STOP THE WORLD… I WANT TO TAKE A PHOTO!

A lightweight tracking mount counteracts the Earth's rotation and opens up a universe of photographic possibilities

Text and photography by Tony Puerzer

OUR PLANET'S rotation puts us in a race against time when we take astrophotos with a camera mounted on a tripod. In a matter of seconds, stars turn into streaks and deep-sky objects are smeared beyond recognition. Thankfully, there's a solution. And, no, it doesn't require us to stop the world.

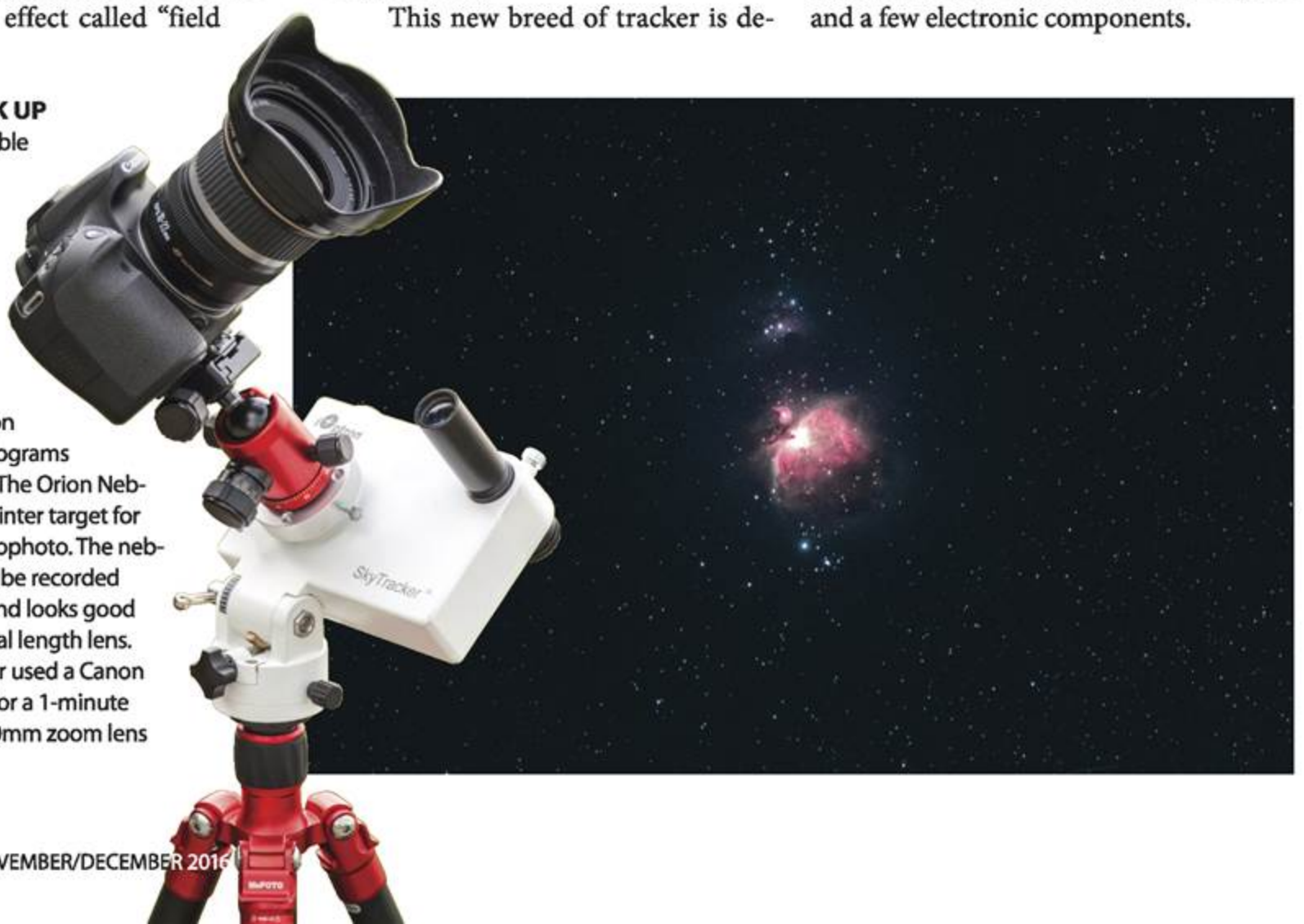
A tracking mount permits long-exposure pictures that capture detail in deep-sky objects and retain pinpoint stars. Best of all, you might already have a suitable tracker. If you own an astronomical telescope equipped with a motorized *equatorial* mount, all you need to buy (or make) is an inexpensive adapter to affix your camera to your scope. With this arrangement, you won't be shooting *through* the telescope; instead, your camera gets a piggyback ride as the mount tracks the stars. (Note: A motorized *altazimuth* mount won't work, owing to an effect called "field rotation.") And since the scope really isn't necessary in this setup, you can simply remove it and attach your camera directly to the equatorial head via a specialized bracket. That way, there is less equipment to deal with, and chances are, the mount will be less prone to vibration thanks to the reduced weight of the load it carries.

