Four Factors of Filter Highlight Photography

This guide will cover the background and purposes of the Four Factors of a Great Photo as well as Filter Highlight Photography. By the end of this guide, you will learn how to take a single image and apply minor manipulations that produce consistent reproducible results. You will also learn the processes of camera set-up, image editing, and advance scouting techniques used by master photographer Christian James.

There are four factors that contribute to a great photo: composition, manipulation of time, manipulation of light and aperture for effect. A basic understanding of these four factors and how to manipulate each factor are what separate master photographers from amateur photographers.

Composition

Prior to composing a shot I ask myself three things:
1. Why am I here?
2. What makes this location unique?
3. How can I add positive features and subtract negative features?

I applied the three composition questions before/while I took this photo of Harrison Wright Falls which is located in Ricketts Glen, Pennsylvania.

1. Why am I here? I am here to photograph the waterfall.
2. What makes this location unique? The stone steps that carry the viewer's eyes through the scene.
3. How can I add positive features and subtract negative features? The positive feature in the photograph is the large stone in the lower right hand corner that stops the viewer's eye from leaving the scene. The negative feature that was in the photograph was the empty sky above the waterfall, which has been cropped out.

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Manipulation of Time and Light

Understanding the correlation of shutter speed, f-stop and ISO can be confusing at first, but when broken down into basic terms, the process of manipulating time and light becomes much simpler. The simple physics of a camera is based on plus or minus half. If a user changes the shutter speed, f-stop or ISO by 1 setting, that will change light or time by plus or minus half. For example, if a user changes the f-stop from f16 to f11, that will allow twice as much light to reach the camera's sensor. If a user changes the shutter speed by 1 setting, that increases or decreases the speed of the shutter by plus or minus half. When a user changes an f-stop, the user must also change the shutter speed for the exposure value (EV) to remain the same. Multiple combinations of shutter speeds and f-numbers can give the same exposure value. A shutter speed of 1/50 second with an *f*/4.0 setting gives the same exposure value as a 1/100 second shutter with an *f*/2.8 setting, and also the same exposure value as a 1/200 s shutter with an *f*/2.0 setting. The simple take away from this paragraph is that doubling the exposure time doubles the amount of light. Making the f-number one stop brighter also doubles the amount of light.

There are several camera settings that allow users to manipulate time. The easiest way to slow down or speed up time is by changing the camera's ISO. If a user changes the camera's ISO range from 200 at f11@1/60 to 160 at f11@1/50 to 125 at f11@1/40 to 100 at f11@1/30, all images will look exactly the same if nothing is moving in the image. However, if something is moving in the image such as flowing water, the water will become blurrier with each reduction in ISO because the shutter has to stay open longer since the correlation of shutter speed, f-stop and ISO has been changed. When the f-stop stays the same, the shutter speed changes. This is called Aperture Priority (A). When the shutter speed stays the same and the f-stop changes, this is called Shutter Priority (S). An example of when to use Shutter Priority (S) auto bracketing would be a waterfall. An example of when to use Aperture Priority (A) would be the vastness of the Grand Canyon. Additional aperture settings will be covered in the Aperture for Effect section.

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The second way to manipulate time is understanding the correlation between shutter speed and f-stop. The chart below applies this basic understanding.

f/stops	1.4	2	2.8	4	5.6	8	11	16	22
Shutter Speeds Divisions of One Second	250	125	60	30	15	8	4	2	1 sec
	500	250	125	60	30	15	8	4	2
	1000	500	250	125	60	30	15	8	4
	2000	1000	500	250	125	60	30	15	8
	4000	2000	1000	500	250	125	60	30	15
	8000	4000	2000	1000	500	250	125	60	30

What the chart above is demonstrating is equal exposure values by changing the shutter speed and aperture f-stop. The first line in the chart shows how a photographer can stop a moving object with an aperture of f2.8@1/60 of a second or blur the object with an aperture reading of f22@1 second. The main take away from the above chart is that all images in the first line would look the same as far as scene luminance. The two key factors that have changed is manipulation of time and the depth of field. The Aperture for Effect section will cover depth of field.

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Manipulation of Light via Exposure

A true photographer is a master of light. The core essence of a photographer's art is the ability to control and manipulate light. The more knowledge and mastery we have over light, the more power and control we have over our creativity. Unfortunately, many photographers have shifted their focus from mastering light to mastering post-production software. As a result, they often find themselves in time consuming cycle of editing and software upgrades.

The most important element in photography is proper exposure. The reason for auto bracketing the exposure is simple, it allows for the option of editing a near perfect images. When starting with a near perfect image, minor adjustments are usually all that is needed. Auto bracketing is also the solution for the display differences. What looks good on the camera display verses the laptop, the editing computer and what comes out of the printer are usually four different images. Once the shot is composed, I begin by finding the proper exposure by auto bracketing the exposure by +/- .3 stops. For those unfamiliar with auto bracketing, most modern day DSLR's allow users to auto bracket the camera exposure by five to nine frames. An example would be the Nikon D3x, which allows users to auto bracket by nine frames. The camera will take the correct exposure and then four images that are -.3 darker than the previous frame followed by 4 images that are +.3 brighter than the previous frame. Auto bracketing by +/- .3 stops will provide a range of 1.2 stops brighter and 1.2 stops darker. This range can be changed by selecting the (BTK) Bracketing or the (FN) Function button on Nikon cameras and using the thumb scroll to widen the range to .7 or 1 full stop. The majority of the time, I auto bracket by .3 exposure increments because I am looking for the perfect exposure at the perfect moment. Additional auto bracketing camera options that can be changed by the user are the aperture priority or shutter priority selection. When the Aperture Priority (A) is selected, the f-stop will not change and the camera will vary the shutter speed to increase and decrease exposure. When the Shutter Priority (S) is selected, the shutter speed will not change and the camera will cause the f-stop to increase and decrease exposure. While a lot of this information may seem basic to an experienced photographer, it's the process in which it's employed in the blink of an eye in the field that leads to special photos. An example of when to use Shutter Priority (S), Aperture Priority (A) and how to setup your camera to auto bracket will be given under the Camera Setup section.

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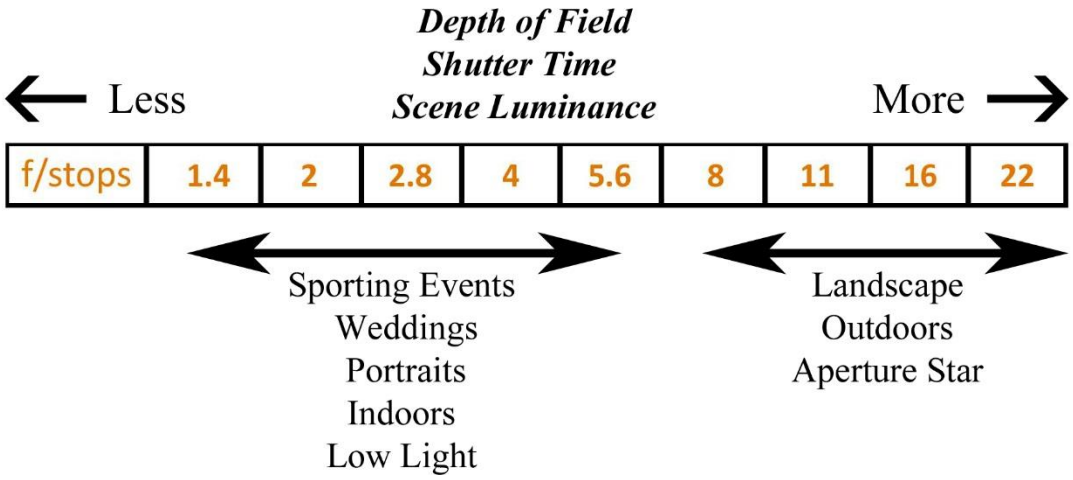
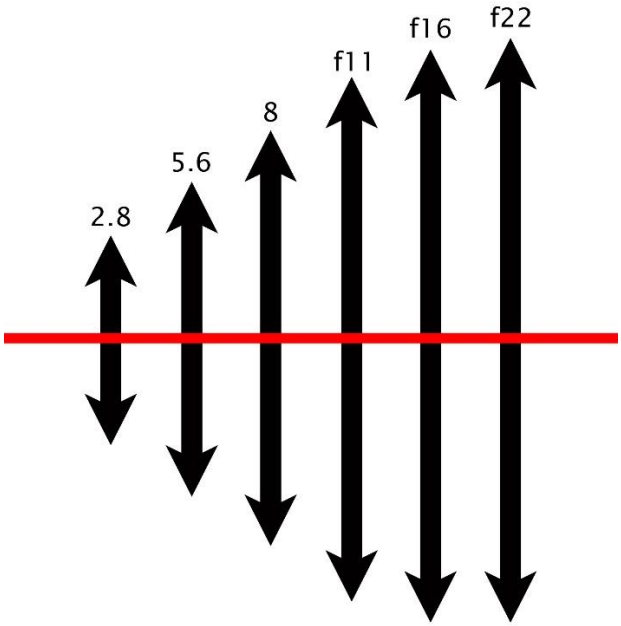
Aperture for Effect

The camera's aperture (f-stop) not only has a direct effect on shutter speed, but also the depth of field in an image. While an aperture setting of f22 does provide more depth of field, it will also require brighter scene luminance, as well as longer shutter speed than an aperture setting of f1.4. Depth of field is the area in an image that is in focus. The chart below provides an example of the correlation between aperture f-stop and depth of field.



