DAVINCI RESOLVE 20

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The Colorist Guide to

DAVINCI RESOLVE 20

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Author: Daria Fissoun, CSI

The Colorist Guide to

DAVINCI RESOLVE 20

The Colorist Guide to DaVinci Resolve 16

Daria Fissoun, CSI

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ISBN [illegible]

Contents

Foreword [illegible]

Acknowledgments [illegible]

About the Author [illegible]

Who This Book Is For [illegible]

Getting Started [illegible]

Interface Review [illegible]

Color Page Layout [illegible]

Viewer [illegible]

Primaries Color Wheels [illegible]

Palette Panel [illegible]

Introducing Blackmagic Cloud [illegible]

Color Correcting a DaVinci Resolve Timeline [illegible]

1 Balancing Footage [illegible]

Opening a DaVinci Resolve Archive [illegible]

Setting Up Project Backups [illegible]

Understanding the Grading Workflow [illegible]

Primary Grading with Color Wheels [illegible]

Precision Grading with Curves [illegible]

Comparing Color and Log Wheels [illegible]

Self-Guided Exercises [illegible]

Lesson Review [illegible]

2 Creating Color Continuity [illegible]

Building a Shot Matching Strategy [illegible]

Organizing Shots Using Flags and Filters [illegible]

Applying Shot Match [illegible]

Matching Shots Using Stills [illegible]

Comparing and Matching Shots Manually [illegible]

Self-Guided Exercises [illegible]

Lesson Review [illegible]

3 Correcting and Enhancing Isolated Areas [illegible]

Controlling the Viewer's Eye [illegible]

Sharpening Key Elements [illegible]

Fixing Overcast Skies [illegible]

Warping Color Ranges [illegible]

Enhancing Skin Tones with Face Refinement [illegible]

Adjusting Skin Tones Manually [illegible]

Self-Guided Exercises [illegible]

Lesson Review [illegible]

Managing Nodes and Grades [illegible]

4 Conforming an XML Timeline [illegible]

Importing an XML Timeline [illegible]

Syncing an Offline Reference [illegible]

Conforming a Timeline [illegible]

Maximizing the Dynamic Range [illegible]

Lesson Review [illegible]

5 Mastering Node Trees [illegible]

Understanding Node-Based Grade Compositing [illegible]

The Importance of Node Order [illegible]

Creating Separate Processing Branches with a Parallel Mixer Node [illegible]

Compositing Color Effects with the Layer Mixer Node 205

Using External Mattes 216

Self-Guided Exercises 222

Lesson Review 223

6 Managing Grades Across Clips and Timelines 225

Working with Versions 226

Appending Grades and Nodes 230

Saving Node Tree Templates 239

Saving Stills for Other Projects 246

Migrating Timeline Grades Using ColorTrace 251

Copying Grades Using the Timelines Album 256

Self-Guided Exercises 258

Lesson Review 259

Optimizing the Grading Workflow 261

7 Using Groups 263

Preparing Media Using Scene Cut Detection 264

Creating a Group 270

Applying Base Grades at the Pre-Clip Group Level 277

Making Clip-Specific Adjustments at the Clip Group Level 288

Automatically Tracking People and Objects 296

Creating a Unifying Look Using the Post-Clip Group Level 313

Working with Lookup Tables 321

Using the Timeline Level 332

Self-Guided Exercises 336

Lesson Review 337

8 Adjusting Image Properties [illegible]
Understanding Timeline Resolutions and Using Palette Modes [illegible]
Using Keyframes to Animate Grades [illegible]
Applying Noise Reduction [illegible]
Optimizing Performance with Render Cache [illegible]
Self-Guided Exercises [illegible]
Lesson Review [illegible]

9 Setting Up Raw Projects [illegible]
Adjusting Raw Settings at the Project Level [illegible]
Adjusting Raw Settings at the Clip Level [illegible]
Grading High Dynamic Range Media [illegible]
Setting Up a Render Cache for Raw Media Projects [illegible]
Self-Guided Exercises [illegible]
Lesson Review [illegible]

10 Delivering Projects [illegible]
Using Lightbox to Check Timelines Before Delivery [illegible]
Reviewing Projects with Clients [illegible]
Understanding the Render Workflow and Presets [illegible]
Creating Custom Renders [illegible]
Configuring a Timeline for Digital Cinema [illegible]
Exploring Advanced Render Settings [illegible]
Lesson Review [illegible]

A Using the DaVinci Resolve Panels [illegible]

B Setup and Delivery on [illegible] [illegible]

Index [illegible]

Foreword

Welcome to The Colorist Guide to DaVinci Resolve 20.

DaVinci Resolve 20 is the only post production solution that combines editing, color correction, visual effects, motion graphics, and audio post production all in one software tool! Its elegant, modern interface is fast to learn for new users yet powerful enough for the most experienced professionals. DaVinci Resolve lets you work more efficiently because you don't have to learn multiple apps or switch software for different tasks. It's like having your own post production studio in a single app!

DaVinci Resolve 20 adds editing with transcriptions from audio, film look creator and ColorSlice six vector grading, IntelliTrack AI for panning audio to match vision, broadcast replay for live multicamera broadcast editing, layout and replay with speed control, and so much more!

Best of all, Blackmagic Design offers a version of DaVinci Resolve 20 that is completely free! We've made sure that this version of DaVinci Resolve includes more features than any paid editing system. That's because at Blackmagic Design we believe everybody should have the tools to create professional, Hollywood caliber content without having to spend thousands of dollars.

I invite you to download your copy of DaVinci Resolve 20 today and look forward to seeing the amazing work you produce!

Grant Petty
Blackmagic Design

Acknowledgments

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Video Materials

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About the Author

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Television School (NFTS), and London South Bank University. She wrote a training series for Adobe Filmmaker and is a contributing author on Mixing Light. In her spare time, she records and uploads video tutorials on post-production techniques in DaVinci Resolve on her YouTube channel.

Who This Book Is For

This hands-on training guide is designed for colorists at every stage of their grading career. It is for newcomers who want to learn the fundamentals of technical and creative color correction, users who want to become more familiar with professional workflows, freelancers who wish to fill the gaps in their knowledge, and professional colorists who are either switching to DaVinci Resolve or adding it to their arsenal of grading tools.

The book is divided into three parts:

- **Part I:** Color Correcting a DaVinci Resolve Timeline
- **Part II:** Managing Nodes and Grades
- **Part III:** Optimizing the Grading Workflow

You'll start by going over the fundamentals of primary and secondary grading adjustments with a focus on normalization, balancing, matching, and building a scene that draws the viewer's eye. You will then learn how to load a timeline edited in another NLE and correctly color manage the footage to ensure it is appropriate for professional deliverable standards like broadcast, cinema, streaming, and the web. Finally, you will look at the various methods professionals use to optimize their grading workflow and the special considerations that must be taken when working with raw media. Each subsequent lesson builds on your understanding of these tools and workflows, with the intention that you will be empowered to develop your own signature grading style by the end. Most of the exercises in this guide can be completed on the free version of DaVinci Resolve 18 from blackmagicdesign.com.

Getting Started

Welcome to **The Colorist Guide to DaVinci Resolve 18**, an official Blackmagic Design certified training book that teaches students and professionals how to get the most out of color grading when using DaVinci Resolve 18. All you need is a Mac, Windows, or Linux computer, the free download version of DaVinci Resolve 18, and a passion for learning about the art of color grading.

This guide blends practical, hands-on exercises with the aesthetic and technical aspects of the colorist's art. You'll learn how to use the program's many grading tools and workflows and gain an in-depth understanding of advanced techniques and creative industry practices. Some exercises will even take you into the realm of compositing, which is an increasingly required skill of contemporary colorists.

About DaVinci Resolve 20

DaVinci Resolve is Hollywood's most trusted application for color correction. It has also become the world's fastest growing and most advanced editing software. It features a complete set of professional audio editing and mixing tools in the Fairlight page and a 2D and 3D visual effects compositing and motion graphics environment in the Fusion page. Together, these powerful tools enable you to complete even the most challenging projects using only one piece of software.

What You'll Learn

In these lessons, you will load multiple projects to learn fundamental and advanced techniques used in various post-production workflows and varying magnitudes of project types. You'll acquire practical skills that you can apply to real-world productions.

Part I

Part I of the book will have you restoring a documentary edit from a DaVinci Resolve archive file. The three lessons within this section focus on fundamental grading theory and practices. You will normalize and balance footage with the primary grading tools in Lesson 1, match shots for continuity in Lesson 2, and use secondary grading tools to target specific elements in Lesson 3.

Part II

Part II looks at more advanced approaches to color management and the grade node tree structure in a feature film sequence. In Lesson 4, you will migrate the project to DaVinci Resolve using an XML file. In Lesson 5, you will more fully explore the importance of node order and consider incorporating mixer nodes to ensure optimal visual results. In Lesson 6, you will practice different methods of managing and copying grades to develop efficient, quick workflows.

Part III

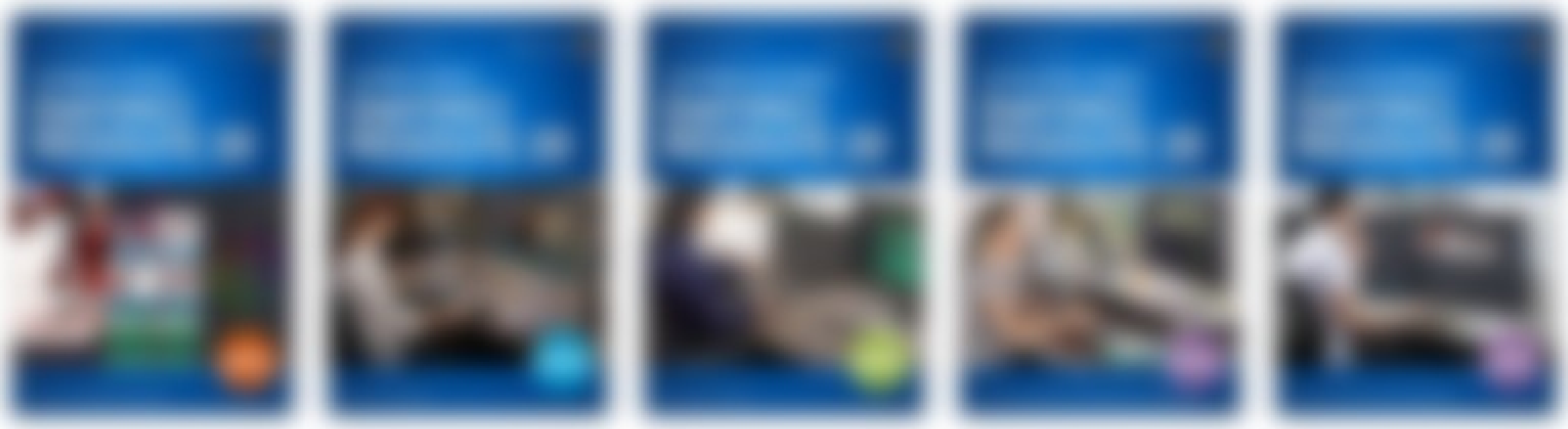
Part III focuses on optimizing grading workflows to ensure quick, accurate deliveries and looks at the unique properties of high dynamic range footage. In Lesson 7 you will examine media reframing and changing resolutions mid-project, advanced keyframing, compositing, and noise reduction techniques. Lesson 8 incorporates the classic grading workflow into a group-based pipeline that will allow you to grade entire timeline segments in one node tree. Lesson 9 teaches how to set up an ACES project with raw media and emphasizes its extended grading potential in the HDR grading palette. Finally, Lesson 10 covers project delivery from basic preset setup to custom renders and DCP workflows.

The appendix at the end of the book provides additional information about the DaVinci Resolve panels, with an extended overview of the DaVinci Resolve Mini Panel.

The Blackmagic Design Training and Certification Program

Blackmagic Design publishes several training books that take your skills further in DaVinci Resolve 20. They include:

- The Beginner's Guide to DaVinci Resolve 20
- The Colorist Guide to DaVinci Resolve 20
- The Editor's Guide to DaVinci Resolve 20
- The Fairlight Audio Guide to DaVinci Resolve 20
- The Visual Effects Guide to DaVinci Resolve 20
- Advanced Visual Effects in DaVinci Resolve 20



Whether you want an introductory guide to DaVinci Resolve or you want to learn more advanced editing techniques, color grading, sound mixing, or visual effects, our certified training program offers a learning path for you. Please visit www.blackmagicdesign.com/products/davinciresolve/training to find the rest of the books in our training series.

Getting Certified

After completing this book, you are encouraged to take a 1-hour, 50-question online proficiency exam to receive a Certificate of Completion from Blackmagic Design. The link to the online exam can be found on the Blackmagic Design training webpage. The webpage also provides additional information on our official Training and Certification Program. Please visit www.blackmagicdesign.com/products/davinciresolve/training.

System Requirements

The exercises in this book were written for DaVinci Resolve 20.0 for Mac, Windows, and Linux. If you have an older version of DaVinci Resolve, you must upgrade to the current version to follow along with the lessons.

NOTE The exercises in this book refer to file and resource locations that may differ if you're using the software version from the Apple Mac App Store. For the purposes of this training manual, if you are using macOS, we recommend downloading the DaVinci Resolve software directly from the Blackmagic Design website rather than the Mac App Store.

Download DaVinci Resolve

To download the free version of DaVinci Resolve 20.0 or later from the Blackmagic Design website:

1. Open a web browser on your Windows, Linux, or Mac computer.
2. In the address field of the web browser, type: www.blackmagicdesign.com/products/davinciresolve.
3. On the DaVinci Resolve landing page, click DaVinci Resolve – Free Download Now.
4. On the download pop-up page, choose whether you will work in the free version of DaVinci Resolve 20 (left) or purchase DaVinci Resolve Studio 20 (right), and then click the button that corresponds to your computer's operating system. The free version of DaVinci Resolve features most of the tools you will need to produce and deliver a professional grade. You can complete the lessons in this book and pass the certification exam using the free version of DaVinci Resolve, although some exercises may display a watermark.
5. Follow the installation instructions.

When you've completed the software installation, follow the instructions in the following section to download the content for this book.

DaVinci Resolve 20 Quick Setup

When DaVinci Resolve 20 is successfully installed, you can launch the application for the first time.

macOS: users will find the DaVinci Resolve application in their Applications folder. Double click the DaVinci Resolve folder, and then double click the DaVinci Resolve application. Alternatively, you can use Launchpad or Spotlight search to locate and launch DaVinci Resolve.

Windows: users will find a shortcut has been added to their Desktop. Alternatively, click the Start menu and search for "DaVinci Resolve" and press Enter to launch the application.

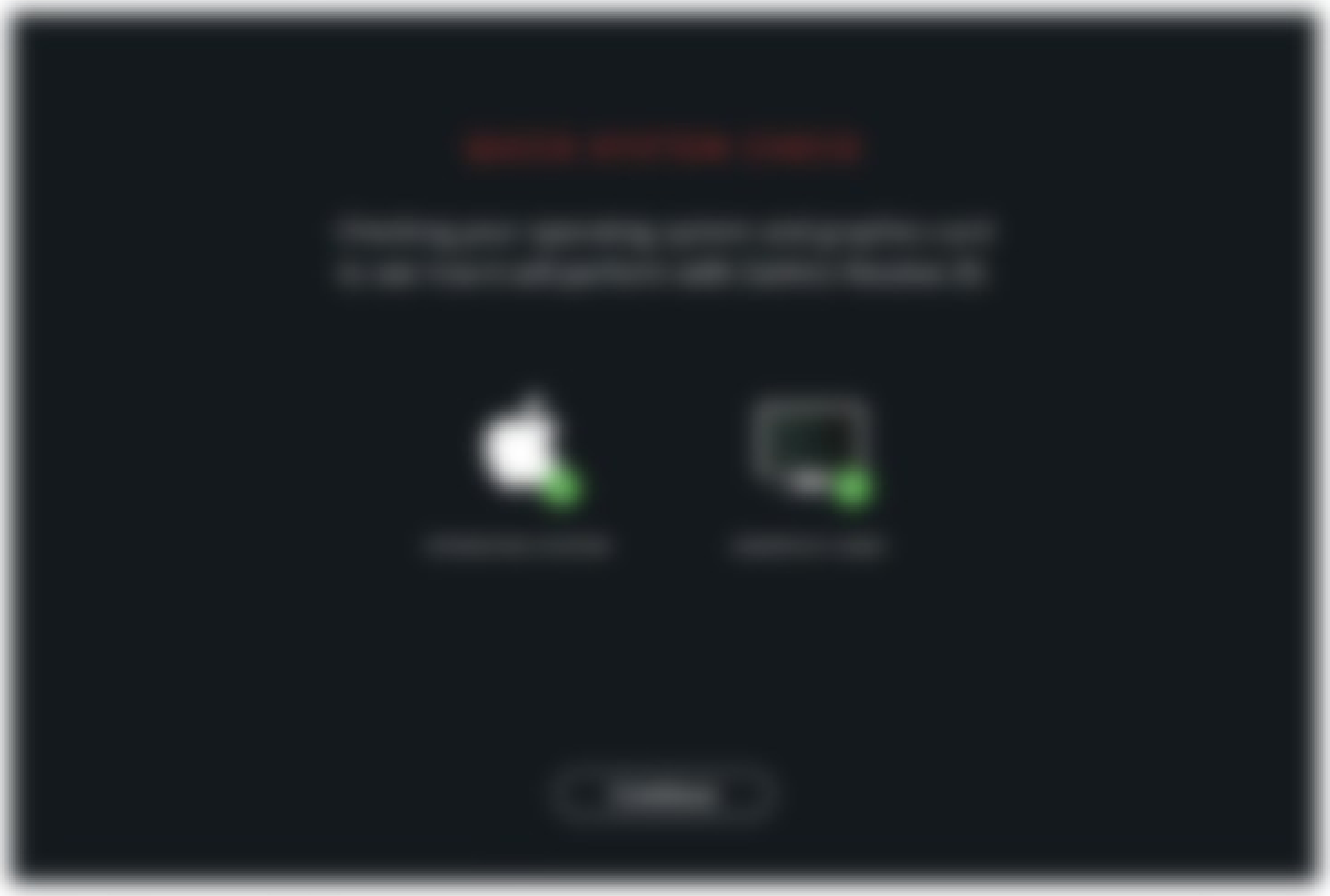
When DaVinci Resolve 20 opens for the first time, you'll see a Welcome splash screen detailing the new features available in the current version.

- If required, you can change the language used. You can also learn more about these and hundreds of other amazing features available in DaVinci Resolve [illegible] by clicking Learn More. Otherwise, click Continue.

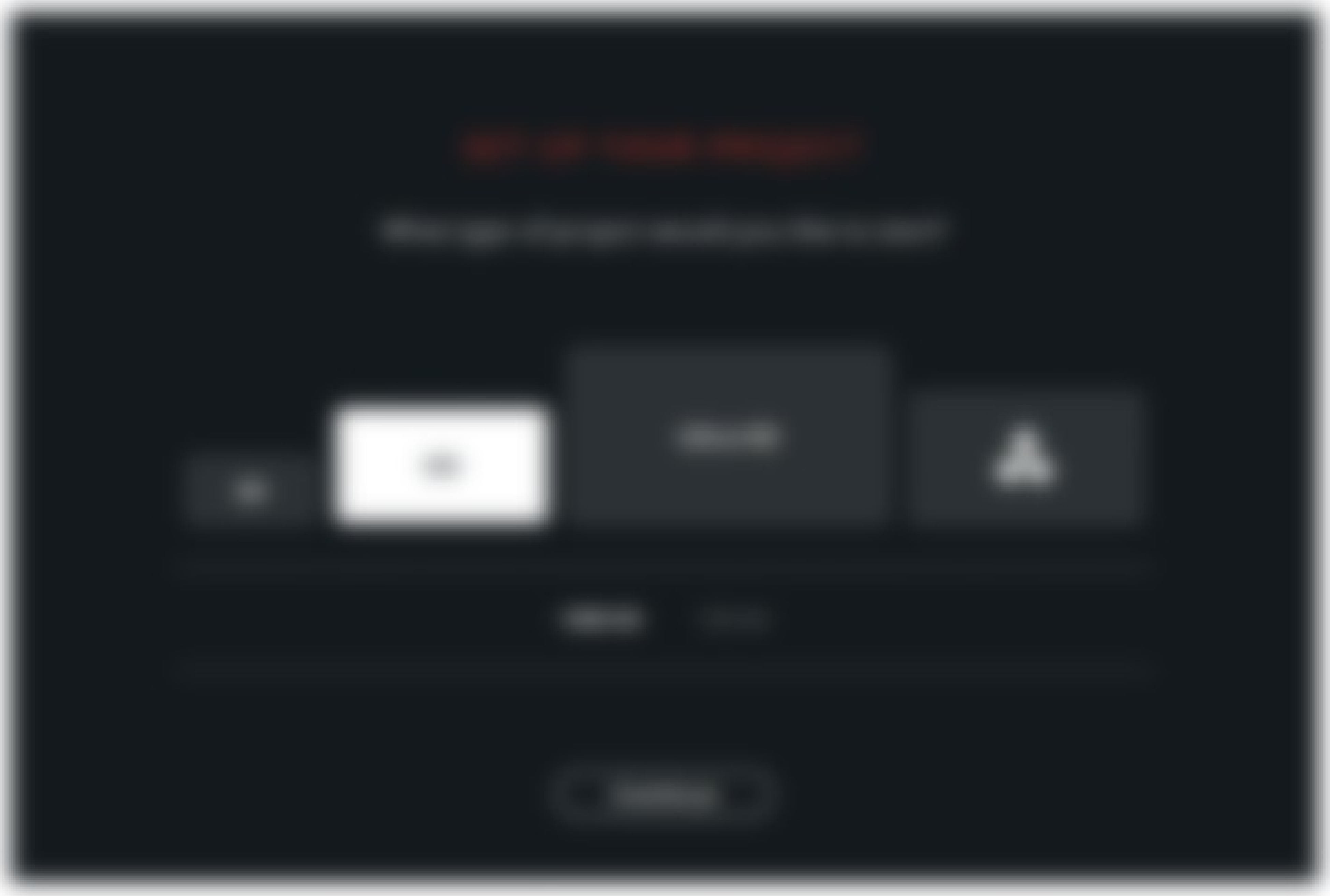
GREAT, YOU'RE ALMOST THERE

Next, you are invited to go through the Quick Setup process. Experienced users can skip this process by clicking 'Skip and Start Right Now,' but new users are advised to follow this process. It will only take a couple of minutes and is useful in understanding how Resolve is working.

- Click the Quick Setup button.

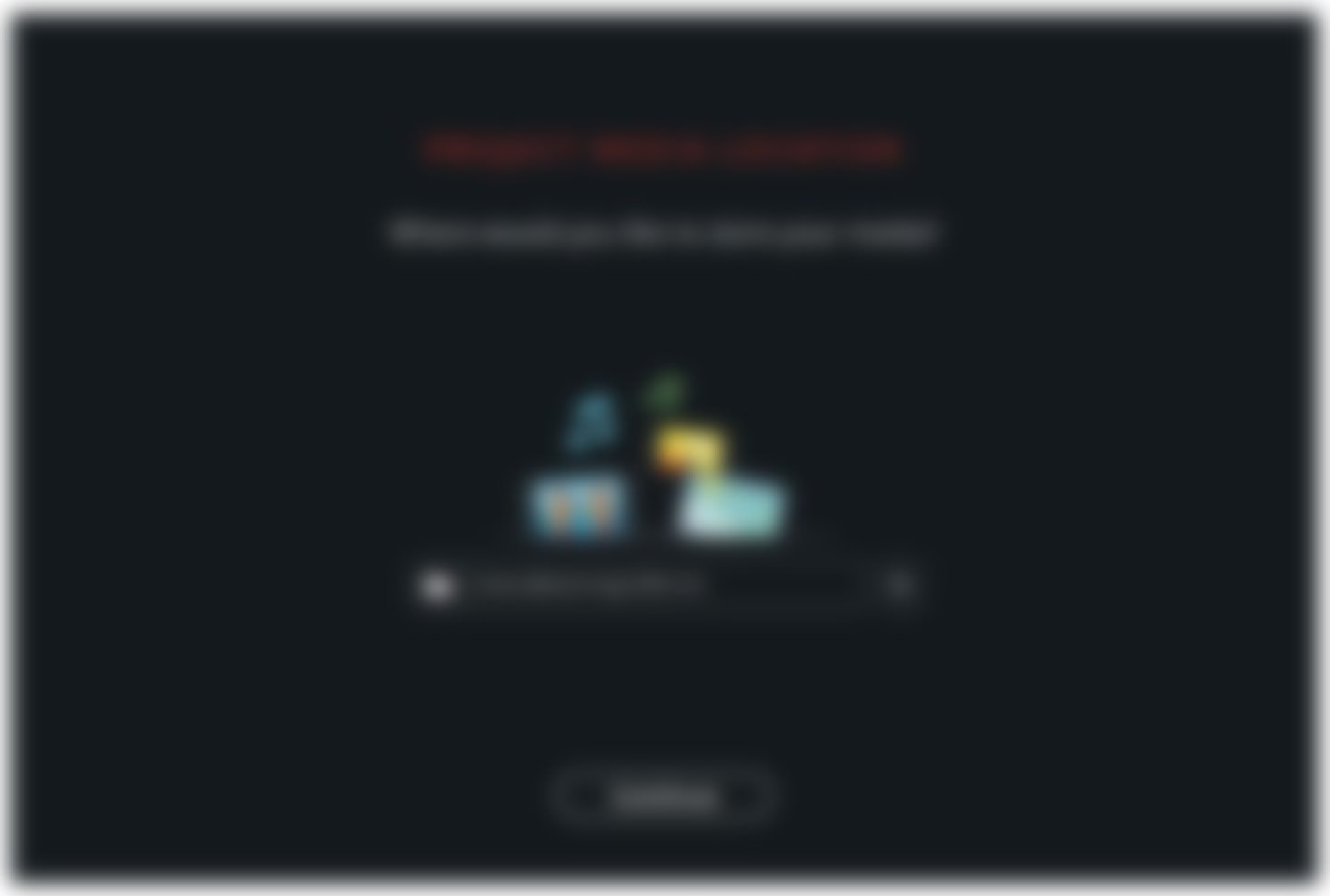


- DaVinci Resolve will check your system to ensure its operating system and graphics card will perform well. If both pass this test, click Continue.



Next, you will be asked what type of project you would like to begin. DaVinci Resolve supports projects at different resolutions, from Standard Definition (SD) and High Definition (HD) to Ultra High Definition and beyond.

- If you know the resolution you commonly work with, you can set that here. Otherwise, leave the resolution set to 1080 HD and click Continue.

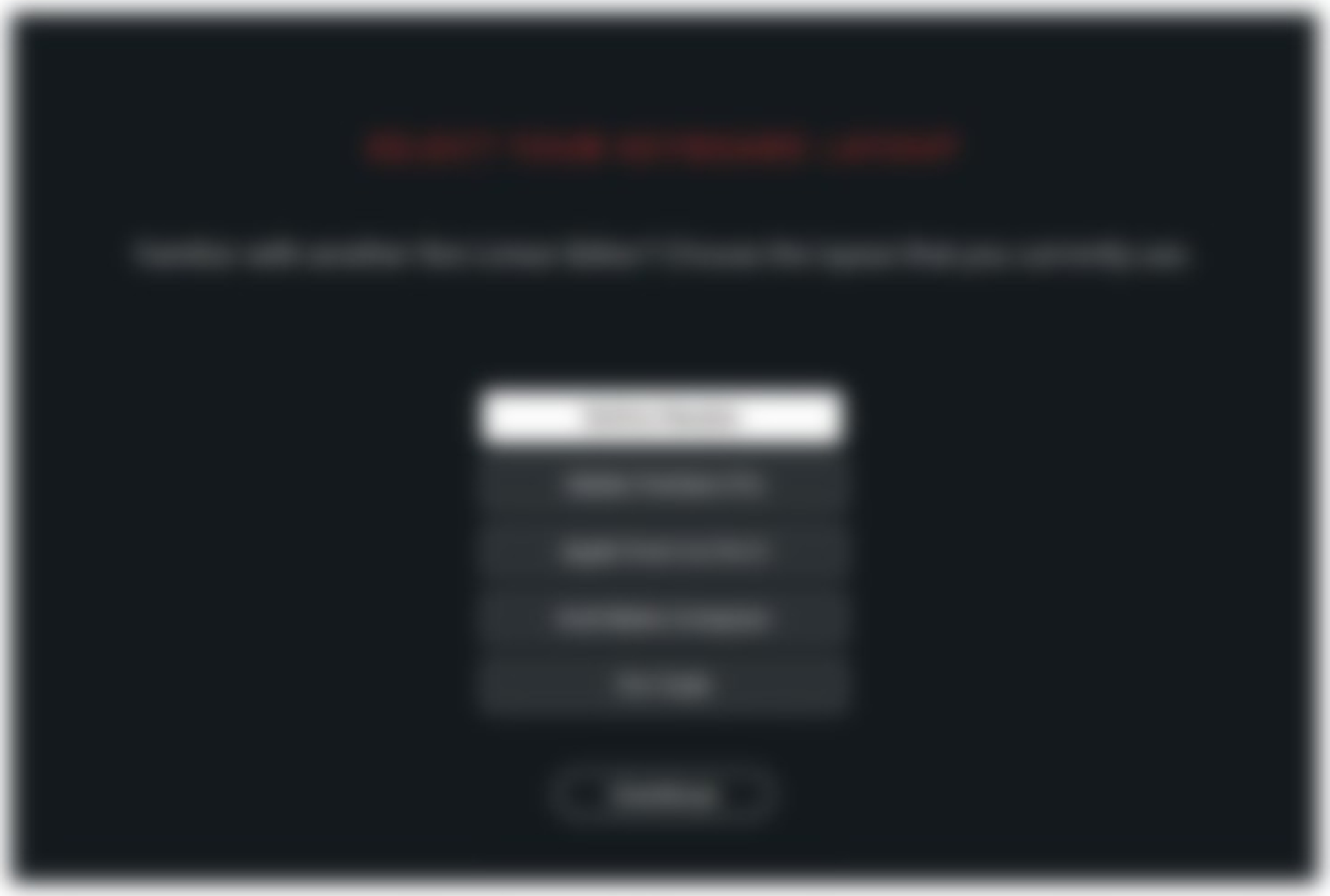


PROJECT MEDIA LOCATION

Where would you like to store your media?

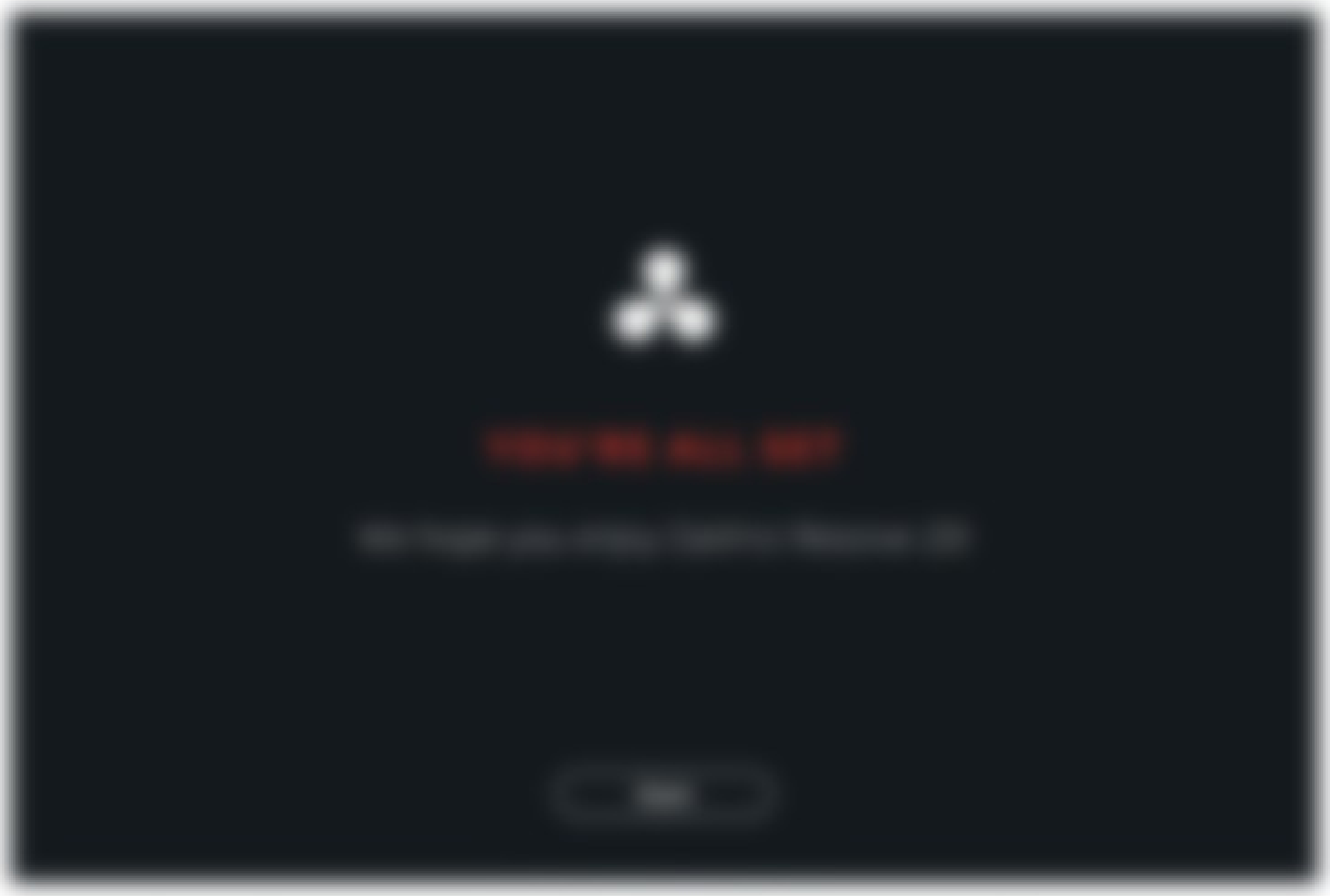
The next screen asks where you would like to store your media. This does not refer to the video, audio, and graphics files you'll edit and grade, but rather the ancillary files Resolve will need to create as you're working. This location is commonly referred to as a "scratch disk" and by default is set to your current user's Movies folder (macOS) or Videos folder (Windows).

- Leave this set to the default location and click Continue.



On the next screen, you will be asked which keyboard layout you would like to use. This is specifically relevant if you're familiar with using another nonlinear editor. However, throughout this Colorist Guide you will be introduced to keyboard shortcuts that use the DaVinci Resolve keyboard layout. So if you change the layout at this point, you may find those shortcuts won't work.

- For now, leave the layout set to DaVinci Resolve and click Continue.



YOU'RE ALL SET

We hope you enjoy DaVinci Resolve 20

Congratulations! You have completed the Quick Setup process and have changed precisely nothing in terms of DaVinci Resolve's default setup. Nevertheless, you have also gained an insight into some aspects of using DaVinci Resolve that will serve you well as you continue learning about the application and how it uses your system.

- Click Start to launch and begin enjoying DaVinci Resolve 20.

Once loaded, DaVinci Resolve will open to the cut page, which is the default opening page for all projects. However, this is not the usual place to begin working with DaVinci Resolve. Instead, you should now exit the application in readiness to begin the first lesson in this book.

[illegible] Choose DaVinci Resolve > Quit DaVinci Resolve or press Command-Q (macOS) or Ctrl-Q (Windows).

   DaVinci Resolve 20 will close.

Get the Lesson Files

The DaVinci Resolve lesson files must be downloaded to your Mac, Windows, or Linux computer to perform the exercises in this book.

To Download and Install the DaVinci Resolve Lesson Files

1. Open a web browser on your Windows, Linux, or Mac computer.
2. In the address field of your web browser, type www.blackmagicdesign.com/products/davinciresolve/training.
3. Scroll the page until you locate The Colorist Guide to DaVinci Resolve 20.
4. Click the Lesson Files Part 1 link to download the media for the first section of the book. The BMD 20 CG – Project 01.zip file is roughly 2 GB.
5. Click the Lesson Files Part 2 link to download the media for the second section of the book. The BMD 20 CG – Project 02.zip is roughly 13 GB.
6. Click the Lesson Files Part 3 link to download the media for the third section of the book. The BMD 20 CG – Project 03.zip is roughly 2.1 GB.
7. After downloading the zip files to your computer, open your Downloads folder and double-click to unzip them if they haven't unzipped automatically.
8. In your chosen storage location – for example, the Movies folder (macOS) or Videos folder (Windows) – create a new folder called **BMD 20 - The Colorist Guide**.
9. From your Downloads folder, drag the BMD 20 CG – Project 01, BMD 20 CG – Project 02, and BMD 20 CG – Project 03 folders into the BMD 20 - The Colorist Guide folder you created in the previous step.
10. You are now ready to begin Lesson 1, "Balancing Footage."

After you have completed an exercise, you have the option to review the completed timeline that is included in every project file provided with the media. Remember that color grading is a subjective practice, and your results will often differ from the completed timelines. Rather than attempting to match your work exactly, use them for general comparison and troubleshooting.

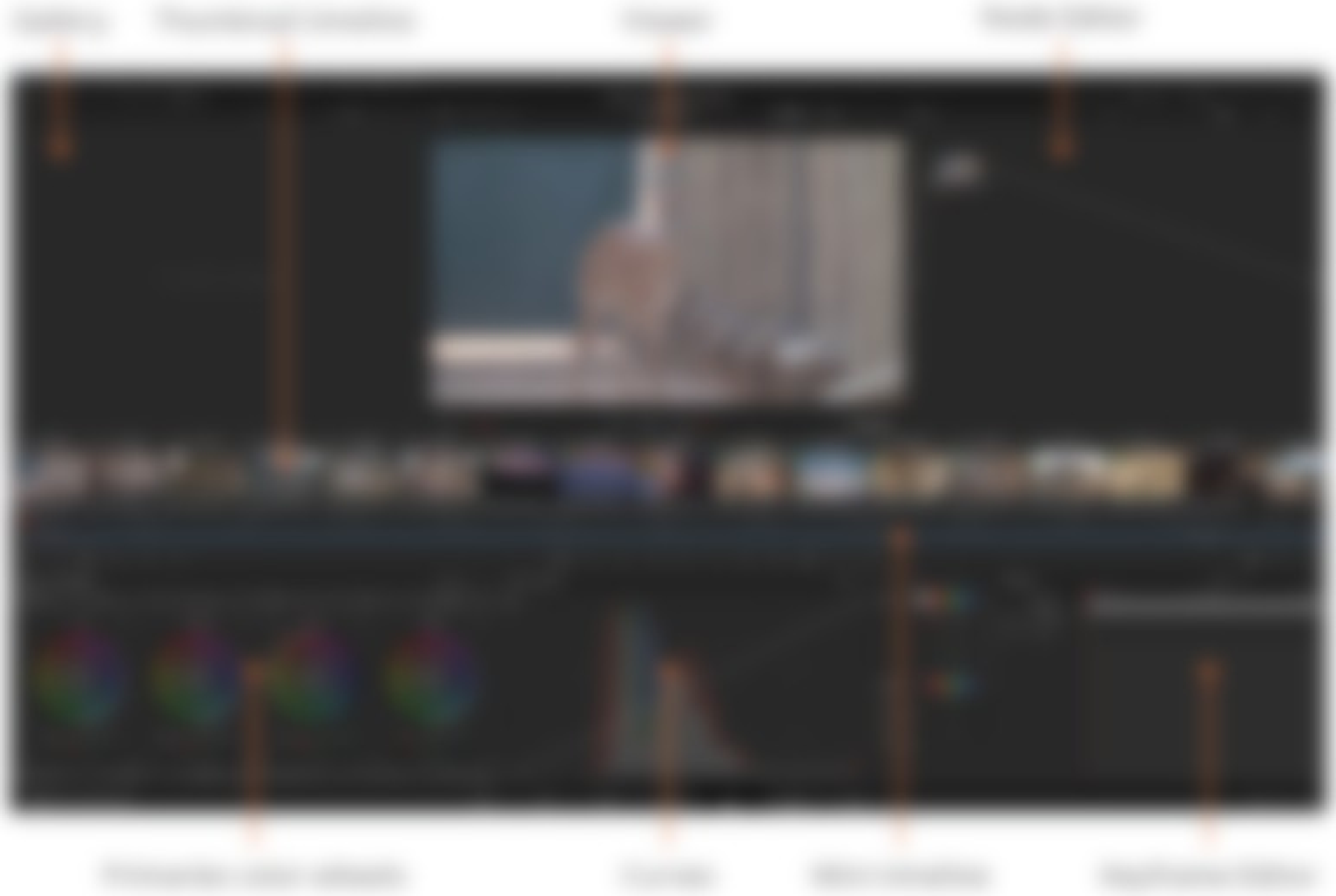
Interface Review

> "No matter how much past experience you have, there's always something new to learn about DaVinci Resolve. I sometimes find that going back and reviewing the basics helps give you perspective on finding a new way to give clients the look they want quickly and efficiently. Highly recommended for seasoned and veteran colorists alike."
>
> **Marc Wielage**, Senior Colorist – Chroma | Hollywood

This section provides an overview of the color page interface, covering its key functions and establishing the terminology that will be used throughout the book.

Color Page Layout

The default layout of the color page contains the following panels:



Gallery: contains stills that can be used for visual comparison or for copying grading data. Stills can be generated from the color page or imported from an external source and organized into albums.

Viewer: displays the selected clip with playback controls and offers additional interface tools.

Node Editor: allows grades and effects to be structured to maximize each clip's visual quality.

Thumbnail timeline: represents each clip as a single frame, making it easy to navigate and find individual clips.

Mini timeline: more closely resembles the track structure of the edit page.

Primaries color wheels: control the tonal and chromatic values of an image based on three luminance ranges lift, gamma, and gain.

Curves: give precise control over the tone-based values of the luminance and RGB channels.

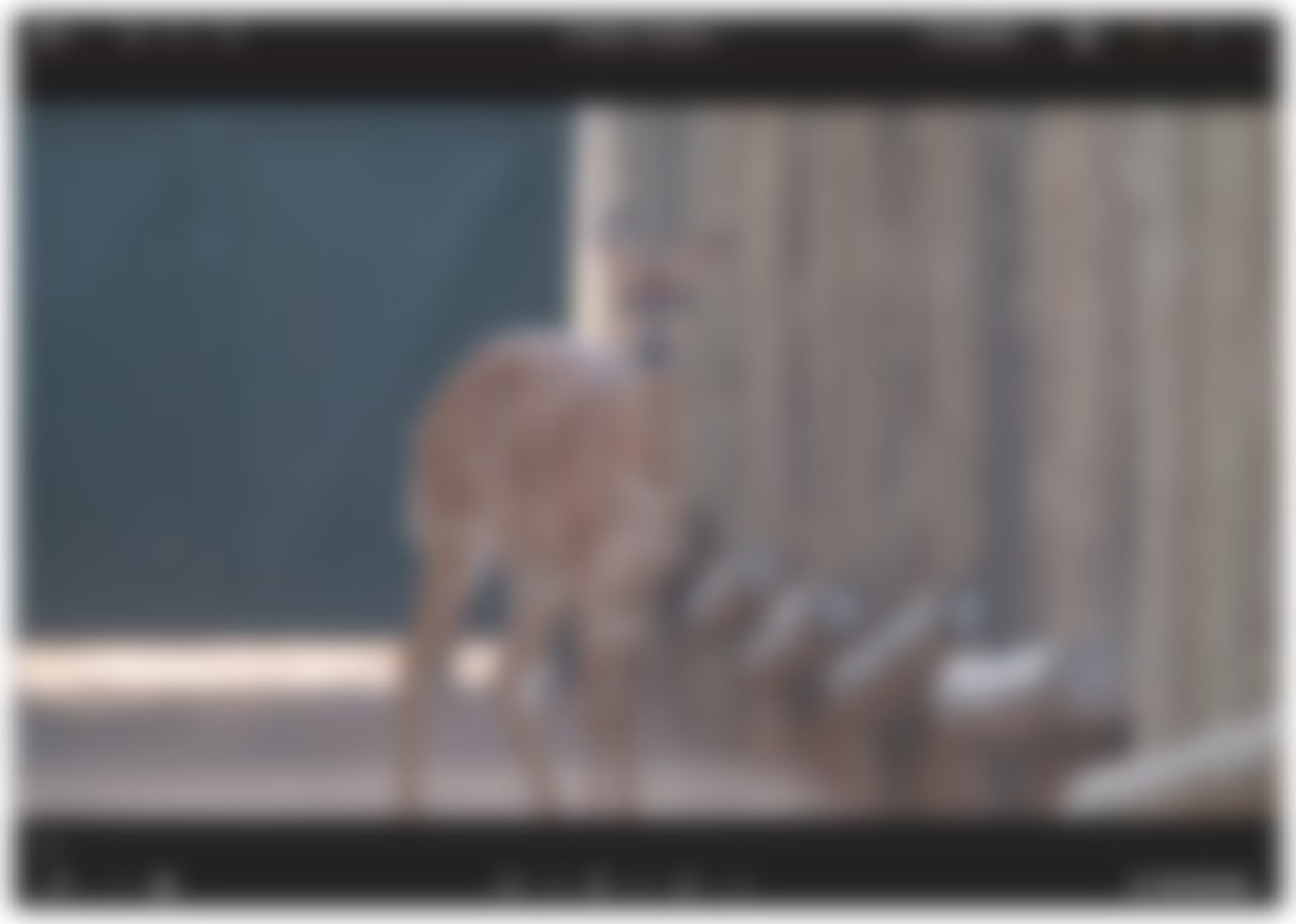
Keyframe Editor: allows you to animate color grades, sizing parameters, and effects.

At the top of the color page, the interface toolbar features buttons that allow you to show and hide panels as needed. Hiding panels (for example, the Mini timeline or the Gallery) will create more space for the viewer and the remaining panels.

NOTE If your screen resolution is less than 1920 x 1080 HD, there may be some differences in the interface layout. For example, your left and central palettes will be combined into a single list on the left side of the screen. In some palettes, parameters such as the Match Frames may be presented on two pages rather than one. Regardless, you will still have access to all the same tools described in this training manual.

Viewer

The viewer shows the frame that the playhead is currently on. By default, images are represented as they will appear upon final render. Additional features allow you to temporarily bypass grades, see clip mattes, and compare clips to one another.



Some additional controls at the top and bottom of the viewer maximize the color functionality in the color page.

TIP You can position your mouse pointer over any tool in the color page to see its name.

Image wipe: enables you to wipe between a still, a clip in the timeline, or a reference movie frame for visual comparison and matching.

Split screen: places clips alongside one another for review and comparison. It features several modes to compare clips on a timeline, clips in the same group, or even versions of grades within the same clip.

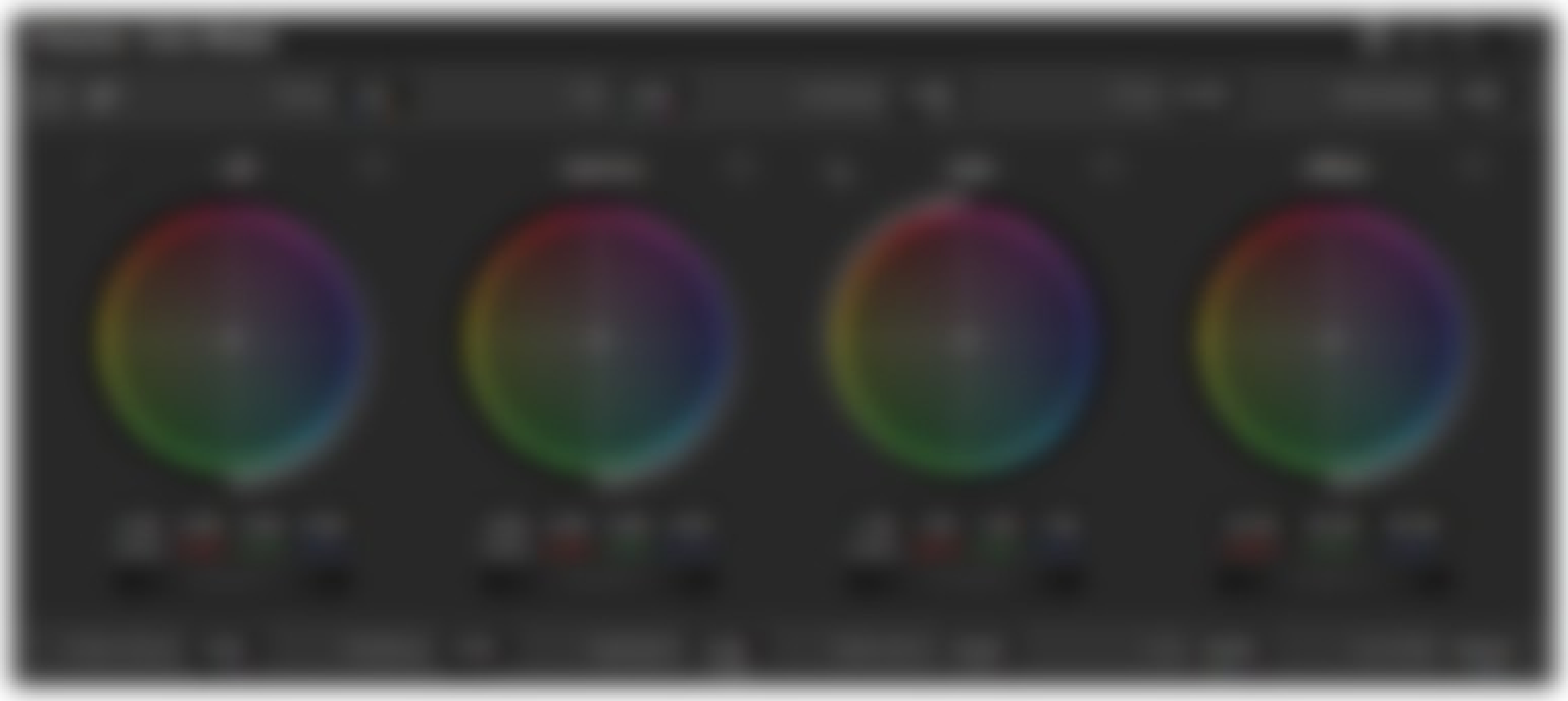
Highlight: is enabled to reveal the matte associated with a selected node.

Onscreen control menu: is a pop-up menu in the lower left of the viewer that features a selection of UI controls associated with some of the palettes and effects of the color page.

The bottom of the viewer contains a scrubber and transport controls that allow you to navigate the clip as you would in the edit page.

Primaries Color Wheels

The Primaries color wheels and the corresponding color bars and log wheels allow you to affect the brightness and hue of the image by targeting specific tonal ranges. Adjustments to the color wheels are made by dragging the color balance indicators at the center.



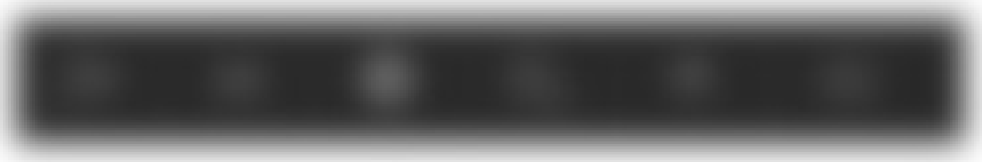
- **Lift** targets the shadows of the image.
- **Gamma** targets the midtones of the image.
- **Gain** targets the highlights of the image.
- **Offset** affects the image uniformly.
- **Master wheels** are the dark horizontal sliders below the color wheels that control the YRGB values of those respective ranges. Y represents luminance, and RGB represents the red, green, and blue channels of the image.

Clicking the Reset arrows in the upper right corner of each wheel will neutralize the color and master wheel of that range. You can also reset the entire palette by clicking the Reset All button in the upper right corner.

The adjustment controls at the top and bottom of the Primaries palette give additional control over image features such as contrast and saturation, temperature and tint, and so on.

Palette Panel

A series of buttons under the timelines allow you to navigate the palettes of the color page. From left to right, these palettes are:



Left palettes – Camera Raw, Color Match, Primaries, High Dynamic Range, RGB Mixer, Motion Effects

Central palettes – Curves, ColorSlice, Color Warper, Qualifier, Windows, Tracker, Magic Mask (Studio version only), Blur, Key, Sizing, 3D

Keyframe Editor – Keyframes, Scopes, Info

Use these buttons to navigate between palettes when prompted during the exercises. The name of each palette appears in the upper left corner when clicked, as well as over the button itself when your mouse pointer hovers over it.

Introducing Blackmagic Cloud

DaVinci Resolve is the world's only complete post production solution that lets everyone work together on the same project at the same time. Traditionally, post production follows a linear workflow with each artist handing off to the next, introducing errors and mountains of change logs to keep track of through each stage. With DaVinci Resolve's collaboration features, each artist can work on the same project in their own dedicated page with the tools they need.

To begin using the Blackmagic Cloud, simply create a Blackmagic Cloud ID, log in to the online DaVinci Resolve Project Server, and follow the simple instructions to set up a new project library – all for one low monthly price.

Once created, you can access the library directly from the Cloud tab in the Project Manager to create as many projects as you need – all stored securely online. Then, invite up to 10 other people to collaborate on a project with you. With a simple click, they can relink to local copies of the media files and start working on the project immediately, with all their changes automatically saved to the cloud.

Enabling Multiple User Collaboration for your project means that everyone can work on the same project simultaneously – with assistants, editors, colorists, dialogue editors, and visual effects artists can now all collaborate wherever they are in the world in a way never before possible.

Media Sync with Blackmagic Cloud Store

Now you don't need to buy expensive proprietary storage that requires an entire IT team to manage! Blackmagic Cloud Store has been designed for multiple users and can handle the huge media files used in Hollywood feature film productions. You can also have multiple Blackmagic Cloud Stores syncing the media files with your Dropbox account so that everyone can access the project's media files.

To find out more about these exciting workflows, visit
www.blackmagicdesign.com/products/davinciresolve/collaboration

Part 1

Color Correcting a DaVinci Resolve Timeline

Lessons

- Balancing Footage
- Creating Color Continuity
- Correcting and Enhancing Isolated Areas

Part 1 of The Colorist Guide to DaVinci Resolve 20 focuses on establishing a strong practical foundation of primary and secondary grading techniques with the aim of balancing and matching media in preparation for creative grading.

This book is divided into three distinct parts, each devoted to a different film genre and using three different project setups and color management methods. In Part 1, the project is a documentary that is processed using DaVinci Resolve's archiving feature.

Project File Location

You will find all the necessary content for this section in the **R20 CG – Project 01** folder. Follow the instructions at the start of every lesson to find the necessary project, timeline, and media files. If you have not yet downloaded the first set of content files, go to the "Getting Started" section of this book for more information.

NOTE Although you can use DaVinci Resolve 20 for most of this guide, some exercises will require DaVinci Resolve Studio 20. If you don't have DaVinci Resolve Studio 20, you can still complete such exercises with a watermark overlay and are encouraged to do so to learn these advanced tools and techniques.

Lesson 1

Balancing Footage

The first project you will grade is a documentary about protecting endangered rhinos. The workflow described is applicable to virtually all types of video project grading, but documentary cinematography is particularly dependent on the following actions:

- **Balance footage:** Documentary videographers often quickly change positions and locations during a shoot, which means they have less direct control over lighting conditions.
- **Match shots:** Scenes, interviews, and B-roll can be shot over many days with different cameras, requiring you to visually match all content to create a cohesive narrative.
- **Improve imagery:** A variety of techniques are used to confine grading to specific portions of a shot to enhance skies, skin tones, and visual framing.

Time

This lesson takes approximately 2.5 hours to complete.

Goals

Opening a DaVinci Resolve Archive 2
Setting Up Project Settings 5
Understanding the Grading Workflow 8
Primary Grading with Color Wheels 11
Precision Grading with Curves 20
Comparing Color and Log Wheels 28
Self-Guided Exercise 40
Lesson Review 42

You wouldn't color grade a somber documentary about Himalayan sanctuaries as you would grade a 30-second perfume ad featuring the latest Hollywood it-man, even if both projects were shot on the same type of camera. So in addition to addressing the technical requirements of the footage, you will also consider the documentary's narrative.

In this lesson, you'll familiarize yourself with the primary grading tools used to adjust the tonal range and color balance of clips on a timeline, learn to read waveforms and parade scopes for optimal matching, and employ secondary grading selection methods to enhance your final look. You will do so in the context of an overall grading workflow that addresses the needs of each timeline clip.

Opening a DaVinci Resolve Archive

The timeline for this project was edited and archived in DaVinci Resolve 20 to create a DaVinci Resolve archive (.dra) folder. This is one of the most efficient methods for sharing and launching timelines because it includes the original project file and all its associated media. By restoring a .dra folder, you can be certain that you are seeing the timeline exactly as intended by the editor, with all its marks, transitions, graphics, effects, and trimming intact.

Blackmagic Design Mini Panel Operations

DaVinci Resolve control panels are designed to give you fluid, hands-on control over multiple parameters at the same time, so you can work faster and be more creative. See the Appendix A, "Using the DaVinci Resolve Panels," for an overview of how a control panel can optimize your workflow in DaVinci Resolve. Throughout this book, lesson notes will show how exercise workflows can be incorporated and enhanced using a Mini Panel.

NOTE For a quick refresher on the DaVinci Resolve interface, see the "Interface Review" section earlier in this book.

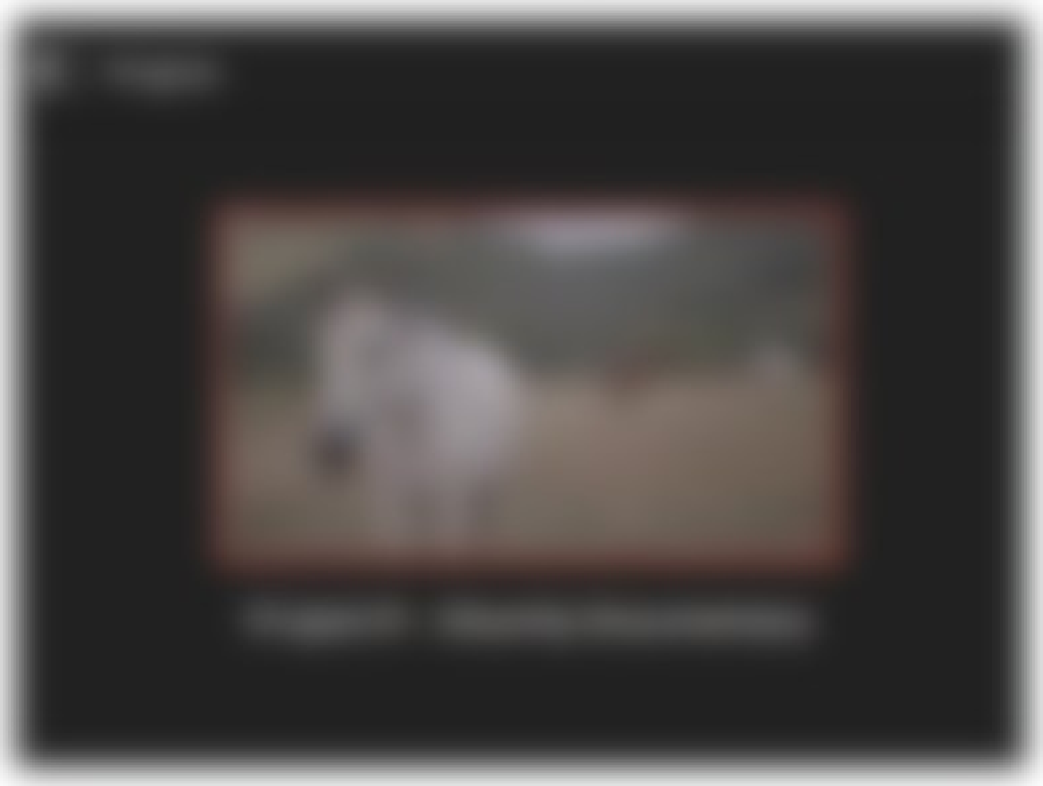
1 Open DaVinci Resolve 20.

2 Right-click in the Project Manager window and choose Restore Project Archive.

3 On your hard disk, locate the BMD 20 CC - Project 1 folder.

4 Select the **Project 01 - Diversity Documentary.dra** file and click Open.

5 In the Project Manager, double-click the **Project 01 - Diversity Documentary** thumbnail to open the project.



6 To enter the color page, click the Color button at the bottom of the interface or press Shift-6.

The name of the timeline is visible above the viewer. You can select the active timeline by clicking the disclosure arrow next to the timeline name and choosing from the dropdown list.

