

Photographing Rainbows

Text by Tom Field

Rainbows are among the most beautiful natural phenomena, perfect for enhancing a dramatic-lighting vista or even becoming the scene's main feature. This two-part article discusses where and when rainbows may be found, how they form, and recommendations for photographing them.

Finding Rainbows

Rainbows can be quite commonplace when conditions are right. Or they can delight with their surprise appearance in unusual places. But the colorful arcs always thrill the observer and, when used effectively, can add a "wow" to photographs.

Rainbows appear under well-defined conditions. Although you cannot always predict when these conditions will occur, at least you can recognize when a rainbow is likely to form and prepare to make some great photographs. Better yet, you can be a rainbow chaser: put yourself in the right place at the right time and know exactly where a rainbow is likely to form.



Photo © Tom Field

Anticipation and preparation are essential for the photographer, because rainbows can be fleeting: appearing and disappearing, shifting in and out of your composition, and fading from brilliant to faint in seconds. Be ready to take advantage of an eminent rainbow, and you will maximize your chances of creating a great image.

There are two common conditions under which a rainbow is visible, but they are caused by the same phenomenon. In one case, sunlight hits raindrops in the sharp edge of a rain storm. The raindrops can be falling, or they can be swirling within wet clouds. In the other case, sunlight hits water spray from a water fall, geyser, or fountain. In both cases, the water droplets must be a certain size for the rainbow to show. The microscopic drops in mist or clouds do not produce a rainbow (which is why ordinary clouds are not colorful). Nor does frozen water, such as snow or hail, make a rainbow. However, droplets of morning dew on grasses or spider webs can show a rainbow if you are in the right position.

Rain Storm

So, when does a rain storm have a sharp edge bathed in sunlight? Typically, this occurs as the trailing edge of the storm moves past your location and the sun reappears. As a bonus, the dark storm clouds make a dramatic and contrasting backdrop for a vivid rainbow. The good news here is that the rain has likely stopped so you should not get wetter. The bad news: in order to be there in time, you were probably already out in the rain. Timing is critical, for passing showers can recede quickly or the sun can go behind another cloud bank. Your perfect rainbow may refuse to wait around while you relocate to get a better composition. That is why predicting the location of a rainbow can improve your chances.



Photo © Tom Field

Spray

Spray can be much easier to deal with than rain: all you need is sunlight at the right angle. Begin with morning or afternoon sun, because rainbows will not be visible from ground level unless the sun is lower



Photo © Tom Field

than 42 degrees above the horizon. Continuous spray from a fountain or waterfall may give you more time to work the scene and find pleasing compositions, but beware of shifting wind which can move the spray in and out of your rainbow. And the sun advances rapidly, so the rainbow remains in one place only a few minutes unless you relocate. Bright sunshine makes bright rainbows, but they may not show up so intensely if the background is also brightly lit. Try for a darker background if possible.

A geyser may be less cooperative than a waterfall or fountain, forcing you to wait for an eruption and then work quickly. But if the eruption is predictable you can at least be set up and ready to shoot when the possibility for a rainbow is greatest.

Composing with Rainbows

A rainbow alone rarely makes an interesting image, unless it is extraordinarily vivid so that it becomes the main subject in an otherwise drab scene. Some of the best rainbow photographs include other dominant objects, with the rainbow used as an accent or visual prop in the composition. Let's look at some examples.

In this image, the photographer has aligned the sweeping curve of the road with the tip of the rainbow, and set the graceful arc to embrace the large tree. These foreground elements make the rainbow photo exciting and adventurous, topped off by a double rainbow faintly visible against the dark cloud. Luck plays a role anytime you are seeing such rainbows, but you still have to use your skill to compose an interesting photo. That can be all the more difficult if rain is pelting down, so practice and forethought are helpful.