Example of Depth of Field with Lens Focused at 10 Feet



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Aperture Depth of Field Exercise

This simple exercise will provide a better understanding of how the aperture f-stop effects image depth of field. By placing a series of objects at various distances and adjusting the camera's aperture f-stop, you will be able to see the differences in the depth of field as you increase the camera's f-stop.

Step 1: Set-up your tripod and camera in an open area.

Step 2: Place a trash bin 10 feet away from your camera.

Step 3: Place a chair 15 feet away from your camera.

Step 4: Place another trash bin 20 feet away from your camera.

Step 5: Place a medium sized object (table) 30 feet away from your camera.

Step 6: Finally, place a large object (car) 50 feet away from the camera.

Step 7: Set your camera lens to manual focus and focus on the chair at 15 feet.

Step 8: Set your camera's aperture f-stop to the lowest number (f2.8/f4/f5.6).

Step 9: Now, take a series of photos but increase the camera's f-stop number after each photo. As you increase the camera's f-stop, more objects should appear in focus.

Key Takeaways

The image with the lowest aperture (f2.8/f4/f5.6) should have produced an image in which the chair at 15 feet was in focus but the table at 30 feet and the car at 50 feet were not. It is also important to note each lens has a different depth of field. A wide angle lens has a greater depth of field then a telephoto lens. Visit www.dofmaster.com to calculate the depth of field for your lenses at various aperture settings and distances. The following charts demonstrate depth of field of a 50mm lens focused at 15 feet with the aperture set at f16, f8 and f4.

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Depth of Field

- 50 feet

- 30 feet

- 20 feet

- 15 feet

f4

- 10 feet

f8

f16

(Camera Focused at 15 feet)

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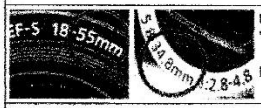
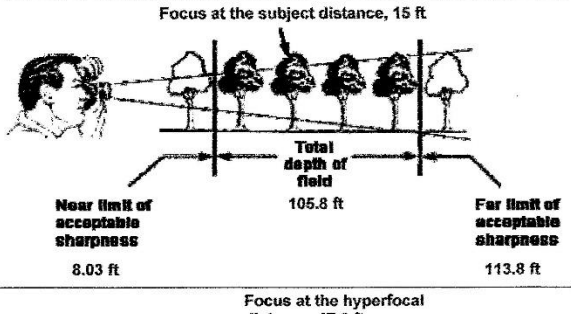
Depth of Field Calculator

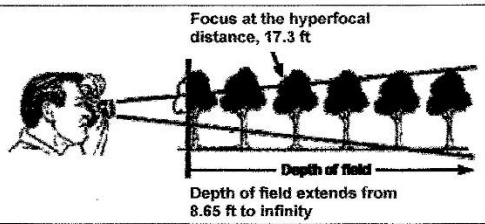
Camera, film format, or circle of confusion		Subject distance	15 ft
Nikon D4, D3x, D3s, D3			
Focal length (mm)	50	Depth of field	
Selected f-stop	f/16	Near limit	8.03 ft
Subject distance	15 feet	Far limit	113.8 ft
		Total	105.8 ft
		In front of subject	7 ft (7%)
		Behind subject	98.8 ft (93%)
		Hyperfocal distance	17.3 ft
		Circle of confusion	0.03 mm



Use the actual focal length of the lens for depth of field calculations. The calculator will automatically adjust for any "focal length multiplier" or "field of view crop" for the selected camera.

Focal lengths of digital camera lenses are listed **here**.





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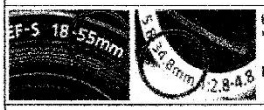
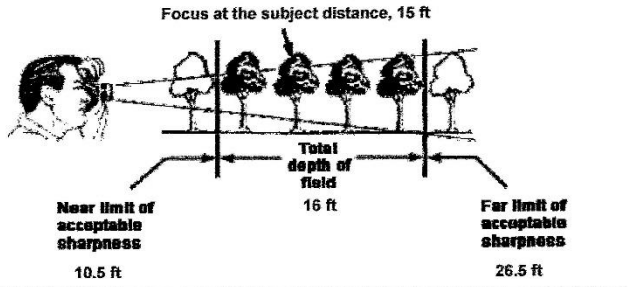
Depth of Field Calculator

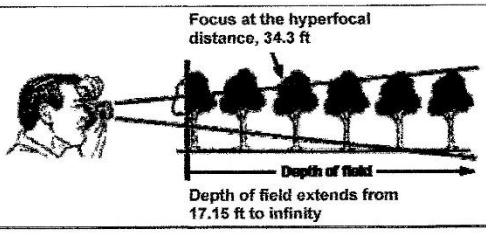
Camera, film format, or circle of confusion: Nikon D4, D3x, D3s, D3	Subject distance: 15 ft
Focal length (mm): 50	Depth of field
Selected f-stop: f/8	Near limit: 10.5 ft
Subject distance: 15 feet	Far limit: 26.5 ft
	Total: 16 ft
	In front of subject: 4.5 ft (28%)
	Behind subject: 11.5 ft (72%)
	Hyperfocal distance: 34.3 ft
	Circle of confusion: 0.03 mm



Use the actual focal length of the lens for depth of field calculations. The calculator will automatically adjust for any "focal length multiplier" or "field of view crop" for the selected camera.

Focal lengths of digital camera lenses are listed **here**.





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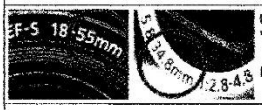
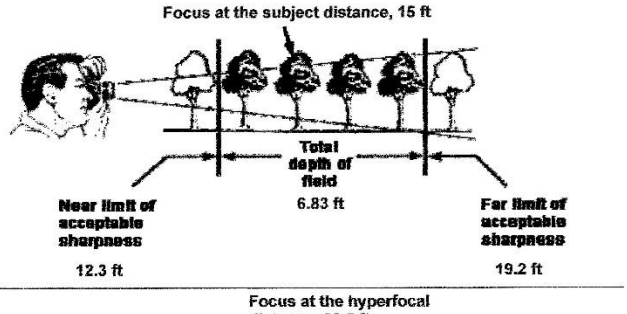
Depth of Field Calculator

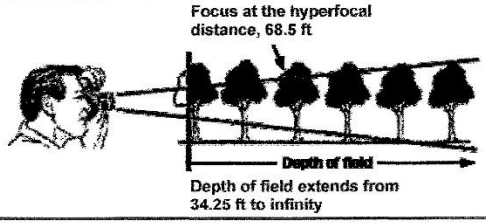
Camera, film format, or circle of confusion		Subject distance	15 ft
Nikon D4, D3x, D3s, D3			
Focal length (mm)	50	Depth of field	
Selected f-stop	f/4	Near limit	12.3 ft
Subject distance	15 feet	Far limit	19.2 ft
		Total	6.83 ft
		In front of subject	2.68 ft (39%)
		Behind subject	4.16 ft (61%)
		Hyperfocal distance	68.5 ft
		Circle of confusion	0.03 mm



Use the actual focal length of the lens for depth of field calculations. The calculator will automatically adjust for any "focal length multiplier" or "field of view crop" for the selected camera.

Focal lengths of digital camera lenses are listed **here**.





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Aperture Examples:

Aperture f1.4 50mm lens.

Aperture f4 35mm lens.

