

Devizes Camera Club

Editing In Adobe Lightroom Develop Module

Clicking your camera's shutter button captures the image, but showing it to its best advantage, either on a monitor, through a digital projector, or as a print, requires post-processing on the computer. There are purists who claim to do everything 'in-camera', but there is still no getting away from basic limitations such as the mismatch between camera and monitor dynamic ranges, the need to sharpen the image to counter the effects of the anti-aliasing filter, and suppressing in-camera noise. This write up is based on the presentation/ demonstration given at Devizes Camera Club on 19th September 2017, showing how to use the Develop Module of Adobe Lightroom to enhance the appearance of your photographs.

1. Some basics before you start

Adobe Lightroom (LR) is based around the Adobe's Camera RAW (ACR) software, which is also used by the full version of Adobe Photoshop (PS). There is also a cut down version available in Photoshop Elements. Arguably the LR version is a slicker and easier to use than of Photoshop, although the functionality is identical.

Editing in LR, as in PS RAW, is non-destructive in that the original photograph is never changed. Instead, the changes you make are applied as filters placed in front of the original photograph whenever you display it on your monitor. This enables LR to preserve image quality, compared to pixel-level editing which will degrade the image if too many changes are made. The downside is that some changes are only possible on a pixel editor, and so for these, the best workflow is to use LR to edit as far as possible (usually 90%+ for traditional style photographs), and then use Photoshop as the pixel editor for the remainder. LR and PS are tightly linked, so it is straightforward to take an image from LR into PS for editing, and then return a saved copy back into your LR catalogue.

Many references have already been made to RAW as an image format, and this is indeed the format you should shoot in if you want the best quality photographs. RAW format images preserve all the data captured when you clicked the shutter, so you have maximum latitude to process the image as you require.

The alternative format offered by most cameras is JPEG, in which your photographs are processed in camera at the point of capture, automatically applying exposure compensation, colour balance, contrast, saturation, sharpening etc. Having done so, it then compresses the image data, discarding what it deems to be redundant. JPEGs can give very good results, but if you don't like what the automatic process has produced, you may not be able to change it because the saved image data is incomplete.

Thus the choice between RAW and JPEG is really between Maximum Quality and Convenience.

2. The Basic Panel – where Major Adjustments are made

The starting point for editing in LR is the Basic Panel, which allows you to get your image looking approximately how you want it. The scale of adjustments you make here are much greater than those available elsewhere, though the downside is that some of the tools are somewhat heavy-handed in that their effects apply to everything in the picture.

There are several control sliders available within the Basic Panel, but these can be simplified into four main groups, which govern the look and feel of any photograph:

- Colour Balance
- Exposure
- Contrast
- Saturation

2.1 Basic Panel : Colour Balance

Correct Colour Balance is normally aimed at removing any overall colour cast, and in particular rendering whites and greys as neutral tones. However, you wouldn't want to remove a colour cast which is contributing to the atmosphere of a picture, such as the warm orange tones on a beautiful sunset or cool blues of a snow scene.

The Basic Panel provides separate sliders for Temperature (how Blue or Yellow) and Tint (how Green or Magenta). Managing the balance between four colours is difficult, but for RAW files, LR can help by providing pre-sets akin to those found on a typical camera such as Daylight, Cloudy, Shade, Florescent etc. These give a good starting point to help you decide the right colour balance for the picture. There is also an Auto option which averages all the colours in the picture to calculate a mid-point and can also be useful as a starting point.

Besides these, there is also an 'Eye-Dropper' which you can use to target a tone on the picture that should be neutral, if the picture has one. This works best on a light grey tone rather than pure white.

Much setting of the Colour Balance is by eye, so it is essential that your monitor shows colours accurately. Otherwise, what looks fine on your monitor may exhibit a colour cast on another monitor, projector or when printed. The best way to ensure this is to use a calibration device such as SpyderExpress.

2.2 Basic Panel : Exposure

Exposure is arguably the most important aspect of any picture. It typically involves making sure the highlights are bright without being burnt out, the shadows dark but still holding detail, and the mid-tones having an even spread though emphasising the main subject of the picture.

A good visual guide to the exposure of the picture is the Histogram, which shows the distribution of tones within the picture. Black is on the lefthand side and White on the righthand side, and typically, if the spread of tones is towards the left, the picture is underexposed, and if towards the right, it is overexposed. The small triangles at top left and top right can also be useful to identify 'clipped' shadows and highlights. Click on the lefthand triangle, and any clipped shadows (ie pure black/no detail) will be shaded blue.

Conversely, click on the righthand triangle and any clipped highlights (ie pure white/no detail) will be shaded red.

