

## Sigma 150-600mm f/5-6.3 DG OS Sport Lens Review

by E.J. Peiker

Over the last 3 years, Sigma has been working hard to transform itself from a run of the mill third party lens maker to a first tier, state-of-the-art, high quality lens manufacturer. They have released several lenses that are widely regarded as the very best on the market including the 35mm f/1.4 HSM Art, 50mm f/1.4 HSM Art, 24mm f/1.4 HSM Art, and the Sigma 18-35mm f/1.8 DC Art. The Art line of lenses, a designation that is reserved for the highest quality optics in the wide to normal focal length range, have been nothing short of spectacular performers besting offerings from Canon, Nikon, Sony and in some cases even Zeiss. Sigma's premium long focal length lenses are in the Sport line. In this line, the Sigma 120-300 f/2.8 has garnered numerous awards and is among the very best telephoto zoom lenses on the market. Sigma also has a consumer oriented Contemporary line which offers good optics at bargain prices. Sigma's newest offering in the Sport line is the 150mm-600mm f/5-6.3 DG OS lens. This review will explore the pros and cons of this lens.



In 2013, rival third party lens maker Tamron introduced a stabilized 150-600mm f/5-6.3 lens at a bargain price of \$1000. The lens was well received and for the money, it offers a lot of bang for the buck. Optical quality on the Tamron lens is very good for the price in the 150-400mm range and starts to tail off after and resulting a relatively soft image by the time the zoom setting reaches 600mm. The lens is fairly light for the focal length range and definite compromises

were made in the build quality to keep the price down. Reliability of the lens has been a bit spotty with a higher than normal, in my opinion, number of AF drive motor failures. But for \$1000 it does get you into the rarefied air of the super telephoto lens.

Sigma was quiet for a year after the Tamron release but then introduced not just a consumer grade competitor to the Tamron lens, the 150mm-600mm DG OS HSM Contemporary, it surprised the world by also introducing a professional grade 150-600mm f/5-6.3 DG OS Sport Lens. The professional grade lens offers all metal construction and a much more complex optical formula designed to maintain higher detail throughout the entire zoom range. The lens is fully weather-sealed, image stabilized, has a minimum focus distance of 8.5 feet, with 9 rounded aperture blades for smooth out of focus highlights and bokeh, is constructed with 24 elements in 16 groups, uses 2 "F" low dispersion lens elements (Sigma claims these to be equivalent to Fluorite elements) and three Super Low Dispersion Elements to keep all colors focusing on the same plane. It accepts 105mm thread filters. Without lens hood and fully zoomed in, the lens is 11.5 inches long. Fully zoomed out with lens hood, the lens is just shy of 19 inches long. The lens is priced very aggressively at \$2000, an optional replacement lens foot with integrated Arca Swiss dovetail is an additional \$240

A lot of excitement was generated in the fall of 2014 for these lenses but then they were very slow to reach the market. The Nikon version of the 150-600mm Sport did not start shipping in the USA until June of 2015 although in Asia, a limited supply was available before that. I was fortunate to get one of the June shipment lenses and have spent a couple of weeks putting it through its paces. Since this lens, in many ways, is a hybrid between the smaller 80/100-400mm zooms and the larger 500 and 600mm primes, comparisons to both will be made.

### Build Quality

I was mightily impressed upon unpacking the lens; this lens exudes quality! It is all metal, fairly heavy, with very smooth tactile focus and zoom rings. Even the lens hood is all metal and utilizes an all metal thumb screw for attaching similar to the Nikon and Canon super-telephoto lens hoods instead of the cheaper plastic bayonet mount hood usually supplied. The lens foot, unlike earlier Sigma super-tele zoom lenses is very rigid and will not flex; it is also not removable without tools. The lens ships with a good quality padded woven nylon lens carrying case and strap. The level of workmanship, finish, smoothness, quality of switches, and responsiveness is something I expect from Zeiss lenses. It easily surpasses any Canon or Nikon zoom with the possible exception of the Canon 200-400mm 1.4x lens. Weather sealing can be found throughout the lens.