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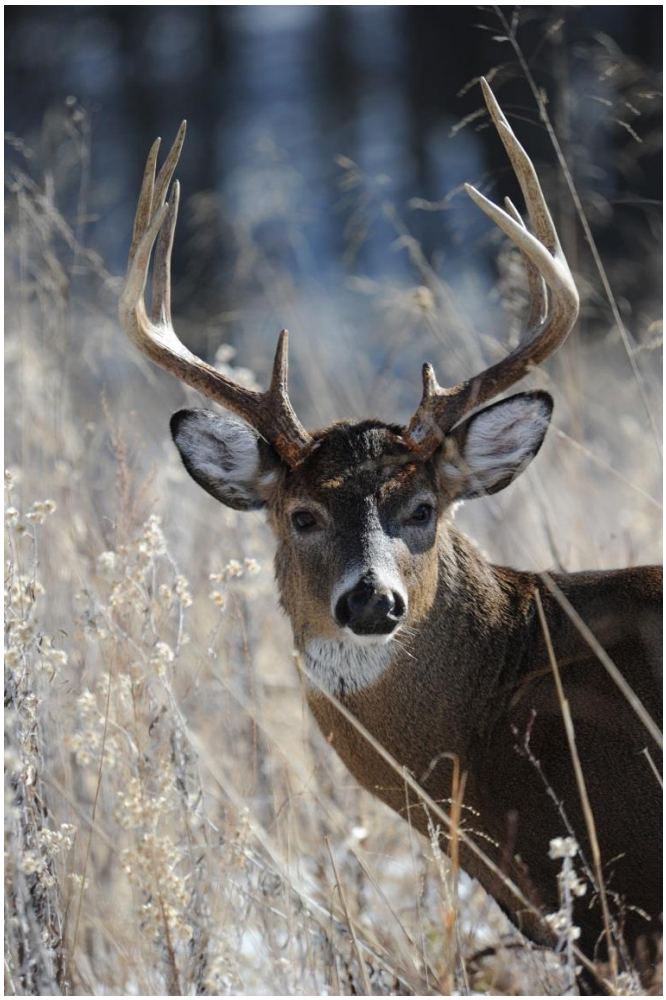

Aperture f5.6 400mm lens.

Low Number Apertures

Depth of Field (DOF) is the front-to-back zone of a photograph in which the image is razor sharp. As soon as an object falls out of this range, it begins to lose focus at an accelerating degree the farther out of the zone it falls. DOF is determined by three factors: aperture size, distance from the lens, and the focal length of the lens.

Low number f-stops (f1.4, f2.8, f4, and f5.6) are mostly used when a photographer wants to limit the depth of field. This aperture effect is commonly used in wildlife, sports, food, portraits and weddings photography.

Aperture f8 70mm lens.

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Aperture f11 14mm lens.

High Number Apertures

High number f-stops (f11, f16, and f22) are mostly used when a photographer wants a large area in focus. This aperture effect is commonly used in landscape images where front-to-back depth of field is required. Keep in mind there is a reciprocal relationship between shutter speed and aperture. Large number apertures require the shutter to stay open longer.

Aperture f16 14mm lens.

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The images below will provide examples of Aperture for Effect. Each image has a different aperture setting ranging from f11 to f22 and each image has a different (EV) Exposure Value ranging from -.7 to +1.0.

Mesa Arch in Canyonlands National Park, Utah.
Camera settings: Nikon D3x 14-24lens at f16@1/40 -.7 Exposure Value.

Toroweap Overlook in Grand Canyon National Park, Arizona.
Camera settings: Nikon D3x 14-24lens at f11@1/80 +1.0 Exposure Value.

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Japanese Botanical Garden in Portland, Oregon.
Camera settings: Nikon D3x 14-24lens at f22@1.3 seconds +.3 Exposure Value.

The above images provide excellent examples of Aperture for Effect. Each image has a different aperture setting ranging from f11 to f22 and each image has a different (EV) Exposure Value ranging from -.7 to +1.0. The correlation of exposure value and aperture setting for each image's aperture star demonstrates the unique opportunities when proper camera settings are used. Each image was auto bracketed from f11-f22 by +/- .3 using the Aperture Priority (A) setting. The auto bracketing of this range provided two benefits. First, it ensured proper exposure and second, it provided a range of aperture star intensity. The defining choice on what image to use was based on the aperture star. The Japanese Botanical Garden image required a more intense aperture star caused by the f22 setting, while the Toroweap Overlook image required less intensity so f11 was chosen.

The Process

The best advice anyone could give in photography is to keep it simple. The principles of the Four Factors of a Great Photo are built on basic manipulation of time and light. Proper exposure with minor editing manipulation will produce more superior results than an image that has been over-edited. Editing software is a great tool, however, too many photographers rely on the software to fix camera-based issues. In Photoshop, when something is pushed, it often pulls something else out. Exposure is an excellent example. The next 3 sections (Scouting, Camera Setup and Editing) will bring it all together.

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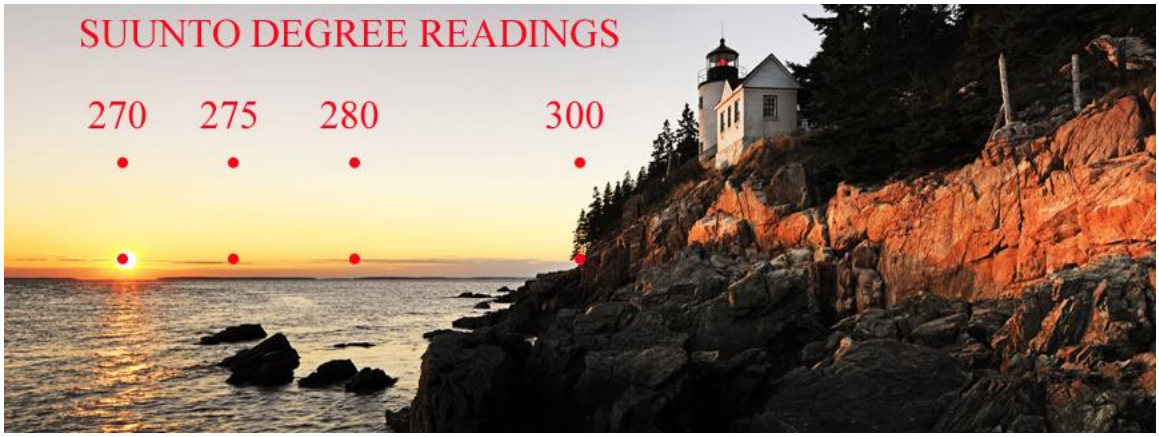
Scouting

Understanding how to scout for photo locations and knowing the tricks of the trade are what lead to special photos. Three scouting tools that a photographer should not live without are the freetidetables.com, Suunto Tandem 360 compass and sunPATH software. Using the photo below, I will demonstrate the importance of each tool.

In this photo of Bass Harbor Lighthouse located in Bar Harbor, Maine, all three scouting tools play an important role. The sunPath software and Suunto Tandem were used to determine what time of year the sun would set between 270-280 degrees. The smart phone app Photoephemeris can also be used to determine sunrise and sunset degrees but is less accurate then sunPATH. The image below shows degree placement in the photo.



By placing the GPS coordinates of Bass Harbor Lighthouse into the sunPATH software, the sun will set at 277 degrees on 10/13/13 and 270 degrees on 10/28/13 which allows for a two week window to capture this photo. The second factor that comes into play here is the tide table. The dark discolored rock indicates high tide. During low tide, water recedes, making additional rocks visible on the left side of the image. Ideal tide conditions for this location is when mid-tide and sunset correlate. Based on the two week window, when the sun will set between 270-280 degrees and correlate with mid-tide, the

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combination of these two events produces a three day window per year to capture this photo. The charts below were used to correlate this information.

Maine, Bar Harbor, Bass Harbor — **October 2013**
N 44° 14.5' / W 68° 21.2'

◆ mid-tide at sunset (277 degrees) ◆ high tide at sunset (270 degrees)