To change the exposure of the original image file, there are 5 different control sliders within the Basic Panel, to be used depending on the overall exposure and spread of tones:

- The Exposure slider does exactly what the name suggests – it brightens or darkens the overall exposure. However, because it applies the effect equally to all tones in the image, it is really only useful for ensuring the mid-tones are correctly exposed. For contrasty images, it can only rescue overexposed highlights at the expense of darkening shadows, and rescue shadows at the expense of blowing out highlights.
- For these contrasty images, LR has 2 control sliders named ‘Highlights’ and ‘Shadows’. Each works like an Exposure slider which selectively targets certain portions of the Histogram. The Highlights control is typically used to darken the brightest tones, and so the maximum effect is applied to the brightest tones, with the effect tapering off until below the mid-tone point, there is no effect. Thus the Highlights control can selectively darken the bright areas of the picture without affecting the dark areas. The Shadows control works in the opposite direction, applying its maximum effect to the darkest tones and tapering the effect so that beyond the mid-tone point, there is no effect. Thus the Shadows control can selectively lighten the darkest tones without affecting the bright areas.
- Note that high contrast images are very likely because of a mis-match between the range of tones which a DSLR can capture and the range of tones which a monitor (or projector or print) can display. A typical DSLR has a range of 9 stops whereas a monitor is limited to 6 stops between pure black and pure white. Hence the brightest stop captured by the camera, potentially full of detail, will show on the monitor as pure white, and likewise the camera’s darkest stop, potentially full of detail, will show on the monitor as pure black. The Highlights and Shadows controls are fundamental to compressing the range captured by the camera into a range which can be displayed or printed.
- Another type of tone distribution in an image is one in which all the tones are bunched together in the middle of the Histogram, as there are no deep shadows and no bright highlights. This cannot be corrected by the Exposure control slider (which just moves the bunched tones from side to side) or by Highlights and Shadows (because there are none). This image would generally be referred to as a low contrast image, but the exposure can be corrected if required by setting the white and black points ie setting the brightest pixel to white, the darkest pixel to black, and stretching all the intermediate tones to fit. LR has two further control sliders, named ‘Whites’ and ‘Blacks’, which can be used to set the white and black points. While this can be done visually, LR also has a useful way of setting these automatically. Hold down the Shift Key and double click on the word ‘Whites’ and LR will locate the brightest pixel in the image and set its tone to white. Likewise, hold down the Shift Key and double click on the work “Blacks’ and LR will locate the darkest pixel in the image and set its tone to black. If this exaggerates the contrast more than you want, then reduce the White point value and increase the Black point value to a position you find acceptable.
- To summarise, use the Highlights and Shadows sliders to compress the tones within a contrasty image such that they can be displayed on the monitor, and then use the Exposure slider to modify the mid-tones as needed. For a low contrast image, use the

Whites and Blacks sliders to set the white and black points in the image, and then use the Exposure slider to modify the mid-tones.

2.3 Basic Panel : Contrast

The correct level of contrast in an image depends on the author's intent. A low contrast image can provide an atmosphere of calm while a high contrast one can be forceful and attention grabbing. Equally, increasing contrast can add texture to an image full of detail, whereas for the human face, it can be more flattering to reduce contrast.

The Basic Panel contains two controls to increase or decrease contrast. The first of these is named 'Contrast', but should be used sparingly because high values can easily produce clipped highlights and blocked shadows without necessarily giving the desired effect in the mid-tones.

The second control is 'Clarity', and this is much more usable. Clarity targets the mid-tones, lightening the mid-tone lights, darkening the mid-tone darks, and generally having little effect on the brightest and darkest tones. This is similar to the way edge sharpening works (see 4.1 below), and as a consequence, high values can introduce unwanted artefacts. It is important to watch out for edges where a dark object is adjacent to a light object. A high positive Clarity value can lead to a black line on the dark side of the edge and a white line or halo on the light side of the edge. However, used carefully, this is one of the most important ways you can add impact to your image.

2.4 Basic Panel : Saturation

Saturation essentially determines how colourful the image is, which again depends on the author's intent.

Within the Basic Panel, there are two control sliders to increase or decrease Saturation. The first of these is named 'Saturation', but like the Contrast control slider, needs to be used sparingly as it increases or decreases saturation for every part of the picture. If you try to increase saturation using the Saturation control, areas that are already saturated will quickly become 'clipped', which in saturation terms means that these areas become a solid block of colour and lose any details or texture which may have been present.

A more useable control slider is the one named 'Vibrance'. When you increase saturation using Vibrance, it affects low saturation parts of the picture more than those parts which are already highly saturated, thus avoiding the clipping which occurs with the Saturation slider.

3. Fine Tuning

The Basic Panel is the starting point for adjusting Colour Balance, Exposure, Contrast and Saturation, but LR and full version Photoshop RAW also have a number of tools available to make finer adjustments to your photography.

Unfortunately, these are not available in Photoshop Elements, and although some are featured in the pixel-editing part of Elements, this means that image quality can be degraded if you make too many edits. Image quality is also degraded because any pixel-editing in Elements uses 8-bit processing (as opposed to LR and Photoshop RAW 16-bit), so adjustments are much coarser as there are only 256 different levels of exposure and colour channels.

For LR (and full version Photoshop RAW), the range of tools is extensive, but can still be grouped into the short list of Colour Balance, Exposure, Contrast and Saturation.

3.1 Fine Tuning - Contrast

The fine-tuning option for contrast can be found in the Tone Curve panel, or 'Curves' for short. We saw how setting of the White and Black points on a low contrast image stretched the range of tones in the picture, and as a by-product, increased the contrast. Stretching tones in this way is also used by Curves to increase contrast in selected parts of the tonal range, and is typically used to increase contrast in the mid-tones.

