

[Lens Review: The Sigma 120-400 4.5-5.6 APO HSM Telephoto Zoom](#) – By Darwin Wiggett

First the preamble:

I am a working landscape photographer. I am not a lab technician. I do tests in field conditions shooting with the gear just like I normally do. I do not take photos of lens charts nor do studio tests. I want to know how well a lens or camera works in the field. I am not paid to do these reviews nor do I get a kick back for any sales of products reviewed. I do not get free camera equipment nor am I sponsored by any camera or lens manufacturers. I am only interested in finding decent gear at a fair price. When I do find a ‘good buy’ I will share my findings with others and then you can decide if the gear will be a good fit for your shooting style.

The Background

Anyone familiar with my work knows I use Canon cameras and Canon Tilt-Shift lenses for the majority of my landscape work. Overall I am pretty happy with the gear I use and when I am not I freely express what I think are the short-comings of the gear (which probably has not made Canon happy at times). 😊

What is less well known is that I love telephoto zooms to create ‘extractive landscapes’ (like the one below). I carry a little [Canon 70-200 f4L](#) lens in my pack and a [Canon 300mm F4L IS](#) lens to cover my telephoto needs. When the 70-200mm does not supply enough reach, I switch to the 300mm. I am happy with these two Canon lenses but sometimes I wish I had all that zoom range in one lens. So I thought I would test the Sigma 120-400mm lens. I chose this lens for its useful focal range, the fact that it accepts 77mm filters (I love filters!), the fact that it is not too crazy heavy (1750 grams) and the fact that it is affordable (about \$1000 CAN). I also compared it to [Canon’s 100-400 f4.5-5.6L lens](#) which I used to own but sold because I was not a huge fan of the lens (but maybe that was a mistake—we’ll see).



The Procedure

In the field I used a solid Gitzo tripod and a [Really Right Stuff BH-55 ball head](#) to support the camera and lenses. I used mirror lock-up, a cable release, no filters, and used live view to focus. I have tested my Canon EOS-1ds Mark III extensively and I get [sharper photos using Live View](#) at 10x magnification than I can get with the camera using auto-focus even after [focus calibration](#). I also turned off Optical Stabilization (Sigma) and Image Stabilization (Canon) for all tripod shots. I shot near and distant scenes. Here are my findings:



The Lenses Tested: The lenses compared from left to right: Sigma 120-400 4.5-5.6 APO, Canon 100-400 f4.5-5.6L, Canon 70-200 F4L and Canon 300mm F4L

First Impressions

I was impressed by the build quality and handling of the Sigma lens. It felt sturdy, and the focus and the zoom mechanisms were smooth and silky. The lens did not feel ‘cheap’ or clunky in any way. The zoom ring is at the front of the lens and a half twist of the hand takes you quickly from 120 to 400mm. Most Canon lenses have the focus ring in the front of the lens and the zoom ring behind so it took me some time to get used to having the opposite arrangement with the Sigma lens. The Canon 100-400 lens has a push-pull zoom that also takes a little getting used to. People who own the 100-400 either love or hate that push-pull zoom; few people are neutral about it. Sigma’s rotating zoom is probably more acceptable to a wider audience.



The Sigma 120-400 and the Canon 100-400 zoomed out to 400mm

An interesting note about the Canon 100-400mm. Numerous photographers I know refer to the Canon lens as the *Vacuum Cleaner*. Take the back lens cap off the 100-400 and cup your hand over the rear lens element. Now push and pull the zoom back-and-forth. You'll get a good strong flow of air sucking in and out of the lens. Guess what moving air attracts? Dust. A fairly common complaint with the Canon 100-400mm lens is that it is a big dust sucker leaving you with a dirty camera sensor. I tried the same test with the Sigma lens and there is still airflow while zooming but significantly less than with the push-pull Canon Lens. If you want to vacuum your carpet as well as take photos, then the Canon 100-400 might be a good choice 😊

Sharpness Tests

I compared all the lenses at every aperture and at numerous overlapping focal lengths. Rather than bore you with pages and pages of 100% screen captures just let me summarize my findings below. You'll need to take a leap of faith that I did my best to make the field comparisons as fair as possible and to keep shooting conditions as controlled as I could. I repeated the tests three times to confirm my initial findings. I will include a couple of critical comparison for visual

reference. Also I will let you know about my preconceptions before the test so you know what I expected to find (my bias). I assumed that the 70-200 f4L and the prime 300 f4L would outperform both the Canon 100-400 and the Sigma 120-400. Also I expected the two big zooms would probably be close in quality.