Date	Day	High Tide	High Tide	Low Tide	Low Tide	Sunrise	Sunset	Moonrise	Moonset	Phase
1	Tu	851am 9.3	909pm 9.8	210am 1.0	230pm 1.1	631am	613pm	256am	420pm	
2	We	934am 9.7	952pm 10.0	254am 0.7	314pm 0.7	632am	611pm	358am	448pm	
3	Th	1013am 10.1	1033pm 10.3	334am 0.4	355pm 0.3	633am	609pm	501am	517pm	
4	Fr	1051am 10.6	1113pm 10.5	412am 0.2	434pm -0.1	634am	608pm	607am	547pm	
5	Sa	1129am 11.0	1153pm 10.7	450am -0.1	514pm -0.5	636am	606pm	714am	619pm	New
6	Su	1208pm 11.2		528am -0.2	555pm -0.7	637am	604pm	823am	655pm	
7	Mo	1235am 10.7	1249pm 11.4	609am -0.2	639pm -0.8	638am	602pm	931am	737pm	
8	Tu	120am 10.6	135pm 11.4	653am -0.1	727pm -0.7	639am	600pm	1039am	825pm	
9	We	208am 10.4	225pm 11.3	741am 0.2	819pm -0.6	641am	559pm	1142am	920pm	
10	Th	302am 10.1	320pm 11.1	836am 0.4	917pm -0.4	642am	557pm	1239pm	1022pm	
11	Fr	401am 9.9	422pm 10.8	937am 0.7	1020pm -0.1	643am	555pm	130pm	1129pm	1st
12	Sa	506am 9.8	529pm 10.6	1044am 0.7	1126pm 0.0	644am	553pm	213pm		
13	Su	613am 9.9	638pm 10.5	1153am 0.7		646am	552pm	252pm	1239am	
14	Mo	719am 10.1	744pm 10.6	1232am 0.0	101pm 0.4	647am	550pm	326pm	149am	
15	Tu	820am 10.5	◆ 846pm 10.8	134am -0.2	◆ 203pm 0.0	648am	◆ 548pm	357pm	259am	
16	We	916am 10.9	942pm 11.0	231am -0.4	300pm -0.5	649am	547pm	428pm	409am	
17	Th	1006am 11.2	1033pm 11.1	324am -0.5	352pm -0.7	651am	545pm	459pm	517am	
18	Fr	1053am 11.4	1121pm 11.0	412am -0.6	440pm -0.9	652am	543pm	530pm	624am	Full
19	Sa	1137am 11.4		456am -0.4	525pm -0.9	653am	542pm	604pm	730am	
20	Su	1205am 10.8	1219pm 11.2	539am -0.1	608pm -0.7	654am	540pm	642pm	833am	
21	Mo	1248am 10.4	1259pm 11.0	621am 0.2	650pm -0.4	656am	538pm	723pm	933am	
22	Tu	131am 10.0	141pm 10.6	702am 0.7	733pm 0.0	657am	537pm	808pm	1028am	
23	We	214am 9.7	223pm 10.2	745am 1.0	817pm 0.4	658am	535pm	857pm	1118am	
24	Th	259am 9.2	309pm 9.9	830am 1.4	904pm 0.7	700am	534pm	950pm	1203pm	
25	Fr	346am 8.9	357pm 9.5	919am 1.8	953pm 1.1	701am	532pm	1045pm	1243pm	
26	Sa	437am 8.7	450pm 9.2	1011am 1.9	1046pm 1.3	702am	531pm	1142pm	118pm	3rd
27	Su	530am 8.7	◆ 545pm 9.1	1107am 1.9	1139pm 1.4	704am	◆ 529pm		150pm	
28	Mo	623am 8.7	641pm 9.1	1203pm 1.9		705am	528pm	1241am	219pm	
29	Tu	715am 9.0	735pm 9.2	1231am 1.3	1257pm 1.6	706am	526pm	142am	247pm	
30	We	804am 9.5	826pm 9.5	121am 1.1	148pm 1.1	708am	525pm	244am	315pm	
31	Th	849am 9.9	913pm 9.9	207am 0.8	235pm 0.7	709am	523pm	348am	344pm	

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Bass Harbor, Maine

Latitude 44° 14' N
Longitude 68° 21' W
Magnetic Declination 18° W

N

Time Zone: 5 Eastern
Daylight Savings Time
(3/10/13 to 11/ 2/13)

Azimuth Bearings are given for MAGNETIC NORTH. DO NOT make a correction with your compass. The Magnetic Declination has been used in the calculations.

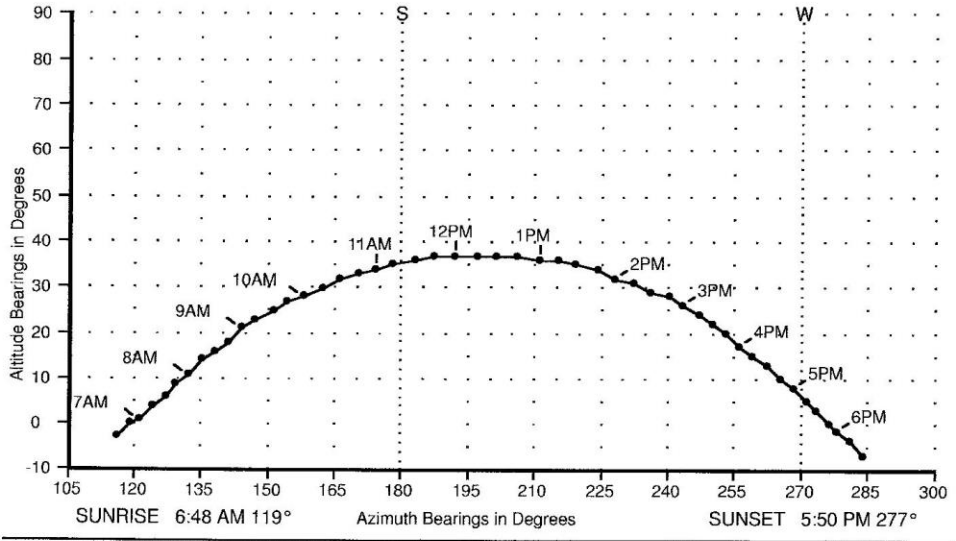
	Date	Dawn	SUNRISE	Azimuth	Day Length	SUNSET	Azimuth	Dusk
Tue	10/15/13	6:28 AM	**6:48 AM**	119°	11:02	**5:50 PM**	277°	6:10 PM

Tuesday, October 15, 2013

15 minute intervals — AZ°- Azimuth ALT°- Altitude

	AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*
	116	-3	---	9AM	144	21	2.60		183	36	1.38	2PM	228	32	1.60		262	13	4.33
	119	0	---		147	23	2.36		187	37	1.33		232	31	1.66		265	10	5.67
7AM	121	1	57.3		151	25	2.14	12PM	192	37	1.33		236	29	1.80	5PM	268	8	7.12
	124	4	14.3		154	27	1.96		197	37	1.33		240	28	1.88		271	5	11.4
	127	6	9.51	10AM	158	28	1.88		201	37	1.33	3PM	243	26	2.05		273	3	19.1
	129	9	6.31		162	30	1.73		206	37	1.33		247	24	2.25		276	0	---
8AM	132	11	5.14		166	32	1.60	1PM	211	36	1.38		250	22	2.47	6PM	278	-2	---
	135	14	4.01		170	33	1.54		215	36	1.38		253	20	2.75		281	-4	---
	138	16	3.49	11AM	174	34	1.48		219	35	1.43	4PM	256	17	3.27		284	-7	---
	141	18	3.08		178	35	1.43		224	34	1.48		259	15	3.73				

* Shadow Length = Object Height x Shadow Factor (Sf)



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Bass Harbor, Maine

Latitude 44° 14' N
Longitude 68° 21' W
Magnetic Declination 18° W

N

Time Zone: 5 Eastern
Daylight Savings Time
(3/10/13 to 11/ 2/13)

Azimuth Bearings are given for MAGNETIC NORTH. DO NOT make a correction with your compass. The Magnetic Declination has been used in the calculations.

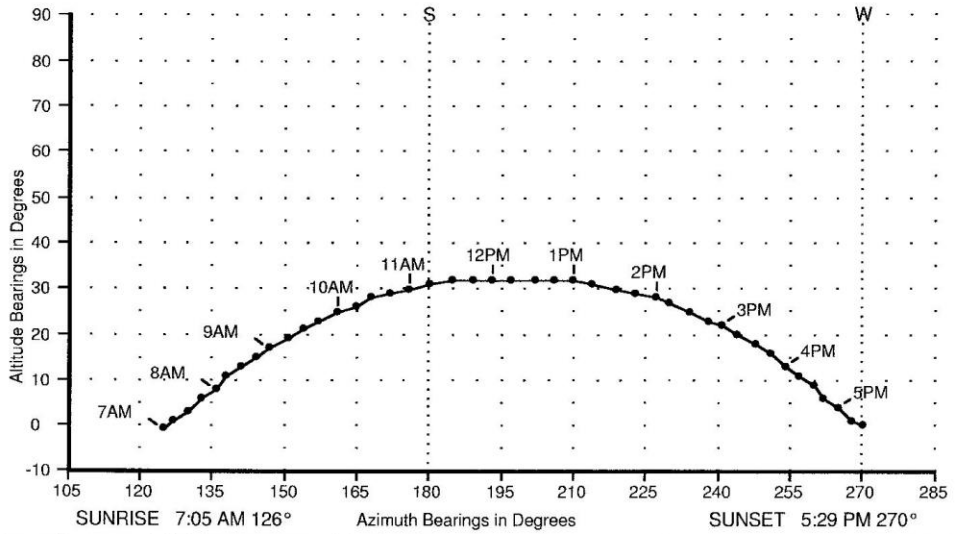
	Date	Dawn	SUNRISE	Azimuth	Day Length	SUNSET	Azimuth	Dusk
Mon	10/28/13	6:45 AM	**7:05 AM**	126°	10:24	**5:29 PM**	270°	5:49 PM

Monday, October 28, 2013

15 minute intervals — AZ°- Azimuth ALT°- Altitude

	AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*
7AM	125	-1	---		151	19	2.90		185	32	1.60		223	29	1.80	4PM	254	13	4.33
	127	1	57.3		154	21	2.60		189	32	1.60	2PM	227	28	1.88		257	11	5.14
	130	3	19.1		157	23	2.36	12PM	193	32	1.60		230	27	1.96		260	9	6.31
	133	6	9.51	10AM	161	25	2.14		197	32	1.60		234	25	2.14		262	6	9.51
8AM	136	8	7.12		165	26	2.05		202	32	1.60		238	23	2.36	5PM	265	4	14.3
	138	11	5.14		168	28	1.88		206	32	1.60	3PM	241	22	2.47		268	1	57.3
	141	13	4.33		172	29	1.80	1PM	210	32	1.60		244	20	2.75		270	0	---
	144	15	3.73	11AM	176	30	1.73		214	31	1.66		248	18	3.08				
9AM	147	17	3.27		180	31	1.66		219	30	1.73		251	16	3.49				

* Shadow Length = Object Height x Shadow Factor (Sf)



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The image below of Bahia Honda State Park, Florida is an example of correlating low tide with high noon. The sunlight of high noon produces clear water.

