

## 70 mm to 600 mm Full Frame at 40 Feet

Dr. John A. Allocca, October 13, 2018, [www.DrJohnPhotography.com](http://www.DrJohnPhotography.com)



Sony A7RIII FF, 70-300 mm at 70 mm, f/8, 1/500 sec, ISO 3200, 40 feet, Handheld



Sony A7RIII FF, 70-300 mm at 100 mm, f/8, 1/500 sec, ISO 3200, 40 feet, Handheld



Sony A7RIII FF, 70-300 mm at 200 mm, f/8, 1/800 sec, ISO 3200, 40 feet, Handheld



Sony A7RIII FF, 70-300 mm at 300 mm, f/8, 1/1000 sec, ISO 3200, 40 feet, Handheld



Sony A7RIII FF, 150-600 mm at 400 mm, f/8, 1/640 sec, ISO 3200, 40 feet, Monopod



Sony A7RIII FF, 150-600 mm at 500 mm, f/8, 1/640 sec, ISO 3200, 40 feet, Monopod



Sony A7RIII FF, 150-600 mm at 600 mm, f/8, 1/500 sec, ISO 3200, 40 feet, Monopod



The image above was cropped 1/6th from the 300 mm photo taken with the A7RIII



The image above was cropped 1/4th from the 600 mm photo taken with the A7RIII

## Crop Sensor vs Full Frame Sensor Cameras and Lenses

There is a great deal of confusion when it comes to comparing crop sensor camera lenses to full frame camera lenses. Often the specification of a crop sensor lens may be stated as 10 mm with a comparable 35 mm focal length of 15 mm. This may give the user the impression that they will have a 15 mm focal length. This is incorrect. The focal length doesn't change. Only the field of view changes. Therefore, it should be stated that the field of view is the same as a 15 mm focal length lens.

A full frame camera projects an image onto a sensor or film that is 36 mm x 24 mm in size. An APS-C camera projects an image that is 22.5 x 15 mm in size. An APS-C sensor costs less than a full frame sensor.

What is of primary concern is the field of view that is produced by these two sensors. As seen in the diagram below, the field of view that is seen by the full frame sensor is wider than the field of view seen by the APS-C or "crop" sensor. The focal length remains the same, which is often confused. The only aspect that changes is the field of view, not the focal length.

Lens and the images projected onto a sensor are round in shape, whereas the sensors are rectangular in shape. The diameter of the circle needs to be larger than the diagonal of the rectangular sensor. A full frame 35 mm lens must have an image circle larger than 43.27 mm. An APS-C camera lens needs to have an image circle larger than 27.04 mm. If an APS-C lens is used on a full frame camera, the image circle would not be large enough to cover the corners of the sensor. If a full frame camera lens is used on an APS-C camera, it will cover the corners of the APS-C sensor.

What makes this concept confusing is that when photos are added to a photo software program, they are often enlarged by the software to a specific size. Most people don't pay attention to the enlargement size in the software. Photos are then presented online using the same frame size, which gives the appearance that they are enlarged. But, the photos are not enlarged from the camera, only from the photo software.

