DIRE STUDIO

Kuuvik Capture

Inside Out

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Covers Version 4.5 of Kuuvik Capture.

Revision J

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Table of Contents

Preface

I have been shooting Canon EOS digital cameras for fifteen years now. I wanted to remotely control my EOS D60 since day one, but digital camera technology was not there in 2002. Six additional years had to pass until the first Canons ready for serious tethered operation arrived (the 50D and the 5D Mark II). Needless to say, I immediately started growing plans about an easy-to-use, high performance tethering app.

In one of the long nights of the Norwegian winter of 2011, I shared these plans with two friends whom I was shooting with. The result was Kuuvik Digital, a company we founded together to realize this dream. The company delivered Kuuvik Capture in 2013, plus a few updates during that year and the next. But problems started to surface. Issues with Canon's mediocre and unsupported Software Development Kit. Obstacles that couldn't be resolved in traditional venture capital realms.

So I acquired Kuuvik Capture in the beginning of 2015 (I wrote the app originally, but the actual rights belonged to Kuuvik Digital), with a firm intention to reboot it based on my recently developed Digital Camera Library. With no financial pressure from any investors.

Boy, what followed was the biggest turmoil of my entire life. I had to climb a few enormous "technology mountains". I rewrote half of the application - from camera communication through RAW decoding to image display - to bring Kuuvik Capture to the level of reliability and speed I was after. And I'm extremely proud of the results.

On the pages of this book I would like to invite you to a journey through the app. I bet I will be able to show you some pretty neat stuff. Some of them is a world's first!

There's only one person I would like to thank for her endurance during the stormy months of the creation of the second Kuuvik Capture: my love and my partner, Agnes Lorincz. Thank you for staying with me!

I hope you will enjoy Kuuvik Capture – and this book.

Laszlo Pusztai
March 2017.

Chapter I – Getting Started

What is Kuuvik Capture?

Kuuvik Capture is an app for remotely controlling your Canon EOS digital camera, which is also known as *tethering*. The name comes from the cable connecting the camera to the computer, and is used even when no cable is involved (*wireless tethering*).

But why would anyone want to do it?

I guess the benefits of working on a larger screen are obvious. As well as the benefits coming from the ability to place the camera in hard-to-reach places and still stay in control with no need to balance on high ladders or crawl into tight corners.

A friend uses it for architecture to check with the guidelines that everything is lined up correctly, and to automate brackets. Lugging around a notebook is even a plus for him, since this way he can deliver finished images right at the client's site.

We have a few customers doing photomicrography with it (that is, using a microscope as a taking lens on the camera).

I use Kuuvik Capture for landscape and product photography (my field "studio" is on the picture) because checking sharpness and focus is much easier with its sharpening and peaking tools, and to help me assess the composition. And I notice distractions on the large screen that I tend to miss on the camera's smallish LCD. Not to mention how much faster is to focus a super telephoto lens when it's used for astrophotography without touching the lens and thus avoiding vibrations.

As you can see, the concept is rather simple, but uses are limitless.

The number one goal behind the app is to help you produce the highest quality images, and thus it works predominantly with RAW files (although you can also shoot RAW + JPG or plain JPG). It's important to note that Kuuvik Capture is not a RAW converter, though - you'll need to pair it with your regular RAW conversion app (Lightroom or Capture One for example). It decodes the RAW files only for displaying the histogram and clipping warnings.

Kuuvik Capture also supports movie recording.

The app is designed for the working photographer, and we continuously receive requests from our customers to make some aspects of their work faster and easier. We take these very seriously, and most of them made their way into the app.

Connecting the Camera

You can connect the camera with your Mac via USB cable, or via some kind of network (wired Ethernet or Wi-Fi) in case the camera supports it. Since this is a basic requirement to use the app, let's discuss it before everything else.

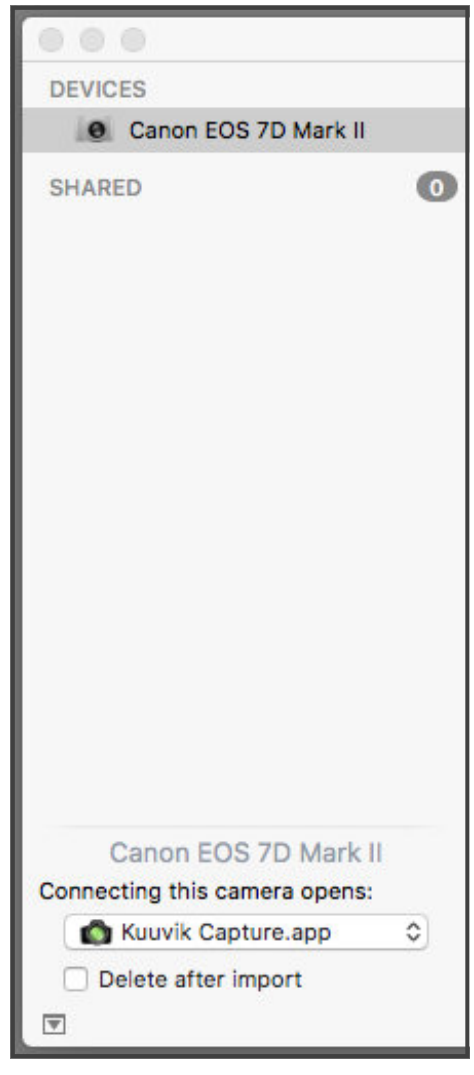
I don't want to repeat here what's already written in the camera's user manual. If you haven't done so already, it's a great time to read through the respective chapters.

USB

The USB connection seems pretty easy (just plug in the cable at both ends), but there are a few gotchas we learned through the years. The first is cable quality. You need a high quality cable, especially if it's long. I personally use either the cable that came with the camera or TetherTools' 15 feet high visibility orange cables. A bad cable causes connection drops and erratic behavior - so if you encounter strange things the very first thing to blame is the "tether" itself.

Second is that the built-in Wi-Fi (as well as the W-E1 adapter) blocks the USB port. You must disable Wi-Fi (turning it off is not enough) and remove the W-E1 card before trying to use the USB connection.

And then there's the Photos app in macOS that starts every time you connect the camera. It's a pain in the back to close it every time. You can't leave it open, as it will interfere with Kuuvik Capture's camera communication.



You can control which application opens when you connect a camera in the *Image Capture* app. Yes, you read that right. Not in Photos, not in System Preferences, but in Image Capture. So to get rid of the Photos autostart go into Image Capture, connect your camera, and click its name under *Devices*.

Then click the little triangle in the bottom left corner to reveal the popup list where you can choose what to do when this camera is connected (to set Kuuvik Capture as the app to open, click **Other…** in the list and pick the app from the *Applications* folder).

There's another, more brutal way to get rid of this annoyance, and this will even prevent Photos from starting when a memory card reader is connected.

Open the *Terminal* app and copy & paste the following command on macOS 10.11 and later:

```
defaults -currentHost write com.apple.ImageCapture disableHotPlug -bool YES
```

And the following two on macOS 10.10:

```
defaults -currentHost write com.apple.ImageCapture2 HotPlugActionPath
-string ""

defaults -currentHost write com.apple.ImageCapture2 LastHotPlugActionPath
-string ""
```

Don't forget to press *Enter* after each command.

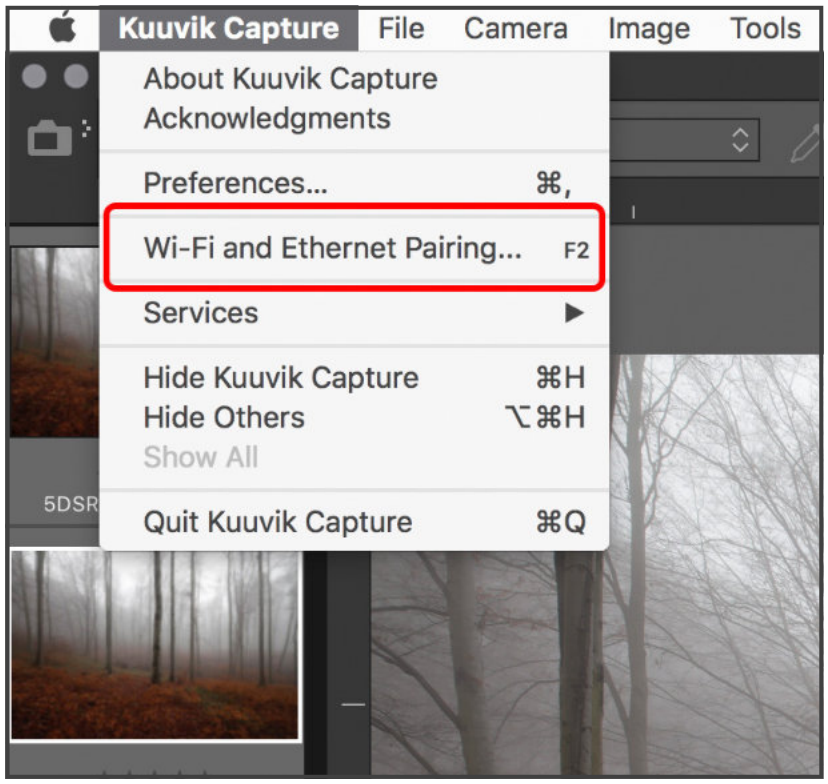
We have recently discovered another impostor that may inadvertently connect to your camera and cause trouble: Dropbox. Even when its auto uploader functionality is off, the Dropbox app sitting on your menu bar grabs all the cameras connected to your Mac. We've reported this to Dropbox, and hope it will be fixed sometime. But if you get the ***Another app is also using the camera*** error with seemingly no app open, then my first recommendation would be to quit Dropbox. Well, this may apply to other cloud storage apps that work with cameras, too.

macOS Catalina 10.15.2 and later users must allow both ***Photos*** and ***Removable Volumes*** access. macOS will not let the app to communicate with USB connected cameras otherwise. In case you missed to enable these when prompted, 4.5 and later versions of the app will warn you to go to *System Preferences* > *Security & Privacy*, and on the *Privacy* tab enable these permissions. *Photos* is under *Photos*, but you'll find *Removable Volumes* under *Files and Folders*.

Wi-Fi and Ethernet

You'll need either a Wi-Fi equipped camera, a built-in Ethernet socket or a separate Wireless File Transmitter for this to work. Only Canon's transmitters are supported, third party Wi-Fi remote control boxes will not work. Please check the tech specs (https://www.kuuvikcapture.com/tech-specs/) for the full list of compatible equipment.

Canon cameras provide network connectivity in several ways. The most complete is the *EOS Utility* connection mode. For this mode a camera needs to be paired to a given app on a given computer. Using two apps on the same computer? You need to pair the camera to them separately, and only one can be active at a time.

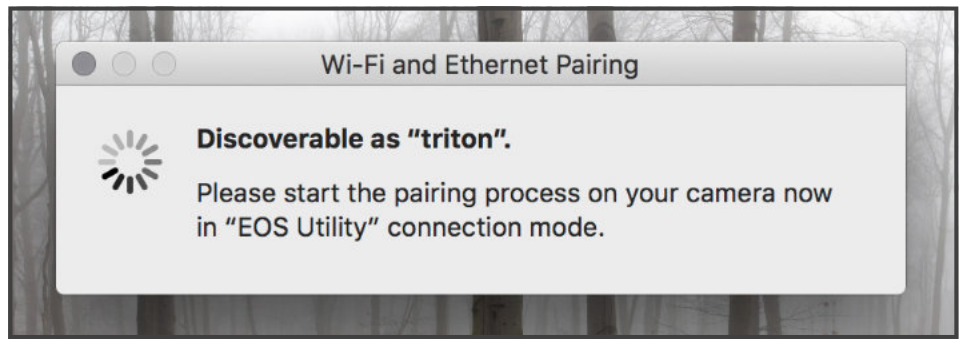


The computer side of this pairing process is dramatically simplified with Kuuvik Capture compared to Canon's own EOS Utility.

The app needs to be in "pairing mode" to accept a pairing request coming from the camera. This mode is accessible through the **Kuuvik Capture > Wi-Fi and Ethernet Pairing…** menu item (or by pressing **F2**).

Kuuvik Capture displays the pairing window (shown on the next page) while in pairing mode. This window also shows your computer's name, which will appear on the camera's LCD during the last pairing step, so you can double-check that you are pairing to the computer you were intended to.

And that's all you need to do on the Mac.



Once in discoverable state, you can start the configuration process on your camera. The process consists of three large steps:

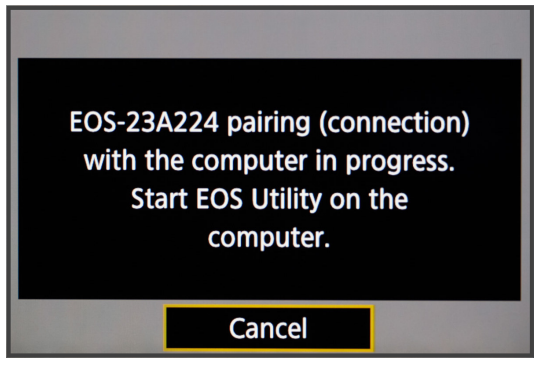
1. Choose a connection mode.
2. Configure your network.
3. Do the actual pairing.

They are documented in your camera's or wireless transmitter's user manual (which you may want to have at hand now), but there are a few important points to consider.

First, do not start any Canon app that may be mentioned in the manual. You are now pairing directly to Kuuvik Capture, and not to Canon's apps. The camera will think it's talking to EOS Utility during the whole process. It is highly recommended to quit Canon's apps as they will almost certainly interfere with Kuuvik Capture.

For step 1, you **must** use the *Connection Wizard* on cameras where it's available (e.g. 5-series, 7-series with the external brick), otherwise you won't be able to complete step 3. Choose the **Remote Control (EOS Utility)** or **EOS Utility** mode (depending on what camera model you have) in the *Connection Wizard*.

In step 2, the camera will ask for network specific parameters (whether it's wired or wireless, plus various options and a password specific to your network). This is the most complicated part of the entire process, but Wi-Fi setup is such a thing… I'd recommend to study the camera/transmitter manual beforehand.



The last step is the actual pairing. The camera's LCD instructs to start EOS Utility, but we're pairing to Kuuvik Capture, so put Kuuvik Capture into pairing mode if it's not there already.

It may take up to 1.5 minutes for the camera and your Mac to find each other.

This is how the camera's LCD will look when the connection is established.

Pairing should be done once (unless in the meantime you paired your camera to another app, another computer, or used another network). To deal with these different scenarios, the very last screen in the process (after clicking that OK button) lets you save up to a few setups into your camera's memory.

But if nothing has changed, Kuuvik Capture will find your camera automatically the next time you turn it on and connect to the network, so the pairing is not necessary every time you want to use a Wi-Fi or Ethernet connection.

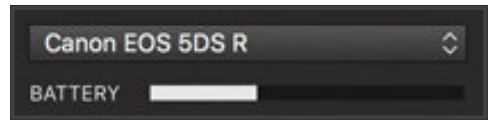
Once pairing succeeds the camera's LCD will turn black, the pairing window will disappear, and the camera's name will show up in Kuuvik Capture's camera selector.

Notes on Wi-Fi Speed

It seems that Canon implements one of the lowest speed classes for each of their Wi-Fi transmitters. This is 150mbps for the external 802.11n bricks (using only one spatial stream), and a shockingly low 60mbps for the internal transmitters (despite they advertise it as 150). So don't expect miracles and be prepared for 12-15 second downloads on these slower cameras. On the other hand, the external bricks are fast enough to be perfectly usable when the network signal is good.

Wi-Fi networks can become unbelievably slow (think longer distances and/or interference), causing the camera to disappear from Kuuvik Capture. A longer network timeout (a longer time allowance for intermittent network errors to clear) may solve this, but at the expense of delaying the detection of actual issues (such as when the battery dies). The app has a preference to control this timeout, and it will be discussed together with other preferences.

Multiple Cameras

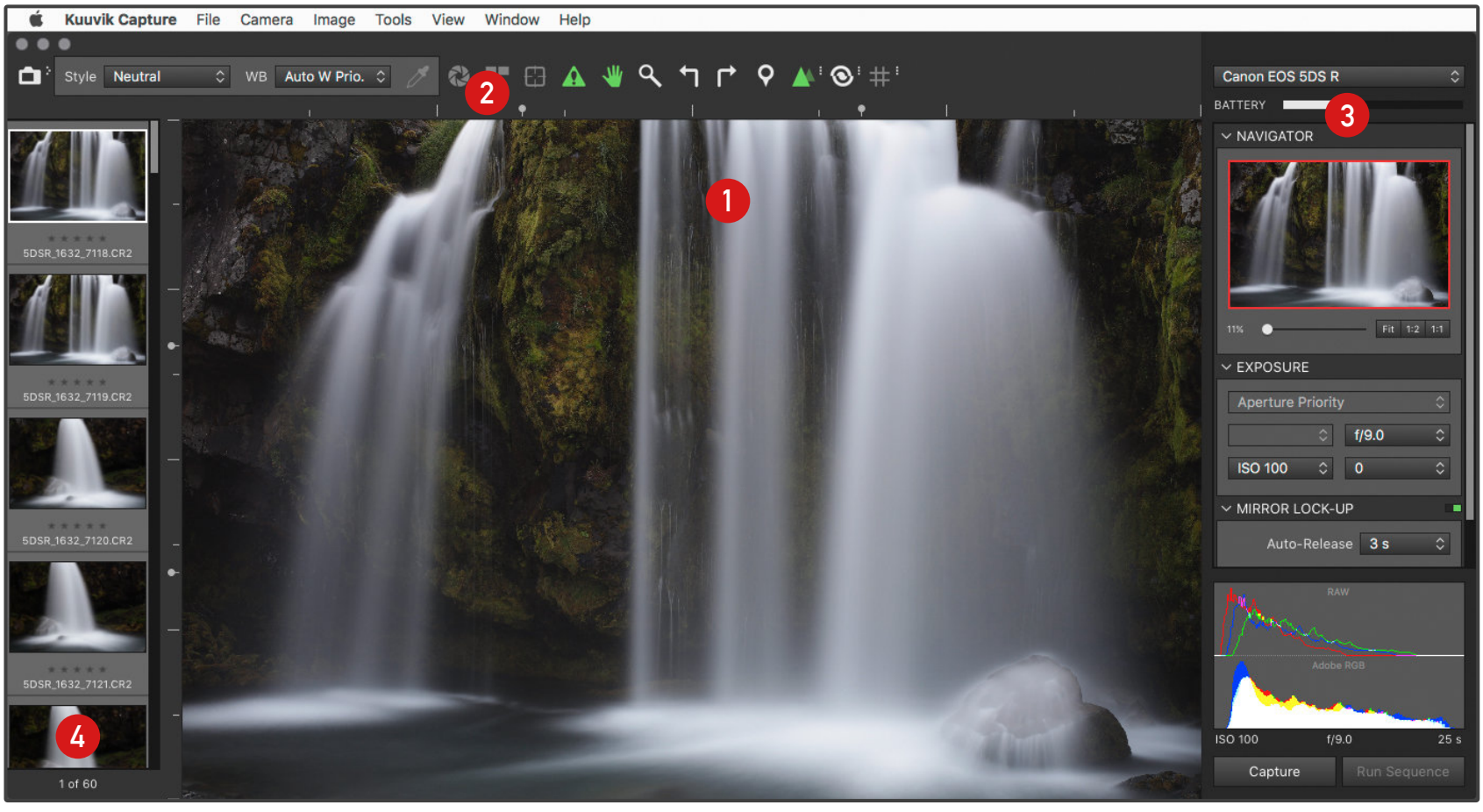


You can connect multiple cameras to Kuuvik Capture, regardless of their connection type (USB or Wi-Fi or Ethernet), but only one of them can be active at a time. Use the camera selector in the top right corner of the app's window to switch between them.

The active camera is what you operate. Non-active cameras are locked (and thus cannot be operated).

The Main Window

Kuuvik Capture's main window is divided into four regions.



1. **Image Area.** This is where your images are displayed. This includes live view, multi-point live view as well as the currently selected image in the Image Browser.

2. **Toolbar.** This is the home for the tools you can use to work on the image area. Green icons mark an active tool, gray icons are disabled tools. There are three vertical dots next to some of the toolbar icons. Click them to revel a toolbar option panel. These option panels can be used to configure the given tool. If you open an option panel, and there's not enough space for it on the toolbar, the last recently used one will be closed. Only one option panel will ever be open when *Solo Mode* (right-click the toolbar for it) is active.

3. **Sidebar.** The place for camera-related controls, dealing with everything from exposure settings through image navigation to the *Dual Histogram*. At the top is the camera selector and battery information. Sidebar sections can be opened and close by clicking their title. Some of the sections can be turned of and off with a switch on the right side. A section is on when the switch is green.

4. **Image Browser.** As the name implies, it's the place for the images captured with the app. You can do rating and labeling here. Plus select the image that's displayed in the Image Area. These images are stored in a session, a construct I'll cover in Chapter II.

And of course there's the app's menu. When I begin exploring a new app, I start with the menu - and highly recommend you this practice. Going through the menu you'll see the various commands and functions as well as their associated keyboard shortcuts.

In Kuuvik Capture we tried to assign a keyboard shortcut to almost all commands (except some rarely used ones). By browsing through you'll also learn about these shortcuts.