Key West, Florida

Latitude 24° 33' N
Longitude 81° 48' W
Magnetic Declination 4° W

N

Time Zone: 5 Eastern
Daylight Savings Time
(3/10/13 to 11/ 2/13)

Azimuth Bearings are given for MAGNETIC NORTH. DO NOT make a correction with your compass. The Magnetic Declination has been used in the calculations.

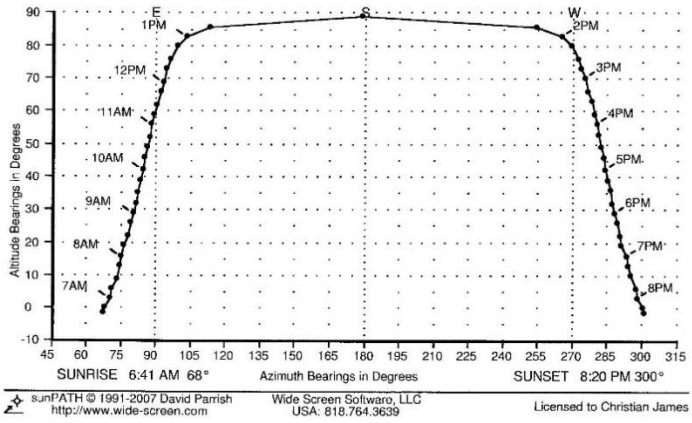
	Date	Dawn	SUNRISE	Azimuth	Day Length	SUNSET	Azimuth	Dusk
Fri	6/28/13	*6:23 AM*	**6:41 AM**	68°	13:39	**8:20 PM**	300°	*8:38 PM*

Friday, June 28, 2013

15 minute intervals — AZ°- Azimuth ALT°- Altitude

	AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*		AZ°	ALT°	Sf*
	67	-2	---		82	35	1.43		96	76	0.25		278	63	0.51		290	22	2.47
	68	0	---		83	39	1.23		99	80	0.18		279	59	0.60		291	19	2.90
7AM	70	3	19.1	10AM	84	42	1.11	1PM	103	83	0.12	4PM	280	56	0.67	7PM	293	16	3.49
	71	6	9.51		85	46	0.97		113	86	0.07		281	53	0.75		294	13	4.33
	73	9	6.31		86	49	0.87		179	89	0.02		282	49	0.87		295	10	5.67
	74	13	4.33		87	52	0.78		254	86	0.07		283	46	0.97		297	6	9.51
8AM	75	16	3.49	11AM	88	56	0.67	2PM	265	83	0.12	5PM	284	42	1.11	8PM	298	3	19.1
	76	19	2.90		89	59	0.60		269	80	0.18		285	39	1.23		300	0	---
	78	22	2.47		90	62	0.53		272	76	0.25		286	36	1.38		301	-2	---
	79	26	2.05		92	66	0.45		273	73	0.31		287	32	1.60				
9AM	80	29	1.80	12PM	93	69	0.38	3PM	275	70	0.36	6PM	288	29	1.80				
	81	32	1.60		94	73	0.31		276	66	0.45		289	26	2.05				

* Shadow Length = Object Height x Shadow Factor (Sf)



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Professional Equipment vs Amateur Equipment:

Nikon D3x 24-70mm Lens @ 70mm f5@ 1/250 second ISO 500 Exposure Value -1.7
Printed on Ilford Galerie Smooth Pearl. JPEG File.

The difference in professional equipment vs amateur equipment may seem minor on paper but the differences becomes more noticeable in the field. When I first bought the Nikon D3x, I assumed the only real difference between the D3x and the D700 would be image size. The D700 was rated at 12.1 megapixels and the D3x was rated at 24.3 mega pixels. But after a few weeks in the field, I really noticed a difference in the two cameras.

During speaking events, I always tell the audience that photography is 50% luck, 40% skill and 10% equipment. While equipment does not make a photographer nor a photo, it can hinder the outcome. In the above photo, I had two cameras setup side by side, a Nikon D3x with a Nikon 24-70mm lens set at 70mm and a Nikon D700 with a Nikon 80-400mm lens set at 80mm. At the time, the Nikon D700 ($2800) was the third best camera body Nikon offered and the Nikon D3x ($7900) was the premier camera body. The Nikon D3x produced the image above while the D700 produced a blurred image. On paper, the only real difference between the two camera bodies is cost and image megapixels. Both camera bodies have a CMOS sensor, five frames per second and a 51

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point auto focus system. An argument could be made for the differences in lenses but both lenses are well suited for this situation and have a comparable cost of around $2000. The main reason the Nikon D700's image did not turn out is because of the inner workings of the camera. While the cameras may share certain components, they do not share image processers or auto focus software. The image processor is what produces the dynamic range of color depth and how fast the auto focus system zeroes in on a moving object.

In today's consumer market, everyone zeroes in on megapixels rather than the quality of the image. Megapixels represents the size of the image. Dynamic range of color depth represents image quality. If I took a picture of a rainbow with a 12.1 megapixel Nikon D700, it would capture six colors of the rainbow whereas the 24.3 megapixel D3x would capture nine colors. If I took out my 41 megapixels Nokia Lumia cell phone and took a picture of the same rainbow, it may only capture three colors of the rainbow. Common sense would tell you that a $199 cell phone is not going to produce a better image than a $7000 camera.

The point of this section is about finding value in your price range and weeding out misinformation. Looking at the current Nikon line up of cameras, there is a reason that each camera costs more than the next. The Nikon D3x is still Nikon's most expensive camera body with a cost around $7000, the Nikon D4 currently costs $6000, the D800 costs around $3000, the D610 costs around $2000 and the D300 costs around $1600. To me, the best deal in this line up for an amateur photographer is the Nikon D610. It offers the 24.3 CMOS sensor of the D3x with the Expeed 3 image processer of the D800. The downside of the D610 is the auto focus system only has a 39 point auto focus system. Will the Nikon D610 focus adequately on a bright summer day for a soccer game? The answer would most likely be yes, however, the camera would likely fail in snowy conditions with a train steaming ahead. The Nikon D300 is a decent camera and the 12.1 megapixel sensor that will produce a clean 24x36 inch print, but the camera has a 1.5 X lens crop factor which makes it a tough recommendation for me. The Nikon D800 is probably the best value out of any camera on the market but most users will never fully use a 36 megapixel sensor which has the capabilities of producing 60x100 inch prints. In the end, it's all about making educated decisions and buying the best value in your price range.

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Camera Equipment

Deciding what camera equipment to buy is never an easy decision. The equipment list below will go over the recommended camera equipment as if I were a first time buyer.

1. Nikon or Canon Full Frame DSLR Camera

2. Camera Lens – First Lens to Purchase with UV Filter. (1) = Best Choice.
   Nikon Camera Lenses: (1) AF-S Nikkor 24-70mm f/2.8G ED Autofocus or
   (2)Nikon AF-S N Nikkor 24-120mm f/4G ED VR Zoom Lens
   or
   Canon Camera Lenses: (1) Canon EF 24-70mm f/2.8L II USM Lens or
   (2) Canon EF 24-105mm f/4L IS USM Autofocus Lens

3. Quality Camera Bag – Lowepro are Quality Bags

4. Adobe Lightroom or Adobe Photoshop

5. Quality Tripod with Ballhead that has a Quick Release.
   Gizto Carbon Fiber Tripod (1) or Manfrotto Aluminum Tripod (2)

6. Camera Lens – Second and Third Lenses to Purchase.
   Landscape Photographers – 14mm-24mm Wide Angle Zoom Lens
   Wild Life or Sports (Parents) – 80-400mm 5.6 Zoom Lens

7. Landscape Photographers – Additional Equipment – Must Haves
   Bubble Level – mounts in the camera's hot shoe.
   Lee Filters 100mm Slipover Foundation Kit (4x4", 4x6" Filter Holder)
   Lee Filters 100 x 150mm 0.9 Soft-Edge Graduated Neutral Density Filter
   Wide Angle Filter System with 0.9 Soft-Edge Graduated Neutral Density Filter

8. Sensor Cleaning Equipment – VisibleDust 724 1.6X Bundle

9. Canon or Epson 17 Inch or Larger Photo Printer

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The list below is the camera gear I currently own, use and recommend.

