



Primer:

Depth

22 16 11 8 5.6 4 2.8

Of Field

Here's a handy creative control that takes up no space in your gadget bag (and costs nothing!): depth of field, the zone of apparent sharpness in a photo in front of and beyond the focused subject. With great depth of field, everything from nearby objects to a distant background will appear sharp in a photo; with limited depth of field, only the focused subject—or a portion of it if depth of field is really limited—will appear sharp.

50 Outdoor Photographer

You can control the depth of field in your photos through your choice of lens aperture, focal length and shooting distance. Larger apertures reduce depth of field; smaller apertures increase it. Longer focal lengths reduce depth of field; shorter focal lengths increase it. Shorter shooting distances reduce depth of field; greater shooting distances increase it. Figures 1 through 3 show how this works.

From a practical standpoint, aperture is your primary control over depth of field. You're going to choose your focal length and shooting distance based on compositional concerns and where you can physically put the camera, rather than on depth-of-field considerations. When you need lots of depth of field, shoot at a small aperture. When you want to limit depth of field, shoot at a large aperture.

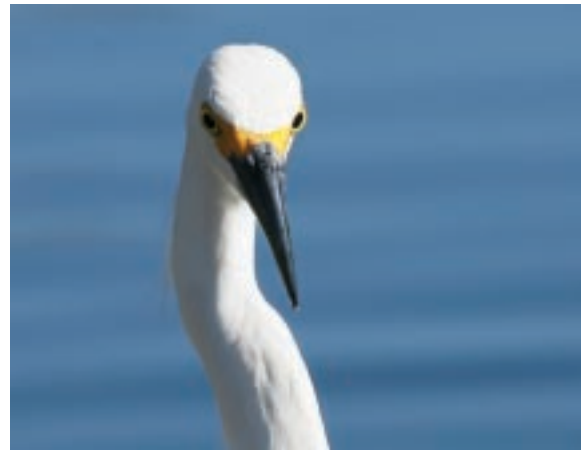


FAR LEFT: Limiting depth of field by shooting at close range with a telephoto lens at its widest aperture directs the viewer's eye to the focused part of the image.

LEFT: When shooting a landscape, it's best to have everything sharp from foreground to background. So put the camera on a tripod and stop the lens way down.

BELOW: Shot straight-on, this egret requires lots of depth of field.

BELOW, LEFT: Shot from the side, the egret requires much less depth of field. Think about the effect of shooting angle as well as aperture on depth of field when setting up a shot.



Here's a typical depth-of-field workflow:

- 1 Choose your shooting distance based on the desired perspective and practical considerations.** Moving closer will increase the size of nearby subjects relative to more distant ones, and increase the apparent distance between them. Moving farther back will decrease the apparent size of nearby subjects relative to more distant ones (or increase the size of more distant ones relative to closer ones, if you prefer), and reduce the apparent distance between them. Often, though, you can't move close enough to, or far enough from, a nature subject. So you shoot from where you can and go to Step 2.
- 2 Choose your lens focal length to frame the image as desired.**
- 3 Choose your shooting aperture to provide the desired depth of field.**

How Much Do You Have?

How do you know how much depth of field you'll have for a shot? Some lenses have depth-of-field scales, which show at a glance the near and far depth-of-field limits for various apertures (see Figure A). Some SLR cameras incorporate a depth-of-field preview, which stops the lens down to the selected aperture so you can see in the viewfinder how much depth of field you have, if the light level is bright enough. The viewfinder image gets darker when you activate the depth-of-field preview, and in dim light, at small apertures, you won't be able to see much in the finder. Some lens manufacturers provide printed depth-of-field tables for their products. None of these tools is totally reliable, however, and for most outdoor shooting,

Repro Ratio Factor

At a given reproduction ratio (magnification) and f -number, depth of field is the same for any focal length (assuming the lens is used on the same-format camera (35mm, 6x6cm, 4x5 inches, etc.). When delivering a 1:8 ($\frac{1}{8}$ life-size) reproduction ratio with an $f/8$ setting, a 50mm lens on a 35mm SLR and a 500mm lens on the 35mm will produce the same depth of field. Of course, to maintain the same 1:8 reproduction ratio with the 500mm lens, you'd have to move 10 times as far from the subject, which will flatten the perspective.

it's sufficient just knowing that stopping the lens down gives you a lot of depth of field and that shooting wide-open provides little.