7 Verify that you are on the **01 Start Timeline**.

TIP You can archive projects by right-clicking a project thumbnail in the Project Manager and choosing Export Project Archive. Doing so will consolidate your project file, timelines, and media into a single folder for sharing or future retrieval.

You're almost ready to start grading! However, before you begin, you should check that your project is being backed up correctly.

Setting Up Project Backups

As soon as you create or load an existing project, it is good practice to ensure that DaVinci Resolve's Live Save feature is running in the background. Performing incremental background saves will keep track of every change you make to your project, as well as retain older versions of your project for future recall.

1. Open DaVinci Resolve > Preferences.
2. At the top of the Preferences pop-up window, switch from System to User.
3. Click "Project Save and Load" to the left to access Save Settings.

By default, Live Save is enabled, meaning DaVinci Resolve will overwrite your active project file every time you make a change, no matter how small. Enabling this setting is crucial for minimizing the risk of losing project changes in the event of unexpected system or program shutdowns.

4. Select the "Project backups" checkbox.

Enabling this option saves a new copy of your project file (.drp) at regular intervals to a designated backup location.

Below, you can see backup intervals spaced by minutes, hours, and days.

5. Leave the first setting to continue backing up your project every 10 minutes, which will produce 6 backup files every hour.

After the first hour, older projects will be cleared from project storage, except for occasional files that extend over hourly and daily intervals. This behavior can be extremely helpful when working on long-form projects because it allows you to return to a project's state from a specific period (such as two weeks ago, for example) without sorting through thousands of backed-up project files.

- Increase the hourly backups to 24 hours. That means that at the start of every hour a new backup file will be generated, allowing you to return to the state of your project at any point in the day. Remember, backups aren't generated unless you are actively working, so an average workday will only produce as many backups as the amount of hours that you work.
- Increase the daily backups to 180 days. This will generate a new backup of your project at the start of every day going back roughly 6 months. Again, this will only produce the number of backups that equals to the number of days you actively work on the project, but this style of backing up can be invaluable when returning to a project a few months after completion to perform additional work/deliverables without the risk of overwriting your older backups.
- To select the backup location, click Browse and specify a safe destination on your workstation or external drive.
- Select the "Timeline backups" checkbox.

  This option will generate a copy of all your active timelines (.drt) at the same backup location and time intervals. Backup timeline files are helpful because they are substantially smaller than the project files and can be used to restore an edit to an earlier version without needing to reconstruct the entire project.

  Project and timeline backups are generated only when there has been some activity within the shortest time interval. So if you have 30 timelines in your project, only the timeline(s) you've worked on in the last few minutes will be backed up.
- Click Save to commit the change and close the Preferences window. You may continue working on your project, knowing that every change will be saved and backed up.

NOTE To open a backed-up project file, you can access the DaVinci Resolve project (.drp) file at the designated backup location on your drive, or you can open the Project Manager, right-click the thumbnail of the project you wish to restore, and choose Project Backups. From the window that opens, you can select from a list of all the backups associated with this project.

With the project loaded and Live Save enabled, you can proceed with color grading. But where to begin? When approaching an ungraded timeline, it's not always obvious where your starting point should be. The next section provides a general overview of the grading process.

Understanding the Grading Workflow

It is good practice to have a clear idea of what your workflow is before beginning a grade. Your workflow is informed by a variety of factors, including the color space and format of your footage, the way the timeline was shared with you, the content of the scenes, and the aesthetic/emotional intention behind the project. Let's review the most common phases of a grading workflow.

Balancing and Shot Matching

Before you can grade footage creatively, you must adjust shot luminance and chromaticity to create a level starting point for your grade. This process is akin to laying down a primer on a canvas before painting to ensure that the pigment is applied to a consistent surface.

A single grade applied to five balanced and matched shots will establish a visual continuity that flows naturally from one shot to the next, whereas the same grade applied to unbalanced and mismatched shots will continue to reflect each shot's differences.

This stage of grading is often referred to as color correction and is achieved by means of primary grading tools, in which the entire frame of the image is adjusted. Color correction is performed using techniques such as normalization, balancing, and shot matching.

Normalization and balancing creates a neutral starting point for clips in the timeline by consistently adjusting their tonal distribution and neutralizing any issues with their color balance.

Shot matching involves comparing clips and matching their contrasts and colors exactly. This technique is particularly advantageous when most of your clips already have a similar look, and you need to tweak only a few exceptional shots to create a smooth starting point for your scene grade.

Secondary Grading

Secondary grading refers to any part of the grading process in which only a part of the image is altered. The potential for secondary grading is limitless, but it is mainly achieved by two means: keying and masking.

Keying targets a portion of an image based on a hue, saturation, or luminance range. In DaVinci Resolve, the main tool for key extraction is the Qualifier palette, although other tools also rely on this method of selection, including HSL curves, the Color Warper, and some Resolve FX.

Masking employs geometric vector shapes to isolate a portion of an image. DaVinci Resolve's masking interface, the Window palette, features adjustable Power Windows in the form of preset shapes (linear, circle, polygon, and gradient), and a customizable curve window that enables you to generate garbage mattes and rotoscoped (animated) masks. The Magic Mask palette performs a similar task by automatically detecting and tracking objects and people to generate masks.

Like the qualifier, windows cannot alter the appearance of an image directly but act as selectors for the grading tools.

Secondary grading is most powerful when qualifiers and Power Windows are used in tandem. While the qualifier focuses on extracting an element with a clean edge, a window can confine the qualifier's influence to a specific portion of the frame. In this way, it's possible to target an object in areas of the shot that are of a similar key range.

Creating a Look

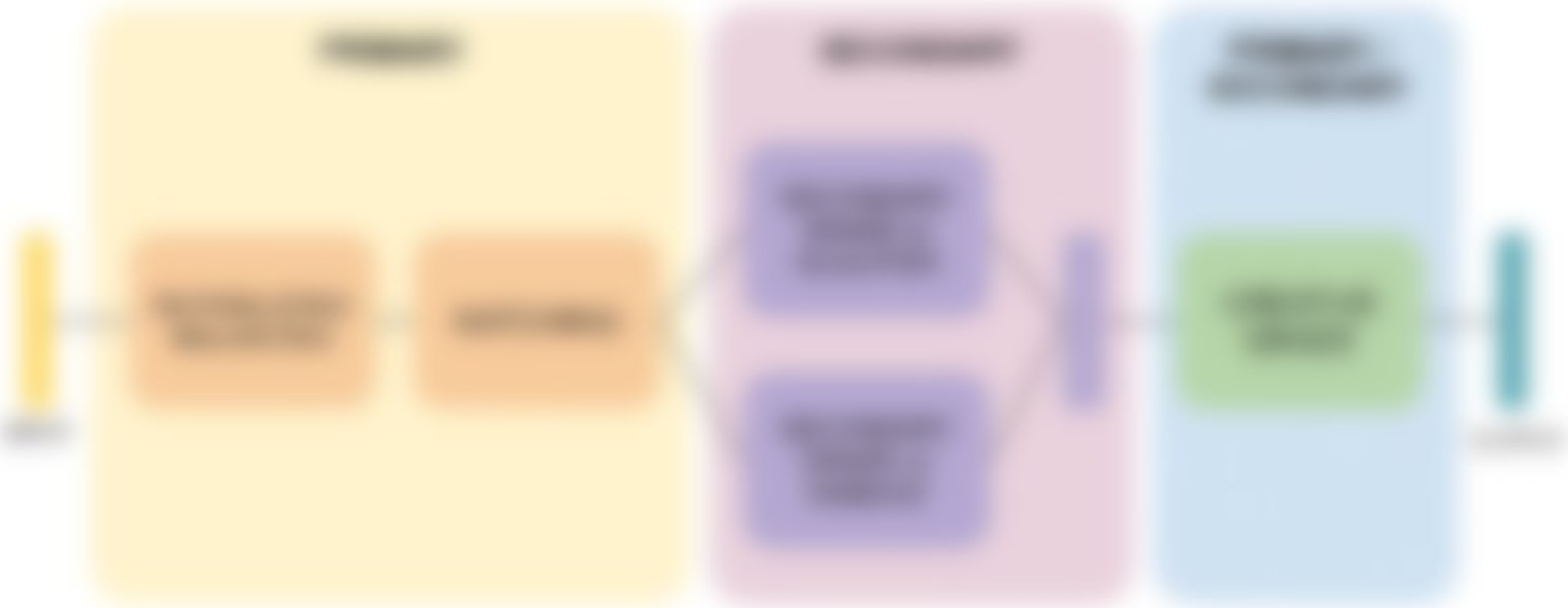
Once your clips are balanced and shot matched, and any individual secondary grading needs are met, your creative process, often referred to as color grading, can begin.

When performing creative grading, you should carefully consider the emotional and narrative implications of the scene. You can apply both primary and secondary grading techniques to influence an audience's emotional perception of an environment by tweaking the scene's color temperature to indicate positive (warm) or negative (cold) moods and evoke a wide range of psychological color and tone associations. Additionally, a creative grade can communicate practical narrative elements such as a change in location or indicate nonlinear scenes.

NOTE The grading workflow described here does not rigidly dictate the order in which these grades should be performed by the colorist. Although balancing and shot matching is a common first step, some workflows might begin with the application of a creative show look-up table (LUT) or color management node and follow with corrective tweaks to the primaries. As you gain more experience as a colorist, you will develop an intuition for the appropriate approach when grading.

Visualizing the Grading Workflow in the Node Editor

The following chart represents a traditional grading workflow in the Node Editor in DaVinci Resolve's color page.



This graph is not intended as a literal guideline to how nodes should be structured in every clip, but rather an interpretation of the traditional grading workflow in node form. In fact, as noted previously, grading workflows will not always be linear, and you might start by applying looks at the end of the pipeline (closer to the Output node) before moving upstream (toward the Input node) to make primary corrections. Because of this, it is helpful to think of this chart as a live signal flow rather than an order of operations.

Primary Grading with Color Wheels

When you first launch DaVinci Resolve's color page (or reset its UI layout), the first grading palettes you see are the Primaries color wheels and Custom Curves. This is because they are among the most fundamental grading tools used for color grading, and you will need to master them to become a skilled colorist.

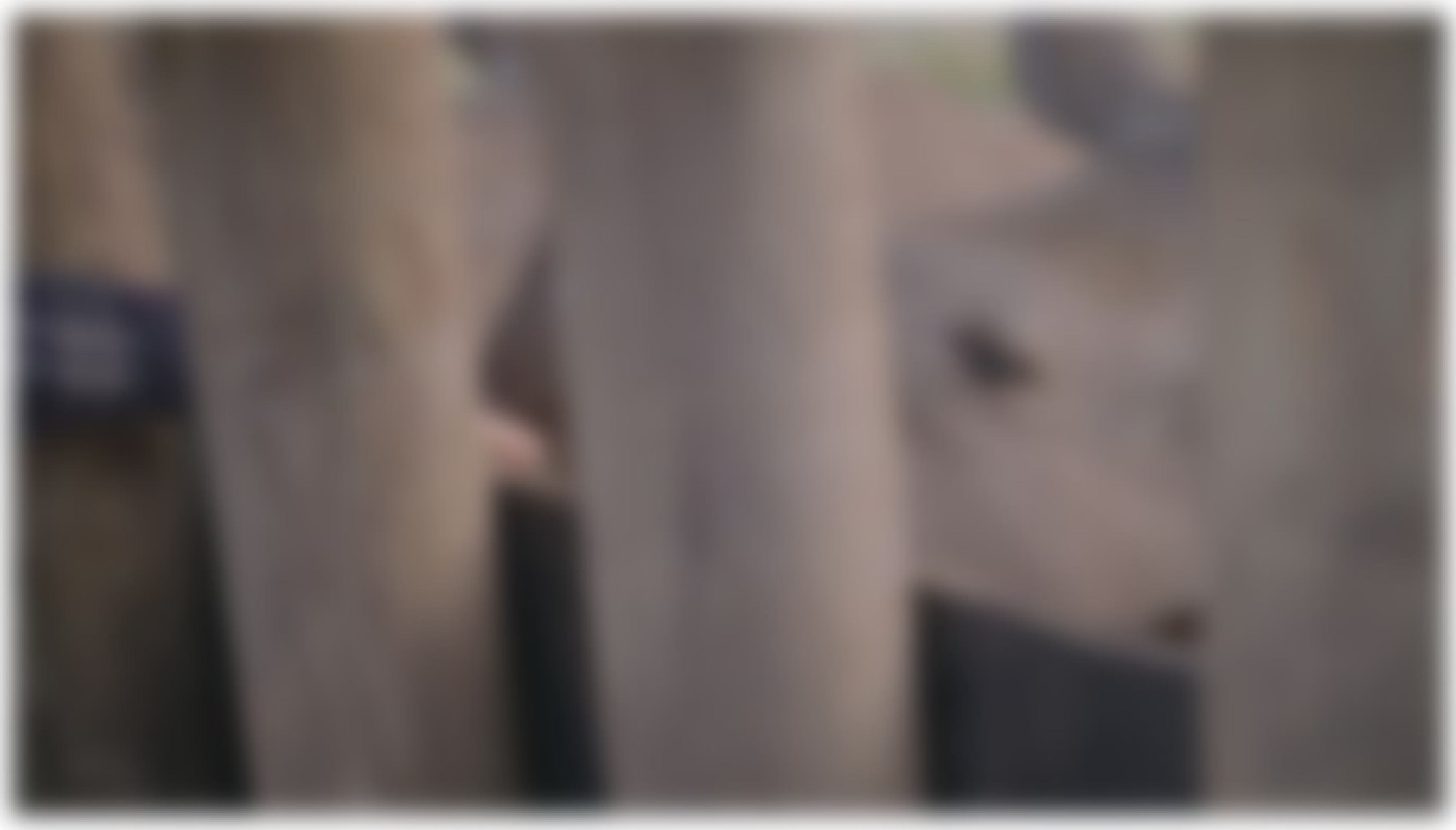
TIP To reset a page to the default layout, choose Workspace > Reset UI Layout. You may want to do this at the start of every new project in this book to match the layout shown in the screenshots. Additionally, you can choose Workspace > Full Screen Window to dynamically resize DaVinci Resolve to fit your computer screen.

In the following exercises, you will learn how to set contextual luminance and balance with the color wheels while monitoring your adjustments in the waveform scope for unwanted clipping and color dominance.

Setting Tonal Range with Master Wheels

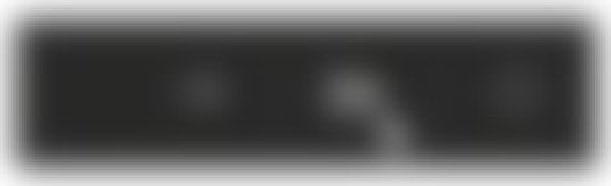
The human eye is particularly sensitive to light sources, shadows, and contrast, which is why it makes sense to begin the color correction process by establishing the tonal range of an image.

- Select clip 02, which shows an image of a rhinoceros behind a wooden gate.



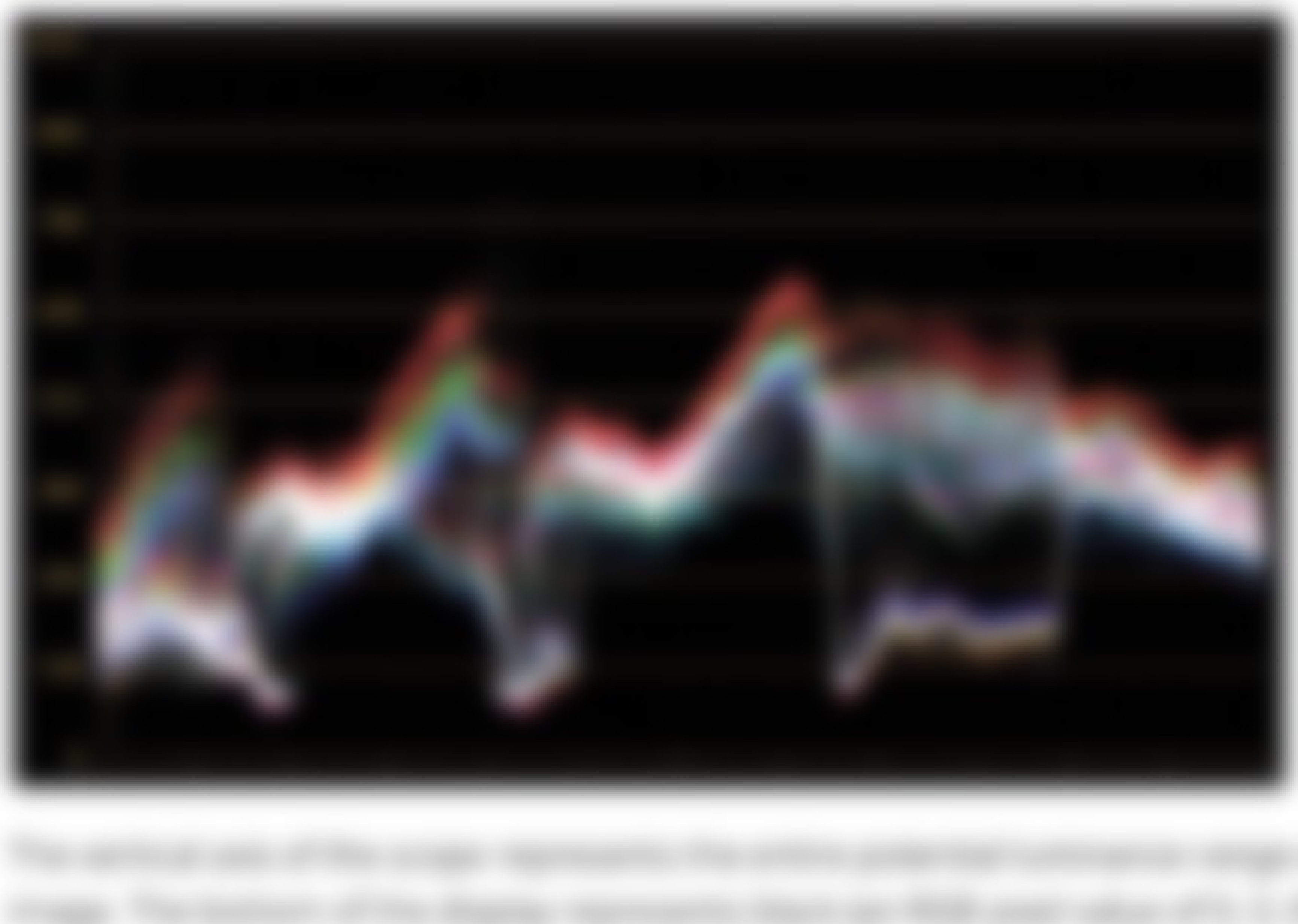
By default, the palette in the lower right corner of the DaVinci Resolve interface is set to the Keyframes palette. You will switch it to display scopes so you can analyze your footage while you color correct it.

- Click the Scopes palette button on the right side of the page.



- At the top of the Scopes palette, click Parade to reveal a scopes dropdown menu, and select Waveform.

The waveform scope displays the luminance and color channel values of the video at the timeline position of the playhead.



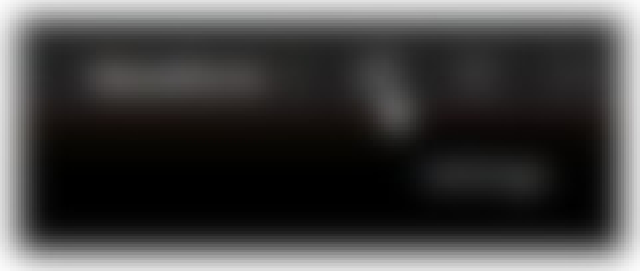
The vertical axis of the scope represents the entire potential luminance range of the image. The bottom of the display represents black (an RGB pixel value of 0, 0, 0) and the top represents white (a pixel value of 1023, 1023, 1023 in a 10-bit depth signal). Between the two values is a vertical black to white grayscale gradient that conveys the full range and distribution of values in the image.

The horizontal axis scans the image itself and produces a readout (also known as a trace) that directly correlates between the viewer and waveform graph. You can think of the waveform display as showing the distribution of pixels across their respective vertical columns based on their luminance levels, with darker areas of the footage appearing toward the bottom of the graph and lighter areas toward the top.

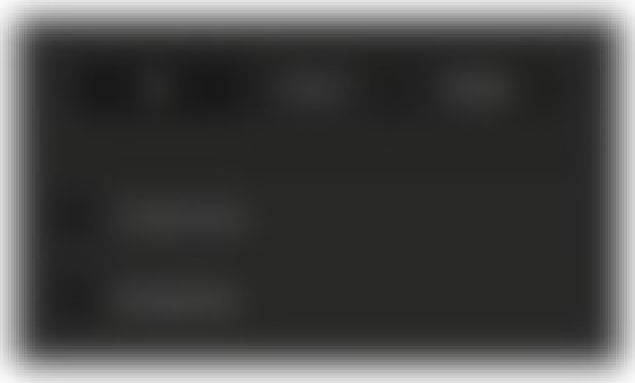
Each color channel is overlaid in the resulting trace. A prominent section of color usually indicates an environment or object with a dominant hue, or an unbalanced image. When channels overlap perfectly as a result of equal intensity, they produce a white trace, which implies a neutral (gray) surface in the scene.

When adjusting tonality in an image, you can disable the RGB channels in the waveform to focus only on luminance.

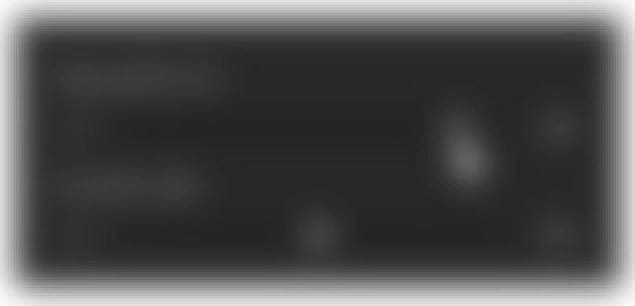
- In the upper-right corner of the Scopes palette, click the Settings button.



- Click the Y (Luma) channel button at the top to display only the luminance of the image.
- Deselect the Colorize option to display the trace with solid white pixels.



- Drag the Waveform brightness slider to the right to increase trace visibility and help make the more subtle areas stand out.

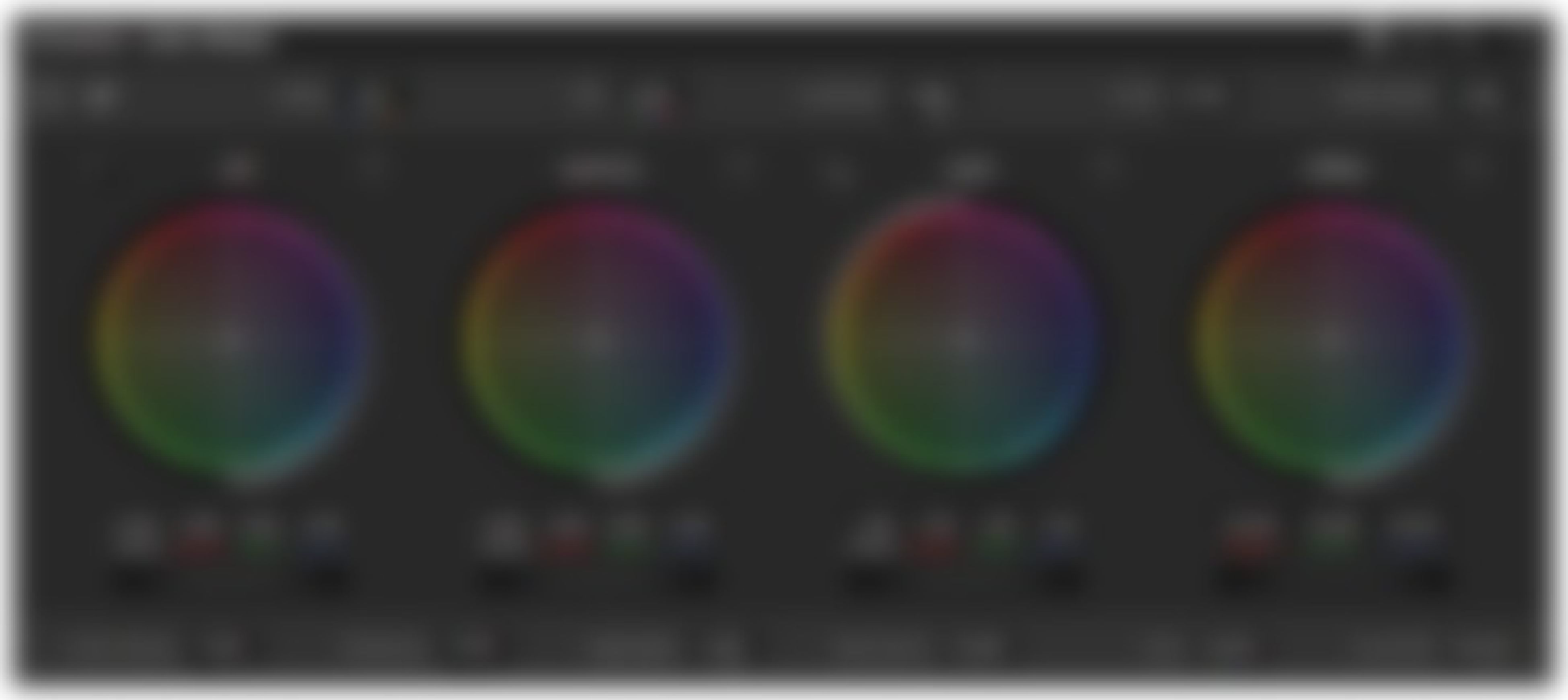


- Click anywhere in DaVinci Resolve to close the waveform settings window.

Any part of the trace that goes below 0 (black point) and above 1023 (white point) in the luminance range will be clipped, which will result in a loss of image detail. Normalization describes the process of expanding the luminance of a video signal in order to best represent the original lighting in a scene.

When normalizing footage, a good starting point is to ensure that the shadows are floating at around 5–10% above the black point (0) on the scope, while highlights stay well under the white point (896). This leaves the remaining 10% as headroom for super white elements such as blown-out car headlights, windows, or metallic specular highlights that can extend up to and beyond the white point.

- Ensure that the Primaries palette is active in the left palettes of the color page.

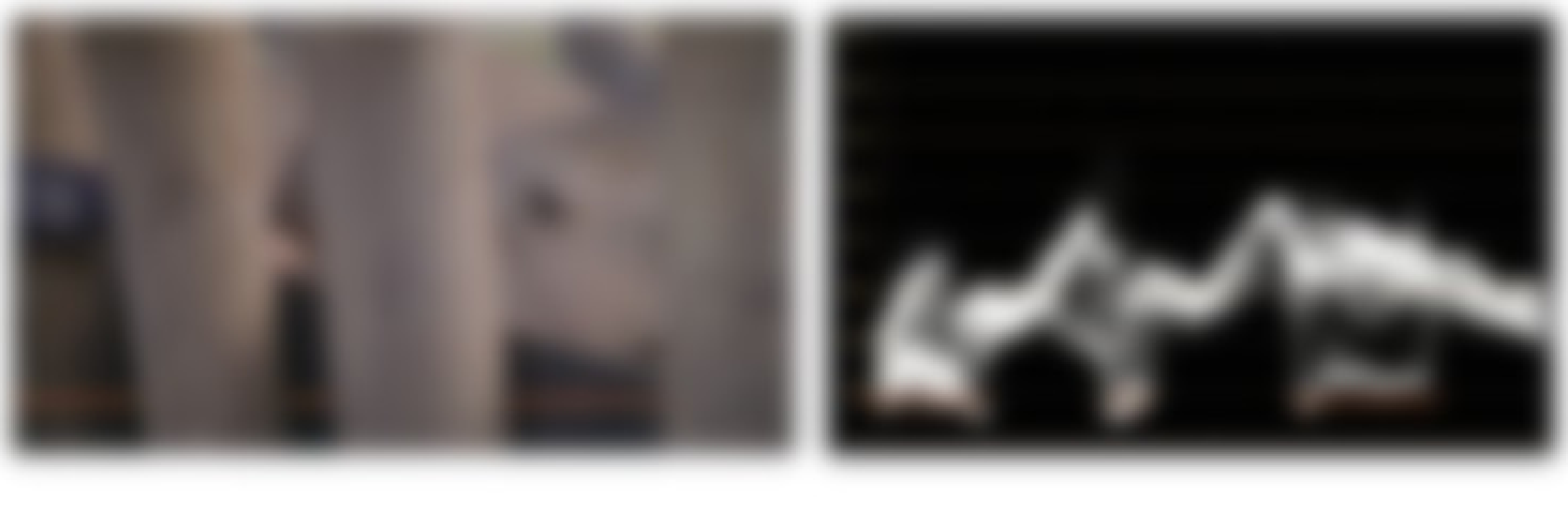


If you've already completed the book The Beginner's Guide to DaVinci Resolve 20 or read the "Interface Review" section earlier in this book, you know that the Lift wheel affects the image shadows, the Gamma wheel affects the midtones, and the Gain wheel affects the highlights. The Offset wheel impacts the entire luminance range of the image uniformly.

The horizontal wheels located under the color wheels are called master wheels and impact the brightness of their respective ranges.

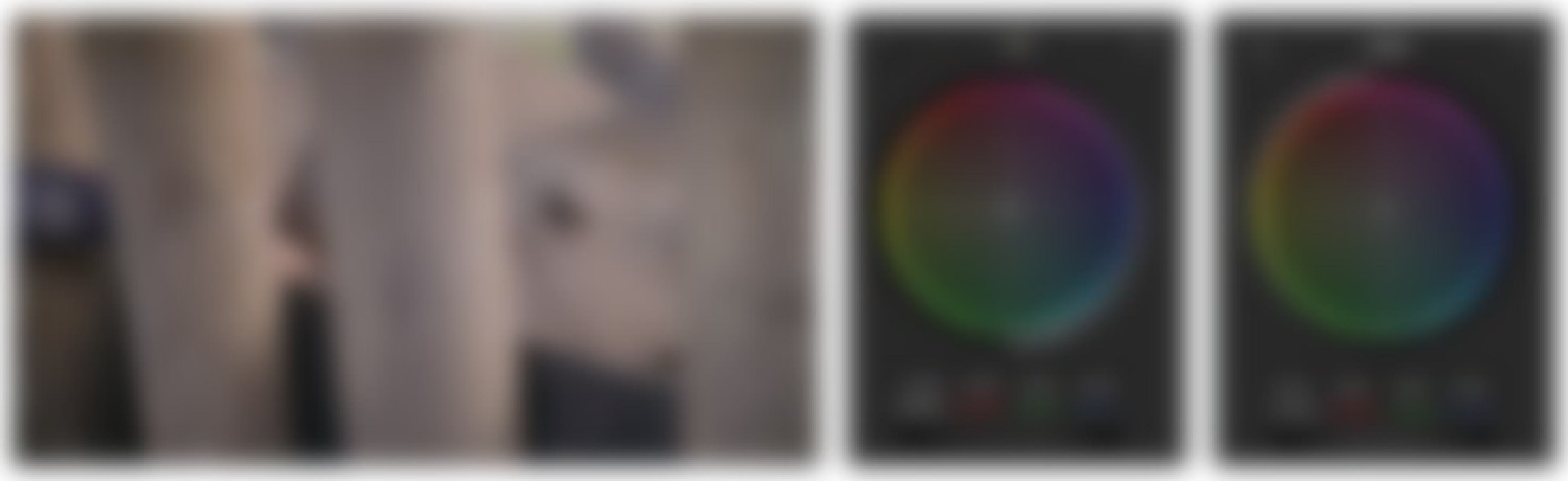
- Drag the Lift master wheel to the left to darken the shadows. Because this image has detail in the darkest areas of the event, aim to place the lowest parts of the waveform trace above 0 but below the 128 line.

Notice the three areas of the graph where the trace of the waveform dips toward the black level. Try to locate their respective positions in the viewer.



These three dark areas correspond to places where the barrier is visible behind the wooden poles in the rhino enclosure. The darkest areas of the barrier are represented by a pronounced dip in the graph.

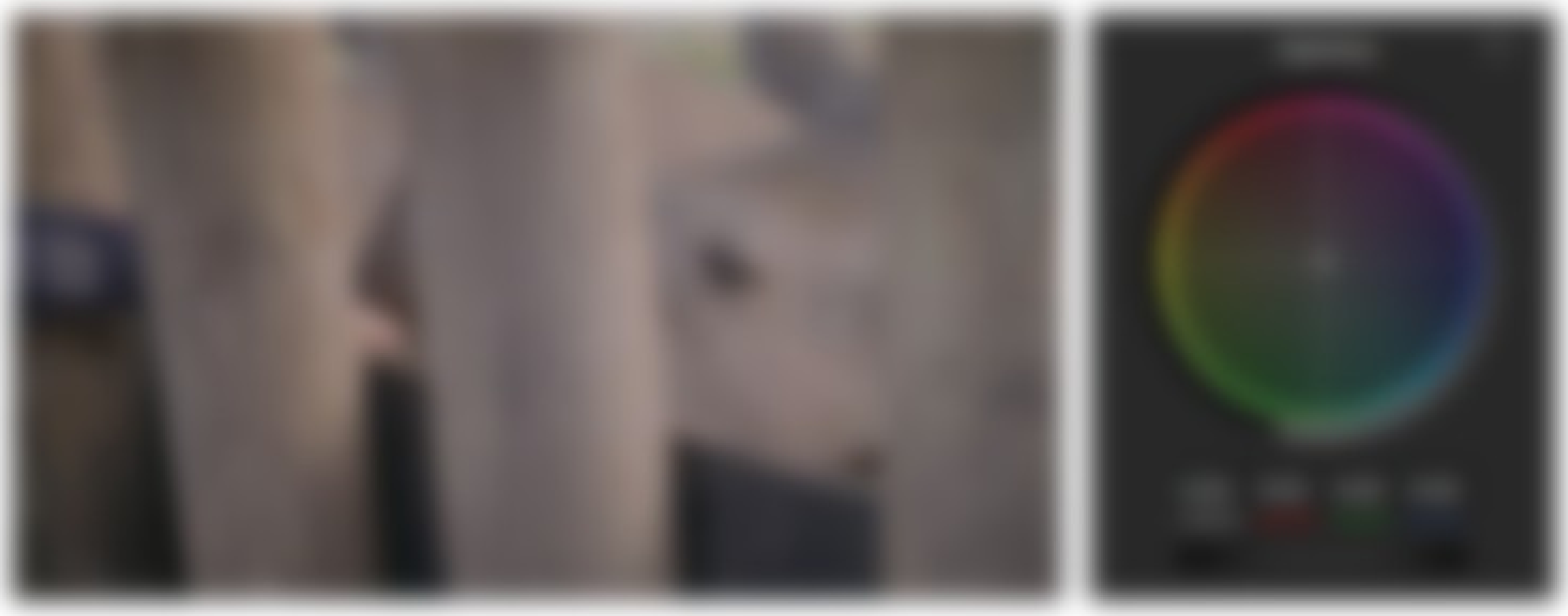
- You can use the Gain master wheel to affect the lighter areas of the image. The image has no chart or reference for pure white, but you could use the thumb in the image as a luminance guide. The highlights on skin should rest between [illegible] on the waveform graph. Drag the Gain master wheel so the tallest traces do not go higher than three fourths of the waveform graph.



This is an example of using image context for balancing and grade adjustment. In future exercises, you will continue to identify elements that you could use as guides for grading decisions.

With the shadows and highlight levels set, you may opt to adjust the brightness of the midtones.

- Drag the Gamma master wheel to the right to brighten the overall scene and enhance the details of the rhino's wrinkled skin.



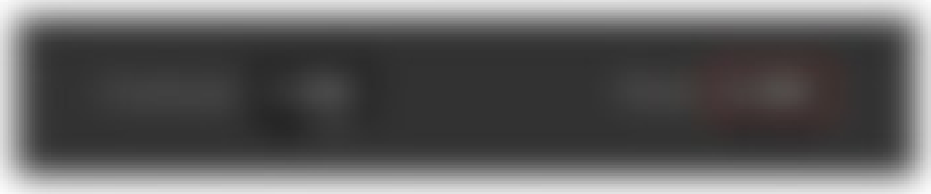
After establishing the tonal range, you can further enhance the image details. The master wheels affect the luminance [illegible] of the image, so you could use the contrast control to refine the distinction between the darker and lighter areas.

10. At the top of the Primaries palette, in the adjustment controls, drag the Contrast setting to the right to increase the level of detail in the skin and the wooden poles.

    Your image might start to look a little dark, but that's OK. At this stage, you should only focus on establishing the depth of the shadows and revealing details in the midtones.

11. To adjust brightness while maintaining the same level of contrast, drag the Pivot control next to the Contrast parameter.

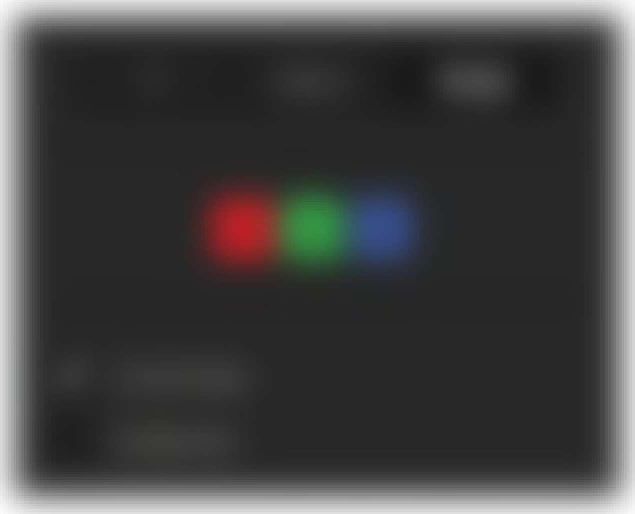
    The Pivot controls the contrast balance by placing more or less priority on either side of the tonal range. By pivoting to the left, you will increase the overall brightness and clarity of the image.

Balancing Colors with Master Wheels

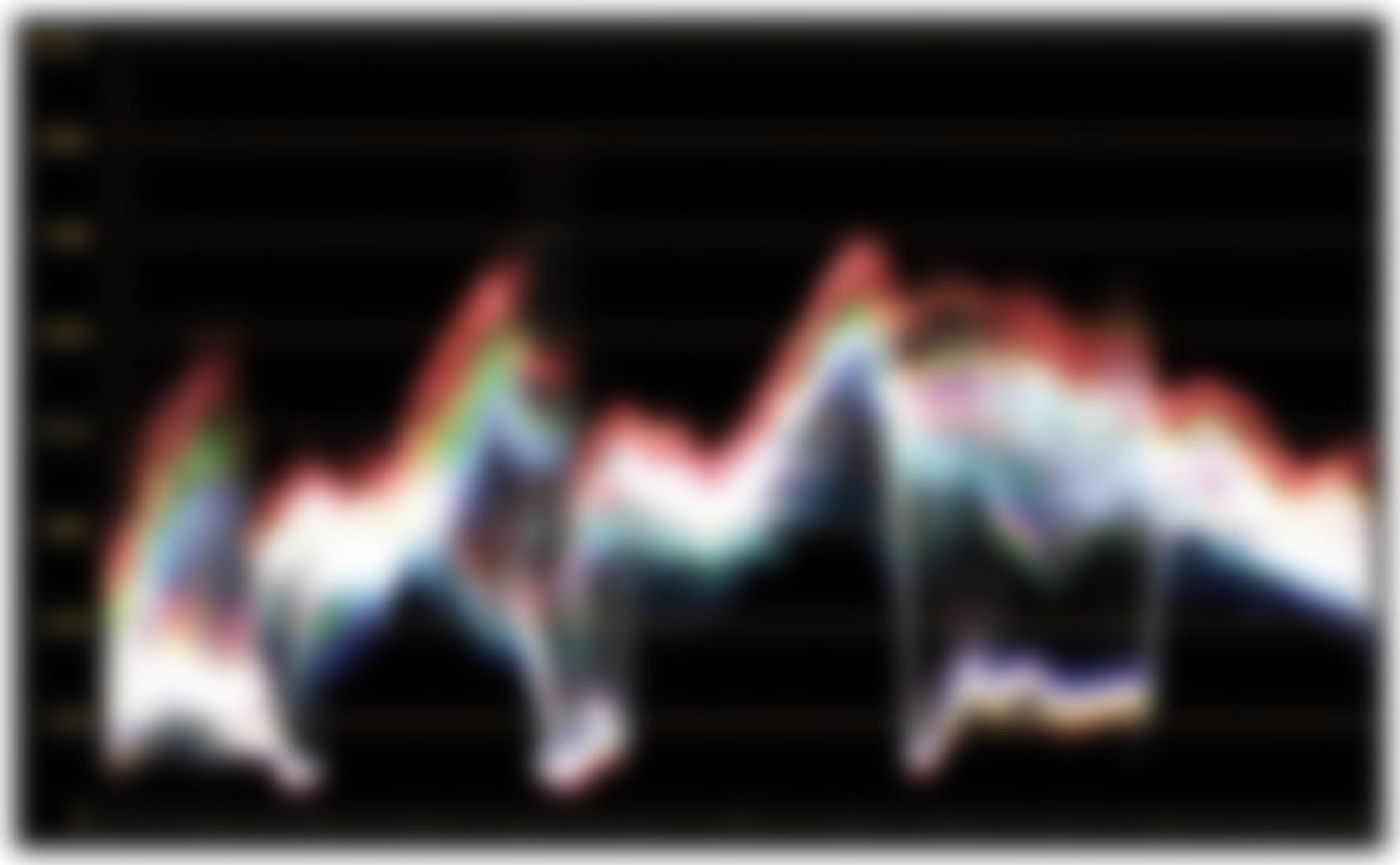
Finally, you will address the color imbalance in this image. This can be accomplished in several ways in DaVinci Resolve, with one of the most common being the color balance indicator within the color wheels. To help with balancing the image, you'll bring back the color channel readouts in the waveform scope.

1. In the upper right corner of the Scopes palette, click the Settings button.
2. Click the RGB channel button at the top and to enable the Colorize option.

    If necessary, activate the three RGB channel indicators.

- Click anywhere outside the Settings window to close it.



In the RGB waveform scope, there is a red section running across the top of the trace. This typically indicates a color imbalance. Since it is in the upper half of the graph, you will use the Gain wheel to correct it.

- Drag the Gain color wheel indicator away from red to reduce the red dominance in the waveform.

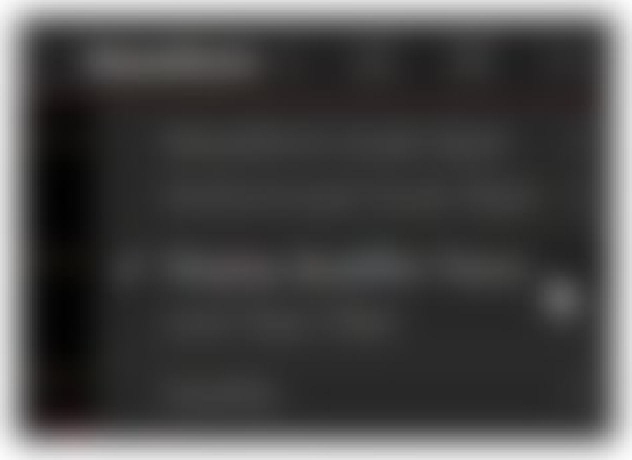
  Notice that when you drag the indicator too far, the image starts to turn cyan. One of the fundamentals of color balancing is that you neutralize colors by adding their complementary hue (in this case cyan to neutralize red). With correct balancing, the addition of the complementary color will produce neutral tones. But if pushed too far, the complementary color will start to show.

- Press Command-Z (macOS) or Ctrl-Z (Windows) to undo the Gain color wheel adjustment but keep the recent Gain luminance adjustment.

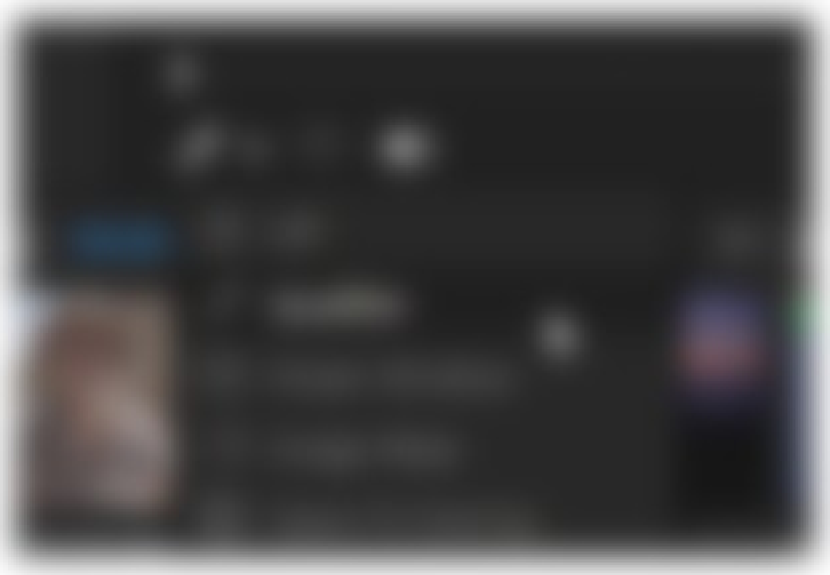
NOTE The undo function is isolated to each clip in the timeline. When you undo, only the changes from the selected clip are removed, and not from any other clips on the timeline, even if you graded them more recently.

One of the unique challenges of this shot is that there are many naturally red elements in it—the wood posts and fence, and the earthy ground in the back. This can create the perception of color imbalance in the waveform. To balance the image without being distracted by these red elements, you need to find neutral surfaces in the waveform and focus on balancing them only. You'll use the Qualifier Focus to help you find these surfaces.

- Click the Scopes palette options menu.
- Select Display Qualifier Focus.

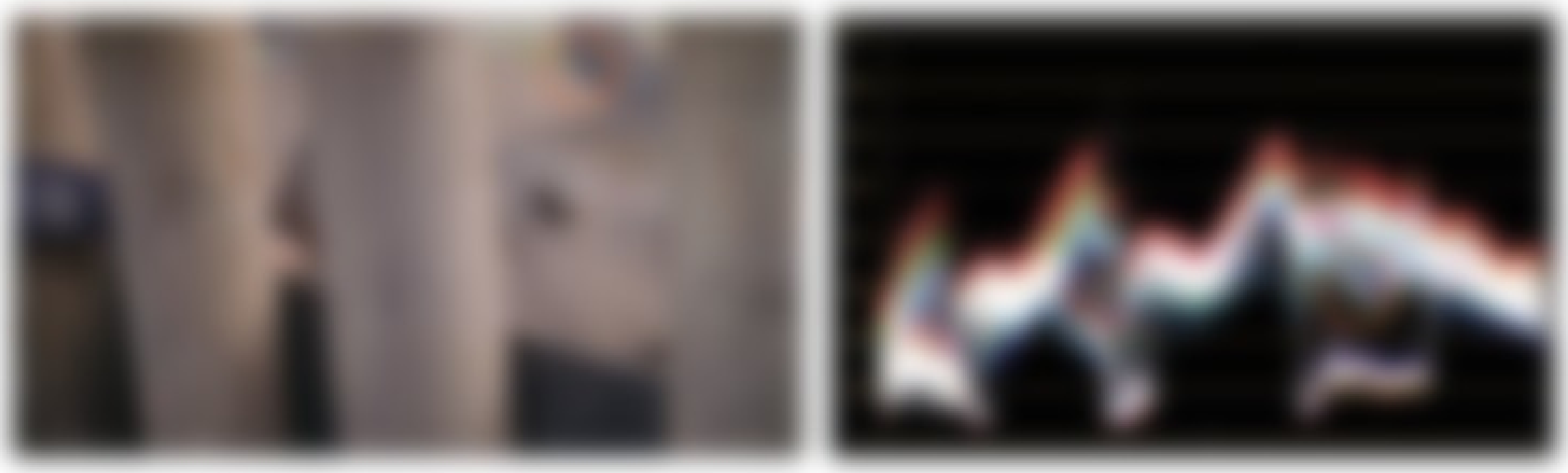


- Ensure that the viewer's onscreen control menu is set to Qualifier.

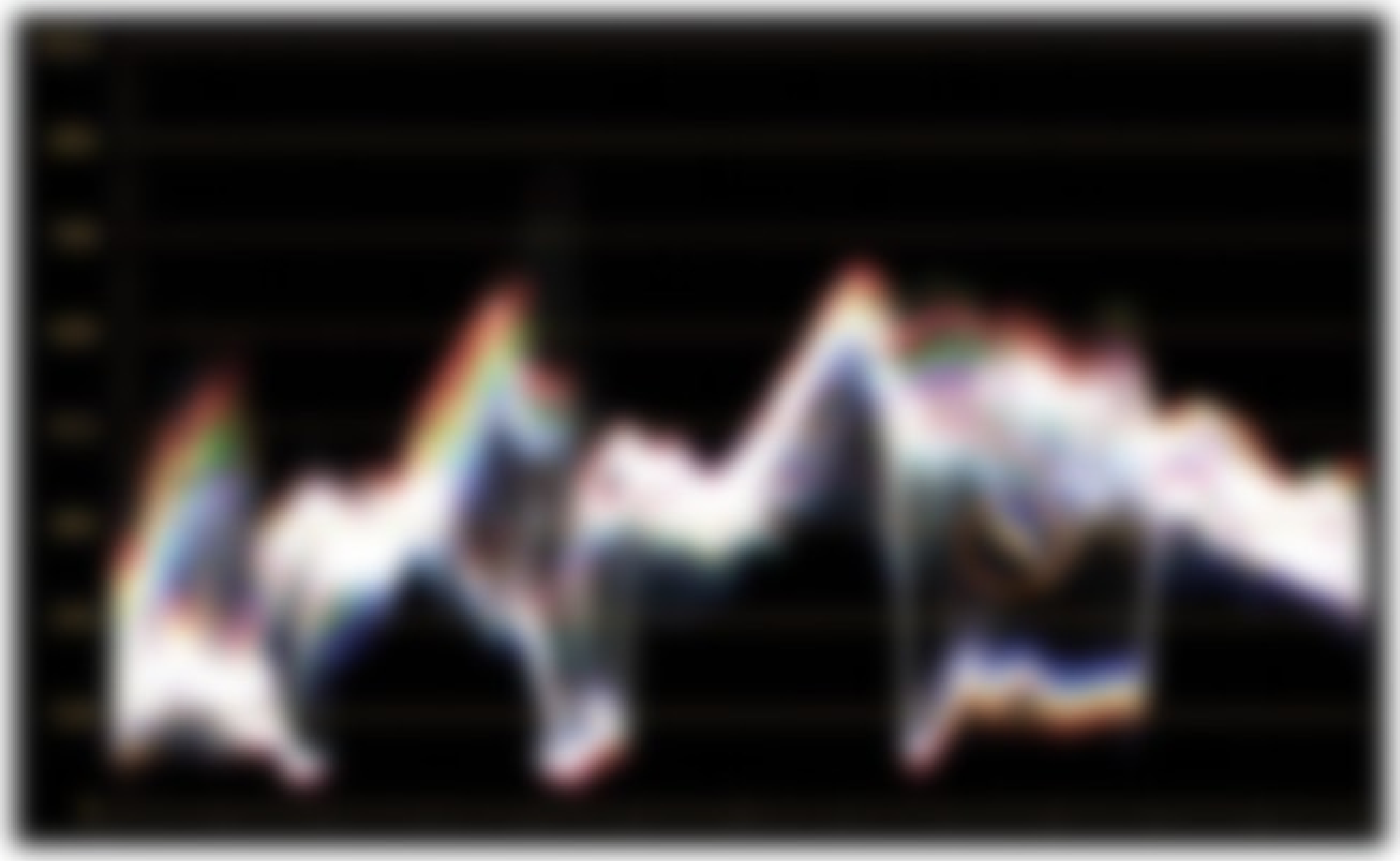


When you move your mouse in the viewer, you should now see red, green, and blue circles hovering around the waveform, showing the values of the pixels directly under your mouse pointer.

Find a surface that you would reasonably expect to be neutral in the image and find its corresponding position in the waveform. In this case, the underside of the church eave is a safe choice.



[illegible] Drag the Gain color wheel indicator away from red until the channels in that section of the waveform overlap to produce a white trace.



[illegible] Press Command-D (macOS) or Ctrl-D (Windows) to toggle the grade on and off. Compare your before and after results to evaluate how the primary tonal adjustment and balance affected the image. Tweak the values if the grade appears overpowering.

Ungraded

Graded

TIP Another way to disable/enable node grades is by clicking the number of a node in the Node Editor.

The grading process usually requires some back and forth tweaking of palette values while monitoring the waveform. Some changes will offset the effects of prior adjustments – like how dragging the Gain master wheel raised the lower midtones – while others might require an occasional reset while you find the optimal reference points for tonal distribution and balancing. Iteration is a completely natural part of the grading process, and you will find that you get faster as you get more practice.

Using the Mini Panel – Offset Mode

Whereas the DaVinci Resolve 15 interface shows four wheels within the Primaries palette (Lift, Gamma, Gain, and Offset), you'll notice that the hardware-based Mini Panel has just three trackballs and rings. To access the Offset wheel functionality, press the Offset button directly above the Gamma trackball. When the Offset button is illuminated, the Gain trackball and ring control the Offset color and master wheels.

Additionally, when Offset mode is enabled, the Lift and Gamma wheels are mapped to control temperature and tint, respectively. To return to the default layout, press the illuminated Offset button again. When it no longer lights up, your trackballs and rings will return to controlling Lift, Gamma, and Gain.

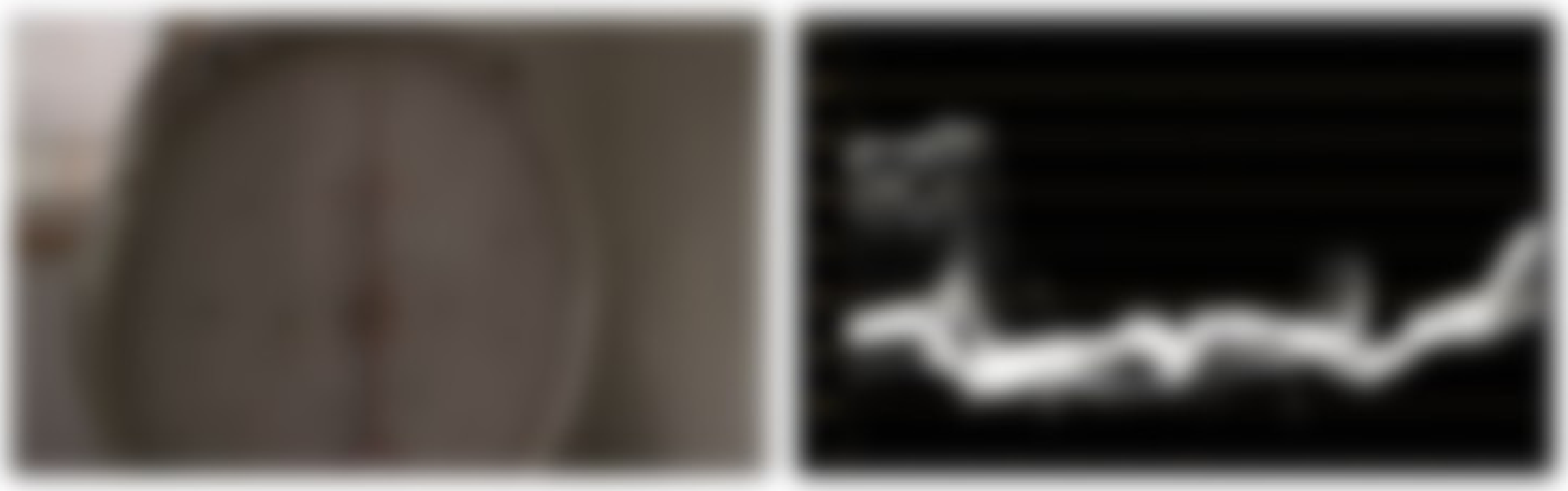
Precision Grading with Curves

Curves are another major grading tool used to perform primary and secondary adjustments. Whereas the wheels target the tonal ranges of an image, the curves affect the intensity of an image's luminance or RGB color channels. The application of custom control points also means you can manipulate the image with far greater precision and flexibility.

Setting Contrast with Increased Flexibility

As in the previous exercise, you will begin by setting the tonal range and contrast of the image. Curves will allow you to do this with finer control over the luminance range and allow for customizable contrast.

1. Select clip 03, which shows an image of a scale.
2. Open the Waveform settings and click the Y button to view the luma waveform.
3. Enable Colorize for a clearer view of the luminance values of the image.

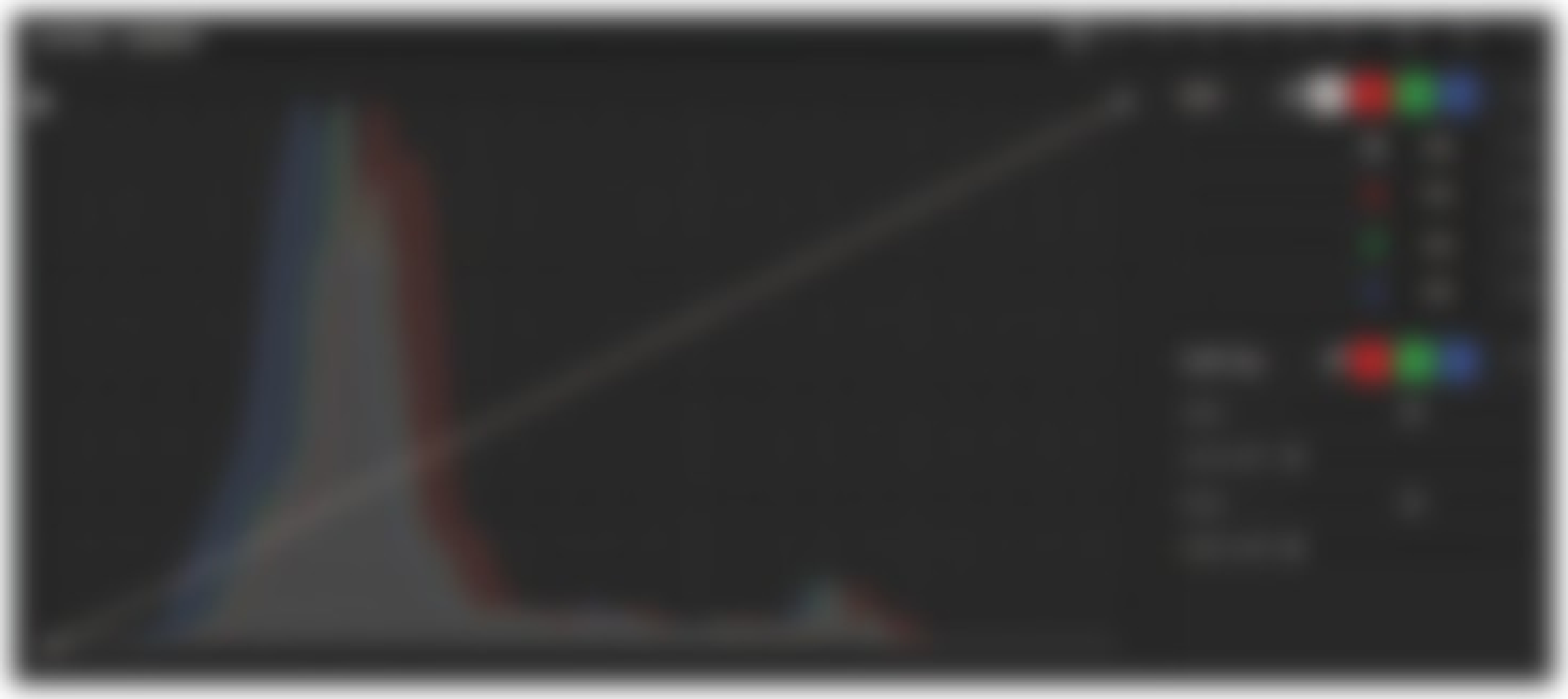


Because the colors in the image are flat, most of the waveform trace is condensed in the lower midtones. A significant elevation appears on the left, where there is a window behind the scale, and to the right there is a short peak where the light reflects off the plastic rim.

4. Choose Workspace > Viewer Mode > Enhanced Viewer or press Option-F (macOS) or Alt-F (Windows) to enlarge the viewer.

The Clips timeline and surrounding palettes collapse, dynamically enlarging the size of the viewer panel. The image is now much easier to see for grading work.

