Nikon Camera Settings for
Photographing Birds in Flight and
Other Fast Moving Animals

Photographing birds in flight (BIF) and fast moving animals (FMA) requires a combination of suitable equipment, familiarity with your equipment, the right camera settings, familiarity with wildlife you're photographing, knowledge of the technical aspects of photography, patience, perseverance, and lots of practice.

Camera settings are an important factor in photographing BIFs and FMAs. This handout discusses Nikon camera settings. It's important to have camera settings that will give you good results without utilizing too much of the camera's memory buffer. This is because your camera's autofocus speed and frame rate (images/second) will be slower as the camera's memory buffer (similar to RAM on your computer) is utilized. It also helps to have large capacity, high speed memory cards to allow faster transfer of images from the camera's memory buffer to the memory card.

I will be using using Nikon's terminology, but Canon and other manufacturers have similar settings, I'm not familiar with their equipment. Having your manual handy when reading this might be helpful.

File Format

RAW files contain far more information about your images than JPGs, but at least one excellent photographer of birds of prey still shoots JPG files. His rationale is that RAW files are so large, shooting continuously at fast frame rates will use up more of the camera's memory buffer, slowing the autofocus speed and frame rate. Even worse, if the camera's memory buffer fills completely, you can't take more photos until at least some of the images have been transferred to the memory card. I think memory card speeds have improved to the point that this probably isn't much of an issue anymore. I have very rarely filled the camera's memory buffer.

Although I don't recommend shooting JPGs, if you do, it's important to try to select the "correct" white balance. I personally still shoot RAW + Basic JPG, because I like being able to open the files quickly and delete the images I don't want without importing them into Lightroom or other software. A small JPG doesn't seem to have a noticeable impact on the autofocus speed or frame rate. I'll delete still other images after more closely reviewing them in Lightroom.

Release Mode

You want to take lots of shots in quick succession, so I suggest setting the Mode Dial on top of your camera to C_H (Continuous High Speed). Shoot in spurts, taking a series of several shots, then refocus and shoot another spurt, then do it again, and again. Shooting in continuous-release mode can fill memory cards and the camera's memory buffer quickly. As noted above, it helps to have large capacity cards to handle the continuous high speed shooting mode, and high speed cards to allow faster transfer of images from the camera to the card.

Autofocus Mode

For moving subjects, you need to use Continuous-servo AF (AF-C), not Single-servo (AF-S). The camera will focus continuously while the shutter-release button is pressed halfway (also see AF-L/AE-L or AF-ON Button, discussed below). As the subject moves, the camera will use predictive focus tracking to predict where the subject will be when the shutter is released.

In the AF-C mode, the default option is "Release-priority", in which the shutter will release even when the subject is not in focus. The camera's autofocus tracking system does a good job of predicting the position of a moving subject when the shutter is released, but expect some unsharp images. It may seem that you'd always want the subject in focus before the shutter can be released, but in the "Focus-priority" option, the shutter will release only after it confirms that the subject is in focus, which would not only slow down the frame rate, but a fast moving subject might even be out of focus by the time the shutter is actually released.

Newer Nikon cameras offer another option within the AF-C mode, "Release + Focus", which works somewhere in between "Release-priority" and "Focus-priority". It receives praise from many, and it is the option I now use. If your camera doesn't include this option, I recommend using "Release-priority".

AF-Area Mode

This mode determines how the camera's focus sensing point for autofocus (AF) is utilized. The camera's focus sensing point is the small illuminated red box in the viewfinder (assuming it's turned on in Custom Setting A5, Focus Point Illuminator). You can move this focus point with the multi selector on the back of the camera. The center focus point should give the fastest autofocus, since it is the most sensitive AF sensor. The camera's autofocus works best when there is more contrast between the subject and the background (e.g., a flying bird against a sky). The camera's autofocus doesn't work as well when there's less contrast between the subject and the background (e.g., a flying bird or a mammal against vegetation).

"Single-point AF" - This mode is generally not suitable for moving subjects, although at least one excellent photographer of birds in flight uses the Canon equivalent with very good results. I believe "Dynamic-area AF" or "3-D Tracking" to be better choices.