Sharpness and Aperture

Lenses all tend to have a sweet spot where there are one or two apertures that give the best resolution or sharpness performance. All four of the lenses tested here had the best sharpness at apertures of f5.6 to f11 with f8 being the sweet spot for all the lenses at all focal lengths. For example, I photographed the image below with the Sigma 120-400 at 200mm.



Shot with the Sigma 120-400 lens at 200mm

In the 100% magnified view of the same scene you can clearly see that apertures larger than f11 start to lose edge sharpness (see below).



f5.6



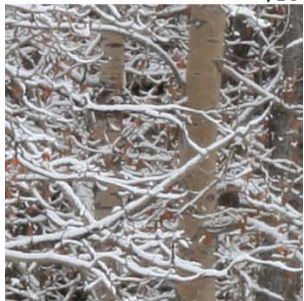
f8.0



f11



f16



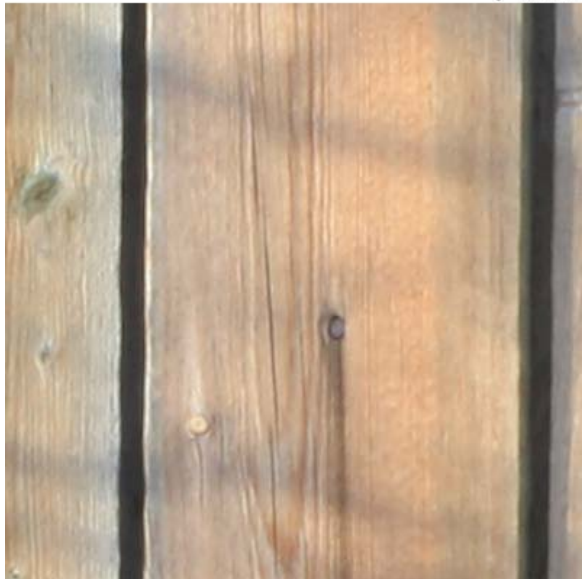
f22

100% view of Sigma 100-200 at 200mm based on aperture

All of the Canon lenses used in this test had a minimum aperture of f32. I would happily use any aperture on any of these lenses from wide open to f11. Even f16 was acceptable in most cases. But f22 and especially f32 are useless apertures in my opinion due to loss of sharpness through diffraction. Below is a 100% view of a photo of a fence in my backyard showing a comparison of f11 and f32 using the Canon 100-400mm lens at 200mm – the differences are striking. I repeated this test three times in different light and with all the Canon lenses—in the end I found that f22 and 32 are useless if you want pro caliber results and/or the capabilities to make large prints.