1. Camera Bodies: Nikon D3x and Nikon D700

2. Nikon Lenses: 14-24mm f2.8 lens, 24-70mm f2.8 lens, 80-400mm lens, 24mm Tilt/Shift lens, 50mm f1.4 lens and 600mm f4 lens

3. Gitzo Carbon Fiber Tripod (G1228) with Gitzo Ballhead (G1277M)

4. Gitzo Aluminum Tripod (G1410mk2) with Wimberley Gimbal Tripod Head

5. Manfrotto 131TC Geared Column with Clamp with Gitzo GH1780 Center Ballhead

6. ProMaster SystemPro Clamper Mini Tripod

7. Hassleblad Quick Release Camera System - Tripod Quick Coupling Plate S (BH Part # HATQCPS) and Hasselblad Tripod Quick Coupling S 45144 (KEH.com # 45144)

8. Lee SW150 Filter Holder Kit for Nikon 14-24mm Lens - LEE Filters 150 x 170mm (1.2, 0.9 and 0.6) Soft-Edge Graduated Neutral Density Filter and 0.9 Hard-Edge Graduated Neutral Density Filter. Note: 1.2 is a 4 Stop Filter, 0.9 is a 3 Stop filter and 0.6 is a 2 Stop Filter

9. Lee Filter Holder Foundation Kit with Lee 77 Adapter Ring for Nikon 24-70mm f2.8 lens, 80-400mm lens. Singh-Ray 100 x 150mm Galen Rowell (1.2, 0.9 and 0.6) Soft-Edge Graduated Neutral Density Filter and 0.9 Hard-Edge Graduated Neutral Density Filter

10. Polarizer Filter and UV Filters

11. Nikon Flash Speedlight SB-910. Gary Fong Lightsphere with Amber Dome

12. VisibleDust 724 Sensor Cleaning Equipment with all Swabs and Solutions

13. Manfrotto 337 Double Axis Spirit Bubble Level

14. Camera Bags: Lowepro Pro Trekker 600 AW Backpack, Lowepro Pro Trekker 400 AW Backpack, Lowepro DryZone 200 Backpack

15. Canon iPF8300 44 Inch Printer with Moab Slickrock Metallic Pearl Paper, Ilford Galerie Smooth Pearl and Fuji Film Professional Vivid Canvas with Moab Desert Varnish

16. Hasselblad 503cw Camera Body with 40mm, 60mm, 80mm and 140-280mm lenses

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Camera Setup

The information that I have provided on how to setup your camera and what accessory equipment to use has come from ten years of trial and error. During that time frame, I have developed a process of camera setup and image editing that I refer to as Filter Highlight Photography. This process has led to consistent results that are reproducible for all skill levels. This page will walk you through the process of setting up your camera for Filter Highlight Photography.

Step 1: Set your camera to auto bracket by 3, 5, 7 or 9 exposures depending on make and model by increments of +/- .3 using the Aperture Priority (A) mode. Rarely do I use Shutter Priority (S) mode. Examples on how to setup up your camera's auto bracketing can be found at the end of this section.

Step 2: Set your camera's shutter Release Mode to CL (Continuous Low Speed) or CH (Continuous High Speed). This setting will allow the camera to auto bracket all exposures at once.

Step 3: Nikon users can press menu – interval timer (Under Camera Icon) – ok and the camera will fire off all frames at once. The advantage to using the interval timer over a shutter release cable is less vibration. This function can also be used for a single frame. Canon users have to use a cable release.

Step 4: Set camera image capture to JPEG- Fine and Raw.

Step 5: Insert appropriate ND filter. Most often I use a 3 Stop Soft-Step (0.9) ND Filter.

Auto Bracketing - Camera Setup Examples

Nikon D700 auto bracket setup

1. Press the (Fn) function button on the front of the camera.
2. Use the rear thumb scroll and select the number of frames to auto bracket by 3, 5, 7 or 9.
3. Use the front pointer finger scroll and select the size (.3 .7 .9) of the exposure increments.

Nikon D3x auto bracket setup

1. Press the (BKT) bracket button on the top left of the camera.
2. Use the rear thumb scroll and select the number of frames to auto bracket by 3, 5, 7 or 9.
3. Use the front pointer finger scroll and select the size (.3 .7 .9) of the exposure increments.

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Canon EOS 7D or 5D Mark III auto bracket setup

1. Click the Quick Menu (Q) button on the back of the camera.
2. Use the front scroll to adjust the size of the exposure increments. There are 3 bracketed stops for the 7D and 3, 5 or 7 for the 5D Mark III.
3. Adjust the number of bracketed shots, for the 5D Mark III, under C: Fn1: Exposure in the Menu Settings.

Editing

The most important element in photo editing is starting with a near perfect image. As stated before, an image with minor editing manipulation will produce more superior results then an image that has been over-edited. Auto bracketing all but ensures a proper range of exposures to begin the editing process. I start the editing process by finding what initially appears to be the perfect exposure at the perfect moment and put it through my defined editing steps. These editing steps will be covered later in this section. After editing the image to what appears to be a final "screen image," I print the image. Once the image comes out of the printer, I usually say to myself "I wish the image was a little lighter or darker." I will then go back into my auto bracketing files and pull the appropriate image. I reapply my editing steps and reprint the image until a final print is achieved. Prior to owning my own printer, I would send three images to the printer and then select the best image of the three to edit into a final print. For those who are new to photography or high-end printing, a screen image and print image are rarely comparable, no matter how expensive the monitor or calibration software. The best indicator of proper color control will come from an entry level printer such as a Canon PIXMA PRO-10 Professional Photo Inkjet Printer with Ilford Pearl paper, not a high end monitor. My advice is to buy a $250 Samsung monitor and a $500 printer instead of a $1100 high-end monitor with calibration software.

Each image presents a unique editing challenge but this process of minor manipulation has produced all of the images in my books and galleries. Photoshop and Lightroom Steps are as follows:

Step 1: 75% of time I start with a Jpeg file in landscape photography due to color control. If the image has a blue tint, I start with a Raw File due to the image's white balance being off. Example images will be provided under the Bringing It All Together Section.

Step 2: Shadow/Highlight Adjustment - In Photoshop, after opening an image, select: Image > Adjustments > Shadow/Highlights = usually no more than 10% adjustment is needed for each.

Step 3: Selective Color Adjustment - Image > Adjustments > Selective Color. Usually "+" to the neutral by 3-5% in general landscape.

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Waterfalls and golf courses "- " to yellow by as much as 30% to bring the images green color inline. Night Photos "+" 3-5% to black and "-" 3-5% neutrals. This darkens the black sky and lightens the buildings.

Steps 4: Brightness and Contrast Adjustment - Image > Adjustments > Brightness/Contrast

Step 5: Vibrance and Saturation or Selective Color Adjustment - Image > Adjustments > Vibrance and Saturation. Usually no more then 3-5%.

Step 6: Repeat steps 2-5 as needed.

Step X: On occasion, I will try the Photoshop auto features of Auto Tone, Auto Contrast, Auto Color and the HDR Toning which are under image adjustments drop down. I also utilize the Dodge/Burn Tool and the Blur Tool on occasion.

Printing Notes: When editing an image, it is important to plan for the differences between the screen image and the printed image. Printed images usually print darker than screen images. Paper selection can also affect the outcome of the final print as certain papers print are darker than others. Metallic paper prints the darkest followed by gloss paper then semi-gloss then pearl and then matte. The top three papers I recommend are Moab Slickrock Metallic Pearl Paper, Ilford Galerie Smooth Pearl and Fuji Film Professional Vivid Canvas with Moab Desert Varnish.

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Bring It All Together

JPEG vs RAW

The most important element in photography to me is proper exposure. I have found that auto bracketing my exposure while using a 3 stop neutral density filter is more important than the file format for landscape photographers.

Whether you shoot JPEG or RAW, each format has its advantages. For this reason, I have my camera image quality file format set to RAW and JPEG Fine. RAW files are able to be edited more extensively in post-processing but this added benefit also comes with limited ICC. Information Color Control is a color algorithm that matches the color from the camera to the printer. Users of RAW must rely on their computer monitor as their Information Color Control. In my opinion, unless a landscape photographer does their own printing RAW files can produce more negative results then JPEG. RAW is recommended for one shot applications such as weddings and portraits.

Currently, I use more JPEG files then RAW files because auto bracketing while using a three stop neutral density filter all but ensures proper exposure with excellent detail in the highlights. The ICC algorithm of a JPEG file produces a great starting point for color consistency. If the exposure is near perfect and the color consistency is near perfect, the additional information RAW file provides will not be needed during editing. As stated before, an image with minor editing manipulation will produce more superior results than an image that has been over-edited. Whether you choose to use RAW or JPEG, the only thing that matters in the end is the quality of the final product. Examples of editing techniques, camera settings, file format and camera equipment used will be provided below.