### Controls

The Sigma 150-600mm Sport lens offers up high end controls with a barrel lock switch, Focus Mode switch with three positions for AF, manual focus, or a programmable manual override where you can program the responsiveness of the focus ring via the Sigma Dock (more on the

dock and this lens later). There is a three position focus limit switch. The focus limit settings have defaults of full range, 10 meters to infinity, and 2.6 meters (the minimum focus distance) to 10 meters. However the focus ranges are also programmable with the Sigma Dock. Next there is an Optical Stabilization (OS) switch with three positions for Off, Mode 1 which stabilizes in roll, pitch and yaw, and Mode 2 which stabilizes in pitch and roll but not yaw for smooth panning. OS settings can also be programmed with the Sigma Dock. Finally there is a three position Custom switch which is programmable via the Sigma Dock. In the off position, the lens operates per the other three switches. In the C1 and C2 position, two different scenarios for Autofocus speed, focus limit distances, and strength of the OS can be programmed. The autofocus speed can be set to the default which finds a balance between focus drive speed and focus accuracy. It can also be set to prioritize focus drive speed over accuracy or a high accuracy mode that sacrifices focus speed for very high focus precision. In most cases the normal mode is a good compromise but I have programmed C1 for fast acquisition and C2 for high accuracy and can now switch quickly between all three should the need arise. The OS settings can be customized to provide a lower level of stabilization which allows the viewfinder to settle instantly or a higher level of stabilization which may take longer to full stabilize the image but when it does it is rock solid. Again, the normal mode appears to be a great compromise between these two extremes.

Sigma has provided a rather convenient zoom arrangement. There is the standard zoom rotating collar but the lens is also designed to operate as a push-pull zoom. Basically you can use the lens in whatever way is more comfortable. The standard zoom ring has the advantage of significant feedback as you are zooming allowing very precise framing while the push pull allows you to move very quickly from one zoom setting to another. You can use them in combination at will as there are no switches to transition between them, simply use the lens in whichever manner works for you. I have found it useful to use the push pull when I quickly need to go from a very short focal length to a very long one or vice versa and then use the zoom ring to fine tune the framing. Using the push pull mechanism also requires fewer hand contortions when mounted on a gimbal head with the gimbal controls oriented to the left side of the lens.

The Sigma 150-600mm Sport lens offers a previously unprecedented level of customization, however, there are a couple of features that the highest end Nikon and Canon super-teles have that the Sigma does not. The first of these is a programmable focus distance preset that allows you to push a single button and the lens immediately drives to a predetermined focus position. This is something I use a lot when shooting from a blind with a fixed distance to set-up perches. The second item is that the lens does not have the ability to autofocus via a button on the lens. Both Canon and Nikon super teles have rubber buttons on the lens barrel that can be programmed for this or other functions. However, neither Nikon nor Canon have either of these features on lenses like the 80-400mm and 100-400mm zooms.

### Lens Set-up

I have found in the past that Sigma lenses often require a very large amount of autofocus fine tuning (or Micro-adjustment in Canon terminology). Before attempting to take any photos, I ran

a comprehensive focus calibration. Sigma provides a much higher precision calibration capability for their Sport or Art lenses via the optional Sigma Dock than Canon or Nikon provide via the in camera adjustment capabilities. The Sigma Dock allows you to calibrate the lens at various zoom settings and various distance settings and then write the data to the lens rather than storing a single offset (or two in the case of newer Canon bodies) in the camera body. The Sigma dock process is however a very time consuming and painstaking process that forces you to iterate many things before finally arriving at a solution. Additionally the process is slowed down since every attachment of the dock to the lens, which needs to be done many times for zoom lens, triggers an online 10-20 second firmware verification to insure you have the latest firmware in the lens. It should only do this the first time you dock it in a calendar day, not every time. After getting about 75% of the way through the calibration process on my D7200, it became obvious that there isn't enough focus calibration range available using just the dock to insure sharp photos at every focal length and every distance. After contemplating this for a while I decided to start over. This time I would first use the cameras AF fine tune function to bring in the most out of range part of the lens which happened to be subjects close to the camera at longer focal lengths. By setting my D7200 to +11 as the starting point, I was then able to get all focus ranges and all zoom settings to provide an optimally sharp image. Below is a screen shot of the Sigma Optimization Pro final results for this lens with the camera set at +11. As you can see, to really dial in this lens, nearly the whole range of settings was needed but this level of fine tuning will result in the very best that this lens has to offer. Without this level of focus fine tuning, this lens would not provide optimal focus unless one is shooting in Live View where focus is done on the sensor rather than with the Phase Detection Autofocus array:

mm	FEET M	8.6 2.6	12 3.5	15 5	20 6	30 8	10 10	50 15	20 20	100 30	∞
150		-17			-15			-15			-15
250		-5			-13			-13			-13
400		+20			-6			-5			-3
600		+20			+1			+2			+4

One item that I noted while doing the focus calibration is that for a lens of this type, this lens is relatively parfocal. This means that the focus doesn't change much as the lens is zoomed. While it does change slightly, it does so less than any other, non-cinema, lens that I have used. Cinema lenses are designed to be parfocal and this is part of the reason why they are often much bigger and much more expensive than still photography lenses.