f8.0

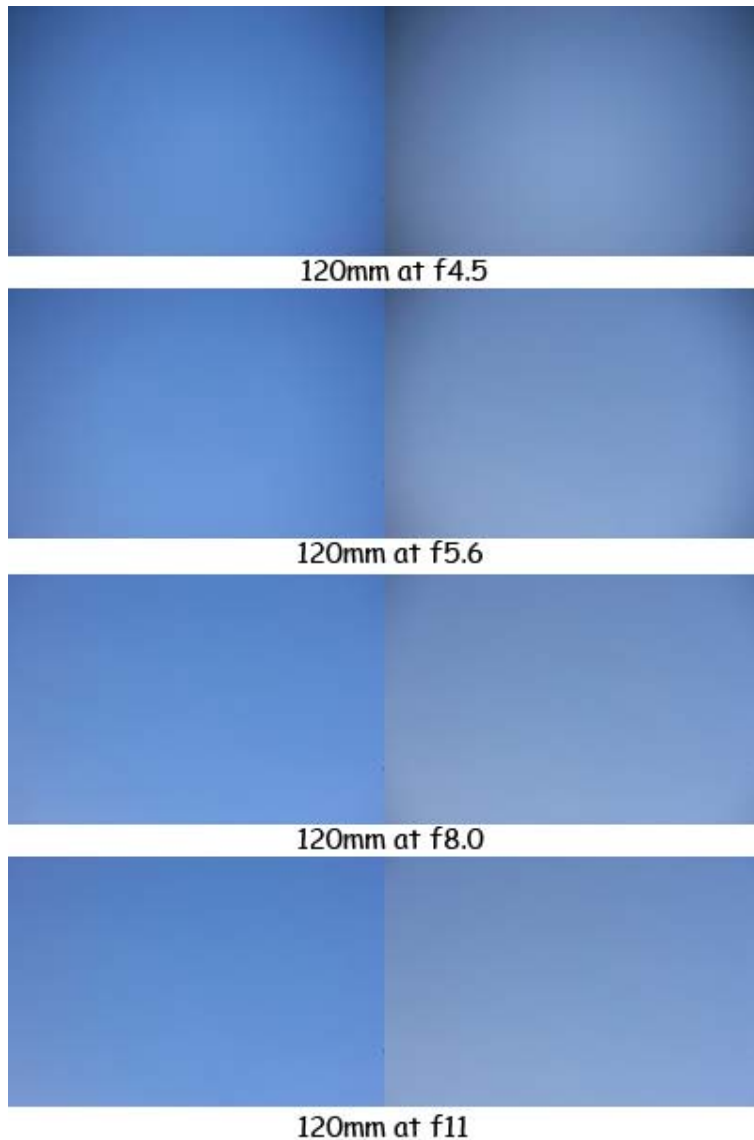


f32

Canon 100-400 at 200mm

Vignetting

Often zoom lenses will show some uneven exposure across the frame at wide open apertures where the edges and corners of the frame are darker than the center. Usually one or two apertures down from wide open and exposure across the frame evens out. The photo below shows the lens vignetting for the Canon 100-400 at 120mm (left) and the Sigma 120-400mm at 120mm (right). By f11 the exposure totally evens out for both lenses. The Sigma seems to suffer from a bit stronger lens vignette than the Canon. The other interesting difference is in the colour between the lenses. The settings on my Canon EOS-1ds Mark III were exactly the same for both sets of pictures and the sets were taken only minutes apart. The Sigma lens renders colours much warmer than the Canon lens.



Lens Vignette Test, Canon 100-400 on left, Sigma 120-400 on right

I found that the Canon 70-200 F4L and the 300 F4L have slightly less lens vignette than the two big zooms and that the exposure across the frame is even at f8.0. Whether lens vignette is a problem for you depends on what you shoot and your style. Correcting vignette is easy in Adobe Camera Raw and in Adobe Lightroom so if you like to shoot wide-open a lot then you may need to correct this problem in post-production. But frankly, most people are purposely adding a vignette effect to their photos so I really think only the most anal photographer would be bothered by the vignetting seen on any of these lenses. But do note, the Sigma has the greatest lens vignette of all the lenses tested.

Sharpness comparisons

I tested all four lenses in the field using various subjects but the the three scenes that showed the differences in sharpness the best were the photos below. One image (the trees) was shot in overcast light, while the wooden fence and the chain link fence with signs were shot on a sunny evening. I compared the sharpness of Sigma lens with the Canon lenses based on these three scenes.



The fence scene used to compare lens sharpness



The Tree scene used to compare lenses on overcast day



The fence scene used to compare lens sharpness

Canon 70-200f4L vs Sigma 120-400mm lens

When I compared the Sigma 120-400 with the Canon 70-200mm f4L I was surprised by how well the Sigma lens performed. Both lenses seemed sharpest at f8. At the tested focal lengths of 120mm and 200mm there was little to distinguish the two lenses in terms of sharpness. The Canon slightly edged out the Sigma at f5.6 but after that they were about even in sharpness until f16 when the Sigma had a tiny edge. Really I could not see much of a difference between the two lenses. Below is a comparison of center sharpness in both lenses at f8. Do note the slightly bluer colour cast to the Canon lens



Canon 70-200f4L

Sigma 120-400

Canon 70-200mm f4L vs Sigma 120-400mm lens - Center Sharpness

Where I did notice some differences between the lenses was at the edges of the frame. The Canon is better controlled at lens vignette at wider apertures but when it comes to edge sharpness the Sigma came out on top at all apertures tested. The disturbing thing about the Canon 70-200 f4L was that there was some colour fringing (magenta) at the edges of the frame (see photo below). Maybe Canon needs to update this lens to a Mark II version to overcome this flaw. For me as a landscape shooter, I like the files I got from the Sigma in the 120-200mm range better than the files that came from the Canon 70-200 f4L.