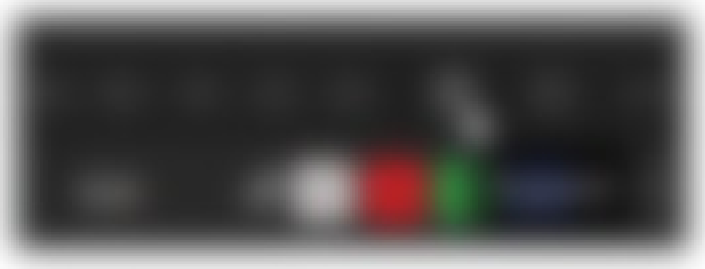
5. Ensure that the Curves palette is active in the central palettes of the color page.



The lower left of the curve graph represents the blackest potential point of the image and the upper right represents the whitest.

The horizontal axis allows you to target any luminance (or hue or saturation, in other HSL curve configurations) section of the image, while the vertical axis allows you to offset that section. By raising or lowering the two control points at either extreme of the curve, the black point and the white point, you can manipulate the luminance distribution of the image.

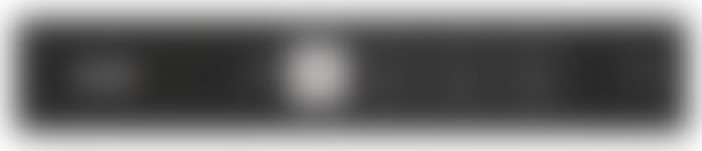
- For finer point control, turn the Curves palette into a floating window by clicking the Expand button in the upper right corner.



To move the window, drag the header. To resize the window, drag the sides and corners.

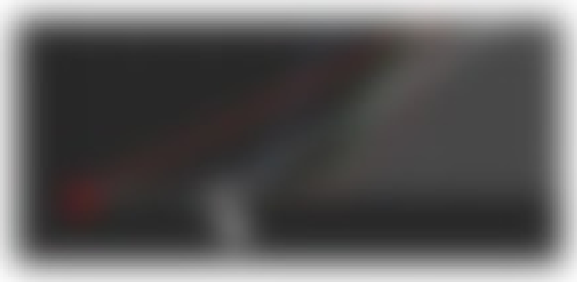
By default, the luminance curve (Y) is ganged to all three color channels (R, G, B). When working with a YRGB curve, as well as affecting the brightness of the image, you will also be impacting saturation.

- Click the Y channel button to ungang the channels.



Now you will only be altering the image luminance.

- Drag the black point of the Y curve across the floor to the right.

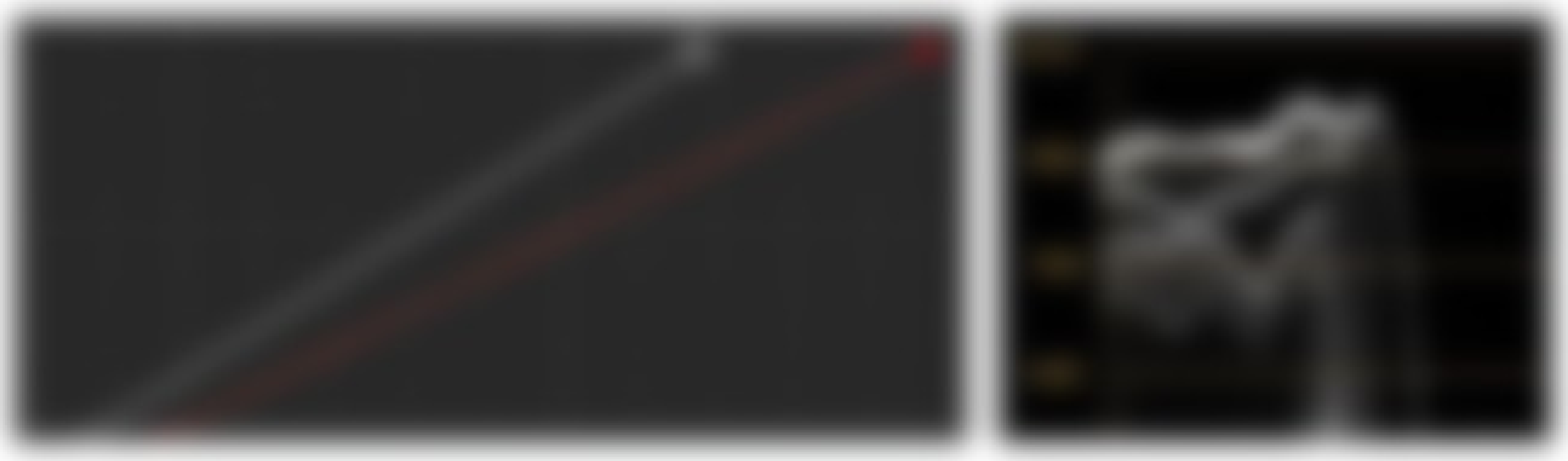


Doing so lowers the waveform of the image linearly, darkening the shadows more than the highlights.

- Stop dragging the control point when the bottom of the trace is still above the 0 line of the waveform graph.

[illegible] To raise the top of the waveform, drag the white point across the top of the graph.

Normally, you'd stop when the top of the trace touches the second horizontal line in the waveform graph (around 896), but because the part of the trace represents a very bright window in the video clip, it makes sense to continue raising it until the trace is about halfway between the top horizontal lines on the graph.

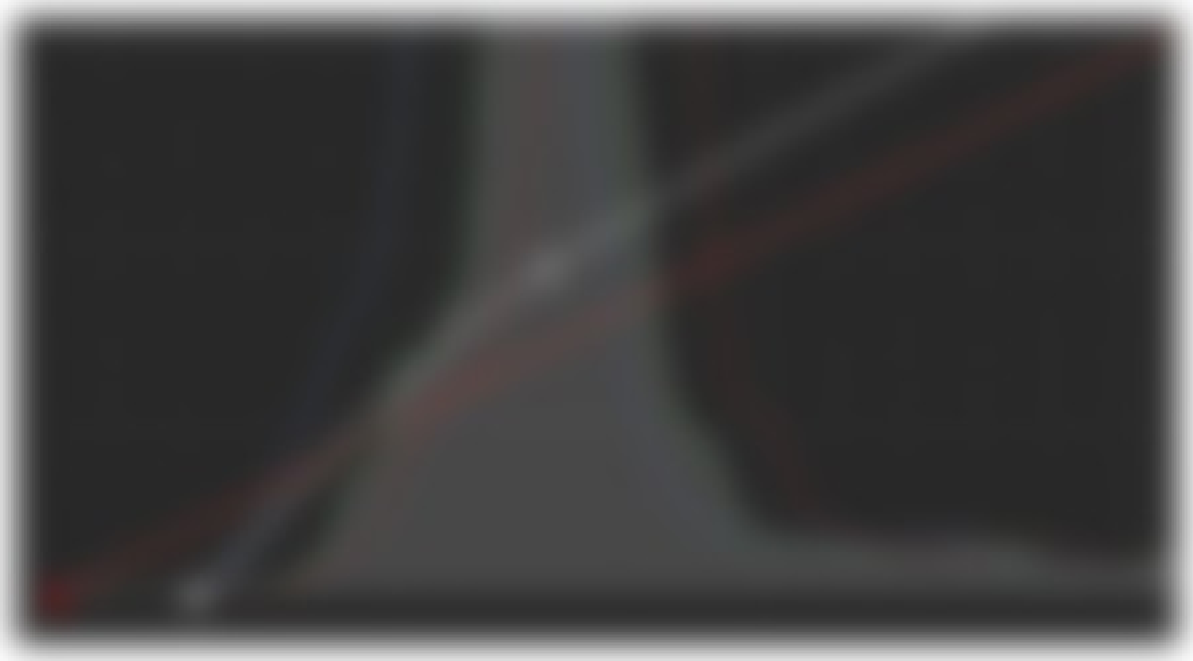


You can add more control points to the curve to manipulate the midtones of the image. Let's isolate the lower midtones that appear too dark after performing that black point adjustment.

[illegible] Click the lower half of the curve to create a new control point that will target the lower midtones.

TIP When creating a control point, Shift-click to prevent the curve from moving to the position of the mouse pointer.

[illegible] Drag the control point up to raise the lower midtones and brighten the face of the cook.



Many colorists prefer setting the tonal range using curves because curves offer much finer control over luminance and allow for customizable contrast.

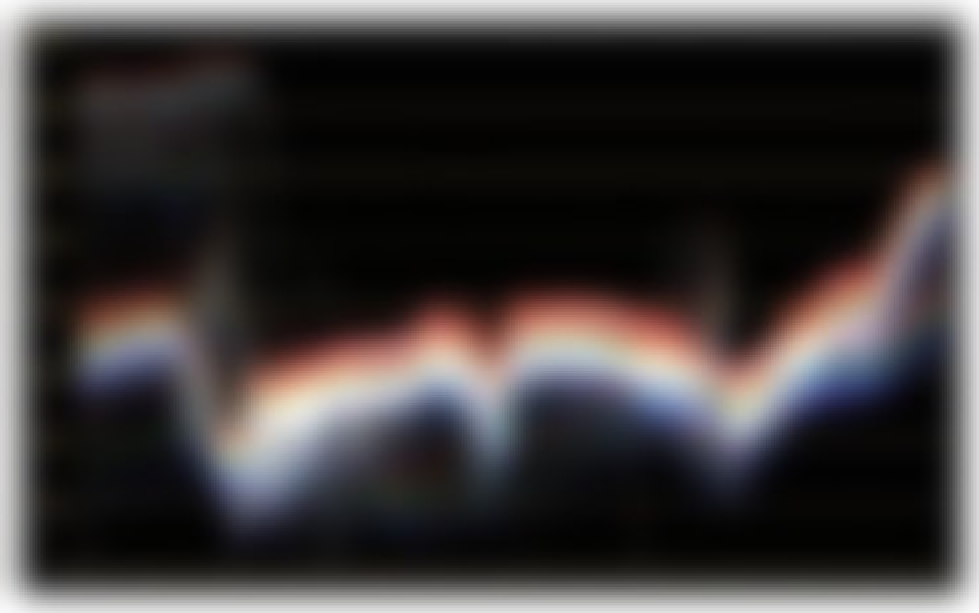
[illegible]

[illegible]

Color Correcting with Curves

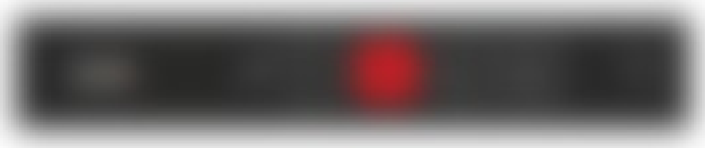
You can use custom curves with dedicated control points to individually manipulate the three color channels at precise levels of the channel intensity.

1. Open the Waveform settings and click the RGB button.
2. Select the Colorize checkbox to review the individual color channels in the Waveform trace.

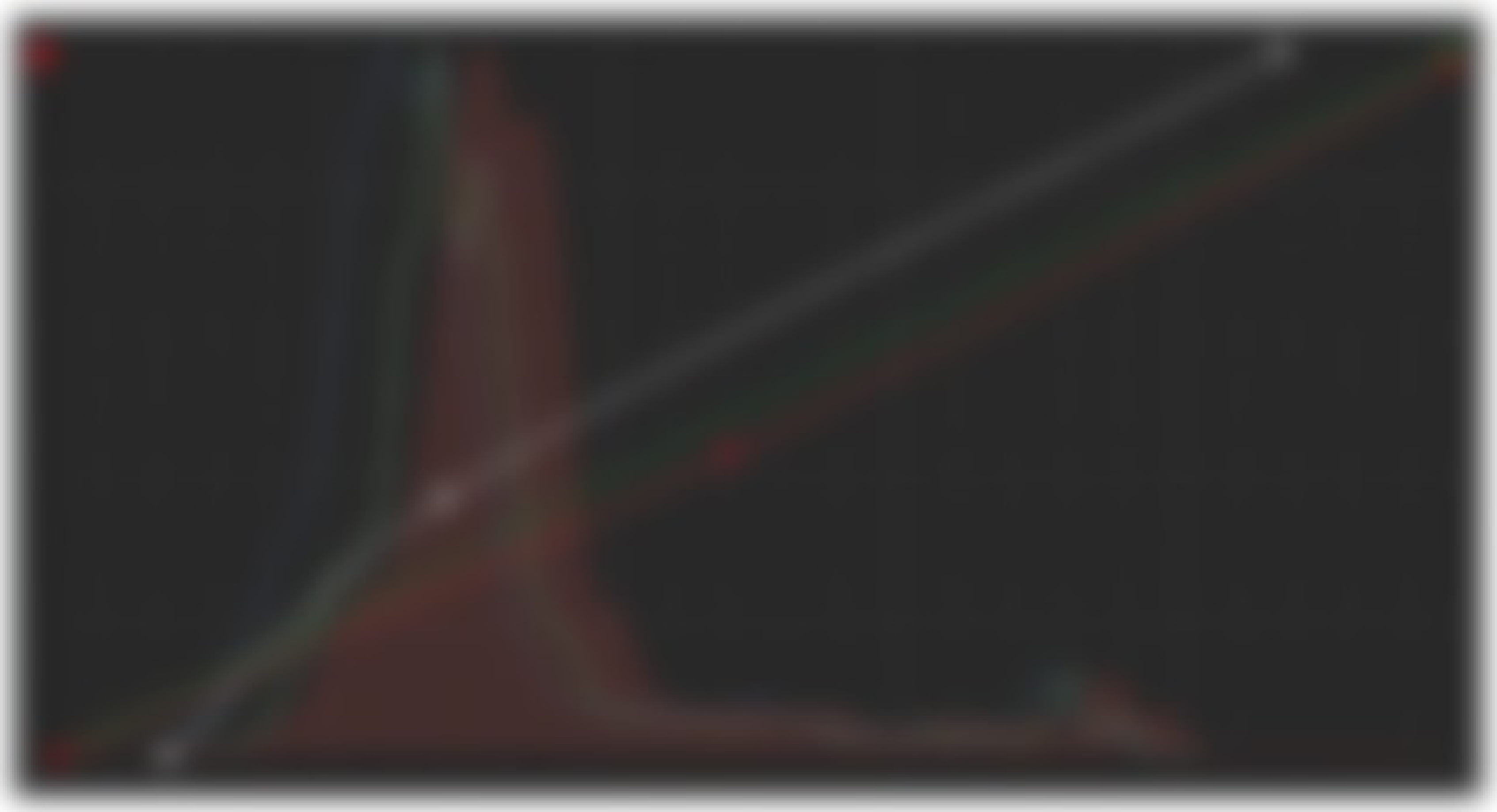


The red channel appears elevated above the other channels, which gives the image a slightly warm appearance.

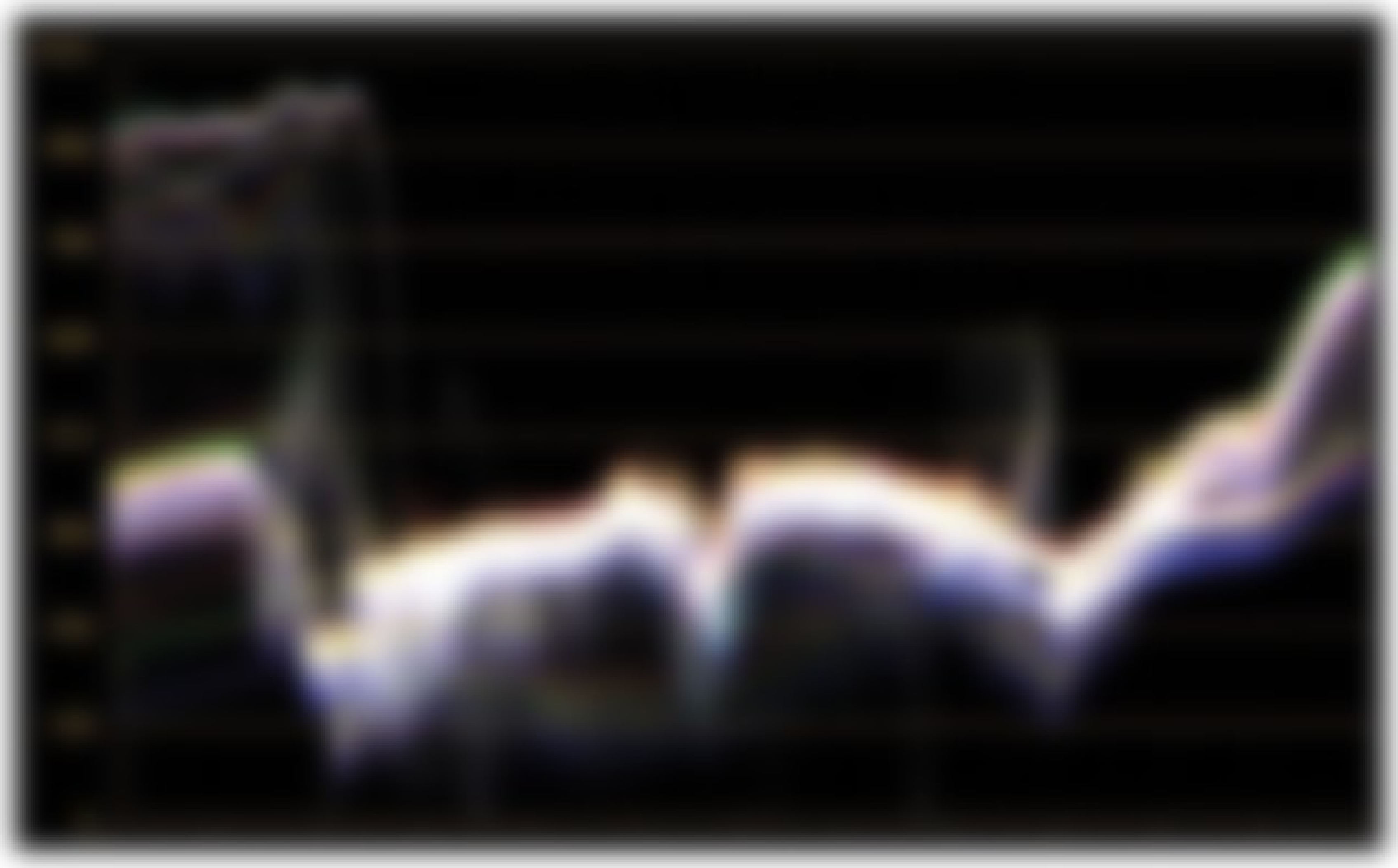
3. In the Curves palette, click the red (R) button to isolate the red channel curve.



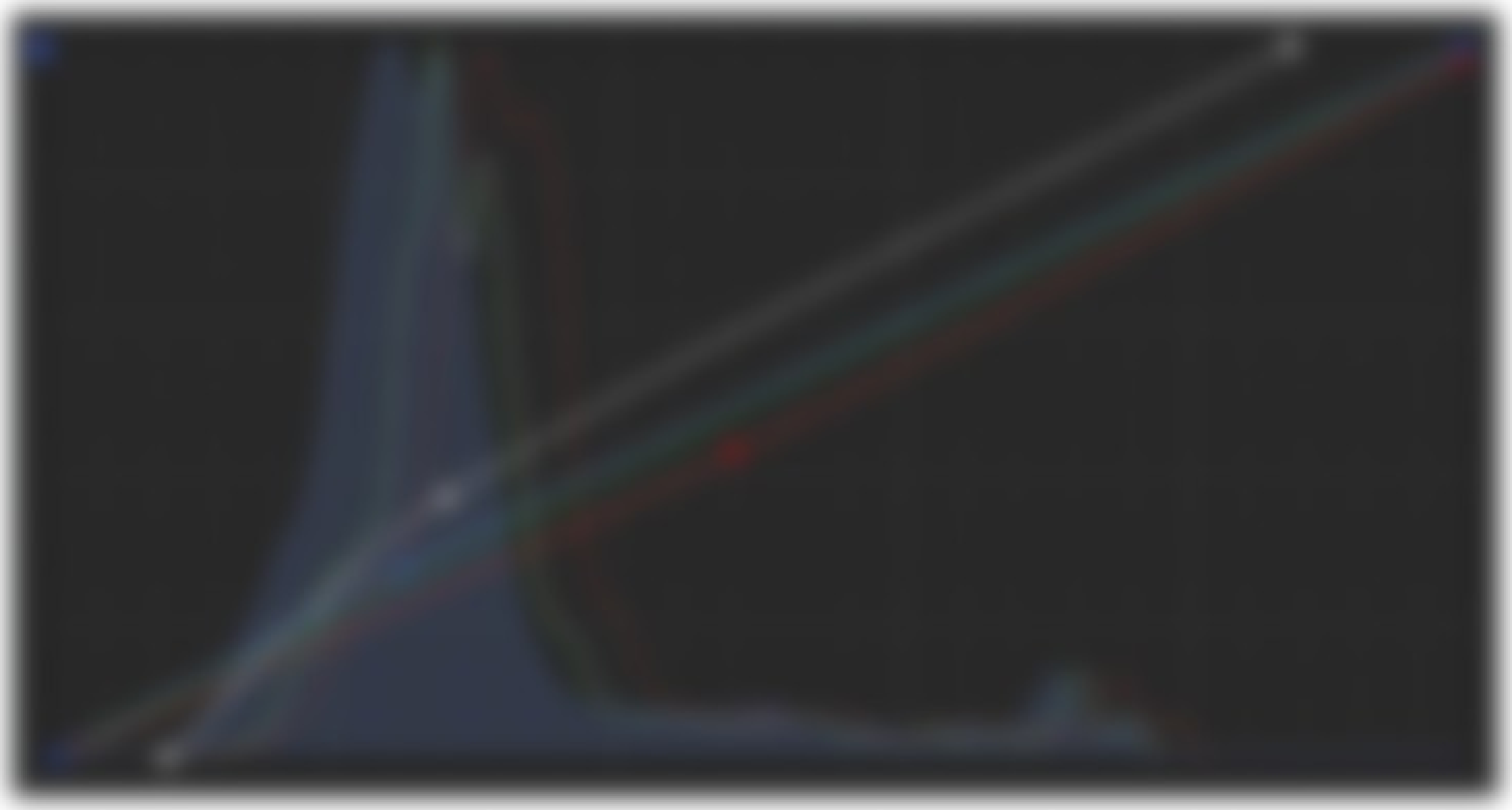
- Click the top of the red curve and drag it downward. Pay attention to the waveform and drag until the red highlight overlaps the blue and green channels, resulting in a white trace along the upper edge of the graph.
- Create a second point on the red curve to perform the same action in the midtones. Drag downward until the lower half of the trace appears white.



Although the red tint is corrected, the image now has a mild yellow tint because the blue channel has less presence in the highlights and midtones.



- Click B to isolate the blue channel.
- Click the center of the blue curve line to add a control point and drag it up until the midtones in the waveform are aligned.



- Press Command-D (macOS) or Ctrl-D (Windows) to disable the color adjustments and then re-enable them to review the corrected image.

  With the luminance of the overall image altered, you could opt to return to the Y curve and further adjust the tonal range and contrast of the image, if necessary. When you're satisfied with your work, press the X in the upper-left corner of the expanded Curves palette to collapse it.

- Choose Workspace > Viewer Mode > Enhanced Viewer or press Option-F (macOS) or Alt-F (Windows) to collapse the viewer back to its original size.

  You have now learned how to operate the two most essential primary grading tools in the colorist's arsenal. Throughout the remainder of this book, you will refine your understanding of these tools and their variants, combine them with secondary tools and effects, and further hone your primary grading abilities.

Using the Mini Panel – Curves

You can use the Mini Panel to control curves with the help of preset points at your fingertips. Enter Curves mode by pressing the Curves button in the upper left of the Mini Panel. If you've already selected a specific curve tool using your mouse, the Mini Panel will jump to that tool. Otherwise, the Mini Panel will open the custom curves interface.

The curves tools provide an excellent way to explore the versatility and functionality of your Mini Panel. You may activate every major curve type featured in DaVinci Resolve using the soft buttons above the 5-inch screens. The knobs below those screens allow you to control specific points of the currently activated curve. For custom curves, intervals of 0%, 20%, 40%, 60%, 80%, and 100% may be adjusted. This functionality allows you to control more than one curve point at once, which will save time, increase your grading efficiency, and allow you to make more creative color grading decisions.

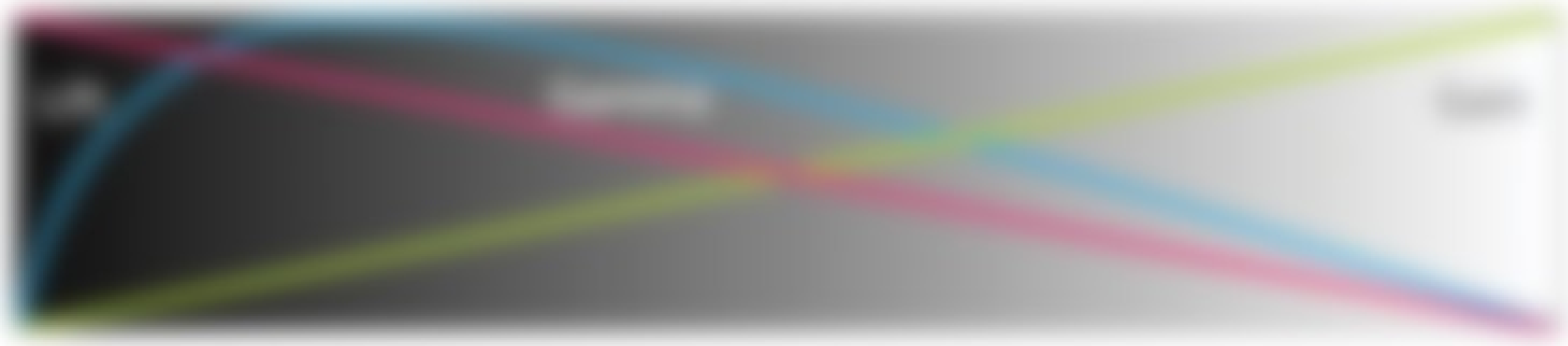
Comparing Color and Log Wheels

Before working on the next clip, let's take a slight detour to understand another function that can be a fundamental part of primary grading and balancing: the log wheels.

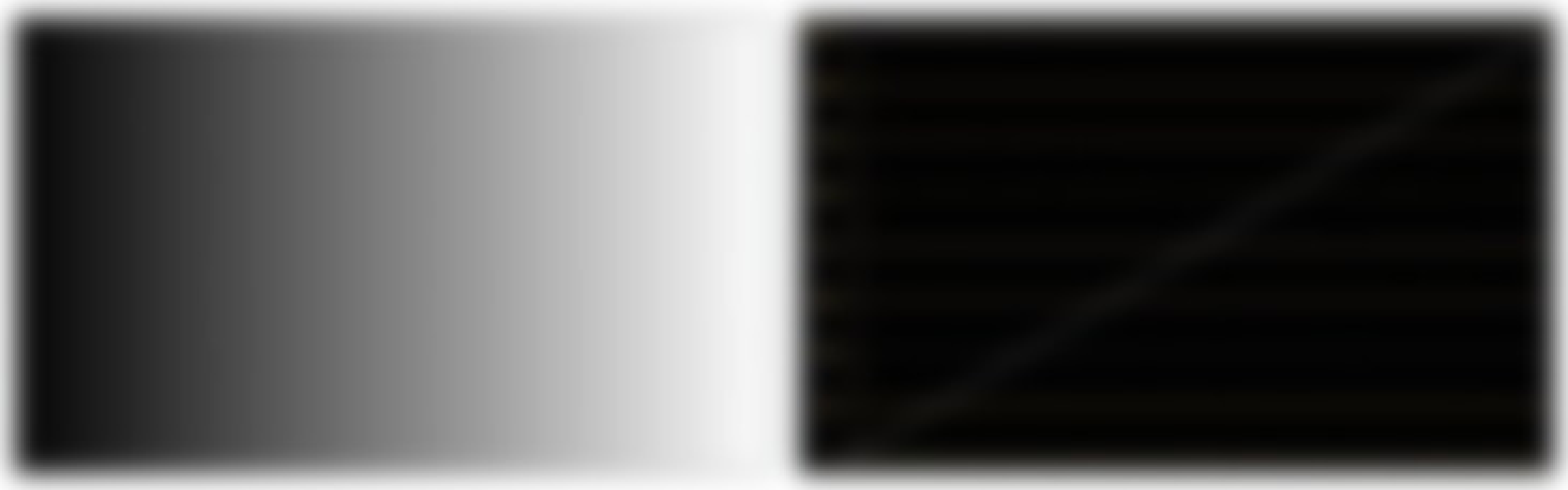
It's easier to grasp the differences between the Primaries color and log wheels by observing a graphic example. Let's use the simple gradient at the end of the timeline and manipulate its brightness to compare how the two adjustments differ.

1 Select the last clip in the timeline (the grayscale image).

In the standard Primaries color wheels that you are familiar with, the Lift, Gamma, and Gain wheels target the luminance range as seen in the following figure.

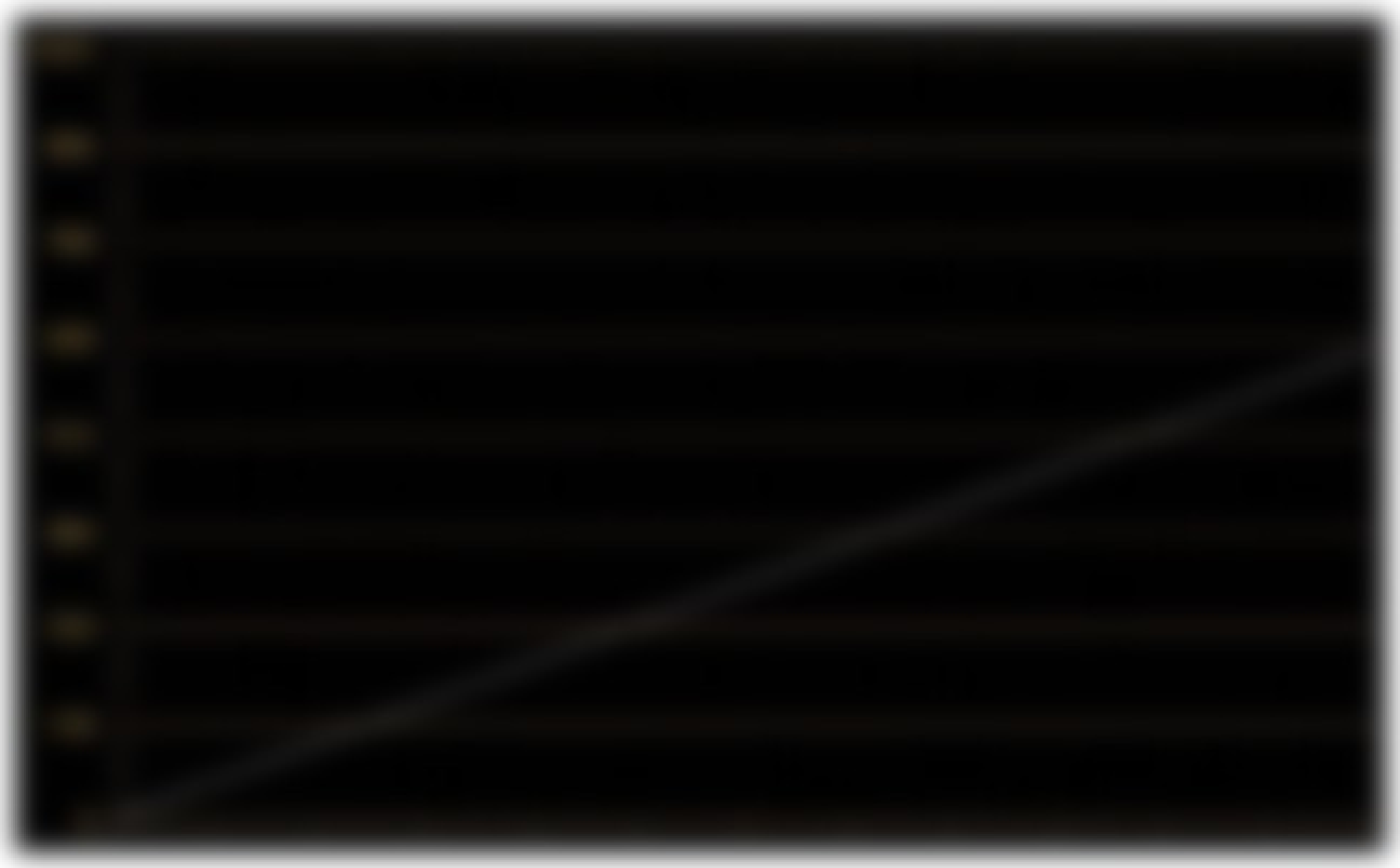


A wide overlap occurs between the segments. When you try to manipulate the highlights of the image using the Gain color or master wheels, the change also substantially affects the midtones, and even the darker sections of the image.



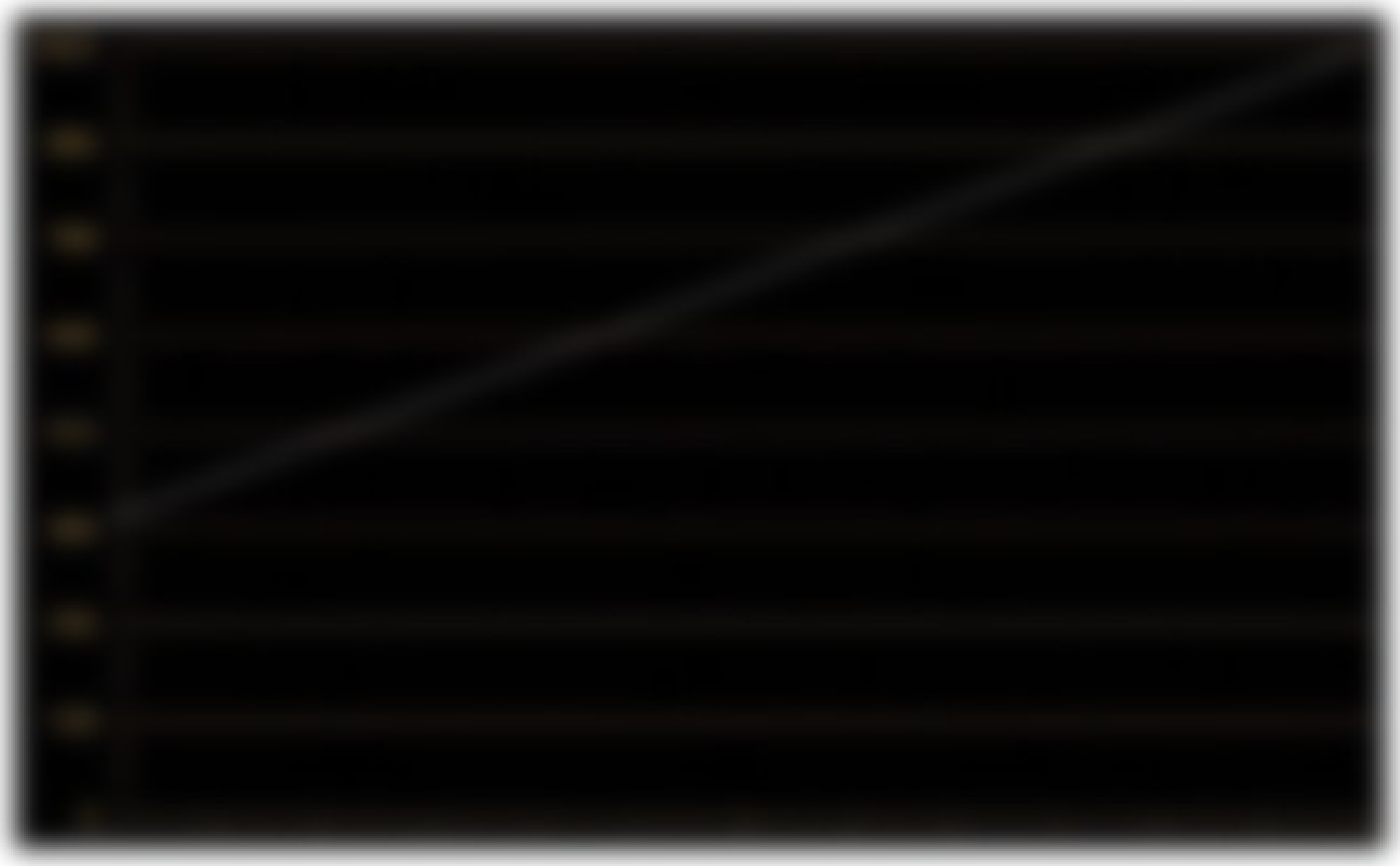
The waveform scope displays the gradient graphic as a flat diagonal line extending from left to right from 0 to 1023, indicating its linear transition from black to white.

- Drag the Gain master wheel to the left to darken the upper ranges of the gradient.



In the waveform, the top of the line moves freely while the bottom of the diagonal line remains connected to the black point. In the viewer, the lightest part of the gradient is affected most severely, with tapered, but still substantial, impact visible on the remainder of the luminance range.

- Reset the Gain master wheel.
- Drag the Lift master wheel to the right to brighten the lower ranges of the gradient.

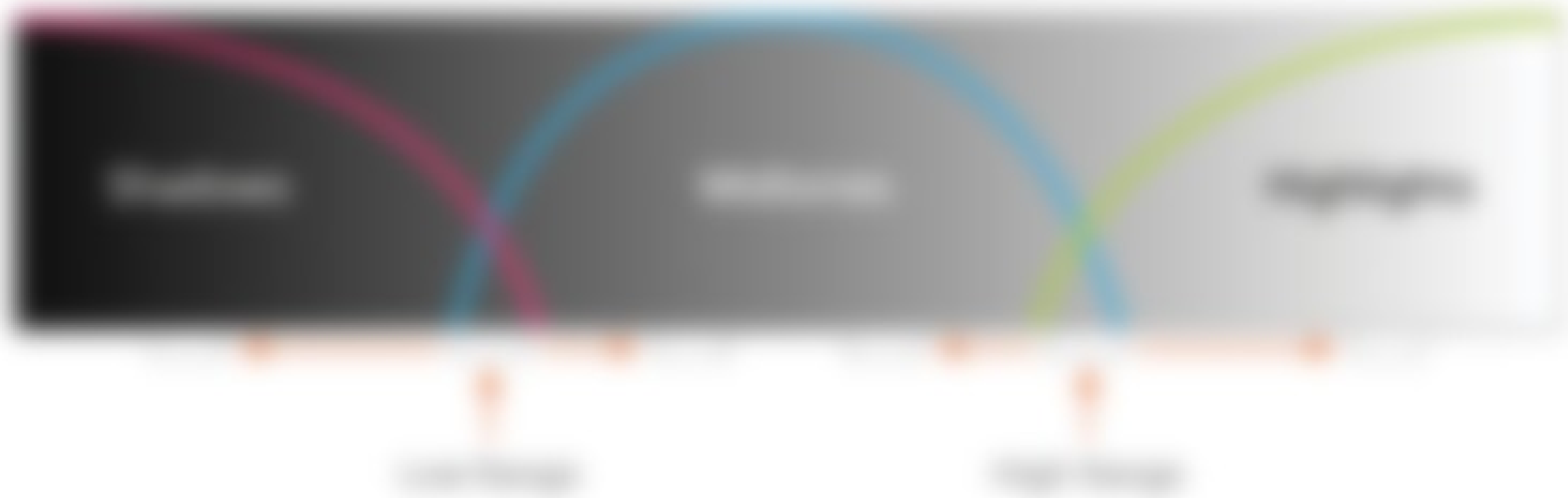


In contrast to the Gain wheel, most of the Lift wheel's impact is on the darkest portion of the gradient, with the effect tapering off linearly as it reaches the top of the waveform.

This symmetry of motion and broad overlap allows for nice, smooth application and transition of colors, even when working on dramatic grades. These tonal ranges are ideal for the "Basic" treatment of footage and organic-looking color changes.

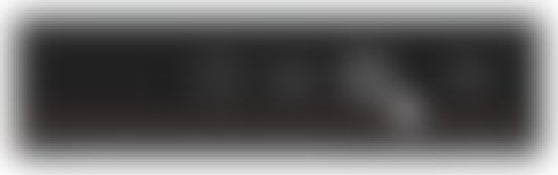
- Reset the Lift master wheel.

When working with log wheels, the tonal ranges are more restricted to their respective sections.



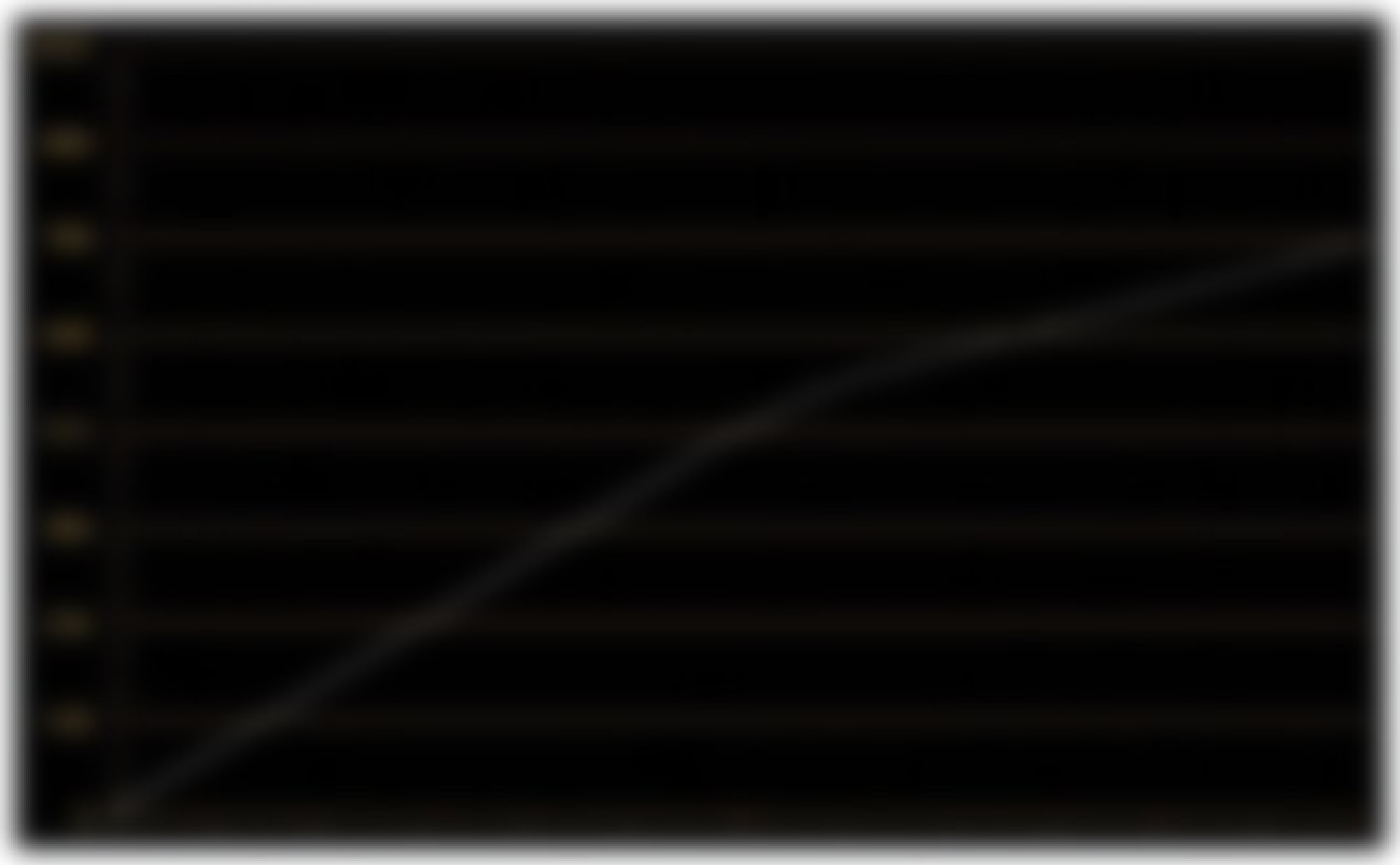
Manipulating the image highlights will have very little impact on the rest of the luminance because of the small amount of overlap between the highlights and the midtones ranges.

- In the upper right of the Primaries palette, press the rightmost icon in the list of primaries tools to launch the log wheels.



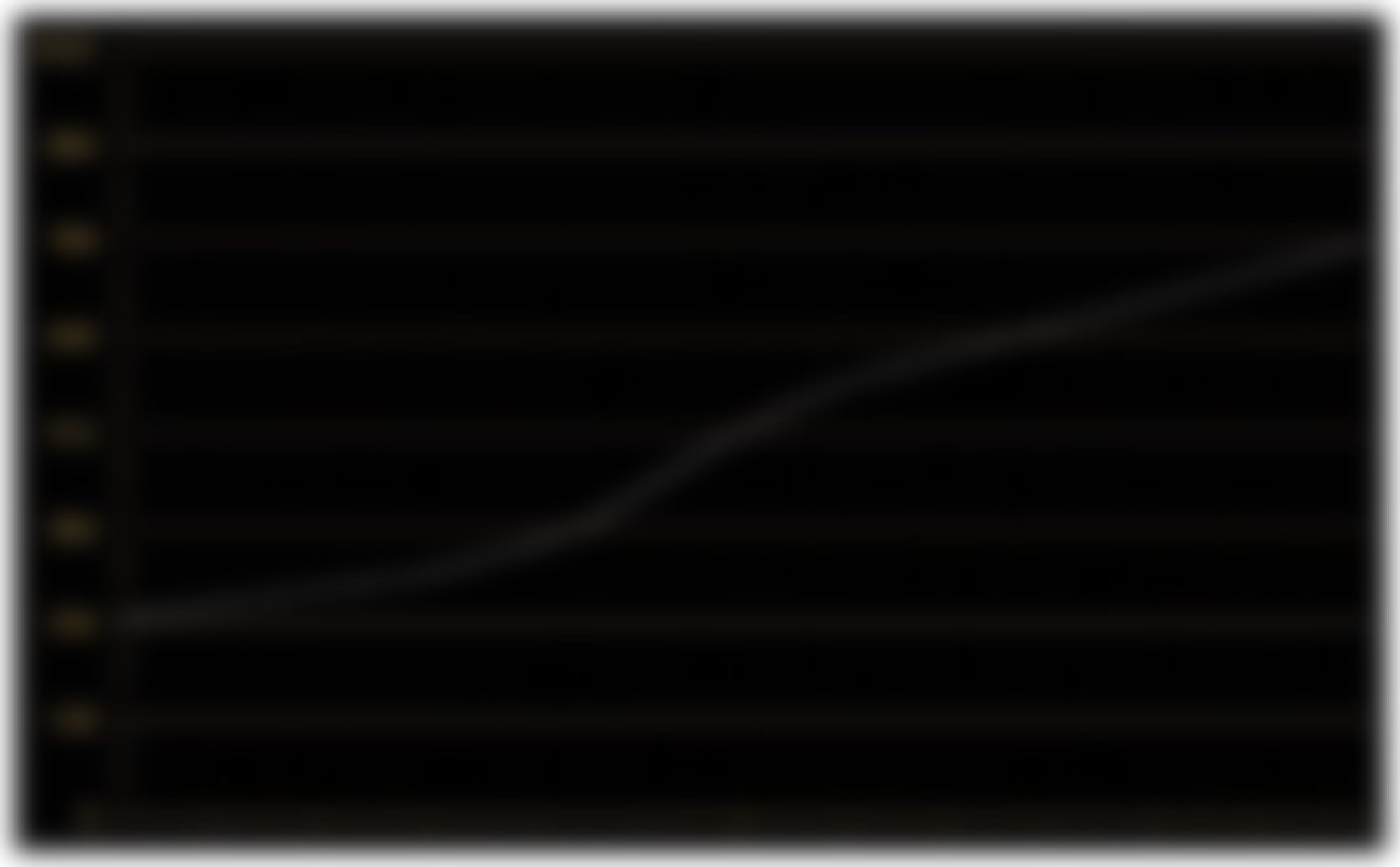
On the surface, this interface looks almost identical to the color wheels. However, adjustments to the shadows, midtones, and highlights react very differently.

- Drag the Highlight master wheel to the left to darken the highlights of the gradient.



The upper half of the waveform bends until it is horizontal, but this has no impact on the shadows. This behavior is reflected in the viewer, in which the lightest portions of the gradient are darkened, while the midtones and shadows remain the same.

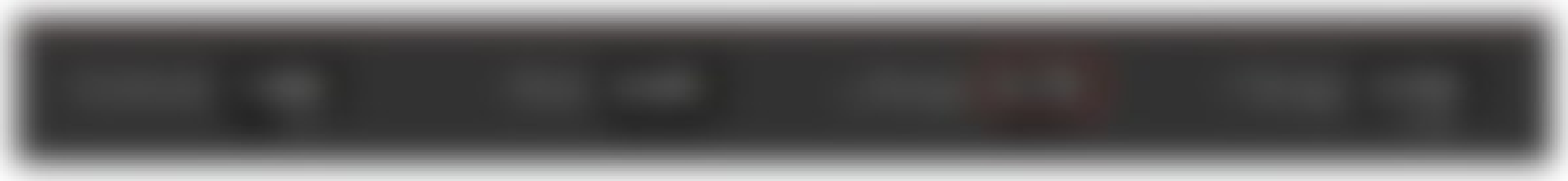
- Drag the Shadow master wheel to the right to brighten the dark ranges.



This time, the lower third of the line rises until it is parallel to the horizon.

With the waveform in this position, it's easy to see how you can affect the overlap between the shadows and midtones (low range) and the midtones and highlights (high range).

- In the log adjustment controls, drag the Low Range value left to move the shadow segment of the waveform lower, thereby extending the midtones range.



- Drag the High Range value right to narrow the highlight section at the top.

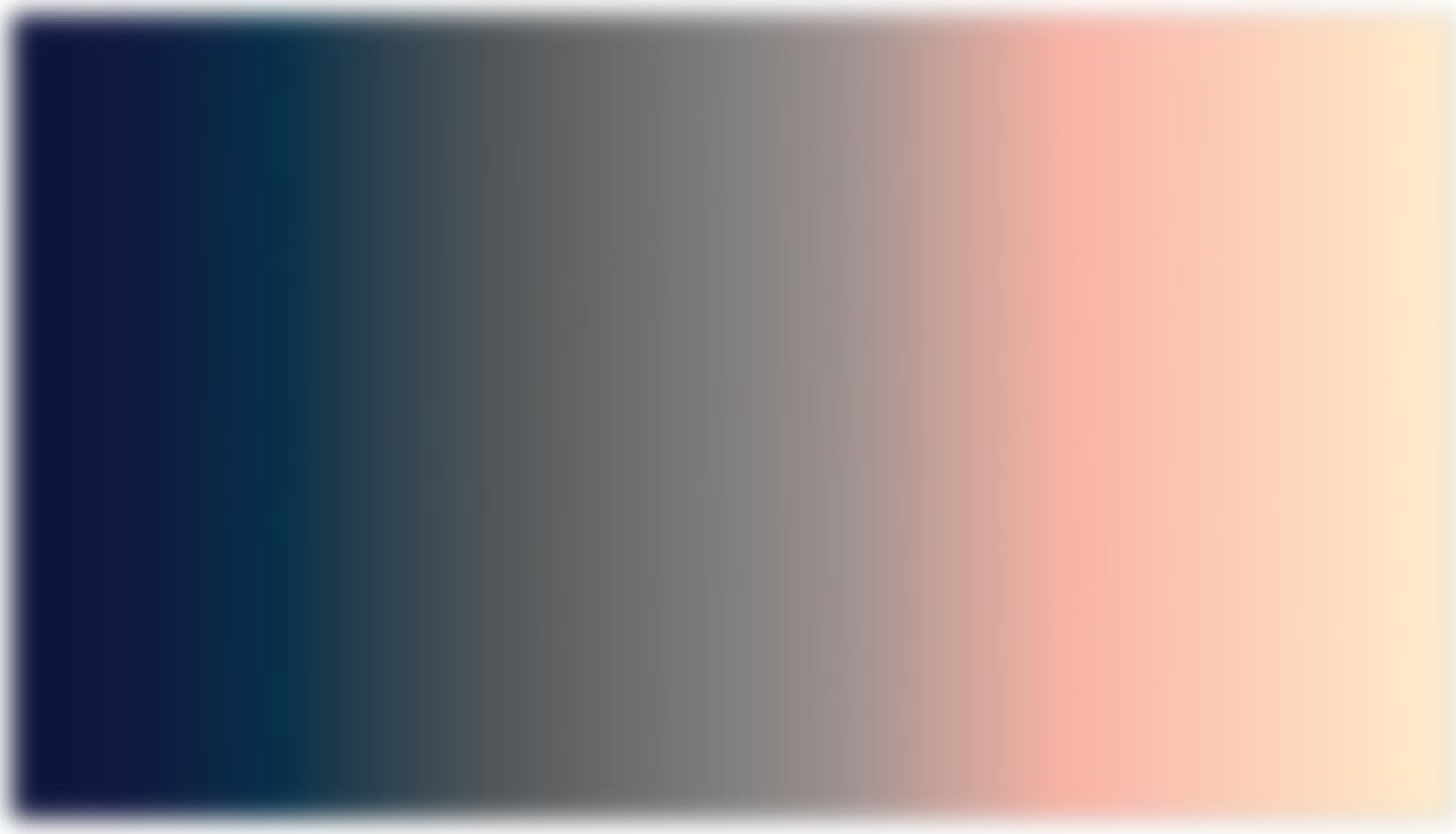
  You can also use the gradient image to explore the behavior of color among the different wheel modes.

- Press the global Reset All button in the upper right of the Primaries palette.
- In the Primaries color wheels palette, drag the Lift color indicator toward blue and the Gain toward red to create a dual-tone gradient.

  This produces a pleasing transition from the black to the white point of the gradient.

- Reset the Primaries palette.

[illegible] In the Primaries log wheels palette, drag the Shadow color indicator toward blue and the highlight toward red.



In this case, there is a clear separation between the adjustments made within the tonal ranges, with a still unaffected segment in the middle that describes the midtones.

[illegible] Reset the Primaries palette.

The Offset wheel affects the luminance of the image uniformly, no matter which Primaries palette mode you are in.

[illegible] Drag the Offset wheel to the right to lighten the gradient evenly.

[illegible] Switch from the log wheels to the color wheels palette and note that the Offset values have remained the same.

The tool is not only identical in both modes but is actively linked, so any change you make will be visible in the Offset wheel of either mode.

[illegible] Reset the Primaries palette.

You can also explore the Contrast parameter and gain a better understanding of what the Pivot does.

Drag the Contrast parameter to the right until you reach the maximum value of 2.0.

This will practically diminish the gradient to just two values: black and white.

Drag the Pivot parameter to redefine the contrast balance.

When looking at this simplified interpretation of contrast, it's easier to understand what the Pivot is doing – it is defining the central or "middle gray" value for the Contrast curl. When Contrast is reset to 1.0, the Pivot parameter does nothing because the highlights and shadows of the image have not been inversely affected.

For now, we will use it as a creative grading adjustment, but in later lessons, we will start to look at the importance of understanding and maintaining true middle gray.

TIP Gradients and color bar graphics can be useful for checking the behavior of various tools and effects in DaVinci Resolve. They can be added to the timeline from the edit page's Effects panel. Open Toolbox > Generators, drag any generator graphic onto the timeline, and then turn it into a compound (right-click > New Compound Clip) to see it in the color page timeline.

Log wheels can be extremely useful when you're attempting to change the brightness or hue of a narrower tonal range. The next exercise will demonstrate a practical use of switching between color wheels and log wheels.

Restoring Shadows Using Log Wheels

With a better understanding of how you can target different tonal ranges, you can now combine the different techniques for effective tonal management and balance.

1. In the Scopes palette, open the Settings and change the waveform back to Y mode with Colorize deselected.
2. Switch the Primaries palette back to color wheels mode.
3. Select clip 07, which shows an image of a mountain range.

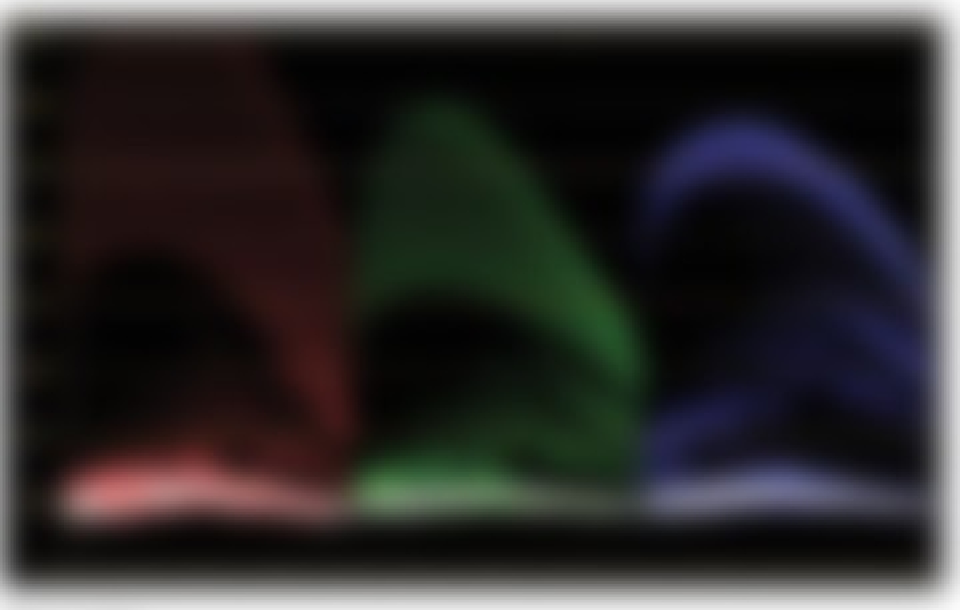
The Luma waveform indicates there is some room for adjusting the image's highlights.

4. Drag the Gain master wheel right to increase brightness until the trace reaches the second horizontal line from the top.

Even though the waveform appears to be intact, the sunset on the horizon might start to appear "blown out." To understand why this is happening, let's check the Parade scopes to determine the distribution of color in the image.

[illegible]

[illegible]



[illegible]

[illegible]

[illegible]

[illegible]

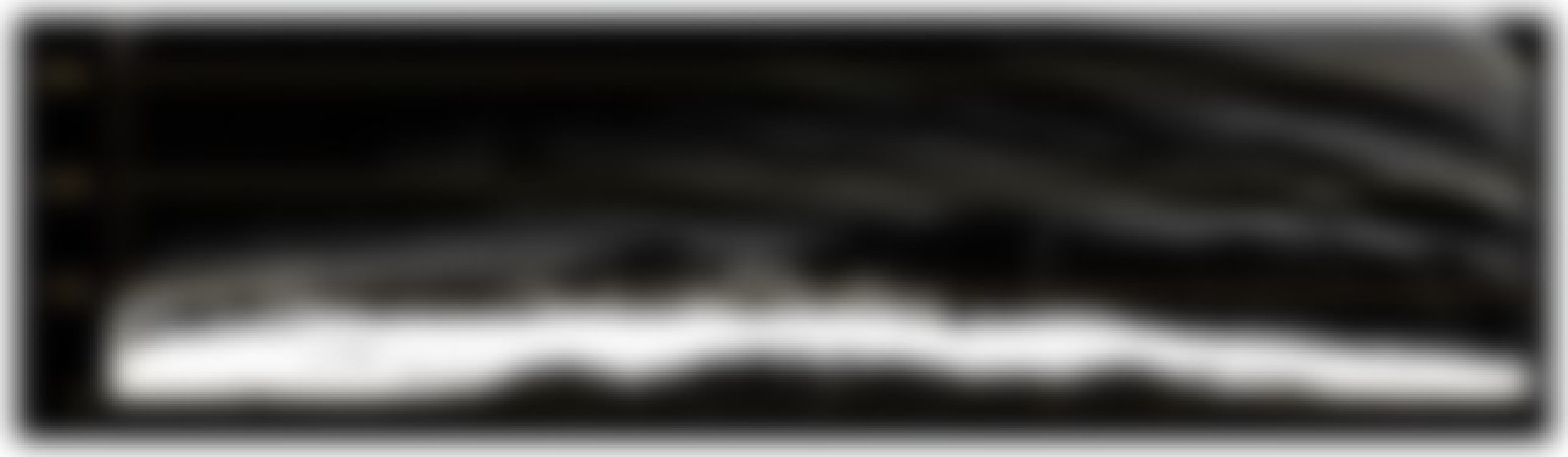
[illegible]

[illegible]

[illegible]

[illegible]

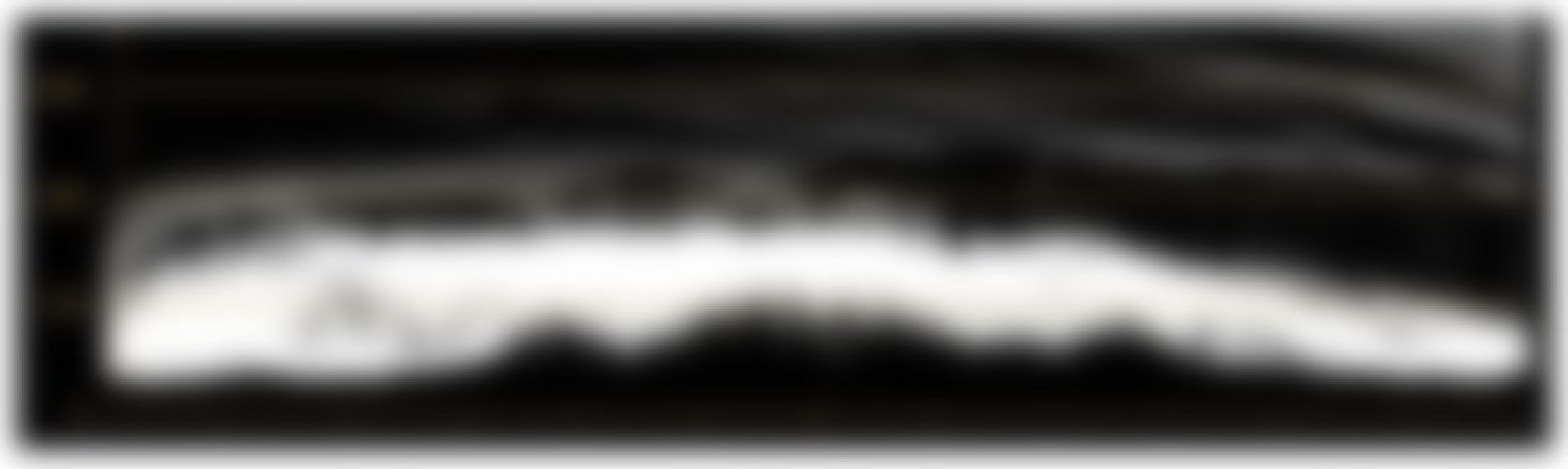
- To confirm this, drag the Lift master wheel to the left to see how dramatically it affects the foreground. The compressed shadows are pulled down until the entire image becomes too dark.