There's one thing I should mention here, though. By using the **Tab** key, you can go through all the controls in the main window (in case *Full Keyboard Access* is enabled in *System Preferences*). The active control is highlighted with a green rectangle.

If a control is a popup list, you can browse through its elements by the up/down and left/right cursor keys. In case the control is an exposure parameter (shutter speed for example), then the cursor keys will select the next half or third stop element (based on your camera's setting), while holding down the **Shift** key will select the next element at a full stop distance.

What's displayed in the image area changes as you work. The possible contents are the following:

- A live video stream from the camera when live view is active.
- Two or three magnified segments of the live video stream when multi-point live view is engaged.
- The image selected in the image browser. In case of RAW files, this isn't the final rendering of your RAW file, just the embedded JPG preview.
- A progress indicator when an exposure sequence is running.
- Empty space, when for example you just deleted an image or disengaged live view in movie mode.

I'll discuss basic operations on the image area (such as scrolling and zooming) together with the corresponding tool.

> ***Note:*** *From this point on, I recommend to connect a camera and try everything as I proceed with the discussion. It's much easier to understand the app in a step-by-step manner than trying to remember everything.*

The Toolbar

Let's go through the toolbar first, as it covers a large share of the app's functionality. After each button's name the corresponding keyboard shortcut is in parentheses. All of the toolbar's functions are also available via the menu.

Live View (L)

This button toggles live view on and off. The general concept in Kuuvik Capture is to start working in live view (using the app as a remote viewfinder), so you spend a lot of time with live view on.

It takes a second or so until the live image stream appears in the app.

> *Live view isn't started automatically on mirrorless cameras, such as the EOS R or M50. You have to turn it on manually.*

There are a few things you should know about live view. The frame rate is 12.5 frames per second - some camera can't even do this, in those cases we lower the rate. The lowest is 7 fps. Just a few could do better, but processing higher frame rates would consume more energy on the Mac (thus shortening its battery life), so we chose 12.5 fps even in those cases as a good balance between power consumption and frame rate.

Live view is low resolution - 960x640 pixels or something like that (higher on some cameras, and lower on others). So don't be surprised if it looks blurry on your 30" display. But since this blurriness affects both the sharpening and focus peaking tools, there's a workaround. You can instruct Kuuvik Capture to not enlarge live view (via **View > Don't Enlarge Live View** in the menu). This way the live view stream will be displayed as a smaller frame inside the image area, in its original resolution. Of course it will be shrunk if the image area is smaller than the actual live view stream's dimensions.

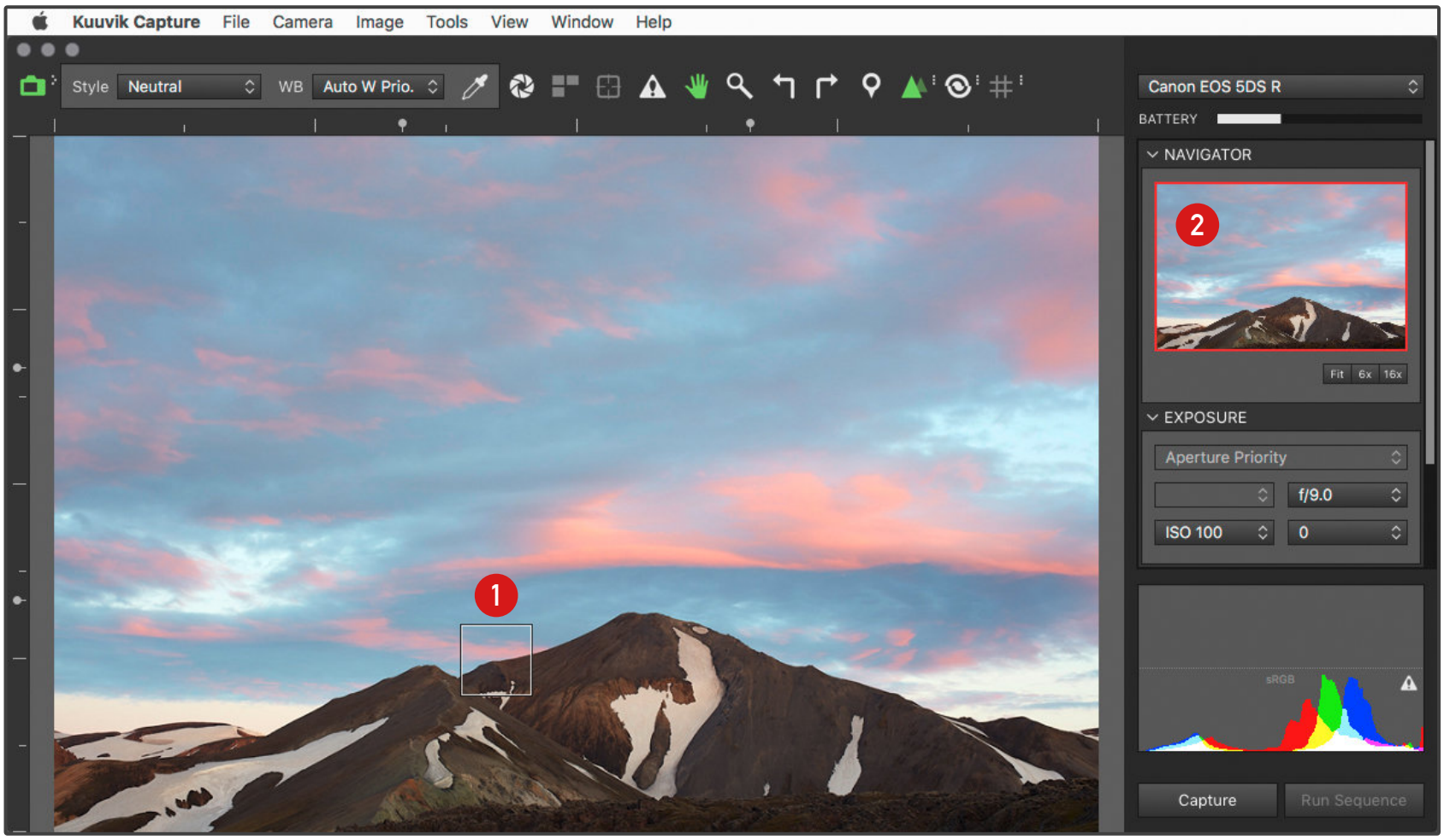
There's a noticeable lag in the displayed video, caused by the camera's electronics and encoding, the transmission and the decoding on the Mac.

Live view can also be engaged from the camera, by pressing its live view button.

> *Two-way operation is an important concept in Kuuvik Capture - if you do something on the camera, the app will reflect the change.*

To save battery on the camera, you can opt for disabling the its LCD during live view (when its turned on from the computer) in Preferences. But note that camera controls only work during live view if the LCD is on. If you need a control in this case, simply press the live view button on the camera, and controls will be unlocked.

Once live view is running, the app's main window will look like the one on the following image.



You see two notable things here. The *Point of Operation* indicator frame (1). In Canon cameras this is a special point to specify three things:

- The point of exposure metering in live view.
- Center point for zooming operations.
- Auto focusing is performed at this point.

You can turn the indicator frame off and back on with the **View > Show > Point of Operation** menu item (or by pressing **^⌘O**).

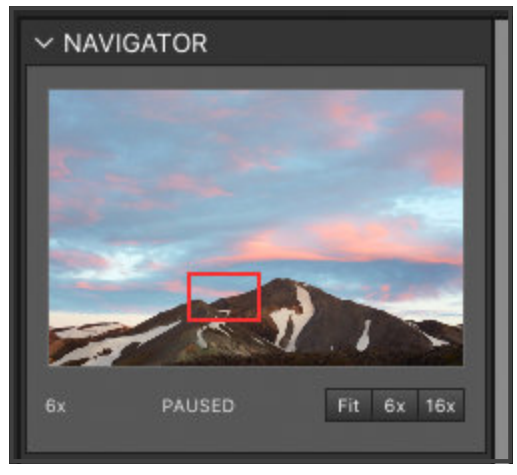
The *Point of Operation* can be moved around with the cursor keys when the full live view image is displayed (that is, not zoomed in, a.k.a. the *Fit* zoom level). Pressing **Shift** will move it in larger steps. Alternatively, clicking the live image with the *Pan* tool active (hand icon), it will immediately place the *Point of Operation* to the clicked point. More about the *Pan* tool later.

> *Well, there are certain limits where the Point of Operation can be placed. When you have an auto focus capable lens attached in AF mode, then you can't go out to the edges, for example. In MF mode though, more of the image is accessible.*

Speaking of zooming, the **+** and **-** keys are used to jump between the camera's zoom levels (Fit/5x/10x or Fit/6x/16x in case of the 5DS/R). Once zoomed in, the cursor keys can still be used to move around (**Shift** increases the step size here too).

There is also a special trackpad gesture controlling zooming: a *flick-pinch*. This is similar to the regular pinch gesture used in zooming in a multitude of apps, you just have to do the pinching faster. The zooming will happen at the point where the cursor is located on the image just before you started the gesture.

The other notable thing on the previous image is the *Navigator* (2). During live view, it is continuously update at 1/3 of the frame rate of the live image stream.



When you zoom in, the label *PAUSED* and the current zoom level will appear below the Navigator's image. The red rectangle, indicating the current position will also shrink based on the current zoom level. Dragging this red frame around, or simply clicking the image will move the zoomed region to the clicked position.

The three buttons, with Fit, 5x and 10x labels can also be used to immediately switch to that zoom level. Note that on the 5DS/R the zoomed-in levels are 6x and 16x magnification.

> *There's an ugly thing with the 10x/16x zoom level: this is a digital zoom, so you will get no more detail than in 5x/6x. This is how zooming on Canon cameras work.*

When you have a lens with a built-in focus motor attached, you can drive focus with the keyboard. Pressing ⌘↑ will move the focus away from the camera, and ⌘↓ will pull it closer. Also holding the **Shift** key down moves the focus in larger steps.

> *By now you may have noticed a pattern: anything you do, holding **Shift** down instructs Kuuvik Capture to do it in larger steps.*

If you want to use the mouse wheel (and the corresponding scroll gesture on the trackpad) for focus pulling, you can set it up in *Preferences*. More on this when I discuss the Preferences window.

Going back to the toolbar, click the three dots right to the live view toolbar icon (or press **^L**) to reveal the *Live View Options* panel.

Option panels provide a means for setting parameters for the given tool. In case of live view, you have the following:

- **Style** for choosing the picture style.
- **WB** for choosing the white balance.
- A white balance picker icon.

Both the *style* and the *WB* list reflect the camera's available picture styles and white balances. You may have noticed, that there's no picture style of Kelvin based white balance editing facility. This is for a good reason.

> *It's not a goal for Kuuvik Capture to blindly replicate everything you can set on the camera already. The app aims to provide tools that either a) can't be found, or cumbersome to use on the camera or b) needed for some real photography situation. Also, since shooting RAW is preferred, there's no point in adding JPG-only tools. So that's why there's no picture style editor here. If you feel that some of those are crucial for you work, contact us, and explain why you need it.*

The white balance picker (**B** key) on the live view options panel can be used to set you custom white balance - from a gray card for example. Once you click the live image, the picked white balance will be programmed into the *Manual* white balance of your camera (overwriting what you had there), and WB is automatically switched over to *Manual*.

Depth of Field Preview (D)

With this button you can turn depth of field preview on and off. Unlike the camera's DoF preview button (which engages DoF preview while it's pressed), this one turns on DoF preview with one press, and it remains on until turned off with another press.

Another difference is while you press the DoF preview button on the camera, you'll unable to operate it from Kuuvik Capture. But if you activate DoF preview from within the app, everything will work as expected.

DoF preview is automatically turned off when you exit live view, or when you take an exposure. The app remembers whether you had DoF preview on when exiting live view, and automatically turns it on the next time you start live view.

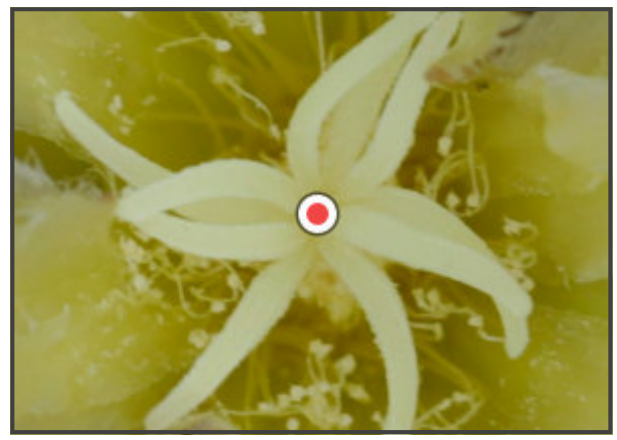
The DoF preview button is disabled when shooting movies, because activating movie mode automatically stops the lens down to the taking aperture.

Set Markers (X)

Let me break the left-to-right order of discussing toolbar icons, and bring the *Set Markers* tool forward, as you need to know about it before discussing multi-point live view.

With this tool you can place up to three markers on the screen, indicated by red, green and blue dots (in this order). Think about markers as points of interests, points where you need to check sharpness, focus, whatever. Markers grew out from my endless frustration with the "zoom in to check, zoom out, scroll to another place with the joystick, zoom in, check, zoom out, scroll to..." nonsense. Especially with manual lenses (which represent 90% of my work) checking multiple points on the image is a tedious job.

With the Set Markers tool active, click the image to place a marker. Command-click an existing marker to remove it. Or press **^⌘X** (**Tools > Clear Markers** in the menu) to clear all of them.

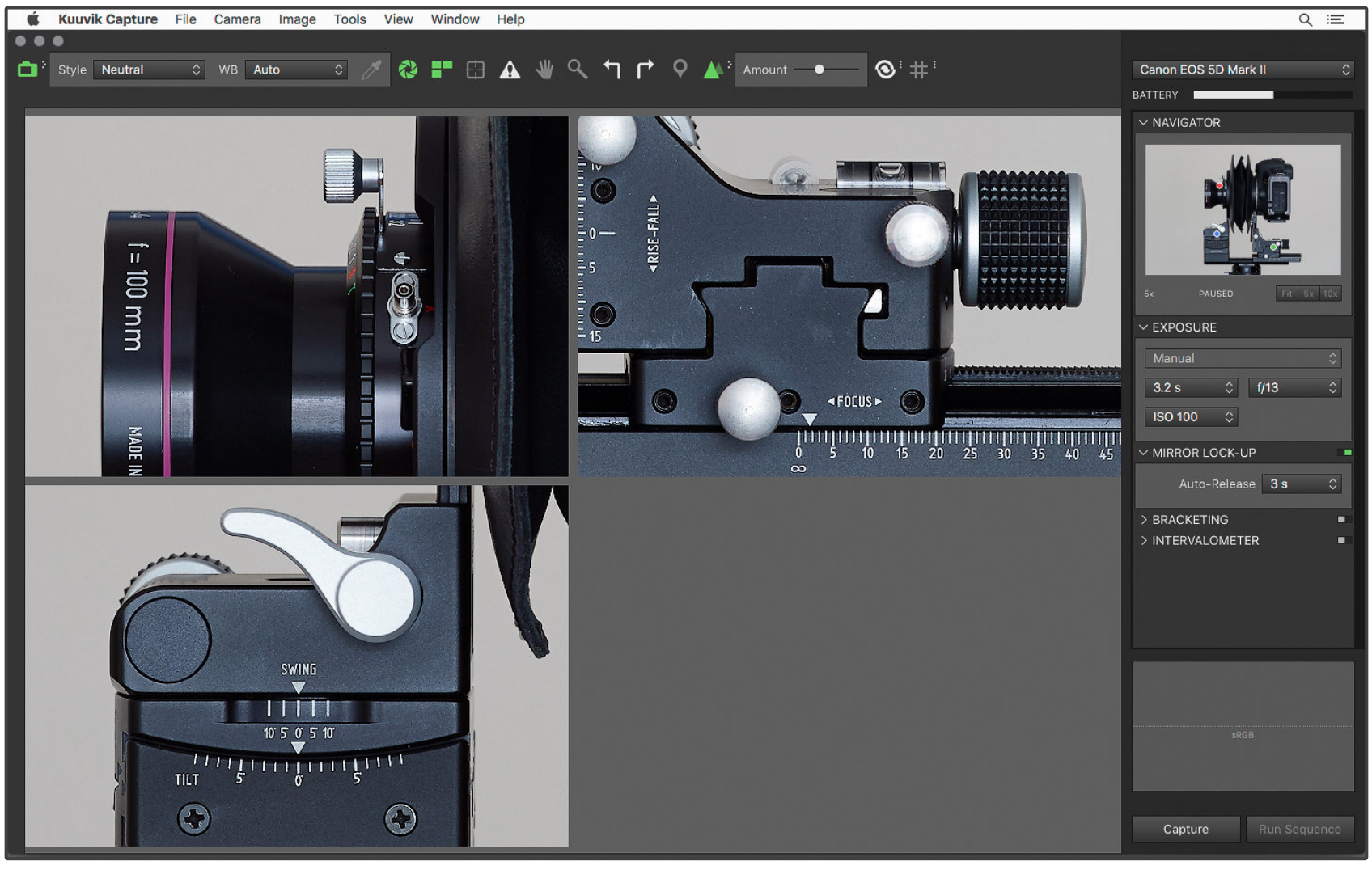


Once the markers are placed, press the **.** and **,** keys to switch between them. When you switch to a marker, live view jumps to 5x/6x magnification and on the preview zoom is set to 50%. Switching between markers works even when the *Set Markers* tool is not active - you just need it for placing the markers.

Multi-Point Live View (V)

With multi-point live view you can see two or three different points of your composition in 5x magnified, semi-live fashion. I said semi-live, since the refresh rate is about 1/3 of a second per point (so about a second to refresh 3 points, and also varies by camera). But this frame rate is good enough to be usable.

You need to be in live view and have to place at least two markers to be able to activate multi-point live view.



Imagine for example that you are doing product photography with a tilt/shift lens (or a technical camera like the Cambo Actus or Arca-Swiss F-Universalis). Placing the plane of focus in a situation like this is an iterative process, where you repeatedly check the same points for focus. With multi-point live view you can define the desired focus plane with three markers, and check those simultaneously.

This is one of the unique, world's first features of Kuuvik Capture.

Multi-point live view works with select cameras, check the tech specs page (https://www.kuuvikcapture.com/tech-specs/) for compatibility information.

Auto Focus (F)

The AF tool can be used to initiate focusing using the camera's auto focusing. Kuuvik Capture relies on the camera to execute the focusing operation. When the tool is active, clicking the live image will place the *point of operation* to the clicked point and start the AF operation.

The app automatically switches the focusing mode to single-point live AF (a.k.a. Flexi-Zone Single).

Since Canon cameras can tell the app when the focusing succeeds, they can't tell when it fails, so Kuuvik Capture waits automatically stops the AF operation after a specified timeout. The timeout can be set in *Preferences*, and by default it's 4 seconds.

If your lens has no focus motor or if the lens is in MF mode, the tool is disabled.

Clipping Warnings (W)

Kuuvik Capture has four clipping warning layers: two for RAW shadow and highlight clipping, and another two for processed shadow and highlight clipping.

This tool can be used to quickly toggle the visibility of all four layers at once, so you don't have to do it one-by-one when you want to check a composition with no visual interference from the warning layers.

Clipping warnings will be described in detail in Chapter II.

Pan (H)

Also known as the Hand tool, the pan tool is used to move the image displayed in the image area. In live view, it works only at 5x/10x zoom levels (as we learned recently, at *Fit* level it moves the *Point of Operation*).

To move the image, just click and drag it.

When a preview image is displayed, double clicking it will toggle between 100% and Fit zoom levels. At any intermediate magnification level a double click will zoom to 100%.

By default the space bar switches to the hand tool while pressed (unless you assigned it to something else in *Preferences*).

Zoom (Z)

I described basic zooming features while discussing live view, but the zoom tool adds a few more possibilities. Clicking the image with this tool will gradually zoom in, keeping the clicked point under the cursor during the process if possible. So you can directly zoom in to the position you are interested in.

In live view it goes through the Fit/5x/10x levels, but on the preview it zooms in in small steps.

Holding the **Shift** key down will reverse the zooming direction, and will zoom out instead of in. The zoom cursor also changes from a + to a - to indicate this change.

There are also a few shortcuts for accessing specific zoom levels quickly: **⌘0** will fit the image on the screen, **⌘1** goes to 100% (10x in live view) and **⌘2** goes to 50% (5x in live view).

Rotate Left / Right (Shift+R / R)

These tools are used to rotate the image in the image area. When you rotate a preview image, the rotation is also stored in the associated XMP file, so next time you load the image the orientation will be preserved. And since it's in XMP, most RAW converters will pick it up automatically.

Kuuvik Capture also reads the orientation information the camera puts into the files, and display the images in that orientation by default.

Sharpening (S)

This is where things are starting to get interesting. The reason behind this tool is that it's easier to see where the plane of focus is on the image when it's over-sharpened a bit. Not grossly over-sharpened, but the right amount of over-sharpening will make the image pop when you reach focus.

Of course you don't want the final image to be over-sharpened this way, as it would ruin the image. That's why Kuuvik Capture employs the sharpening only for the display (in other words, it doesn't affect the final file).

For this scenario (over-sharpening for easier focus), the app's sharpening has distinct advantages over deliberate over-sharpening set in a picture style: a) it does not throw the histogram off and b) it does not affect the recorded image.

