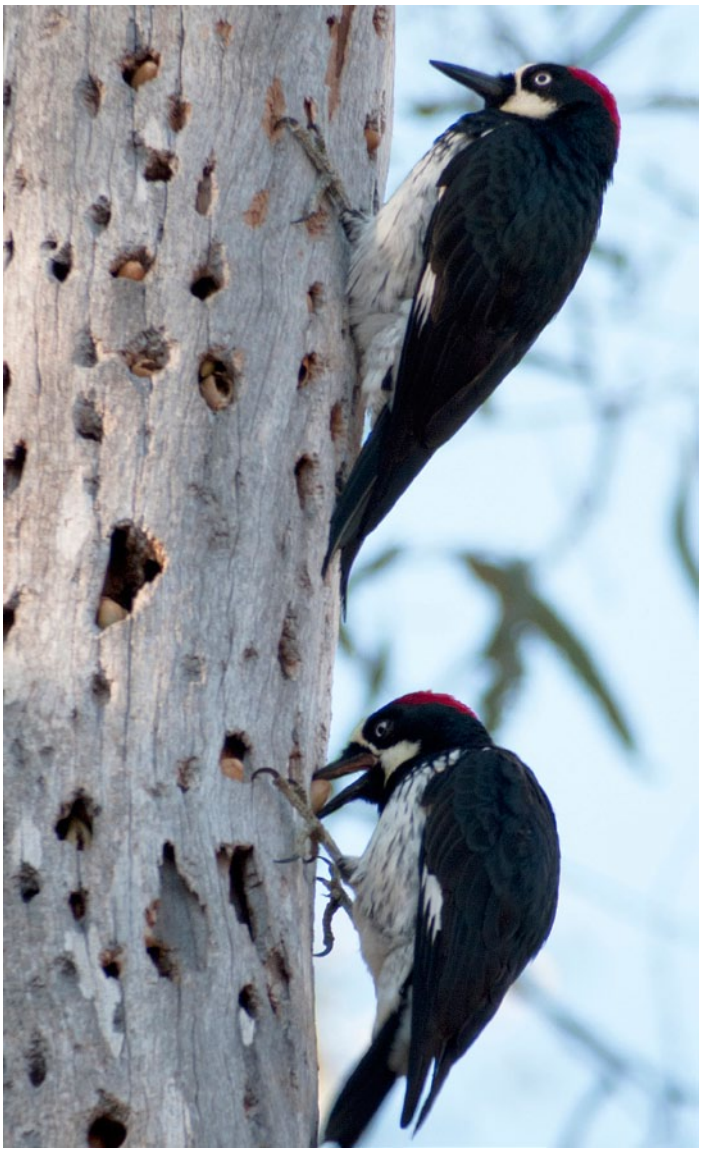

Figure 9. *Acorn Woodpeckers (Melanerpes formicivorus), storing acorns in an eucalyptus tree; image was captured at Lake Hodges, California.*

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Figure 10. *Harbor Seals (Phoca vitulina), adult female and pup; image was captured at the Children's Pool Beach, La Jolla, California.*

Figure 11. *Great Blue Heron (Ardea Herodias), image was captured at Oceanside, California, and received Certificate of Merit, Natural Science, BCA's BioImages, 2010.*

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