- Reset the Lift wheel.
- Switch the Primaries palette to log wheels mode.

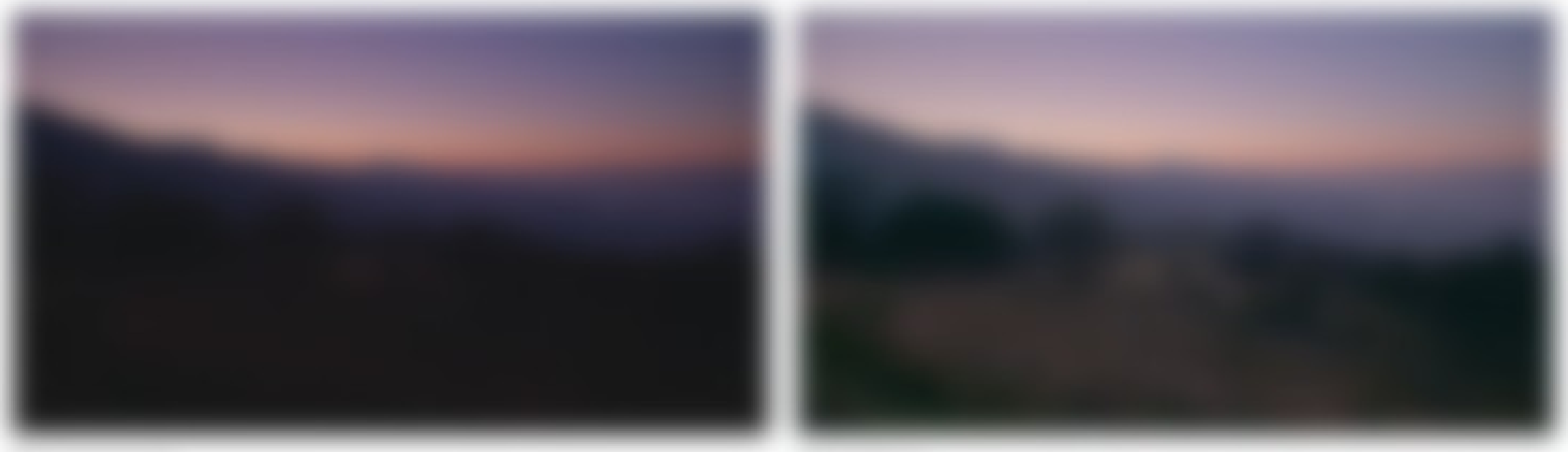
> **TIP** Press Option-Z (macOS) or Alt-Z (Windows) to toggle between the Primaries color and log wheels.

- Drag the Shadow master wheel to the left to lower the black point without clipping it. Note that the tree details begin to pop out against the mountains and ground.
- In the adjustment controls, drag the Low Range parameter to the left to redefine the shadow range. Because of this narrower range, adjustments to the Shadow wheel will be more concentrated to the compressed trace at the bottom of the image.
- Drag the Shadow master wheel to the left to further expand the compressed shadows. Keep adjusting the Low Range and Shadow master wheel controls until you see a good amount of detail in the foreground of the mountain clip in the viewer.



Because the Shadow wheel is more dedicated to the lower ranges of luminance, it is not affecting the midtones as dramatically as the Lift wheel did. With the contrast adjusted, you can now address the colors. This image is particularly tricky because of the conditions under which it was captured. The sun is still rising, resulting in beautiful peach, purple, and blue gradients throughout the sky. You will strive to retain these striking hues while balancing the colors in the foreground—most notably, the magenta in the shadows.

- Switch the Primaries palette back to color wheels.
- Gently drag the Gamma color balance indicator away from magenta and toward green/yellow. Stop dragging before the green in the shadows becomes overpowering.



[illegible] [illegible]

You have successfully brought back a lot of detail to the image foreground, but this came at the expense of the beautiful gradient in the sky, which now appears a little washed out. In the next exercise, you will isolate this log grade to the foreground of the image while reducing its impact on the sky in the background.

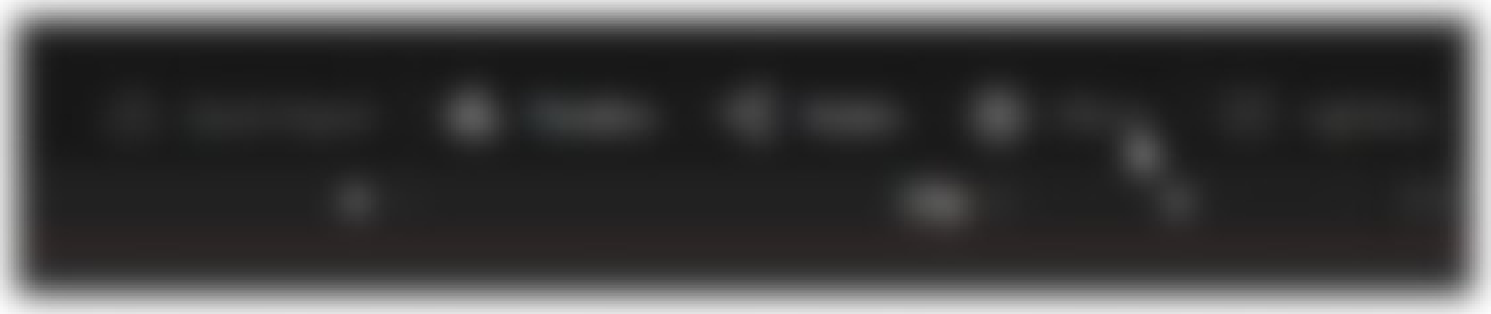
Isolating a Grade to a Depth Plane

Resolve FX are a collection of effects and filters that enable you to adjust the physical or visual properties of footage in creative ways that are often not possible using common grading tools. You will learn secondary grading techniques in Lesson 3, but this clip is ideal for an early demonstration of the restorative power of secondary selection via an effect called AI Depth Map.

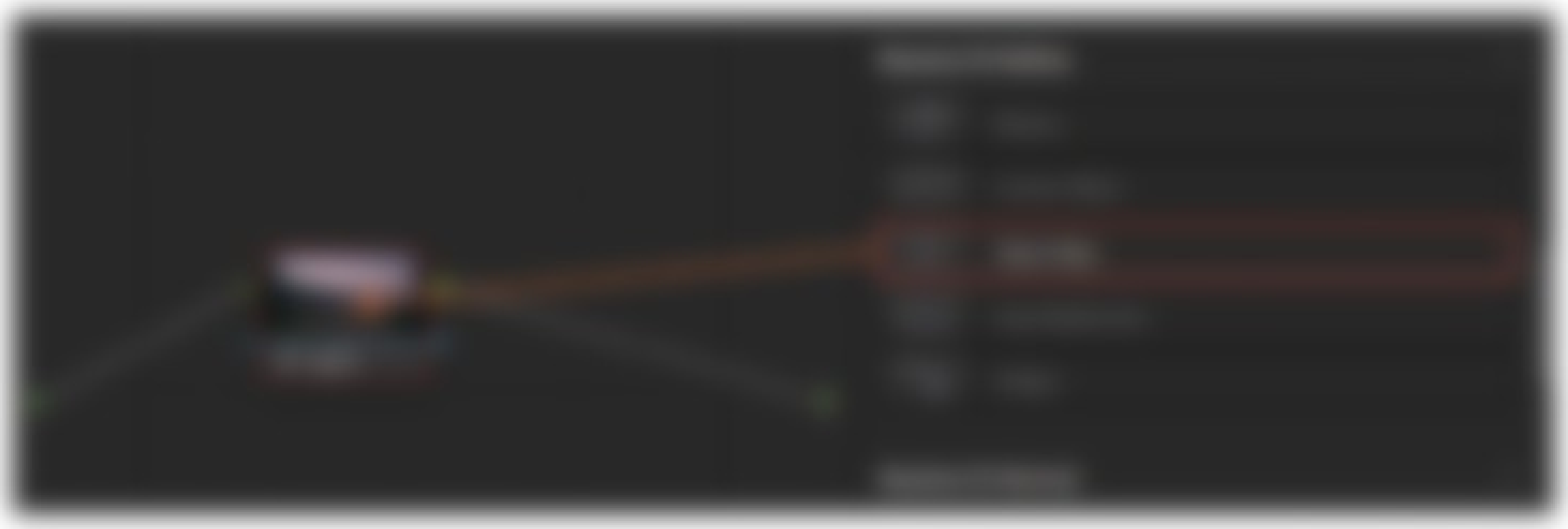
The AI Depth Map effect can automatically analyze and produce a 3D map of a scene, which can be used to isolate a grade to a specific plane of an environment, such as the foreground.

NOTE The following exercise requires DaVinci Resolve Studio to complete.

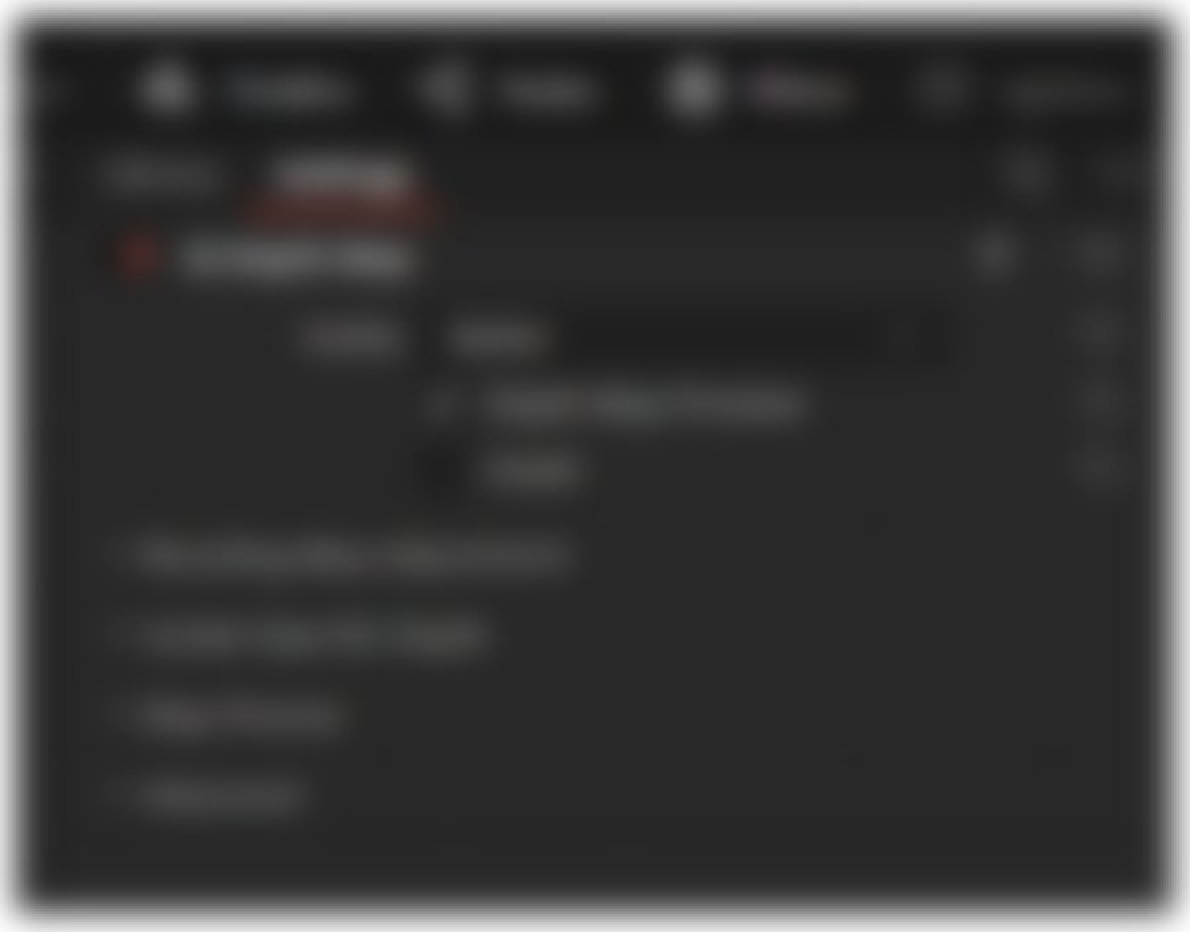
- In the interface toolbar, click the Effects button to open the Effects panel library.



- Scroll down the Effects Library until you find the Resolve FX Refine section.
- Drag the Depth Map effect onto corrector node 01 until a + (plus sign) appears and then release.



The Effects panel switches to the Settings tab, which features the AI Depth Map effect parameters.



- Wait a few moments for the AI Depth Map to run its analysis and output a black and white image (called a matte) of the scene.

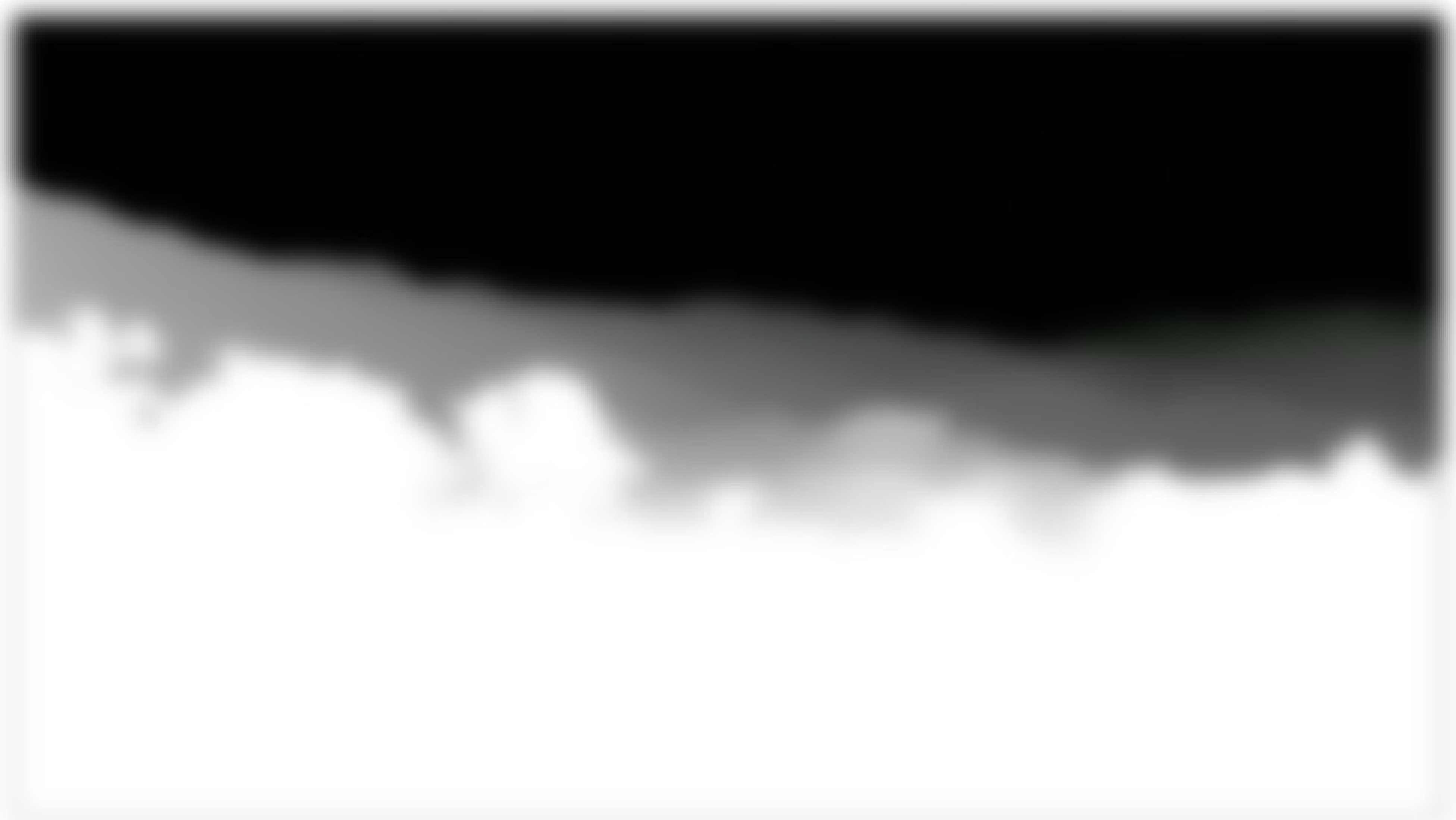
NOTE If you're not using DaVinci Resolve Studio, a watermark will appear over the image. You can dismiss the warning dialog and complete this exercise with the watermark.

The resulting matte resembles the mountain city, with the foreground plants appearing light gray, the mountains a darker gray, and the sky almost completely black. In addition to mapping the spatial environment of the scene, the matte also represents the area that a grade or effect will impact. White indicates full opacity, or a selected region, whereas black indicates transparency, or the lack of selection in that area. Gray implies semi-opacity and partial selection.

You will adjust the AI Depth Map parameters for a more pronounced selection of the foreground.

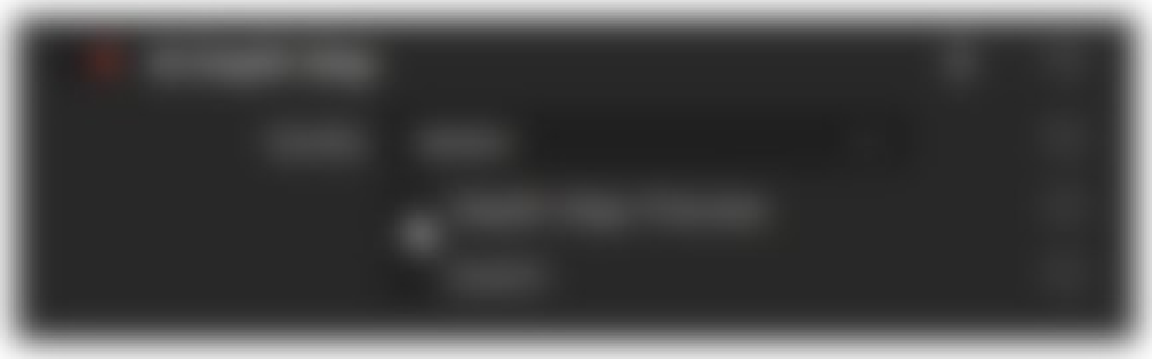
- Click the Resulting Map Adjustment header to expand its parameter controls.
- Under Resulting Map Adjustment, select the Adjust Map Levels checkbox to gain access to the Limit and Gamma controls.
- Decrease the Near Limit to 0.200 to brighten the foreground of the matte.

- Decrease the Gamma (0.750) to offset the background range.



With the depth map modified to meet the needs of the image, you can now disable the matte preview in the viewer and review the final result.

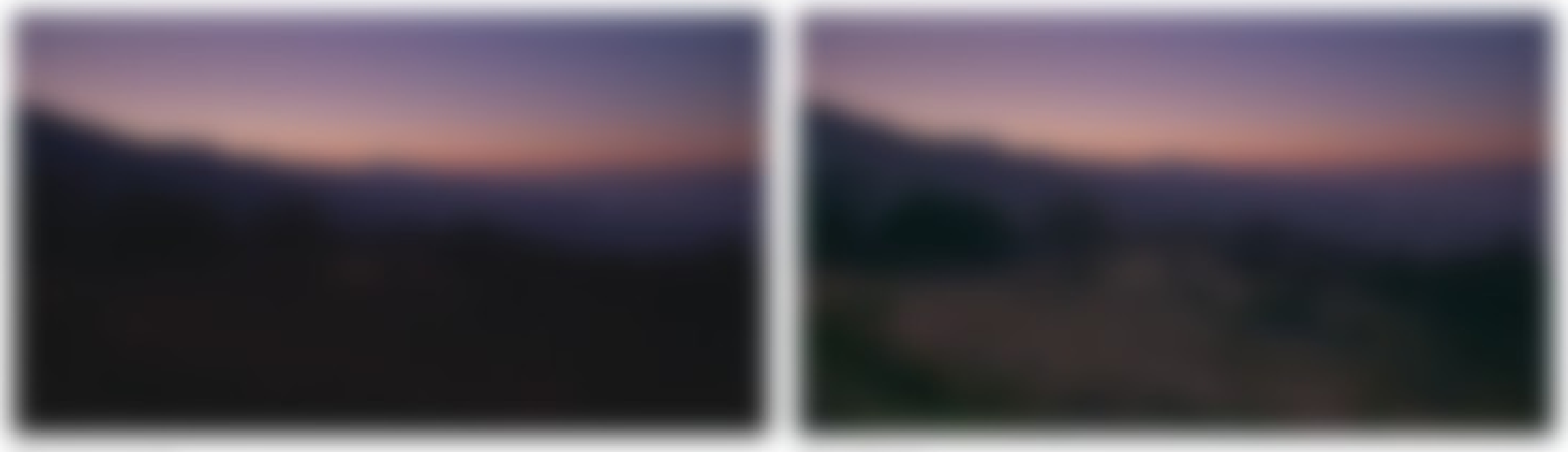
- Deselect Depth Map Preview at the top of the settings.



The Depth Map tool can be invaluable for quickly and accurately separating foreground subjects from a scene – such as in interviews or outdoor shoots with limited lighting. In these cases, you'll want to soften the result to help blend the foreground grade into the background.

- Expand the Map Finesse header and select Postprocessing to reveal the matte refining controls.
- Increase the Blur (0.750) to soften the edges of the depth map planes.
- Drag Contract/Expand left (–1.000) to reduce the resulting halo around the trees.

- Press Command-D (macOS) or Ctrl-D (Windows) to disable the corrector node and then re-enable it to compare the corrected image to the original clip. Review and adjust, if necessary.



Ungraded Graded

As seen in this exercise, you can use Primaries color and log wheels together very effectively. Color wheels can be used to set an initial tonal range and contrast, while log wheels can behave like a secondary adjustment that can further refine the three luminance ranges.

Log wheels are particularly effective when working on underexposed or overexposed footage. They allow for restorative work in the high and low luminance ranges, as well as minor tweaks to the brightness and hues of those areas, without majorly altering the remainder of the image. In cases where unwanted change does occur, you can make use of secondary tools, like the Depth Map effect, to isolate the grade to the desired area.

Self-Guided Exercises

Complete the following exercises in the 01 Main Timeline to test your understanding of the tools and workflows covered in this lesson.

Clip 01 – Use the YRGB curve to normalize the clip and then unganging the channels to balance. Increase the Saturation parameter in the adjustment controls to bring out the natural colors in this underlit shot.

Clip 02 – Use the Contrast and Pivot controls to enhance the details of the scale.

Clips 03, 04, 05, and 14 – Use the Primaries color wheels and the Waveform scope to establish the tonal range and contrast on these clips. Balance their colors where necessary.

Clips 6, 13, 15, and 17 – Use the Curves palette and the Parade scope to establish the tonal range and contrast on these clips. Balance their colors and increase saturation where necessary.

When you've completed these exercises, open the "04 Completed" Timeline to compare your work to the Lum and Balance nodes in the "solved" timeline.

Lesson Review

1. Does a DaVinci Resolve archive (.dra) contain the original project media?
2. What does the Y in YRGB represent?
3. What does the Pivot parameter in the adjustment controls do?
4. How do you add additional control points to curves?
5. What is the difference between the Primaries color and log wheels?

Answers

1. No. Archived projects (.dra) consolidate all related project media within a single folder that can be restored through the Project Manager.
2. The Y in YRGB refers to luminance.
3. The Pivot sets the contrast balance, or "middle gray" point.
4. Click directly on a curve to add a new control point. Shift-click to add a new control point without adjusting the curve's position.
5. The Primaries color and log wheels target different tonal ranges of the image. Primary wheels tend to have a broader impact on the image, while log wheels are more restricted to their respective tonal ranges.

Lesson 2

Creating Color Continuity

When editing footage for a video project, the end goal is often to create a single running narrative that appears to be happening in real time. Much of the time – even in documentary filmmaking – this unity of time is an illusion. Materials for a single scene can take days or even weeks to photograph, which can result in fluctuations in light, temperature, and color cast as both environmental and technical factors influence the footage from one day to the next.

The goal of shot matching is to assess how multiple clips compare to one another when placed on a timeline and to ensure that they maintain color continuity. When shots don't match, the audience becomes aware of their artificial sequencing, which breaks the illusion of cinema and compromises the viewer's suspension of disbelief.

Time

This lesson takes approximately 2 hours to complete.

Goals

Building a Shot-Matching Strategy 44
Organizing Shots Using Flags and Filters 48
Applying Shot Match 52
Matching Shots Using Stills 56
Comparing and Matching Shots Manually 61
Self-Guided Exercise 75
Lesson Review 77

In the previous lesson, you looked at the most common tools and workflows for normalizing and balancing shots in preparation for a grade. In this lesson, you'll examine the shot-matching process using many of the same tools.

Building a Shot-Matching Strategy

Your approach to shot matching will usually depend on the nature of the footage.

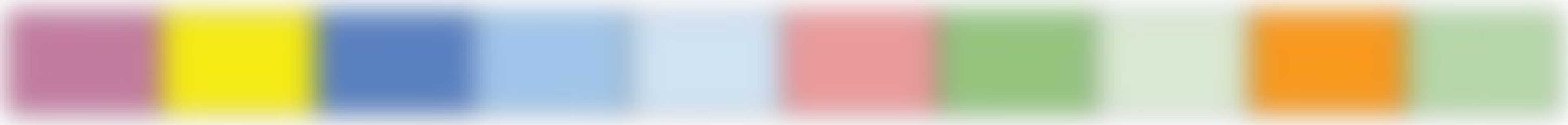
On a narrative production that was shot by an experienced cinematographer and camera crew, the quality of the raw content can have a reliable consistency throughout and require minimal balancing and matching.

For documentaries, fluctuation in locations, light sources, and temperatures (not to mention the use of multiple different cameras) may require much more diligent footage preparation.

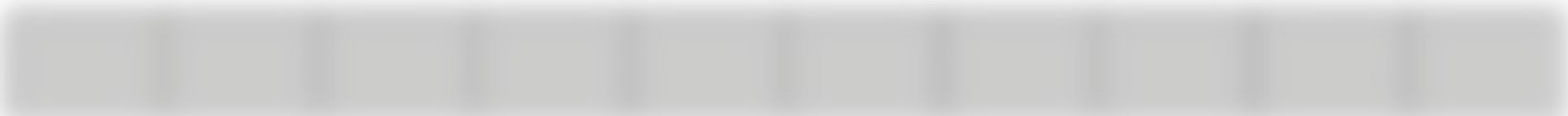
It is normal to incorporate both balancing and shot matching during the first primary grade pass. You may opt to treat these as separate jobs and apply them to independent nodes, or you can forgo balancing on shots that you are matching to a single "hero" shot in a scene.

Your shot-matching strategy can be narrowed down to the following approaches and considerations:

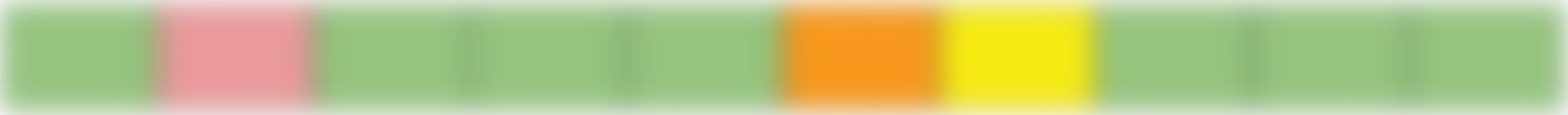
- **Balance all shots in a sequence:** This workflow assumes a shot-by-shot approach to normalization and balancing in order to produce a visually uniform sequence. This time-consuming method is best applied to projects with vastly mismatched media sources or lighting conditions (archival documentaries, festival promo videos, and so on).



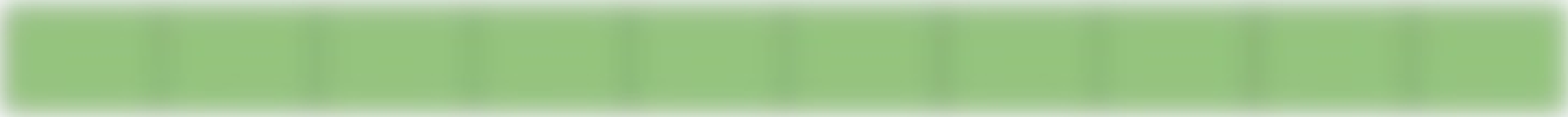
Every clip balanced individually.



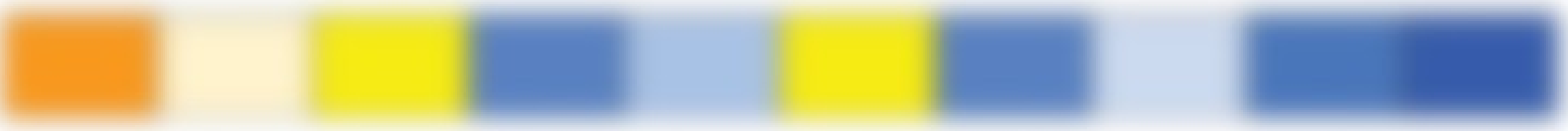
- **Adjust only mismatched shots in a sequence:** If only one or two shots in a sequence are mismatched, it makes sense to adjust only those shots to create an even starting point for the scene grade. This approach is more common to standard grading practices and usually applies to pick-up shots captured on a different day or stock footage captured by a third party.



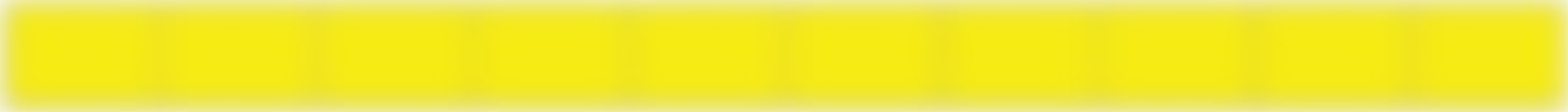
Mismatched clips graded to match the rest of the sequence



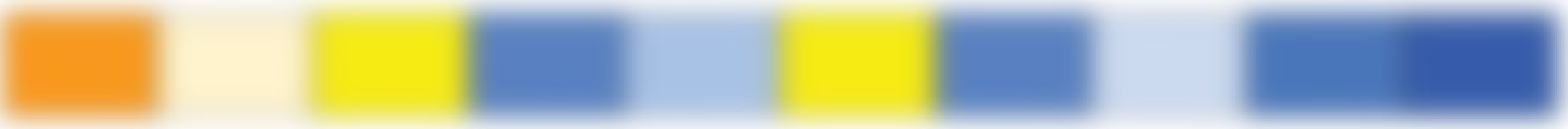
- **Select a single reference shot (a hero) in a mismatched sequence.** Sometimes you will have more than one clip that is a good candidate for a reference (for example, when working with footage from a three camera shoot, or from a 2-day outdoor production). In these cases, you may opt to use a hero shot that will have the least extreme impact on the color tone of the other clips.



Clips adjusted to a hero shot that causes the least color distortion



Or you might consider settling on the clip that is closest in appearance to your intended grade. In doing so, any further creative grading you perform will aim to enhance the colors and not undo them.



Clips adjusted to a hero shot that is closer to the final intended look

TIP When choosing a hero shot, it's best to select an establishing shot or any wide or long shot of the scene and match all other angles to it. A wide shot is likely to have the best overall representation of light sources and shadow tones, as well as include most of the physical elements in the scene, such as actors, costumes, set design, walls, and so on. In contrast, a close-up might contain less reliable data for balancing and might share few elements with other shots.

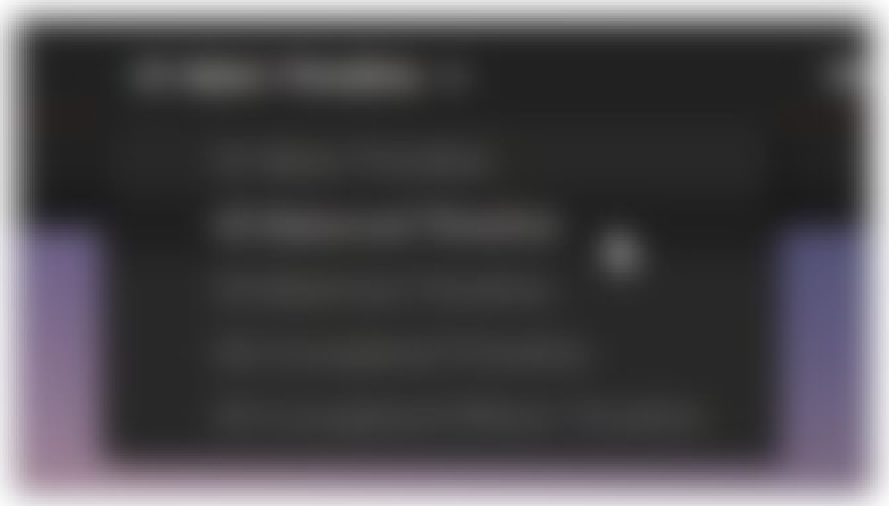
The exercises in the following lessons will focus on the practical implementation of shot matching based on these methods. Understanding the variety of matching methods available in DaVinci Resolve 18 will enable you to construct grading workflows that are best suited to your coloring abilities and project type.

Organizing Shots Using Flags and Filters

In the previous lesson, you scrubbed, searched, and clicked individual clips throughout the timeline. This is generally not an issue in small projects, but if the edit had several hundred clips, you might find this method time-consuming and prone to errors and missed clips.

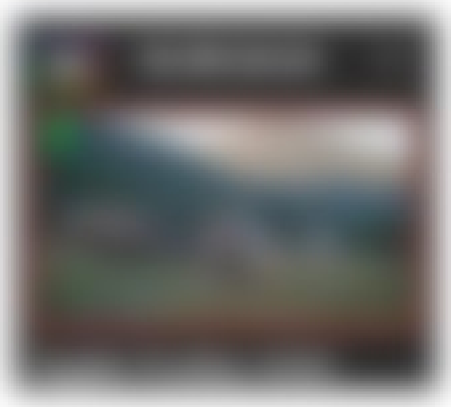
DaVinci Resolve features many organizational tools that will help you filter your timeline based on a variety of technical and narrative specifications. One of those tools, called a flag, can help you manually define and search for clips based on any criteria you choose. For example, you might flag clips that have overexposed skies, clips that require green screen keying, or clips that need narrative-specific dynamic grades.

1. In the timeline menu above the viewer, open the **02 Balanced** Timeline.

   The timelines in this project already include some flags. You'll add a few more to identify the clips you will use for the matching exercises in this lesson.

2. In the timeline, right-click clip 04 and select Flags > Green.

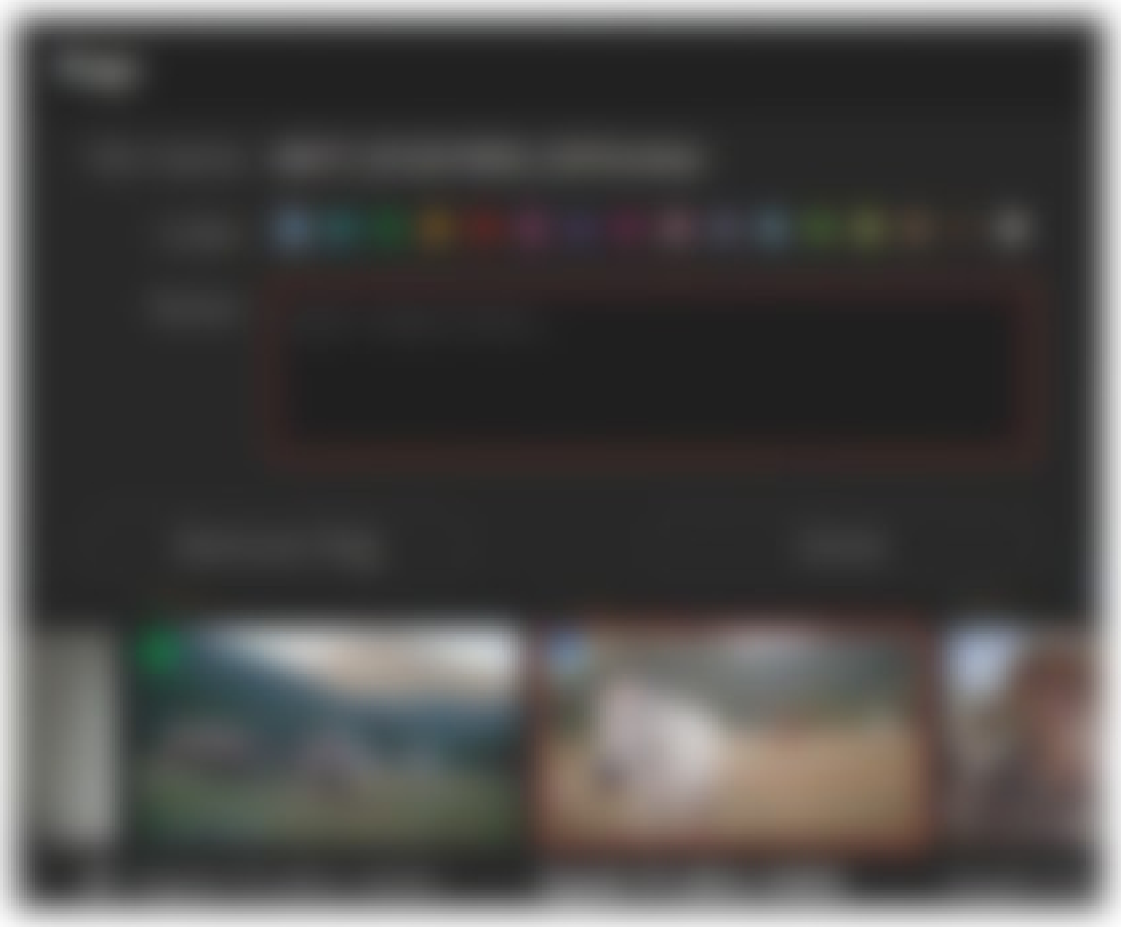
   A green flag appears in the upper left corner of the clip thumbnail to indicate that the clip is flagged.

   Another method for applying flags is to use a keyboard shortcut.

- Select clip 05.
- Press G on your keyboard to add a flag.

  While this is a faster technique for applying flags, in this case it applied the wrong color flag.

- To change the flag to green, double-click the blue flag on the thumbnail to open the Flags dialog.



  Notice that the Flags dialog allows you to add notes to flags, which is very handy for detailing future grading intentions or identifying technical issues.

- Select the green colored flag and click Done to close the dialog.

  The keyboard shortcut is configured to apply the default blue flag. To change the default color, you'll need to change the flag color in the toolbar of the edit page.

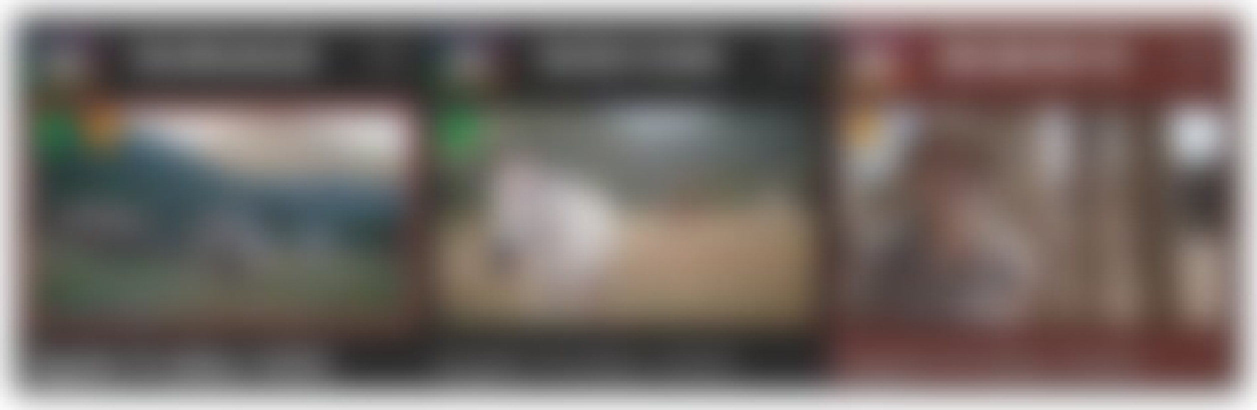
- Go to the edit page.
- In the toolbar, next to the flag icon, click the disclosure arrow and choose Yellow.

> **TIP** When setting a new default flag color, make sure that none of the clips on the timeline are selected. If a clip is selected while a new color is picked, that clip will be flagged.

- Return to the color page.

[illegible] Select clip 04 and hold Command (macOS) or Ctrl (Windows) to select clip 06 at the same time.

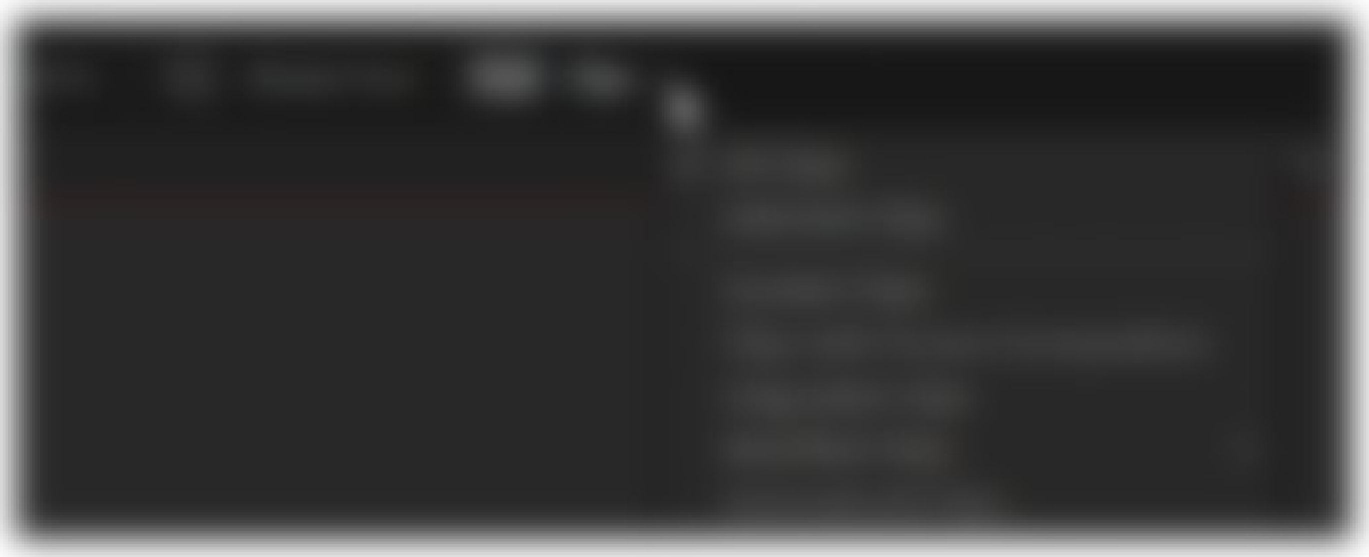
[illegible] Press G to apply green flags to both clips.



TIP You can apply a flag to a sequential range of clips by selecting the first clip, holding the Shift key, and then clicking the last clip. You can then use any of the methods described to apply the desired flag to the selected clips.

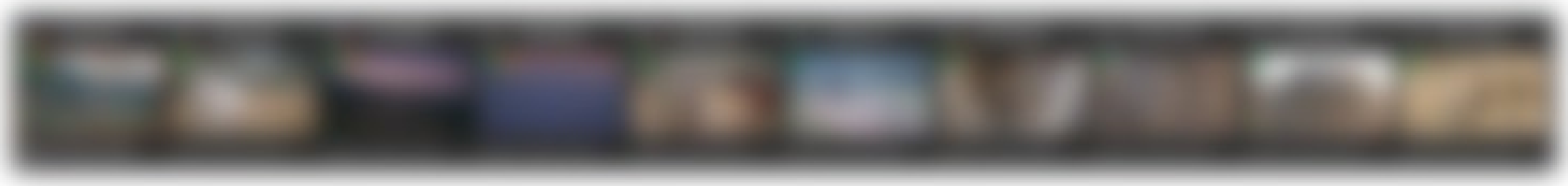
The green flags in the timeline now identify the clips you will be working on throughout this matching lesson. You'll find it easier to locate and navigate between them if you filter the timeline to show only the green flagged clips.

[illegible] In the interface toolbar at the top of the color page, click the disclosure arrow next to the Clips button and choose Flagged Clips > Green.



TIP When a filter is applied to a timeline, the Clips button is underlined in red to serve as a visual reminder that some clips in the timeline might not be visible due to the filter.

You have temporarily hidden all clips that do not have a green flag. The result is a significantly simplified timeline that will help you focus on those clips without the need to navigate around your timeline and locate them.



[illegible] As with flags, you can also use markers for filtering purposes. The difference is that flags identify an entire clip and its source media, whereas markers identify a specific frame or range of time. Adding a flag to a clip applies it to every appearance of the source clip in all the timelines of the project, whereas markers will appear only in that single instance of the clip in the timeline. Markers can be applied using a keyboard shortcut (M), and their default colors can also be set in the toolbar of the edit page.

[illegible] To add to your filter selection, click the disclosure arrow next to the Clips button and choose Flagged Clips > Yellow.

As you likely noticed in the previous steps, clips can be assigned more than one flag color. As a result, media classifications can overlap, allowing you to filter clips that have several workflow roles.

[illegible] In the Clips dropdown menu, choose Yellow again to remove the yellow flags from the clip filter.

[illegible] To reset the Clips filter, choose All Clips at the top of the list.

In DaVinci Resolve, flags and filters can perform a wide variety of functions. You can use different flag colors to identify clips that must be reframed due to a visible boom microphone, single out clips that need white balancing, or isolate clips that require a flashback look. When the timeline is filtered based on flag color, you can focus on addressing just one category of clips at a time.

Applying Shot Match

The Shot Match function in DaVinci Resolve analyzes the colors in one image and reconfigures the primaries of another image (or multiple images) to match it.

The results of any automatic grading function should be carefully evaluated because an algorithm is unable to recognize the environmental factors behind scene colors. Even so, the Shot Match function can be a great starting operation when matching clips and can enable you to quickly prepare shots for on-set review or when processing dailies.

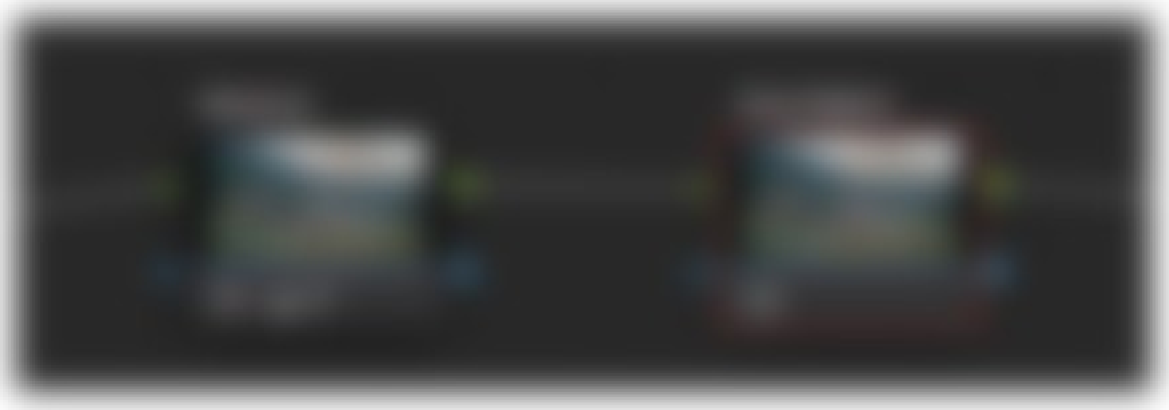
1. In the green flag-filtered timeline, select clip 01.

You will match the colors in this clip to the ones in clip 02 directly after it. In the interest of organization and preservation of the video signal, you will keep the balance and color match on separate nodes.

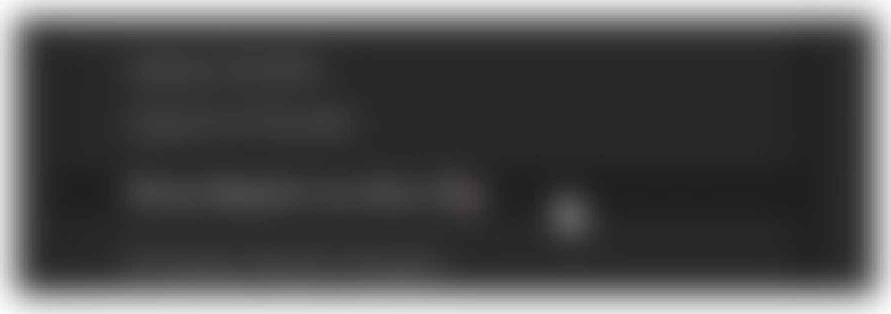
2. In the Node Editor, create a new serial node by right-clicking node 01 (Balance) and choosing Add Node > Add Serial or by pressing Option-S (macOS) or Alt-S (Windows).

It is a good practice to label your nodes to keep track of their function and your overall workflow.

- Right-click the new node and choose Node Label. Name the node **Shot Match**.



- Without leaving clip [illegible], right-click clip [illegible] and choose "Shot Match to This Clip." It will take a few moments for the shot match analysis to be performed and applied to the active clip [illegible].



> **NOTE** If you cannot see "Shot Match to This Clip" in the contextual menu of a clip, it is possible that you are right-clicking the active clip and not the clip you are trying to match to.

- Press Command-D (macOS) or Ctrl-D (Windows) to disable and enable the Shot Match node to review the adjustment.

> **TIP** Press Shift-D to bypass the entire node tree and compare your work to the source footage. You can also bypass entire color pipelines by pressing the Bypass Color Grades and Fusion Effects button in the upper right of the viewer.

The result is a much better match between the two images. Clip [illegible] becomes warmer and less contrasted to match the environment in clip [illegible]. However, the shadows could be darkened to better match the mountains and the details in the animals, and the gamma could be brightened and cooled to remove the strong red tones.

- Drag the Lift master wheel left until the shadows of the waveforms in clips [illegible] and [illegible] match more closely.

- Drag the Gamma master wheel right to brighten the image and increase contrast in the details.
- Drag the Gamma color wheel indicator away from red until the rhinos appear more neutral in color.

Before match

After match

Automatic shot matching can be helpful for creating a starting point for manual matching and to quickly resolve major camera issues in front of clients. But ultimately, you should still learn how to assess images using the video scopes and manually match them with the primary grading tools. This will give you greater confidence when working with media that automatic tools struggle with, such as scenes with unconventional lighting or environments with context-dependent visual cues.

Matching Shots Using Stills

Stills have a variety of functions in DaVinci Resolve, as you will learn in lessons throughout this book. One of the most direct uses of stills is for visually comparing clips in the viewer.

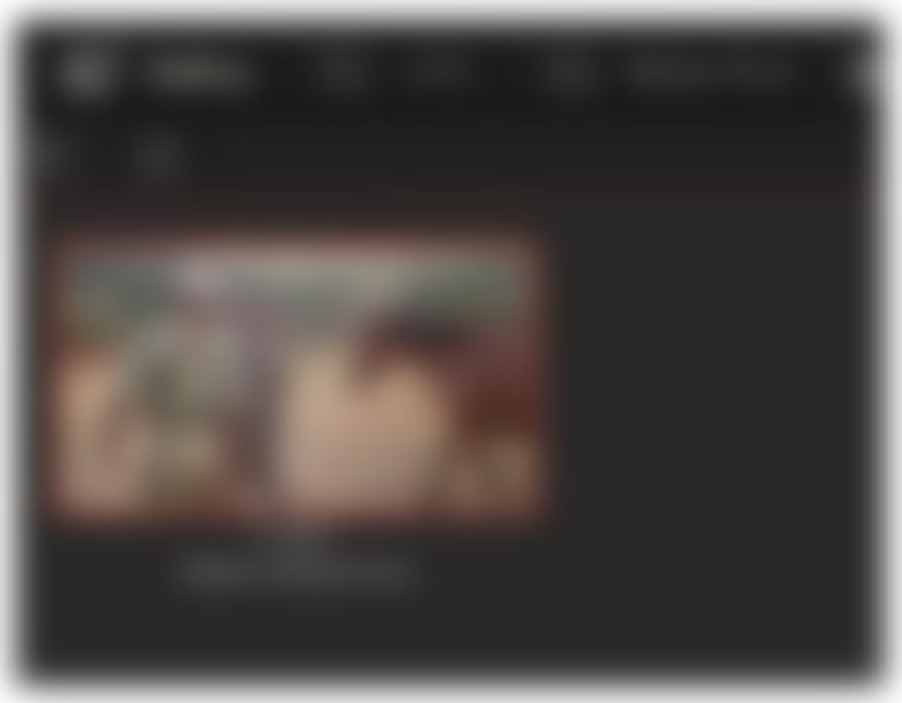
By superimposing a still, or snapshot, of a previous clip onto a current clip, you can visually assess their differences in contrast, saturation, and color dominance.

In this exercise, you will use stills to manually match clips.

- In the green flag filtered timeline, select clip 05.

In the 02 Balanced Timeline, this clip already has its tonal range and balance set via the Primaries color wheels.

- Right-click in the viewer and choose Grab Still.
- Double-click under the still that appears in the gallery and label it **Match Reference**.

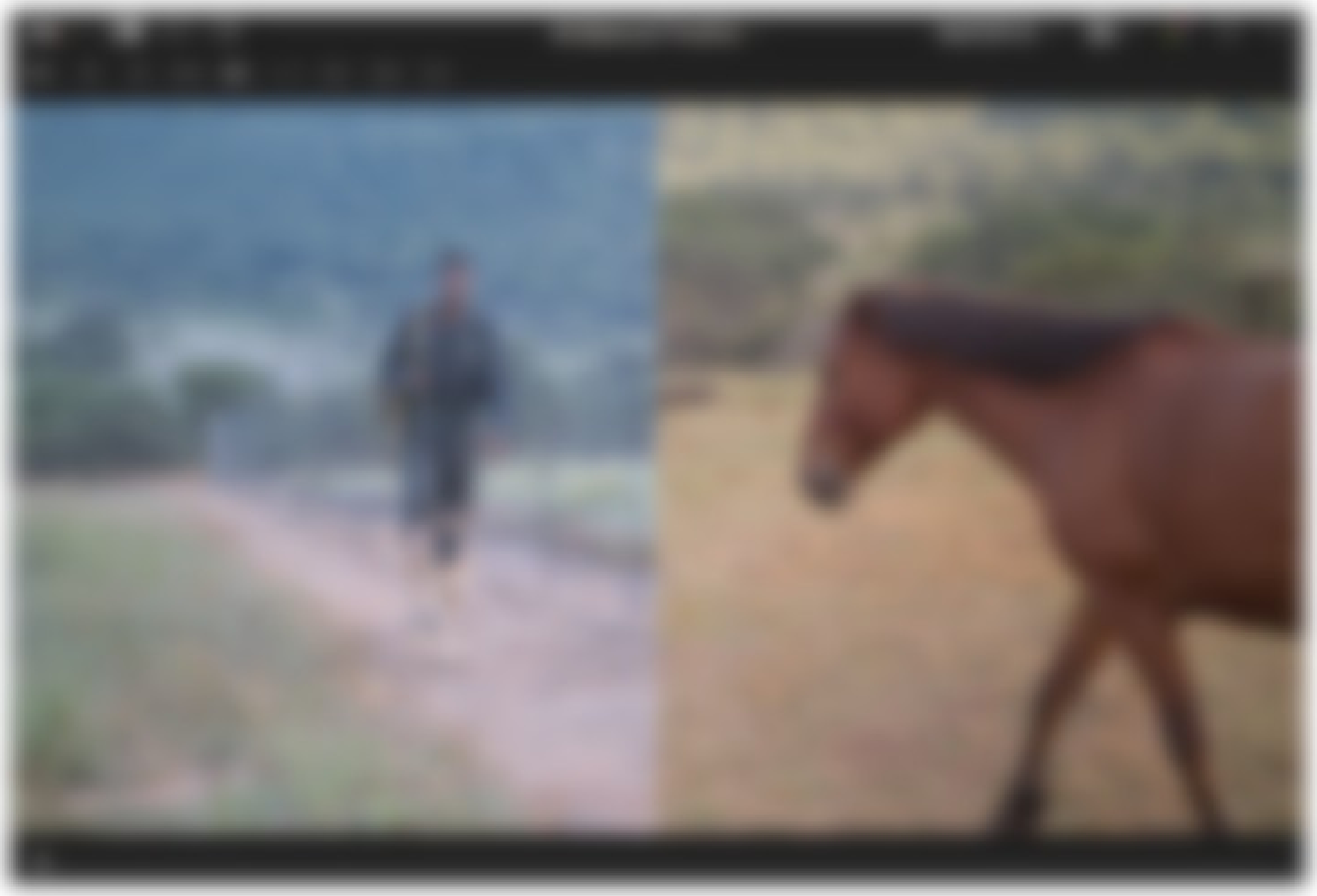


NOTE The numbers under the stills refer to the timeline track, the clip number, and the number of stills generated for that clip.

- In the timeline, select clip 06. You will use the Primaries color bars and the Parade scope to match this shot to the still.

- In the Scopes mode pop-up menu, choose Parade.
- In the Gallery window, double-click the Match Reference still.