TRACKERS TO THE RESCUE

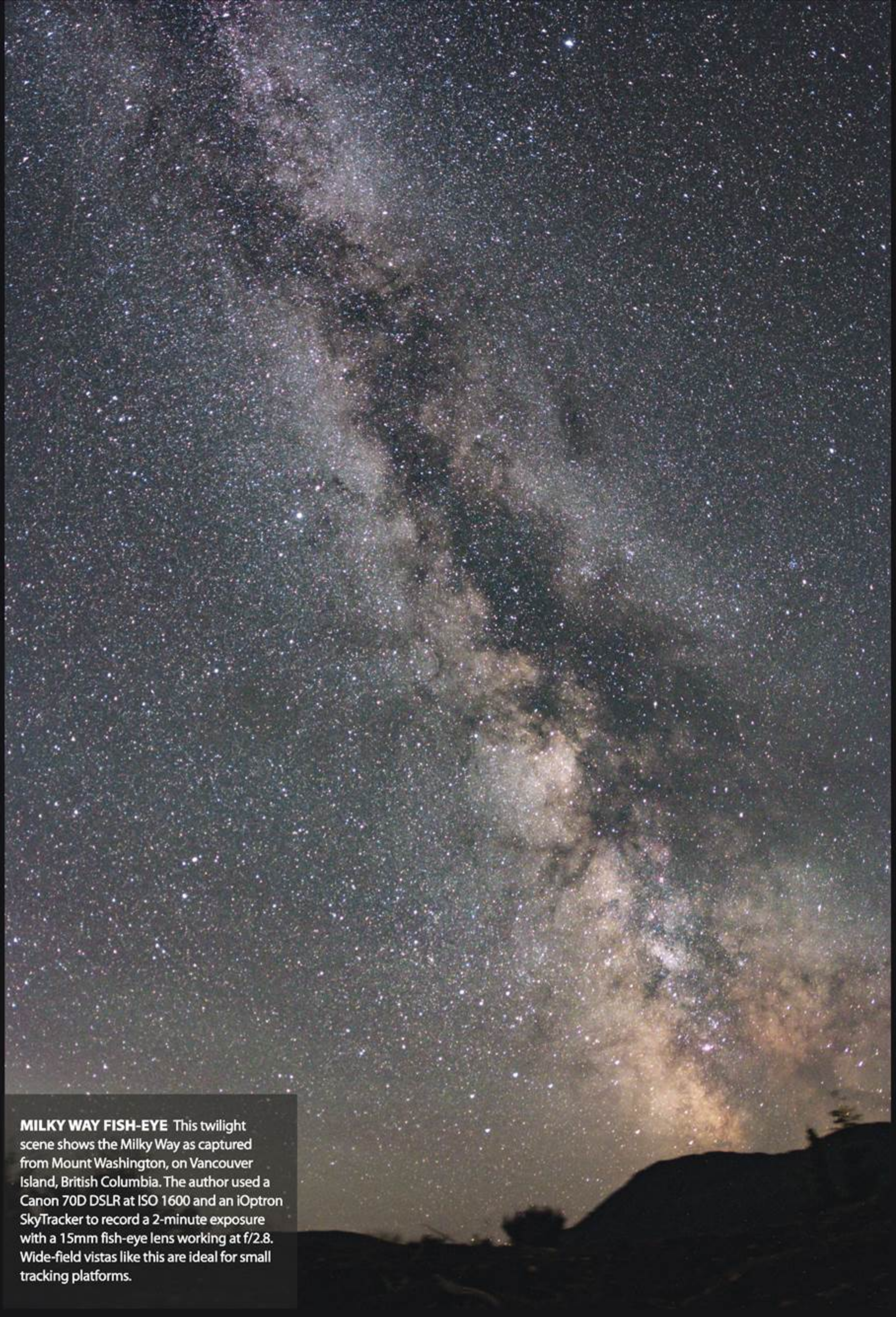
But what if you own a Dobsonian or some other instrument lacking an equatorial mount? Or what if your scope's mount is simply too big to pack off to a dark sky location? You're in luck. Over the past few years, a number of manufacturers have introduced tracking platforms that allow budding astrophotographers to enter the world of long-exposure imaging without the expense and bulk of a full-sized telescope mount.