The Tone Curve panel includes a graph to show how the tones are being altered by your adjustments. The horizontal axis of the graph shows the starting (input) tones, with black on the extreme left and white on the extreme right. The vertical axis shows the effects of your adjustments (ie the output tones), and goes from black at the bottom of the axis to white at the top.

With no adjustments, the tone curve is a straight diagonal line, because the input on the horizontal axis is the same as the output on the vertical axis. If we make a typical adjustment to increase mid-range contrast, we lighten the Lights (ie mid-tone lights) and darken the Darks (ie mid-tone darks), which creates a shallow 'S' shaped curve. The S shape stretches the middle part of the tone curve and so increases contrast in this tonal range.

These adjustments can be made using the slider controls, or by using the TAT (Targeted Adjustment Tool) in the top left corner of the panel. Click the icon and move it to a part of the picture you want to make lighter or darker. Then click and drag the cursor up (to lighten) or down (to darken), concentrating on the picture to achieve the effect you want.

Note that the White and Black points in the Tone Curve remain the same, so creating an S-shaped curve and stretching the mid-tones means that you have to compress the highlights and shadows, which has the effect of reducing contrast in these tones. This is not usually a problem since these tonal ranges do not usually contain the focal point of interest within the picture.

Tone Curves work in a similar way to the heavy handed Contrast control slider in the Basic Panel, but can be much more targeted at the specific photograph. You may want to lighten the mid-tone Lights but leave the mid-tone Darks as they are, or may want to change the tonal range of the 'Lights' and/or 'Darks'.

3.2 Fine Tuning – Colour Balance

We saw in the Basic Panel that colour balance, achieving correct whites and neutral greys, can be achieved by the combined effects of the Blue-Yellow and Green-Magenta control sliders. However, it is still possible to have correct whites and neutral greys yet one of the other colours looks wrong. For instance, as Barry Beckham has observed in his LR and PS tutorials, digital cameras often record blue skies which are too much biased towards cyan, and need to be adjusted slightly towards the purple end of the spectrum.

The tools for this can be found in the HSL (Hue, Saturation, Luminance) Panel under Hue. This provides the ability to adjust any of 8 colours individually, without affecting the colour of the others. To solve the Blue Sky problem, Barry Beckham recommends setting the Blue slider to +15. Alternatively, if you can see that one colour is not as it should be, you can use the Hue TAT tool. Click the icon at the top left of the Hue part of the panel, hover the cursor over the colour to be adjusted, and then click and drag either upwards or downwards to change the colour balance of that colour. LR might determine that there are actually 2 colours involved and will adjust both in the correct proportions.

3.3 Fine Tuning – Exposure and Saturation

The exposure controls within the Basic Panel enabled us to adjust the Highlights, Mid-Tones and Shadows to produce an acceptably exposed image. However, what if we wanted to darken a blue sky while at the same time lightening the orange/yellow/green portions of a landscape? Or what if we wanted to increase the saturation in just one colour?

The tools we can use in LR to achieve this are included in the HSL Panel, specifically the Saturation and Luminance parts of the panel. Each provides a list of 8 colours, which can be adjusted individually to increase/decrease luminance (ie exposure) or increase/decrease saturation. The effect we require may involve a combination of luminance and saturation adjustments. For instance, we may have a colourful flower but rather bright and distracting green background. So long as the flower is not also green, we can reduce the luminance of green, and also reduce the saturation of green, to make the flower stand out more from the background. Use of extreme values may cause unwanted artefacts such as haloes around edges, but a moderate adjustment of both luminance and saturation helps to avoid these.

Adjustments can be made directly by moving the appropriate sliders, or you can use the TAT tools, icons for which can be found in the top left corner of the Saturation and Luminance sections respectively. The procedure is the same as for other TAT tools – select the icon, hover over the colour to be adjusted, and then click and drag upwards to increase Saturation or Luminance and drag downwards to decrease Saturation or Luminance.

3.4 Fine Tuning – Turning your image to Monochrome

If you want to create a monochrome version of your photograph, the simplest way is to go to the Basic Panel and decrease the Saturation slider to -100%. However, this often leaves a very bland image which needs a considerable boost in contrast to give it any impact.

The HSL Panel provides a more targeted way to process your monochrome version. First of all, in the Panel Header, click 'B&W'. The picture will now appear in monochrome, which may not look much different to the one produced by decreasing Saturation to -100%.

However, the HSL panel now gives you the usual 8 colour sliders, which you can use to darken or brighten the monochrome tones of individual colours. For instance, in a landscape image, you could use the blue slider to darken an originally blue sky while also lightening the land by increasing the orange/yellow/green sliders. If you can't remember what colours individual elements of the image were, a TAT is available to assist. Click on the icon, hover over the tone to be darkened or lightened, then click and drag upwards to lighten or downwards to darken.

3.5 Fine Tuning – Vignetting

Darkening the perimeter of a picture helps to hold the viewer's attention on the central interest, and indeed in photographic competitions, judges will often mark a picture down if it has bright areas too close to an edge or corner.