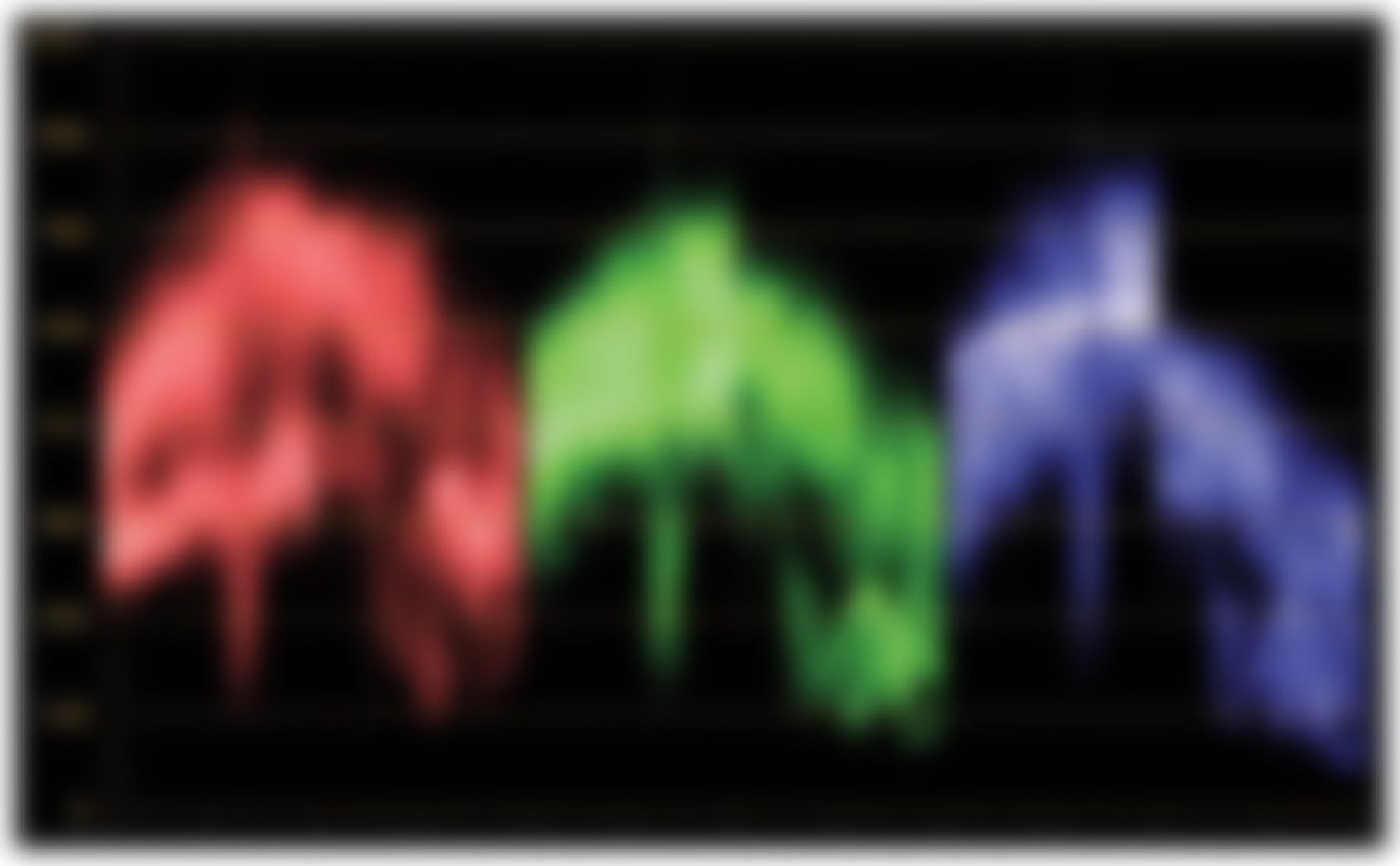
You should now see the two clips in the viewer, separated by a wipe line that you can drag.



A set of controls appears in the upper left corner of the viewer, allowing you to change your wipe style.

TIP You can insert a wipe using the keyboard shortcut Option-W (macOS) or Alt-W (Windows).

The shot of the man by the fence is much cooler than the still with the man and the horse. The Parade scope, which is also split in half, objectively shows the difference.



The reference still's blue channel trace appears substantially lower, indicating an absence of blue in the highlights and upper midtones. As blue's complementary color is yellow, this results in the reference image looking warmer.

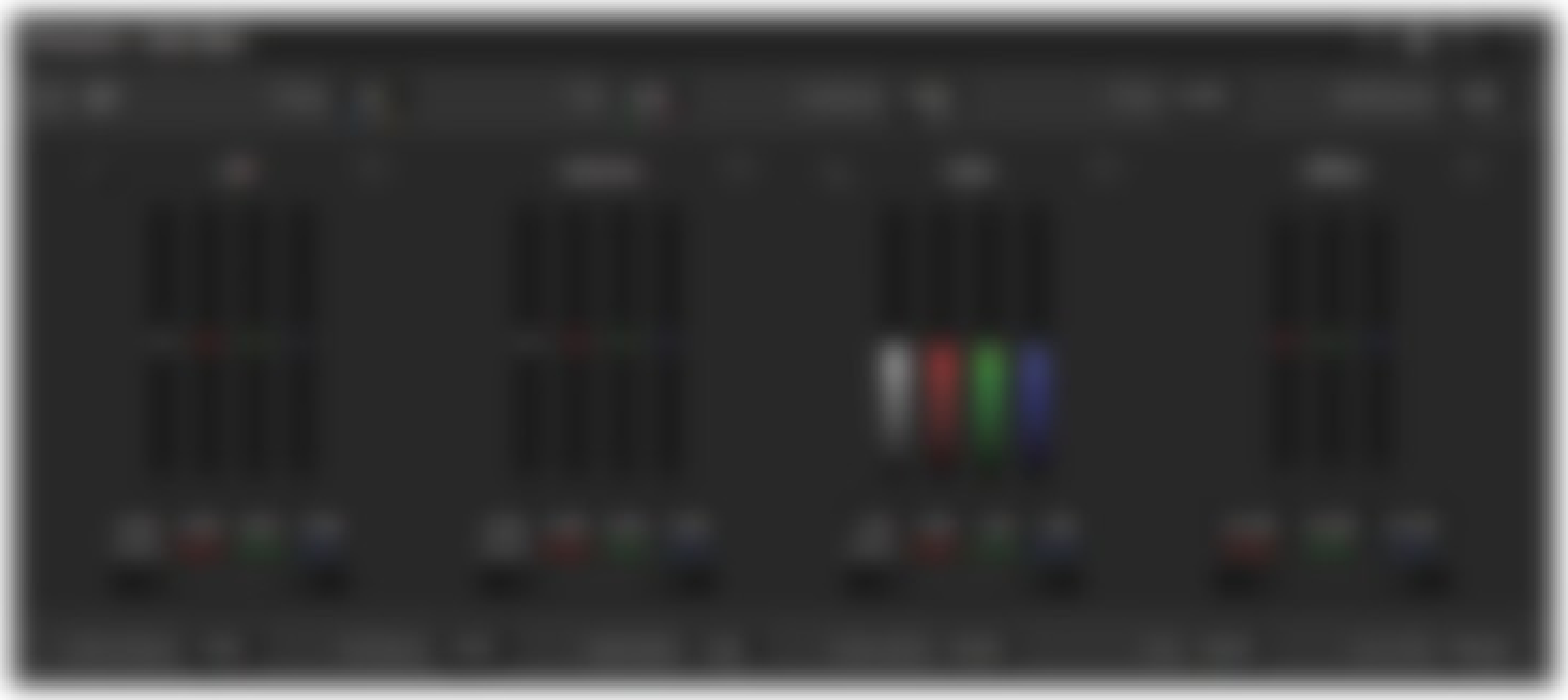
When shot matching, the goal is not to fully match the parades to each other. That is usually impossible because of the different contents of the frames. Instead, you must study how the three channels relate to each other and try to re-create their respective proportions in the clip that you're matching.

- In the node graph, change the label of node 01 in clip 06 to **Match**.

TIP Labeling nodes has many benefits. Labels clarify the grading workflow by specifying each node's task, which enables you to make faster adjustments as you grade.

To label nodes more quickly, consider creating a custom keyboard shortcut. Open DaVinci Resolve > Keyboard Customization. Find the Label Selected Node command in the Commands list (use the search field, if necessary), select the Keystroke field, and press the keyboard shortcut you wish to associate with the command. The Tab key is a good option because it is not assigned to any default command.

- In the Primaries palette, switch the mode to Color Bars.

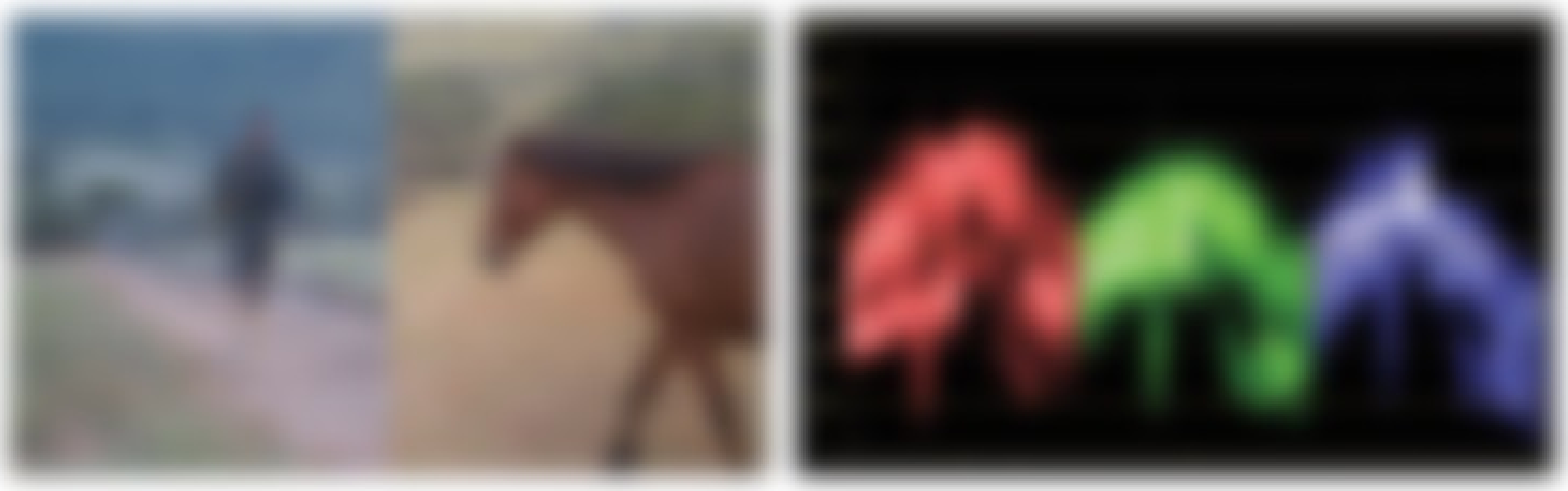


The bars are an alternative representation of the color wheels, and changes in either mode will reflect in both modes. The bars offer greater precision over the individual color channels of the image than the wheels.

- To match the shadows, drag the Lift Y (luma) bar down until the shadows of clip 04 match the shadows in the reference still. Keep your eye on the green parade and aim to set the lowest point of clip 04's trace (the man and dog) to a similar level as the shadow in clip 03 (the man and horse).

TIP Use the scroll wheel of your mouse to adjust the Primaries color bars with more precision.

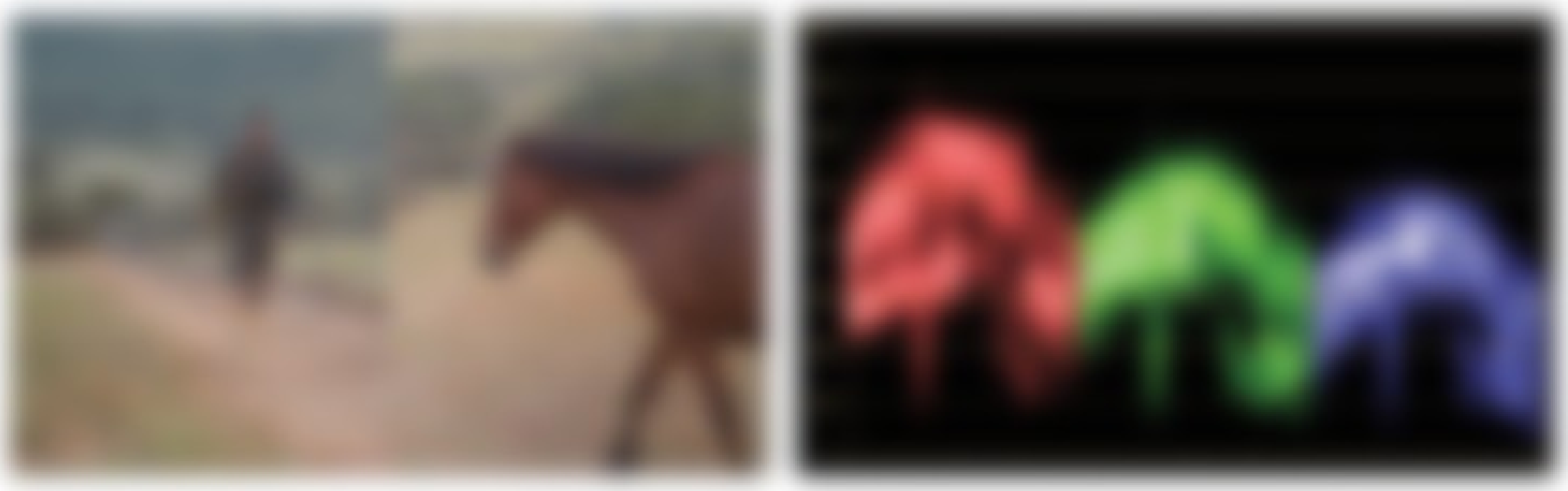
- Drag the Gain Y bar down until the arc in the green highlights matches across the two shots.
- Drag the Gamma Y up slightly to match the midtone section of the green parade.



The reason you are using the green channel as the starting point for the overall balance is because the green channel has the most substantial impact on the combined luminance of the image (over 70%), with red having significantly less influence (20%) and blue having even less (under 10%). Therefore, adjustments to the green channel will have a clearly global impact on the signal, while red and blue changes will be more confined to their respective channels.

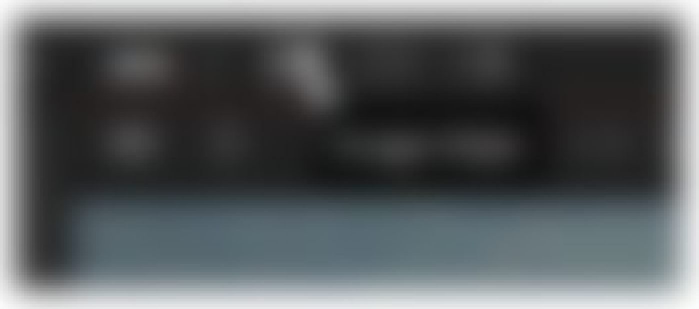
The next step is to address the overall balance to match the reference.

- Drag the Red and Blue Lift bars to match their respective shadows to the reference parade.
- Drag down the Blue Gain bar until the tops of the blue parades align.
- Drag up the Red Gain bar to match the warmer reference look.
- Finally, drag up the Red Gamma bar to match the trace pattern in the middle of the red parade. If needed, return to the Red Lift and Gain bars to compensate for changes in the red parade spread.

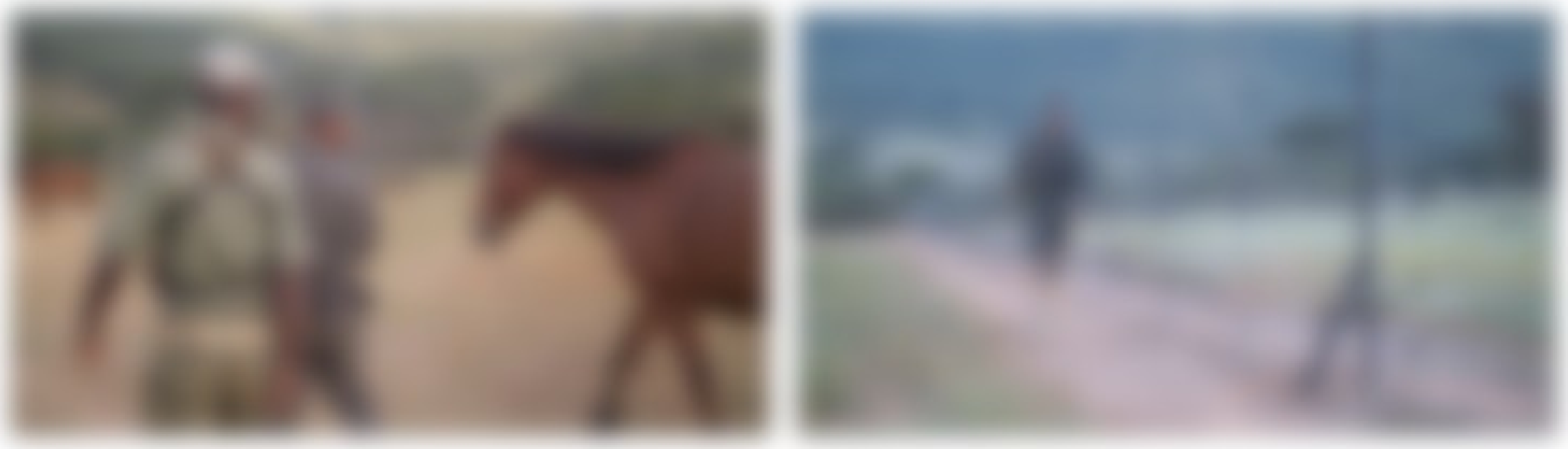


The result is a quick matching of the two clips using the Primaries color bars.

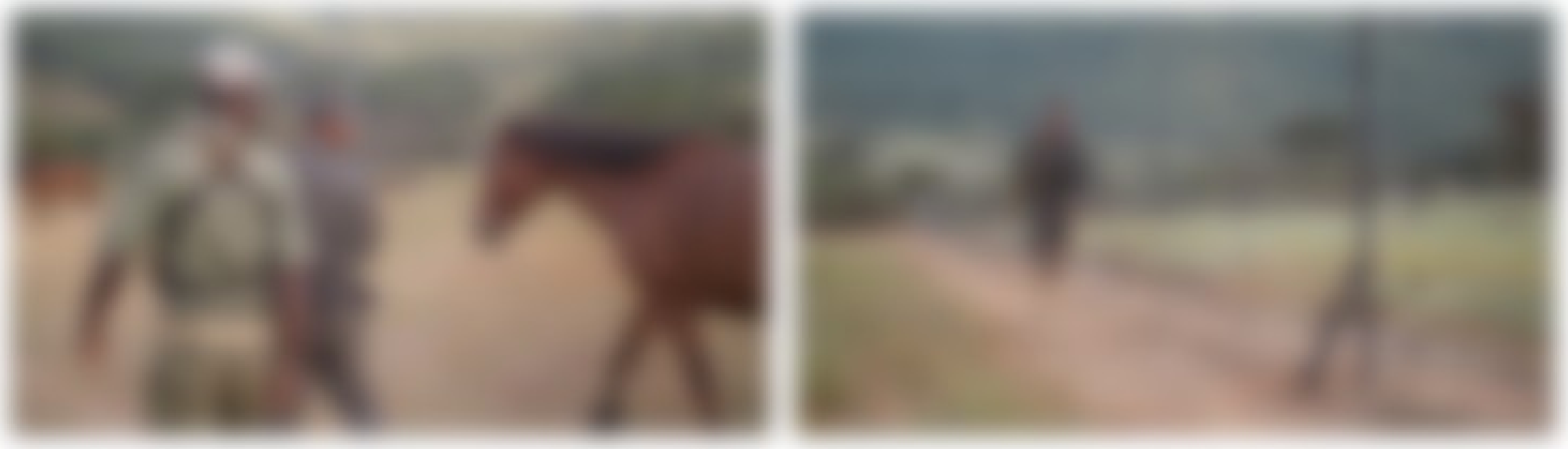
- To turn off the reference wipe, in the upper left of the viewer, click the Image Wipe button or open the viewer options in the upper right and choose Show Reference Wipe.



- Disable and enable the match grade to compare clip 05 before and after the manual matching adjustment.



Before match



After match

With the clips matched, you can now apply creative grades to them and continue to see consistent results.

- Select clip 05.
- In the Node Editor, locate the Contrast node and click the number 02 in the lower left corner to enable it. The image in the viewer will shift to display deeper shadows and more detailed midtones.
- Select the Contrast node and choose Edit > Copy or press Command-C (macOS) or Ctrl-C (Windows).
- Select clip 06.
- Right-click the Match node and choose Add Node > Add Serial.

[illegible] Select the newly created node and choose Edit > Paste or press Command-V (macOS) or Ctrl-V (Windows).

Clip 05 adopts the same level of contrast because of the successfully matched tonal ranges and colors in the first node.

> **NOTE** The Y (luminance) bar of the Primaries color bars affects the image differently than the master wheel. Like the RGB curve, the master wheel affects all RGB channels, which impacts saturation, whereas the Y bar targets only luminance.

When using stills for shot matching, your grading becomes even more precise when used in conjunction with video scopes. This is because scopes display an objective measure of the luminance and color values of each frame, allowing you to make informed adjustments.

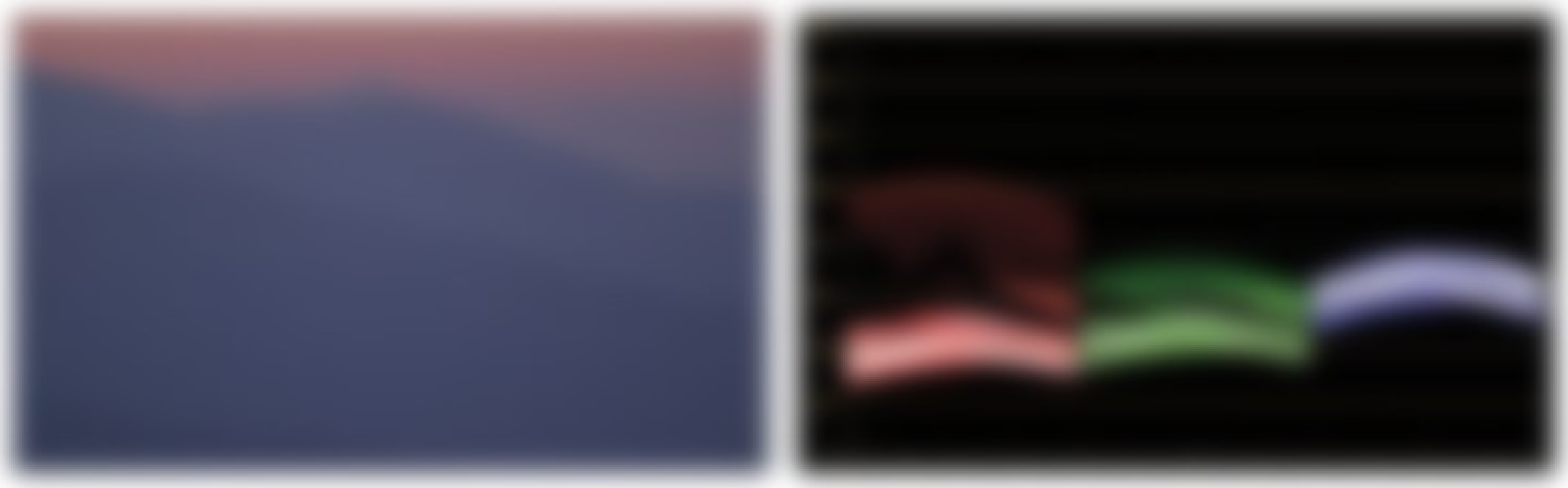
Stills have the additional benefit of containing the grading data of the clips they were generated from. In later lessons, you will use this data as a starting point for grading other clips or for applying grades across entire scenes.

Comparing and Matching Shots Manually

You don't always need to generate a reference still in the gallery for repeat shot matching. In this exercise, you will extract a reference directly from the timeline and match the images using custom curves.

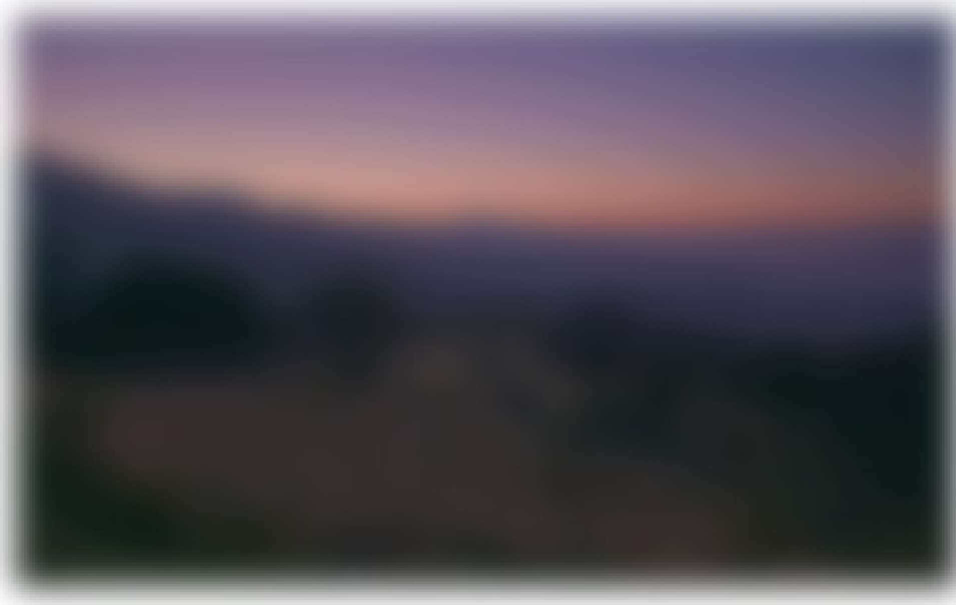
1 In the green flag filtered timeline, select clip 04. You will match this clip to the previously balanced clip 05.

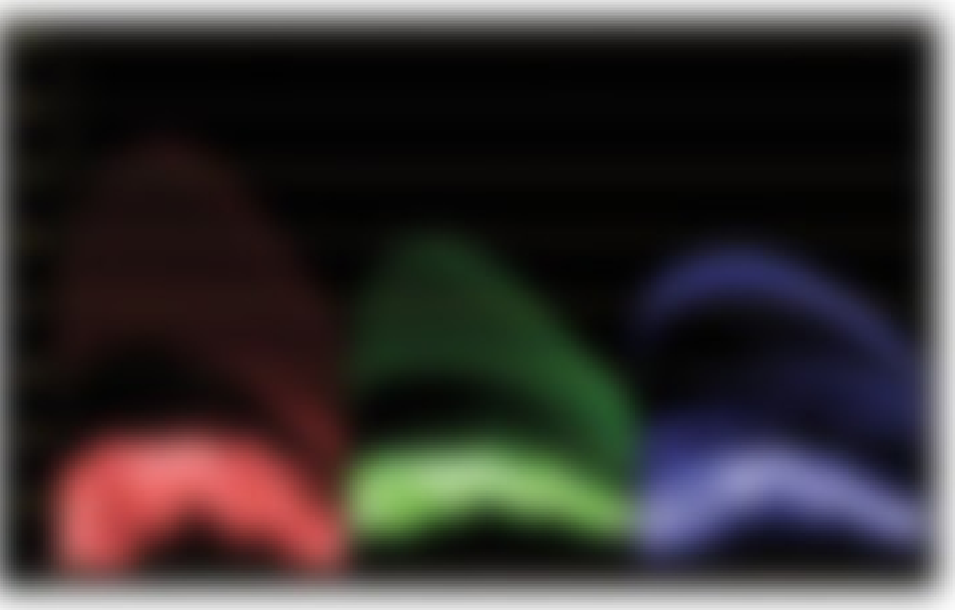
2 Review the Parade scope for clip 04.



You can see distinct differences in the shapes of the three channels. The red channel has the widest spread, extending beyond the green and blue channels in both the shadows and highlights. The blue channel's highest point is almost level with the green channel's highest point, although it is far more compressed in the midtone range.

- Select clip 03 and review its parade.





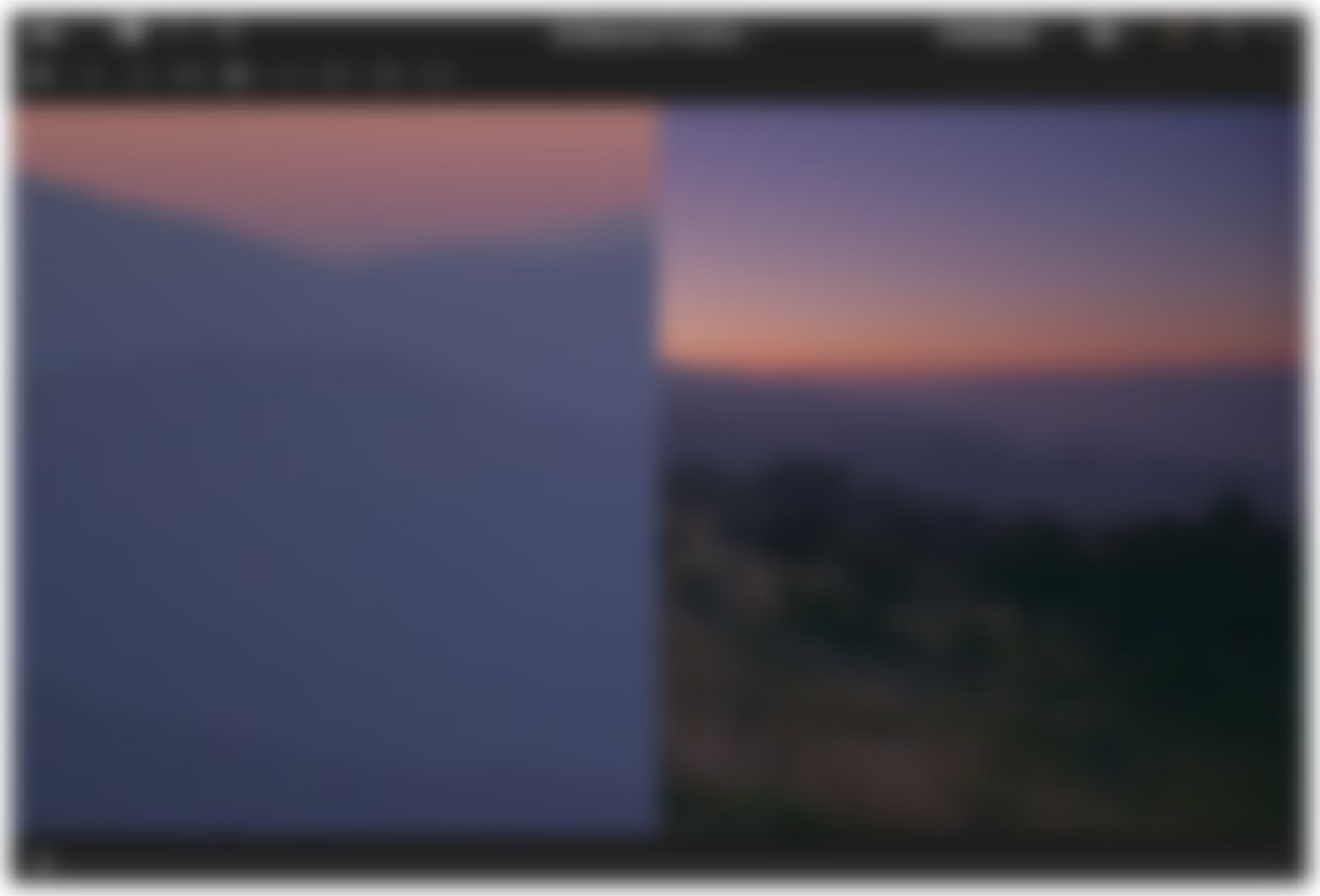
The most obvious difference is in the overall spread and contrast of the three color channels. The shadows extend to the bottom of the scopes graph, with the red and blue shadows even touching the black point line (0).

In this situation, visual evaluation of the frame is vital. By understanding the content of the image, you can choose to ignore certain properties of the graph. Clip 03 contains a variety of elements that are not visible in the close-up in clip 04. The trees and field silhouetted against the mountains appear as bunching at the bottom of the parade and can be safely ignored. You can choose to omit such elements from the scopes when shot matching.

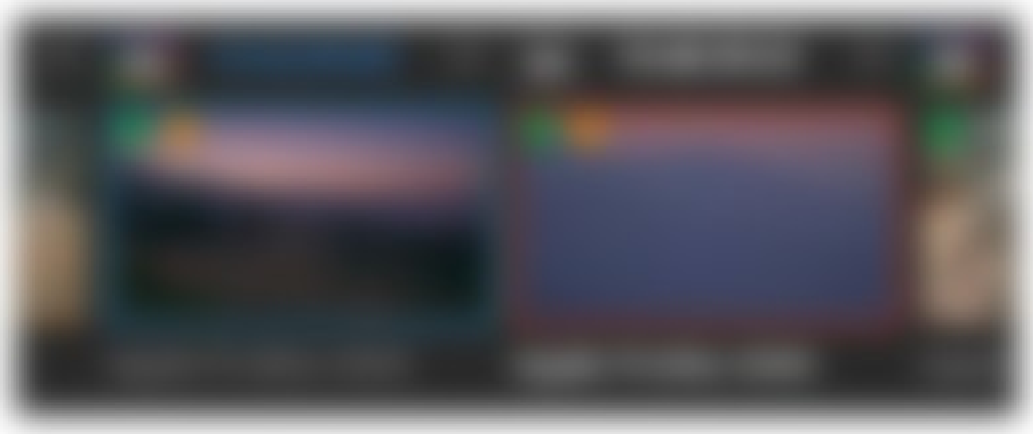
- Select clip 04.
- Right-click clip 03 and choose Wipe Timeline Clip.

Both clips become visible in the viewer at the same time, divided by the wipe line.

TIP Quickly toggle the wipe on and off by pressing Command-W (macOS) or Ctrl-W (Windows). Some colorists move the wipe to the edge of the viewer in order for the reference to fill up the whole screen and toggle the wipe continuously as they match the grade in the active clip.

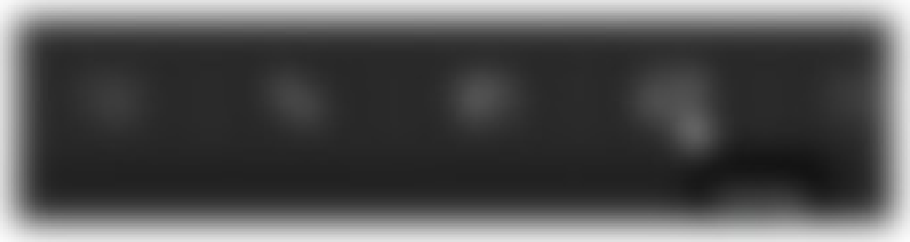


In the timeline, a blue highlight indicates that clip 03 is currently being used as a reference.

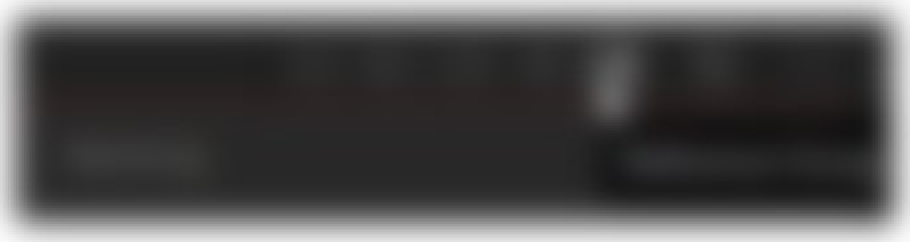


One way to help you focus on the relevant elements of the parade is to reframe the reference clip within the viewer. Clip 03 is a much wider shot than clip 04, so you can zoom in and reposition it for a better representation in the Parade scope.

- In the middle palettes, click the Sizing button to open the Sizing palette.



- In the palette's upper right corner, choose Reference Sizing mode.

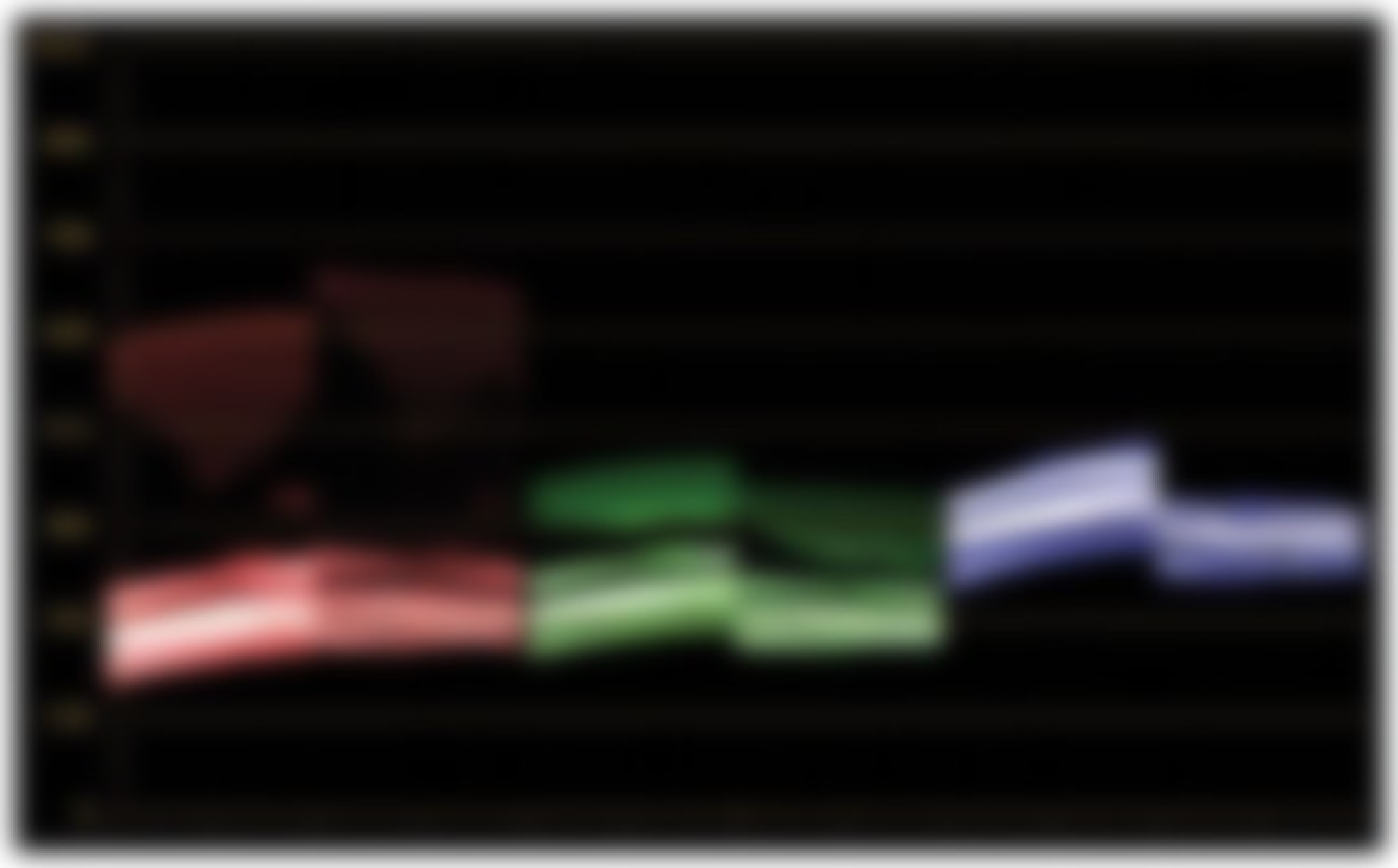


The Reference Sizing tool applies the transform changes only to the reference image in the viewer, not to the actual clip in the timeline.

- Use the Sizing controls to zoom in to the reference image by a factor of about [illegible].
- Pan the image to the left and tilt the image down until the framing starts to match that of clip [illegible].

These transform changes place the reference image into a much better position for both visual evaluation and for a more usable Parade scope trace.

The side-by-side parade comparison reveals that the reference image has some minor discrepancies, such as the stronger presence of red in the upper midtones and a lower blue channel trace.



When matching, remember that it's generally impossible to re-create the exact shape of the graphs themselves. Instead, you should focus on matching the height, depths and the midtone distributions of the traces.

In the Node Editor, label node 01 **Match**.

Open the Curves palette.

Let's perform a few adjustments to see how curves affect the parades.

Isolate the R curve and drag the white point left and the black point right until the red channel in both parades has an equal spread.

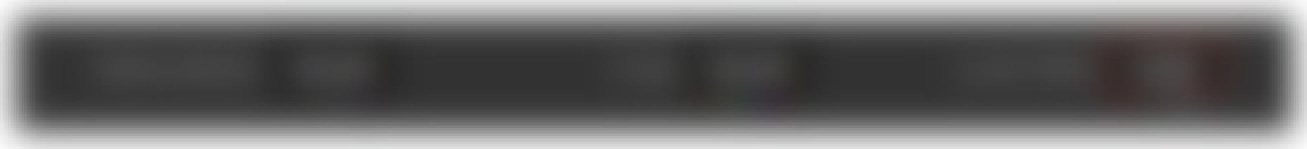
Isolate the G curve and drag the black point to the right.

As you drag the green control point, the two other channel parades begin to shift, affecting the output of the entire image. This happens because, by default, DaVinci Resolve tries to keep the luminance of the image constant when you adjust the individual RGB channels in the Curves and Primaries palettes. Because each channel contributes to the overall brightness of the image, changing the strength of one channel forces the other two channels to compensate for the shift in luminance.

This behavior is usually advantageous when performing creative color grading because it allows you to focus on designing a look for your scene without affecting the brightness or contrast. However, when shot matching, this behavior can be counterproductive. To manipulate each channel independently, you need to indicate to DaVinci Resolve that you do not wish to maintain constant luminance.

Open the Primaries palette and set the mode to Color Wheels.

In the lower right corner of the adjustment controls, drag Lum Mix down to 0.

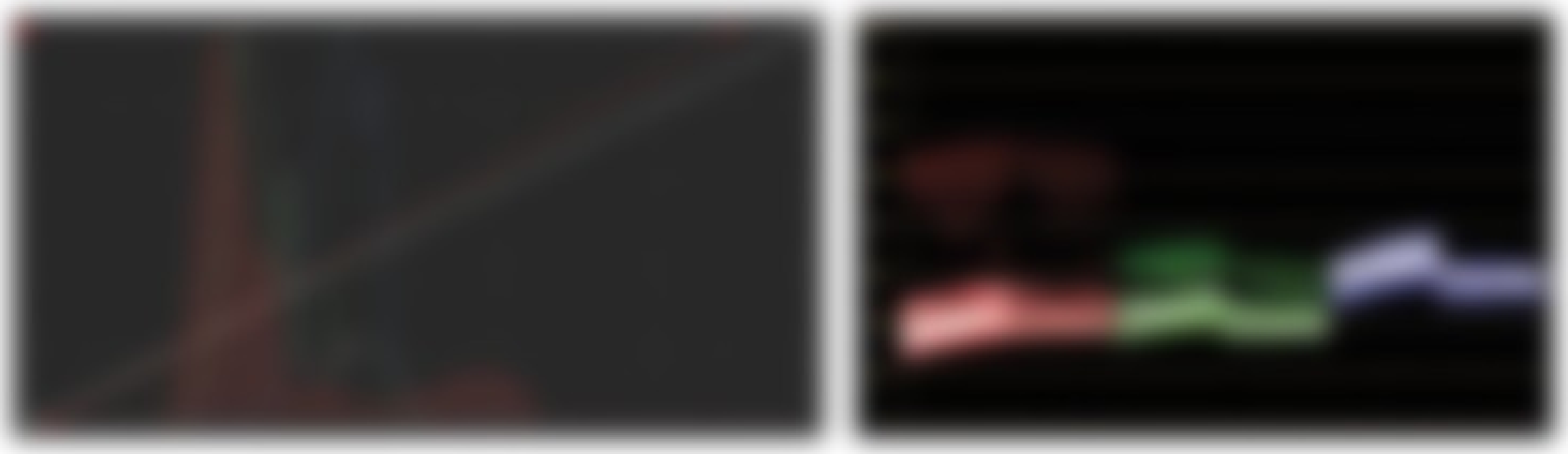


TIP In the Project Settings, you can set Lum Mix to default to a value of 0 on every clip. Click the gear icon in the lower right corner of the workspace to open the Project Settings window and go to General Options > Color and choose "Luminance mixer defaults to zero."

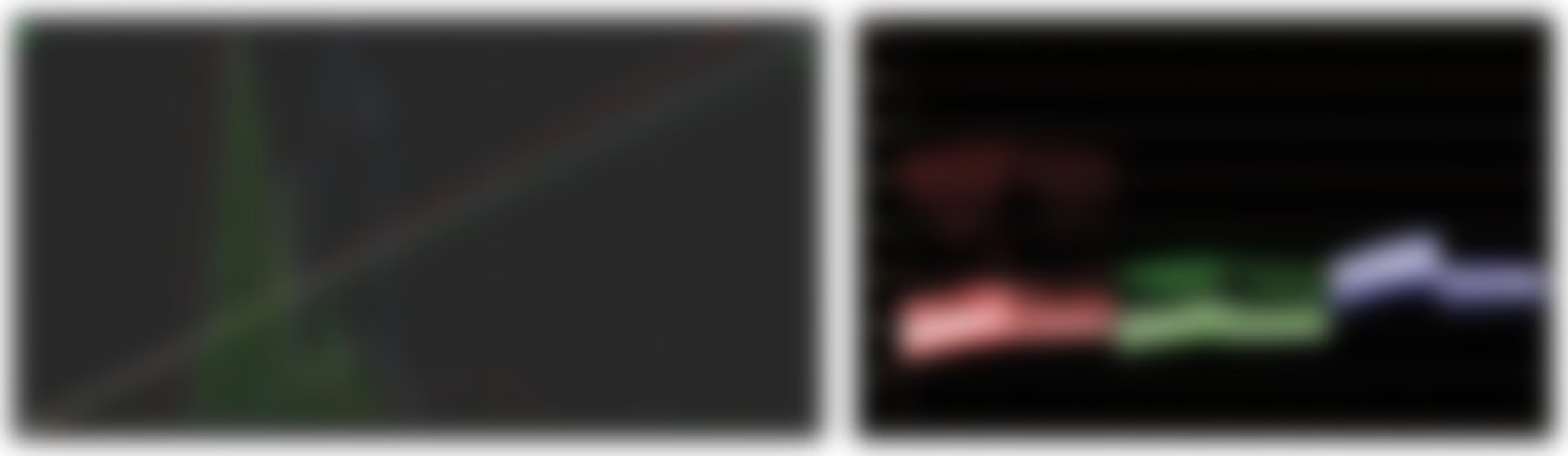
With the channels behaving independently, you can attempt to match the curves once again.

Reset the Curves palette.

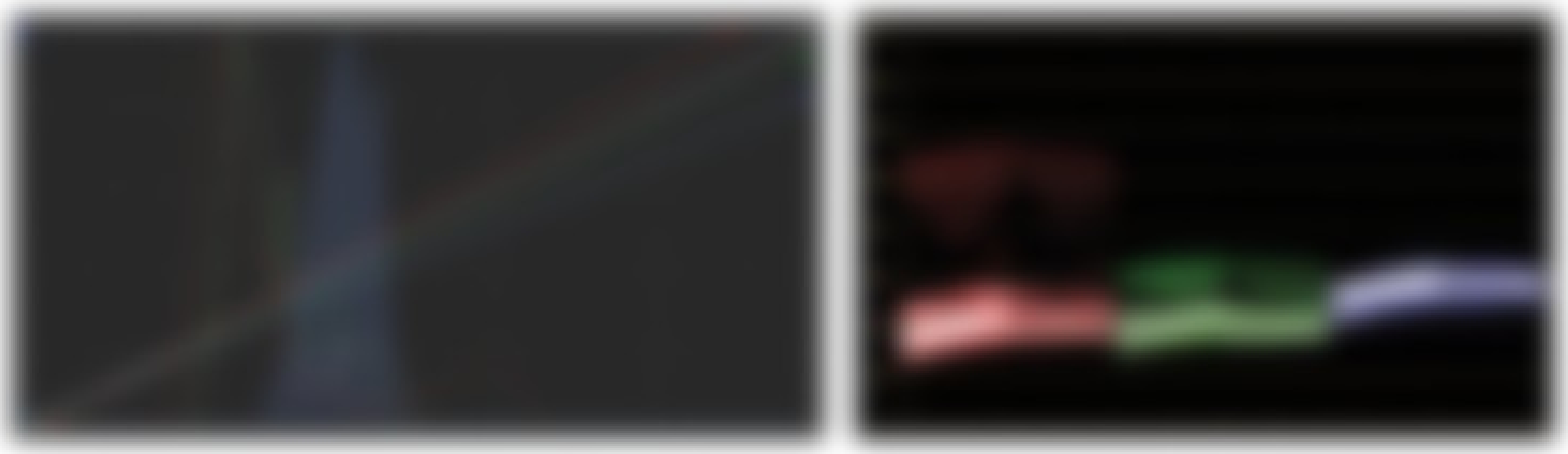
- Isolate the R curve again and drag the black and white points until the red channel in both parades has an equal spread.



- Isolate the G curve and reposition the black and white points to align the green parades.



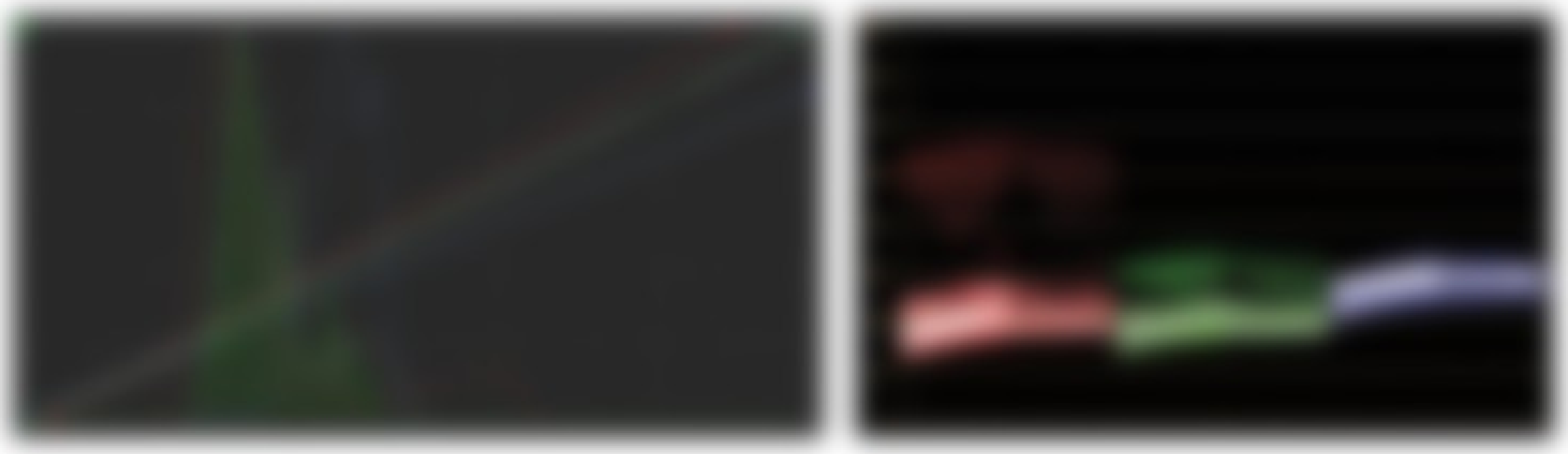
- Isolate the B curve and reposition the black and white points to align the blue parades.



It appears that the parades now equally match each other but the colors in clip 04 still do not match the reference in the viewer. This is because you have focused only on the highlights and shadows of the images. The midtones are equally important and can have a profound impact on image appearance.

Notice the bunching in the lower midtones of the channels. It represents the mountains in the image. Although the red and blue channels are aligned, the green channel is mismatched between clips 04 and 05.

- Add a control point to the green curve and drag until the midtones of the green channel line up more accurately. Adjust the green curve's black and white points if necessary.



  The match between the two parades results in a satisfactory visual similarity in the mountains and the sky. However, you can now continue to assess the match by eye and further refine the result.

  The close up shot could use some contrast to create greater depth between the mountain ranges in clip 04. This difference in contrast is representatively much finer discrepancies in the clips' parades that are too minor to target with primary grading tools.

- In the adjustment controls, tweak the Contrast to complete the match between the clips.

- Open the Sizing palette. In Reference Sizing mode, click the reset arrow to return the reference image to its original placement.

  If you do not perform this reset, all future reference images, including wipes/stills from the gallery, will have the same transform placement in the viewer.

- Disable the image wipe.

- Toggle between clips 03 and 04 to verify that the match is successful.

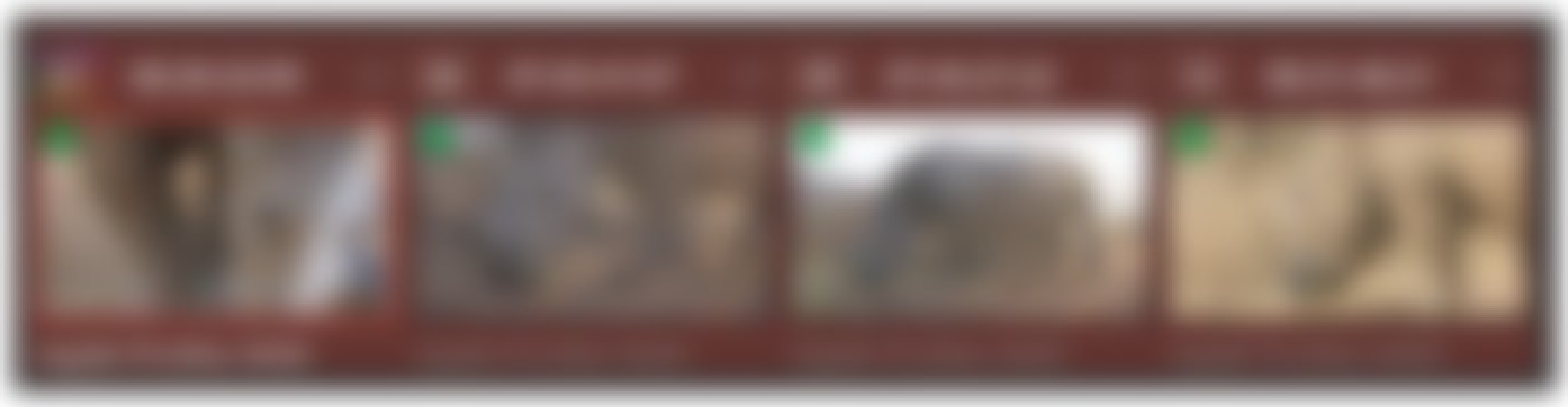
  When matching clips using the scopes, aim to equalize the heights and depths of the pixel spread and then detect any apparent bunching or mismatching in the midtones to address any remaining color issues. By displaying an exact readout of the RGB values of each clip, scopes can help you remove the guesswork that might accompany the minute tweaking of midtone ranges and allow you to approach the image from a more empirical yet creative mindset.

Using Split-Screen Views to Compare Clips

An alternative method of visually comparing clips within the viewer is by using a split-screen display. Instead of overlapping and wiping the still of a single image, you can display the media from multiple clips side by side. The media you use could be from other clips in the timeline, stills in the gallery, different versions of grades (Lesson 6), or other clips in the same group (Lesson 7).

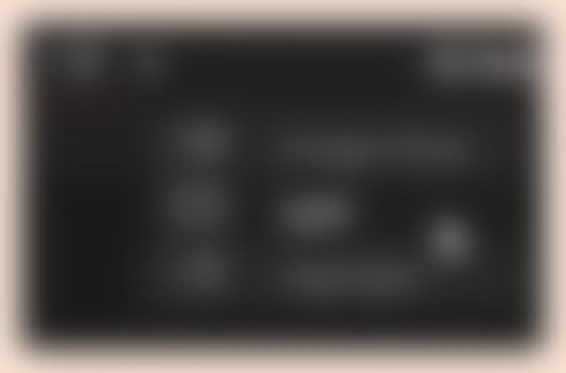
This comparison method is especially effective when you already have a collection of clips that are similar in appearance and you need a wider visual reference of a scene or environment.

- In the green flag filtered timeline, select clip 07. This clip is already balanced with custom curves.
- Shift-click clip 10 to highlight clips 07 to 10.

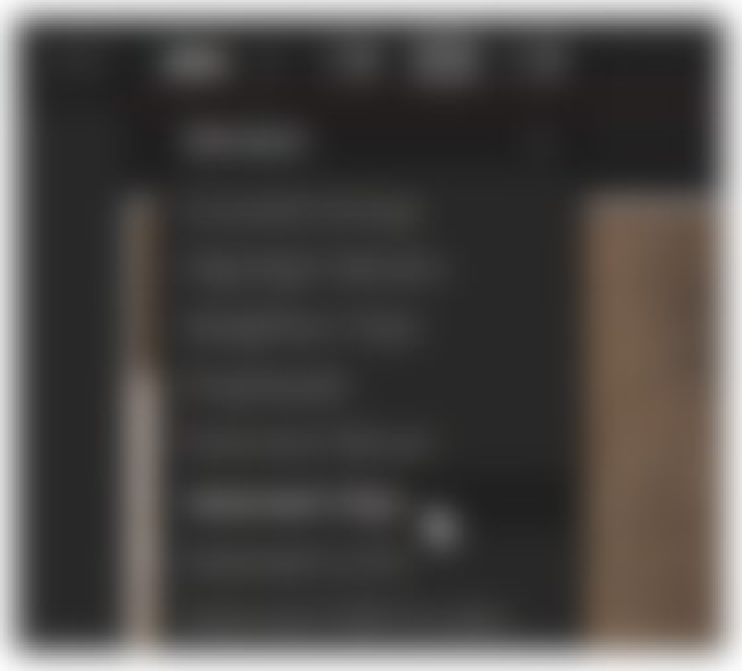


- In the upper left of the viewer, click the Split Screen button or open the viewer options in the upper right and choose Split Screen > On.

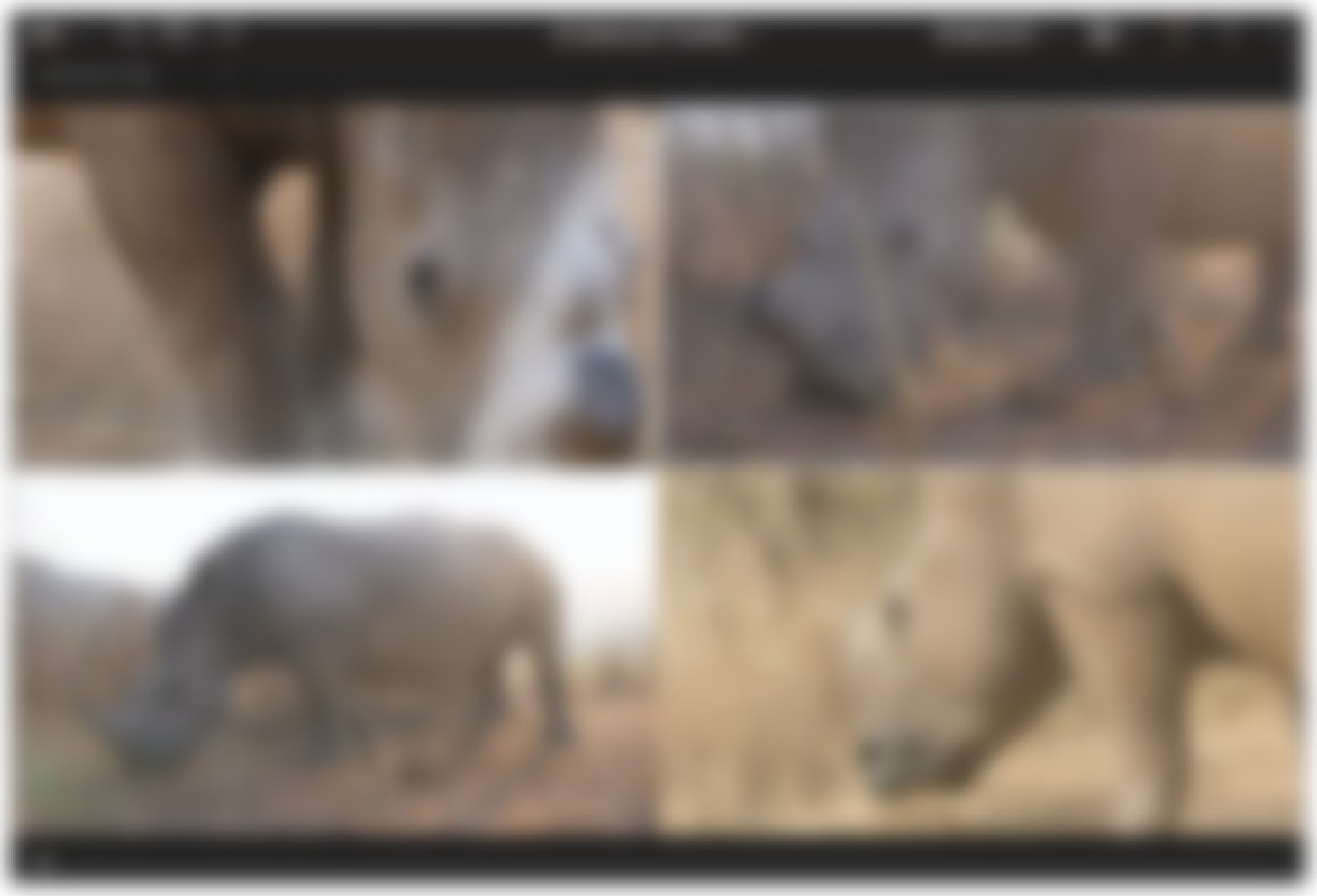
NOTE If you cannot see the Split Screen button, it may be because your viewer window is too small to accommodate it. Click the disclosure arrow next to the Image Wipe button to reveal the list of viewer modes and select Split.