"Dynamic-area AF" – In this setting, you focus using the selected focus sensing point and if the subject briefly moves from that focus point, the camera will use information from surrounding focus points to try to keep the subject in focus, but will not actually change the focus point you are using. You select how many focus points to activate; depending on the camera, the choices can be 9, 11, 21, 39, or 51 points (Custom Setting a7, Number of Focus Points). The manual recommends using more focus points for more unpredictable subjects like birds. It's important to remember that you first have to acquire the focus using the illuminated focus sensing point on the subject; then, if the subject briefly leaves the focus point, the camera will check surrounding focus points to keep the subject focused. Expect the camera's autofocus to have difficulty holding a subject when there is little contrast between the subject and the background or if the subject fills less than about half of the focus sensing point.

"3D-tracking" – In AF-C mode, you focus using the selected focus sensing point, and if the subject moves from that focus point, the camera will select new focus points as the subject moves. Since 3D-tracking works by comparing the color of the subject with colors surrounding the subject, it does not work well when the subject and background are similar in color. I've found "3D-tracking" to work very well when photographing birds against a sky background, but so does "Dynamic-are AF". "3D-tracking" does not work well, for example, when photographing Bald Eagles flying against a background of dark trees. Another problem I've found with "3D-tracking" is when the subject lands in a tree or on the ground, "3D-tracking" keeps hunting for the focus whereas "Dynamic-area AF" will autofocus on a bird that has landed.

I've almost stopped using "3D-tracking", but I still keep it in mind as an option if the right situation would present itself. If you photograph your kids' sports games, I think "3D-tracking" might work well on brightly colored uniforms.

Here's the best explanation I've found (and modified slightly to make it more concise) of the difference between Dynamic-area and 3D Tracking:

> Originally Posted by Bloozecruz at
> http://www.flickr.com/groups/nikon_d90/discuss/72157623355626262
> In Dynamic-area AF, there's a Top Dog AF point. But he has lots of friends and he asks them for advice. He says to the guy to the left "Hey, what do you think? Am I still in focus on the subject?" Lefty replies "Looks good to me." Top Dog says "Thought so. Thanks for the help." If Lefty says "You're not is focus anymore", then Top Dog uses an average focus distance based on the results of the focus points around him. It's a bit more complicated than that, as it's still slightly weighted towards his final decision. After all, he's Top Dog and this ain't no democracy.
> In 3D Tracking, it's a team sport; there is no Top Dog. When the subject moves to the left, the focus point says to the guy on the left "Hey, can't see the subject anymore, you see anything?" Lefty replies "Yeah, it's right in front of me." Response, "Tag you're it, you take over from here buddy."

Auto-area AF – With this mode, the camera automatically selects the subject and the focus point. It's not suitable for photographing BIFs and FMAs.

Focus Tracking

There is slight lag between when the shutter-release button is pressed and the shutter is actually released. In AF-C autofocus mode, the camera will use the focus sensing points to track the subject's movement toward or away from the camera to predict where the subject will be at the moment the image is actually captured. "Focus Tracking with Lock-On" (Custom Setting a3) lets you select how long the camera will wait before refocusing on the subject. At least one excellent photographer uses the Canon equivalent of Single-point Autofocus and sets Canon's equivalent to the Focus Tracking to Long. This allows the subject to leave the focus sensor for a longer time before the camera starts try to find the subject again. I think these settings might work in situations where there's little contrast or color difference between the subject and the background. I keep experimenting with all the settings, including "Off", but I haven't noticed a significant difference.

AE-L/AF-L or AF-ON Button (CS a8)

This button on the back of the camera can be set to do the same thing as pressing the shutter-release halfway down. However, the only way to activate Vibration Reduction (discussed below) is by pressing the shutter-release halfway down. Many use and strongly advocate this "Back Button Focus", but it's always seemed like an extra step to me.

ISO Sensitivity Auto Control

If you decide to try this feature, you need to understand what your camera is doing.
- In the "Shooting Menu" under "ISO sensitivities", set the "Auto ISO sensitivity control" to ON, select a "Maximum sensitivity" and a "Minimum Shutter Speed". The minimum ISO sensitivity will be whatever you've selected for the ISO setting on the camera. The maximum sensitivity you select will depend on your camera, since newer cameras are much

> better at reducing digital noise resulting from a high ISO. Remember, however, that if the image isn't sharp due to a slow shutter speed, a higher ISO may be the better choice.
> - In Aperture Priority exposure mode: If the camera can't achieve a proper focus at the maximum ISO and minimum shutter speed you've selected, it will then begin to select slower shutter speeds.
> - In Manual exposure mode: The ISO sensitivity is shifted if the selected shutter speed and aperture can't attain a correct exposure as indicated by viewfinder display (-…0…+). I've found that when shooting in manual Exposure Mode (discussed below), the display in the viewfinder always shows 0 even when I've chosen an exposure compensation. For example, if I've set the exposure compensation to + $^2/_3$, the viewfinder stills shows 0. You have to press the +/- button on the top of your camera for the viewfinder to display the exposure compensation.
> - The maximum sensitivity you select will depend on your camera, since newer cameras are much better at reducing digital noise resulting from a high ISO. Remember, however, that if the image isn't sharp due to a slow shutter speed, a higher ISO may be the better choice.