LR provides a vignetting tool called 'Post-Crop Vignetting' within the Effects Panel. Post-crop refers to the fact that you can apply the vignette, subsequently decide that the picture needs a different crop, and have the original vignette modified based on the new crop.

The first choice to make is the Style of the vignette, which can be Highlight Priority (default), Colour Priority or Paint Overlay. Visually, the effects are similar, although Highlight Priority keeps the colours at their original saturation whereas Colour Priority modifies the saturation of colours and paint overlay just makes the tones darker or lighter.

Besides this, the tool consists of four sliders which control the Amount (how dark or indeed how light you want the vignette), its size (Midpoint), its shape (Roundness) and the degree of Feathering you want applied. It is often a good idea to set the Feather to 0 in order to see exactly the size and shape of the vignette. Once you have these set, return the Feather to where you want it.

3.6 Fine Tuning – De-Haze

Dehaze is available on the subscription version of LR, although third-party plug-ins are also available. As its tool, it is designed to remove haze eg atmospheric haze in a landscape or cityscape. The effects are akin to a combination of contrast/clarity, vibrance and setting the white & black point, and are achieved by complex calculations based on actual image content.

If you have a low contrast image which needs a boost, try the De-Haze tool, though be aware that a little goes a long way, and values above +20 can introduce unwanted noise and other artefacts.

3.7 Fine Tuning – Localised Adjustments

All the fine-tuning options covered so far will adjust specific aspects of the whole picture. The final set of tools provide the ability to target adjustments to selected parts of the picture.

There are 3 different local adjustment tools, each of which can be used to provide an extensive range of actual adjustments, either separately or in combination. The adjustment tools can be found in the toolbar between the Histogram and the Basic Panel, and are :

- Graduated Filter (rectangular icon fourth from the left)
- Radial Filter (round icon fifth from the left)

- Adjustment Brush (rightmost icon shaped like a lollipop on its side)

3.7.1 Graduated Filter

Click the Graduated Filter icon and a list of available adjustments appears in a drop-down box, many of which mirror the controls in the Basic Panel. You don't have to make your final choice of adjustments here, but it will be useful to set an approximation to you can see the effect as you apply the filter. For instance, if you want to darken a sky, you might set the Exposure to -0.50 and the Highlights to -100. Then start from the top of the picture (ie sky) and drag down to the horizon. You will see 3 lines appear on screen as you drag down – from the top line to the centre line, the full value of the adjustment is applied; and from the centre line to the bottom line, the value of the adjustment is gradually reduced as you get closer to the bottom line. You can then adjust the Exposure and Highlights values until you are happy with the result.

Darkening a sky is an obvious example, but Graduated Filters can be set starting and finishing at any point. Starting from the top and dragging down to the horizon might replicate a 'soft grad' filter placed in front of the lens. You could equally start a short distance above the horizon, and drag down just to the horizon, to mimic use of a hard grad. [Tip – if your LR Grad Filter area is very narrow, it can be difficult to set the angle properly. To achieve a horizontal or vertical hard-grad effect, hold down the Shift key as you click and drag.]

Alternatively, you can drag from the bottom to lighten a foreground, or drag from one side if the original lighting is uneven side to side.

3.7.2 Radial Filter

The Radial Filter was originally intended as an off-centre vignette, so its default is to apply the adjustment outside the circle. To use it to make adjustments inside the circle, make sure the Invert Mask box is ticked.

As with the Graduated Filter, click the Radial Filter icon to display a drop-down box of available adjustments, which is identical to the Grad Filter. Set an adjustment to an approximate value, and then click and drag on the part of the picture to be adjusted. Initially, you will create a round filter. However, when you release the mouse button, four drag handles appear on the circle, allowing you to modify its shape and size. You can also hover over a part of the filter boundary line and then click to rotate it to fit your target adjustment area. You can also move the whole filter by clicking anywhere within the filter and dragging it to where you want it. Once the filter is in place, you can then refine the value of the adjustment, in the same way as the Grad Filter.

Radial filters can be used in Landscapes to lighten or darken elements of the picture, and providing the feathering is set to more than 50, it will be difficult to detect the edges. They can also be useful for lightening a face, eg if the subject is wearing a hat which has cast a dark shadow or if the face is of a brown-skinned person. Toning down a highlight is another application, depending on how regular the shape of the highlight area is.

3.7.3 Adjustment Brush

The Adjustment Brush enables you to make local adjustments to irregular shapes. Click the Brush icon to display the drop-down box of available adjustments (the same list as for Grad and Radial Filters), and set an approximate value for the adjustment you want. Then simply click and drag to 'brush' the effect onto the part of the picture to be adjusted.

Also, below the list of adjustments, it is recommended that 'Flow' is set to a small number eg less than 15. Flow specifies how gradually you build up the effect, and for greatest control, you want to build the effect gradually. A high Flow risks the adjustment being uneven and obtrusive, whereas the aim should be that any adjustments should not be visible to the viewer.

Another useful tool, immediately below the Flow control, is 'Auto-Mask' and it is recommended that this is ticked. If you are, for instance, lightening a dark object which is surrounded by lighter tones, Auto-Mask will stop you accidentally painting with the brush over the edge of the dark object.