- In the upper left dropdown menu, choose Selected Clips to display all four clips.



- In the viewer, click the upper right image to select clip 06 on the timeline. The selection is indicated by a white outline in the viewer and an orange highlight in the timeline.



Changes made to the color page palettes will impact whichever clip is actively selected in the split screen view. You can perform approximate grade matching by switching between clips in split screen view, visually comparing them, and making quick adjustments in the Primaries color wheels and curves.

Reading scopes and evaluating their data can be a straightforward process, but it still requires a bit of practice to develop a critical eye and grade with finesse. Over time, you will gain a better intuition for which sections of the trace should be used and which can be ignored for better adjustment of highlights, midtones, and shadows. Shot matching is a highly valued skill set that requires plenty of patience and experience, so keep at it!

Self-Guided Exercises

Complete the following exercises in the green flag filtered [illegible] Timeline to test your understanding of the tools and workflows covered in this lesson.

Clips 08, 09, and 10 – Match these clips to clip 07 using any of the methods covered in the lesson. For an added challenge, try matching each clip using every method covered in the lesson (Auto Shot Match, Primaries color bars, and Curves) to get a better understanding of their usage and to develop your personal grading preferences.

When you've completed these exercises, open the [illegible] Completed Timeline to compare your matching to the Match nodes in that "solved" timeline.

Lesson Review

1. How can you filter a timeline to show only clips with a flag?
2. When performing an automatic shot match, you might right-click the clip you have selected and not see "Shot Match to this Clip" in the contextual menu. Why?
3. True or false? It is possible to use a timeline clip as a reference in the viewer without first creating a still.
4. How do you prevent changes made to one color channel from affecting the waveform trace of the other two channels?
5. Which viewer mode allows you to see multiple clips in the viewer at the same time?

Answers

1. Click the disclosure arrow next to the Clips button and choose Flagged Clips.
2. The clip you have selected is the one that will be receiving the automatic shot match adjustment, so "Shot Match to this Clip" cannot be an option. Right click any other clip on the timeline and "Shot Match to this Clip" will appear in the contextual menu.
3. True. To do so, right click a clip in the timeline and choose "Wipe Timeline Clip."
4. In the Primaries palette, set Lum Mix to 0.
5. Split Screen mode allows you to see multiple clips in the viewer at once.

Lesson 3

Correcting and Enhancing Isolated Areas

After balancing and shot matching, you might need to target details in the shots for more specific enhancement. This is the secondary color grading stage.

Secondary color grading is not a standardized phase of the color grading process. Instead, it is a needs-driven component of the workflow that is utilized only when a shot requires it. It enables you to achieve a wide variety of goals that improve the overall aesthetic and creative quality of the footage, as well as to fix continuity errors.

In the first part of this lesson, you'll review some of the common applications of secondary grading using qualifiers and windows. Your goal will be to isolate areas of the image for color and effect enhancement with the purpose of attracting the viewer's eye.

Time

This lesson takes approximately [illegible] hours to complete.

Goals

Controlling the Viewer's Eye [illegible]
Sharpening Key Elements [illegible]
Fixing Overcast Skies [illegible]
Warping Color Ranges [illegible]
Enhancing Skin Tones with Face Refinement [illegible]
Adjusting Skin Tones Manually [illegible]
Self-Guided Exercises [illegible]
Lesson Review [illegible]

In the second part of this lesson, you will use more nuanced tools to clean up oversaturated or overblown skies, adjust regions of an image based on hue, and calibrate skin tones to produce smoother, more natural results for the subject. Throughout the lesson, you will also employ some of the tools available in the Effects panel to see how subtle adjustments can exert an enormous effect on the emotional impact of an image.

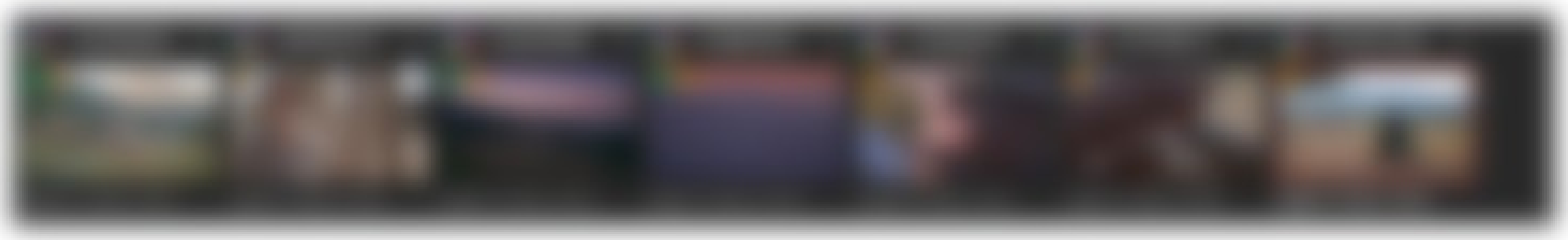
Controlling the Viewer's Eye

A film's musical score and sound effects can have a resounding impact on audience perception. Similarly, color and light play a crucial role in manipulating the way an audience interprets a scene. In this lesson, you will focus on the fine art of shaping light to control the viewer's eye.

Drawing Attention Using Windows and Saturation

A simple alteration can dynamically reimagine the composition and mood of a shot. In this exercise, you'll enhance the saturation in the vibrant, sunlit areas of a field to give a scene a more dramatic feel.

1. In the Project 01 – Kisumu Documentary project, open 01 Neutral timeline.
2. In the Clips pop-up menu, choose All Clips to remove the green filter in the timeline.
3. Filter the timeline to show only those clips with yellow flags.



4. In the yellow flag filtered timeline, select clip 07. This clip already has a first node labeled Lum.

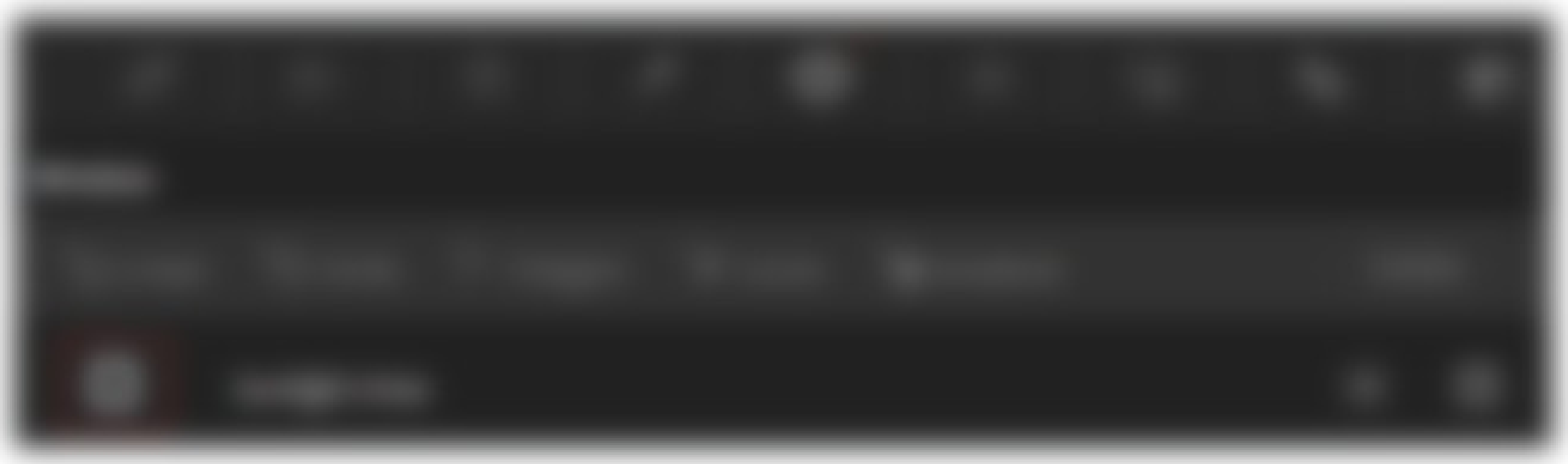
5 Create a second node and label it **Sunlight**.

6 In the central palettes toolbar, click the Windows palette button. You'll use a Power Window to specify the region of the image you will grade.

7 Click the Linear window button to activate it. It's the square-shaped window at the top of the preset windows list.

When activated, the button has an orange outline, and you will see the onscreen window controls in the viewer.

8 Double-click to the right of the window button thumbnail and enter the name **Sunlight Area**.

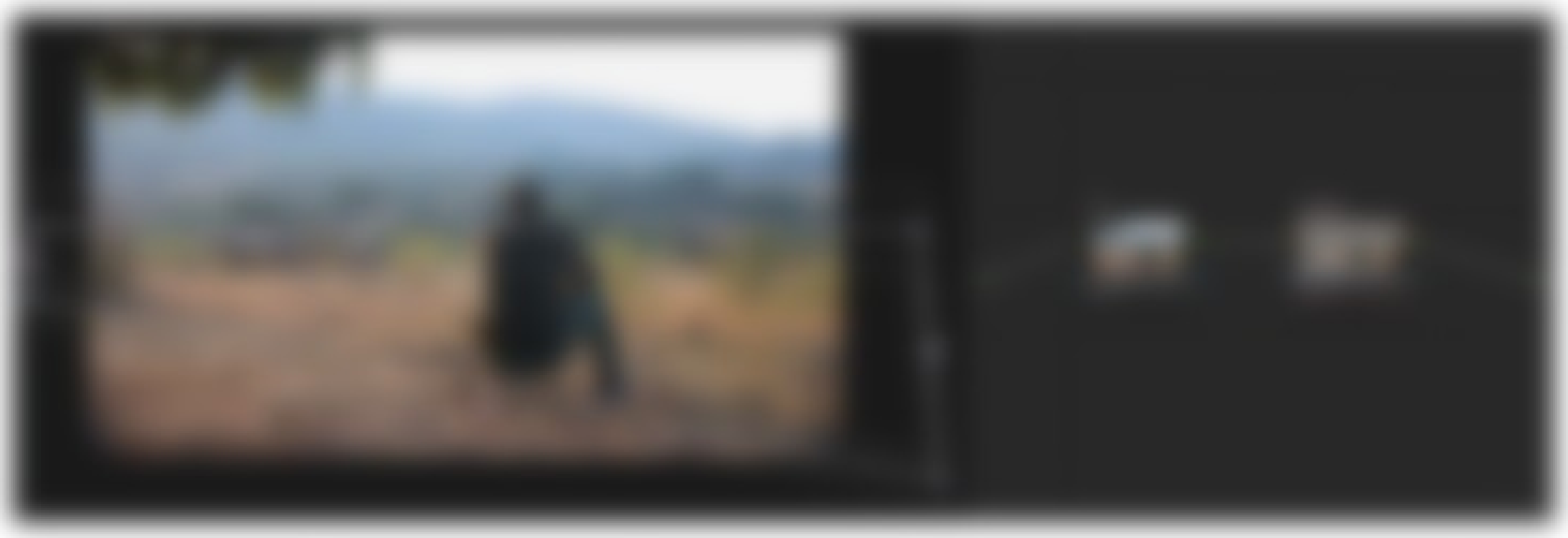


9 Use your mouse scroll wheel in the viewer or press Command - (minus sign) in macOS or Ctrl - (minus sign) in Windows to zoom out. This will allow you to maneuver the window's control points beyond the image frame.

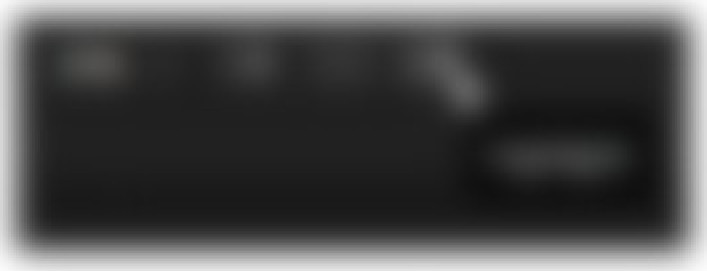
TIP In addition to using your mouse scroll wheel to zoom in and out of the viewer, you can click your middle mouse button and drag to pan. If you do not have a middle mouse button, hold Ctrl (macOS) or Command (Windows) and scroll to move vertically in the viewer and hold Shift-Command (macOS) or Shift-Ctrl (Windows) and scroll to move horizontally. To reset the viewer, press Z on your keyboard.

10 In the viewer, move the four edges of the window to select the entire horizontal middle of the image where the sun hits the ground. Make sure to adjust the shape to mimic the path of the sunlight.

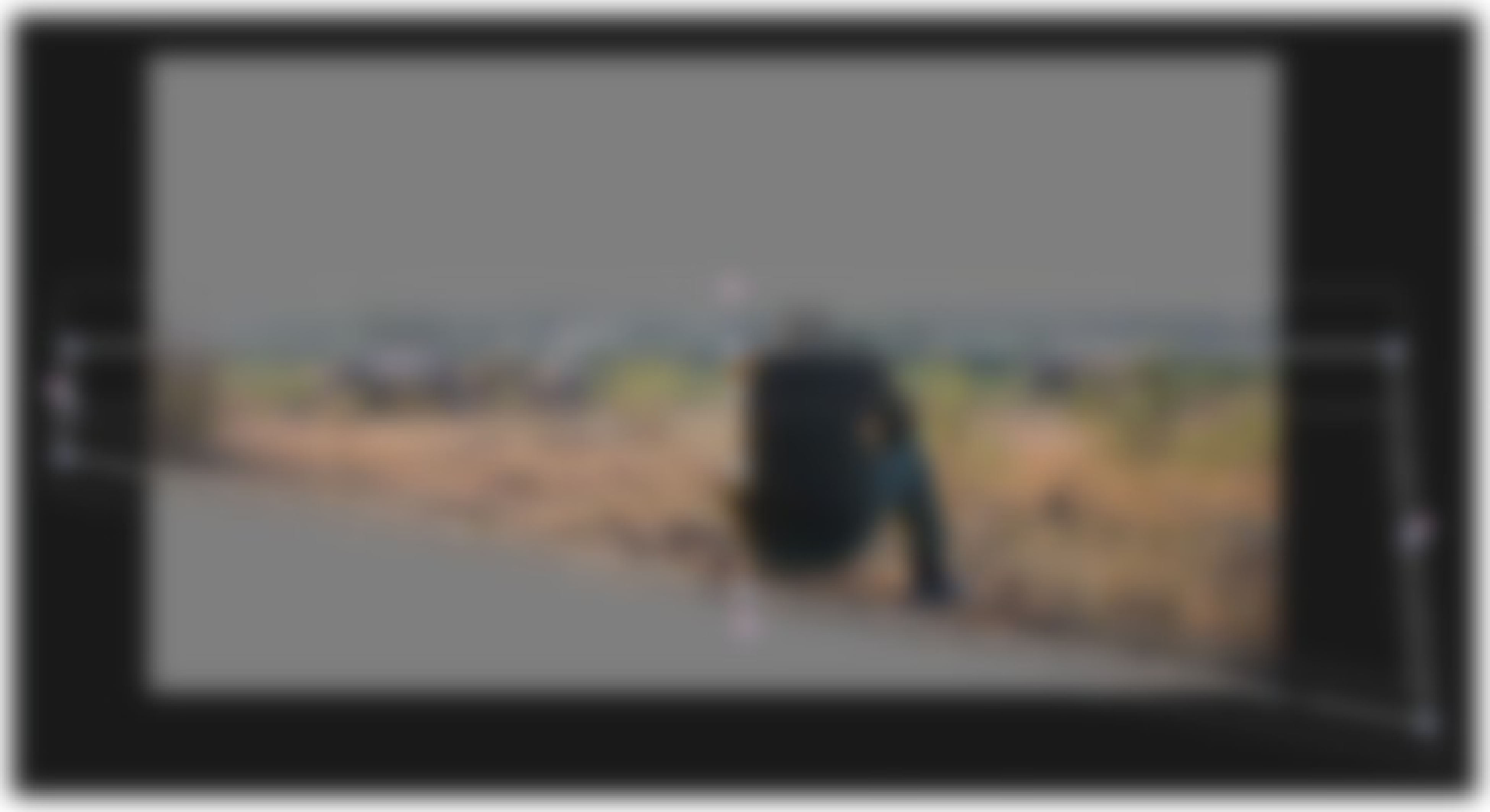
- In the viewer, drag the red points of the window outline to increase the softness around its upper and lower edges.



- To review your Power Window selection, click the highlight button in the upper left corner of the viewer.



The viewer shows the part of the image that will be affected when you begin grading in this node and turns the area outside of the selection gray.



- Click the Highlight button again to disable highlight mode and return to your full frame.

  With the secondary selection created, you can begin to grade the image.

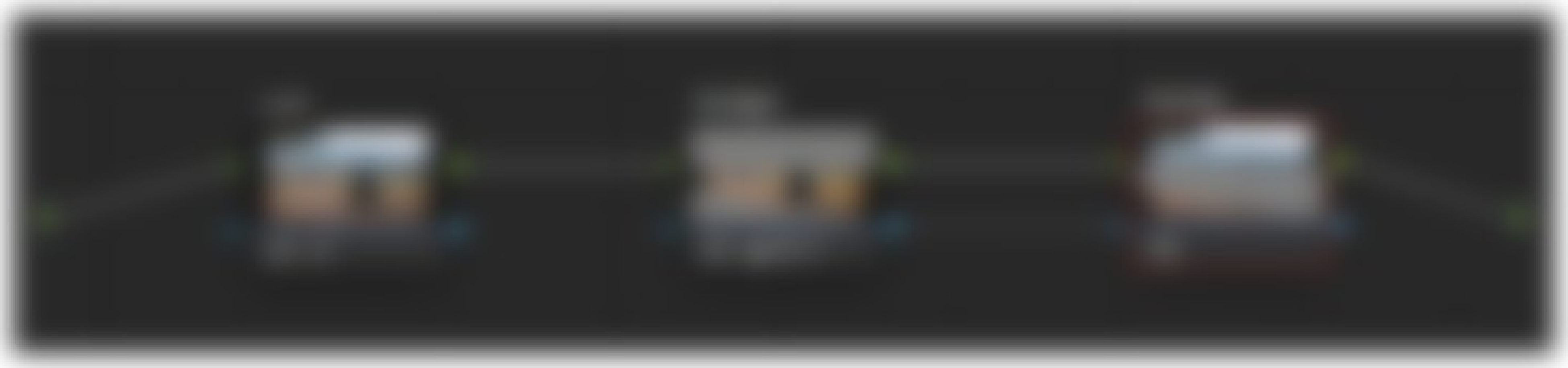
- In the Primaries palette, increase the Sat to [illegible] and the Contrast to [illegible].

  > TIP Toggle the onscreen window controls in the viewer by pressing Shift-~ (tilde) on your keyboard. You can use this keyboard shortcut to hide the outline and better see the impact of your grade on the image.

  This small change dramatically amplifies the golden sunlight in the scene and draws the viewer's eye to the ranger in the foreground and the forest he is protecting. Next, you will reduce focus on the non-essential details around them.

- With the Sunlight node still selected in the Node Editor, right-click it and choose Add Node > Add Outside or press Option-O (macOS) or Alt-O (Windows). This inverse selection will allow you to grade the environment around the Sunlight Area window.

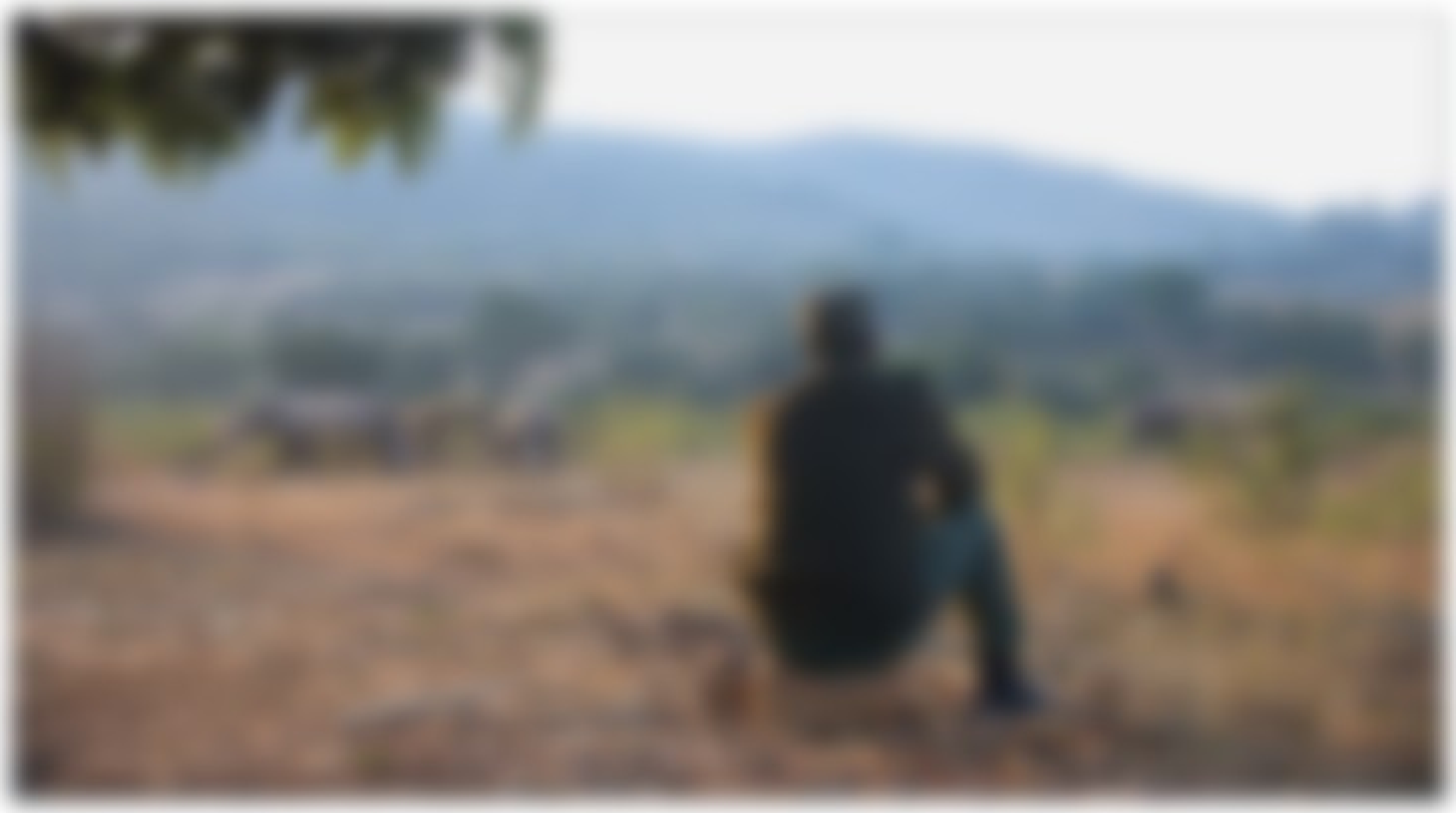
- Label node [illegible] **Outside**.



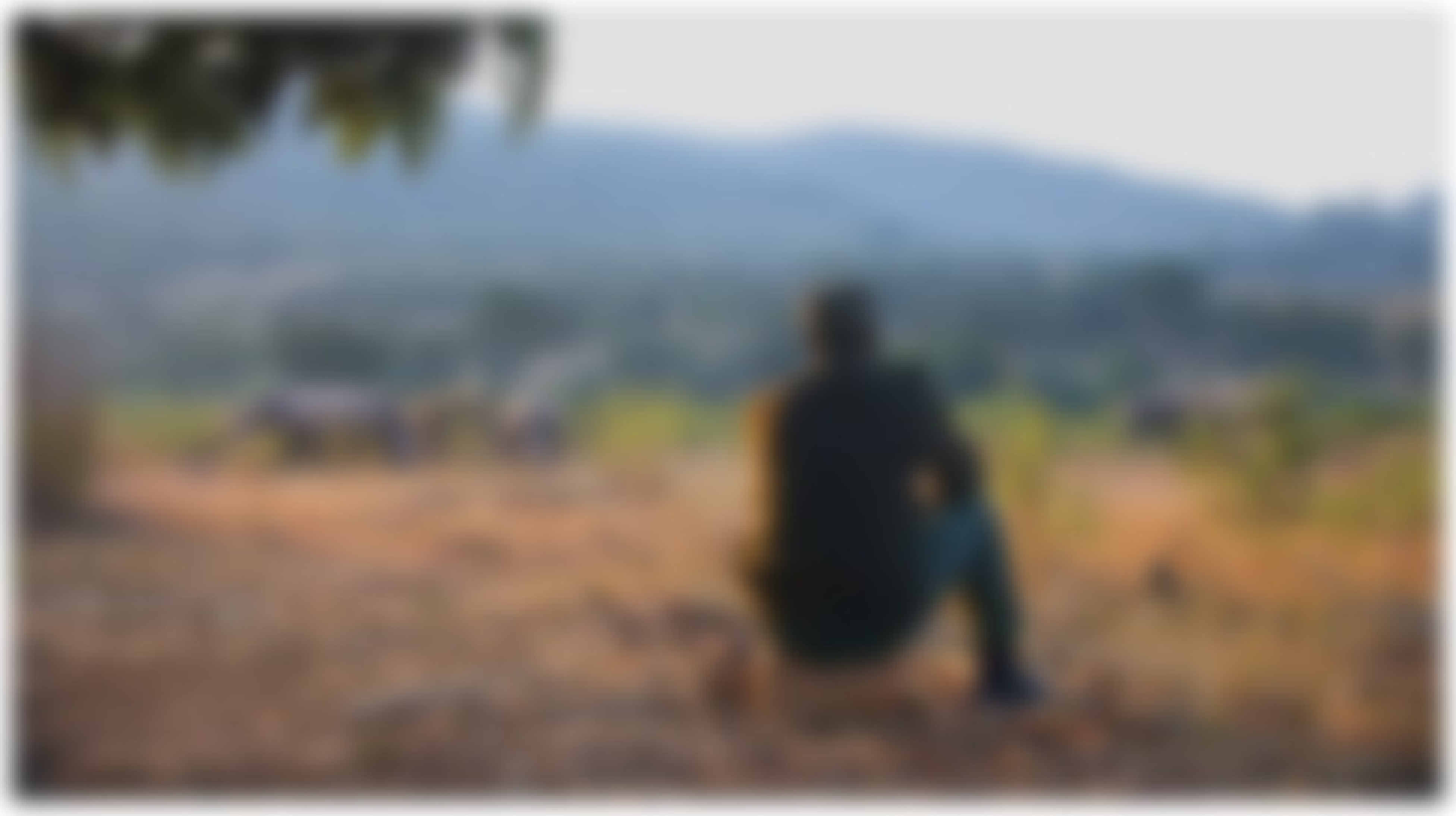
  One of the greatest benefits of working with nodes is the live nature of their video and key signal connections. The Outside node is directly using the previous node's key (selection) data, so if you were to make changes to the Sunlight Area window in the Sunlight node, it would immediately reflect on the key of the Outside node.

- Drag the Gamma master wheel ([illegible]) to decrease the brightness and reduce the Contrast ([illegible]).

Doing so creates a dark framing effect around the figure of the man and further draws the eye toward the sunlight on the field.



Before



After

Mimicking a Shallow Depth of Field

The Tilt-Shift Blur in the Effects panel imitates the look of a shallow focus lens to direct the audience's attention. With it, you can achieve effects that a lens could not—such as reducing the focus of elements contained within the same focal field and selecting the blur type, amount, and angle.

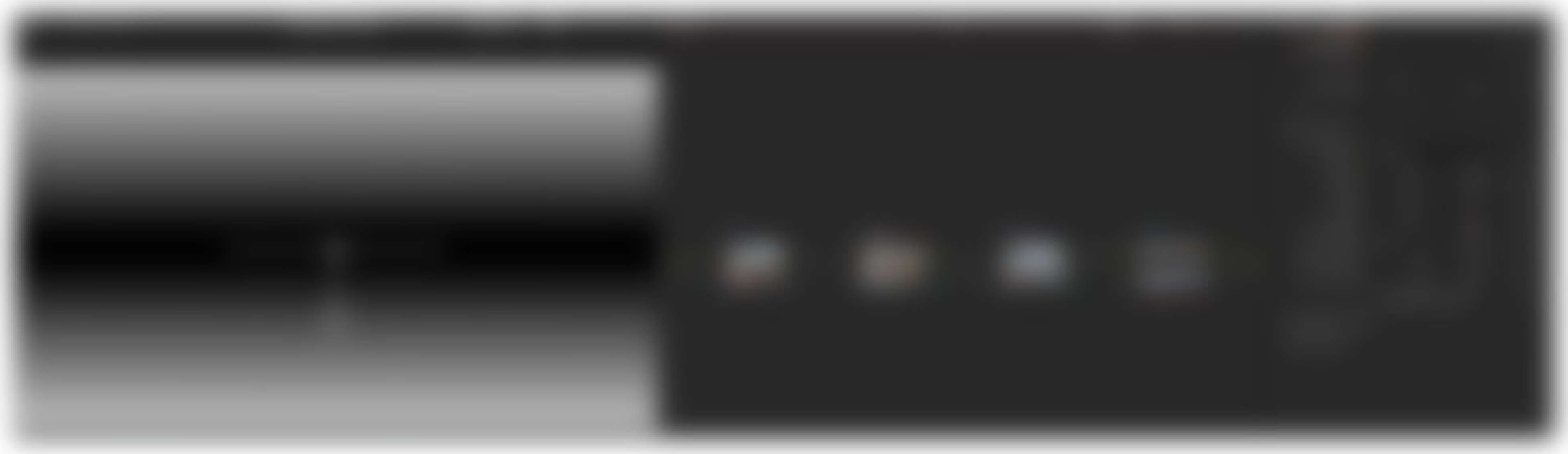
NOTE The following exercise requires DaVinci Resolve Studio to complete.

You will continue to work on clip 07 in the yellow flag filtered timeline.

1. Create a new serial node (node 04) and label it Tilt-Shift.
2. In the interface toolbar, click the Effects button.
3. In the Effects Library panel, under ResolveFX Stylize, locate the Tilt-Shift Blur effect.
4. Drag the Tilt-Shift Blur effect onto the empty Tilt-Shift node.

   The Effects Library switches to the Effects Settings panel in which you can tweak the Tilt-Shift Blur effect controls.

5. In the Settings panel, in the Depth of Field category, select Depth Map Preview to review the matte map.



You encountered a Depth Map previously in Lesson 1. As a reminder, the matte represents the area where an effect is applied. White indicates full opacity, black indicates complete transparency, and grayscale is the range of semi-opacity between the two values.

Currently, the map is level with the horizon and is successfully targeting the rhinos in the background. However, it is not an entirely realistic composite. The depth of field is too extreme at the top and bottom of the image, while still maintaining focus on both the man in front of the camera and the rhinos hundreds of yards in front of him.

TIP Repeatedly select and deselect Depth Map Preview to visually assess the position of the Tilt-Shift Blur matte in relation to the image when determining the placement of the Tilt-Shift effect.

- Adjust the matte spread by dragging the In Focus Range pointer to the right ([illegible]) to include more of the man in the focused range of the shot.
- Adjust the vertical position of the matte by dragging the Center Y value down ([illegible]) to ensure that the area directly behind the rhinos goes softly out of focus.
- Deselect Depth Map Preview.
- Slightly decrease the Near Blur Range ([illegible]) and Far Blur Range ([illegible]) values to reduce the severity of the blur and produce a more realistic result.

Before

After

Focusing Attention with Vignettes

In filmmaking, a vignette refers to the darkened edges of a film frame that are usually created as a result of the matte box casting a shadow on the camera lens. With the advancement of camera and lens equipment, natural vignettes are no longer an issue. However, their absence has caused an appreciation for the framing service they provided, and vignettes are now sought after for both creative and compositing purposes as an effective method of directing the viewer's eye.

In this simple exercise, you will apply a circle window to a shot and reduce the brightness of the area around it to create a vignette around the central subject. You will continue to work on clip 07 in the yellow flag filtered timeline.

1 Create a new serial node (node 05) and label it Vignette.

2 In the Window palette, click the Circle window button.

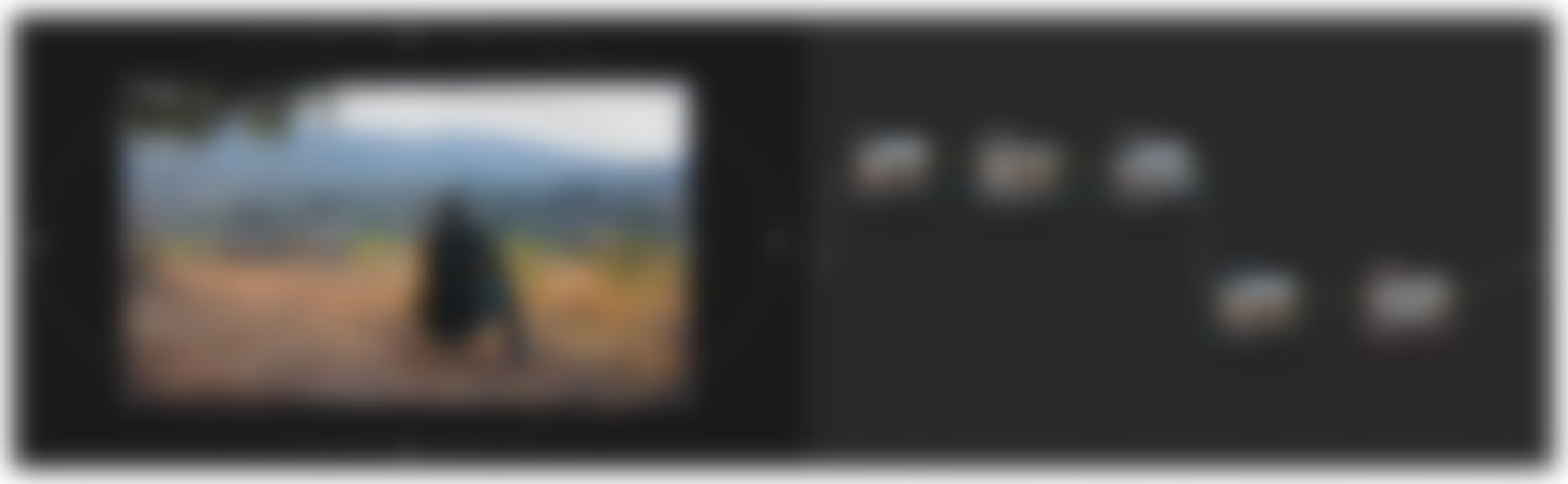
3 Ensure that the viewer's onscreen controls pop-up menu (in the lower left of the viewer) is set to Power Window.

Vignettes are usually elliptical since that reduces their visibility and makes it easier to seamlessly blend them into the footage, as compared to shapes with straight lines and corners.

4 Double-click the layer name field next to the circle window and type **Vignette Frame**.

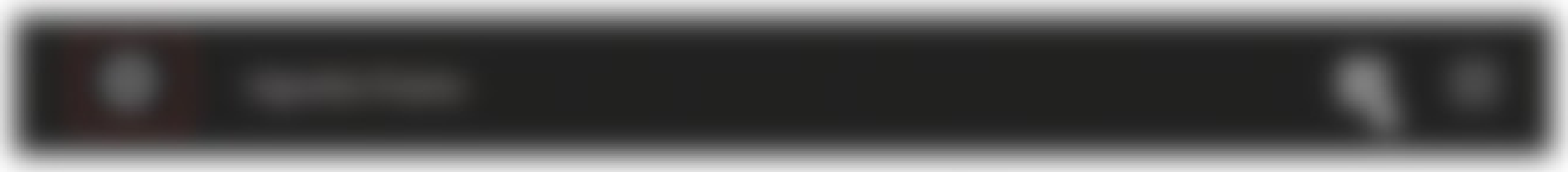
5 Use the onscreen transform controls to reposition and rescale the circle to completely fill the viewer frame.

6 In the onscreen controls, drag one of the midpoints to create a wide, soft edge around the selection.



In the Node Editor, the Vignette node thumbnail preview shows that you have selected the subjects in the center of the frame. To use the node as a vignette, you will need to invert this selection.

7. In the viewer's Windows palette, on the right side of the circle window row, click the invert icon.



8. In the onscreen controls pop-up menu, choose Off to hide the window outline.
9. With the vignette shape created, you can proceed to use the primary grading tools to create a vignette effect on the image. Reduce the brightness of the selected area by dragging the Gamma master wheel to the left (-0.05). Using the gamma tonal range will ensure that you are not darkening overly bright areas of the footage, such as the overcast sky, which would make the vignette too obvious.

> **TIP** Vignettes are most effective when they are subtle. If you're concerned that your vignette may be too prominent, review the thumbnail of the clip in the timeline to determine whether the vignette is overly pronounced in the corners. If so, raise the Gamma back up to reduce its strength or further soften the Power Window's edges to blend it more seamlessly into the image.

You can also save the vignette you just generated for future use as a preset.

10. In the Window palette, ensure that the appropriate window (Vignette Frame) is selected in the window list.
11. In the upper-right corner of the palette, click the Options button and choose Save as New Preset.
12. Enter the preset name as **Vignette**.

From now on, when you want to apply this exact shape to a node in any other clip, you need only access the Window palette option menu and choose the preset Vignette.

> **TIP** A Vignette Effect is also available in the Effects Library on the Resolve FX Stylize category for quick application of a simple, customizable vignette.

It takes careful consideration and assembly of secondary grading to draw the eye of the audience without calling attention to the image manipulation. When an audience becomes aware of the colorist's handiwork, it can break the illusion of realism and compromise immersion in the narrative.

Using the Mini Panel – Power Windows

Using a DaVinci Resolve Mini Panel to create windows is quick and easy. To start, press the Windows button in the upper left of the panel. The 5-inch screens will display a row of Power Window presets along the top.

Select the desired preset and then press Window On to activate it in the node.

Then use the knobs under the screens to simultaneously adjust the size, pan, tilt, aspect ratio, softness, and opacity of your window. With practice, you'll find that using the Mini Panel is a faster method of setting up Power Windows than using a mouse.

You can also find nodes with built-in windows in the node controls of the Mini Panel, where the most common node commands are accessed. Press the Node + soft keys to create a new serial node with a window already activated, thereby turning two commonly used shortcuts into one. Pressing the Node + Circle button, for example, creates a new node with a circular Power Window.

Sharpening Key Elements

The Blur palette in the central palettes of the color page contains a Sharpen mode. It works best when used sparingly and when applied at the end of a grading pipeline. Too much artificial sharpening can introduce image artifacts and stand out for the wrong reasons. When used precisely, sharpening can make details look more dynamic and draw the viewer's eye to a desired object.

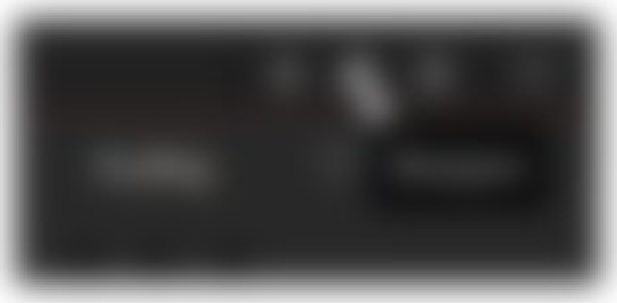
- In the yellow flag filtered timeline, select clip 06.

The clip begins with a man's hand obscuring the shot. In such cases, it's a good idea to play through the clip until you find a better starting point for grading and adding effects.

- In the viewer jog bar, drag the playhead to the center of the clip.

- Create a second node and label it **Sharp**.
- In the central palettes, open the Blur palette.

- In the upper right corner of the palette, press the second icon to activate the Sharpen mode.

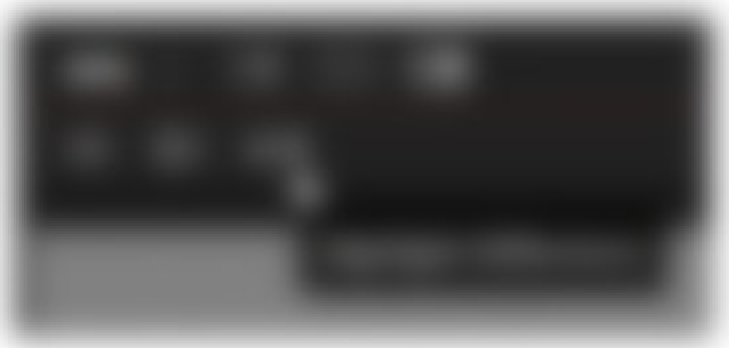


The main control in the Sharpen palette is the Radius. Dragging it upward will blur the image, while dragging it down will sharpen the edges of any high-contrast detail.

- Reduce the Radius by dragging down any of the three channel sliders. The RGB channels are ganged by default, so adjusting one will equally alter the other two.

Although it's easy to see that the engravings become more detailed with this adjustment, the severity of the impact that sharpening has on the rest of the image is more difficult to determine by eye.

- Above the viewer, click the Highlight button, and then click the A/B Highlight Difference button in the upper left corner.

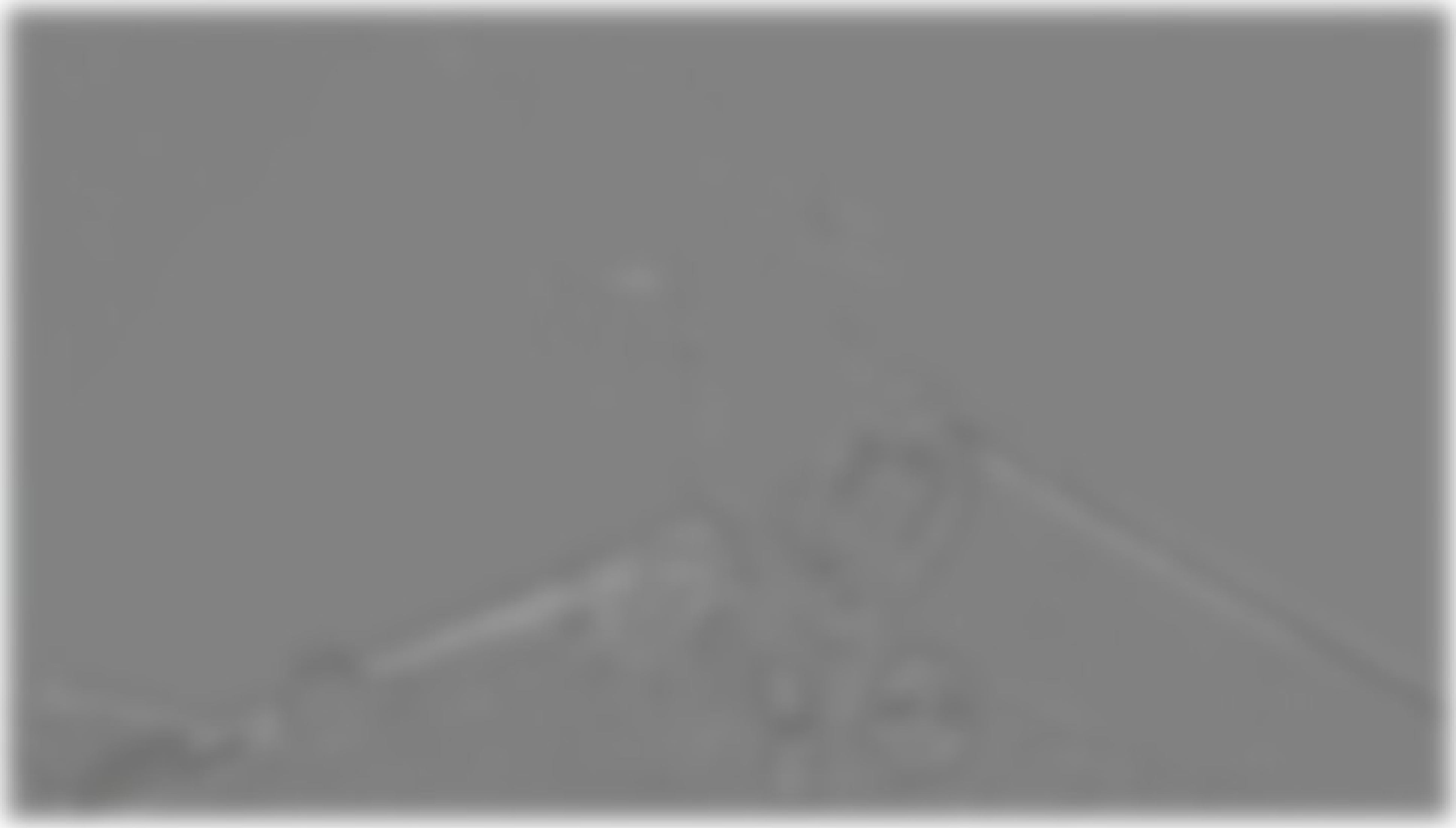


A/B Highlight Difference shows you the change that has occurred in an image within an active node. If color grading, A/B will display the areas of the image that have changed hue and tone. If there have been pixel-based changes, like sharpening, A/B will display the object edges affected by the adjustment.

- Adjust the Radius to about [illegible] for a satisfactory level of detail on the shotgun engraving but without overly emphasizing the barrel and the smoke coming out of it.
- In the Sharpen palette, increase the Scaling to [illegible]. Doing so will multiply the result of the Radius adjustment.

With the sharpening affecting the image uniformly, you might see some unwanted artifacts, like the increased noise pattern throughout the frame. You can limit the sharpening effect using the Coring Softness and Level controls at the bottom of the palette.

- Increase the Level to around 10–15 until the fine noise in the image is removed. The Level determines the size of the details that are impacted by the Sharpen tool. As you increase it, smaller detail is omitted from the sharpening effect.
- Increase the Coring Softness to around 5 to gently recover some of the sharpening lost after the Level threshold adjustment. You can think of the Coring Softness as similar to the soft control points in the Power Windows that determine the softness of the matte edge.



To see the results in the image, you can disable the highlight.

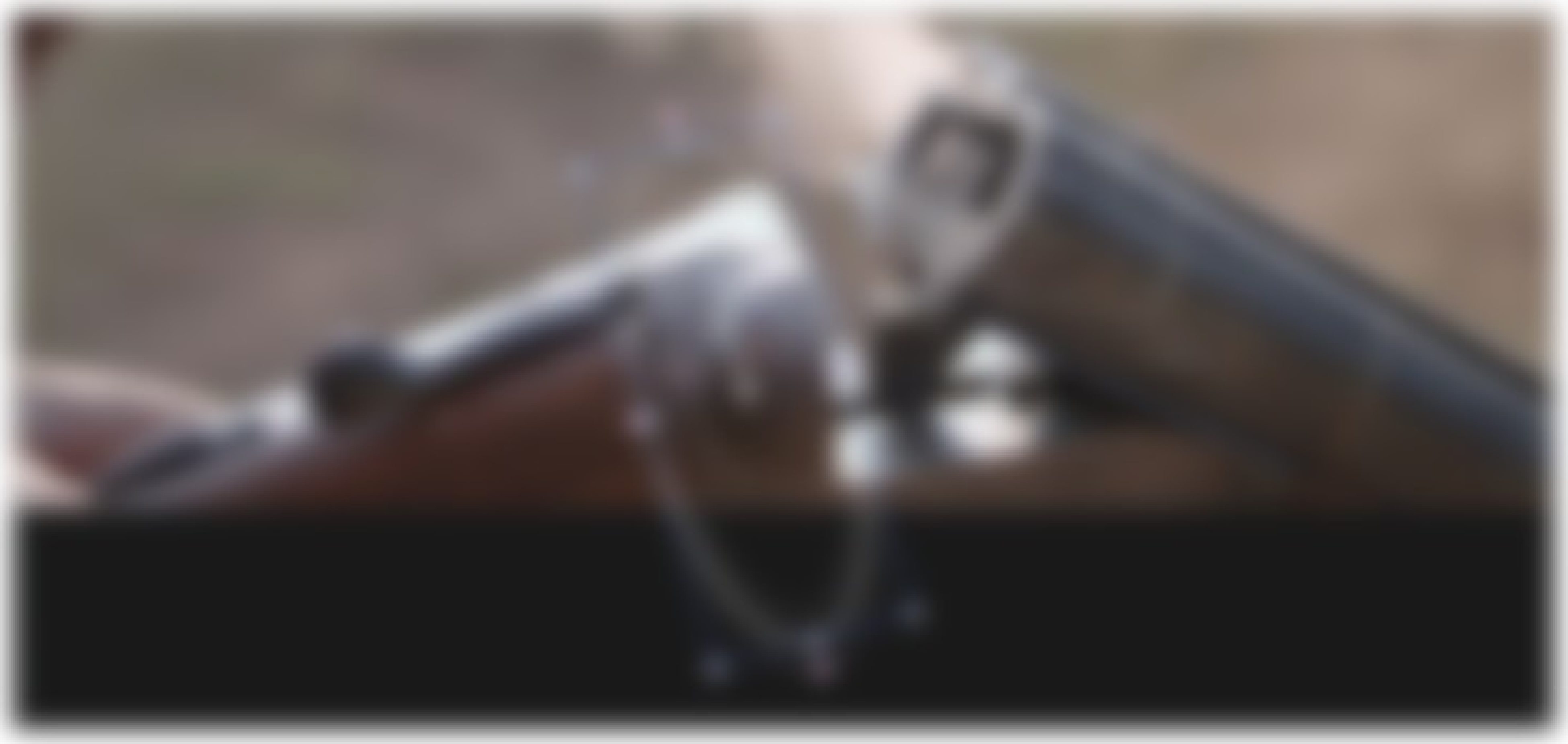
- Click the Highlight button above the viewer or press Command-Shift-H (macOS) or Ctrl-Shift-H (Windows).
- Toggle Command-D (macOS) or Ctrl-D (Windows) to bypass the Sharp node and compare your results to the original image.

Although the sharpness looks very nice on the engravings, it appears overly sharp on the left hand at the end of the clip, and on the shotgun shell at the start. You can use a window to limit the sharpening effect to a specific area in the shot.

Tracking Obscured Objects

Adding a simple circular window to the Sharp node will allow you to confine the sharpening to the decorative engravings on the shotgun breech chamber.

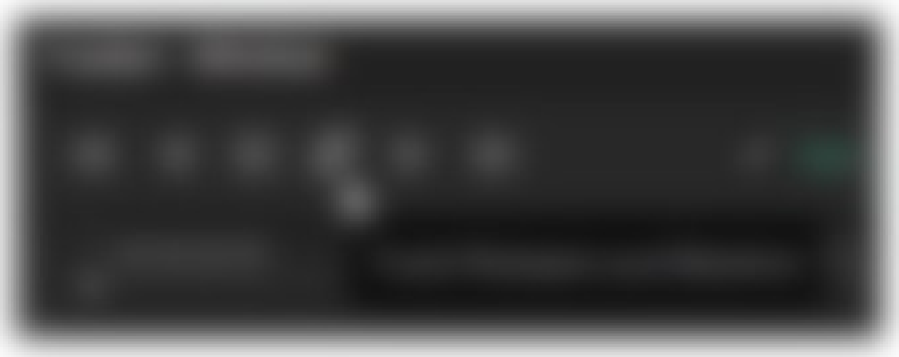
1. In the Sharp node of clip 05, create a circle window and name it **[illegible]** [illegible].
2. Make the circle smaller and narrower, and rotate it so it confines the sharpening effect to just the engravings on the breech.



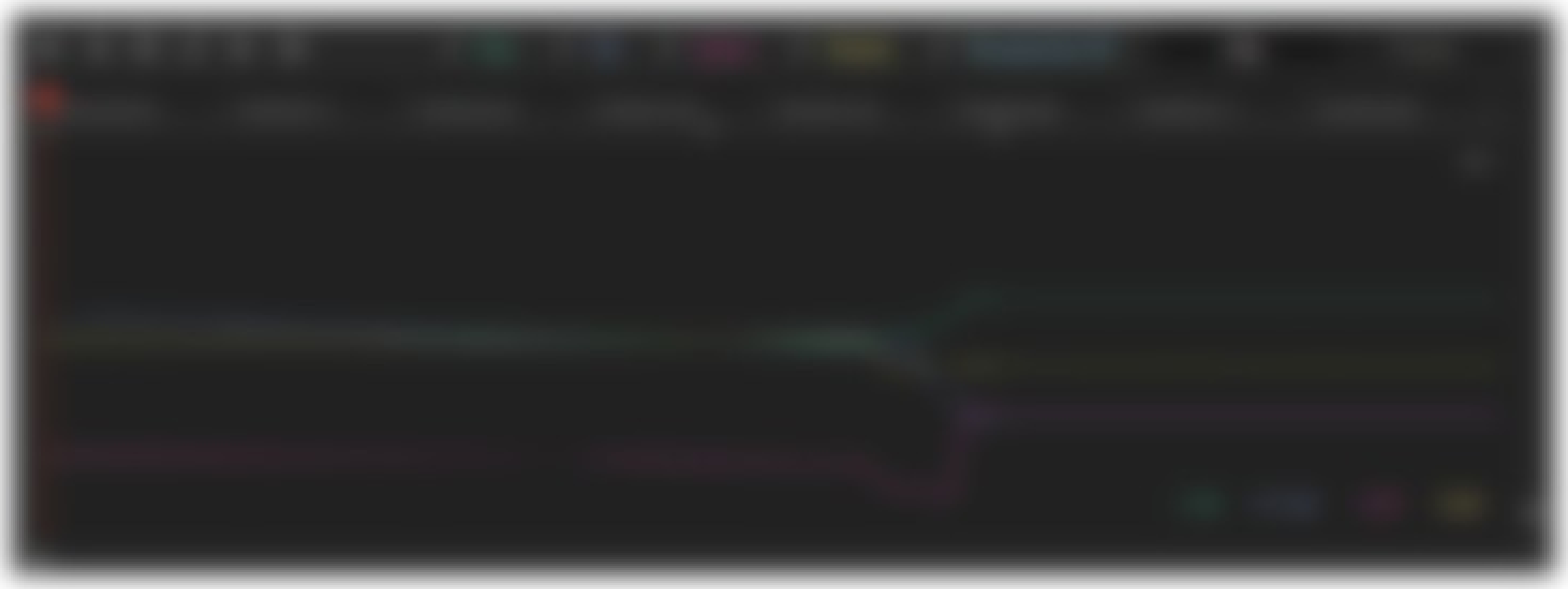
3. Drag the red control point on the window to soften the edges of the mask.

   The sharpening is now successfully isolated to the detail on the breech. However, scrubbing through the clip will reveal that this is a handheld camera shot, and the shotgun is moved as it is loaded. You'll need to track the window for the effect to follow the engravings.

4. In the central palettes toolbar, click the Tracker button next to the Window button.
5. With the playhead still in the center of the shot and your circle window placed on the detail just under the barrel, click the Track Forward and Reverse button. This action will trigger an analysis of motion within the clip, resulting in the window moving together with the shotgun.



As the analysis runs forward, the window disconnects from the shotgun detail due to the interference from the man's hand. This occasionally happens when performing a difficult or obstructed track, and it is useful to know how to fix the issue.



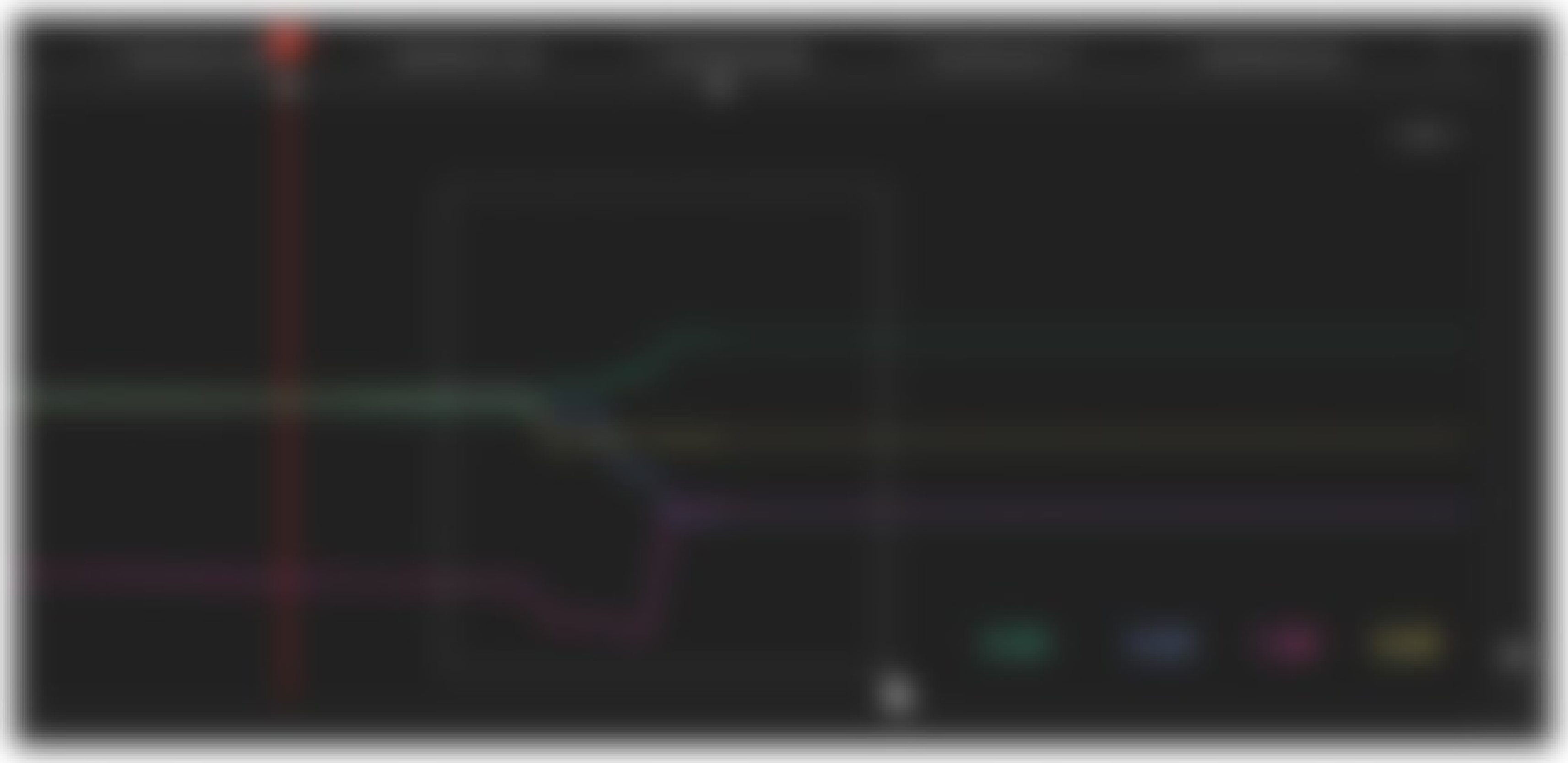
After the forward analysis, the playhead automatically jumps back to the starting frame and runs a backward analysis too. This analysis features no obstacles and successfully produces a clean track.

TIP It is common practice to track from the center or the end of a clip when doing so will provide more reliable tracking data than tracking from the first frame.

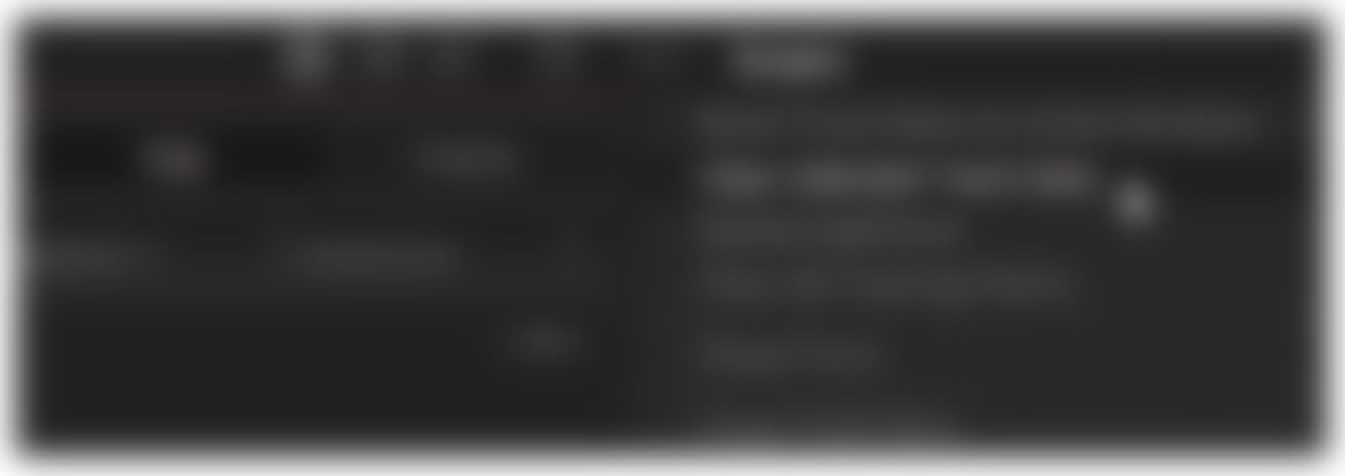
- In the upper right corner of the tracker graph, click the right keyframe navigation arrow to return the playhead to the central keyframe.