If your lens has a depth-of-field scale, you can maximize depth of field for a given aperture by switching to manual focusing mode and rotating the lens' focusing ring so that the focusing scale's infinity mark lies opposite the far depth-of-field limit mark for that aperture. This will set focus to the hyperfocal distance for that aperture, and depth of field will run from half the focused distance to infinity. This is much simpler than it sounds (see Figure B).

Too Much Of A Good Thing?

Lots of depth of field sounds like a good thing, right? Everything is sharp, and you're covered for slight focusing errors. So, why not always shoot with the

Depth Of Field Revealed

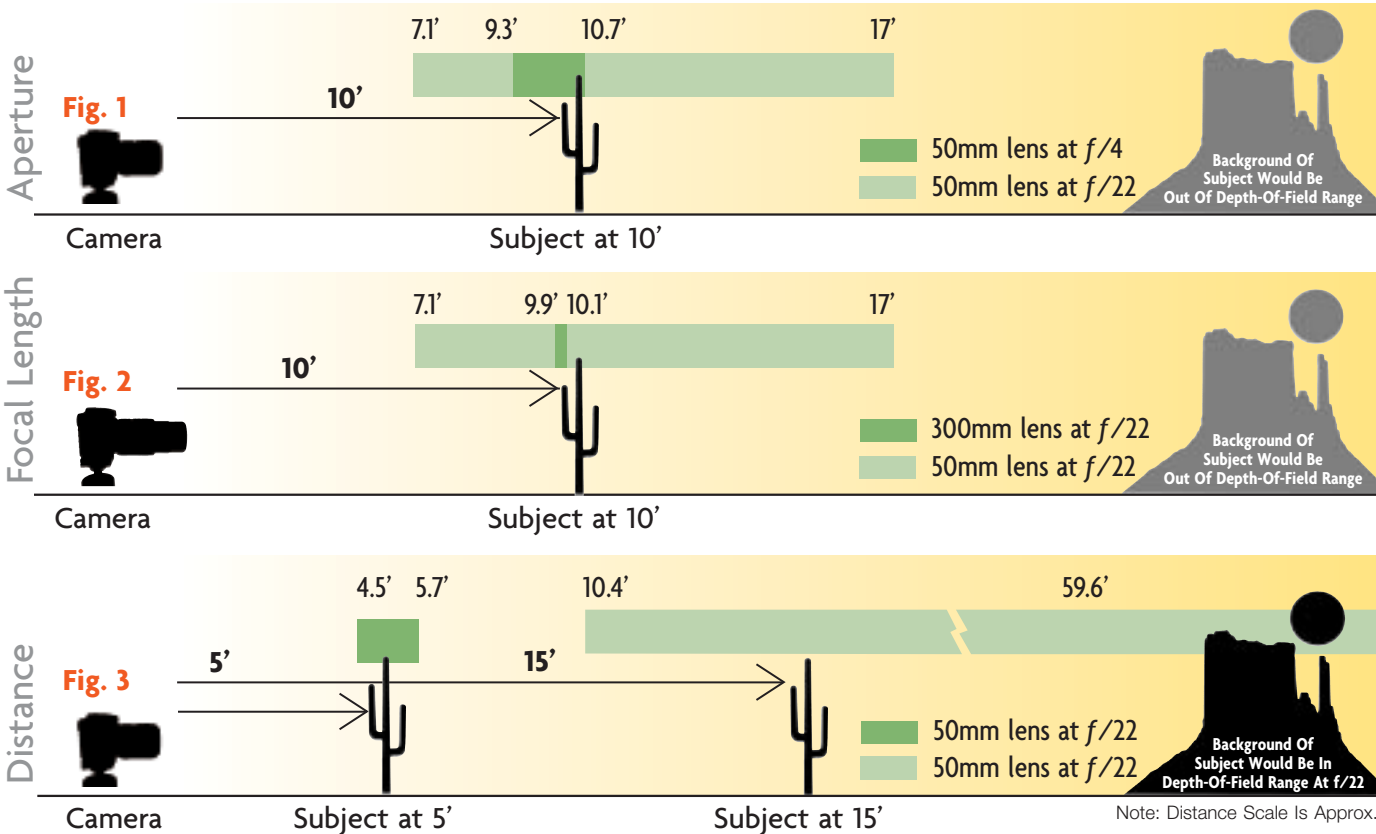


Figure 1: The effect of aperture on depth of field. At $f/4$, depth of field with a 50mm lens focused at 10 feet runs from 9.3 feet to 10.7 feet (solid green area). At $f/22$, it runs from 7.1 feet to 17 feet (green-shaded area).