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Raw File Example:

Nikon D3x 24-70mm Lens @ 55mm f9@6 seconds ISO 400 Exposure Value -3.3
3 Stop (0.9) Soft-Step Spilt ND Filter used on sky. Boat was light painted with a Sirius 500 LED Spotlight. Printed on Moab Slickrock Metallic Pearl Paper.

This is an image where a RAW file was used. The blue tint of the top image is a key example of when the white balance is off. Simply changing the white balance setting in Photoshop from (As Shot) to (Cloudy) improved the image by 80%.

Edit Step 1: Shadow +20%.

Edit Step 2: Dodge Tool used to lighten the boat.

Edit Step 3: Blur Tool used to "blur out" any noise in the sky.

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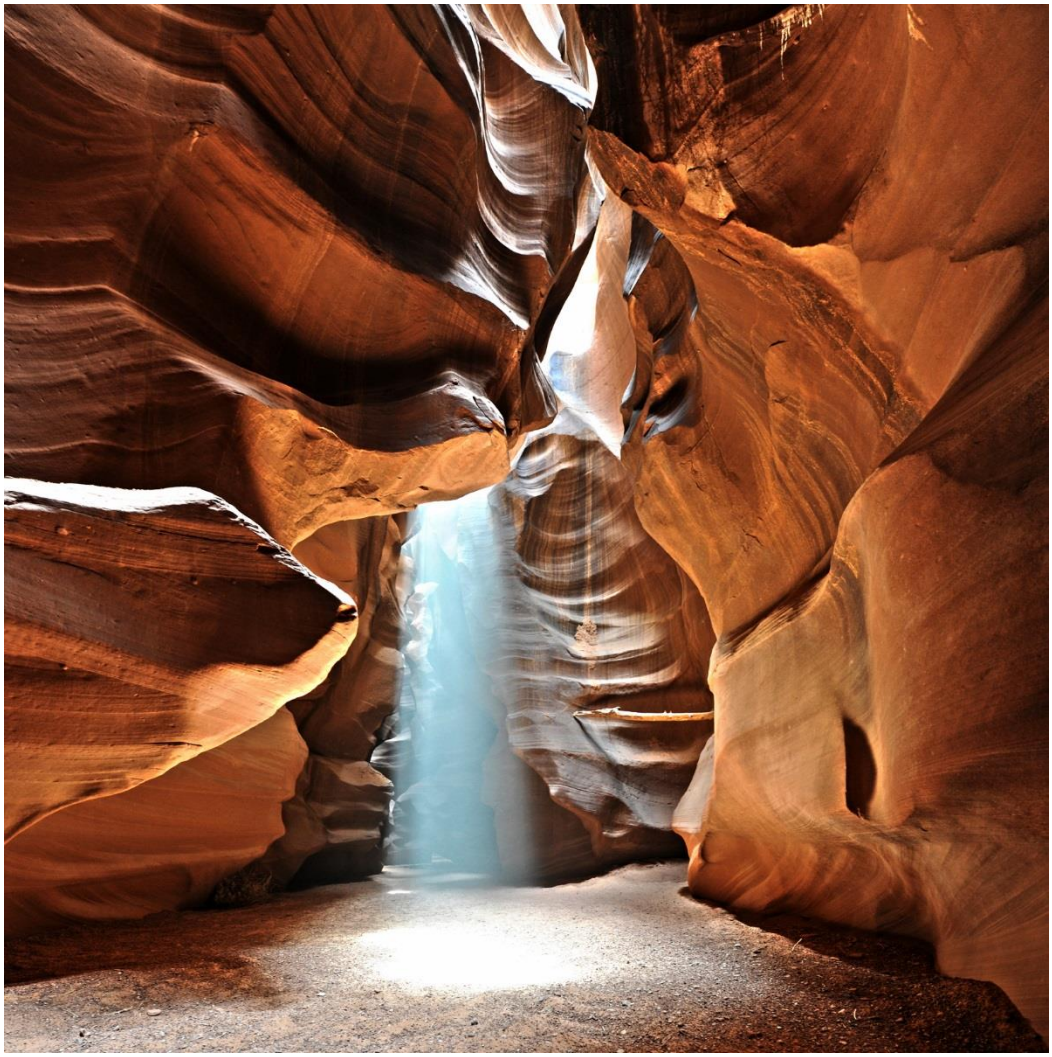
JPEG File Example:



Nikon D3x 14-24mm Lens @ 14mm f9@ 1/4 second ISO 400 Exposure Value +0.7
Printed on Moab Slickrock Metallic Pearl Paper.

The number one concern people have about JPEG is loss of information. While this is partly true, the information that is lost is what I call “spare tire” information. The additional information a RAW file provides is only needed if the image is not captured correctly in camera. The file size of this image provides an excellent example of this theory. RAW file size with no editing straight from camera 26.3MB. RAW file opened and saved as a JPEG with no editing 13.1MB. JPEG file size with no editing straight from camera 12.4MB. Final JPEG image size with editing 14.1MB.

Edit Step 1: Shadow +8% Highlight +6%

Edit Step 2: Brightness +6% Contrast +9%

Edit Step 3: Vibrance +2% Saturation +3%

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JPEG File Example:

Nikon D3x 14-24mm Lens @ 15mm f22@ 1/3 second ISO 50 Exposure Value -1.3
4 Stop (1.2) Soft-Step Spilt ND Filter used on sky. Foreground stones were splashed with water to provide color depth. JPEG File

Edit Step 1: Shadow +8% Highlight +9%

Edit Step 2: Selective Colors = Adjust Neutrals by +5% to blacks

Edit Step 3: Brightness +5% Contrast +8%

Edit Step 4: Vibrance +4% Saturation +4%

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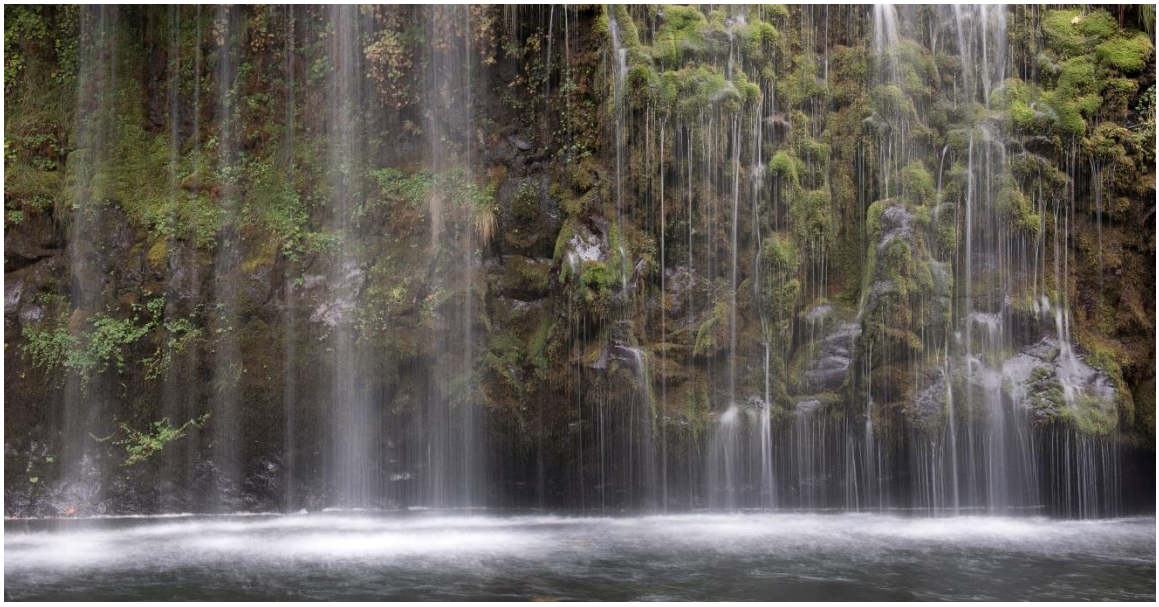
Neutral Density Filter vs Polarizer Filter:



Nikon D3x 24-70mm Lens @ 35mm f13@ 1/3 second ISO 100 Exposure Value -0.3 Polarizer Filter used for water clarity. Printed on Moab Slickrock Metallic Pearl Paper. JPEG File.

Knowing when to use a Polarizer Filter or ND Filter is the number one mistake I see in the field. Most often, I see amateur photographers using a Polarizer Filter when they want the effect of ND Filter. The only time I use a Polarizer Filter is when I want to cut the clarity of water. A Neutral Density Filter should be used to darken highlight areas of an image instead of a Polarizer Filter. In the last ten years. I've only used a Polarizer Filter a handful of times.

Edit Step 1: Shadow +6% Highlight +11%

Edit Step 2: Selective Colors = Adjust Neutrals by -3% to blacks to brighten the Neutrals and adjust Yellows by -21% from blacks. Reducing black from the Yellows will bring the images green inline.