Canon 70-200f4L - edge

Sigma 120-400 - edge

Canon 70-200 F4L vs. Sigma 120-400mm lens - edge sharpness

Canon 300mm F4L vs Sigma 120-400mm lens

For me this test was a no brainer, I figured that the prime Canon 300mm lens would easily surpass the Sigma lens in terms of sharpness—a prime versus a big range zoom—c'mon! But, I was impressed by the Sigma lens. At 300mm, at almost every aperture, the Sigma zoom could easily match the sharpness of the Canon prime. At f5.6 the Canon had a slight edge but by f8 and past the two lenses performed almost identically in terms of sharpness. The Canon lens has a tiny bit more 'snap' (contrast) and a slightly cooler colour cast but otherwise the lenses performed essentially the same. The photo below compares center sharpness at f8 between the lenses.



Canon 300 f4L vs. Sigma 100-400 - center sharpness

When I compared edge sharpness between the two lenses I was surprised that the Sigma lens was just as sharp along the edges as the Canon prime. And the good news is neither lens showed the magenta fringing at the edges like I saw in the 70-200mm lens. I also compared the sharpness of the Canon 300mm lens coupled with a Canon 1.4x converter to give me 420mm. I zoomed the Sigma out to 400mm and compared the sharpness of the two lenses. The Canon lens with the 1.4x converter could not match the sharpness of the Sigma zoom at any aperture whether in the center or along the edges. Below is a photo showing center sharpness at f8 for both lenses.



Canon 300mm F4L with 1.4x

Sigma 120-400

Canon 300mm F4L with a 1.4x converter vs. Sigma 120-400

The Sigma 120-400 can easily compete with Canon's 70-200 f4L and 300mm F4L lens in terms of sharpness. The other two lenses have a bit of a speed advantage with a wide aperture of f4 (useful for sports and wildlife shooting) but for landscape purposes, the Sigma is way more flexible combining a huge zoom range with excellent overall sharpness.

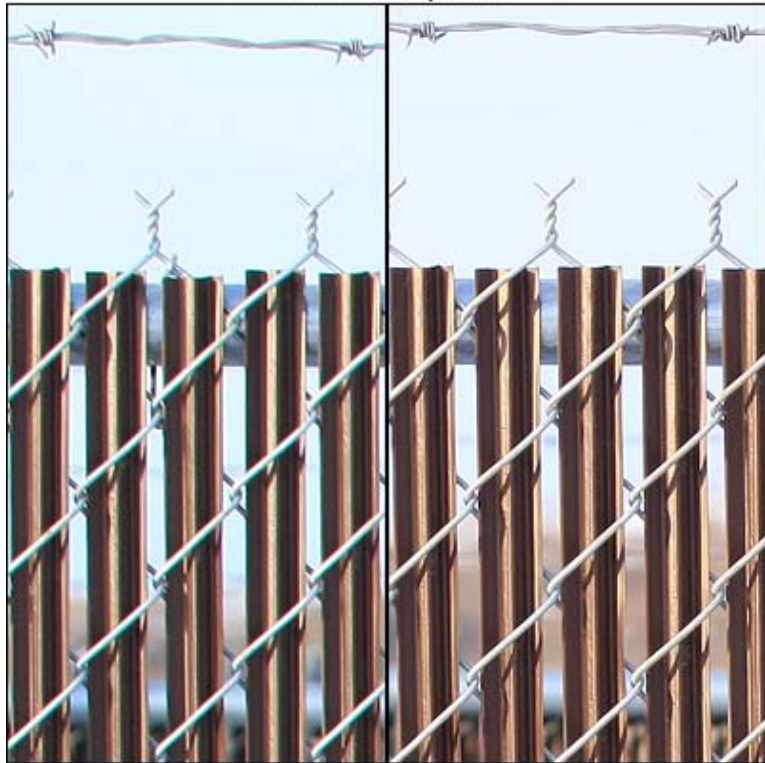
Canon 100-400 f4.5-5.6 vs. Sigma 120-400 f4.5-5.6

Ok, this is the shootout that I was really interested in. Are the two lenses comparable? I tested the lenses at 120, 150, 200, 300, and 400mm at all apertures. In the images below I present the results at f8 where both lenses tended to perform the best.

At the 120 and 150mm the Sigma was superior because it had much better edge sharpness and very little colour fringing. The Canon lens has noticeable fringes in contrasty areas along the edge of the frame (see photo below). Also note that the Canon has a much cooler colour cast than the Sigma lens.