Open the *Sharpening Options* panel by clicking the three dots next the the toolbar icon (or by pressing **^S**) to reveal the sharpening amount slider. Set the amount according to the current camera and shooting situation.

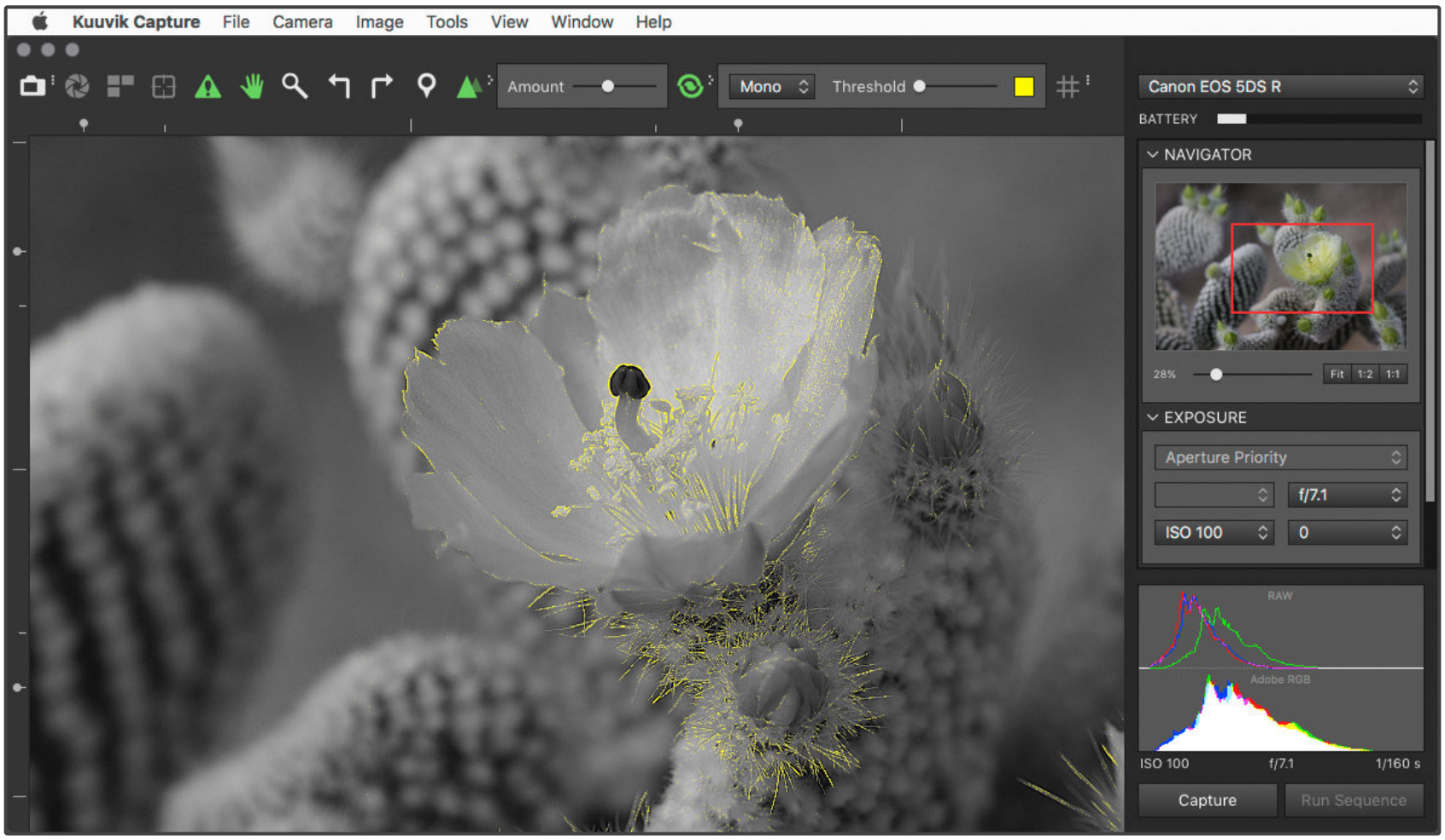
The live view stream and images usually need a different amount of sharpening, so the amount slider stores different values for live view (including multi-point) and images.

Sharpening is turned on by default.

Focus Peaking (P)

This tool, designed to be both a focusing aid and sharpness assessment tool, highlights high contrast edges on the image (works in live view, including multi-point, as well as on images).

The image below shows focus peaking on an image.



The peaking tool has three modes:

- **Color.** The image remains in color, the edges are highlighted in a solid color**.**
- **Mono.** The image is converted to monochrome, the edges are highlighted in a solid color.
- **Mask.** The edges are shows in solid white, everything else is black.

You can cycle between these modes by clicking **Tools > Cycle Peaking Mode** (or by pressing **M**). Or you can select the mode directly on the *Peaking Options* panel (click the three dots next to the peaking icon or press **^P** to open it).

Kuuvik Capture has color presets (green, pink, yellow, white) for the edge highlights. Use **Tools > Cycle Peaking Color** (or press **K**) to switch between them. But if you need another color, just click the colored square on the *Peaking Options* panel and pick your color on the displayed color picker.

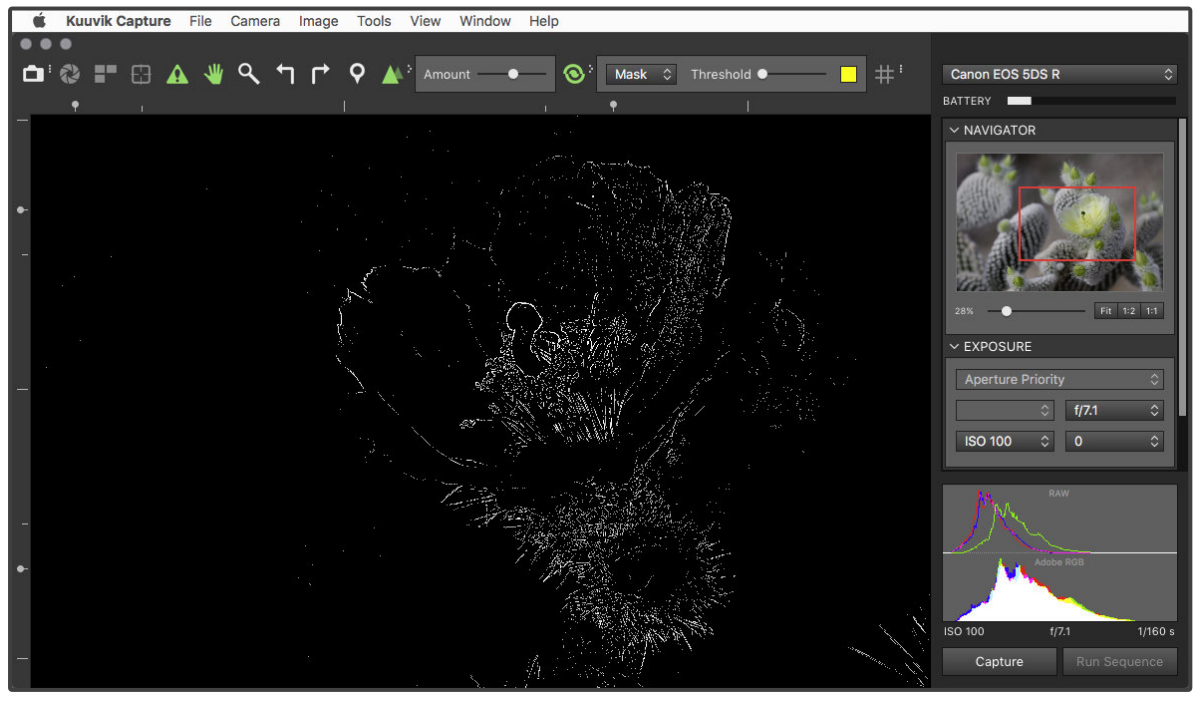
Two things control how the focus peaking algorithm detects the edges: a) the amount of sharpening applied to the image with the *Sharpening* tool and b) the *Threshold* slider on the *Peaking Options* panel.

The image on the left shows a low threshold, the right a medium threshold setting. Threshold values are stored separately for live view and preview images (just like the sharpening amount).

Let me return to the peaking mode for a moment. To the *mask* mode to be exact.

The focus peaking mask is displayed while you press and hold the **Alt/Option** key - regardless of what other tool is currently active.

It works in live view, multi-point live view as well as on images.



Show Guides (G)

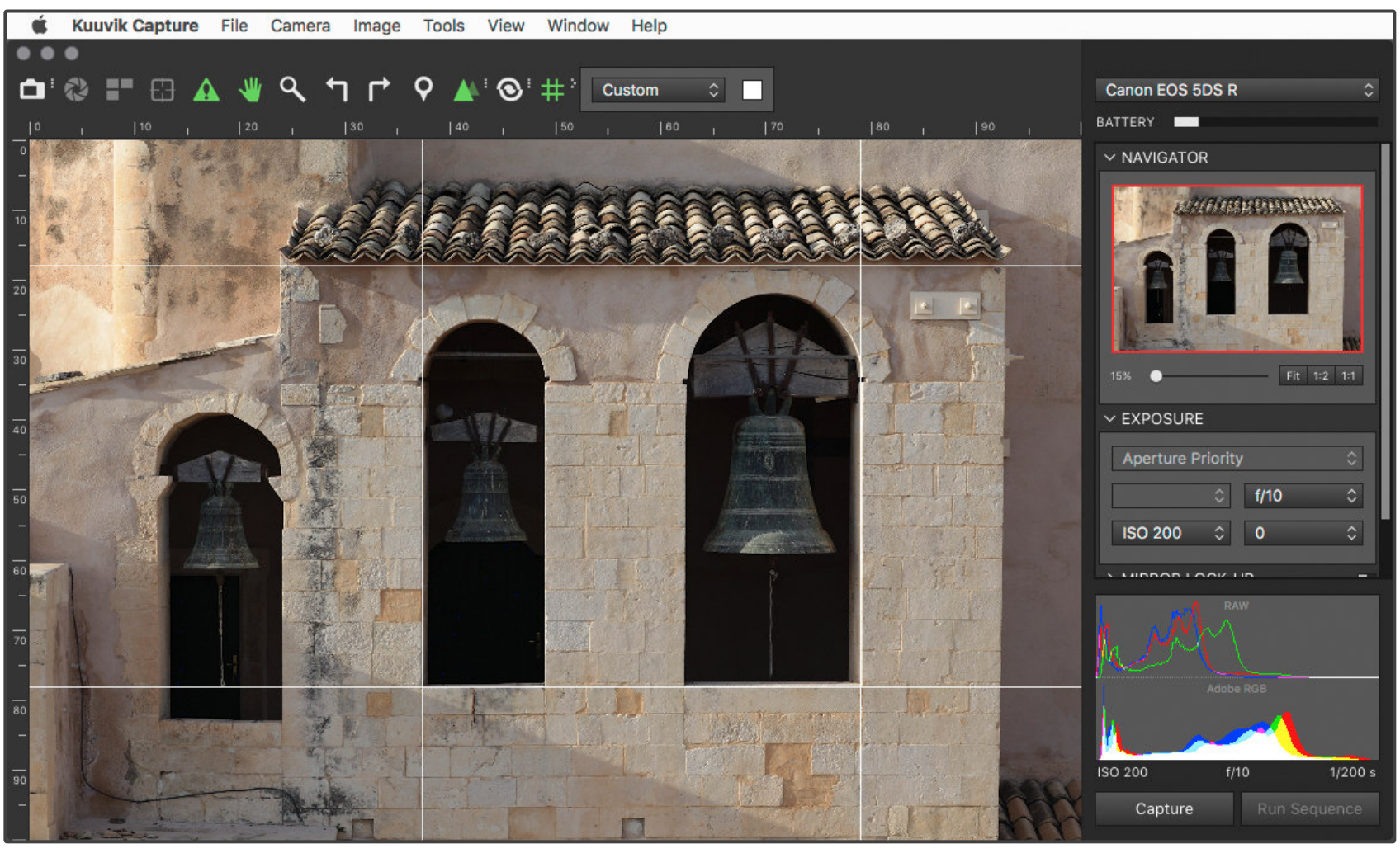
Kuuvik Capture lets you choose from a set of predefined guide templates as well as lets you place guides anywhere you would need.

You can access the predefined templates from the **View > New Guides From Template** menu item, or from the *Guide Options* panel (**^G**). There are three kind of templates:

- **Grids.** You can choose from 3x2, 6x4 and 30x20 grids.
- **Composition lines.** These templates are here to help in making your composition. The choices are center, thirds, golden ratio, plus lines at 25% edges to help in stitching.
- **Aspect ratio lines.** For marking 1:1, 5:4, 4:3, 16:9, DCI 4K, 2.39:1 aspect ratios.

You might have noticed the labels *absolute* and *aspect-relative* above the template names. These are the same for still photography, and will cover the differences in Chapter III.

The image below shows a typical usage scenario for guides: making sure that building features are absolutely horizontal and vertical in architecture photography.



Click the color picker (colored square) on the *Guide Options* panel to set the color for the lines. Note that you can also set the opacity. I tend to use a color and opacity that while still visible, does not interfere with my current composition.

To move a guide, hover the cursor over it (it will change shape), click the guide and drag it. You can move around guides created from templates freely.

To add a new guide, click one of the rulers (at the top and left side of the image area), and drag a new guide from it onto the image area. Existing guides can be removes using the rulers, too: simply drag a guide onto the rules and it will disappear.

Speaking of rulers, Kuuvik Capture has two different scales: percents, and thirds/quarters/eighths. To switch between those, use the **View > Ruler Scale** menu item, or click the intersection of the rulers (indicated by the red arrow on the right).

The percent scale is trivial, but a few word about the thirds/quarters/eighths scale. Quarters are indicated by longer marks, eighths by shorter marks. Thirds are where a mark has a dot at its end.

The Sidebar

I've introduced the sidebar when I talked about the main window. You already saw the camera selector (at the top), and the Navigator (the topmost panel in the scrolling region).

Because Chapter II will discuss most of the sidebar panels (*Mirror Lock-up*, *Bracketing* and *Intervalometer*), as well as the histogram and the buttons at the bottom, I'll only describe the *Exposure* panel and some general stuff here.

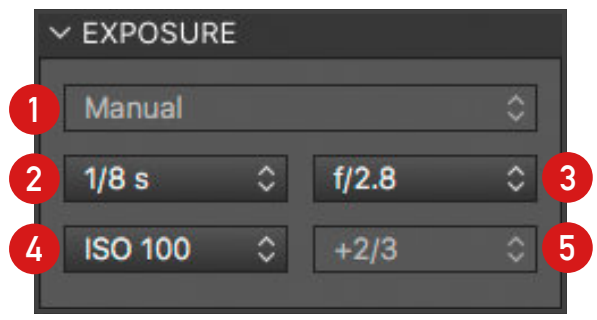
The panels in the scrolling region can be revealed by shortcuts, like **^N** for *Navigator*, **^E** for *Exposure*, and so on. The full list is under the **Window > Sidebar Panels** menu item. Right-clicking the scrolling region presents a context menu, where you can also reveal any of these panels. Or expand them all. Or close them all. When you reveal a panel, it's opened, and scrolled into view.

We saw how the buttons on the *Navigator* zoom the live view. They are titled differently for previews (1:2 and 1:1), as well as there's a slider, but it works the same way for previews as it does for live view.

OK, that was the general stuff, now move onto the *Exposure* panel.

It has five fields:

1. **Exposure mode,**
2. **Shutter speed,**
3. **Aperture,**
4. **ISO Speed,**
5. **Exposure compensation.**



All these fields are bi-directional: if you change an exposure parameter on the camera, the field will reflect the change.

On 1-series Canons *exposure mode* is a popup button, so you can select the mode from here. On cameras with a rotating exposure mode dial, well, Kuuvik Capture has no magic powers to turn the dial remotely, so you have to do it. But the current mode is reflected here.

The app supports *Manual* (M on the camera), *Aperture Priority* (Av), *Shutter Priority* (Tv) and *Manual Bulb* (B) modes. If you set any other mode on the camera, the *Exposure* panel will say *Unsupported Mode*, and you will not be able to change any of the exposure parameters (and some other tools, such as *Bracketing*, will be disabled).

In manual mode you can set all three exposure parameters. With newer cameras exposure compensation shows the difference between the values you set, and the value metered.

> *You can initiate exposure metering by either using the camera's shutter release or via the* ***Camera > Start Metering*** *menu item (or with the* ***Y*** *key).*

Similarly, in Aperture Priority mode the shutter speed field will show the metered value while metering is active. But in that mode you can also set exposure compensation.

In manual bulb mode the shutter speed field turns into a number entry field, where you can set the length of the bulb exposure - between 1 and 999999 seconds.

There are a few shortcut keys (and the corresponding menu items in the **Camera** menu) that can be used to jump to these fields immediately. They are **T** for shutter speed, **A** for aperture, **I** for ISO and **C** for exposure compensation. They work only if *Full Keyboard Access* is enabled for all controls in *System Preferences*. Kuuvik Capture will tell you how to do it if it's not enabled on you Mac.

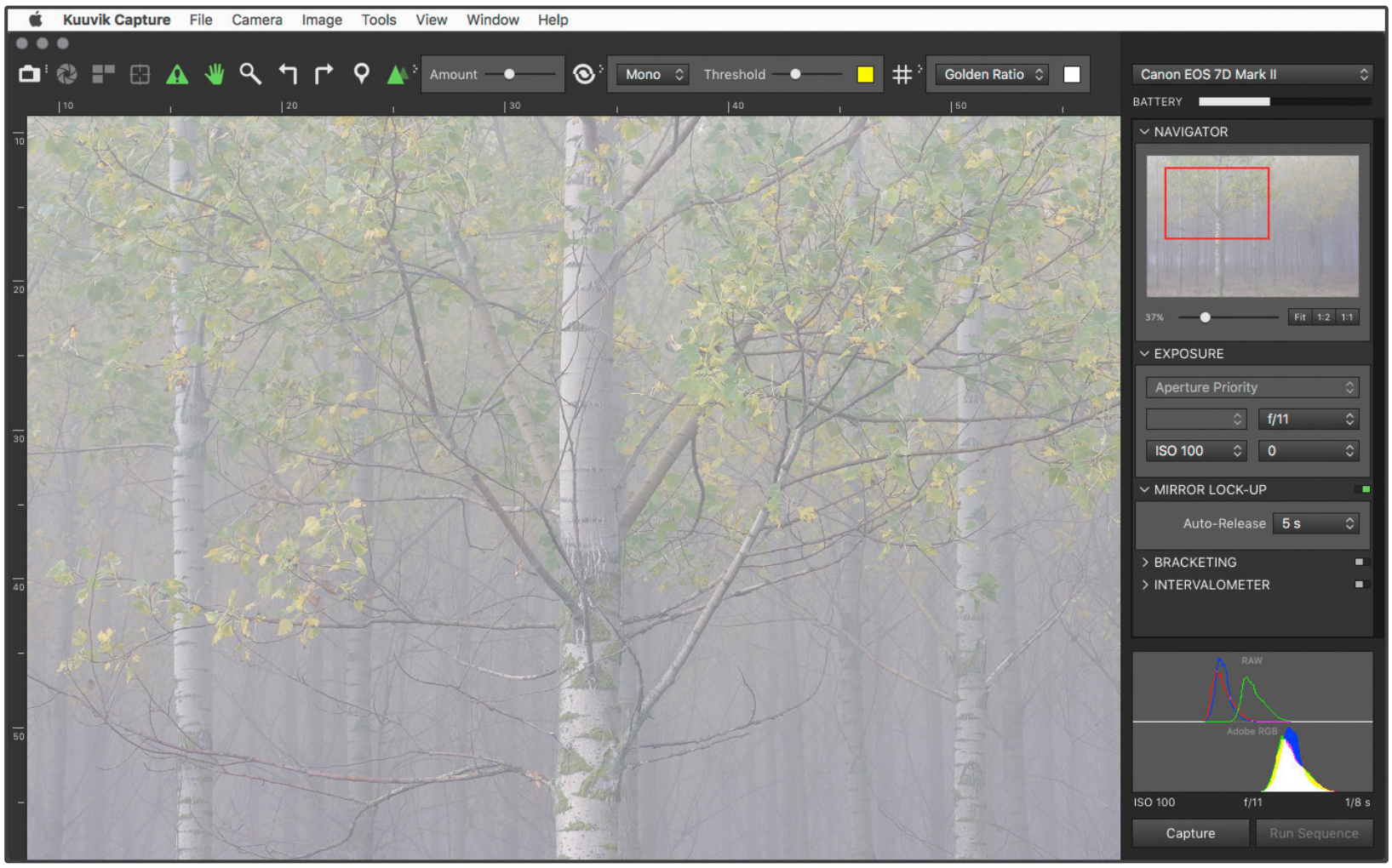
A green rectangle appears around the control when you press T/A/I/C - and the cursor keys can be used to change values. By default they change by the exposure step increments set on your camera, but by pressing the **Shift** key the cursor keys will change it in whole stops.

But since these fields are popup lists, you can click them and select the values from the popup menu.