Another useful tool especially for the Adjustment Brush is the availability of pre-sets such as Iris Enhance, Soften Skin and Teeth Whitening. At the top of the list of available adjustments is a pull down list of Effects, which list various pre-sets (usually the last setting you used for Exposure, Clarity, Saturation etc). Teeth Whitening is a pre-set in this list which is actually a combination of increasing Exposure and Decreasing Saturation. Use the adjustment brush to paint over the teeth with the pre-set selected to achieve the effect. If it still isn't quite right, manually adjust the Exposure and Saturation until you have what you want. Similarly, Iris Enhance and Soften Skin are combinations of other adjustments.

4 Sharpening and Noise Reduction

So far, we have concentrated on the look and feel of a photograph, eg tranquil or challenging, sympathetic or otherwise to the subject etc, to try to convey our intent to the viewer. Sharpening and Noise Reduction are somewhat secondary to this, concentrating more on the quality of the image. At a first glance, they might not seem related, but the way any editing software works means that you may need to strike a compromise between the two. Sharpening an image where there is significant noise present will also sharpen the noise, whereas noise reduction involves some loss of sharpness.

4.1 Sharpening

Sharpening should more correctly be termed 'edge sharpening', and aims to enhance the contrast on the boundary between a light tone and a darker tone. The technique is similar to Clarity in the Basic Panel, and involves darkening the darker side of the boundary and lightening the lighter side of the boundary, thus making the boundary itself more pronounced. When applying sharpening, it is best to zoom in to 100% magnification in order to see the effects more clearly.

In LR, Sharpening can be found in the 'Detail' panel, with 4 sliders available to control the sharpening effect. These are :

- **Amount** – the greater the amount, the greater the sharpening effect. Moving the slider all the way to the right normally gives a 'crazy paving' effect typical of over-sharpening. If you then move the slider back to the left until the crazy paving goes away, that is

probably the correct sharpening amount for an image where you show the detail. Alternatively, a portrait may only need sharpening around the eyes, nose and lips, in which case localised sharpening using the adjustment brush may be better.

- **Radius** – Determines how wide the sharpening zone is. The default of 1.0 is a good general purpose setting, though a detailed shot might need less (eg 0.7 or 0.8) and a portrait might need a higher setting.
- **Detail** – The default of 25 is a good general purpose setting, though images with a lot of detail can benefit from a higher setting.
- **Masking** – limits the effect of sharpening on areas of smooth tone such as sky. Higher values treat wider areas as being smooth toned. To see which parts of the image are being masked, zoom out so you can see the whole picture on screen, and then hold down the Alt key as you drag the slider. The image turns into a greyscale version, which is pure white (no masking) when the slider is zero, and dark areas appear as you drag the slider to the right, with pure black showing areas which are completely masked, and grey ones showing partial masking (ie reduced sharpening).

Why do we need sharpening? It might seem logical that with a sensor capturing in excess of 20 Megapixels, a high quality lens, accurate focusing etc, images should already be sharp. However, built into the camera's image capture system is an Anti-Aliasing Filter, placed immediately in front of the sensor. The purpose of the Filter is to prevent moire patterning on the image, but it does this by slightly blurring the image reaching the sensor. Sharpening the image in LR aims at the very least to counteract this blurring. It goes without saying that sharpening in LR cannot rescue a very unsharp image (you can't make a silk purse out of a sow's ear type logic).

4.2 Noise Reduction

Noise on an image manifests itself as either grain (Luminance noise) or coloured blotches and speckles (Colour noise). LR has separate sections for Luminance and Colour noise, but the noise reduction technique is similar, involving replacing the noisy pixel with a sample from adjacent pixels, effectively a localised blurring of the image. It is this process that can lead to a loss of sharpness.

As with sharpening, it is best to zoom in to 100% so you can accurately see the effects your noise reduction adjustments are having. To reduce luminance noise, use the Luminance slider, with higher values producing more noise reduction. If you take the slider all the way to 100, the image will take on a plastic/rounded edge appearance. Then, move the slider to the left until you achieve an acceptable balance between sharpness and grain. The other sliders in the Luminance section, labelled Detail and Contrast, appear to have only a small effect and then only on very noisy images.

To reduce Colour noise, use the Color (sic) slider. This is set by default at 25%, and this is normally sufficient to suppress colour noise. There are also two sliders labelled Detail and Smoothness, but again, these only have an effect on very noisy images.

What causes noise? Understanding the causes of noise can help to minimise it at the taking stage, which is really the best route to a noise-free image, although sometimes you do not have a choice. The principle causes of noise are:

- **Using a High ISO.** Cameras will have a 'native' ISO which is normally between ISO100 and ISO200, and anything higher than this is achieved by amplifying the digital signal.

This amplification process is liable to introduce noise, and the greater the amplification, the greater the noise. Some cameras handle this better than others, and some cameras have a High ISO Noise Reduction feature which reduces noise at the taking stage, although this can be similar to reducing noise in post-processing ie it is at the expense of sharpness.

