

## Nikon 80-400 f/4.5-5.6G Evaluation



Killdeer - D7100 in 1.3x DX crop mode handheld, 80-200 f/4.5-5.6G @ 400mm

### Construction:

The 80-400 f/4.5-5.6G is a relatively large and bulky lens for the genre but overall, given its size I did not find it very heavy and found it to be well balanced even on a light D7100 without optional vertical grip. If this lens had the same metal construction as the 300 f/4 or 70-200 f/2.8 it would be even heavier. There is a lot of polycarbonate in the lens similar to the other recent f/4 range of lenses. This isn't a bad thing as it still feels strong and durable but doesn't have that tank-like feel. In normal use it will last a long time but I would not want to subject it to a hard hit or a fall to the ground as it would likely be seriously damaged.

### Sharpness and Resolution:

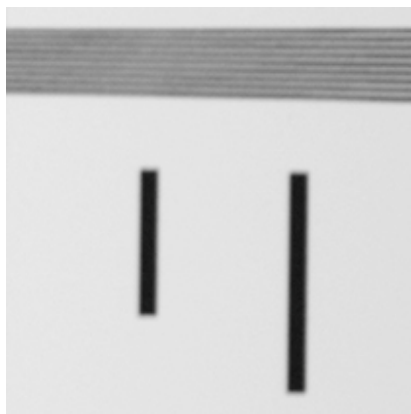
Overall the lens promises to be significantly sharper than the lens it replaces and my findings bear that out. I tested center sharpness as well as DX, FX, and DX crop modes. The FX tests were done on a D800E and the crop mode tests were done on a D800E and D7100. I compared the results at various focal lengths:

At 80mm, the lens is very good in the center but it finishes significantly behind the 85mm f/1.4G and f/1.8G at similar apertures. Both current models of the 70-200 (f/2.8G VR2 and f/4VR) also

beat the new 80-400 but by less than I was expecting. The new lens still is very impressive especially since it was being shot wide open. By f/8 there was virtually no difference. The FX corners are a different story where the other lenses handily beat the 80-400 by nearly 30% in the lines per frame resolution test. The difference is mostly gone when shooting the 80-400 in DX mode on either the D800E or the D7100 with the resolution drop falling to just 12% compared to the 70-200 f/2.8 and f/4. When using the 80-400 in what Nikon calls 1.3x crop mode on the D7100 which is really a 1.95x crop compared to a full-frame sensor, the 80-400 holds up very well with just a 8% lower resolution which is relatively insignificant.

At 200mm the new 80-400 lens is an f/5.3 lens. Results at 200mm mirror those at 85mm. It is a very good performer in the center and in the two DX crop modes and falls off compared to the other lenses in the full-frame corners.

Many have asked how this lens compares at 300mm to the 300mm f/4 and also at 400mm to the 300mm f/4 with 1.4x converter. In short, it doesn't. The 300 f/4 is an amazingly sharp lens and trounces the 80-400 in resolution throughout the frame even when using DX crop mode and the 1.95x crop (1.3x DX crop). Even with the 1.4x attached to the 300, it handily beats the 80-400. Here are 100% crops of identical areas of the ISO12233 test chart taken from the upper right hand corner of a DX frame comparing the new 80-400 vs. the 300 f/4 + 1.4x:



80-400 f/4.5-5.6G



300mm f/4 + 1.4x

A comparison of the new 80-400mm versus the 70-200 with 2x or versus other offerings like the Sigma 120-400, 50-500 and 150-500 also reveals this lens significantly superior to those options. The Sigma lenses are dispatched easily with this lens being sharper in all regimes and all parts of the frame. It really isn't close at all. Some have also asked how it compares to the Canon 100-400. The new Nikon 80-400 is superior to this very old lens in every category except build strength which easily goes to the all metal Canon lens. But optically and especially in auto-focus speed there is no comparison. It also easily outperforms the Nikon 70-200 f/2.8G VR2 with 2x III teleconverter in all regimes. At 280mm, the 70-200 f/2.8G VR2 with the 1.4x II shot at f/5.6 is slightly superior in the center and significantly superior on the edge for sharpness and resolution to the 80-400 at f/5.6. At f/8 the centers are equal but the FX corners are still superior using the 70-200/1.4x combo.

Stopping down to f/8 puts the lens on the D7100 into diffraction at the pixel level but the diffraction fall-off is less than the improvement in sharpness in the lens so it is still better to shoot at f/8 and accept some diffraction than it is to shoot wide open. The breakeven point on the D7100 is about f/11. At f/11 you will get similar sharpness (with greater depth of field) shooting with the new 80-400 as you would get shooting the lens wide open. The larger pixel size of the D800E pushes this to about f/13. The sweet spot on both cameras for maximizing resolution is to shoot at f/7.1.

Overall this lens is an excellent pairing with DX cameras where the weak part of the lens, the full-frame corners, are always masked off. It is an even better performer in the 1.95x (1.3x DX) crop mode where only the best part of the lens is used. If shooting this on a D7100 you get a 160mm-780mm stabilized 15 megapixel system. This is probably the best lightweight hand held bird photography rig on the DSLR market. It is a hand-holdable mega reach system with excellent optics and very capable stabilization. The only downside is the frame rate and buffer of the D7100 - more on that later.