◆◆◆

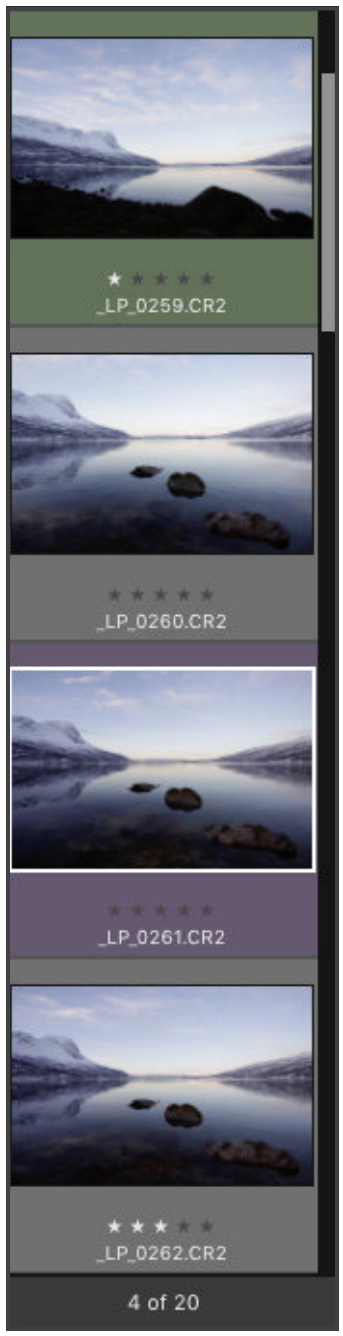
At this point you already know a lot about Kuuvik Capture, so it's time to move on to the subject of actually capturing images.

Chapter II - Capturing Still Images



OK, you are eager to press that Capture button at the bottom of the sidebar, but where the captured image will go? Well, press it now, and let's find out!

Sessions



Sessions are rather simple beings in Kuuvik Capture - each session is a folder on your Mac. The folder corresponding to the session is where the app downloads captured images. The Image Browser displays thumbnails of images found in this folder.

When you open the app for the first time a default session is created in **~/Pictures/Kuuvik Capture** in your home folder.

The *Image Browser* (shown on the left) is used to manage images in the session: to rate, label and delete them.

The image you select in the browser is loaded into the *image area*. The selected image has a white border around it in the browser.

You can select next and previous images using the cursor keys, or jump to the very first or last image using the ↖ and ↘ keys.

Star ratings can be set either by clicking the stars under the image, or with the **0-5** keys. The **0** key, as well as clicking a star for the second time, will remove the rating. The **]** and **[** keys will increase and decrease the ratings.

Most color labels are also accessible from the keyboard: *red* (**6**), *yellow* (**7**), *green* (**8**) and *blue* (**9**). The *purple* and *none* labels (the latter clearing the color label) are accessible either from the **Image > Set Color Label** menu, or via right-clicking the image area.

Rating and labeling works on the selected image when you use the shortcut keys, but by right-clicking any thumbnail in the browser you can set these for the clicked thumbnail. Obviously clicking star ratings for any thumbnail will set the star rating for that image.

> *Ratings and labels are stored in industry-standard XMP sidecar files, so opening the session's folder or a single image in your RAW converter (or creating a hot folder for the session) will immediately make the ratings and labels available in there. Well, assuming that you converter can handle XMP metadata.*
>
> *Ratings embedded into images are also read, but XMP sidecars take precedence.*

If you shoot RAW+JPG, downloaded RAW+JPG pairs will be handled as a single package, but only the RAW file is used for display. Thumbnails in the Image Browser are marked with a "+" badge to indicate that a JPG is also present, while the file name will show just the RAW.

Deleting the package will delete both the RAW and the JPG.

You can open any image in your favorite RAW converter or photo editor in two ways. The **Open With** menu (either from the **Image** menu or after right-clicking) lists all the apps on your computer capable of opening the selected image directly. Clicking the app's name will open the image in the chosen app. A preferred editor can also be assigned in Preferences, and pressing **⌘E** will immediately open in image in the preferred editor app.

Images having GPS coordinates in their metadata can be shown on a map in Maps with the **Show on Map** (**⌘G**) command in the **Image** menu or from the context menu.

To move an image to the trash, press **⌘⌫** (or choose **Move to Trash** from the **Image** menu or from the right-click context menu).

To change the sort order of the *Image Browser* thumbnails, use the **Image > Sort By** menu, or the right-click context menu. You can sort by file name, date created and rating, both in ascending and descending order.

> *Thumbnails displayed in the Image Browser are coming from the RAW files' embedded low resolution thumbnail. So there's no need for time consuming thumbnail generation. But being low resolution, some pixelation may happen if you resize the image browser to larger sizes.*
>
> *Hover the cursor over a thumbnail and a tooltip will be displayed showing the image's capture date, camera and lens, plus exposure parameters. A lot more can be included by setting the* ***Metadata tooltips*** *preference to* ***Extended****.*

You can resize the browser by dragging its side (or via the **Window > Image Browser** menu). And completely hide it when you don't need it (**Window > Image Browser > Hide** or, **^H**).

If you want to create a new session, use the **File > New Session…** menu item or press **⌘N**. Of course you can also open a session (**File > Open Session…** or **⌘O**). And if you want to quickly open the session's folder in *Finder*, choose **File > Reveal in Finder** (or press **⌘F**).

Dragging and dropping a folder to Kuuvik Capture (either the running app or its icon on the Dock) will open the folder as a session. This is a huge time saver if you open different sessions a lot.

Capturing a Single Image

Capturing a single image is easy: click the Capture button on the bottom of the sidebar, or press **⌘K**.

> *You can also reconfigure the space bar in Preferences to mirror the functionality of the ⌘K shortcut.*

Several things happen in response to starting the capture. The camera is set to a compatible "single frame" drive mode if necessary and image quality is set to RAW, RAW+JPG or JPG based on what you set in *Preferences*. JPG files are always large/fine quality.

Single frame drive mode is required because of how Canon's remote control interface works. The app leaves single frame, silent single frame, 2s and 10s self-timer as set. In case other drive mode is set on the camera, it will be changed to single frame or silent single frame (the latter if silent continuous was set on the camera). And since one of the main goals of Kuuvik Capture is to help you in creating the highest quality images, RAW is the natural choice. But since a few of our customers asked for JPG support, the app can also do that.

Captured images are recorded onto the card in the camera and also downloaded immediately. With RAW+JPG you also have the option to not download the JPG. In case you don't have a card in the camera, files will be still downloaded to the computer.

> *By RAW I mean real, proper RAW. sRAW and mRAW aren't, so they are not supported.*

Of course you can also capture an image by releasing the shutter on the camera. In this case Kuuvik Capture has no chance to set drive mode or image quality, but will do the best it can.

> *You can use a regular cable release connected to the camera to initiate captures.*

The newly captured and downloaded image appears in the Image Browser and also loaded into the image area.

> *Kuuvik Capture extracts and displays the embedded JPG preview from the downloaded RAW file.*

From this point on, the app's tools you learned in Chapter I can be used on the preview: sharpening, focus peaking, markers, guides, panning, zooming, rotation, etc.

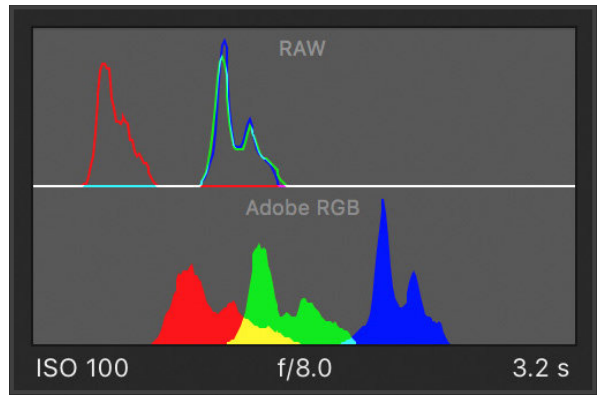
You also see exposure parameters used to capture the image below the histogram area.

The Dual Histogram

You are familiar with histograms. But you might not be familiar that the usual histograms (on the back of your camera and in your favorite RAW converter) miss information that could be an important factor when deciding your exposure.

Regular histograms (I'll call them *processed histograms*) are generated from the image *after RAW conversion*. Parameters like white balance, picture style, color space and even sharpening have a huge influence on the histogram, and may hide important issues. Misleading you to think that you have a correct exposure, but in fact you might clip channels.

Kuuvik Capture's Dual Histogram has a RAW-based histogram (top) along a processed one (bottom) to display information from different vantage points. The RAW-based one reflecting the image's data before conversion. They are complementary instruments helping you to precisely assess an image's exposure.



Naturally, the RAW histogram is displayed for RAW files. If you have a JPG image loaded, or in live view, only the processed histogram will be available.

> *The RAW histogram and corresponding clipping warning layers are generated in the background, so it may take a moment until the RAW histogram appears. It is not necessary to wait for the RAW histogram; it is possible to move to or capture another image. But you can't delete or purge images during this time. You can also switch from the automatic RAW histogram generation to manual, a setting discussed later on.*

In case of RAW files, the processed histogram is generated from the JPG preview image that every RAW contains (this is what you see in the image area, and this is the source of the histogram shown on the camera's LCD). This represents how the image was processed by the camera. Your RAW converter will almost certainly convert it in a different way, so the final word on exposure still belongs to the converter. But the camera's interpretation gives a solid starting point.

For checking highlight and shadow clipping at a glance, you'll see warning signs on the left and right of the histogram if the app detects that more than 0.01% of the image's pixels are clipped. There are a different set for RAW and processed data.

While processed clipping could be avoided by changing conversion parameters, RAW clipping is always hard fact, indicating unrecoverable data loss. It's a good practice to avoid RAW clipping wherever possible. Even tools like highlight recovery in your RAW converter will be more effective if the RAW channels are not clipped.

The processed histogram also indicates the image's color space. For live view and movie recording the camera always serves video frames in sRGB – even if you set your camera to Adobe RGB.

This is how the Dual Histogram works, but let me dig a bit deeper into why one would need it. I'll discuss the effect of white balance and color space choice, but will leave experimenting with other processing parameters as an exercise to the reader.

Let's begin with white balance. Cameras see quite a bit differently than humans do. On the right is how a Canon EOS 7D Mark II sees a ColorChecker chart, for example.

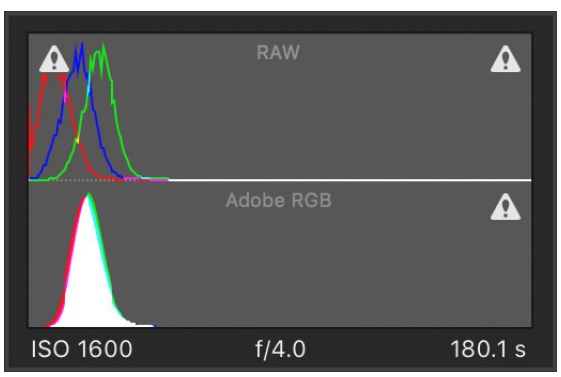
Thanks to white balancing, you don't get this greenish mess normally.

During RAW conversion the converter multiplies red/blue channel values, effectively stretching or compressing them, to reach your chosen white balance. For the ColorChecker image, the red channel should be stretched by about 2x, and the blue channel about 1.4x.

> *White balance is is always represented as RGB coefficients during RAW conversion, not with color temperature/tint as RAW converters and cameras present this data to you. Color temperature is a construct to handle these numbers in a more user-friendly way. And the way these coefficients are mapped onto color temperature is a proprietary process for each converter. This is why you get completely different white by using the same Kelvin value in different RAW converters.*

Comparing the RAW and processed histograms on the previous page's example clearly shows how white balancing pushed the peaks of the red and blue channels to the right.

What happens if the red channel had data above the mid-point and stretched by a factor of 2? Well, it will be clipped. This is white-balance-induced clipping, and the usual histograms show this.



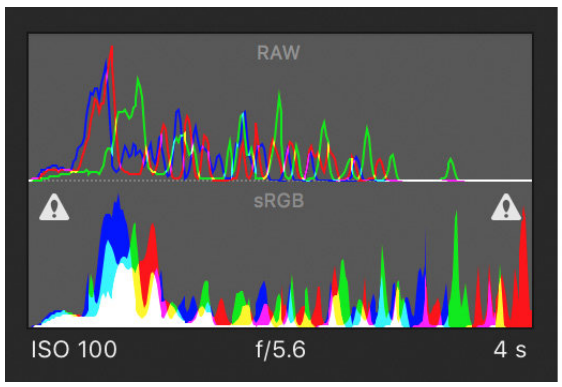
But in the other direction, when a channel is compressed (with a coefficient less than 1), the processed histogram might show that everything is in order, while in reality a channel is already clipped. The result is detail-less flat areas with no color variation in saturated regions. And the same applies to shadow areas too, with channels lifted out of underexposure. The latter happens all the time when I do astrophotography

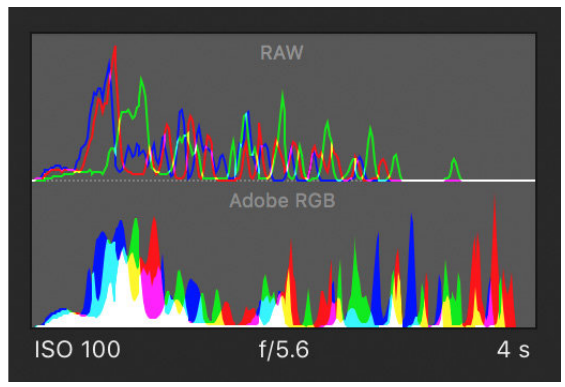
and the exposures are too short (as you see on the example on the left). The RAW histogram easily catches this.

> *I must note that we apply gamma correction to the RAW histogram, and thus it's not entirely RAW. Why? Because the way the sensor captures the world doesn't agree with how humans see. The role of gamma correction is to redistribute tones to match human vision. So it's not the everything-crammed-to-the-left kind of RAW histogram you may encounter in some apps and geeky articles. Instead, it's something that makes sense for a human photographer.*

Now on to how color space choice affects the processed histogram. Canon cameras offer sRGB and Adobe RGB. This specifies the color space JPG files (including embedded previews is RAW files) will be converted to.

I made two photos of a regular ColorChecker chart. One with setting the camera to sRGB and another with setting it to Adobe RGB. Lighting and exposure were the same.





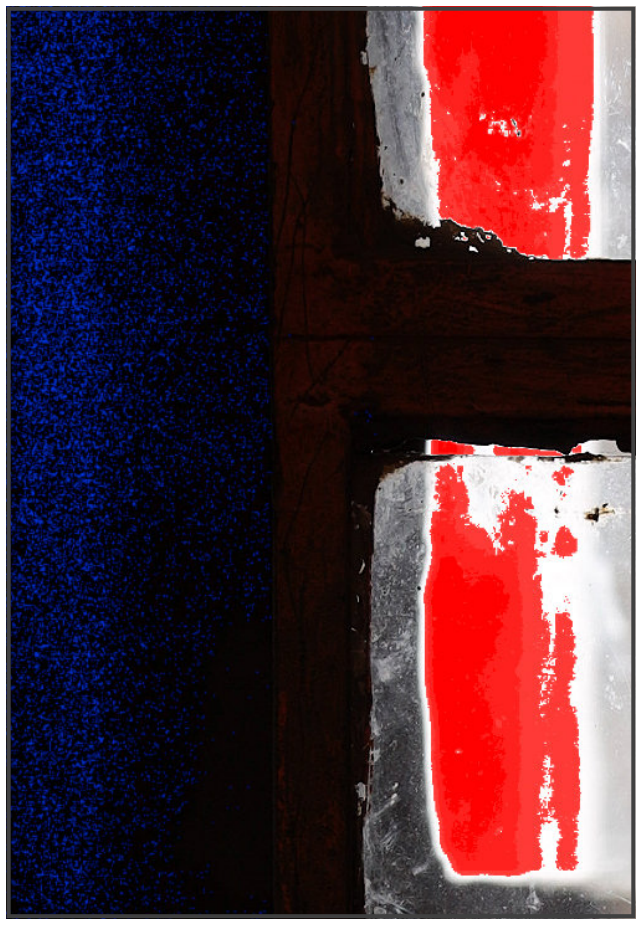
There's absolutely no clipping in the RAW data (the RAW histograms are identical). And there's no clipping when converted to a sufficiently large color space - Adobe RGB. But in sRGB the histogram becomes more elongated and both highlights and shadows are clipped. This is a good example of color-space-induced-clipping. And can be easily fixed by choosing a larger color space. But if you are shooting JPG and even Adobe RGB is not large enough… It's a reason to switch to RAW.

One consequence of this is that the histogram during live view (which is always in sRGB) may show clipping while the captured image's histogram (in Adobe RGB) not. And even a histogram from an Adobe RGB embedded preview might show clipping while there's absolutely no clipping in the image when converted to ProPhoto RGB in your RAW converter.

I'd recommend to treat these processed histogram clipping warnings as different levels. The sRGB warning in live view goes off first, this should ring a bell in your head to watch more closely after taking the image, as there may be a problem. After taking a picture, if Adobe RGB shows clipping, then it's time to either check it in your RAW converter or back off a little bit.

Finally I'd like to mention another tool that goes along the non-white-balanced idea. This is Unitary White Balance. Unitary WB is a special WB where the channels are not stretched and compressed at all (their coefficients are 1). Images taken with Unitary WB will have the previously shown green cast in their JPG previews (RAW data is not affected). To program Unitary WB into the camera's Manual WB slot, click **Camera > Set Unitary White Balance** in the menu.

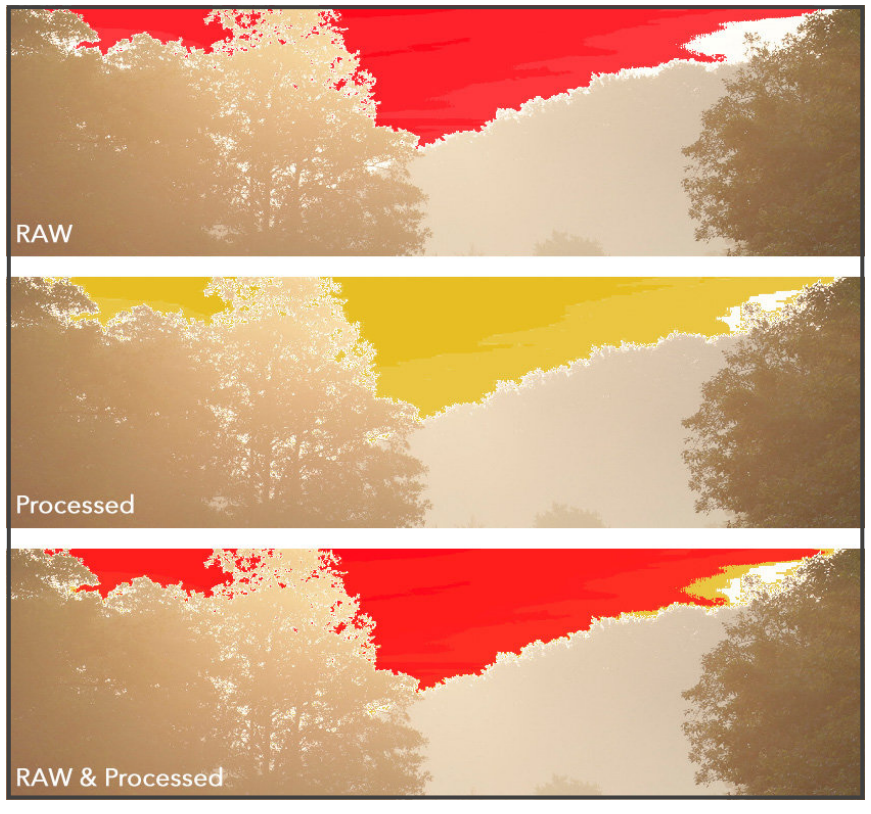
Clipping Warnings



As mentioned in Chapter I, there are four clipping warning layers: two indicating RAW clipping and two for processed data clipping.

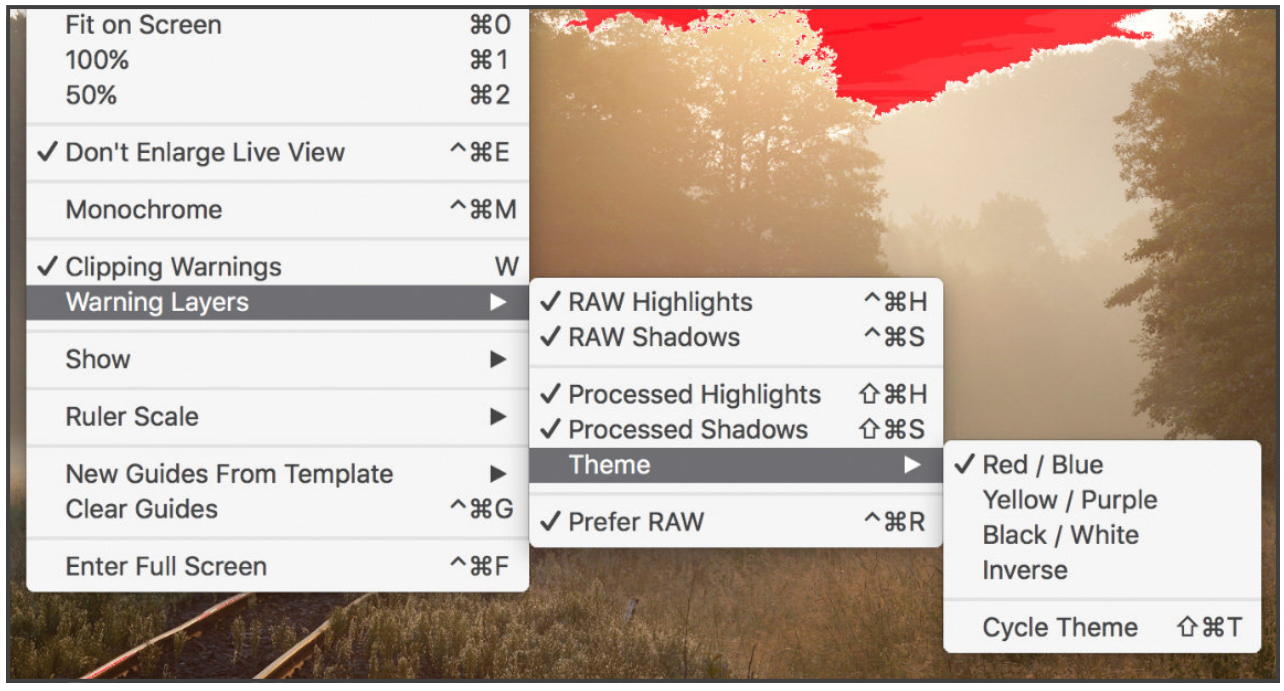
The saturation of each warning layer's color increases as more channels are clipped for a pixel, as you can see on the left (with only the RAW layers shown).