Center Sharpness



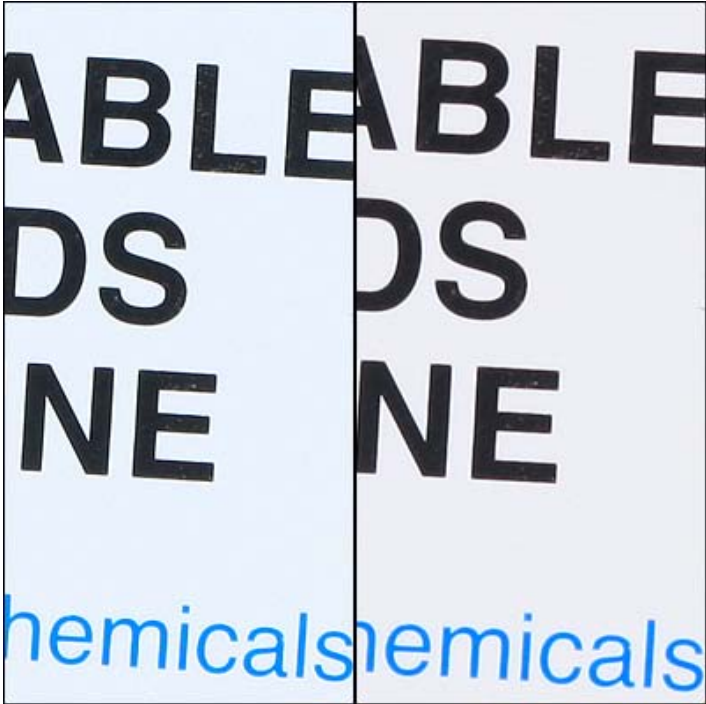
Edge Sharpness

Canon 100-400 at 120mm

Sigma 120-400 at 120mm

Canon 100-400 and Sigma 120-400 at 120mm

At 200mm sharpness evens out between the two lens with similar center sharpness and a slight nod to the Sigma for better edge sharpness (see below)



Center Sharpness



Edge Sharpness

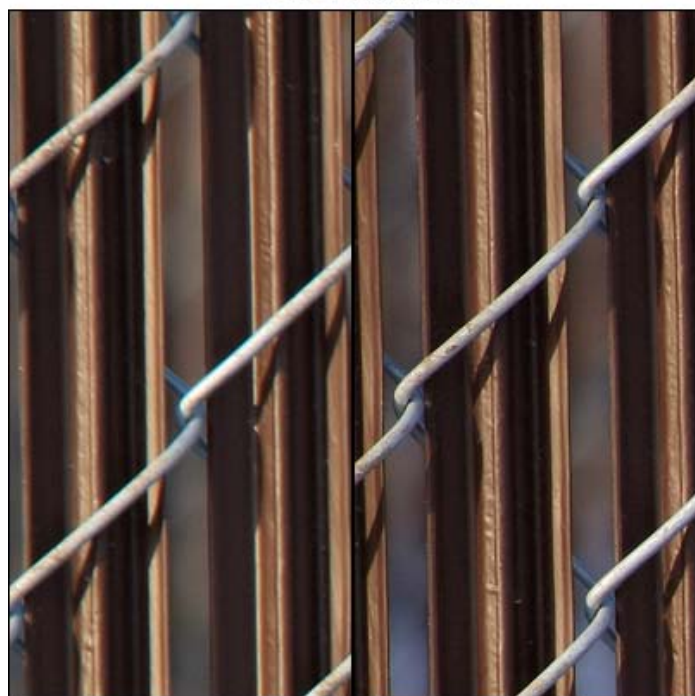
Canon 100-400 at 200mm Sigma 120-400 at 200mm

Canon 100-400 vs Sigma 120-400 at 200mm

At 300mm the Canon is sharper in the center but the Sigma is sharper at the edges of the frame (see photo below) so I would call the test a draw.



Center Sharpness



Edge Sharpness

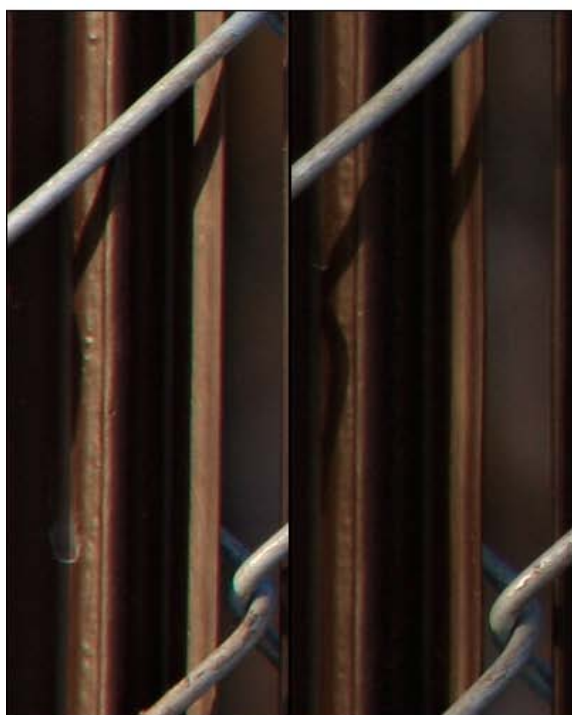
Canon 100-400 at 300mm Sigma 120-400 at 300mm