In the Tracker palette, you can see a visual representation of the amount of motion detected in each transformation parameter. Each colored line corresponds to the colored parameter label above the Tracker palette. Based on the sudden and erratic movement on the pan and tilt graph lines in the second half of the graph, the tracking data has become distorted. To fix the track, you must first remove the unusable "bad" track data.

- Drag within the tracker graph to draw a dotted selection outline around the bad track data.



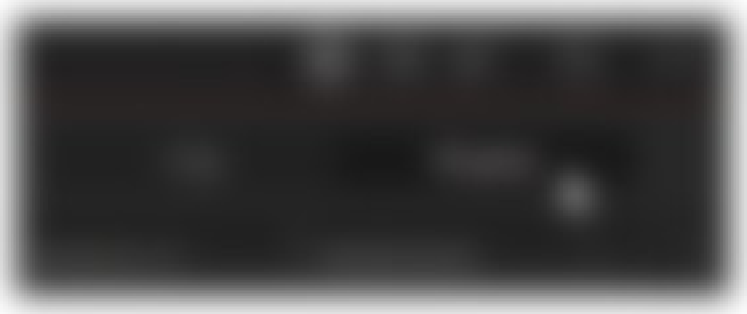
- In the Tracker palette, in the options menu (…), choose Clear Selected Track Data.



The track data in the selected area of the tracker graph is removed. Knowing that the track cannot be analyzed with the obstruction, you'll need to manually adjust the movement of the window during the time that the hand is in the shot.

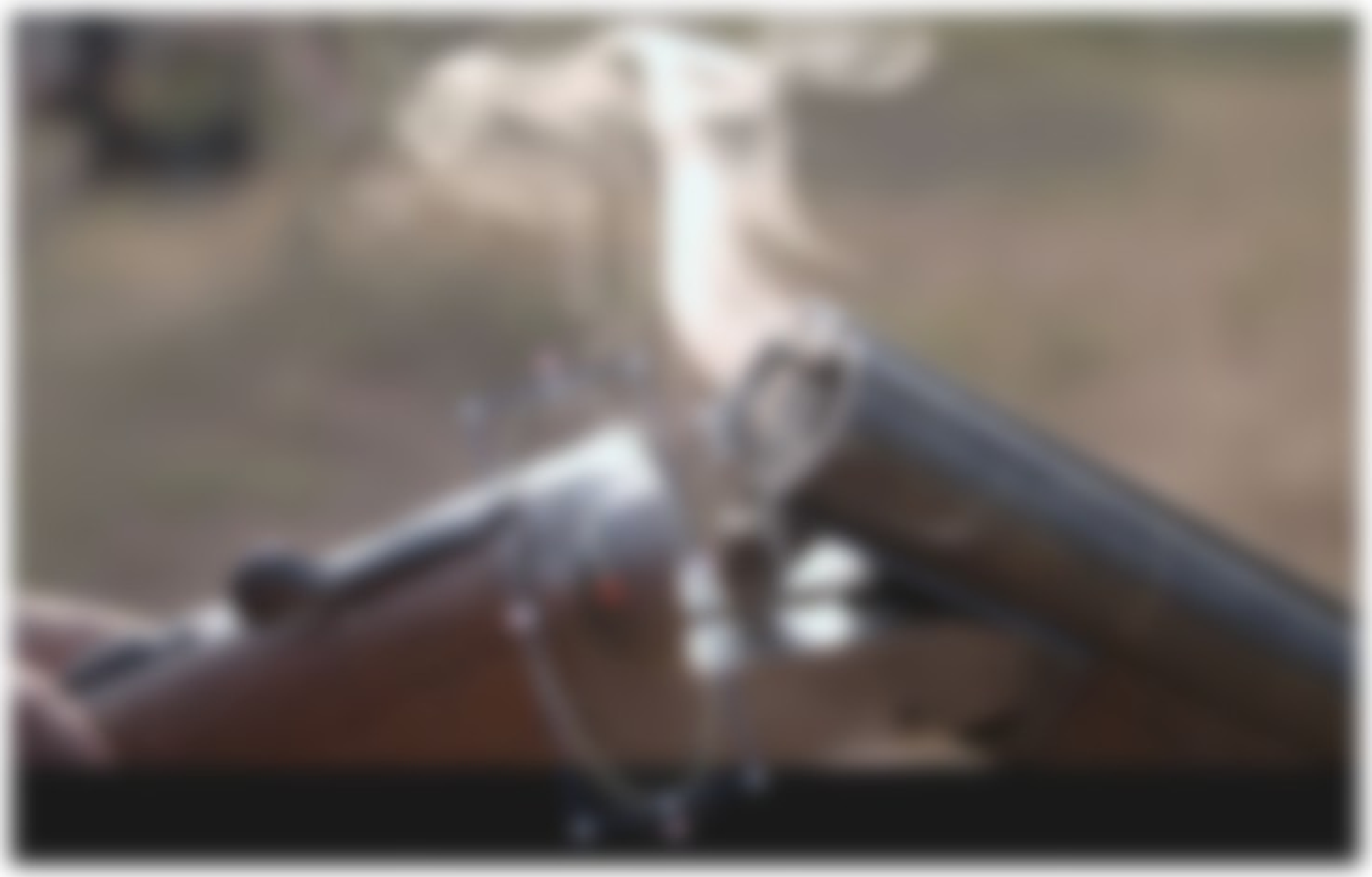
- Switch the Tracker to Frame mode.

In Frame mode, any changes you make to the window in the viewer will be recorded as a keyframe, as opposed to the Clip mode, which applies a global change to the window's position in the entire clip.



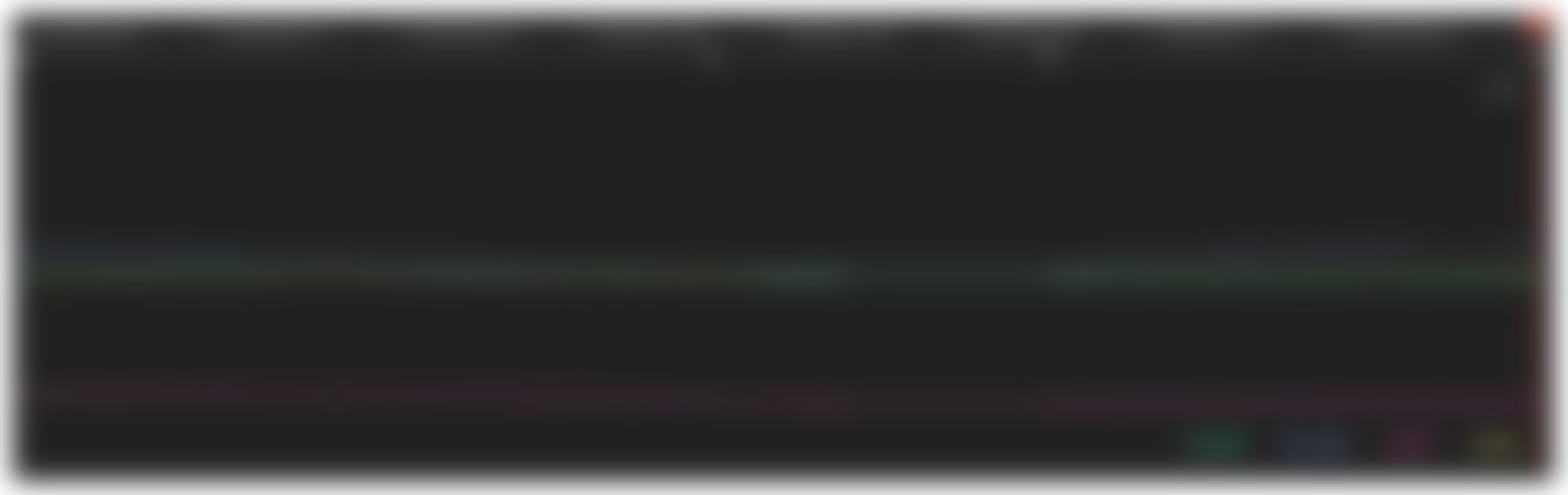
- In the viewer, drag the playhead to a point in time where the obstruction has passed and the area appears to be trackable again.

- Manually reposition the window to the area of the breech that you were previously tracking. Use the anchor point in the center of the window as a visual guide, if necessary.



A new keyframe appears in the tracker graph, and movement is automatically interpolated (mathematically calculated) between it and the last tracked moment.

- Click the Track Forward button to perform the rest of the track analysis.



Using the Mini Panel – Tracking

You can use the Mini Panel to track Power Windows without using your mouse by pressing the Tracker button in the upper left of the panel.

By enabling Frame mode, you can also keyframe and manually animate windows. Pressing the Left Arrow and Right Arrow keys will display more advanced keyframe controls in the viewers.

Due to the unsteady motion of the shotgun, you may choose to make further corrections to the manual window track to produce a smoother result.

[illegible] Drag the playhead to the last frame where the breech is visible before the hand passes in front of it.

[illegible] With the Tracker palette still in Frame mode, drag the window to the correct position.

NOTE When in Frame mode, the window anchor turns red. This acts as a helpful visual reminder that any changes made in the window will be logged as keyframes and animated.

[illegible] Play through the clip a few times to review the motion of the window track and make necessary adjustments until you are satisfied with the result.

TIP Click the Loop button in the viewer playback controls to continuously replay the clip you're working on.

What About the Hand?

You have completed the exercise, but the man's hand continues to pass under the tracked window. Is it not affected by the sharpening adjustment? The short answer is yes. If you were to analyze the footage frame by frame, you would find that the pixels in his hand are affected by the secondary grade. However, due to the speed of the hand motion and the mildness of the window adjustment, the result is barely visible and can be left in place.

If you had increased/decreased the gamma or applied a stronger visual effect, the result would have been obvious, in which case you would have needed to make further manual adjustments to hide the effect when the hand passes under it. One solution would be to change the opacity of the window from 100.00 to 0.00 in the Window palette, animating the change using two subsequent keyframes in the Tracker palette the moment the hand obstructs the view, and then adding another two keyframes to bring the opacity back up after the obstruction is gone. Another common solution would be to introduce and track a second window to mask out the obstruction, which you will learn how to do later in this lesson.

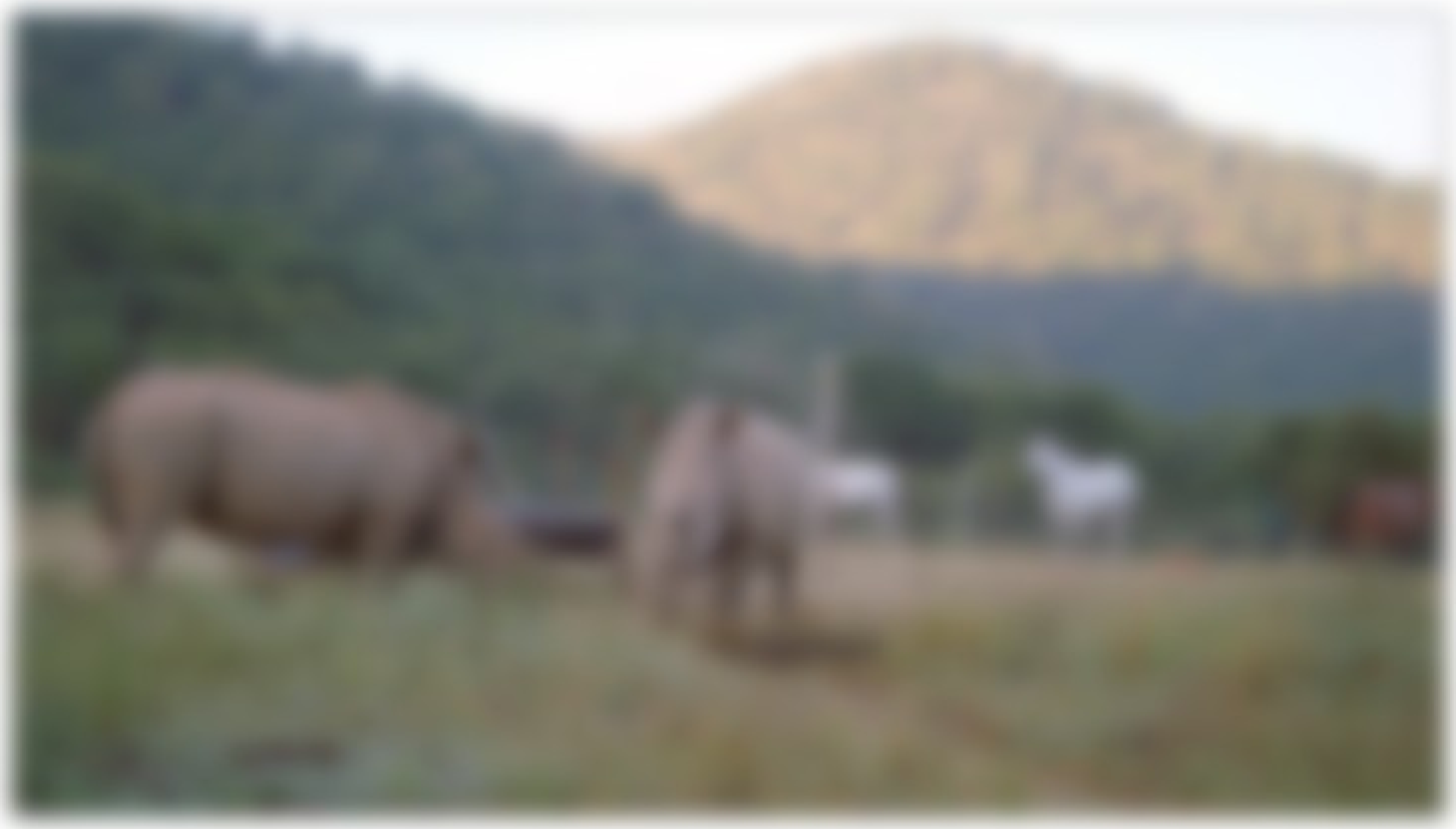
Fixing Overcast Skies

Capturing footage with skylines in camera can sometimes be problematic. Due to the wide dynamic range of light involved, subjects in the foreground usually require substantially different exposure levels compared to the sky. Opening the aperture or raising the ISO may be optimal for capturing the foreground but often results in a blown-out sky. In professional film productions, this is remedied with a lower ISO and additional lighting on the talent or by using controlled skylines in a sound stage, but on small productions and documentary shoots, these are rarely options. Thus, the footage is usually captured with the sky blown out, and it is up to the colorist to correct this shot.

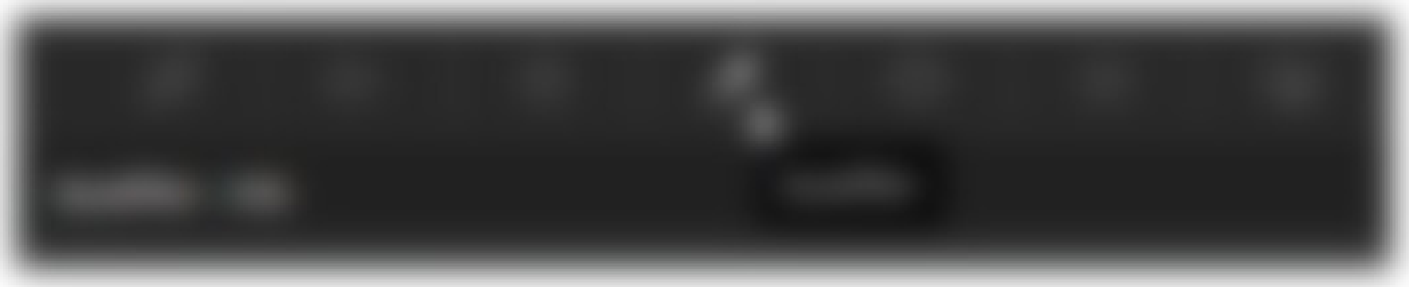
With the advent of high dynamic range digital film formats (known as raw formats), cinematographers can capture and retain detail in a wider range of exposure levels than ever before. We will look at such formats and workflows in Lesson 9, "Setting Up Raw Projects." However, you may still often find yourself working on media with compromised highlights, and it is vital to understand how to adjust them effectively.

There are several approaches to correcting or matching a sky when working with standard dynamic range footage. The fastest is to apply a gradient window and blend color into the top of the shot. A higher precision approach involves first isolating the sky with a keying tool, such as the qualifier, and then tweaking the color values using the standard grading tools.

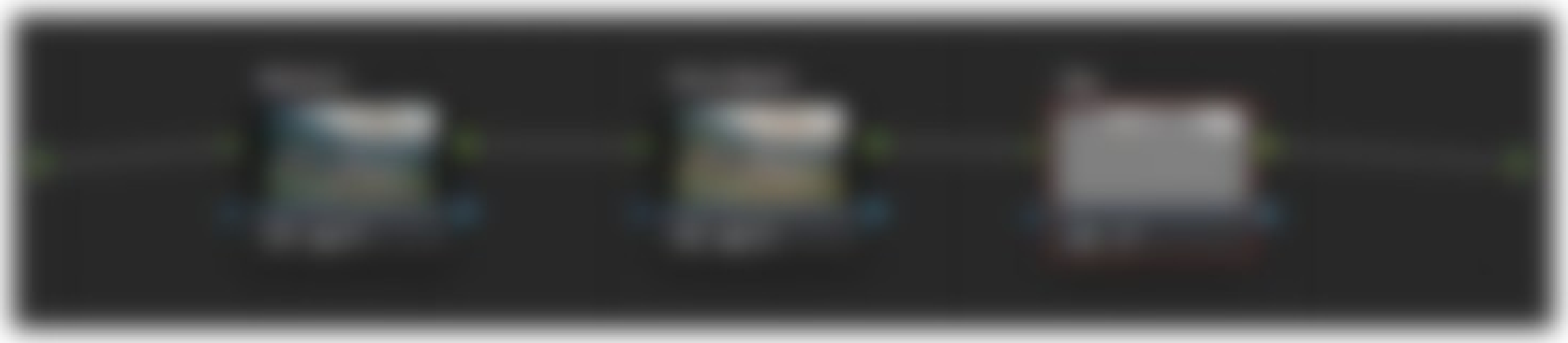
- In the yellow flag filtered timeline, select clip 01. This clip was previously balanced and matched, and now needs secondary grading to address the overcast sky.



- Create a third corrector node called **Sky**.
- With the Sky node selected, in the central palettes, open the Qualifier palette.

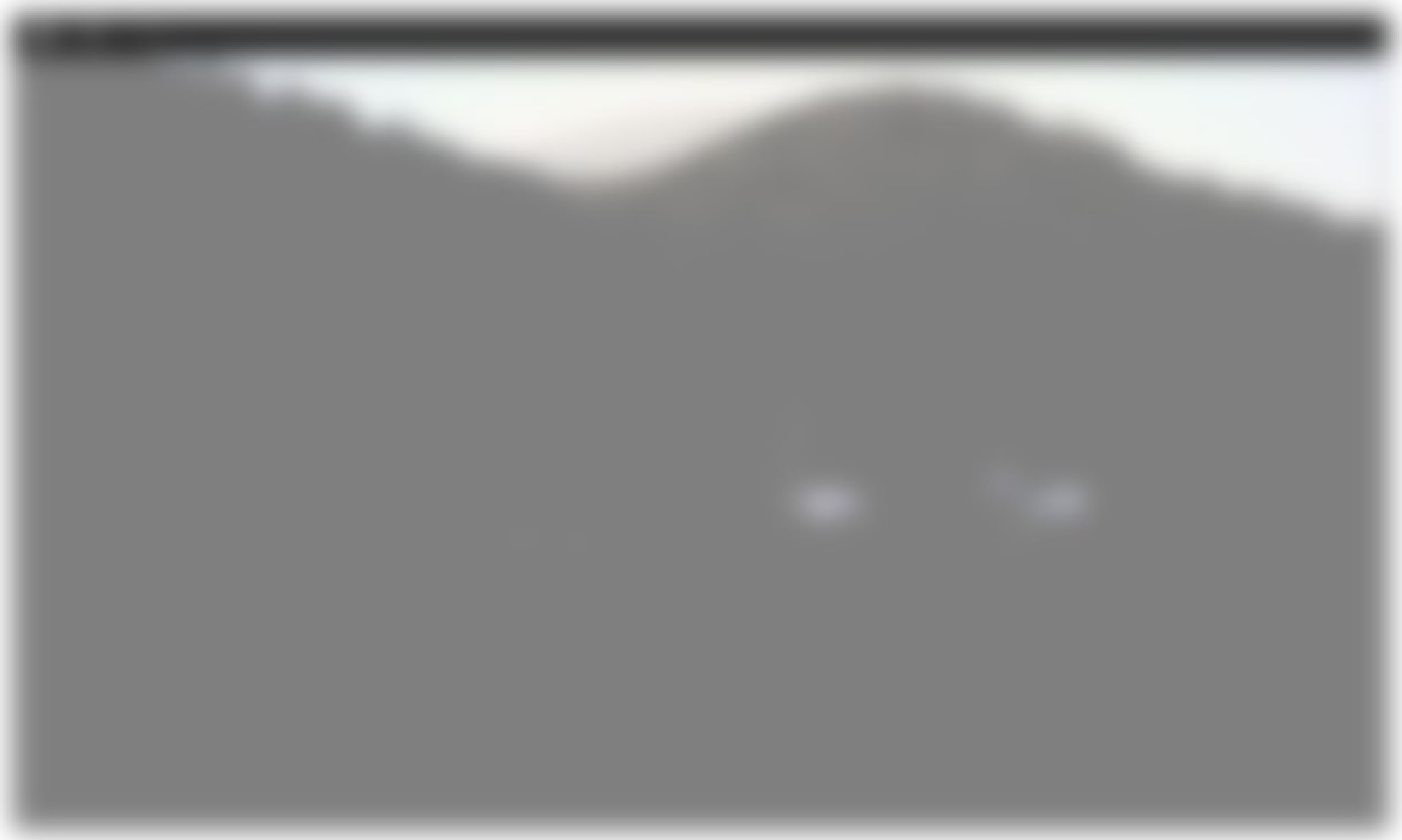


- In the viewer, using the Qualifier tool, click and drag across the sky. The Sky node thumbnail will update to show the initial qualifier selection.



To refine the qualifier values, you must change the viewer mode to display only the selection.

- Switch the viewer to Highlight mode. Ensure that the mode on the viewer toolbar is set to Highlight.



When a selection is first made using the qualifier, it will often miss necessary sections or include unwanted areas. It is up to you to refine the selection using a variety of methods. To begin, you will use the HSL Qualifier palette to fine-tune the RGB selection by dragging the Hue, Saturation, and Luminance sliders to define exactly what those values should be.

- Toggle the Highlight button to compare the original image with the selection. You will see that areas of sky between the branches of the trees need refinement.

A good starting point to refining the HSL selection is to disable each parameter one by one to determine whether its absence would improve the qualifier.

- Click the orange toggle next to Hue to disable it.

Doing so has a positive effect on the selection. The horizon becomes refined, and more areas of sky in the trees are included in the qualifier result. This makes sense because the blown-out white sky is mostly made up of luminance data, not hue. Leave the Hue range disabled.

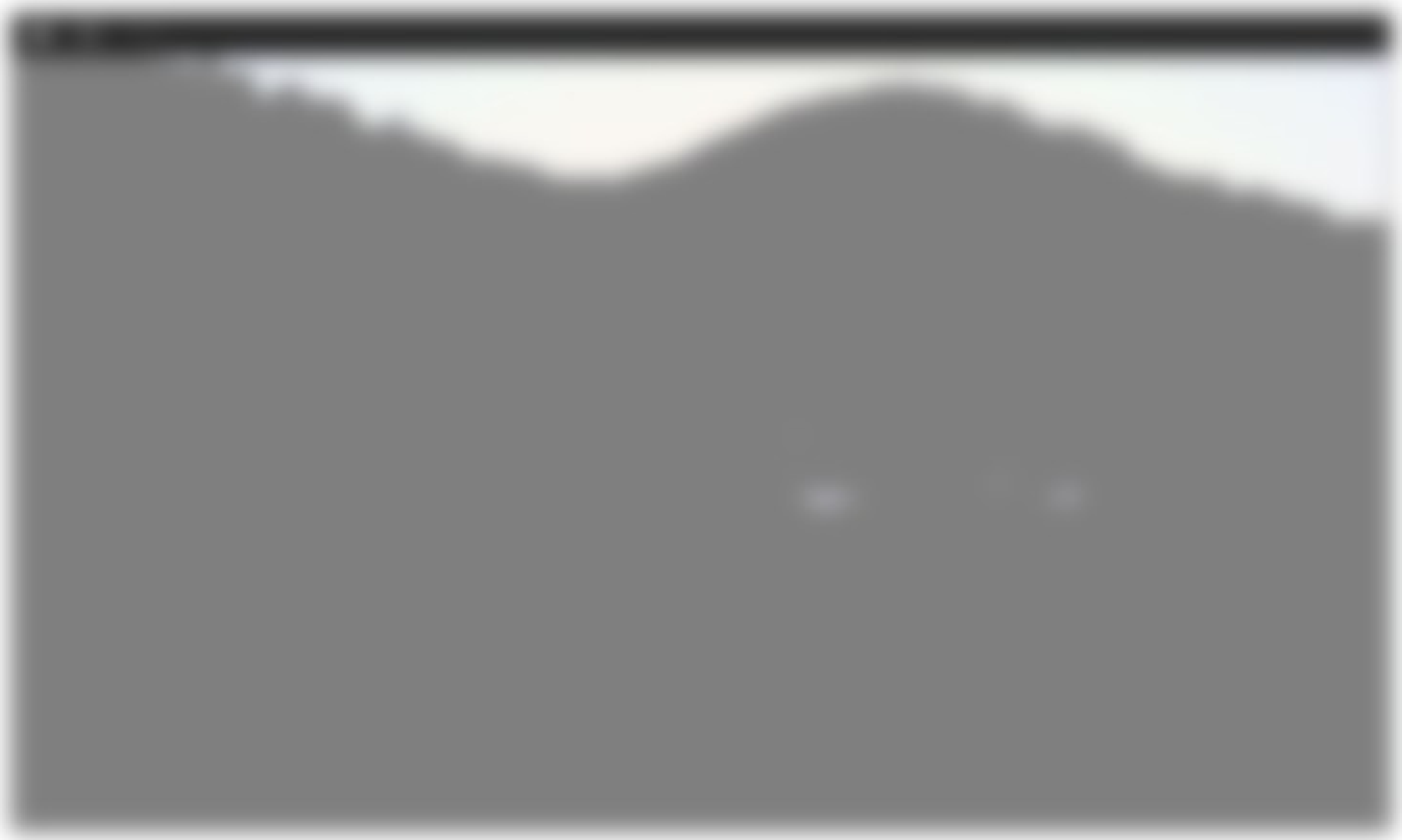
Toggling the Saturation and Luminance parameters reveals that they are vital to the selection, so you will leave them enabled.

The next step is to adjust the values of the parameters to ensure the cleanest edge selection. You may want to zoom in on the horizon in the viewer to better see the result of these adjustments.

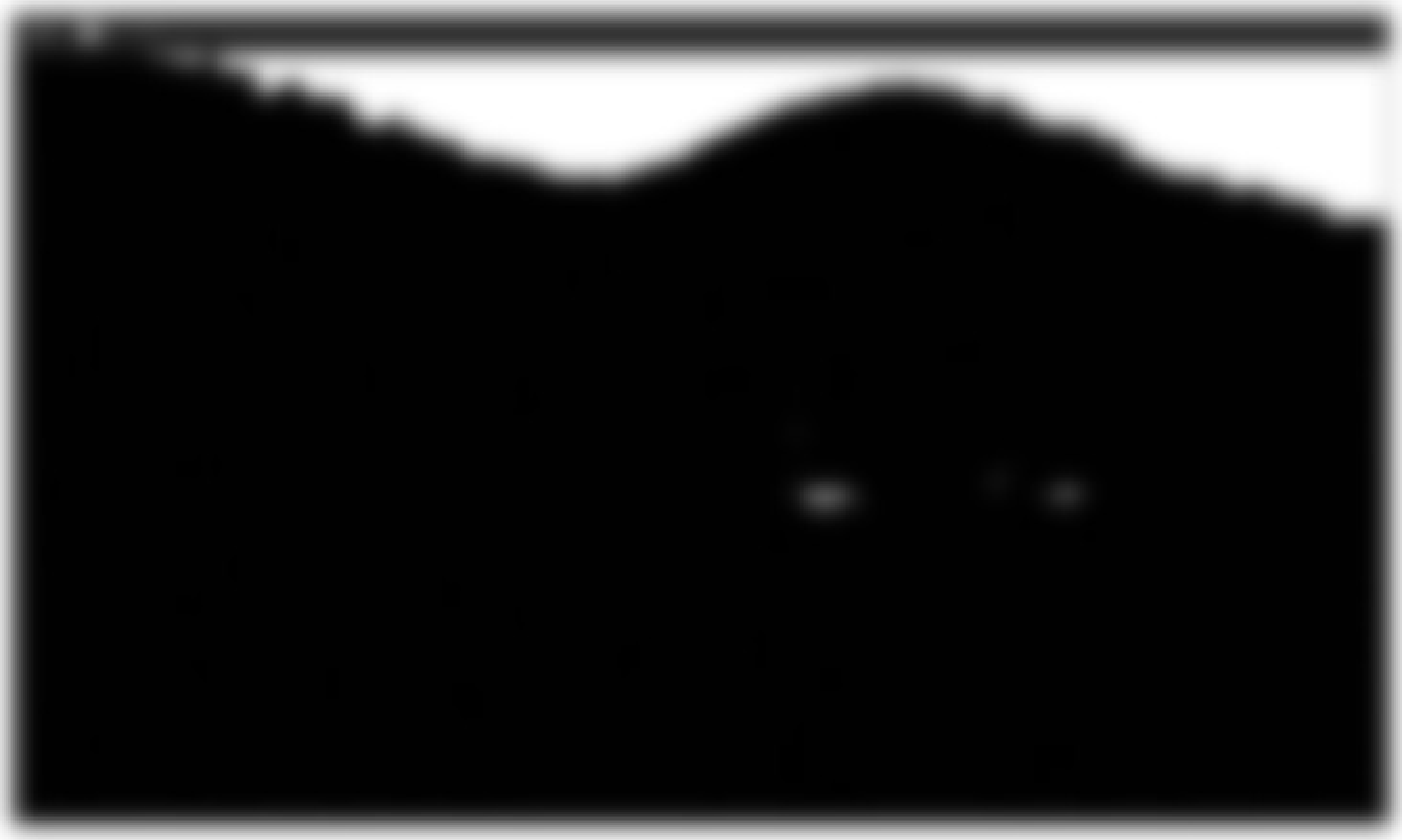
- Drag the right side of the Saturation range, or drag the High field beneath the Saturation bar, to remove the qualifier selection from the mountain treetops, if there is any.

9 Drag the left side of the Luminance selection (Lower) to further refine the selection. Aim to include the darker areas of sky between the trees.

The focus is on ensuring the cleanest possible selection along the horizon, so, for now, you can ignore any other regions of the image that are also being selected, such as the horses.



10 In the upper left of the viewer, click the Highlight B/W button to switch to a black and white representation of the matte.



You will use the Matte Finesse controls in the Qualifier palette to further clean up the matte. Unlike the HSL parameters, which targeted the original image's pixel color and luminance data, Matte Finesse impacts only the values of the resulting black and white matte.

Using the Mini Panel – Qualifiers

After making an initial qualifier selection, you can use the Mini Panel to refine it. When you press the Qualifier button in the upper left section of the panel, the two 5-inch screens and their surrounding buttons and knobs become the controls you'll use to continue making adjustments.

At first, you'll see the controls for Hue on the left screen and Saturation on the right. In the upper left section of the panel, press the Right Arrow button to navigate to the Luminance controls. In certain tools, you must use the Left Arrow and Right Arrow buttons to access all the functions that a specific tool offers.

One more push of the Right Arrow button will bring you to the Matte Finesse tools.

- The Pre-Filter parameter performs some minor cleanup of the original image by reducing compression artifacts like macroblocks. Increase the pre-filter [illegible] to soften the edges of the matte.

- The Clean Black and Clean White parameters eliminate noise by shrinking very small selection areas of the matte. Adjusting Clean Black will reduce some of the minor [illegible] in the trees under the horizon. A setting of [illegible] should be enough for a satisfactory reduction.
- Likewise, tweaking Clean White ([illegible]) will simplify the white matte between the tree branches.
- The Post Filter cleans up the resulting key by reintroducing some of the finer detail from the original image back into the selection. Increase the Post Filter ([illegible]) to see branch and leaf details return to the mask.

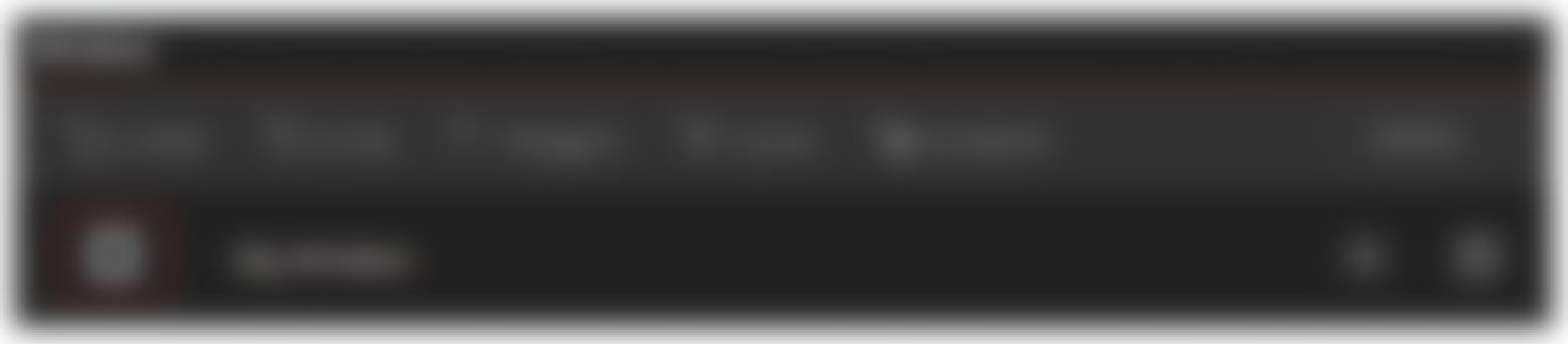
  The accuracy of the qualifier often depends on the nature and quality of the footage. In this case, you might experience some difficulty in getting a clean extraction from both mountain tops due to the difference in depth of field between them. When one mountain has a clean key, the other appears too soft and too noisy. In such cases, the best approach is to break up the keying process into several nodes and combine them using a key mixer.

NOTE You can see the results of using a key mixer to clean up the sky selection on this clip in the [illegible] Completed Timeline. Open the timeline, right-click the clip, and under Local Versions, choose Mixed Key to see the version of the node pipeline with the key mixer.

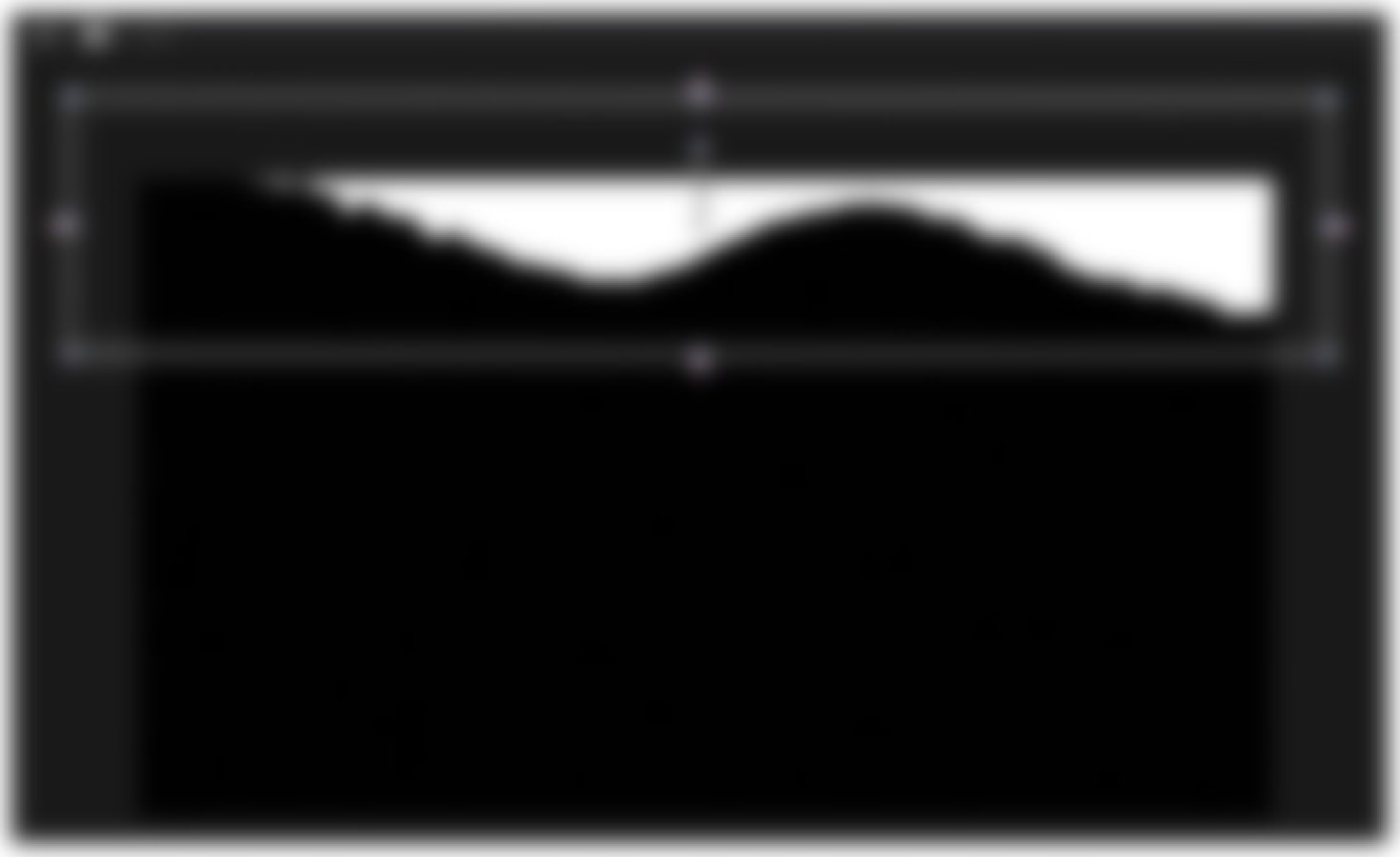
Using Windows to Limit Qualifiers

If the HSL qualifier has selected areas beyond the edge that are not needed, you can quickly exclude them using windows. In this exercise, you'll remove the horizon from the selection so that your secondary grade will only impact the sky.

1. Open the Windows palette.
2. Activate the Linear window button, and label it **Sky Window**.

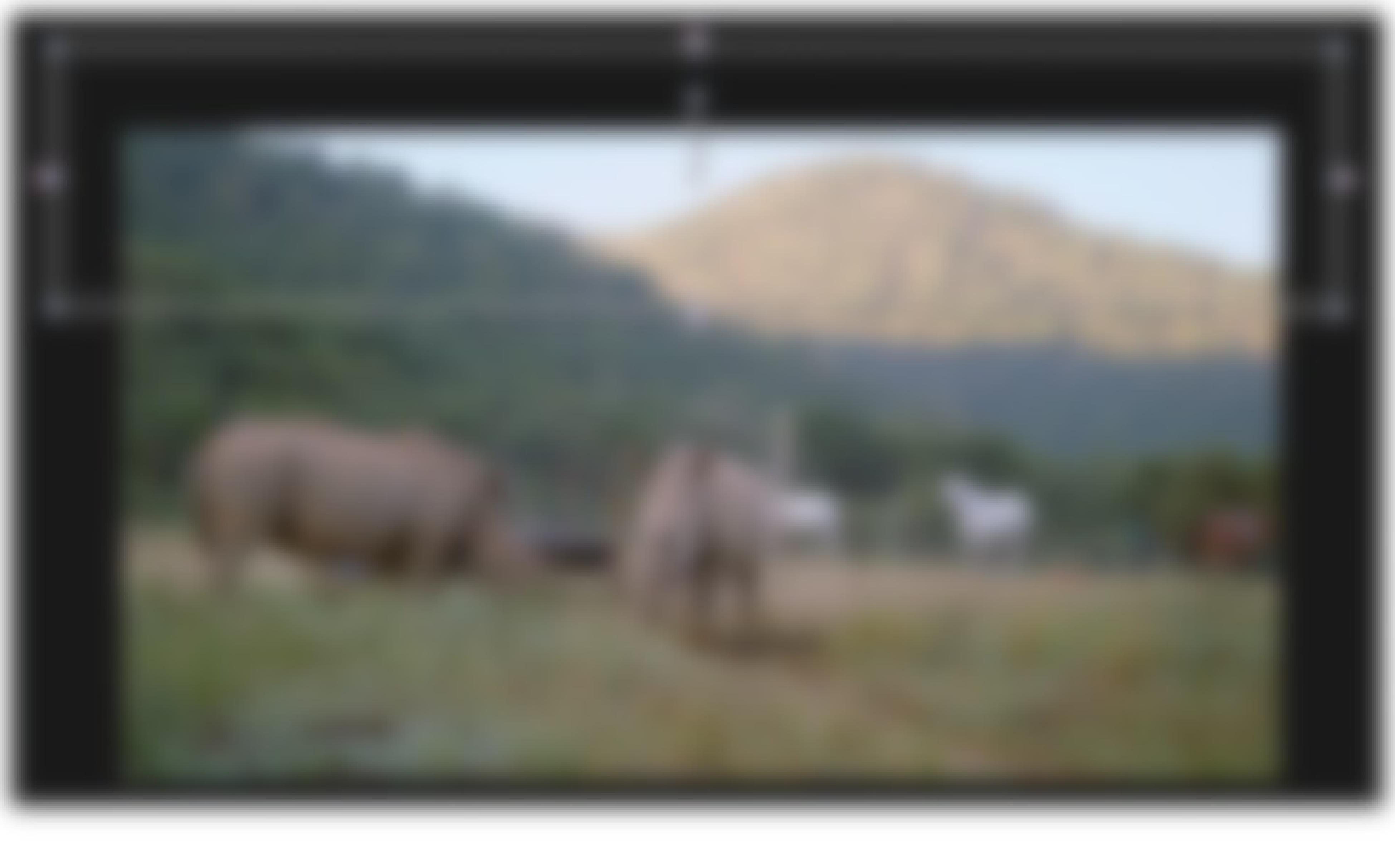


- Drag its corners around the sky selection to exclude the lower regions of the matte.



The sky should now be successfully selected and ready for color adjustment.

- Click the Highlight button to disable the matte preview.
- Drag the Gain master wheel to the left (0.95) to reduce the brightness of the sky. By turning the white pixels gray, you will make them more receptive to hue and saturation changes.
- Drag the Gain color wheel toward cyan/blue to introduce blue into the sky.



Making luminance and color adjustments within a qualifier selection sometimes reveals issues that were hard to spot in the original matte. In the case of this image, the horizon might adopt a dark border, which indicates that the grade is impacting the trees.

- In the Qualifier palette, increase the Clean Black (20.0) until the selection retracts from the treetops.

  Finally, to soften the grade along the horizon, you can gently blur the edge between the black and white portions of the matte.

- In the Matte Finesse Controls, increase the Blur Radius (3.0).

  A gentler edge will ensure a more organic-looking grade and hide any remaining imperfections in the selection.

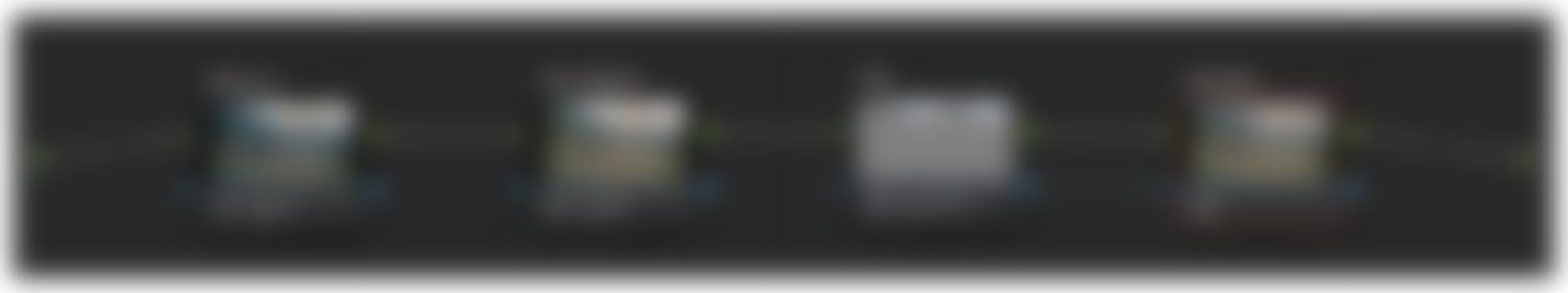
Adding Atmosphere

When you look into the distance through several miles of air, you see the atmosphere slowly building up over trees, buildings, and mountains until it forms a solid color in the sky. If on an polluted day, the atmosphere may have a hazy white, brown, or orange look; on a clear day, you would see a soft blue. This concept is known as atmospheric perspective and can be observed in real life and on film. The farther away an object is, the more its saturation and contrast is reduced and the more it adopts the color of the atmosphere.

When enhancing a sky, or replacing it altogether, you need to blend an equivalent hue into the shot's horizon to replicate this atmospheric perspective. Otherwise, the replacement sky might look fake against the horizon.

- In the Node Editor, right-click the Sky node and choose Add Node > Add Outside, or press Option-O (macOS) or Alt-O (Windows). This inverse selection will allow you to blend the color of the sky into the horizon of the image.

- Label node 04 **Outside**.



TIP In the Node Editor, drag your middle mouse button to pan and adjust the slider at the top of the panel to increase or decrease the size of the nodes.

- At the bottom of the Window palette's preset list, activate the Gradient window button and label it **Atmosphere**.

  An outline of the gradient controls appears in the viewer in the form of a line with a perpendicular arrow extending from it.

  The gradient window works a bit differently compared to the other windows you have created. Instead of defining a shape, you position a starting point and then drag the arrow in the direction of the gradient fall-off. The farther you drag the arrow, the softer the gradient will be.

- Adjust the top of the gradient (the horizontal line) to the top of the distant mountain and drag the arrow to taper the gradient off toward the bottom.

- Drag the Offset color wheel in the direction of cyan-blue to give the distant mountain a slight blue tint.

- Press Command-D (macOS) or Ctrl-D (Windows) to compare the results before and after your atmosphere addition.

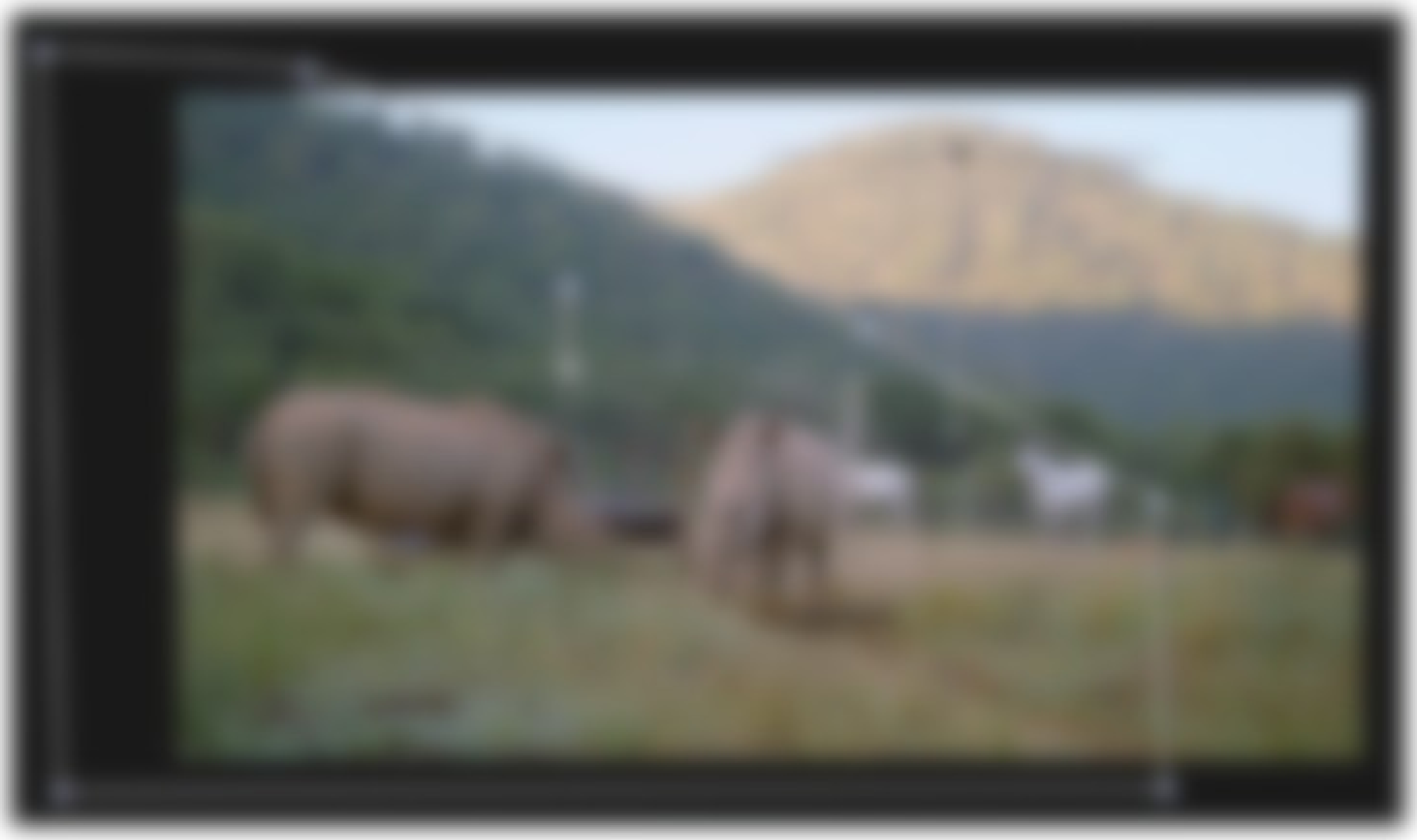
  The gradient looks good in the distance but covers too much of the foreground mountain. You will want to create a new window to mask out anything you don't want affected by the atmosphere grade.

- In the Node Editor, disable the Outside node. Doing so will allow you to continue working without being distracted by the blue grade.

- While still in the Window palette, activate the Curve/pen tool button and label it **Foreground**.

- In the viewer, click around the foreground hill and the lower left of the frame to create a custom shape. To close the loop and define the shape, click the first point that you created.

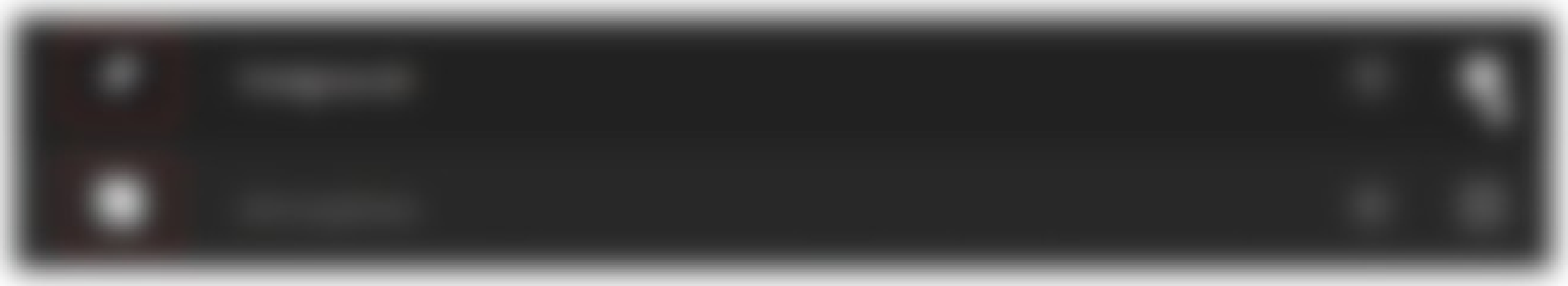
> **TIP** When creating custom windows, click to create linear points and drag to create rounded Bezier curves. To delete a point, select it and press the Delete or Backspace key, or middle-click the point with your mouse.



- Enable the Outside node to see the result.

  The atmosphere grade now affects both the background mountain and the entirety of the custom shape. This is because, by default, all windows are additive. You will need to indicate that you wish to subtract the selection from the final result.

- In the Curve window row, next to the label, click the Mask button to subtract the custom shape from the final key of the node.



10 To the right of the Window palette, adjust the Softness parameters to feather the edge of the curve. Drag the Inside and Outside fields to make the border of the foreground window less aggressive between the two mountains.

You have successfully fixed the overcast sky in this clip using a technique practised by thousands of colorists on millions of film and television clips around the world. This technique can be employed aesthetically to add color and beautify a scene but is also often used to match clips with mismatched sky hues.

Performing Sky Replacement

More advanced approaches to fixing an overcast sky involve replacing the sky altogether, usually with a still photo, video, or computer generated image. The Sky Replacement effect allows you to quickly perform such advanced compositing and even track the sky to a moving shot while integrating it to the camera's lens properties.

In this exercise, you'll use the sky key and atmospheric perspective that you generated earlier in the lesson to integrate a new artificial sky into the shot.

NOTE This exercise requires DaVinci Resolve Studio to complete.

1 Open the Effects Library.

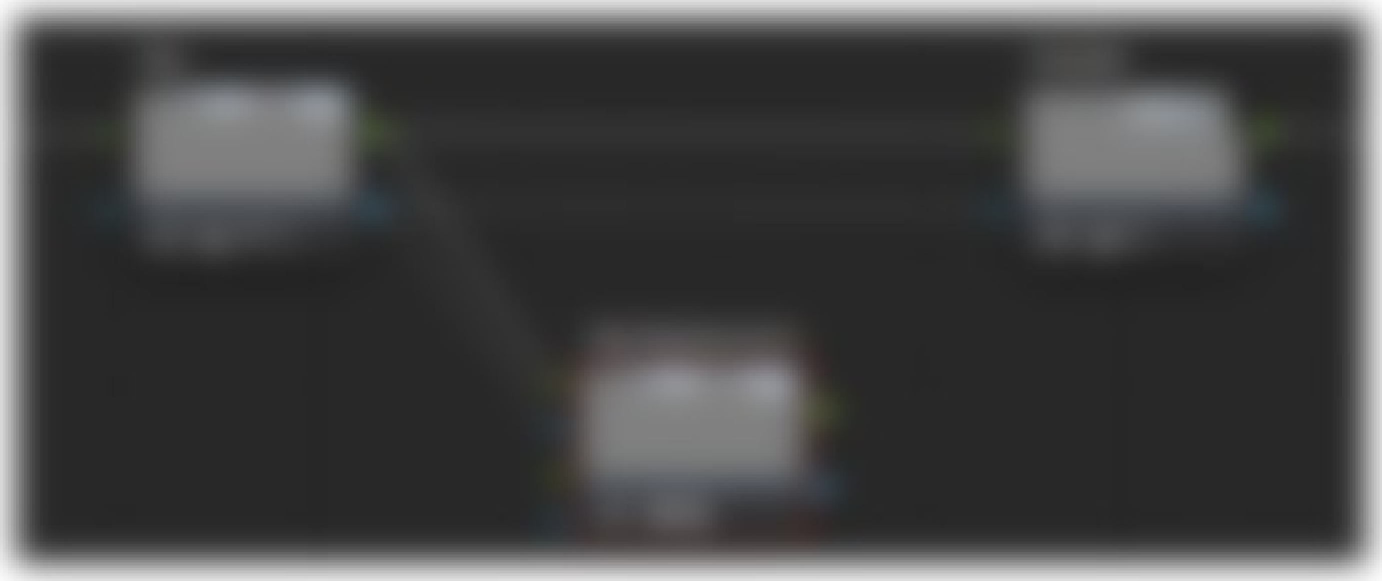
2 Click the magnifying glass at the top of the panel to reveal the search bar.

- Type **sky** to filter the library contents.

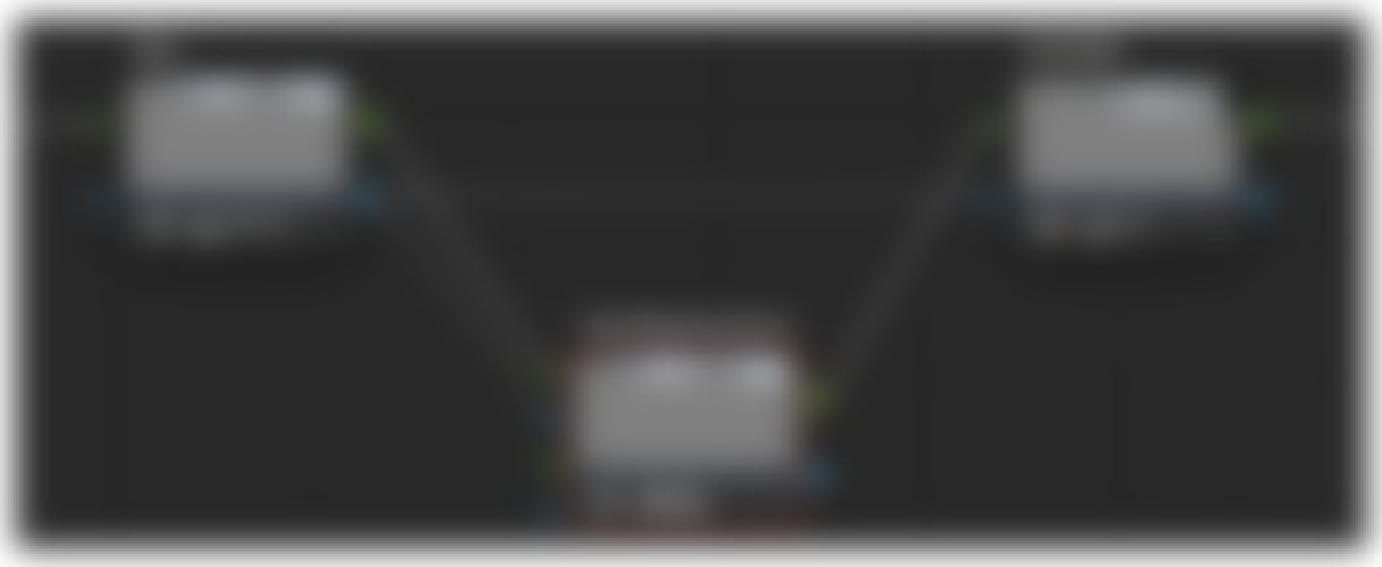
- Drag the Sky Replacement effect onto an empty space in the Node Editor near the Sky and Outside nodes.

> **TIP** Click the magnifying glass in the Effects panel to remove the effect search bar.

- Connect the Sky node's RGB output (green square) to the Sky Replacement's top RGB input (green triangle). This will be the video signal used as a backplate (background layer) for the sky replacement composite.
- Connect the Sky node's key output (blue square) to the Sky Replacement's top key input (blue triangle). This will feed the sky key data to the Sky Replacement node and determine the area of the image where sky replacement occurs.