### Lens Handling

This is a fairly heavy lens! In stock form this lens weighs 6.3lb and since the collar is mounted right by the lens mount, it is very front heavy. With a standard generic Really Right Stuff lens

foot that covered the whole stock foot, the camera, even with optional battery grip, could not be balanced on either a Wimberley Head or the 4th Generation Design Mongoose head. When zoomed to the longer focal lengths it is grossly out of balance. This realization prompted a search for a longer replacement foot with built in Arca Swiss quick release dovetail. I was disappointed that neither Really Right Stuff nor Kirk made a replacement foot yet but my search revealed that Sigma actually makes a dovetailed replacement foot for the lens. It is however not yet shipping in the USA. I was able to find an online Japanese distributor that sent me one. It is dramatically longer than the stock foot (and much heavier) but works really well and allows the lens to be balanced. The only downside to the Sigma replacement foot is that it increases the weight of the lens to 7lb. I did notice that the Sigma foot has a slightly narrower track than the replacement feet from RRS, Kirk, 4th Generation, or NatureScapes requiring me adjust the clamp on the Mongoose I was using for this review. Screw type quick release mechanisms won't have a problem but clamps need to be adjusted and once adjusted properly for this foot, may not be able to accommodate other feet.



Sigma Replacement Foot



Stock Foot

In the field, having the option to quickly zoom in a push pull manner or to precisely zoom with a zoom collar rotation makes this lens a pleasure to use. The balance does of course change as the lens is zoomed since the front of the lens extends outward during zoom operations, it isn't a huge problem when using the optional longer lens foot. This lens has click stops in the horizontal and vertical rotation orientation. Canon users are used to this but for a Nikon user it is a treat to have tactile feedback when the lens is level in the roll axis. The collar's rotation, despite being way behind the center of gravity is very smooth, smoother than any Canon or Nikon lens with integrated collar I have used. It is clear that Sigma finally listened and designed

a truly stable and smooth lens collar. The zoom lock switch can be engaged at 150mm, 180mm, 200mm, 250mm, 300mm, 400mm, 500mm, and 600mm so if you want to avoid accidental zooming or zoom creep and shoot the lens like a prime, it can easily be done using this function.

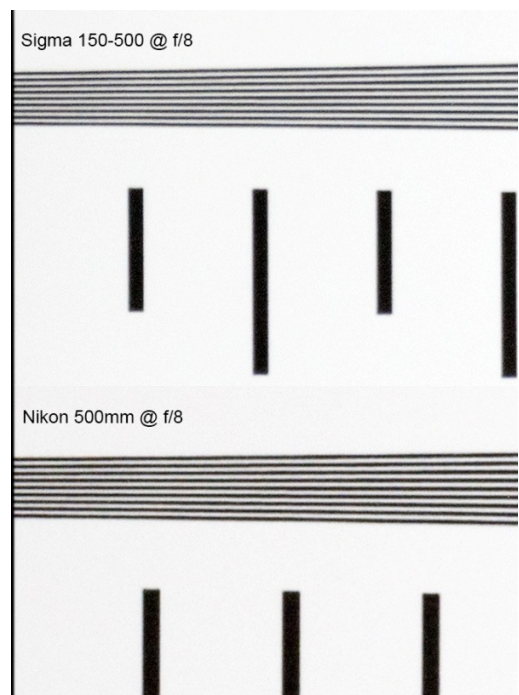
Nikon teleconverters will not mount on this lens as is the case with all Sigma lenses. Sigma makes a compatible teleconverter for this lens however the autofocus speed would likely be severely compromised especially at longer focal lengths since the maximum aperture would exceed f/8, the smallest aperture that either Nikon or some Canon cameras will focus with reliably.

By virtue of the lens' smaller size and lower weight than the Nikon 500mm, or 600mm primes, it is easier to maneuver while providing much more versatility due to its zooming capability. It is however more than a stop slower at the longer focal lengths than the super tele primes although almost the same speed as the 80-400/100-400 genre of lenses in overlapping focal lengths. Will this be a case of having to choose versatility over image quality? Let's take a look!