Hence if you want to avoid noise, be aware of your ISO setting. In low light settings, a high ISO may be unavoidable to achieve an acceptable combination of shutter speed and depth of field. However, in brighter conditions, you may have the shutter speed higher than it needs to be, or the aperture narrower than needed for the required depth of field.

- **Using a long shutter speed** (ie several seconds and upwards). Long exposures cause the sensor to heat up and some pixels may take on incorrect colours or luminance levels. Again, some cameras handle this better than others. Some also have a Long Exposure Noise Reduction feature, which takes a second 'dark' image of the same duration and corrects the real image based on noise detected on the dark image.

It is difficult to avoid Long Exposure Noise, because you are probably using a long exposure for effect (eg to blur water or clouds), so it is best to learn how much of a problem it is for your camera. If the long exposure is required simply because of low light levels, then there might be a trade off between a shorter exposure and higher ISO.

- **Under-Exposing or needing to brighten shadow areas.** A camera using a 14-bit processor can capture 16,000 (actually 16,384) different shades of grey between pure black and pure white, which if evenly distributed, should guarantee detail throughout its 9 stop dynamic range. However, the tones (and therefore image detail) are not evenly distributed. The camera will allocate half of the available 16,000 tones to the brightest stop, half of what is left to the next brightest stop, half of what is left.....etc. This means that by the time it reaches the darkest stop, only 32 shades of grey are left (compared with the 8,000 available to the brightest stop). Ordinarily this would not be a problem, as the main interest in the image is unlikely to be in that darkest area. However, if the overall image is underexposed and you need to brighten everything in post-processing, the shadow areas will show evidence of noise.

The way to avoid this is generally referred to as '**Expose To The Right**' or ETTR for short. 'Right' in this context refers to the Histogram, where the lightest tones are on the righthand side. ETTR recommends that we over-expose our image where possible providing we are able to avoid highlight clipping (where pixels record as pure white with no detail), and then we reduce the exposure in post-processing. This helps to ensure that we do not have any part of the picture recorded in the darkest stop, and so we maximise the information captured in the RAW file. If highlight clipping might be an issue, you can also take a bracketed series of shots (underexposed/normally exposed/over exposed) and either combine them as an HDR image (see 7.1 below) or use the brightest shot which is clear of highlight clipping.

5 Cropping

Your camera's sensor captures photographs in a fixed ratio, usually either 3:2 or 4:3. However, this may not be ideal for the composition you want, which encompasses all possibilities from square to letterbox shape. Also, you may want to adjust the format to fit a standard print size such as A4 or 10"x8".

Cropping in LR is made possible by the Crop Tool, which is the leftmost icon (a dashed rectangle) on the toolbar between the Basic Panel and Histogram. Click this icon to enable Cropping and Straightening.

For free form cropping, ensure that the padlock on the right of the panel is unlocked, and then simply use the grab handles to move each side (or from the corner to move both horizontal and vertical together) to re-compose the image. Note that since this is non-destructive editing, the part of the image you have cropped out is still there, so you can bring it back into the frame if you change your mind.

Alternatively, you may want to specify a particular Aspect ratio. To do this, click the padlock to lock it and then click the pull down list of ratios immediately left of the padlock. This specifies many of the usual ratios, but if what you want is not already listed, then create a new one. Now as you pull the grab handles to crop your image, the selected ratio will be maintained. If you need to re-position the picture, simply click and drag the picture to where you want it.

The other feature on this panel is the Straighten Tool, which is useful if you have a sloping horizon or sloping verticals. Click the Ruler icon labelled 'Angle' and position it over a part of the line that should be horizontal. Then click and drag to another part of the line. When you release the mouse, the image will rotate to make the line you have just drawn horizontal. The same procedure is followed to correct a sloping vertical, and LR is able to identify whether your line should be horizontal or vertical. The alternative is to use the slider to the right of the 'Angle' label, and judge the correct position manually, helped by the grid overlay.

If at any time, you want to discard the crop, press the Reset button on the Crop and Straighten Panel (NB not the Reset Button at the bottom of the screen, because this resets all editing adjustments).

6 Lens Corrections and Perspective

Lens and Perspective Corrections are now a hugely complex subject in the subscription version of LR. This guide just covers the basics.

6.1 Lens Profile Corrections LR is able to correct distortion and uneven lighting caused by the camera lens by making use of an extensive library of lens profiles. The EXIF data attached to your image will contain details of the lens used (and the focal length if it was a zoom). LR selects the profile and can automatically correct the image for pincushion or barrel distortion, as well as lighten the edges and corners if the lens is prone to light fall-off in these areas. To activate this, go to the Lens Corrections Panel / Profile tab, and tick the 'Enable Profile Corrections' box. The lens make and model should appear below. You can also manually adjust the Distortion and Vignetting adjustments using the two sliders at the bottom of the panel, which adjust the strength of the standard profile for your lens.

6.2 Chromatic Aberration Corrections Colour fringing around the edges of the picture (caused by Lateral/Transverse Chromatic Aberration) can be corrected by another tick box on the Lens Corrections Panel / Profile tab, labelled 'Remove Chromatic Aberration'. You will need to zoom to 100% to check if any fringing is present, and if so, tick the box.