Linear distortions:

I am surprised and impressed by how well linear distortions are controlled throughout the zoom range of this lens. Very little observed pincushion or barrel distortion is observed on the linear distortion test chart. Adobe won't have much work to do on this front when it releases lens profiles.

Chromatic Aberration:

Similarly, chromatic aberration, even in the FX corners is minimal and the very slight purple fringing is easily corrected and will be completely corrected automatically once Adobe releases a lens profile for this lens.

Auto-focus Response:

Auto-focus is quick and positive with little to no hunting. It is literally light years ahead of the lens it replaces and also blows away the focus response from the Sigma lenses in this genre and the now very old Canon 100-400mm lens. The lens can easily be used as a bird in flight lens. With the focus limit switch engaged, it feels like you are shooting with a faster lens. Even the D7100, which has a lower spec AF system than the D800, was easily able to track Mourning Doves flying in my neighborhood. Initial focus acquisition was faster with the D800 though.

### Vibration Reduction:

The 80-400G has Nikon's latest spec VR system which is claimed to be good for 5 stops. Overall I found it to be very effective and similar to what I found with the 70-200 f/4G which shares the VR system with this lens. My subjective rating is that the practical reduction in vibration is approximately 3 - 4 stops.

### Other Observations:

This is not a 400mm lens. My tests show it to be closer to 385mm lens when focused at infinity and that is reduced somewhat as you get near minimum focus. Unfortunately this focal length inflation has become all too common in the photo industry. If you are going for reach, the difference between the 420mm of the 300 f/4+1.4x is more significant than you would expect due to this. You can see this in the ISO 12233 test chart crops above.

Many will ask, can I use this lens with a Teleconverter for even more reach? I did briefly test this and in the center it is a credible combination. Of course AF speed is compromised and corner sharpness leaves a lot to be desired but in a pinch, the center is plenty sharp for internet or small print uses. In cropped DX frame mode (1.95x) you would have a field of view equivalent to that of a 1092mm on a full frame camera. Stopping down to f/10 makes things even better especially on the larger pixel cameras.



Long-billed Dowitcher - D7100 in 1.3x DX crop mode handheld, 80-200 f/4.5-5.6G @ 400mm

## Conclusion:

The new 80-400 f/4.5-5.6G is an exceptional follow-on to the older 80-400 f/4.5-5.6D lens. AF performance is in a different universe compared to the old lens. Optically it is also much better especially in the center of the frame. It basically runs circles around the old lens in every regime. It is significantly superior to using a 2x III with the 70-200 f/2.8G (either the VR or VR2). It is not as good on the long end as the 300mm f/4 with or without the 1.4x II but then again it is much more versatile due to the zoom capability. I highly recommend this lens for the DX shooter but if you need edge to edge sharpness on an FX frame, this is not the best lens for you. The biggest Achilles heel for this lens is its price; \$2700 is a steep price for an f/4.5-f/5.6 variable aperture zoom. For that amount you could just about buy a 70-200 f/4, a used 300 f/4 and a 1.4x and have better performance but it would be a bulkier and less versatile kit. At \$2000 I would be very enthusiastic about this lens but at \$2700, unless you really need the versatility, I would wait for the inevitable rebates and price reductions. I do however feel that paired with a D7100 this is an incredible lightweight combination for some serious reach and capable of professional level results.

## A few words about the D7100:

This test gave me a lot of time with a D7100. Overall I am very impressed with the camera. The AF performance is better than I expected and its detail rendering capabilities at low ISO, due to the large pixel density and no low-pass filter, are impressive. Handling is pure Nikon and anybody comfortable with Nikon DSLRs made in the last few years can transition to this camera very quickly. Build quality is very good but the camera does have a bit of a plastic feel which is to be expected in such a light body. It has many of the features built into the pro bodies at a lower price point. I tried to create moiré since this camera does not have the filter designed to avoid that but was unable to - the pixels are just too small. I think removing the low-pass (or AA) filter was a wise move by Nikon. The camera does have some drawbacks compared to what I am used to. First there is no separate AF button. You can program the AEL/AFL button for AF but then you lose that button for other functions - I like to program the AEL/AFL button to change aspect ratios quickly. As reported by others, the buffer is just awful. The camera literally comes to a stop after just 6 RAW frames. It takes a long time for the next frame after that and all subsequent frames. The camera is very slow to write data to a card and it takes a long time for the buffer to clear. This improves slightly in 1.3x DX crop mode but not as much as I would expect given that the camera is moving half the data. You will definitely want the fastest cards made if you want to shoot action with this camera. The camera is a bit more noisy than I would like which is also what I expected given the pixel density. It seems to be about 1 stop noisier than the D800E. I also noted that with a busy high contrast background, even though the viewfinder depiction of an AF point was completely on a bird's head, the camera wanted to jump to the background indicating that the actual AF sensor might be located in a slightly different place or be somewhat larger than its depiction. (see picture below). In short, the

D7100 is a very capable camera but lacks some of the features and precision found in the pro bodies. It is superior in every way to the D7000 which it replaces.



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