### Image Quality

As I was running the lens focus calibration tests, I noticed that this lens is quite good from an image quality standpoint. I look at literally hundreds of calibration target shots every year from many different lenses and I was quite impressed at what I was seeing in the viewfinder and on the rear LCD. I also noticed that by f/8, which is only 2/3 of a stop from wide open at the long focal lengths, the lens was extremely sharp. I was excited to look at this lens using resolution charts and comparing it to my Nikkor 500mm f/4G VR lens. In summary, on a D7200 at f/8 there is essentially no difference, both lenses resolve right to the limit of the ISO12233 test chart. At f/6.3 the Nikon lens, which is already stopped down 1 1/3 stop at that point, is sharper. I would likely shoot the Sigma at f/7.1 or f/8 most of the time as I do with the Nikon 500mm f/4 lens so there should be essentially no image quality difference the way I photograph. Stopping down beyond f/8 does not improve image quality on either lens.

I borrowed a friend's Nikon 600 f/4G VR, which is a slightly sharper lens than Nikon's 500 f/4G VR, and ran a similar test. At 600mm and f/6.3, the Nikkor was easily sharper, by f/8 the Sigma had closed the gap quite a bit and by f/11 they were essentially equal for resolution as diffraction started to be the limiter, not optical sharpness.



500mm center of frame comparison at f/8 reveals essentially no difference at the highest resolution of the ISO 12233 chart - difference in magnification is due to focus breathing on zoom lenses - see discussion

Comparing the lens to the Nikon 80-400mm f/4.5-5.6G VR (the new 80-400), the Sigma equals or beats the Nikon for resolution at every focal length and aperture in the range where they overlap on the test chart. And when you add the much higher build quality, higher level of customization, much longer focal length on the long end at a lower price, the only thing that justifies keeping the 80-400G is its smaller size and lower weight. In a feather detail comparison taken with the Sigma 150-600 at 400mm and the Nikon 80-400mm there is very little difference. The Nikon lens has a tiny bit more contrast but on the D7200 sensor also shows a bit more moiré pattern interference, It also has slightly less magnification. The samples were shot at a distance of 40 feet and 100% crops are illustrated below.



Sigma 150-600mm @400mm (left) vs. Nikon 80-400mm @ 400mm, 40 feet, f/8

Compared to the Nikon 200-400 f/4 VR II, at shorter focus distances the lenses are similar in performance at all overlapping apertures and focal lengths and at longer shooting distances beyond 50 feet, the Sigma easily outperformed the 200-400 once again revealing the long distance shooting challenges that the Nikon 200-400mm lenses have.

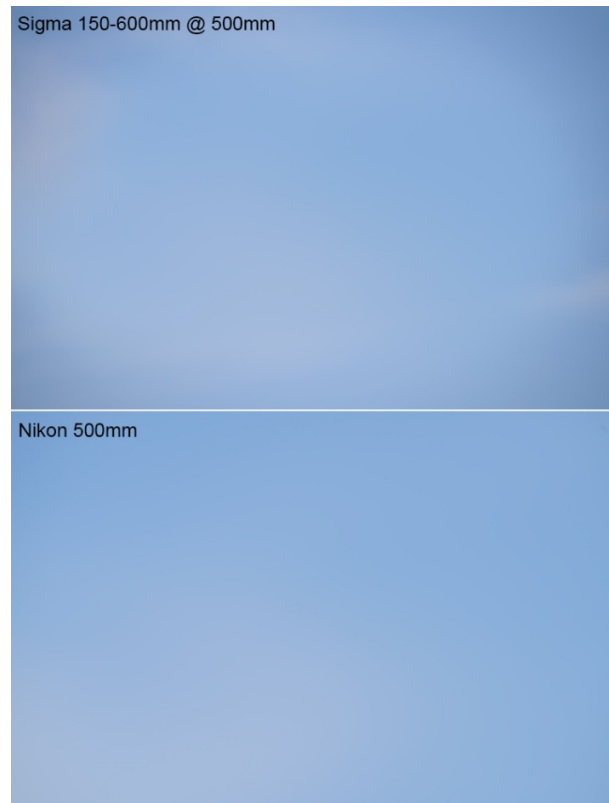
The Tamron 150-600mm f/5-6.3 lens was also tested in comparison and there simply is no comparison on any level. It is significantly behind the Sigma in every test I did and feels very cheap in comparison. This does allow it to have a much lower weight though - 2lb less. I have not tested the Sigma 150-600 Contemporary lens which is a direct competitor to the Tamron.