Processed clipping warnings are also available during live view and movie recording. Just keep in mind that exposure simulation should be enabled on the camera for the best results (otherwise live view will not reflect your current exposure).



RAW and processed layers can be shown separately or combined (the default). When used together, the processed layer usually triggers first. To be able to distinguish the two types when used together, you can choose from different color themes for the processed warning layers (RAW layers are always red/blue).

There are a bunch of items on the **View** menu, as well as on the image's right-click context menu and on the histogram's context menu. You can toggle each of the four layers separately, or turn the whole stack on and off with the **Clipping Warnings** command (or by pressing the **W** key or clicking its toolbar button) when the warnings get in the way of evaluating composition.



Prefer RAW disables processed layers when RAW data is available for an image.

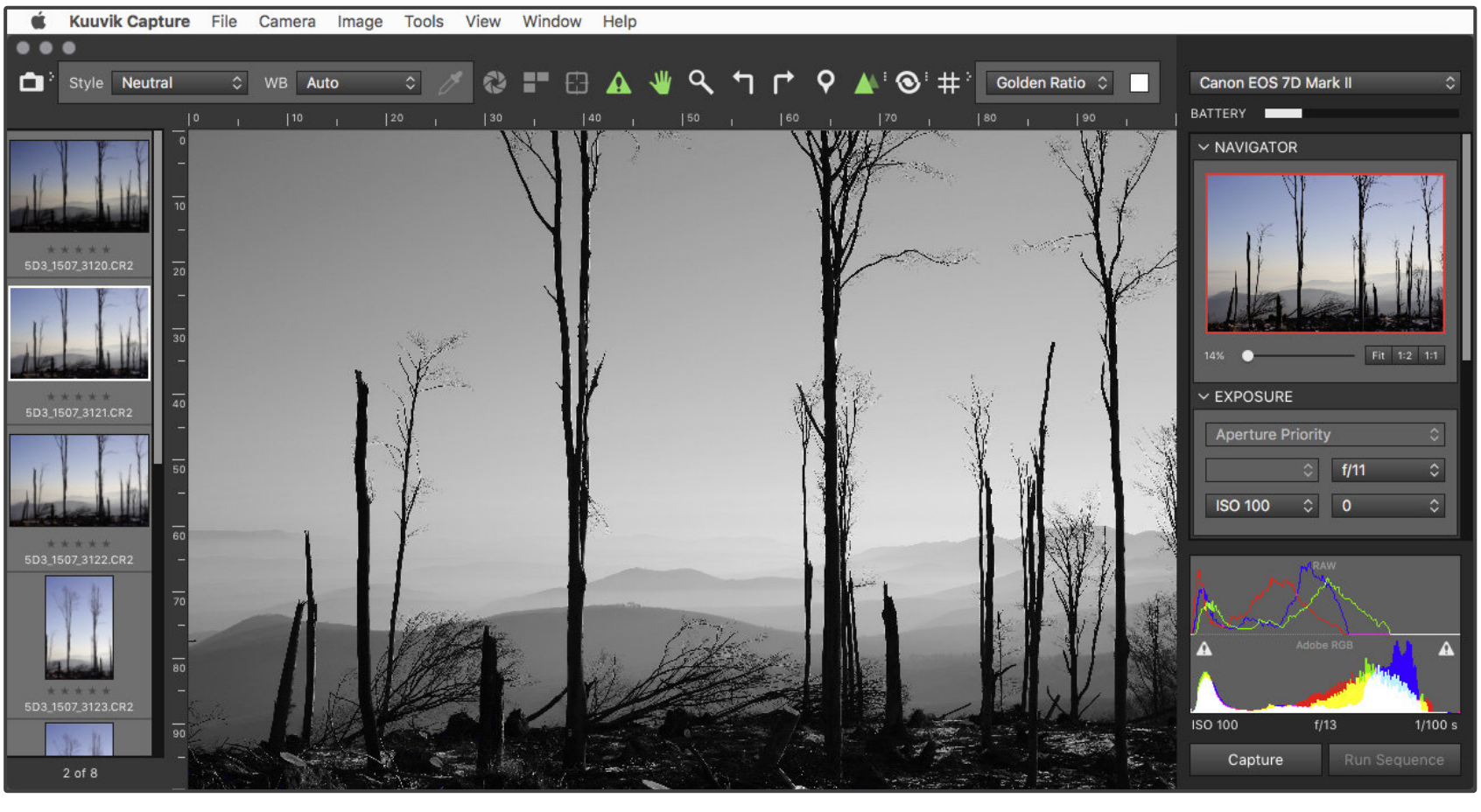
My preferred way of working is to turn Prefer RAW on and set processed warnings to the red-/blue theme. This way I always have red/blue warnings: processed ones during live view and for JPG files, and RAW ones for RAW files.

The default is yellow/purple for the processed warnings.

The *Inverse* theme is a special one. Instead of being multi-level, it will invert the pixel where one of the channels is clipped, thus overexposed red becomes cyan, yellow becomes blue, and so on.

Monochrome Mode

This is a special viewing mode that converts the image displayed in the image area into monochrome. Everything else (the image browser, navigator) will remain in color.



It is similar to the *Mono* peaking mode, and in fact they both display the luminance channel (the L in Lab mode) of the image. But *Monochrome* mode does not activate peaking. They are interconnected, though. Turning on *Monochrome* mode when peaking is active, and is in *Color* mode will switch peaking into *Mono* mode. Turning off *Monochrome* mode when peaking is active in *Mono* mode will switch peaking into *Color* mode. If peaking is active in *Color* mode when *Monochrome* mode is turned on, it will switch into *Mono* mode. Choosing the *Color* peaking mode will turn off *Monochrome* mode.

Monochrome mode is also available during live view and movie recording. But unlike the Monochrome picture style, it only converts the image into grayscale for display. Recorded images and movie files are not affected.

Block Boundary Artifact Reduction

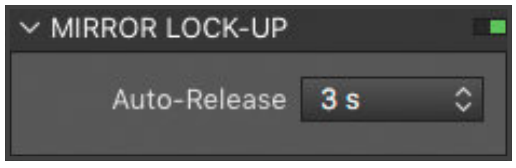
Kuuvik Capture uses the embedded preview JPG when displaying RAW files. Unfortunately, these previews aren't the highest quality – cameras try to save space by higher JPG compression. The downside is that when one sharpens such an image, 8×8 pixel compression block boundaries may become visible, as you can see on the magnified image to the right. It is especially distracting on large homogeneous dark and light surfaces, and makes judging image quality a harder task.

To combat this, Kuuvik Capture has a block boundary artifact reduction function.

On this image most of the artifacts are gone. Of course permanent damage done by low quality JPEG compression can't be reversed completely, but the magnified image is certainly less problematic this way.

The function is active by default, but can be turned off in Preferences if you don't need it. Yes, there are situations, like hard straight edges in architecture and product photography, where the reduction might introduce its own artifacts. It is a tool useful in most situations, and not useful in some. Use it accordingly.

Mirror Lock-Up



The third panel from the top on the sidebar control mirror lock-up on the camera. The switch on the title of the panel indicates whether mirror lock-up is enabled on the camera (it's enabled if the switch is green).

You can switch mirror lock-up on and off using this switch, via the **Camera > Mirror Lock-Up** menu item, by pressing ⌘**U**, or on the camera.

> *Some entry level cameras do not support mirror lock-up at all. The 1Ds Mark III does not support mirror lock-up during tethering. The function is disabled on these cameras.*

With Canon cameras you need to press the shutter release twice to capture an image if mirror lock-up is active. Kuuvik Capture can automate this for you. Just set the time you want to wait between flipping up the mirror and releasing the shutter with the **Auto-Release** field. Values range from 0.5s to 15s.

> *Canon added a similar function to the 5DS and 5DS R, but the auto-release time is limited to 2 seconds. It is usually not enough when using such a high resolution camera. While Kuuvik Capture will work with this in-camera auto-release, it is recommended to use the app's release timer instead.*

Or you can turn the auto release off (choose Off from the popup) to switch it back to working the usual way. But how this usual, double-trigger way works different from camera to camera.

- The 50D and 5D Mark II provide no information about the mirror's position to Kuuvik Capture. In this case the Capture button changes title to Trigger. You have to press it twice (first flips up the mirror, second releases the shutter). The app doesn't know if you flip the mirror up on the camera, though.

- On all other cameras Kuuvik Capture can track the mirror's position, so the Capture button changes title to Mirror Up when the mirror is down, and back to Capture when the mirror is flipped up. If you flip the mirror up from the camera, the app follows this as expected.

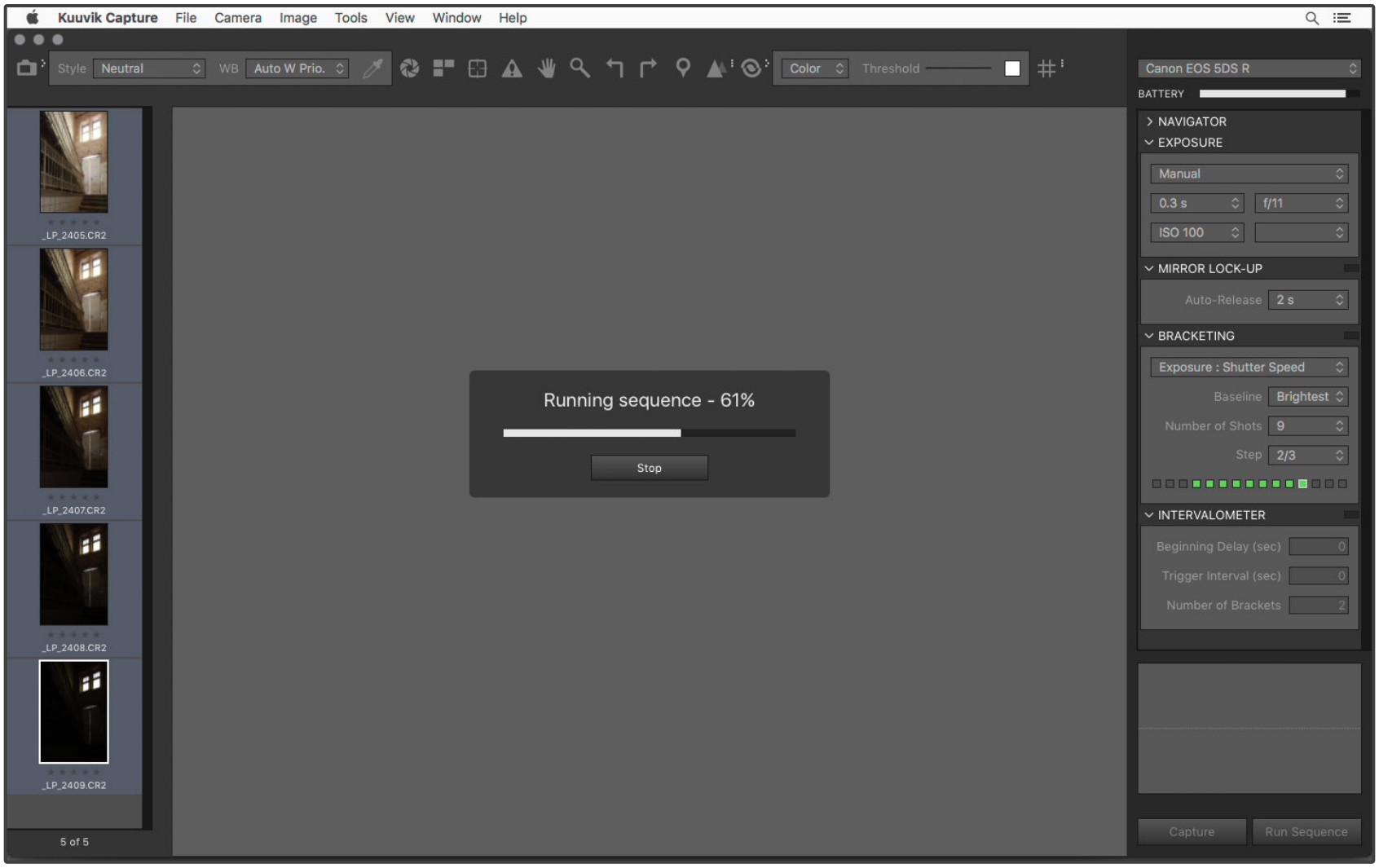
Mirror lock-up settings will be ignored if you initiate a capture from live view, since the mirror is already flipped up.

> *Here's something you need to know about mirror lock-up and live view. Some newer Canons (5DS/R, 1D X Mark II, etc) feature an electronic first curtain shutter (EFCS), which induces even less vibrations than regular mirror lock-up. EFCS is automatically used when you initiate a capture from live view (but not otherwise).*

Exposure Sequences

Kuuvik Capture supports different exposure sequence types: auto-exposure brackets, focus brackets and intervalometer sequences. You can even combine the brackets with intervalometer sequences.

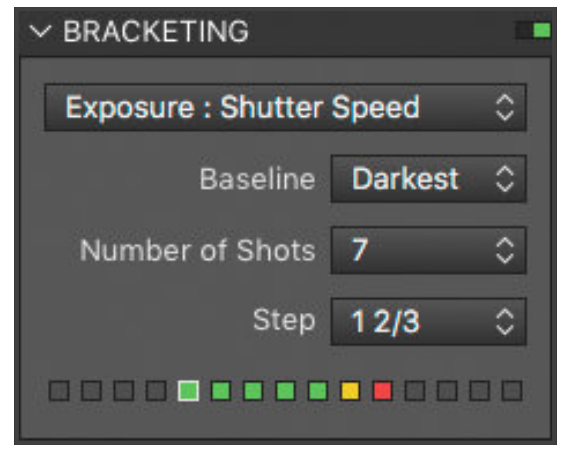
Once a sequence is configured and ready to run, the **Run Sequence** button in the lower right corner of the sidebar becomes enabled. Press it (or choose **Tools > Run Sequence** or press ⌘**R**) to start the sequence. During sequence execution the image area show a progress bar.



The camera is locked during the entire sequence to avoid any potential interference.

As execution proceeds, downloaded image appear in the *Image Browser*. Images captured during a sequence are marked with a color label - you can set the color in *Preferences*.

Auto-Exposure Brackets



Bracketing can be enabled with the switch in the title of the Bracketing panel (or via the **Tools > Bracketing** menu item or by pressing **⌘B**). The first field on the panel specifies the type of the bracket. Aperture, shutter speed and ISO are the auto-exposure brackets Kuuvik Capture supports. Which of those three are available depends on which exposure mode the camera is in:

- All three types are available in manual mode.
- Only ISO is available in aperture (Av) or shutter priority (Tv) modes.
- Aperture and ISO are available in manual bulb mode.

Baseline specifies which frame of the bracket is represented by the current parameters on the *Exposure* panel. If you ever used auto-exposure on your Canon, it works by specifying the middle frame - that is, you will make some frames darker, some frames brighter than that. But in practice what you know is how either the darkest or brightest frame should be exposed in the bracket, and roughly how many frames you need. With the *Baseline* setting you can do exactly that: tell Kuuvik Capture which end of the bracket you have specified in *Exposure*. It can be either the *darkest*, or the *brightest* frame, or even the *middle* frame if you really need that.

Number of Shots and *Step* are both self-explanatory. You can go up to 15 shots per bracket, and the step size can be set up to 3 stops.

The colored squares at the bottom is the *bracketing monitor*. The number of colored squares correspond the number of shots you set above. The baseline frame is indicated with a white border around the colored square.

Green squares mean that the given frame will be executed with no issues. *Yellow* means that the step size between the given frame and the neighboring green frame is less than what you specified, but there's still a difference. Why could this happen? Because you ran out of the settings range the camera is capable of. For example you wanted an exposure longer than 30 seconds. *Red* means that there's no difference between the current frame and the neighboring green or yellow frame.

Shutter speeds in the above screen shot are the following:

1/8s 0.4s 1.3s 4s 13s 30s 30s

You can see why the sixth frame marked yellow, and the seventh red. In general you want to avoid red frames, since they will just waste storage space. If you hover the cur-

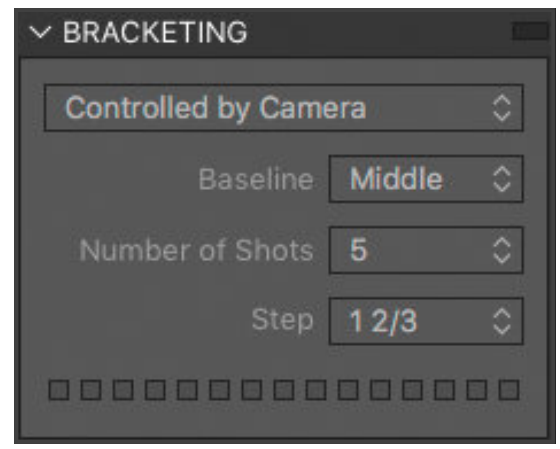
sor over the green and yellow squares, a tooltip will appear showing the varied exposure parameter for that frame.

If you also turn on mirror lock-up, then it will be used for each frame of the bracket.

> *On EOS-1 series cameras the mirror is flipped up at the beginning of the sequence and only the shutter is operated for each shot.*

The best way to use Kuuvik Capture's bracketing is to be in manual exposure mode and set everything up according to your needs.

Camera Controlled Brackets



While it is not recommended to use the camera's built-in auto-exposure bracketing with the app, it automates bracket execution even in this scenario. It reads AE bracketing settings from your camera and displays them.

The *bracketing monitor* is not available in this case.

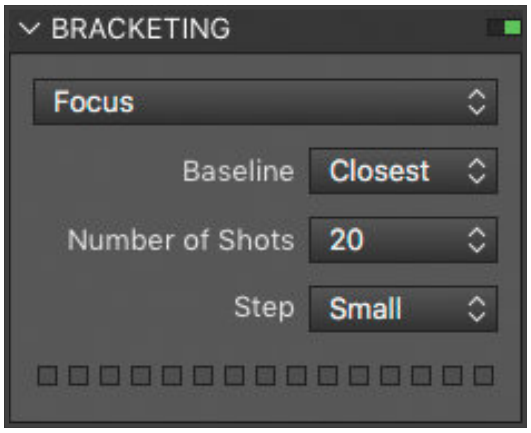
White balance bracketing is not supported, and if you happen to set it the message *Unsupported Configuration* will be displayed in place of the *bracketing monitor*. Click the question mark after the message to display more information about the problem and how to solve it.

Flash exposure bracketing (FEB) is also unsupported due to camera limitations. But there's a trick to simulate it utilizing the intervalometer. More on this later.

The EOS RP introduced in-camera focus bracketing. Kuuvik Capture handles it as another type of camera controlled bracket. The camera's focus bracketing settings are displayed in the app, but you can change them only on the camera. When camera controlled focus bracketing is active, hitting the **Capture** button will run the entire bracketing sequence. Note that the images are captured with electronic shutter, that is, they are prone to severe rolling shutter effect.

But since Kuuvik Capture has real, proper focus bracketing, I'd highly recommend to use that.

Focus Bracketing



With focus bracketing you can drive the focus in AF-capable lenses. Each focus bracket starts from a baseline point. If it is set to *Closest*, then Kuuvik Capture will move the focus away from the camera during the sequence. If it is *Farthest*, then the app will move the focus towards the camera.

A focus bracket can consist of a maximum of 100 shots.

Step size is a tricky thing. You can set *Small/Medium-/Large*, but what they mean? Unfortunately the exact focusing distance change for these steps vary from lens to lens. The multiplier between small/medium and medium/large also varies from lens to lens, so it's something you need to experiment with and measure for your lenses. As a starting point, small steps is what you get when driving the focus with the cursor keys in live view. Medium step size is what you get then driving the focus while holding **Shift**.

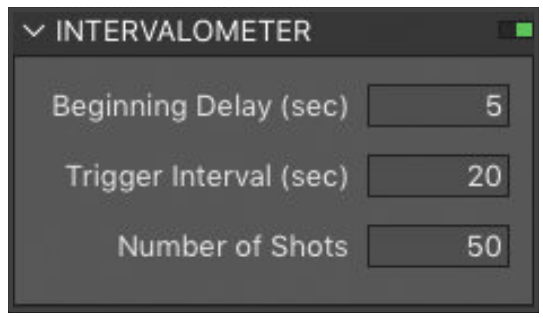
Focus bracketing utilizes live view on the camera.