For birds in flight, I try to shoot at a shutter speed of $^1/_{800}$ second or faster, and I try to keep the ISO at 1600 or less, but if necessary, I'll let the ISO go higher. If the birds are following a predictable path and are gliding or soaring (not flapping their wings), you might try a slower shutter speed. When the light gets too low, however, you may want to just enjoy watching the birds rather than photographing them.

High ISO Noise Reduction

Since "High ISO Noise Reduction" (in the Shooting menu) is only applied to JPG images, the setting doesn't really matter if you're shooting RAW images. If you're shooting JPGs, set it to "Off", since applying the noise reduction in the camera will slow down the autofocus speed and the frame rate. If it's necessary to clean up digital noise in JPG images, you're better off using noise reduction software.

Exposure Metering

Select "Matrix" or "Center-Weighted" (on the back of your camera), depending on which allows you to best judge how much to over- or under-expose to compensate for the middle tone of your camera's meter. It helps to use blinking highlights and check your histogram frequently to avoid blown out highlights.

ISO Settings

I've started using Auto ISO (See "ISO Sensitivity Auto Control" above) and have found it to work very well. Today's cameras and processing software allow much better noise reduction than they did a few years ago. A noisy image can often be repaired with noise reduction software, but an unsharp image will end up in the recycle bin.

Shutter Speed

To photograph BIFs, you need shutter speeds of about $^1/_{800}$, and preferably faster. If light is poor, you can drop down to a slower shutter speed, but you'll probably start getting a lot more unsharp images. Strongly consider increasing the ISO setting, discussed above.

Aperture Selection

Since you need a fast shutter speed, you will need an aperture that is at or near the lens' capability. If there's good light, you can stop down an f-stop or two. If the light isn't good, you may want to shoot wide open to keep the shutter speed up.

Exposure Mode

In "Aperture-priority" exposure mode, you select an aperture and your camera selects the appropriate shutter speed for the ISO you've selected. If your subject is significantly different tone than the background, you need to utilize Exposure Compensation by pressing the +/- button with your index finger and rotating the sub-command dial with your index finger. If you're shooting birds as they fly through an area where the light and background are remain fairly constant, Aperture-priority will work fine, but if the subject is moving through bright and dark areas, there isn't time to adjust the Exposure Compensation, so consider Manual exposure, discussed below.

In "Manual" exposure mode, you select both the shutter speed and the aperture using the command and sub-command dials. By rotating the command dial with your thumb, you raise or lower the shutter speed. This is faster than changing the "Exposure Compensation" when shooting in "Aperture-priority", but it takes a lot of practice. However, it's a challenge to learn to quickly change the exposure manually.

Flash

Fill flash can fill in shadows, give a catchlight to the eye, and enhance the color of birds' feathers. If the flash is mounted too close to the camera, it can also cause eyes that appear to glow in various colors; see separate handout on "Tips and Techniques for Photographing Birds in Flight and Fast Moving Animals"). However, BIFs & FMAs are generally too far away for fill flash, even with a Better Beamer Flash Extender. Fill flash won't freeze your subject and your camera probably has a flash sync speed of a $^1/_{250}$ second (slow for BIFs & FMAs), so fill flash has limited application for photographing BIFs & FMAs.

Vibration Reduction

Note that Vibration Reduction will utilize more of your camera's memory buffer, slowing down the autofocus and frame rate. When photographing BIFs and FMAs, you're generally shooting at high enough shutter speeds that VR isn't needed.

Summary

A web search shows that there are some very opinionated perspectives on the best settings, and little overall agreement. Hopefully, the discussion above will help you select camera settings that will work best for you. Photographing fast moving subjects takes practice. You need to be able to operate your camera quickly. Then, you can concentrate on fine-tuning your photographic technique. Don't be surprised if you get a lot of unsharp images in the beginning, but your percentage of keepers will continue to improve with practice.