On the D7200 there is a very slight amount of chromatic aberration at all focal lengths as you get to the corners of the image but it is so tiny you really have to pixel peep to see it. Turning on the automatic lens correction in Camera RAW or Lightroom completely eliminates them.

So far Sigma has a real winner on its hands - excellent image quality that is competitive with the super-teles at the apertures that I shoot and better than most long zooms. So, besides maximum aperture, what's the downside? On APS-C (DX) cropped bodies there really isn't a downside. Where the Nikon super-teles and to a lesser extent the long zooms outpace the Sigma is on full frame bodies in the corners. The Sigma lens vignettes significantly on full frame sensors although using 1.2x crop or Canon's 1.3x crop largely eliminates it. Adobe's lens profiles have already been updated to include this lens and this also completely eliminates any

visible vignetting on full frame bodies. Resolution in the corners is relatively good and about equal to the Nikon zooms but behind the f/4 super teles. Chromatic aberration continues to increase as you get into the corners of the full frame sensor along high contrast edges, but again, the Camera RAW and Lightroom lens profiles completely eliminate it.

Focus breathing is an issue with this zoom lens as is the case with virtually all zoom lenses coming to the market these days. Focus breathing is a phenomenon where the lens loses focal length as your subject gets closer to the minimum focus distance of the lens. In my estimation, the Sigma 150-600mm is approximately a 500mm lens at minimum focus even when zoomed to 600mm. As I stated, this is the norm for zoom lenses. At shooting distances of 30 feet or more, the lens returns to approximately 600mm true focal length.



Full Frame Vignetting Comparison

### Autofocus Performance

As one would expect, a lens whose maximum aperture is f/6.3 at the longer focal lengths is not going to focus as fast as an f/2.8 or f/4 prime lens since a fraction of the light is reaching the autofocus sensor but I did find the AF speed more than adequate for foraging birds, swimming waterfowl, cars driving by on the street, etc... For predictable flyers it is also fast enough for birds in flight but for smaller and less predictable flyers, lenses that focus faster, especially the large aperture primes are superior. By going to a custom setting on the lens that prioritizes speed of focus over accuracy, this can be negated to some extent and if you are good at tracking, you might not even notice the reduced focus accuracy since the longer you can keep the area of focus on the AF sensor, the more accurate the focus becomes even in this faster less accurate mode. As stated above, this can be programmed with the Sigma Dock.

Shot to shot focus consistency in the normal focus speed mode is superb with this lens with the lens going to the same point in space every time, unlike offerings with similar and even larger apertures from Nikon and Canon. I noticed this when I was calibrating the lens and again noted it when shooting with it in the field.





Pied-billed Grebe Chick - D7200, Sigma 150-600 @ 600mm f/8

### In The Field

Having alleviated any image quality and focus consistency fears, it was time to take the lens out in the field for some real world photography. There had been reports of some photographable Least Bitterns at a local park so I was hoping to use the new Sigma 150-600mm Sport lens to capture some images of them. I did see the Least Bitterns on three occasions but never in a photographable scenario. As a consolation, I was happy to find a Pied-billed Grebe mother with three chicks that were quite cooperative coming within 20 feet at times. This allowed me to use the lens at various focal lengths. Overall I was very pleased with the lens' responsiveness, focus speed, and image quality. The only downside is the large shift in center of gravity as the lens is zoomed back and forth. Once I was able to zero in on a suitable tension level on my 4th Generation Design Mongoose, this became less of a problem. Of course this issue is not unique to the Sigma lens, most zoom lenses that operate in this focal length regime get significantly longer as you zoom in resulting in a forward shift of the center of gravity. The only lenses that do not are the larger Canon 200-400mm 1.4x lens and the Nikon 200-400, the latter of which offers nowhere near the reach due to being limited to just 400mm.

I mount my lenses with the gimbal controls on the left side of the lens and camera so that my right hand never needs to leave the shutter button. Doing this does make it a little more difficult to reach the zoom ring since the lens needs to be zoomed from the top but it is much easier than the Nikon 200-400 which is difficult to zoom when mounted on a gimbal head. Fortunately, since the Sigma 150-600 Sport can also be used in a push-pull manner, this proved to be a more comfortable way to use the lens when mounted on a gimbal head.