> ***Silent LV shoot***. *may need to be disabled in the camera's menu if you intend to use flash during focus bracketing sequences, otherwise the flash may not fire.*

Just like with auto-exposure brackets, mirror lock-up can be combined with focus brackets.

Kuuvik Capture tries to move the focusing distance back to the starting point after a focus bracket finishes. But on some camera/lens combinations it might not position the lens back to the exact starting position.

Intervalometer and Self-Timer



The role of the intervalometer is to let you execute a number of single shots (or brackets) after a specified time passes. If bracketing is disabled, it will execute single shots, and if bracketing is on, then it will shoot the specified bracket. Pretty straightforward.

Beginning Delay is the amount of time you want to wait before the first shot. The time *Trigger Interval* specifies is interpreted as between the start of the shots (and not between the end of one shot and a beginning of another). So you need to be careful to choose a longer interval than your exposure time. No problem if you fail to do it, just the shots will be executed one after another with no wait. It can be even helpful if you just want to execute the same shot a number of times (in this case just set 0 as the interval).

> *This is the way the trick to use flash exposure bracketing (FEB) works. Set up FEB on your camera, set the number of shots in the intervalometer and set the interval to zero. Kuuvik Capture will trigger the shots and the camera will vary flash exposure between them.*

With *Number of Shots* set to 1, the intervalometer becomes a self-timer. *Trigger Interval* is ignored in this case. It is recommended to use this method instead of the camera's self-timer drive modes.

> *Self-timer drive modes on the camera are supported to be able to use the IR remote (RC-1/5/6), which demands the use of self-timer drive modes.*

Intervalometer sequences can be combined with bracketing and mirror lock-up.

Culling

Culling is the process of selecting your best shots, or keepers in a session. It is based on the star ratings I had introduced at the beginning of this chapter.

Contrary to the usual "throw out the bad ones one-by-one", Kuuvik Capture sports a "mark the best & ditch the rest" concept of image culling. During the years, I found the negative approach (throwing out the bad ones) impacts my creative process in a very bad way: I've been concentrating on the bad images, instead of the standouts. It was a kind of mental torture for me.

With the app, I just give stars to the best images, to those that I really like (and those whose technical properties are also good). Then ask the app to trash the others (**Image > Purge Unrated** menu item or **⌘P**).

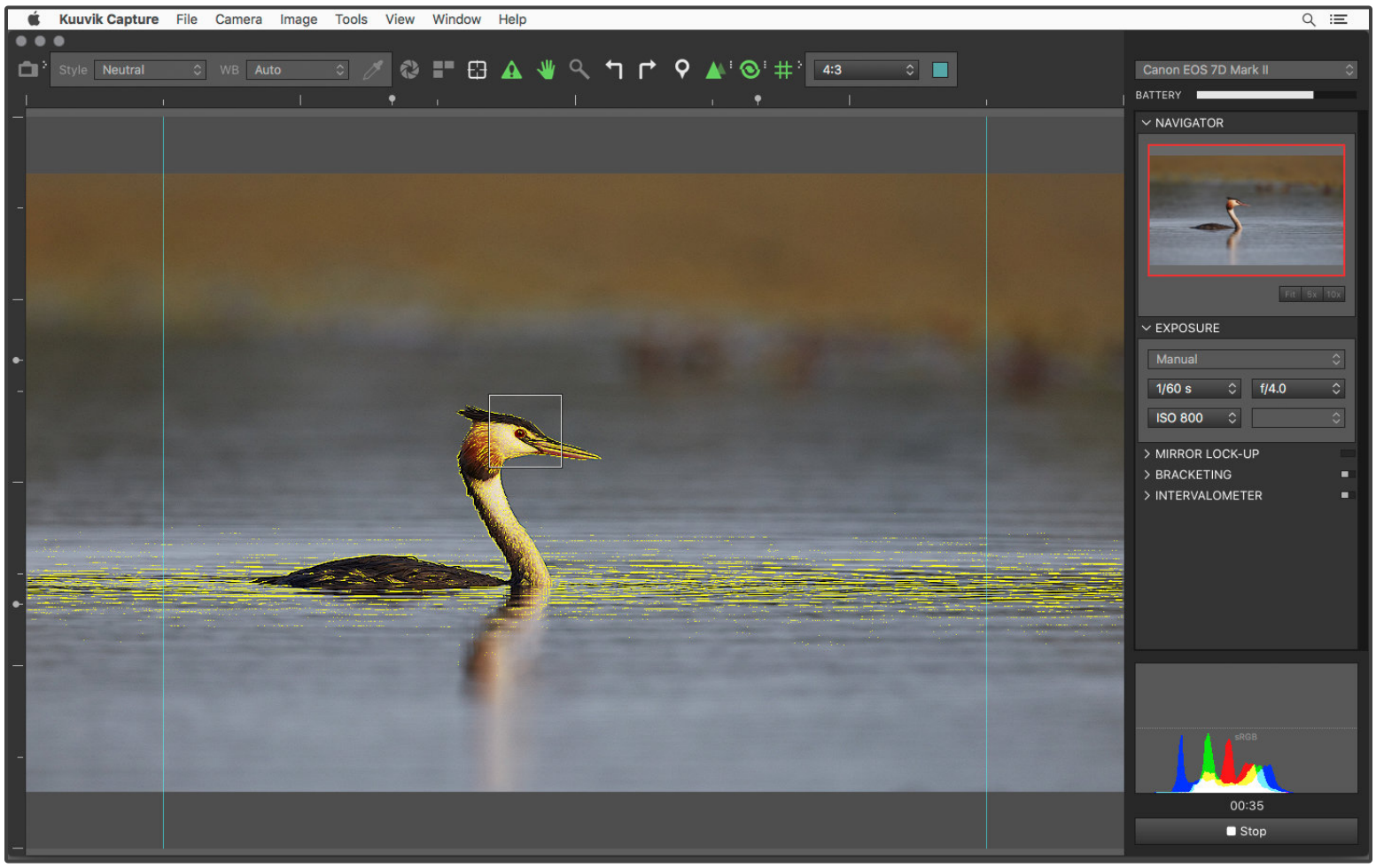
You also have the option to decrease star rating of remaining images, and start the process all over again. To do it, click the **Image > Purge Unrated and Decrease Rating** menu item or press **⇧⌘P**.

It's simple, intuitive, and fosters positive thinking about the good images.

> *One of the side effects of sessions being simple folders is that you can use Kuuvik Capture to cull your previous shots. Even ones not captured with the app, like a wedding or sports event. Just open the folder you want to cull as a session. I use it all the time to select the keepers from my bird shoots (letting me to go through around 2000 images a day in a breeze).*

Purged images are moved to the Trash, so you can restore them from there if you accidentally purged some worthwhile photos.

Chapter III - Recording Movies



Tethering can also bring advantages to the cinematographer. Think about cameras placed in hard-to-reach locations, or enclosed in a crash box. It's much easier to set up and execute your shot if you see what you are doing.

Turning on Movie Mode

Newer Canon cameras are equipped with a movie mode switch. On these, you just flip the switch and it's done.

But on models with no such switch, movie mode must be switched on in the menu. The exact procedure is described in your camera's manual, so I'm not going to replicate it here. You need to look for **Live View/Movie func. set.** and under **LV func. setting** choose **Sills+movie** with **Movie display**.

In both cases, Kuuvik Capture will immediately start live view (meaning that it will close the camera's menu).

> *In Movie Mode still shooting is not possible from Kuuvik Capture. Even if the camera can shoot stills in this mode, the app will ignore them and will not download them.*

Since the USB port has no sufficient bandwidth to stream movies, they are recorded to the card in the camera only. So unlike in stills mode, you must have a card in the camera.

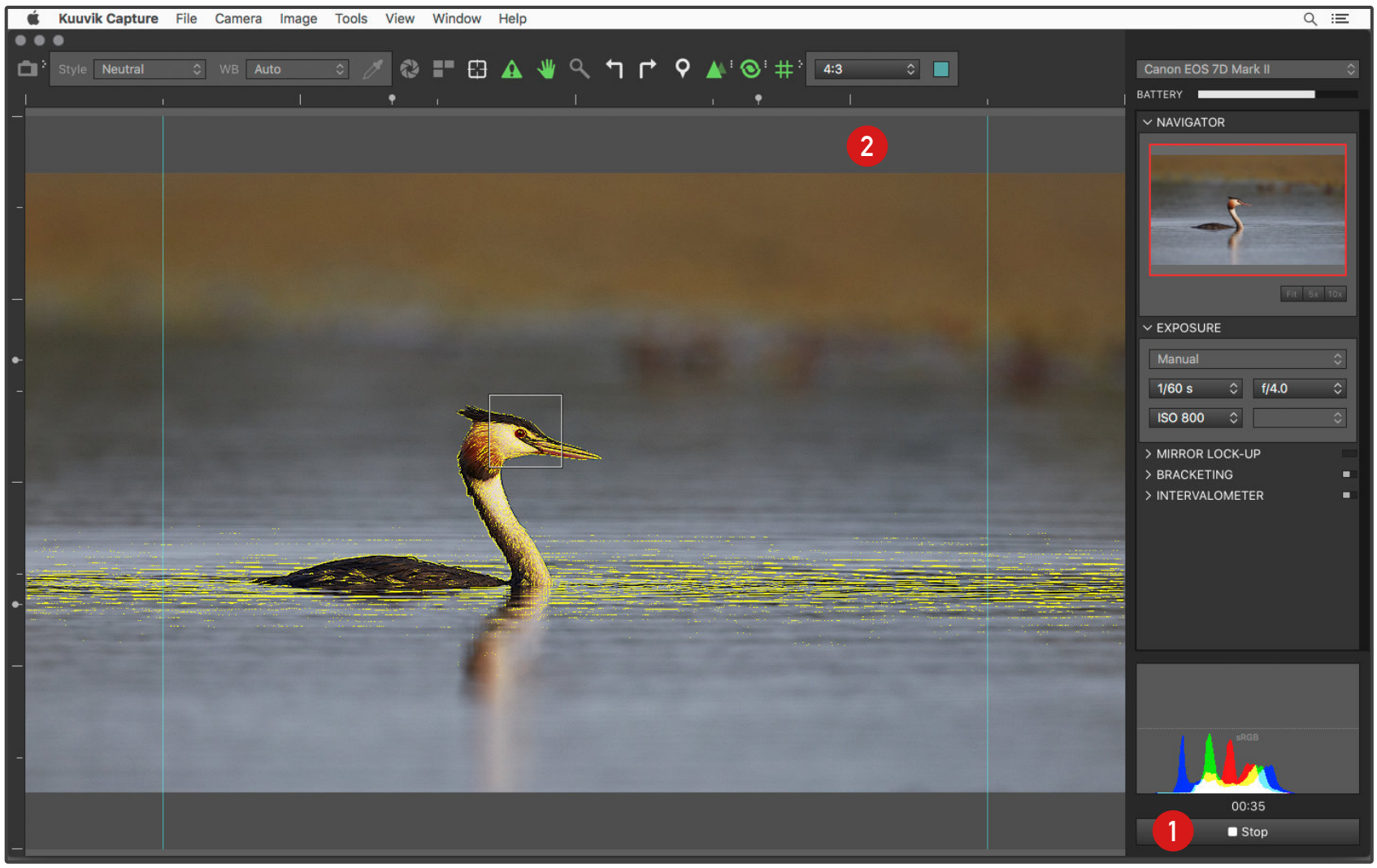
Kuuvik Capture does not download recorded movies, you need to do it after the shoot outside the app.

Some older Canon cameras limit movie shooting while using Wi-Fi tethering. I guess the reason is a thermal budget issue: both movie recording and Wi-Fi produce a large amount of heat, and cameras can't cope with that. The external WFT-E7 transmitter brick (since it's not inside the camera, meaning it does not affect camera heating) always worked in our tests, as did newer models.

If your are planning to do movie shooting while using Wi-Fi, I'd highly recommend to check your camera before the actual shoot - a large message usually pops up on the camera LCD if movie shooting is not supported with Wi-Fi.

Live View in Movie Mode

The app's main window changes slightly in movie mode.



The **Capture** and **Run Sequence** buttons are replaced with the **Record/Stop** button (1). Gray bars (2) are displayed between the sensor's 3:2 aspect ratio and the recorded movie file's aspect ratio. So if you shoot in 16:9 or DCI 4K, bars will be above and below, and on the sides if you shoot 4:3.

> *The aspect ratio of the live view stream in movie mode varies greatly from camera to camera. Some provide 3:2. Some provide 16:9 if recording in 16:9 but 3:2 if recording 4:3. It's a complete mess, so we've decided to make it uniform, thus the gray bars were born.*

The live view's frame rate and resolution are the same as in normal live view.

Depth of Field Preview is disabled, since in movie mode the camera already stopped the lens down. Also disabled is the *Multi-Point Live View*. And of course mirror lock-up, bracketing and intervalometer are meaningless in move move, so their associated sidebar panels are completely ignored. The *Image Browser* is disabled.

Sharpening, focus peaking, zooming, panning, focus drive, etc. are available just like in standard live view mode.

You can stop live view in movie mode, but have to start it again before starting recording. This is a way to save battery while the camera is set up but waiting for the scene to unfold.

Canon Log Mode

When the camera is set up to record in C-Log, the picture style control changes to indicate this. Recording bit depth is also displayed.

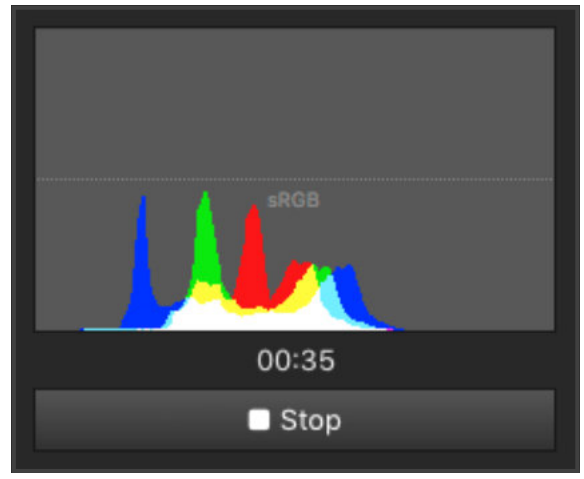
C-Log mode cannot be changed from the Kuuvik Capture, only on the camera.

Live view shows the C-Log image, view assistance is not available yet.

Note that recording to the card is not possible in some cases (like 10bit C-Log on the EOS R). The record button in the app, just like the the record button on the camera, will not function in these cases.

Starting and Stopping Recording

It's done the same way still captures are started: clicking the **Record** (the title will change to Stop when recording starts), with **⌘K** or with the space bar if you configured it to do so in Preferences, or via the **Camera** menu.



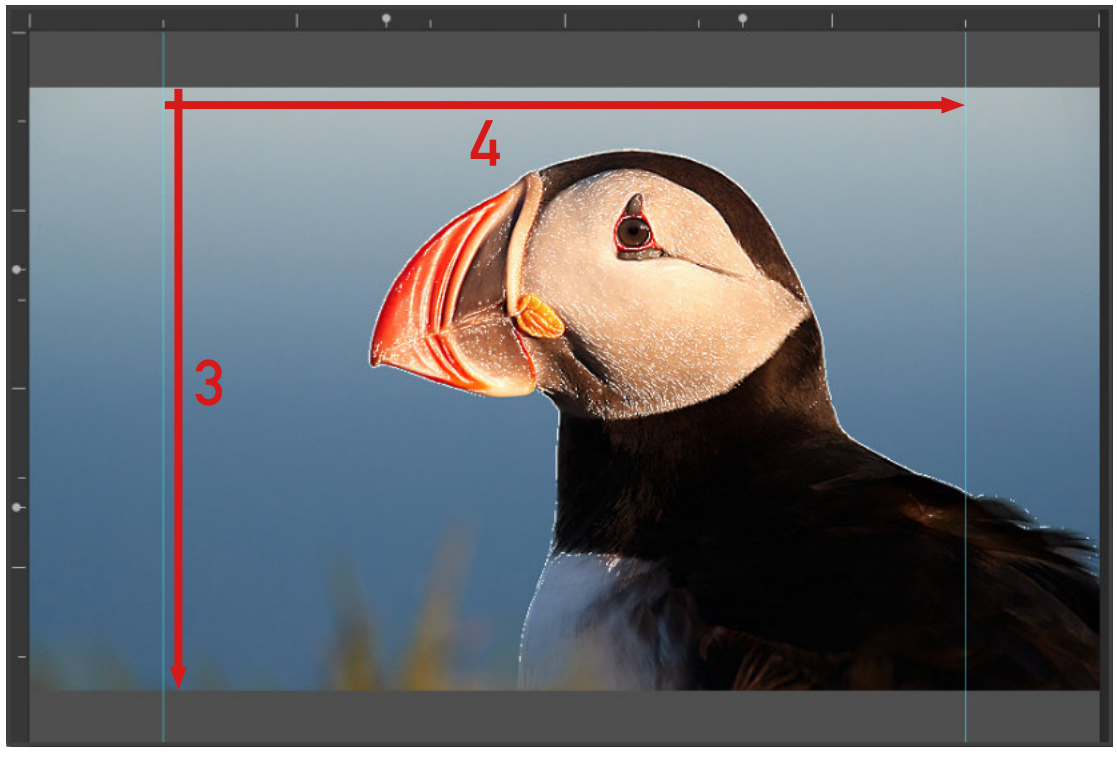
A recording time is also displayed under the histogram. But since Canon cameras do not provide time code through the tethering interface, this is just a simple time started along the camera's. Meaning that recording time displayed on the camera and in the app may slightly differ.

Zooming is disabled during recording and the zoom level is automatically set to *Fit*.

> *Some Canon cameras lower live view resolution during recording, so if you notice that the live view image becomes a bit blurry during recording, then this is the reason.*

Aspect-Relative Guides

When I introduced guides, I mentioned that there's something called *aspect-relative guides*, and they are for movie mode only.



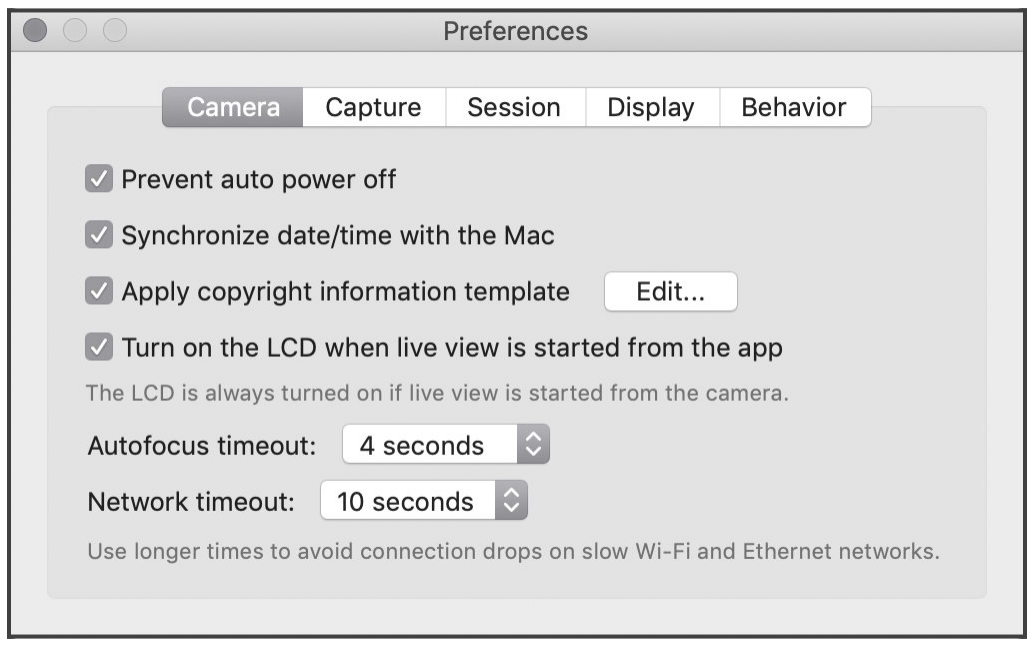
The position of aspect-relative guides are calculated relative to the aspect ratio of the recorded movie.

For example if you are recording 16:9 HD, the 4:3 guides are placed in a way to indicate the 4:3 crop within the 16:9 image.

The position of these guides will change if you change the recording format to one with a different aspect ratio. Absolute guides (such as grids) are always displayed at the same position, regardless of the recording format.