Figure 2: The effect of focal length on depth of field. With a 50mm lens focused at 10 feet, depth of field at $f/22$ runs from 7.1 feet to 17 feet (green-shaded area). With a 300mm lens focused at 10 feet, depth of field at $f/22$ runs from 9.9 feet to 10.1 feet (solid green area).

Figure 3: The effect of distance on depth of field. With a 50mm lens focused at five feet, depth of field at $f/22$ runs from 4.5 feet to 5.7 feet (solid green area). With the same lens focused at 15 feet, depth of field at $f/22$ runs from 10.4 feet to 59.6 feet (green-shaded area).

Note: Distance Scale Is Approx.

Fig. A

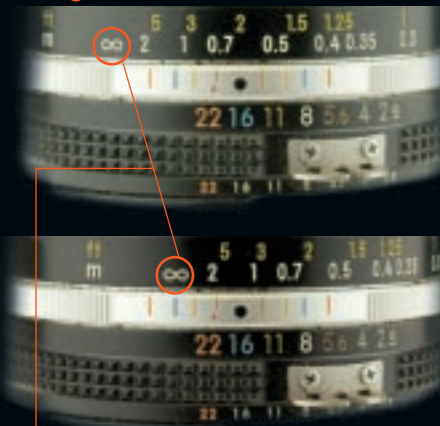


Fig. B

FIGURE A: Some lenses have depth-of-field scales, which at a glance show you the approximate depth-of-field range you'll have at different apertures and focused distances.

FIGURE B: If you rotate the lens' focusing ring so that infinity aligns with the far depth-of-field limit mark, the lens will be focused at its hyperfocal distance for that aperture, and depth of field will run from infinity to half the focused distance. This is a good setting for quick shooting (except for subjects that are closer than the near depth-of-field limit).



Macro photography is an area where minimizing depth of field is called for. Open the aperture as wide as possible and stop down only to include the critical elements in your zone of sharpness.

lens stopped way down? Well, for one thing, stopping the lens down reduces the amount of light transmitted to the film or image sensor. Thus, you'll have to use a slower shutter speed or a higher ISO. A slower shutter speed increases the likelihood of image blur caused by camera shake or subject movement, while higher ISOs mean grainier, noisier images with less attractive contrast and colors. Mounting the camera on a sturdy tripod will eliminate camera-shake problems, but not subject-movement problems—even inanimate plants can move on a windy day, and it's not always fun to lug around a tripod.

Another reason why you won't want to do all your shooting with the lens stopped all the way down is that tiny apertures produce a lot of diffraction, which reduces overall image sharpness. Lenses produce their sharpest images at intermediate aper-

tures. At wide apertures, various aberrations reduce sharpness, and at small apertures, diffraction reduces it. So for optimal image quality, it's best not to stop the lens all the way down unless you really need all that depth of field.

The main reason you won't want to shoot everything with the lens stopped down, though, is that some shots work better with limited depth of field. For example, if a headshot of a wild beast has to be shot against a distracting background because you can't move the camera position or subject, you can use limited depth of field to throw the background so far out of focus that it's no longer distracting; just shoot with the lens at its widest aperture. The longer the focal length and the closer the subject, the more out-of-focus the background will become. It's best to focus on the subject's eyes (or the eye that's nearest to the camera if shooting at an angle to the face) because the eyes are our

The Macro Twist

At normal shooting distances, most of the depth-of-field sharp zone lies beyond the focused plane, while at macro shooting distances, depth of field is about evenly split in front of the focus plane and beyond it.

primary contact point with creatures that have them, and out-of-focus eyes make the whole image seem unsharp. Another justification to limit depth of field is selective focusing. By focusing carefully and limiting depth of field, you can concentrate the viewer's attention on a specific portion of an image.

Yet another reason to use great depth of field only when you need it is that depth of field really is an illusion. Only objects at the focused distance are maximally sharp. Closer and more distant objects will also appear sharp, but they won't be as sharp as the focused subject. Depth-of-field limits are based on viewing a certain-size print from a certain distance—essentially, an 8x10-inch print at arm's length. If you make a larger print, or view from a closer distance, depth of field will be less. Hence, use depth of field to cover subjects near and far when you need to, but don't use it as a crutch for poor focusing. **OP**

What's In A Name?

Don't confuse depth of field with depth of focus. The latter is the very tiny distance at which the image can be focused in front of or beyond the film plane or digital image sensor without noticeably decreasing image sharpness.