This new breed of tracker is designed specifically to carry a camera, and I think it represents the best deal in astronomical equipment bar none. For roughly the price of a good eyepiece (or camera lens), you can choose an iOptron SkyTracker (reviewed in the May/June 2013 issue), a Vixen Polarie (July/August 2012) or a Sky-Watcher Star Adventurer (November/December 2014). All three units are very compact (not much bigger than a paperback book), which makes them ideal for travel. Even the largest one fits easily into a carry-on bag for your winter vacation.

If you're handy and want to tackle a DIY project, visit *SkyNews* editor Gary Seronik's website (www.GarySeronik.com) and have a look at his nifty hinge tracker. Gary has provided detailed instructions and illustrations to guide you through making your own mount with basic hardware-store parts and a few electronic components.



GEAR UP AND LOOK UP The author's ultraportable astrophotography setup consists of an iOptron SkyTracker camera mounted on a lightweight travel tripod, right. The SkyTracker measures just 153mm (6 inches) on its longest dimension and weighs only 1.2 kilograms (2.6 pounds). Far right: The Orion Nebula (M42) is a perfect winter target for your first deep-sky astrophoto. The nebula is bright enough to be recorded with short exposures and looks good with just about any focal length lens. For this shot, the author used a Canon 70D DSLR at ISO 3200 for a 1-minute exposure with a 70-200mm zoom lens set to 200mm and f/4.



MILKY WAY FISH-EYE This twilight scene shows the Milky Way as captured from Mount Washington, on Vancouver Island, British Columbia. The author used a Canon 70D DSLR at ISO 1600 and an iOptron SkyTracker to record a 2-minute exposure with a 15mm fish-eye lens working at f/2.8. Wide-field vistas like this are ideal for small tracking platforms.

WHAT TO SHOOT?

Tracker mounts excel at wide-field astronomical images. You've probably seen some amazing photos of the Milky Way arching over a particularly scenic landscape. Shots like this are easily within the capabilities of a standard DSLR camera mounted on a tracking platform. Choose your location with care, and use the widest-angle lens in your collection to make your own night-sky-wonderland images.

Tightening up the field of view lets you frame an entire constellation, complete with its resident population of deep-sky objects. On a standard crop-sensor DSLR camera, try lenses in the 30-to-50mm focal-length range. If you're up for a long-term project, consider creating your own photographic atlas of the constellations. Not only will you come away with some striking images, but doing so will increase your knowledge of the night sky season after season.