6.3 Correcting horizontals and verticals The Transform Panel provides various tools for correcting perspective problems such as correcting converging verticals whilst keeping

horizontals unaffected. The easiest way to do this is using the set of Upright buttons at the top of the panel. Auto is often a good selection, whereas Guided provides the greatest control as it gives you the opportunity to draw lines on the image of what should be vertical or horizontal (up to 2 of each).

These adjustments will lead to the image being stretched or squashed, and the result is normally an asymmetric quadrilateral which will need to be cropped to cut out the white areas. Before you do this, it is worth trying the Aspect and Scale sliders further down in the panel, as these can reduce the amount of white and possibly help recover some of the pixels that have been lost as a result of the Transformation.

7. Photomerge : High Dynamic Range (HDR) and Panorama

Photomerge is available on the subscription version of LR, and provides the ability to create a RAW file (Adobe dng format) from multiple original files, either to create an HDR (High Dynamic Range) image or a Panorama. To access Photomerge, click Photo on the very top tool bar, and then select Photomerge in the drop down list.

7.1 High Dynamic Range HDR is a technique to photograph an extremely contrasty scene which is beyond the camera's dynamic range. At its simplest, you would shoot an underexposed version of the scene, a normally exposed one and an overexposed one. Ideally a tripod would be used to ensure the content of the image is the same in each frame, although hand held is possible if the camera is held reasonably steady (and if the shutter speeds are high enough for hand holding). It is important to maintain the same Aperture to ensure the depth of field is identical on each frame, and to maintain the same focus point.

With the resulting bracketed images loading into LR, select them and then select Photo>Photomerge>HDR. LR builds a preview version of the merged image, with a small number of options on the right hand side. These are:

- Auto Align: If the shots were hand held, this will ensure the image content lines up correctly;
- Auto Tone: If ticked, LR will make a starting guess at Exposure, Highlights, Shadows, Whites and Blacks;
- De-ghost Amount: If there is any movement in the content of the images, you can specify to a certain extent how this is handled. For instance, if you photograph a waterfall, the underexposed version will have more clearly defined water droplets than the overexposed version (which has a longer shutter speed). If you specify High de-ghosting, the merged image will use the underexposed version for the actual water.

However, this might produce noise when you subsequently process the merged image.

When you are happy with the preview, click the Merge button to create the merged image. Processing can take a little time, but when complete, you have a new merged RAW file which can be processed in LR in the same way as any single file captured by the camera. Note that the HDR RAW file will be substantially larger than your standard single frame RAW file.

7.2 Panoramas Panoramas enable you to capture a wider scene than your widest lens can, or may enable you to shoot a wide scene with a standard or short telephoto lens in order to compress perspective. They can be taken on a tripod, with or without the aid of a specialist panoramic head, or hand held. For a landscape sequence, it is recommended that you hold the camera in portrait orientation, to give leeway for cropping an unevenly shaped

panorama. For a vertical panorama, hold the camera in landscape orientation. For both types, overlap the images by about a third, to enable the software to line them up when stitching. It is important that the Aperture, Shutter Speed, ISO and Focus are constant through the sequence.

To merge your panorama, select the constituent images and then select Photo>Photomerge>Panorama. LR will create a preview of the stitched panorama, with a small number of options on the right hand side. There are 3 different projections, which you can try in order to see what the differences are. There is also a 'Boundary Warp' option, which can be an easy way to remove white areas produced by the merge process. Note however that Boundary Warp can cause straight lines to curve (eg a straight horizon), so it should not be used if this will be obvious.

Once you are happy with the Preview image, click the Merge button. Again, processing can take a little time, but the result will be a merged RAW file which can be processed in LR in the same way as a single file captured by the camera. Note that panoramic image files can be very large, and this may slow LR down when applying standard adjustments.

8. Red Eye

Red Eye can be a problem on portraits taken by on-camera flash where the flash is too close to the lens axis. Fortunately, it is straightforward to fix in LR. Go to the Toolbar between the Histogram and the Basic Panel and click the third icon from the left (looks like an eye). Select this, hover over the red eye, then click and drag away from the eye until the circle covers and extends a little beyond the red area. When you release the mouse, the red will be replaced by dark grey. If necessary, you can increase or decrease the size of the pupil, and darken or lighten it.

9. Spot Removal

Although LR is not a pixel editor, it can perform simple Clone and Heal actions, typically to remove dust spots in areas of smooth tone (eg sky) or aircraft vapour trails. Both work in the same way as pixel-editing Clone and Heal in Photoshop. Clone will replace a specific part of the image by copying and pasting from elsewhere in the image. Heal will replace a part of the image with a sample from adjacent pixels. Thus Heal normally works best on areas of smooth tone while Clone is better for areas containing detail.