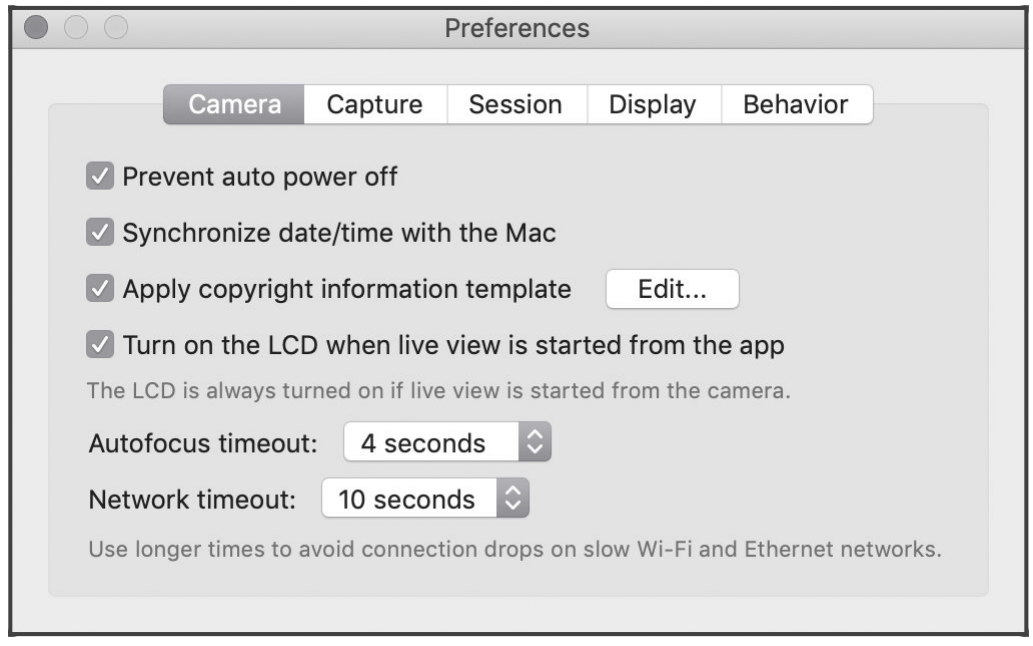
Custom guides are absolute, and thus they do not follow recording aspect ratio changes. Also, if you move a guide, it will turn the current template into custom, meaning that the guides become absolute.

Chapter IV - Supplementary Functions



Setting Preferences

The Preferences window is accessible by pressing ⌘, or by clicking the **Kuuvik Capture > Preferences…** menu item.



Let me go trough the settings one by one.

Canon cameras go to sleep after a the time set in the menu. When a camera goes to sleep, it disconnects from Kuuvik Capture. With the *Prevent auto power off* option you can circumvent this sleep.

Turning on *Synchronize date/time* with the Mac tells Kuuvik Capture to update the camera's clock upon each connection. It will set the date and time zone to match that of your Mac. It does the update even if GPS-based time setting is active in the camera.

You can manage the author and copyright settings of your cameras with Kuuvik Capture's copyright information template. It will be discussed in detail in the next section. But this is the place where you can enable/disable the template with the *Apply copyright information template* preference (and edit it with the **Edit** button).

Both time synchronization and copyright template application are done immediately on all connected cameras when you enable them.

The next setting controls whether the camera's LCD is turned on when you start live view from within the app.

If you turn this preference off, the camera's LCD will remain turned off to conserve battery. But you can turn the LCD on any time with the live view button on the camera.

When you start live view directly on the camera, it's LCD will turn on regardless of this setting (chances are that you engaged live view on the camera because you want to look at the LCD).

With *Autofocus timeout* you can specify after how much time the app gives up the AF operation. The range is 2/4/8/16 seconds.

Network timeout tells the app how much time is allowed for intermittent network errors to clear. A longer network timeout may prevent the camera to disappear from Kuuvik Capture, but at the expense of delaying the detection of actual issues (such as when the battery dies).

The default is 10 seconds, which we found to be suitable for most Wi-Fi networks. You can go as low as 5 seconds or as high as 30 seconds. My personal preference is to go with the lowest number, and raise it in the presence of connectivity issues.

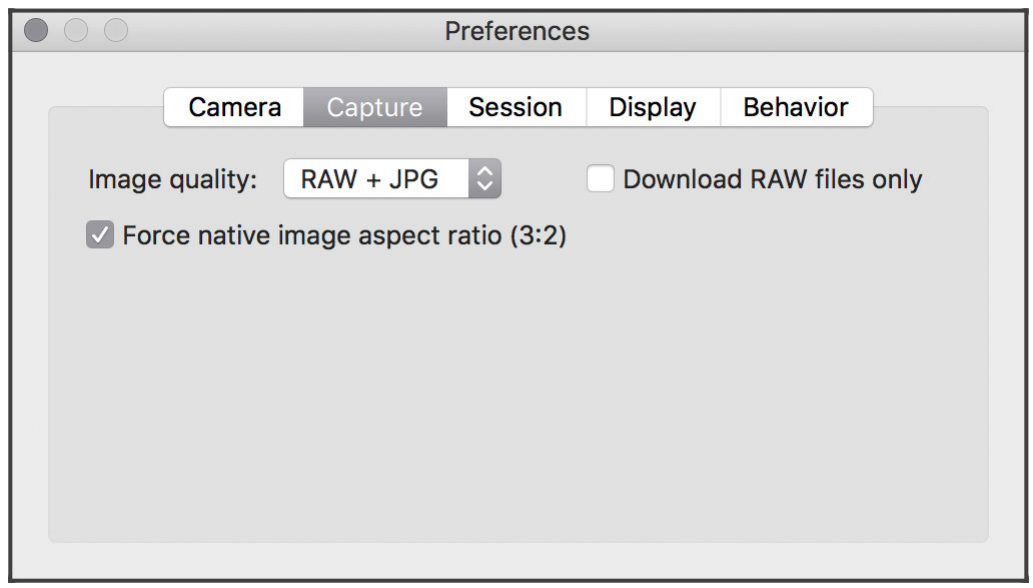
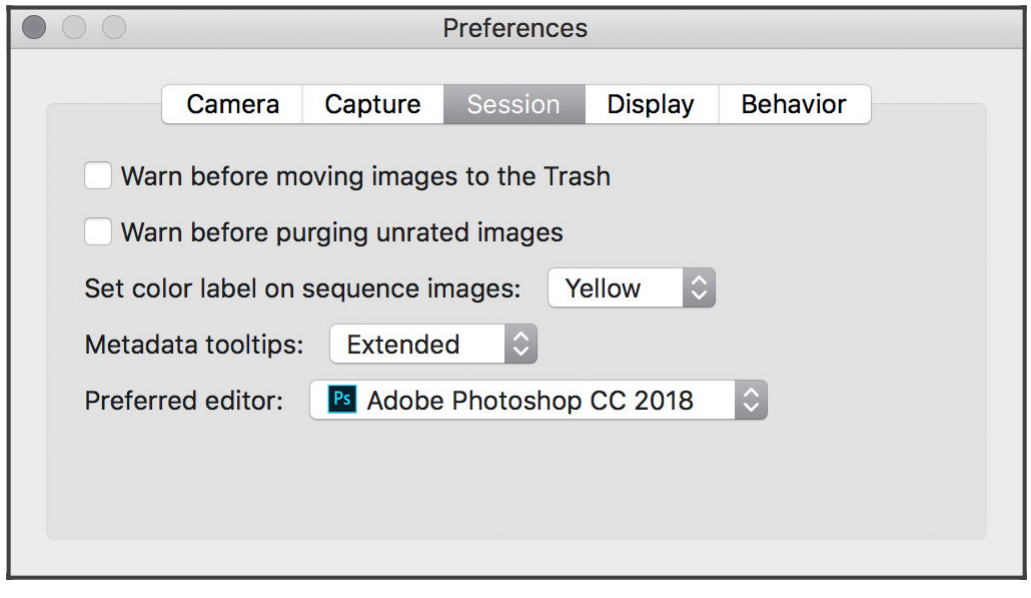


Image quality controls whether you shoot RAW, RAW+JPG or JPG. JPG files are large-/fine ones, since we still want to keep image quality at the highest possible level. When you choose RAW+JPG, the *Download RAW files only* option appears so that you can set whether the JPG files will remain on the card (by default), or downloaded along the RAWs. With the JPG image quality setting files are always downloaded of course. In case of RAW+JPG pairs the RAW file is used for display.

There's also an option to force the native 3:2 image aspect ratio. Aspect ratio control is a complete mess on Canons. You have two settings to cope with, and sometimes get a cropped JPG file and other times a full resolution JPG with metadata to indicate the crop. To make things worse, RAW converters and Photoshop tend to change how they interpret cropping metadata from version to version. We simply don't want to get involved in this messy situation. So by default Kuuvik Capture forces the camera default 3:2 aspect for all images. You have the option to turn it off, if you really really know what you are doing and need non-3:2 images. But you were warned.



By default Kuuvik Capture warns you before moving images to the Trash and before purging images. These warnings can be turned off with the two "Warn..." settings.

The name of *Set color label on sequence images* speaks for itself. This is the color all images captures shot as a part of a se-

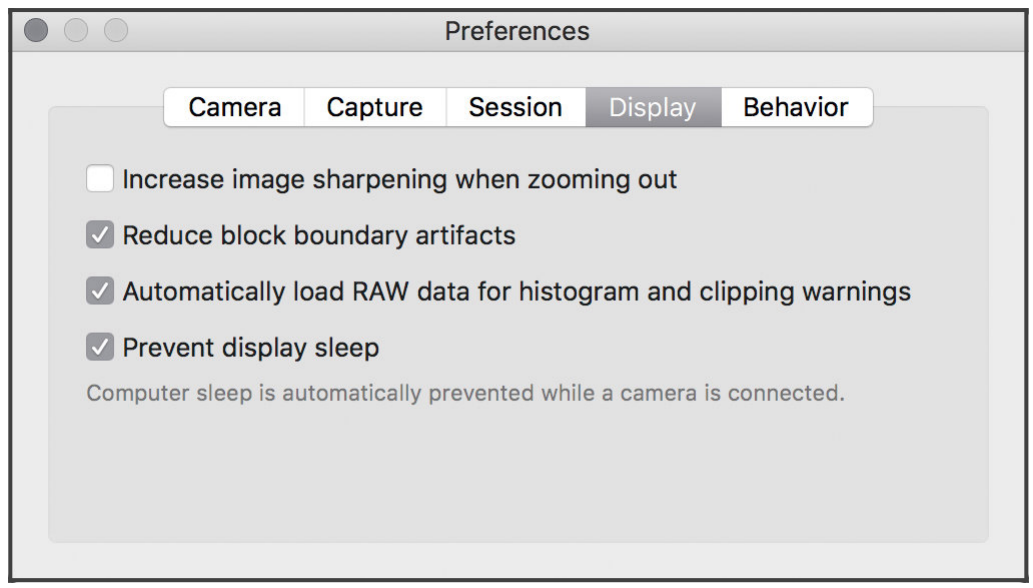
quence is labeled with. Choices are all five supported label colors, plus None, if you don't want to add color labels automatically.

You can control the amount of information *Metadata tooltips* in the Image Browser display with the next preference. *Basic* includes date, camera name, exposure parameters and lens focal length. *Extended* adds color space, copyright, artist, camera owner, camera serial number, and GPS coordinates.

The *Preferred editor* is the RAW converter or image editor of your choice that you would like to use to quickly open any image from Kuuvik Capture. By pressing **⌘E** (or via the menus, but I bet that the keyboard shortcut will be used more often). You can designate any app that is registered as an editor for CR2 or JPG files on your Mac as the preferred editor.

> *Lightroom is not registered as an editor, and is unable to open individual files without importing, you will not see it listed. If you use Lightroom, a hot folder should be set up in Lightroom for the Kuuvik Capture session folder, and it will automatically import images from there.*

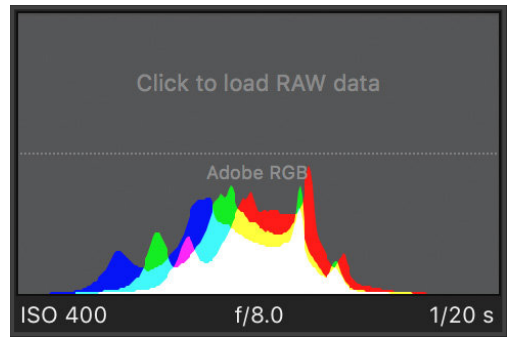
Beginning with Kuuvik Capture 3.3 image sharpening is kept at the same visual amount if you zoom in and out. Previously sharpening was slightly stronger when you zoomed out. You can restore this older behavior with the *Increase image sharpening when zooming out* option. It affects image loaded into the image area, but not live view and multi-point live view.



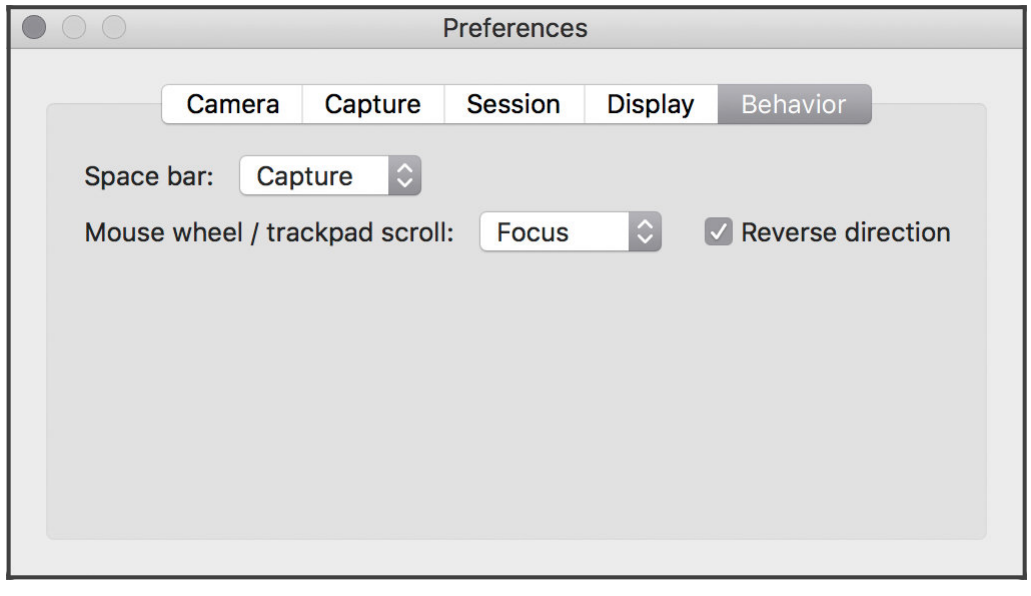
Block boundary artifact reduction can be turned off with the next option. When turned on, the function activates for RAW files between 75% and 100% zoom levels and if sharpening is also active – block boundaries are eliminated by the interpolation process, and not visible at all when you zoom out. It is automatically disabled for JPG files and live view.

RAW loading consumes a lot of energy, and there are situations when conserving battery is of paramount importance. Turn off *Automatically load RAW data for histogram and clipping warnings*, and no energy-consuming loading will take place automatically. The default is to automatically load RAW data, so that both the RAW histogram and clipping warnings could work as expected. With the **Prefer RAW** clipping warning option you'll see the processed warning layers until the ones generated from RAW data arrive.

Should you need the histogram or the warning layers later on, you always have the option to load the RAW data manually. Just click the placeholder on the RAW histogram, or choose the **Load RAW Data** command from the menu, or press ⌘**L**.



Computer sleep is automatically disabled on your Mac as soon as you start Kuuvik Capture. But the display is allowed to go to sleep. To disable this, check *Prevent display sleep*.



Choose between the two possible functions of the space bar with the *Space bar* setting. The choices are *Pan* (to pan the image as described in Chapter I) and *Capture* (which will mirror the ⌘**K** shortcut to capture images and start/stop movie recording).

The mouse wheel (and its associated gesture on the trackpad) can be assigned to the following three functions (with the *Mouse wheel /trackpad scroll* setting):

- *Scroll*, which will scroll both the magnified live view and the preview.
- *Zoom*, which can be used to zoom into and out of the preview image.
- *Focus*, to drive focus in live view and multi-point live view.

Choosing *Zoom* or *Focus* reveals a setting to reverse the wheel and scroll gesture direction.

The Copyright Information Template

While you can set both the author (aka artist in EXIF) and copyright information from the camera, keeping the copyright info up to date when a new year comes takes some effort. If you ever noticed a previous year's copyright notice only when exporting the image from Photoshop – then this feature will be golden for you.

I always set the author to my name, and the copyright notice to (of course with the actual year):

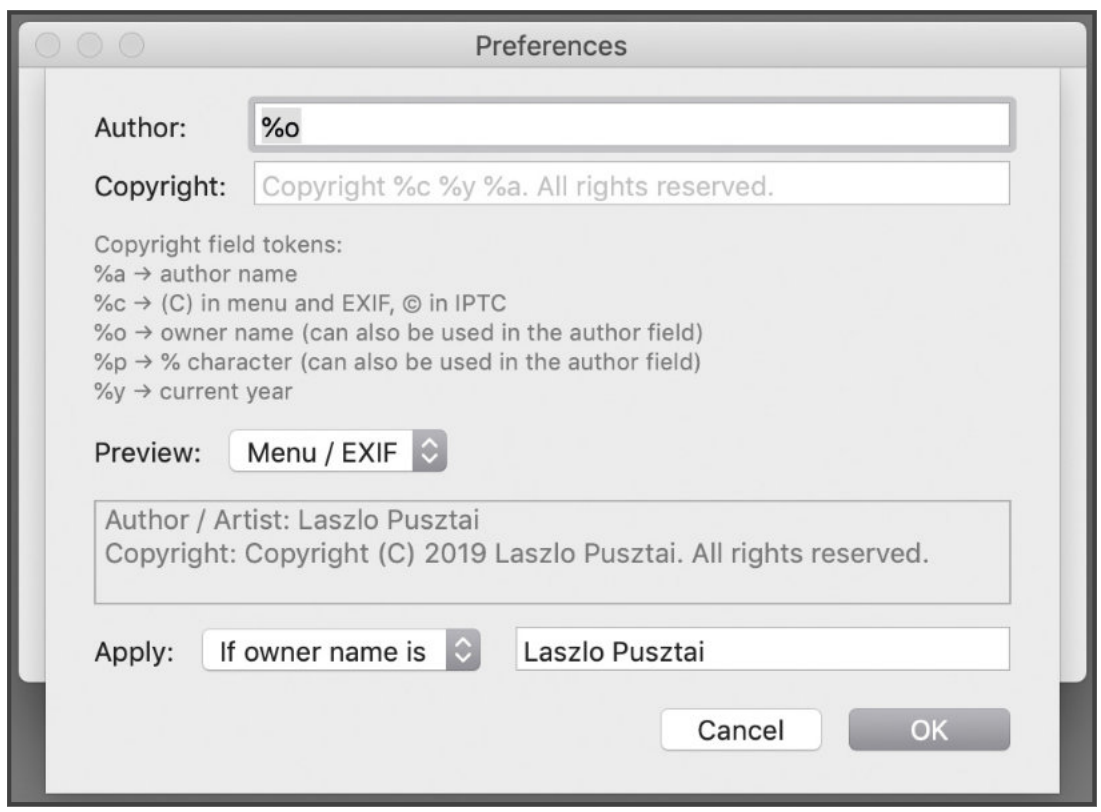
Copyright (C) 2019 Laszlo Pusztai. All rights reserved.

This satisfies the requirements of several countries (some requiring the copyright symbol, others the "copyright" word to be present in the notice, and even some require to declare that you reserve your rights) and is something I have been using for decades. As you may have guessed, the problem is keeping the year current.

The *copyright information template* can set both the author and the copyright notice in new cameras, as well as keep the notice updated when a new year comes. You just have to connect your camera and it's done automatically.

But you have to create a template first and instruct Kuuvik Capture to apply it when a camera is connected. To create your template, bring up *Preferences*, and click **Edit** after the check box titled **Apply copyright information template** on the **Camera** tab. If you turn on the check box on for the first time it will automatically display the editor.

Here's how my template looks in the editor.



The easiest way to set up your copyright info is to type your name in the *Author* field and click **OK**. The defaults will take care of creating the appropriate copyright notice in the format shown above. But you can also customize it.

You can use tokens to insert predefined information snippets, such as the current year. All the tokens are listed on the editor itself. One of them is **%o**, which will be replaced with the owner name currently set in the camera (setting the owner name is

discussed in the next section). For example, I prefer to set the author to be the same as the camera owner (me) and thus use **%o** as the author name. I leave the copyright field at its default. But if you have a long name, you may need to change it, as Canon cameras have a limit on how long the copyright notice could be. *Jean-Baptiste Emanuel Zorg* (apologies to Luc Besson and Robert Mark Kamen) will definitely need to use a customized template… But in any case, the *Preview* section will give you a live preview of how the expanded template will appear in the camera.

If your camera is IPTC capable (EOS R, 5D Mark IV, 1D X Mark II), then the app will also set up and activate IPTC metadata in the camera.

> *Let me stop here for a second. IPTC information you set must be separately activated with turning **Add IPTC information** on in the camera's menu. Kuuvik Capture does it for you. But it always activates IPTC, and if you don't want this, then you have to turn off applying the copyright information template.*

If you already have IPTC metadata in place, then the creator and copyright fields will be updated. You can see how the IPTC fields will look like by changing the preview type to *IPTC* (instead of *Menu / EXIF*). The most important difference is that you can use accented characters in IPTC fields, but only ASCII is allowed for the camera menus (that will be written as EXIF fields into files). The app will automatically convert any non-ASCII characters entered into the author and copyright fields for the menu, including the copyright symbol itself. But will keep the accented ones in IPTC fields.

The template can be applied to all cameras unconditionally, or you can set up a filter limiting the application of the template to cameras having a matching owner or artist name field. In case you regularly connect other people's cameras and don't want to mess up their copyright info.