Edit Step 3: Contrast +13%

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Tilt Shift Lens:

Nikon D3x 24mm Tilt- Shift Lens f16@4 seconds ISO 400 Exposure Value +1.0
2 Stop (0.6) Soft-Step Spilt ND Filter used on building. 3 Stop (0.9) Soft-Step Spilt ND Filter used on sky and clock tower. Without the additional 3 stop ND filter the clock hands were not visible. Printed on Moab Slickrock Metallic Pearl Paper. JPEG File.

Tilt-Shift lenses allow photographers to avoid perspective distortion. When the lens is shifted downwards, all vertical lines of buildings will run parallel to the edges of the image. If this image was taken with a standard lens, the building would appear to be leaning backwards.

Edit Step 1: Shadow +8% Highlight +10%

Edit Step 2: Brightness +4% Contrast +3%

Edit Step 3: Under Filter select the Noise Filter. +5% Noise.

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HDR Toning Example:

Nikon D3x 14-24mm Lens @ 14mm f16@ 1/30 second ISO 50 Exposure Value -1.3 3 Stop (0.9) Soft-Step Spilt ND Filter used on sky. Printed on Moab Slickrock Metallic Pearl Paper. JPEG File.

Golf courses can be difficult to photograph due to image vibrance. Trying to get the image to pop without over saturation is difficult. The editing steps below have produced reproducible results.

Edit Step 1: HDR Toning under Image Adjustments in Photoshop CS5. Reset saturation to 0 then select OK in top right hand corner.

Edit Step 2: Shadow +5% Highlight +5%

Edit Step 3: Selective Colors = Adjust Neutrals by +3% to blacks and adjust Yellows by -22% from blacks. Reducing black from the Yellows will bring the images green inline.

Edit Step 3: Adjust Brightness +3% and Contrast +2%

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Manual/Bulb Mode:

Nikon D3x 24-70mm Lens @ 60mm f11@ 6 seconds ISO 400 Exposure Value -1.0 3 Stop (0.9) Soft-Step Spilt ND Filter was used to darken sky and keep fireworks from being over exposed. Printed on Moab Slickrock Metallic Pearl Paper. JPEG File.

Photographing fireworks can be difficult because of the dynamic range of light within the image. The key to photographing fireworks is to have your cameras focus and exposure set prior to the fireworks. Once the image has been focused properly, set your camera lens to (M) manual focus. Next, change your camera's exposure mode to (M) Manual/Bulb. Now, set your camera's settings to the predetermined shutter speed and f-stop.

Edit Step 1: Highlight +9%

Edit Step 2: Selective Colors: Adjust Neutrals by -3% to black and +2% black to Blacks.

Edit Step 3: Adjust Brightness +3%

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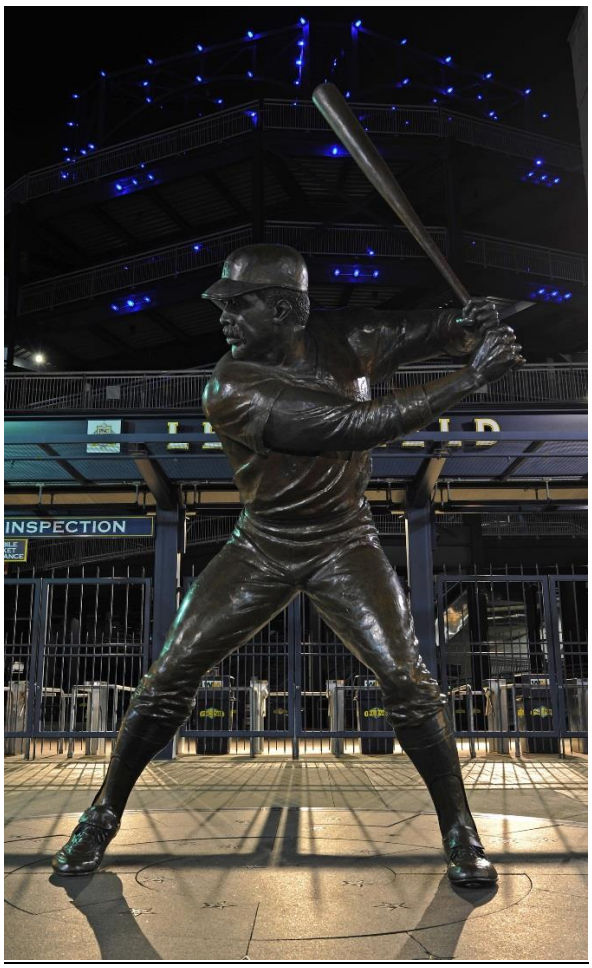
Light Painting:



Light painting is a simple process of using a flash light or laser pointer to add additional light to a specific subject. In this photo of the Willie Stargell statue at PNC Park in Pittsburgh, I used a small flash light with a wide beam to enhance the detail in the statue. I started by finding the overall scene exposure which was f8@5 seconds at ISO 50 with a -1 exposure value. I then used the small flash light to paint the statue for 3 seconds. The key to light painting is to move the beam relatively quickly so one spot is not brighter then another. It is also important to vary the light painting time as each scene requires longer exposure times and light painting times.

Another light painting technique that is popular is laser painting. Photographers use multicolored laser pointers to create unique messages and drawings within an image. The process is similar to that of light painting in that you want to find the overall scene exposure and then add the laser painting to the image.

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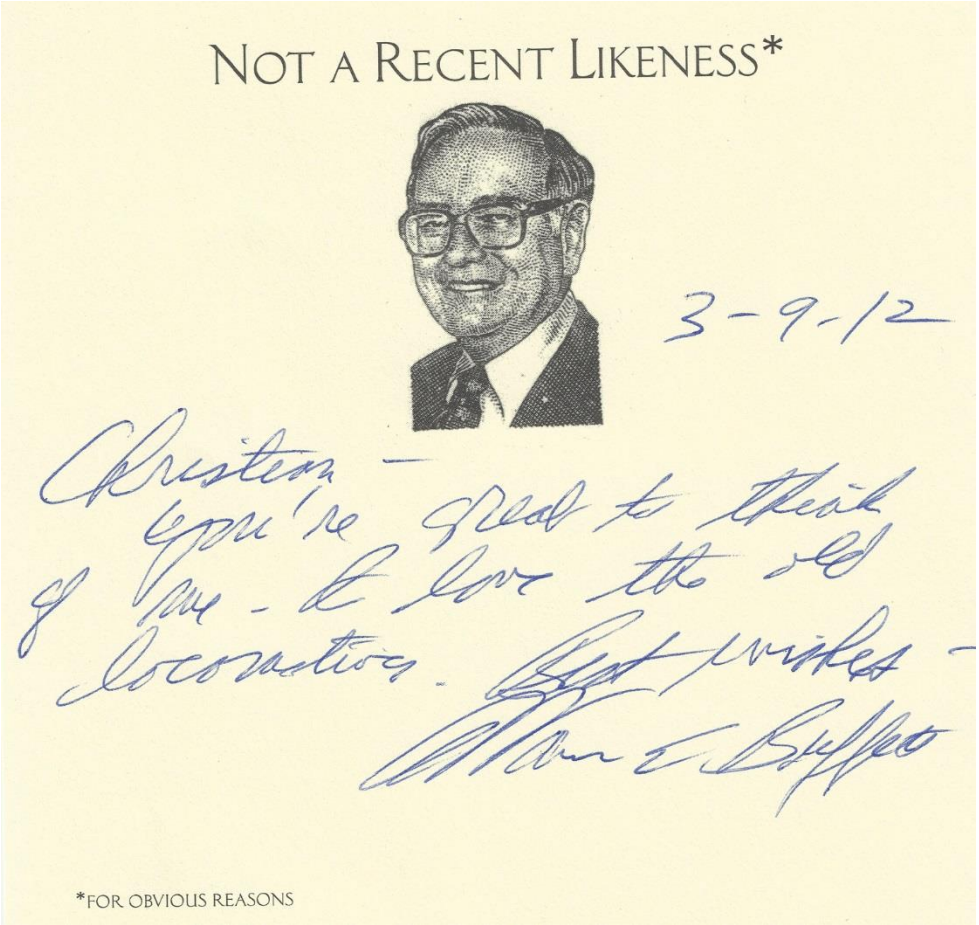
Selling to Customers:



As photographers, we tend to focus on subjects we are passionate about and often forget about customer's passions. A few years ago, I was talking with an interior designer and she said to me, "one thing I can never find great photos of is golf courses." At that time, I had never even considered photographing golf courses but since that day I have always made it a point to know my customer's passions. People will spend money on items they are passionate about. Another kind of customer that will buy a framed print is a customer who has been to the location in the photo. People will spend money on mental vacations.

In the end, the best advice I can offer is keep it simple. Find a process that works for you and continue to test new processes but never lose focus on the basic foundations of photography, which are composition, manipulation of light, manipulation of time and aperture for effect.

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