Canon 100-400 vs. Sigma 120-400 at 300mm

At 400mm the Canon is clearly superior both in the center and at the edges (see below)



Center Sharpness



Edge Sharpness

Canon 100-400 at 400mm Sigma 120-400 at 400mm

Canon 100-400 vs. Sigma 120-400 at 400mm

But in my other sharpness tests with the two lenses I found that the Sigma Lens gave equal or better results than the Canon at 400mm. I think the reasons for the differences are dependent on the ability of the camera or the user to get precise focus. I used Live View at 10x to focus all lenses but at 400mm I noticed that the Canon lens 'snapped' into focus more obviously using Live View than did the Sigma when both were racked out to 400mm. The photo of the fence below shows that the Sigma can give great results at 400mm if perfect focus is achieved



Canon 100-400 at 400mm

Sigma 120-400 at 400mm

Test 2 of Canon 100-400 vs. Sigma 120-400 at 400mm

As a general conclusion the two lenses are pretty similar with the Sigma performing better at the wider end of the zoom range and the Canon performing better at the longest focal lengths or at least the Canon was easier to focus precisely at longer focal lengths. In the middle ranges of 200 and 300mm the lenses are pretty evenly matched. The Canon has a little less lens vignette but the Sigma has less colour fringing on the edges. The Sigma lens is a little warmer in colour cast than the Canon lens.

Autofocus and Image Stabilization

I did some autofocus testing with the both lenses on static and moving subjects and I really could not see any difference in lens performance between the Canon 100-400 or the Sigma 120-400. Both seemed zippy and locked focus pretty well. I had the same amount of keepers from both lenses when using auto-focus. But I am not an action/sports shooter so my tests were not

rigorous. As well, in my casual tests of how well the Image Stabilization (Canon) and Optical Stabilization (Sigma) worked for handheld shots, both lenses gave me similar results. I was happy with the stabilization system in both lenses used and I could manage hand-held shots about two shutter speeds below what is recommended for non stabilized lenses.

Conclusion

As a landscape lens I really liked the Sigma 120-400 lens for its great range and convenience. It gave me as good as the results I currently get from my 70-200 and my 300mm Canon lenses and better results at 400mm than I get with my 300mm coupled with a 1.4x converter. So now I can take just one zoom lens and leave the two other lenses and the converter behind. If I were a wildlife shooter I might stick with the two Canon lenses for the extra speed that f4 gives me.

When it comes to the Canon 100-400mm and the Sigma 120-400mm it really is a matter of weighing benefits and costs. The Canon lens performs better (or is easier to focus precisely) at 400mm and it vignettes less at wide apertures. On the other hand it has the push-pull dust-sucking zoom and chromatic aberrations at wider focal lengths and costs significantly more than the Sigma zoom (about \$1750 new in Canada). The Sigma performs better than the Canon zoom at focal lengths 200mm or less with little or no fringing and better edge sharpness. At 300mm the lenses are equally matched but sharpness (or ability to get sharply-focused images) falls off a bit at 400mm with the Sigma. The Sigma is a bargain at \$1000 Can.

Personally, I would buy the Sigma lens over the Canon 100-400 zoom simply because I can't see much in the way of benefits or performance for me as a landscape shooter with the Canon over the Sigma. And \$750 in savings is the benefit I get from my choice.



©Darwin Wiggett - Sigma 120-400mm lens at 273mm

I have read mixed reviews about both the Canon 100-400mm and the Sigma 120-400mm lenses in terms of sharpness. Whether this is a quality control issue with the manufacturers or testing differences among reviewers is hard to dissect. I do know that many photographers use too flimsy a tripod and have poor technique (center post up, no mirror lock-up, no cable release) when using telephoto lenses and so maybe some of the sharpness issues are a result of user error. When using proper technique both the Canon 100-400 and the Sigma 120-400mm lenses can deliver professional results. I would not hesitate to use either lens.

Darwin Wiggett, Feb 2010

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