To use the Spot Removal tool, go to the Toolbar between the Histogram and the Basic Panel and click the icon second from the left. Set the action to either Clone or Heal (in the Spot Removal panel), and then hover over the part of the picture you want to replace. Now adjust the size of the spot removal circle by using the mouse wheel (or, if you would rather, move the slider in the Spot Removal panel). If we are removing a dust spot in the sky, we would have the action set to Heal, and then a single click on the dust spot will cause it to be replaced. To replace a non-circular shape such as a vapour trail, hover over one end of the trail, click and then drag the brush along the length of the vapour trail. When you release the mouse, LR will attempt to find a matching shape that can be used to replace the vapour trail. For both circular and non-circular shapes, if you are not satisfied with the source of the replacement pixels, you can drag the replacement shape to something more suitable.

Note that Heal will struggle to replace an object at the edge of the photo, and in this case, Clone may be more successful. Using the Spot Removal tool in Clone mode also works reasonably well in out of focus areas, but for detailed areas, it is usually best to take the image into Photoshop for pixel editing.

10. Some Workflow Tools

LR contains a large number of ways to enhance your photographs, and you could spend a long time on the computer processing each one separately. Fortunately, there are some short cuts available to reduce the time you spend at the computer.

10.1 Previous: If you have 2 pictures which were taken on the same occasion and in similar lighting, you can fully process the first one, then select the second one, and then click the Previous Button at the bottom right of the screen. All the adjustments made to the first image will be applied to the second image.

10.2 Sync (Synchronise): Synchronise takes this a step further, and enables you to apply selected adjustments to several pictures at the same time. For instance, you could apply all the settings to a sequence of similar pictures, or you could just synchronise 'Spot Removal' to get rid of dust spots which occur in exactly the same place in a number of images.

To use Sync, first process fully one of the pictures in your sequence. Then, with this picture still active (ie displayed in the main frame), select the others in the sequence. You will see that the active picture has a light grey frame, the others selected have mid-grey frames, while non-selected ones are a darker grey. The button at the bottom right of the screen which in 10.1 was labelled 'Previous' is now labelled 'Sync'. Press the Sync button, and a new window opens allowing you to select which adjustments you want to make to all the selected pictures. If you want to select just a small number of adjustments, it is easiest to 'Check None' and then tick just the ones you do want. When you have made your selection, click the 'Synchronise' button, and the changes will be made.

10.3 Copy and Paste: Copy/Paste is similar to Sync, allowing you to specify selected adjustments from one picture and apply them to other pictures one by one. As before, first of all you fully process your first picture. Then click the Copy button at the bottom left of the screen (NB you have to have the lefthand panel open to see this), and select which adjustments you want copied. Then go into the second picture and click the Paste button to paste whatever adjustments were included in the Copy process.

10.4 Before and After: If you want to see what difference your adjustments have made, you can use the Before & After tool to show each one side by side. In the Develop module, on the toolbar below the main image, are side-by-side rectangles with the letter Y in each. Click this icon (or simply press the letter y) to see the before and after versions. You can also see the versions as top and bottom (useful for a panorama), or have a split screen with half being the before and half the after. To return to the current version, click the 'Loupe View' icon on the same toolbar, or press the letter d.

10.5 Reference View: A new feature in the subscription version is the 'Reference View', for use if you want to match the colour balance or general exposure of 2 different pictures. For instance, if you take photos at a wedding and the bride or bridesmaids have coloured dresses, you might want to make sure that the dresses are the same colour in all your photos. In the Develop module, next to the before & after icon is a similar icon with the

letter 'R' in the rectangles. Click this and the screen splits, with the active photo being displayed in the right hand panel. You can then drag and drop another picture into the lefthand panel. The picture in the lefthand panel is your reference image, while the one in the righthand panel is active and can be adjusted in the usual way. The aim is to match its colour balance etc to the reference image. Again, to return to Loupe View, either click the Loupe View icon or press the letter d.

11. Soft Proofing

Getting the colours on a print to match the ones we see on screen can be difficult. This is partly because we see a print using reflected light, which will vary according to the light source, whereas our monitor is backlit. It is also because a monitor can typically show a wider number of colours (known as the gamut) than a print, so if a colour is not available, the printer will use the nearest one it can produce.

One way LR can help is by displaying a 'Soft Proofing' version, in which it tries to show the picture using only the gamut available to the printer. The first thing LR needs for this is the print profile of the printer and of the paper type to be used (including whether it is matt, lustre or gloss). If using a third party printing service, profiles can normally be downloaded, or alternatively for home printing, the paper manufacturer will supply the printer profile on request when you buy the paper.

To Soft Proof a particular image, go to the toolbar beneath the main picture in the Develop module, and click the 'Soft Proofing' tickbox. [NB if you can't see this on the toolbar, go to the downward pointing arrow at the extreme right end of the toolbar, and make sure you have Soft Proofing ticked.] A small panel opens up below the Histogram, giving you the chance to specify which Print Profile to use.

The panel also gives you the option to create a proof copy, which is a Virtual Copy of the original, to be adjusted purely for printing purposes (thus leaving your main version unaffected). If the Soft Proofing version is substantially different to how you saw your final version on screen, then you might want to adjust it further. For instance, if the vibrant reds you saw on screen have all become rather dull, you might want to increase the saturation and/or luminance of Red in the HSL panel or increase overall contrast in either the Basic Panel or Tone Curves. Once you have finished, make sure you use this Proof copy for printing, either on your home printer or when exporting a jpeg to send to a third party printer.