At the end of the rainbow you will find one of two things, and neither is a pot of gold: either (1) dry air (the rainbow fades away with the last water droplets) or (2) shadow (of a cloud, building or mountain) where the sunlight no longer illuminates the droplets. Given a large sheet of rain in full sunlight, rainbows would appear as complete rings if the earth did not get in the way. In fact, they can appear as full rings when seen from the air. The point where your rainbow intersects the earth

has potential for a great image. If you have the mobility (such as a vehicle and

open territory) or if you plan ahead, you may be able to position the end of the rainbow exactly where you want it. Technically, as you move you are viewing different rainbows, but here is the point: you can control the rainbow's apparent position. So try composing with different subjects featured at the end of the rainbow. And try telephoto instead of capturing the entire visible arc.

The longer your lens focal length, the more you will magnify the rainbow into broad color bands, while reducing the apparent curvature. For an inspirational example, search Google Images for "Galen Rowell rainbow".



Photo © Tom Field

In the photo at right, a strong composition was created using the sweeping arc of a strong foreground shadow as a leading line toward the base of the rainbow. A short telephoto or normal lens can effectively combine the foreground with the distant rainbow and horizon in a unified image.

Notice here how the rainbow is nearly vertical as it intersects the horizon. After reading about rainbow angles later in this article, you will recognize this as a sign that the sun is very low in the sky. Late in the day, rainbow arcs are the broadest, and the ends hit the ground at steep angles. Using a wider angle lens, the rainbow takes on the familiar semi-circular appearance. The widest rainbow can be captured with a 20-mm lens (having 84° horizontal field of view on a full-frame 35mm camera). The choice of angle-of-view will probably be driven more by your subject than by how much of the rainbow to include, but try different things for as long as the rainbow persists (often not long at all). A zoom lens will let you experiment with compositions much faster!

Capturing the entire arc of a big rainbow indicates a sweeping landscape shot. This does not mean that your subject must be the landscape alone. Often the sun may offer you a scenic, broad rainbow while spotlighting some foreground object such as a tree or flowered hillside. The trick here is not only balancing the foreground luminance with the dim background, but exposing in such a way that any wind-induced motion in the foreground does not smear the object. It is best to pick foreground objects that are not affected by the wind.

When the opportunity arises, compose on the run and shoot quickly with whatever you have before the moment is gone. Instant familiarity with your tripod and camera controls will improve your chances!

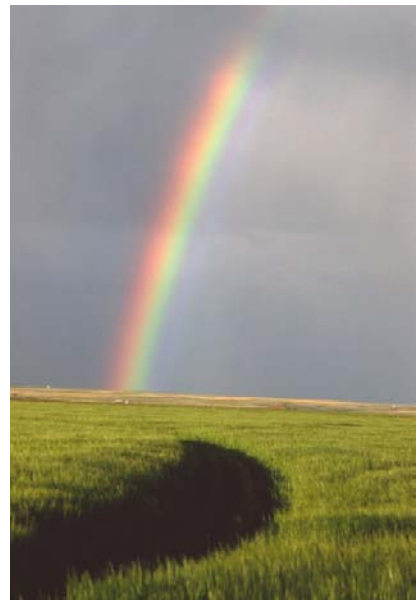


Photo © Tom Field

Camera Techniques for Photographing Rainbows

Lens

The span of a rainbow can be small (with high sun angle) or as wide as 84 degrees (with the sun at the horizon). If you are lucky enough to capture the maximum size rainbow, you will need a 20-mm wide-angle lens (on a full-frame 35mm camera). But a 28-mm will be plenty wide enough for partial rainbows or smaller spans. If you are caught with a too-narrow lens, consider rotating the camera (in an artistic way, hopefully) so that the rainbow extends corner-to-corner across the frame. You will get somewhat wider coverage and perhaps create an appealing image. Or take the opportunity to shoot a mosaic (pano) and stitch it in the computer. At the other extreme, use a telephoto lens to make the rainbow bands appear larger relative to the surroundings, or to isolate a bright rainbow's end near a subject of interest.

Filters

The colors of the rainbow can be rendered more intense and saturated using a polarizing filter. The polarizer reduces the white sunlight reflecting off the fronts of raindrops, mist, and background. Eliminating that white light improves contrast and makes the rainbow colors appear more saturated. Be careful not to dial in too much polarizer and filter out the rainbow itself. Try to strike a good compromise, leaving the rainbow strong while minimizing the hazy, white light surrounding it.