I tested the normal focus speed mode, the fast focus speed mode that sacrifices AF precision, and the slow focus mode which sacrifices focus speed for precision. I did find that panning with a swimming Pied-billed Grebe, shots taken in the fast tracking mode on subjects at relatively close distances of 20 to 40 feet lacked the acuity of shots taken in the normal or slow AF mode. It is apparent in going through the shots on a computer at 100% pixel view where I switched from fast AF mode to Normal AF mode. The slow AF mode shots and normal shots were relatively equal and the camera had no problem tracking a predictable swimmer. In the field, shooting swimming birds, I was again quite impressed by the shot to shot focus consistency. Every shot that I took as I panned across the water has what appears to be precisely the same quality of focus. This is not something I am used to from either my 80-400 or my 500mm f/4 Nikon lenses. Due to this, I tend to take more shots than I need to. This is simply not as necessary with the Sigma lens.

There isn't too much flight shooting available this time of year in my part of the world so I couldn't completely analyze this. I did however try to photograph some Grackles in flight and the AF system had little problem tracking such a high contrast subject. I found the exercise tiring though when coupling this lens with a D7200 with vertical grip due to weight. Since the lens collar is not removable, this additional weight must also be hefted during any flight shooting. For Canon shooters that routinely shoot super tele primes hand held for flight shooting, this won't be a problem. The lens will actually seem lighter even though it is just as heavy as the Canon 500 f/4 due to not having as large of a front element and thereby not being as front heavy resulting in easier hand holding. The lens is about 2lb lighter (with the optional enhanced lens foot) than the Nikon 500mm f/4G making it a lot easier to shoot hand-held.

Maximum aperture at 150mm is f/5 and drops to f/6.3 by 500mm as expected. In-between, the maximum aperture at 200mm is f/5.6 and at 400mm it is f/6. Transmission losses or the lens' T-

stop values are about 0.2 stops higher than the Nikon 80-400 for the same aperture setting due to the additional 4 lens elements.

Critically analyzing the images I took on my 30" NEC computer monitor after the shoot left me quite impressed. The ability to render fine detail even at 600mm is impressive as illustrated by this 100% crop representing just 3% of the pixels of the entire shot:



As stated earlier, focus consistency was outstanding when looking at image after image on the monitor.

### Conclusion

The new Sigma 150-600mm f/5-6.3 DG OS Sport lens is quite impressive, especially given the price point of \$2000 or \$2240 with the enhanced lens foot. Image quality surpasses the quality level of other zooms that venture out into the 400-600mm range while maintaining very good autofocus capability despite the relatively small maximum aperture of f/6.3 at the longer focal lengths. It is especially well suited for crop-factor cameras such as the Nikon D7200 or the EOS 7D Mark II which avoid the lens' biggest weakness, the corners. But even with a full frame camera capable of cropping the image circle slightly like the Nikon D810 (1.2x crop) or the Canon EOS 5DS/5DSR (1.3x crop), the worst part of the lens can be avoided while maintaining a very high megapixel image. Adobe's RAW converters, Camera Raw and Lightroom, have excellent profiles built in to largely eliminate the corner issues that the Sigma 150-600 Sport has even on full frame cameras when using the entire frame.

Excellent image quality in a super tele zoom like this does come with the penalty of weight though. The lens, with the integrated enhanced foot is approximately the same weight as the Canon 500mm f4L II or the newly announced, but not yet available at the time of this review, Nikon 500mm f/4E VR even though they give you 1 1/3 stops more light gathering capability at 500mm. Physically, the Sigma lens is substantially smaller though making it easier to pack while reaching all the way out to 600mm without the large drop in image quality at the longest focal lengths that is so common with super-tele zooms. In a world of increasing airline regulations on what can be brought on-board as carry-on luggage, the smaller size in a lens capable of reaching 600mm is important. Comparing it to something at least in the same general price range, the 80/100-400mm class lenses, it outperforms them for image quality while having significantly more reach but at a 1/3 stop penalty in light gathering and a substantial weight penalty.



Nikon 600mm f/4G vs. Sigma 150-600mm Sport  
Size comparison

In the end, Sigma has a real winner on its hands and at a very aggressive price for what the lens delivers. I will most definitely be keeping mine and it is likely that my Nikon 500mm f/4G and 80-400 f/4.5-5.6G lenses will see a lot less use, especially when I travel.