With my template described above, when a new camera arrives, I only set the owner name, and the copyright info template takes care of everything else.

Setting the Owner Name

The camera owner's name cannot be set from the camera itself, this functionality only available to tethering/remote control apps. Why? Because if your camera gets lost (or stolen), chances are that the new "owner" had no chance to change it yet. So the device could be identified. This name is also embedded into all the images made with the camera, extending the ability to identify the original owner. It is not a perfect anti-theft measure, but might be helpful when recovering your lost property.

It's pretty straightforward to set or change the owner name in Kuuvik Capture. Connect your camera, and click **Camera > Settings > Edit Owner Name…** in the menu.

If you have a copyright information template that uses the owner name token or is filtered for owner name, then the template is automatically applied after changing the owner name.

IPTC Export/Import

Kuuvik Capture can export and import IPTC information from/to the camera. This function uses the same XMP files *EOS Utility* (as well as our *ShutterCount* app) uses for its similar function, so you can freely mix and match the two apps to manage IPTC information. There's an addition in Kuuvik Capture, though. While importing IPTC info, the *copyright information template* is applied to the imported file if the **Apply copyright information template** preference is set. So you can't inadvertently import copyright info that's inconsistent with the template.

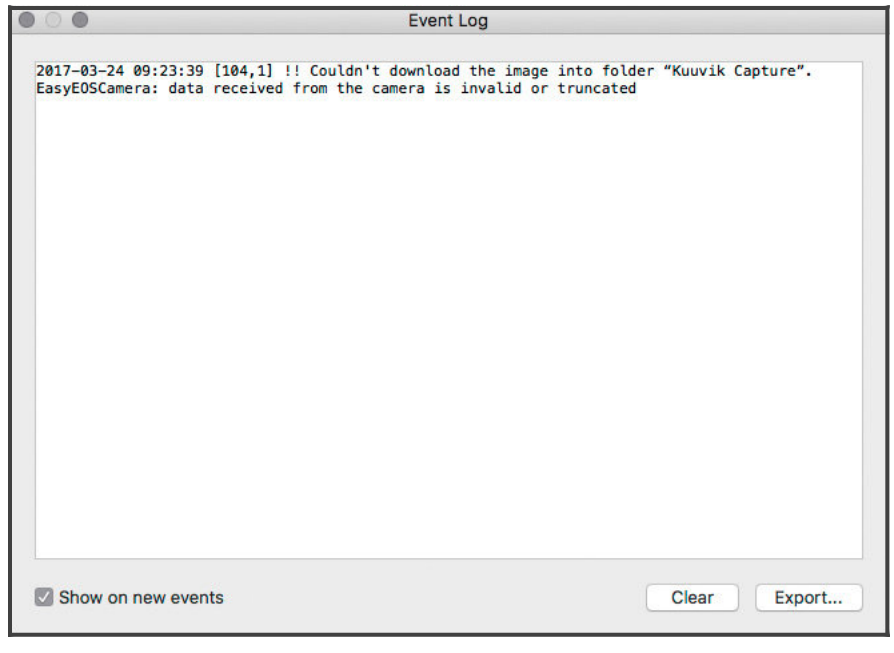
The export and import functions are available under the **Camera > Settings** sub-menu for cameras supporting IPTC information (1D X Mark II with firmware 1.1.0 or later, 5D Mark IV and EOS R at the time of writing).

Just like with the *copyright information template*, imported IPTC information is automatically activated in the camera.

How one can use this function? For example I have a "default" IPTC info file, one that sets contact information in addition to the copyright related fields. I import this file to each new IPTC capable camera, and let the copyright info template take over after that.

The Event Log

Kuuvik Capture includes a two mechanism to allow us to diagnose any problems that might arise on your computer. The first is the *Event Log*. It contains the history of all errors and warning you encountered while using the app.



You can access it any time with the **Window > Event Log** menu item.

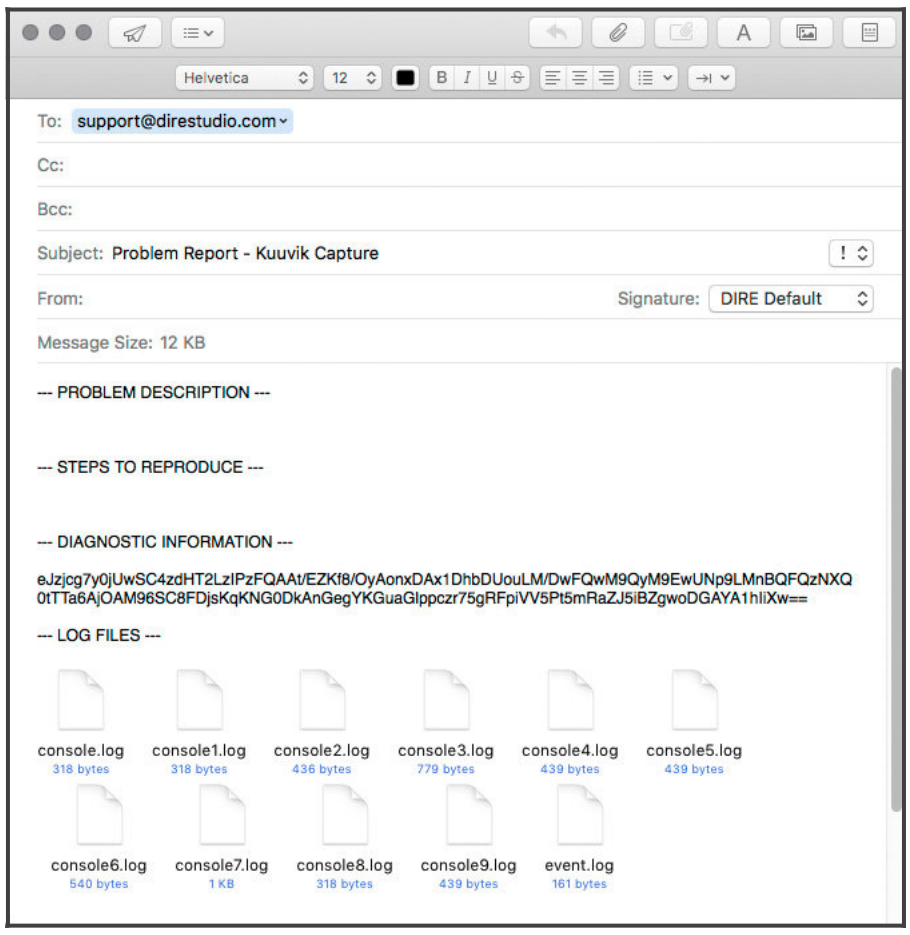
The buttons at the bottom lets you clear and export the log. The event log will be automatically displayed on new events if *Show on new events* is checked.

In general the events you see here are those you can do something about. Just as download problems, card and disk full errors, unsupported file errors.

Reporting a Problem

Use the **Help > Report a Problem** menu item to contact us if you encounter any problem with Kuuvik Capture. It's the fastest way to get in touch with us. The function creates a new email in the *Mail* app, with attached diagnostic information and logs.

We can fix only what we can reproduce in the lab – so with the exception of trivial cases it's important to tell us not just what the problem is, but also how can we make it happen. Screen shots are also of great value. You can send them attached to this mail.

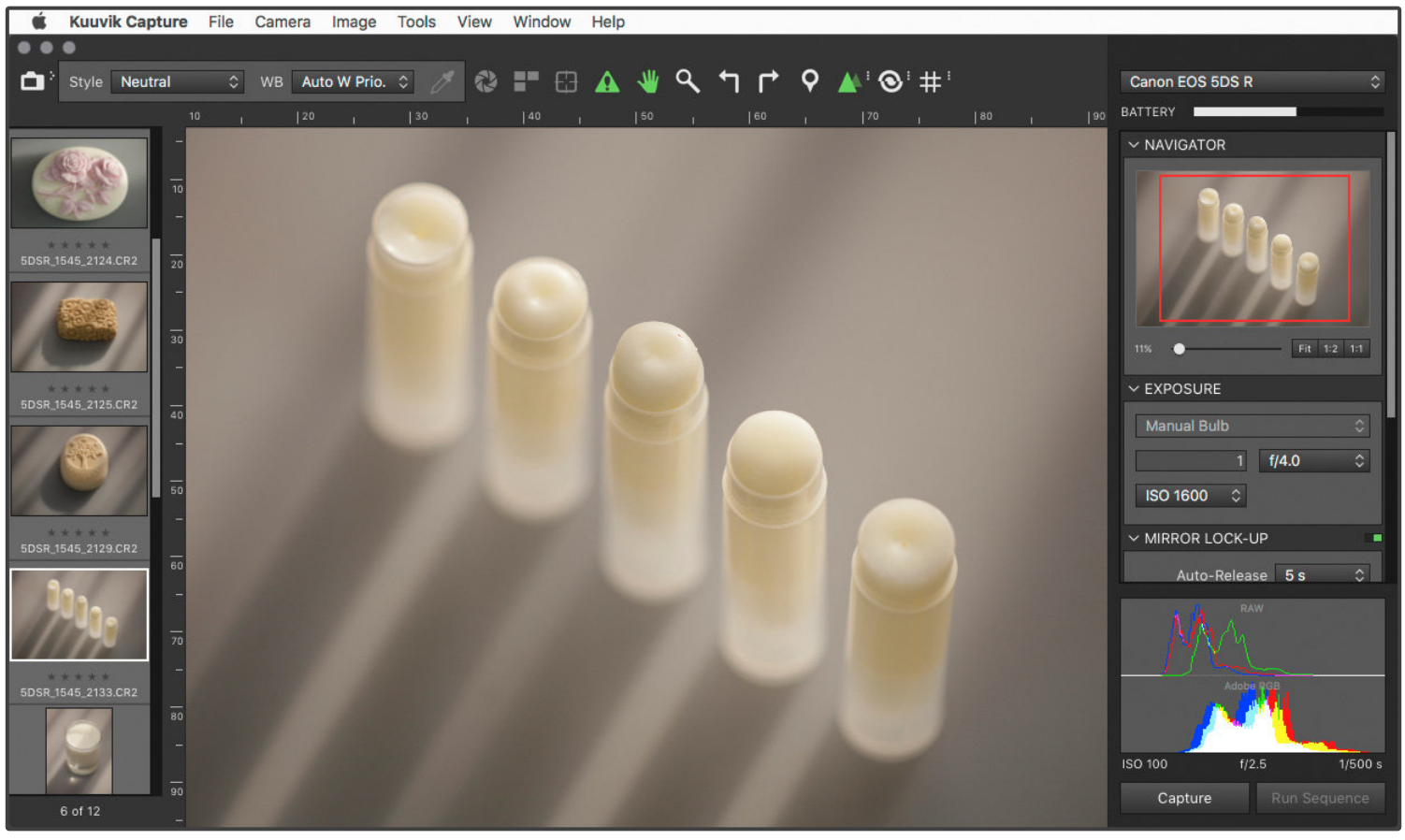


The diagnostic information section contains information about the app's environment: which Mac you are using; macOS and Kuuvik Capture version numbers; as well as the result of some basic diagnostics.

The app automatically attaches console logs from the last 10 runs. These logs contain potential error information.

Regarding the personal information content of these reports, please refer to DIRE Studio's privacy policy: https://www.direstudio.com/legal-/privacy-policy/

Appendix


Kuuvik Capture
File
Camera
Image
Tools
View
Window
Help
Style
Neutral
WB
Auto W Prio.
Canon EOS 5DS R
BATTERY
NAVIGATOR
5DSR_1545_2124.CR2
5DSR_1545_2125.CR2
5DSR_1545_2129.CR2
5DSR_1545_2133.CR2
6 of 12
EXPOSURE
Manual Bulb
1
f/4.0
ISO 1600
MIRROR LOCK-UP
Auto-Release
5 s
RAW
Adobe RGB
ISO 100
f/2.5
1/500 s
Capture
Run Sequence

Creating a Wi-Fi Access Point on macOS

Imagine the following situation: you are out in the field, photographing an old castle. You want to place the camera on a crane to photograph from a high vantage point. The crane is higher than your longest USB cable can reach, so wireless connection would be the most appropriate solution.

First obstacle: most Canon Wireless File Transmitters (both built-in ones and external bricks) require an existing network to connect to in EOS Utility mode. And those that have the option to create a network make an unbelievably slow one.

Back to our example: there's no phone coverage (for a *Personal Hotspot* trick), there are no nearby networks of any kind to connect to. You could create an ad-hoc wireless network on your Mac, but setup is complicated and error prone (needs manual TCP/IP configuration on both the computer an on the camera), and in the last few versions of macOS there's no way to create a secure Wi-Fi network. The lack of security is a total showstopper, so this isn't the appropriate way to make the connection work.

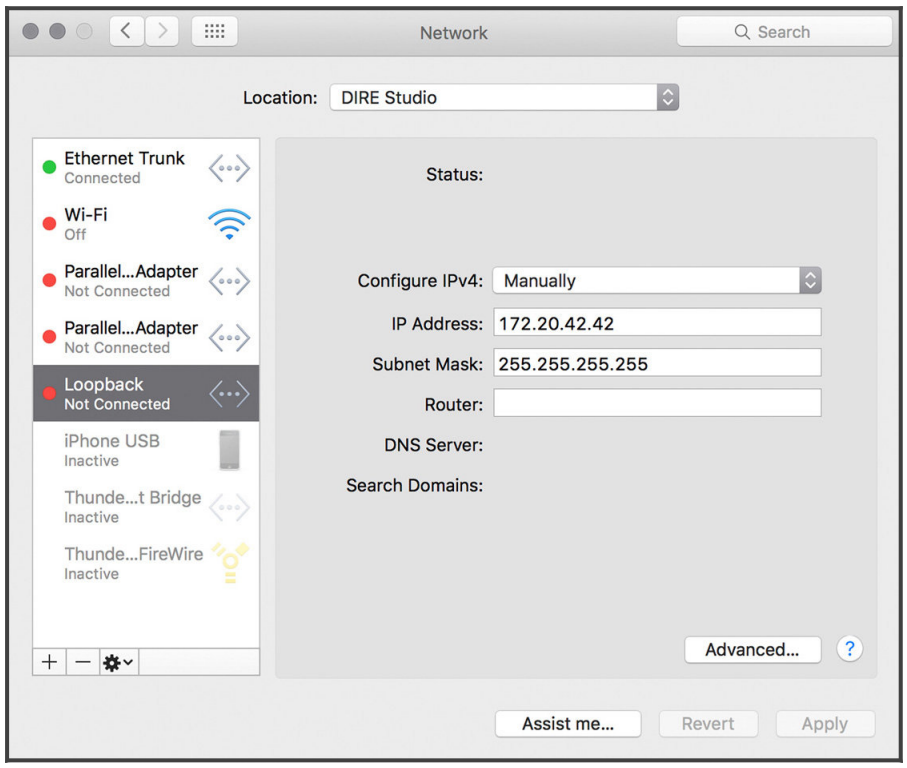
There's a neat trick, however. macOS has a built-in *Internet Sharing* feature that practically creates a Wi-Fi access point to share an existing network connection. The next obstacle is that you need the network you want to share to be in the "connected" state (think cable plugged in both to the computer and into a router). Unfortunately the built-in loopback interface (which is always connected and provides access to the local computer only) is not accessible from the Network preference pane in *System Preferences*.

The key to the trick is to make the loopback interface appear in the Network pane. Actually, it's pretty straightforward: launch the *Terminal* app and copy & paste the following two commands:

```
sudo networksetup -createnetworkservice Loopback lo0

sudo networksetup -setmanual Loopback 172.20.42.42 255.255.255.255
```

Enter your password to allow these modifications if macOS asks for it.

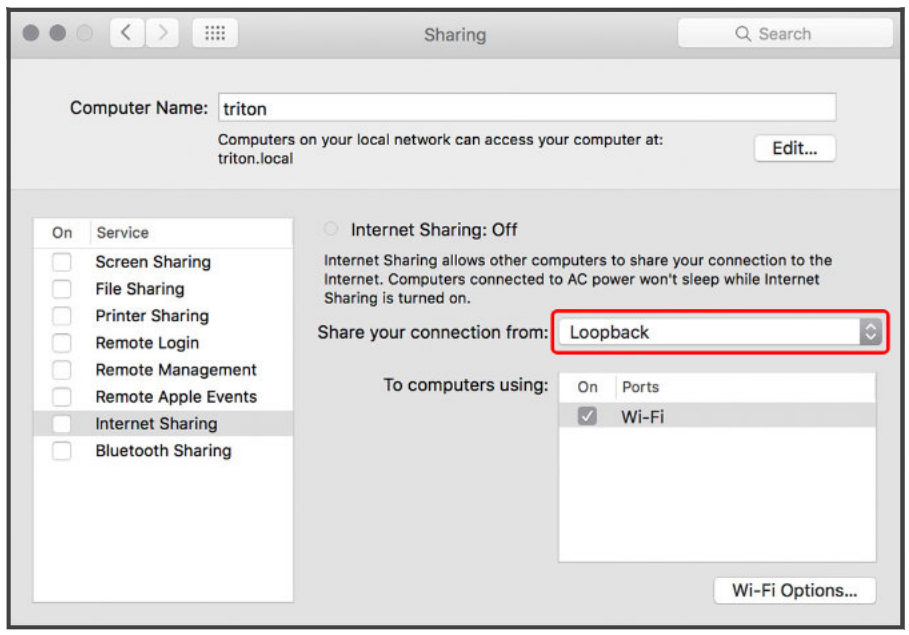


Now your Network preference pane should list the brand new *Loopback* service.

It's still listed as "not connected", but don't worry, that's just a bug.

If you use multiple "network locations", you need to repeat the above commands for each location. If you just use the Automatic location, then you can move to the next step.

Go to the *Sharing* preference pane, and on the list of services click *Internet Sharing*. If the service is already on, turn it off. Choose the *Loopback* service as the one you want to share your connection from. And share to computers using Wi-Fi.



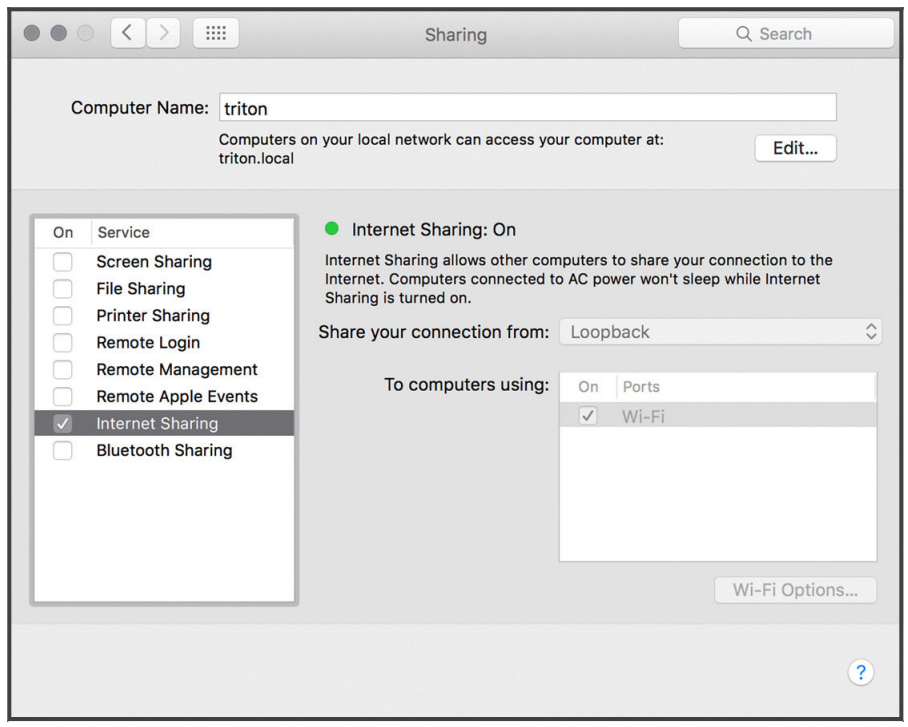
You can set up the shared Wi-Fi network (the network we'll connect the camera to) by clicking the **Wi-Fi Options** button. The Wi-Fi Options screen is on the bottom of this page.

The network name is your computer's name by default, but I'd recommend to enter a simple alphanumeric name (containing no special characters), as Canon cameras have issues with displaying characters outside of the simple letters and numbers range.

All other options are the usual Wi-Fi setup options. A few notes though. Channels 1-11 use the 2.4 GHz band, while 36-48 use the 5 GHz band. Transmitters in the 70D and 6D only operate on the 2.4 GHz band, while the external WFT-E7 brick operates on both. The 5 GHz band is faster and generally has less interference from other networks and appliances

operating in the crowded 2.4 GHz band. For security, choose *WPA2 Personal* (the other option is *None*, which is unacceptable).

Once the Wi-Fi options are entered, you can start the sharing service. To do it, click the check box in front of its name in the list. macOS may ask to turn on your Wi-Fi radio if it was off, and will ask your confirmation to start the sharing service. After the service has been successfully started you'll see a screen similar to the one below:



IMPORTANT: due to a macOS bug, your selection in the *share from* list may change to another (random) network service. So you must check whether it still shows the *Loopback* service after each start!

The Wi-Fi icon on the menu bar will change to the sharing icon once the sharing service is ready to accept connections.

And that's it! Your personal access point is now ready, you can connect to if from your camera.