Capturing individual deep-sky objects means moving up to long-focal-length lenses. This is the most difficult category of long-exposure astrophotography and will test your ability to accurately polar-align the mount and tax its tracking accuracy. When using a short telephoto lens (100mm to 300mm focal length), every little error in the imaging chain is magnified. Yet the rewards, if successful, can be stunning. Bright deep-sky objects such as the Orion Nebula and the Pleiades are ideal first targets.

Try a series of exposures at ISO 1600, starting at around 30 seconds and increasing to about 5 minutes. Remember: In addition to a tracking platform and camera, you'll need a remote shutter-release cable and a camera with a Bulb (B) mode for exposures longer than 30 seconds. And don't be afraid to experiment—pixels are free!

SAFETY IN NUMBERS

As good as portable trackers are, there's no free lunch. Lightweight mounts are inherently more susceptible to tracking errors and vibration than those weighing a hundred times more. For this reason, it's a good idea to opt for short exposures at high ISO rather than long exposures at low ISO. Try different exposure/ISO/lens-aperture combinations to find the sweet spot between image detail and digital noise, which tends to get worse as exposures lengthen and ISO values increase.

The main advantage of taking short exposures is that several of them can be added together to get the equivalent of a much longer single exposure. For example, ten 1-minute exposures when added together can produce an image the same brightness as a single 10-minute exposure. This process of digital additions is called "stacking," which I'll touch on in a future column. ✦

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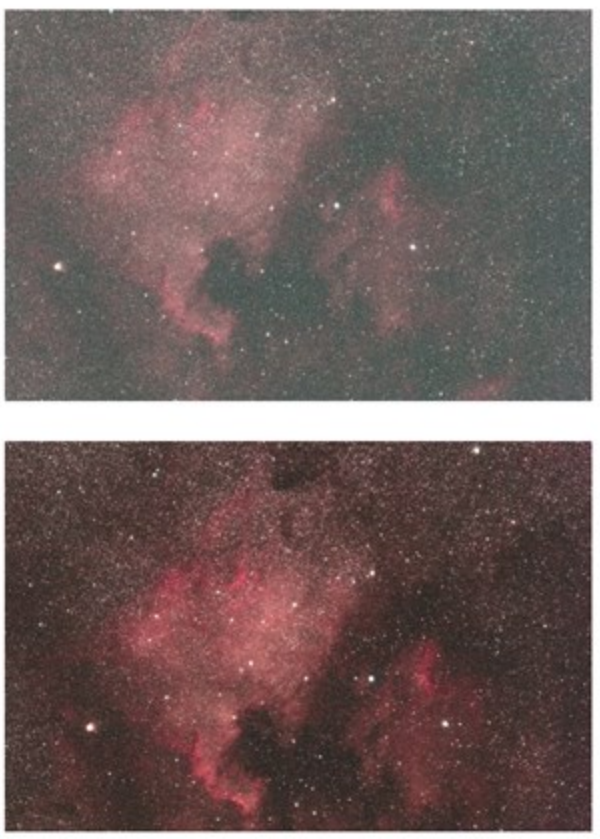
SHOWPIECE CLUSTER The cool blue wisps of nebulosity surrounding the Pleiades cluster, in Taurus, are an absolute delight to photograph with a medium telephoto lens. This 5-minute exposure was captured with a 300mm lens at f/4 and a Canon 70D DSLR at ISO 1600. The camera and lens rode atop the author's iOptron ZEQ25 telescope mount.



DARK SKIES MATTER Both 4-minute exposures of the North America Nebula shown here were produced using the same equipment (a Canon 70D DSLR at ISO 1600 with a 300mm lens set to f/4 and an Astronomik CLS filter). The difference is that the top image was shot from Nanaimo, British Columbia—a medium-sized city—while the bottom photo was captured at a dark rural location. The two photos were processed exactly the same way, but notice how much darker the background appears in the bottom image. Shooting under good rural skies not only produces more pleasing results but also allows longer exposures and more aggressive postprocessing of your images.