Exposure

Storm rainbows tend to occur in dim light, and the use of a polarizing filter further leads to long exposure times, wide apertures, or both.

Since a passing storm (that produces the rainbow) might be followed by wind, your foreground may be in considerable motion. If you shorten shutter time to freeze the motion, your large aperture may leave the foreground out of focus. Shoot with focus bracketing (for later assembly in a computer) or increase the camera's sensitivity (ISO) and stop down the aperture to keep everything in focus. But if you can exclude any moving foreground



Photo © Roy Sewall

elements, go for a long exposure and smaller aperture to keep everything in focus.

Be careful not to overexpose rainbows, especially if they are the brightest light in the scene. Slight under-exposure will retain more saturated colors and prevent a washed-out look. Your camera's meter and histogram may vary, so if you found the perfect rainbow give yourself the best chances of a perfect capture: bracket exposures!

Fortunately, most rainbows are easy to meter and there are no special tricks to know. The low contrast of most storm rainbow scenes means that your camera meter will almost certainly give a good exposure. Just watch out if you include large areas of dark foreground because your meter may tend to overexpose sky areas. For bright daylight rainbows such as waterfalls, meter for the scene as usual and bracket at least one stop over and under.

Protection

Putting yourself out in the elements—especially setting up to shoot right after a passing storm—does not mean that you and your equipment must get thoroughly wet. In fact, you must avoid this unless you have waterproof gear.

A plastic poncho is cheap, lightweight, and easily stored in your camera bag. It offers protection in all but the heaviest downpour, plus you can keep some equipment sheltered inside. Wind can be the downfall of ponchos, though, and you may prefer to invest in a rain parka and rain pants. Waterproof boots keep your feet dry and comfortable even when moving through soaked grass or underbrush. Plastic trashcan liners are handy protection for gear or as a disposable ground cloth after the rain stops. If you know in advance that you will be waiting out the storm in the open, consider setting up a temporary emergency shelter—a tiny plastic tent. And please: always take precautions to avoid weather dangers such as lightning, flash floods, and avalanche. A small towel kept under a poncho or parka is handy for drying fingertips and wiping raindrops off equipment. Clip it around your neck or fold over a belt. Wash excess dye from black towels, and use them as a light absorber or a focusing cloth (put over your camera and head to preview your scene with aperture stopped down). In a pinch you can even shield your camera from light rain using a towel.

If you will be actually shooting during rain, buy or make a camera raincoat. There are many commercial products to choose from, but it is easy to make one inexpensively. Cut clear plastic sheeting to size, then form fit using clear packing tape—it is lightweight and rainproof. The heavier plastic thicknesses are more durable and easier to manage; try six-mil (0.006-inch) thickness which is readily available in home improvement stores. Any camera raincoat must leave room for your hands to reach underneath for

operating the controls and mounting the camera. True storm chasers may want a submersible camera enclosure or even a waterproof camera, but there is no need for a SCUBA housing.

Rainbow Planner

Where to Look

With only two ingredients, sunlight on raindrops, a rainbow will form—it is just a matter of being in the right place to see it. Where will that be? The rainbow forms in an arc 42 degrees off the sunlight axis. This is not hard to visualize using the following method.

Pinpointing your Rainbow

1. Hold your thumb at an angle about half of a right angle (L-shape) from your index finger. This will be 45 degrees, which is close enough to 42 degrees.
2. Now extend your arm and sight down your index finger toward the shadow of your head (the anti-solar point). You might resemble a child pointing a make-believe gun.
3. Your thumb is now aiming at a spot along the rainbow. Holding your thumb at the same angle, keep pointing at the anti-solar point and pivot your arm to aim your thumb anywhere along the rainbow's arc.
4. An interesting accent for a distant subject is where the rainbow meets the horizon. Your telephoto lens can magnify the distant subject and thus enlarge the colored bands of the rainbow—dramatic! Pivot your arm right or left until your thumb is aimed horizontal (level with the ground). That is the spot where you want to place the subject. Now you may have to move yourself (and your rainbow) left or right until the subject and the rainbow coincide.

While this method may seem imprecise, it can indicate with surprising accuracy the location of the potential rainbow.

Angle of Sun

If the sun is directly overhead, the arc of the rainbow will be toward the ground. The only way you will see a rainbow is to position yourself above some water droplets in the sun, such as spray from a waterfall or fountain.

But as the sun gets lower in the sky (below 42 degrees from the horizon), the rainbow arc starts to rise above the opposite horizon. Therefore, look for rainbows in the morning or afternoon, depending on the season and your location. The biggest landscape rainbows occur when the sun is at the horizon.



Photo © Tom Field

For planning, look on the Internet or consult your portable GPS to predict the solar position. These will tell you exactly what elevation and azimuth (direction) the sun will be at a given date or time. On the Web (free) or iPhone, try Photographer's Ephemeris to plot on a map the sun direction at any given time. For that, visit <http://photoephemeris.com>. This is an incredibly powerful tool!

Season

We know from physics that rainbows form when sufficiently large droplets of water are in the air, and direct sunlight hits them. That means you are unlikely to observe rainbows in cold climates, because atmospheric moisture is likely to be frozen. Nor will you find rainbows in fog or fine mist—it must be

larger droplets. Bright sunlight is essential for strong rainbows, so anticipate more rainbows in spring and summer than in fall and winter.

Storms

Receding rain storms tend to have falling rain in their trailing edge, where it can be exposed to newly-revealed sunlight and form rainbows. Approaching storm clouds, on the other hand, sometimes overshadow the advancing wall of rain, so no sunlight hits the droplets and rainbows are less likely to form.

Terrain

Some locales experience very predictable afternoon storms marching away from the sun direction and followed by clearing, sunshine, and rainbows. There, you only need interesting foreground subjects to compose great images. Less ideal are locales where the rain storms are not predictable or move toward the sun, but you still may find rainbows in the oncoming storm. Good terrain for rainbows allows you to see clearly toward the horizon opposite the sun, so you have a chance of photographing the end of the rainbow. Finally, good rainbow terrain allows you to move freely: you will be able to relocate so the rainbow is in a desired position for your composition. Even if no storm appears, you can scout the locations and subjects, and then return during a storm armed with knowledge and goals.

Double Rainbows

A secondary rainbow often appears in a wider arc (51 degrees) than the primary rainbow, but faint to the point of being nearly invisible. But if you are out there in rainbow conditions, you may witness a strong secondary rainbow, and you have the potential for a dramatic photo! Notice that the color bands are reversed and spread wider in a secondary bow.

Sunset Rainbows

Sunset rainbows are special for three reasons.

(1) The sun's rays are nearly horizontal, so the top of the rainbow will be high in the sky. In fact, a sunset rainbow is the widest arc you will ever see from the ground: half of the full-circle rainbow can become visible, and you will need a wide angle lens to capture it all. This means the ends of the arc are nearly vertical as they intersect the horizon. Sometimes only the end segment of the rainbow appears, and if you see a photo of a vertical rainbow at the horizon, you will know it was made at sunset (or sunrise).

(2) At sunset, the sunlight contains more red hues and less blue (because of atmospheric scattering). This will affect the appearance of the rainbow by emphasizing the red bands and muting the blue bands. The same red tint will apply to anything on the ground illuminated by the sunset. The effect can be quite dramatic. Digital cameras can be fooled into overcorrecting the red tint, so watch your color temperature setting (you do not want the red light rendered white).

(3) If you are lucky, you can get a rainbow against sunset clouds. This phenomenon is gorgeous to behold, but photos seem to be few. Be sure to turn around next time you are photographing a sunset, and see if the sky behind holds anything interesting.

With the best of planning, it is still a matter of hoping a strong rainbow appears. At least you will know where it will be, rather than just leaving the composition to chance. Happy hunting!