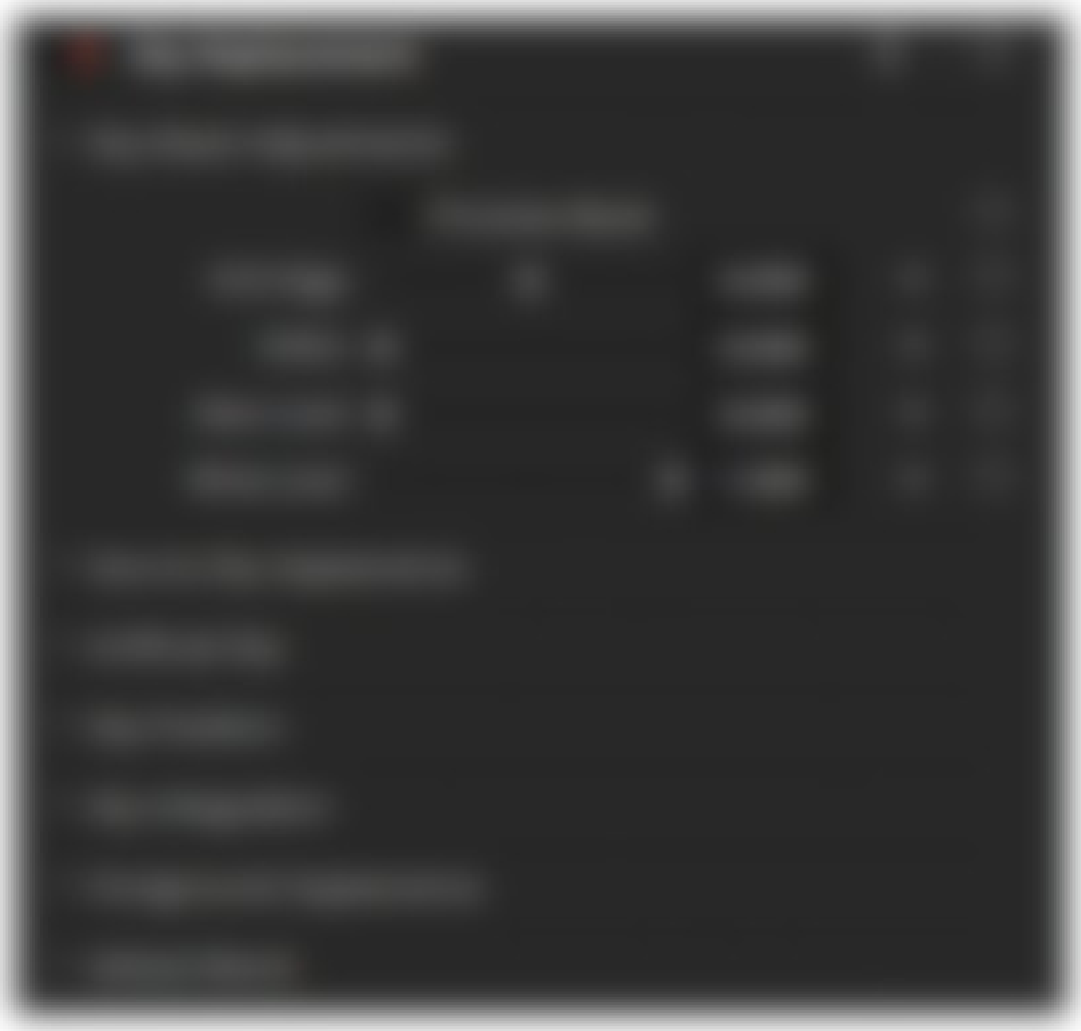
- Finally, connect the RGB output of the Sky Replacement node to the RGB input of the Outside node. This will continue the signal flow and incorporate the Sky Replacement effect into the clip pipeline.



Note that the key connection between the Sky and Outside node remains. This ensures that the Outside node will continue superimposing the atmospheric grade to the mountaintop.

- Select the Sky Replacement node to open its settings in the Effects panel.

The settings are divided into categories that support a variety of sky replacement workflows. Click a category header to expand or contract its list of parameters.



Sky Mask Adjustments allow you to preview and adjust your incoming key mask.

- Click Preview Mask to review the Sky node key.

As you have taken care to extract the overcast sky precisely with the Qualifier palette, you will not need to adjust the incoming mask. However, if your artificial sky blends seamlessly enough with the original background hue, you can opt to retract the mask to re-introduce more of the edge detail at a later stage.

- Click Preview Mask again to disable the matte preview mode.

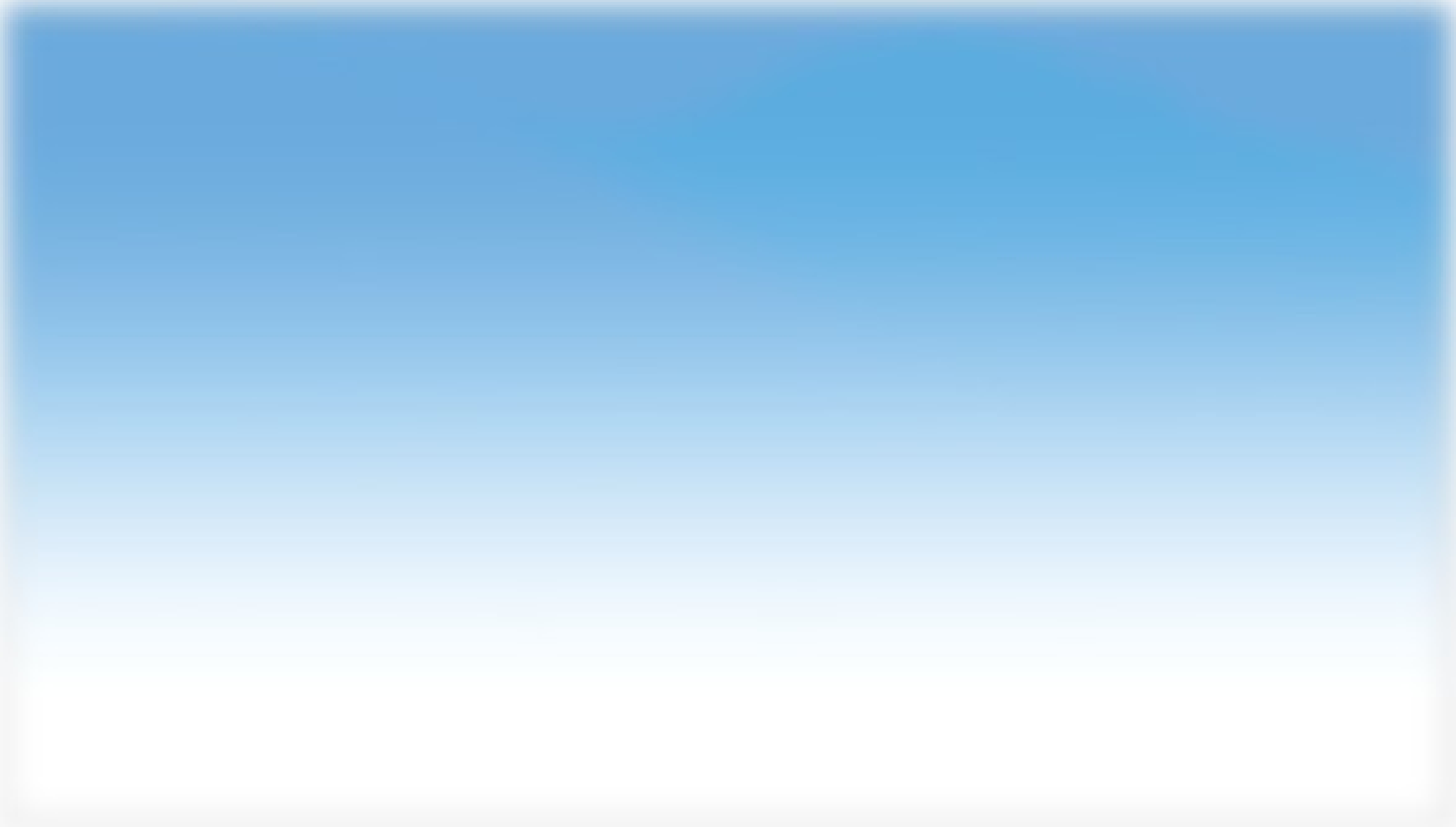
Source Sky Appearance features the parameters you'll need when working with external sky images or videos.

To introduce a sky image or video into the clip composite, drag the media from the color page media pool into the Node Editor. The media will appear as an external matte with four key outputs and one RGB output. Connect the RGB output of the Ext. Matte node to the second RGB input of the Sky Replacement node to see the sky media in the keyed area of the clip. You can even opt to use the second key input to isolate a portion of the incoming image or video.

- Since you will not use any external media for this composite, leave the parameters in the Source Sky Appearance category as they are.

Artificial Sky allows you to generate your own sky using a variety of color and gradient parameters, as well as controls for cloud and sun detail.

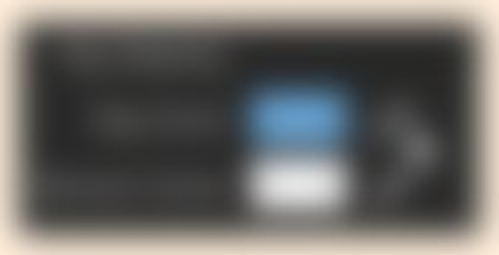
[illegible] Click Preview Artificial Sky and increase Sky Opacity to 1.000 to see the default sky gradient in the viewer.



[illegible] Deselect Preview Artificial Sky to review how the gradient appears when masked.

[illegible] Change the Sky Color to match the saturation levels more closely in the scene.

TIP Disable the Sky Replacement node and use the color picker tool to sample the blue color you introduced in the original Sky node.



When working with larger sky areas or designing more intricate sky hues, adjust the Horizon parameters to determine the softness, height, and angle of the sky gradient.

Next, you will introduce some cloud detail to make the sky more dynamic.

- Increase Cloud Opacity to [illegible].
- Reduce the Cloud Scale to [illegible] to place the clouds at a greater distance.
- Adjust the Cloud Time ([illegible]) to change the distribution of the clouds.

The Hotspot parameters help imitate the look of the sun in the sky. This element might be necessary when matching the light and shadows in certain shots. However, since the foreground in this environment does not have direct sunlight, it will not be necessary to activate it.

- Leave the Hotspot Brightness at [illegible].

With the contents of the sky set, you can revisit the mask adjustments to fine-tune the incoming sky.

- Under Sky Mask Adjustments, drag up the Shift Edge ([illegible]) to reintroduce tree details across the edge of the mask.

This adjustment works because the sky replacement is close to the original sky hues. When working with more dramatic composites like a dark stormy sky or a red Mars atmosphere, you may want to leave the incoming sky as is.

Sky Position controls allow you to match the sky to the environment and to adjust the sky's final position and size. Auto Size for Reticle ensures that the entirety of the incoming matte is filled with the sky image.

- Since there is a slight camera wobble in this locked off shot, click Track Foreground to analyze the footage outside the input key. This will result in the artificial sky moving together with the rest of the shot.
- **Sky Integration** is used for final sky previews and to adjust the composite based on the camera's lens properties. Because there is no obvious lens distortion or change in focal distance, these settings can be left as they are.
- **Foreground Appearance** allows you to adjust the image foreground based on the [illegible] of the sky key. Your goal in this exercise is to create a sky that matches the environment, not the other way around, so you can leave these parameters as they are.
- If your artificial sky has strong hues, you can use the **Global Blend** parameter to fade it into the original environment, producing a more natural result.

Before

After

TIP As well as a method of correcting blown-out or overcast skies, Sky Replacement can help you match the sky color and detail between shots captured on different cameras or at different times of the day.

To shoot fast and travel light, documentary filmmakers might sometimes need to compromise on best technical practices such as good lighting and consistent exposure. Secondary grading allows us to get the best possible image out of every shot.

Warping Color Ranges

The Color Warper allows you to adjust two parameters at once, producing quick results in an interface that encourages intuitive grading. It features three modes: Chroma Warp, Hue Saturation, and Chroma Luma. Its mesh interface ensures a smooth transition between hues, which reduces image artifacts. The Color Warper helps enhance the appearance of objects or areas with a distinct hue and can be combined with other secondary selection methods for optimal results.

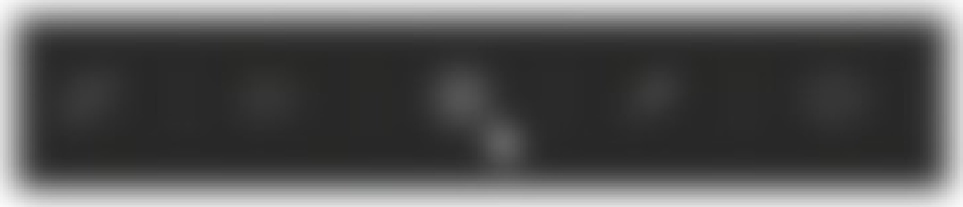
Chroma Warping in the Viewer

The simplest way to interact with the Color Warper is through the color page viewer. This method works best on areas with well-defined color ranges, such as for vehicles, clothing, or the sky. In this exercise, you will adjust the color of the dry grass on the ground to give it a healthier, greener appearance.

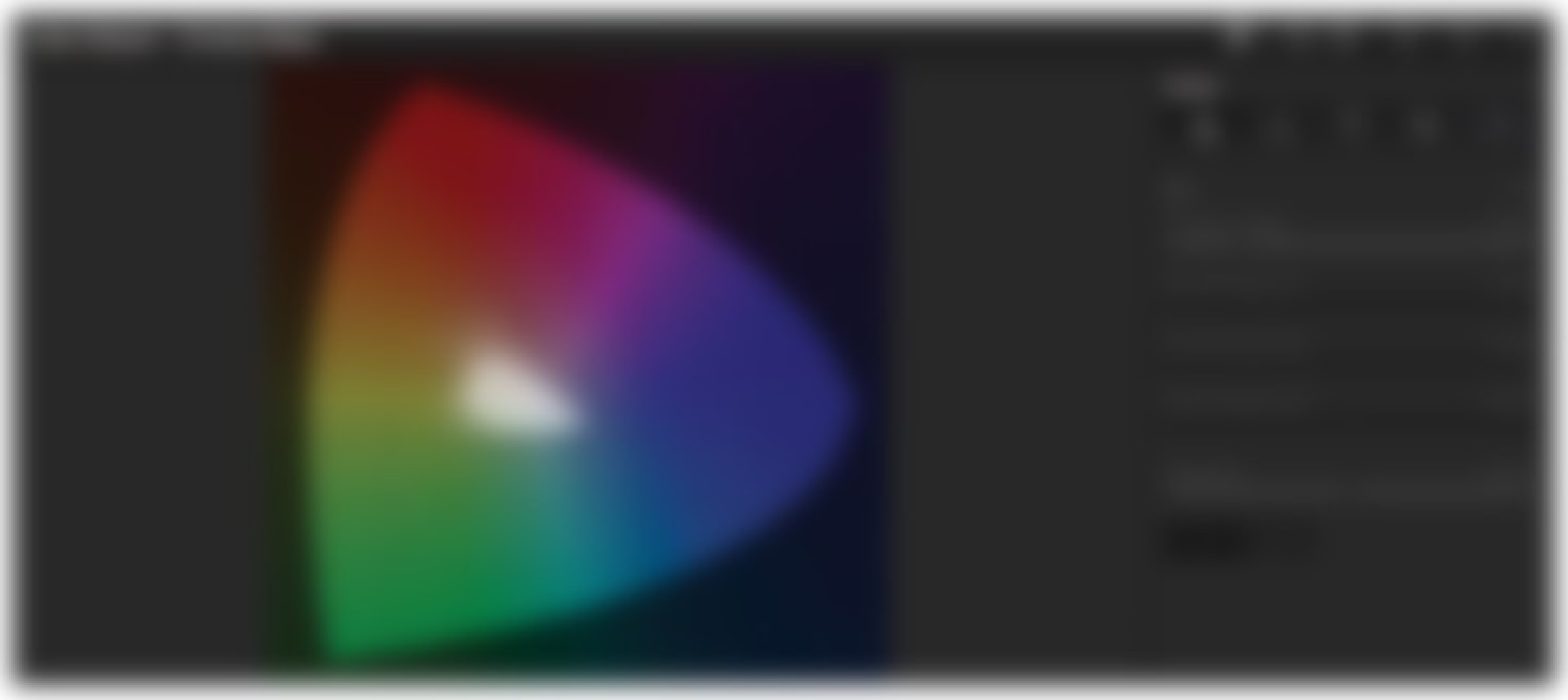
You will continue to work on clip 01 in the yellow flag filtered timeline.

1 Create a new serial node at the end of the pipeline and label it **Grass** (node 06).

2 In the central palettes, open the Color Warper palette.



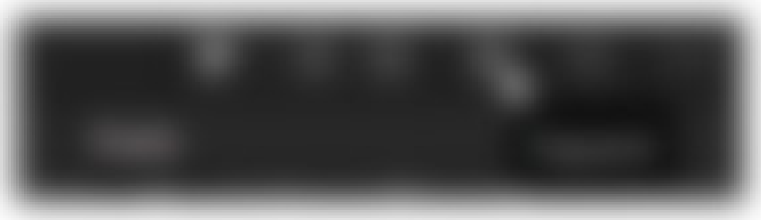
The Color Warper's Chroma Warp tool features a chromaticity diagram that represents all the potential hues you can target and adjust. A white mask showing the distribution of the current frame's colors and their saturation levels is projected onto the diagram to guide your selection.



The right side of the palette contains tools and pinning options that can be used to achieve optimal precision when warping. Under the Tools header, you'll find two primary options for the warping method:

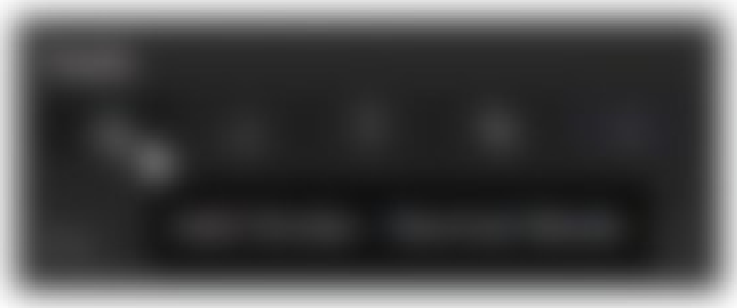
- **Normal mode** – selects a range of colors for a smooth, consistent change across a broad spectrum of hues. This is ideal for achieving organic-looking results as a range of similar hues is pushed toward a single target.
- **Point-to-point mode** – selects a specific color for more precise adjustments to individual objects or surfaces. This is ideal for more refined results, similar to those achieved by the Qualifier tool.

- Click the Expand button in the upper-right corner to turn the palette into a floating window.

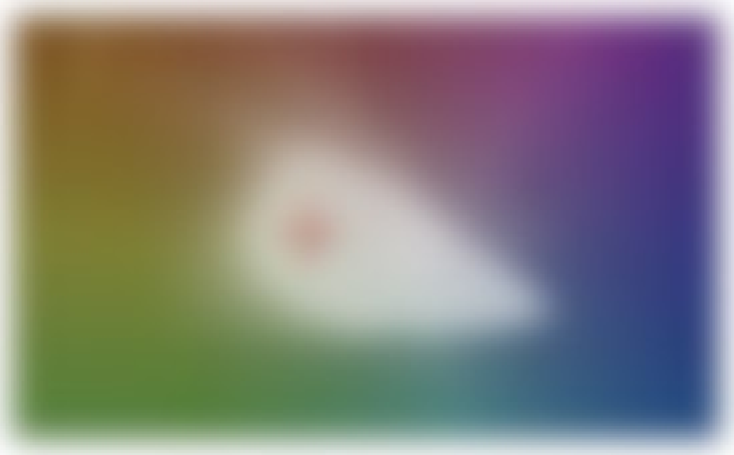


Drag the corners and edges to resize the window to your liking and drag the palette header to reposition it. The larger interface will make it easier to make precise adjustments.

- In the sidebar, under Tools, ensure that Add Stroke - Normal Mode is selected.



- Hover your mouse pointer over the image in the viewer.

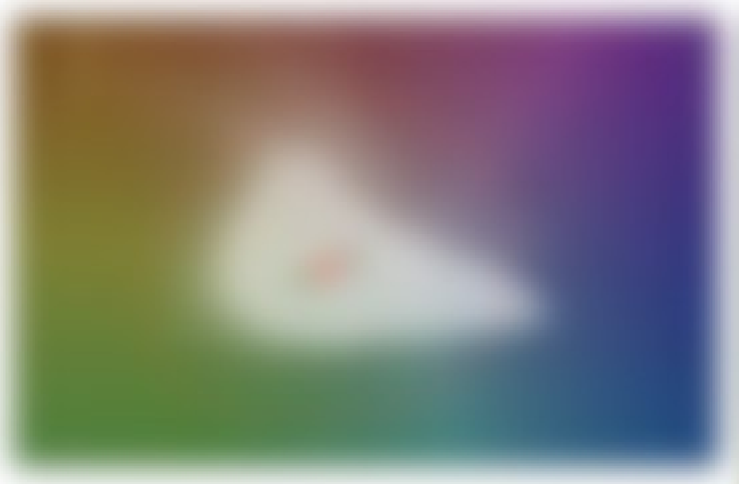


An orange crosshair appears in the Chroma Warp diagram, corresponding to the hue over which your mouse pointer is placed.

The Color Warper features the same hue layout as the color wheels and offers the same saturation control. Moving a point closer to the center will desaturate a hue while moving a point outward will increase color intensity. Moving a point in a circular fashion will change the color of the selected hue.

- In the viewer, click a patch of grass under the left rhino and drag diagonally toward the lower left.

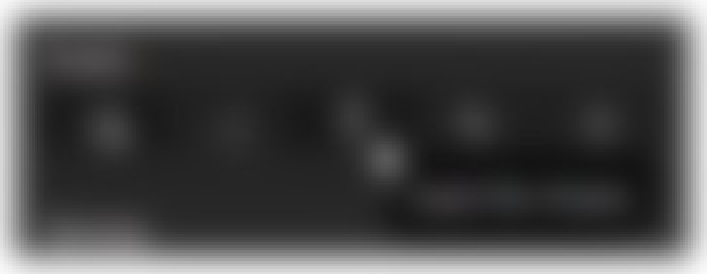
TIP Hold Option (macOS) or Alt (Windows) and click in the viewer to preview which areas of the image will be affected by the warper.



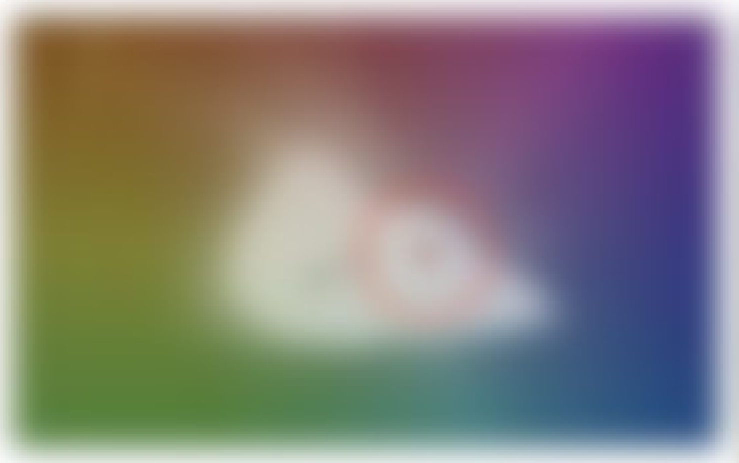
This results in more saturated greens, but the effect overpowers other regions of the frame. Several factors might contribute to this when using the Color Warper: the image may have many shared color properties (yellows/greens), the image may be desaturated (resulting in the hues being clustered together in the mesh), or the chroma warp may be operating within too broad a chroma range.

One of the simplest ways to refine your chroma warp selection is to pin areas of the image that you wish to exclude from the warp.

- Under Tools, select Add Pin Point.



- In the viewer, click a cloud in the sky to omit white areas from being warped.



A pin appears in the Chroma Warp diagram, indicating the location of the cloud in the mesh. This significantly cleans up the selection in the viewer.

- With the Pin Point tool still active, click a part of the rhino that's being warped green.

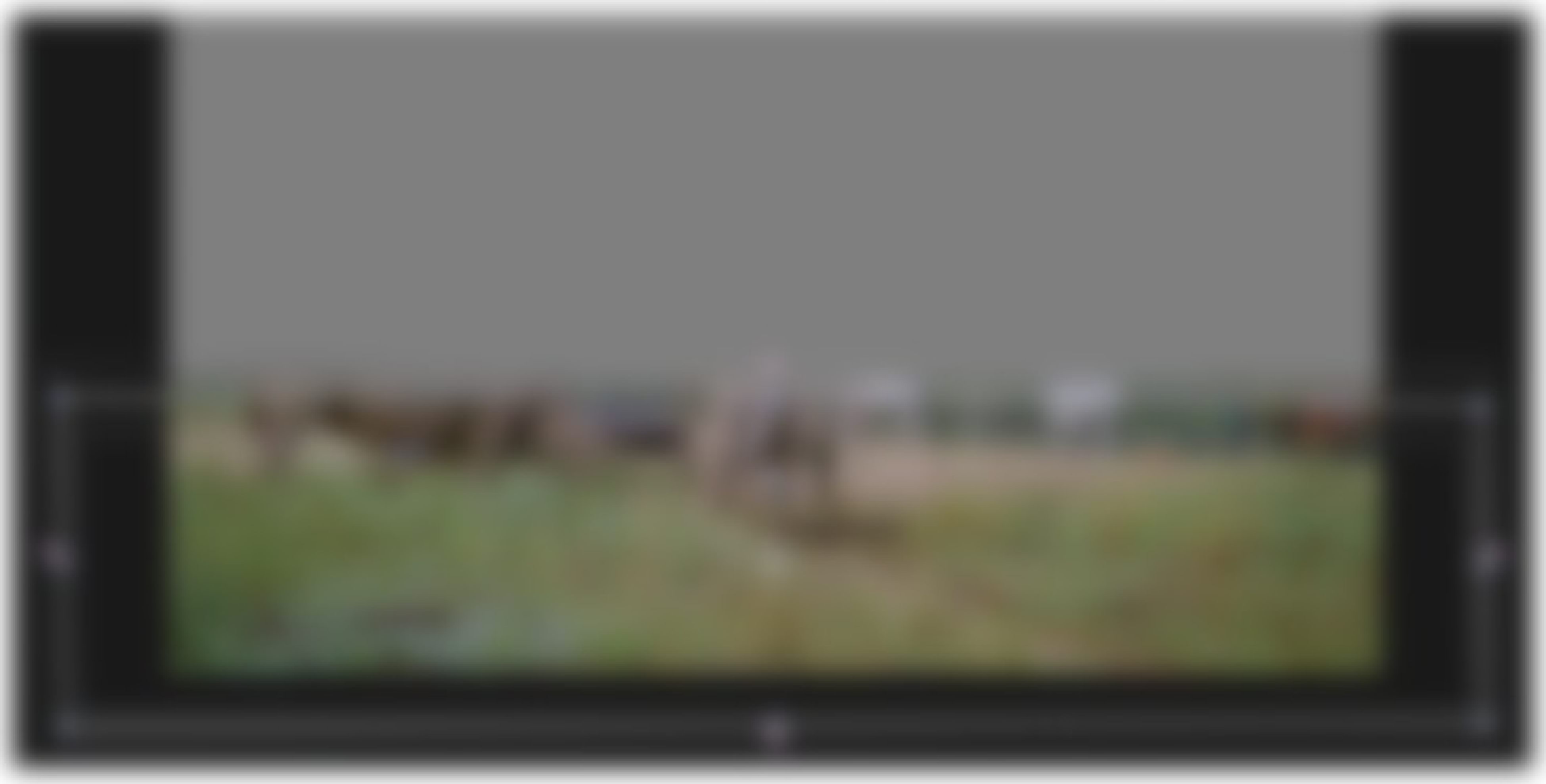
Another pin appears on the mesh, and the result in the viewer is further improved.

- If necessary, choose the Select tool and refine the hue and saturation of the grass points directly in the Chroma Warp diagram.

Observe the surrounding environment in the scene to ensure that you reach a realistic shade of green.

Finally, you can use additional secondary tools to isolate your grade to the bottom of the frame.

- In the Window palette, create a linear window and label it **Grass Matte**.
- Drag the corners of the window around the grassy field in the foreground of the image.

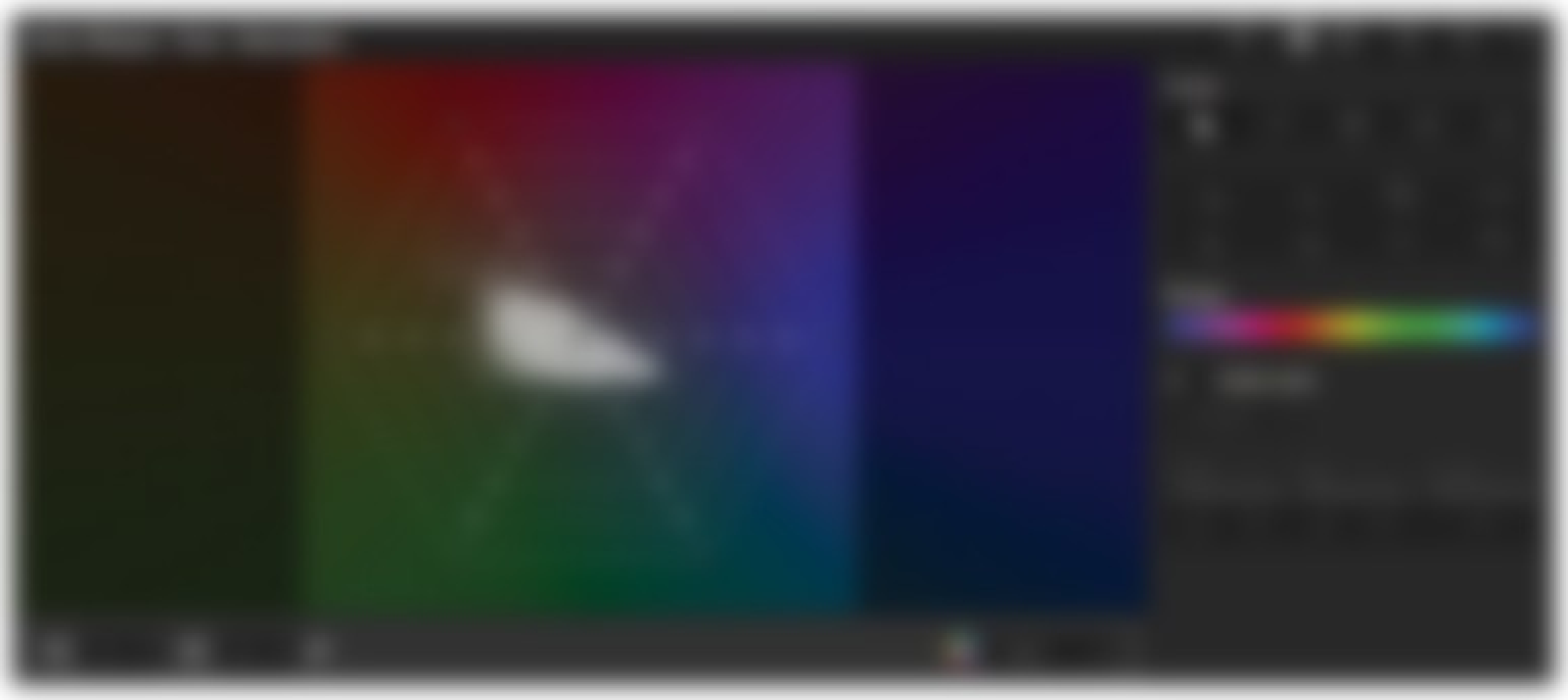


The adjustment is isolated to the grass, while keeping other elements, like the dirt on the ground, unaffected.

The Color Warper enables intuitive adjustment of color, hue, and saturation directly within the viewer. As you likely noticed, the adjustment is optimal when the hue is kept close to the source color. If pushed too far, the warp mesh can overlap itself, resulting in visual artifacts. In such cases, consider switching the Chroma Warp to Pinned Point mode or using an alternative hue correction method, such as HSL curves or the qualifier.

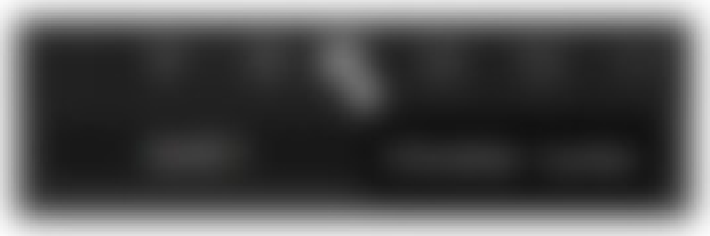
Using the Grid Interfaces

The Color Warper also contains two grid interfaces for changing either hue and saturation or chroma and luma. The Hue-Saturation grid is similar to the Chroma Warp's Normal mode but features far greater flexibility when warping. The grid interface enables you to adjust the mesh resolution, providing a clearer visualization of the color vectors and neutral white point.

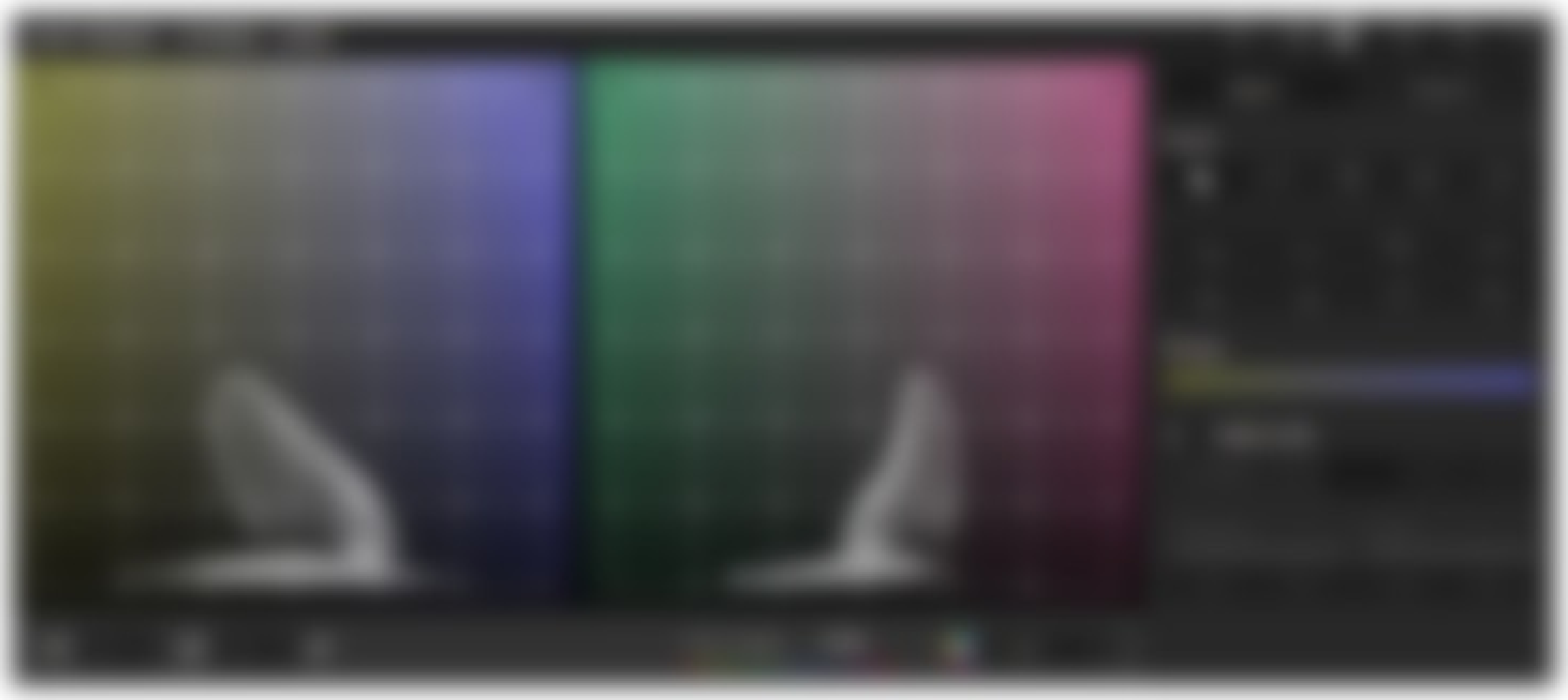


The Color Warper's Chroma-Luma grid allows you to adjust the hue and luminance of a selected range simultaneously. This opens up some creative and practical applications when working with bright areas, such as skies, lights, and windows.

- In the yellow flag-filtered timeline, select clip 04.
- Create a new serial node called **Sky** (node 02).
- In the upper-right corner of the Color Warper, press the Chroma-Luma button.



The Chroma-Luma panel features a pair of mesh grids that depict the cross sections of a 3D chroma-luma cube. A trace is projected behind the grids, representing the distribution of the chroma and luma data of the current frame in the viewer from two perspectives.



The horizontal axis of the grid represents hues, while the vertical axis maps the luminance. You will use control points on these grids to enhance the vibrant colors of the sky. The right side of the palette features advanced selection and pruning tools, which are used to achieve optimal precision when warping.

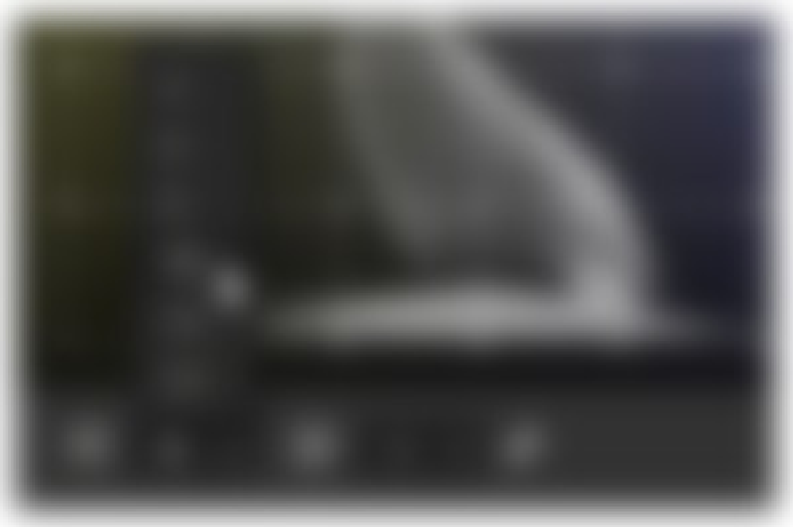
- In the viewer, click a light area of the sky and drag down.

In color grading, changing luminance based on a hue can often lead to distortion. Therefore, it is essential to maintain precise Chroma-Luma selections and make subtle adjustments.

- Reset the Color Warper by clicking the reset arrow in the upper right corner of the palette.

TIP Right-click a control point to reset its position in the grid.

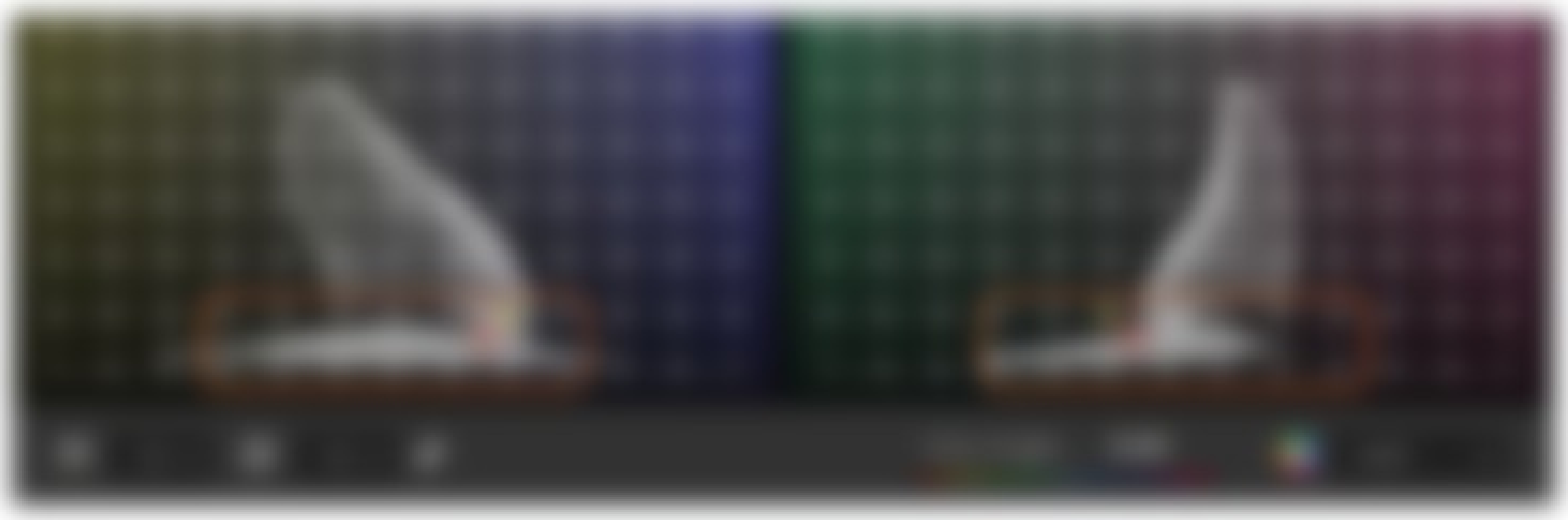
- In the lower left corner of the Color Warper palette, click the Chroma resolution dropdown menu and set the resolution to 12.



The Color Warper grid now features 12x12 divisions, allowing for much more precise selection. By default, the chroma and luma resolutions are linked, although this behavior can be disabled by clicking the link icon next to the resolution dropdown menus.

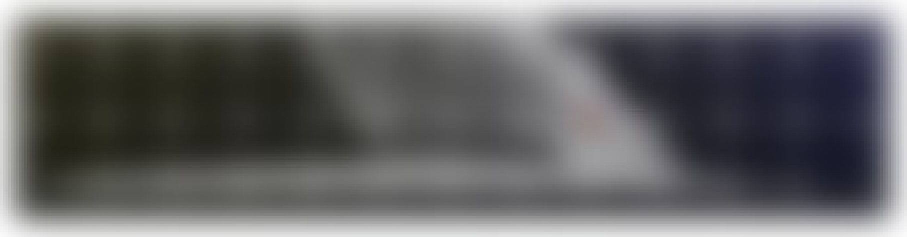
Next, you will lock the darker regions of the image to protect them from adjustments made to the sky.

- In the viewer, hover over the hill in the foreground and the mountains in the background.



The orange crosshair indicates that the luminance range of those regions lies in the bottom two rows.

- Select any point on the row directly above the bottom of the grid.



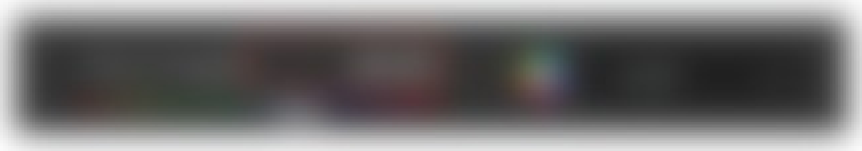
9 In the Tools sidebar, click the Select Row button to expand the selection to the entire row.

10 Click the Convert Selected to Pin button to lock all the control points on that row.

A black outline indicates pinned points. Adjustments made near a pinned point will not affect it, and the surrounding grid mesh will warp around it.

11 Repeat steps 8–10 in Grid 2 (the grid on the right) to protect the shadows in those chroma regions too.

12 At the bottom of the palette, drag the Hue Angle parameter ([illegible]) to determine the hues that you will introduce to the sky. The aim is to reach a more yellow tone in the left grid and a magenta tone in the right grid.



As you do this, the waveform's trace in the grid will rotate, revealing its 3D nature.

13 At the top of the Tools sidebar, select Grid 2.

14 In the viewer, click the region between the orange and blue gradients in the sky and drag right and slightly upward to push a vibrant pink hue into the sky.

15 At the top of the Tools sidebar, switch to Grid 1.

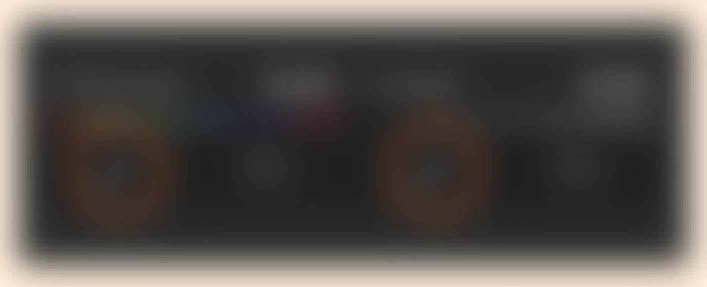
[illegible] In the viewer, click the orange region right above the mountains and drag left and upward to brighten the sky and give the sunrise a warmer, more pronounced glow.

Notice that when you finish adjusting a point in the grid, it also becomes pinned, as indicated by the black outline. This means that you can adjust multiple control points in the Color Warper grids without them affecting each other.

Before

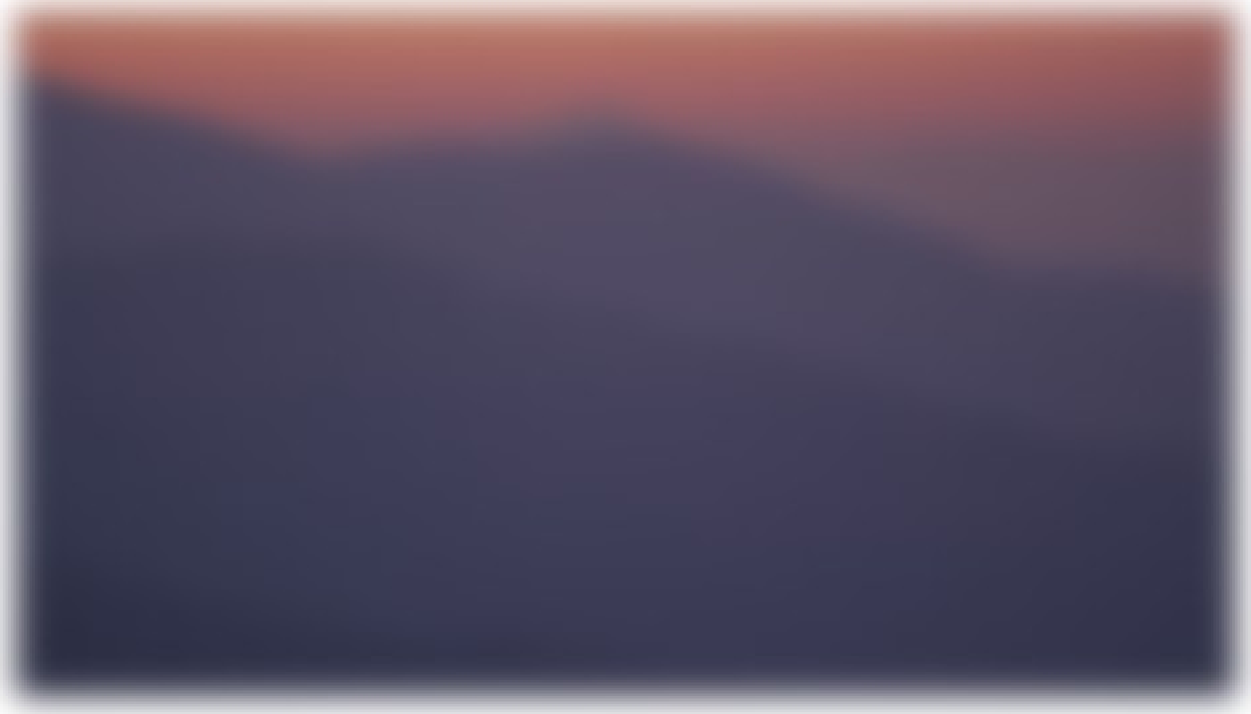
After

TIP If you start to see banding in the sky as a result of dragging a control point too far, select the point and click the Smooth buttons (the feathers) under the Chroma and Luma parameters in the sidebar.



This will nudge the point toward its original position, softening the grade and reducing artifacts. The Smooth buttons can be clicked as many times as needed for incrementally smaller nudges.

- When finished, copy the Sky node and paste it into a new node in clip 04 to keep the look of the sky consistent.



Before

After

As you continue to work with the Color Warper, explore the remaining selection and pinning tools in the sidebar to gain a fuller understanding of how selections can be made faster and with more precision.

Enhancing Skin Tones with Face Refinement

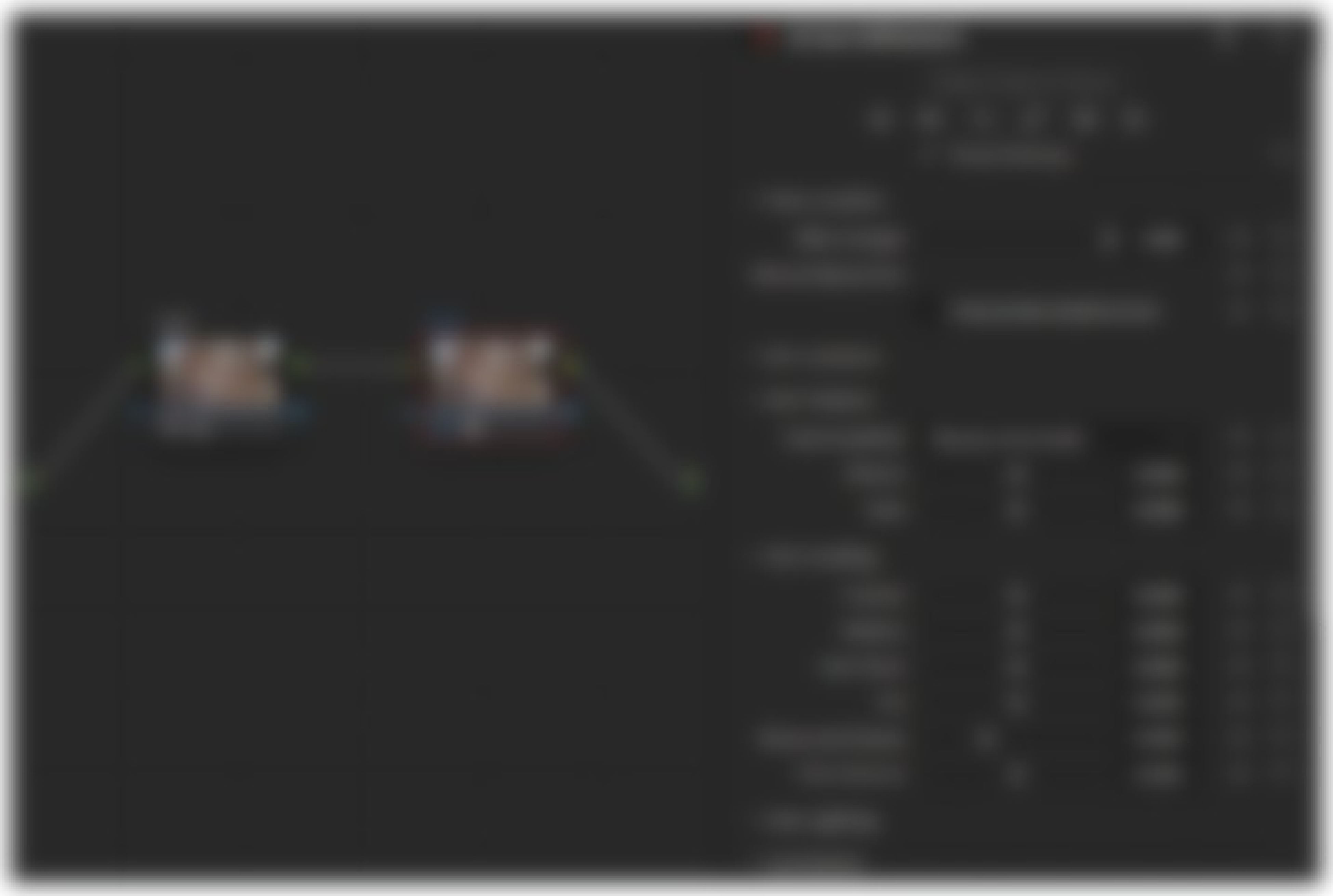
Whether watching a fictional film or a documentary, audiences will pay the utmost attention to the actors (and therefore the faces) of the people on the screen. Colorists and makeup artists share the common job of "protecting the talent." This means we need to do our best to make skin look clear and natural.

In DaVinci Resolve, this is achieved with a combination of primary adjustments aimed at ensuring skin is well exposed and balanced, and secondary grading methods and effects to reduce minor imperfections.

NOTE This exercise requires DaVinci Resolve Studio to complete.

In this exercise, you'll start with a well-framed and properly exposed shot. The only issue is that the speaker is wearing a wide-brimmed hat on a sunny day, resulting in harsh shadows on her face. Your goal is to make her face stand out more and then address general imperfections using the AI Face Refinement effect.

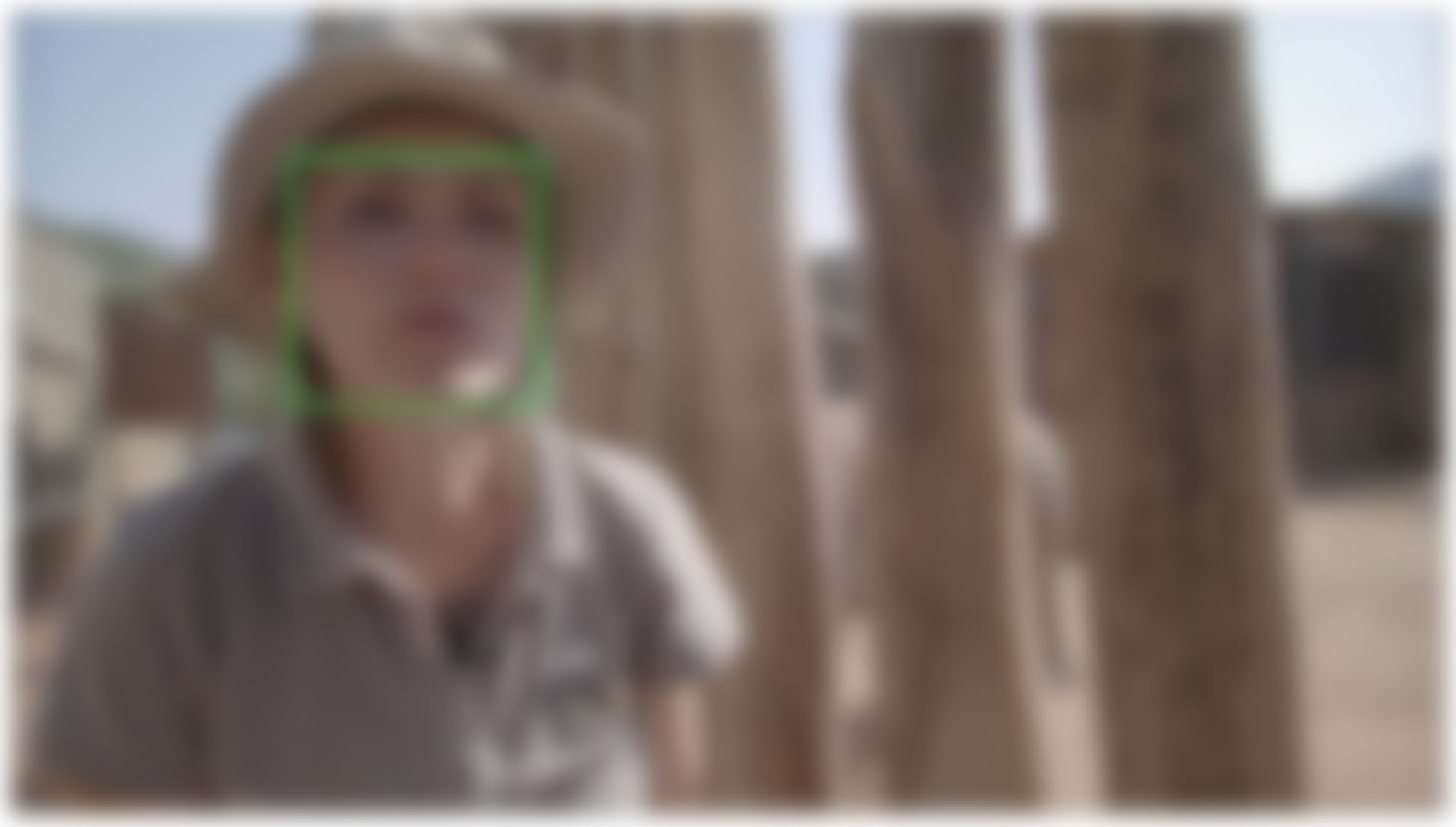
1. In the yellow flag filtered timeline, select clip 02. In the Node Editor, you can see that it has already has a luminance adjustment on the first node.
2. Create a new serial node and label it **Face**.
3. Open the Effects panel.
4. In the Resolve FX Refine category, drag the Face Refinement effect onto the Face node.



NOTE If you are not using DaVinci Resolve Studio, a watermark will appear over the image. You can dismiss the warning dialog and complete this exercise with the watermark.

When activated, Face Refinement automatically detects and tracks faces, giving you the option to add side lighting, enhance the skin, and adjust individual features such as the eyes, lips, teeth, forehead, cheeks, and chin.

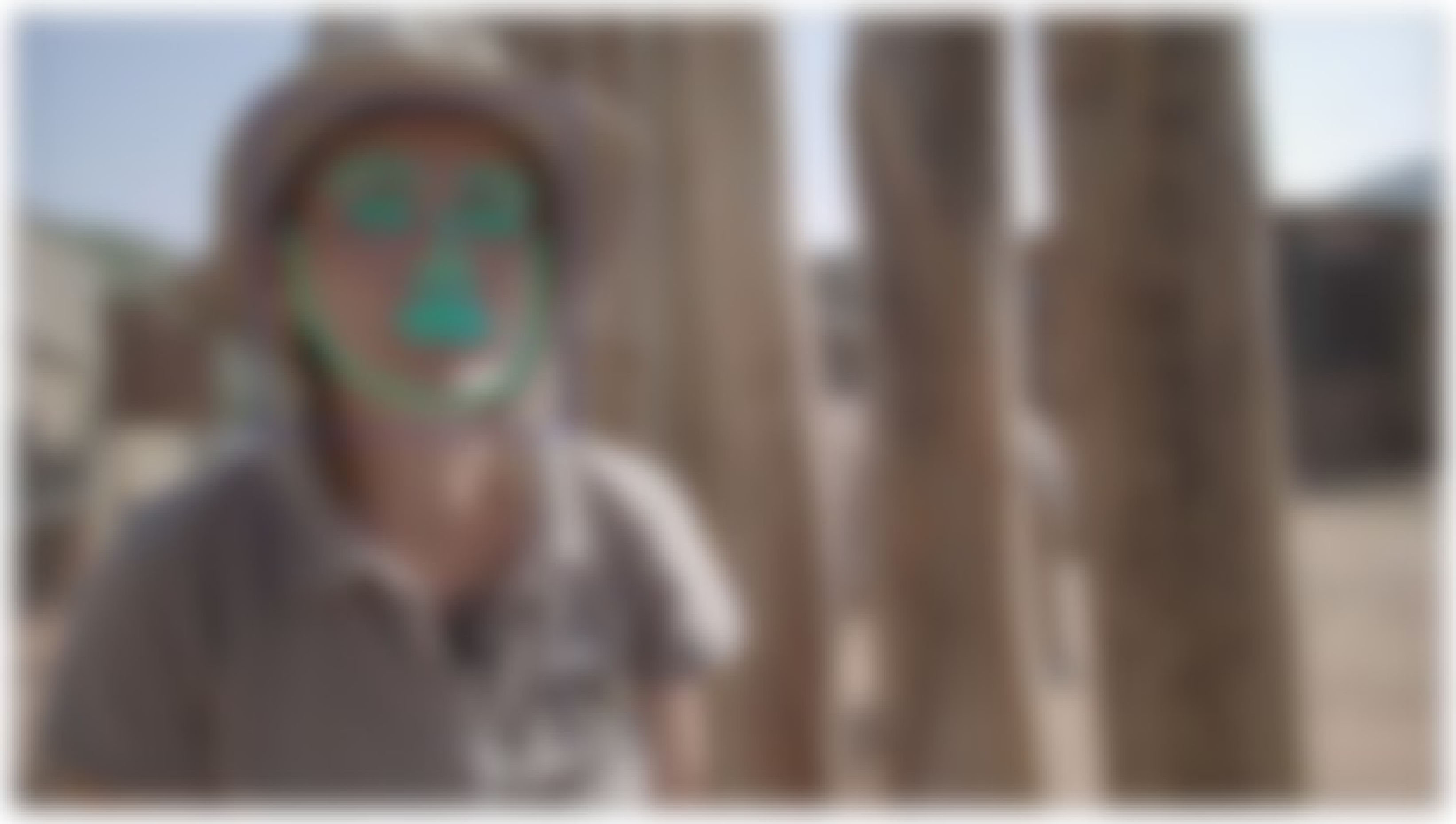
- In the AI Face Refinement settings, click Detect Faces in Frame.



A green box appears around the subject's face. If there had been more than one subject in the frame, red boxes would have appeared around the other faces, and you would have had the option to select the subject that you wished to track. In cases where you might want to track multiple faces, you will need to create dedicated Face Refinement nodes for each subject.

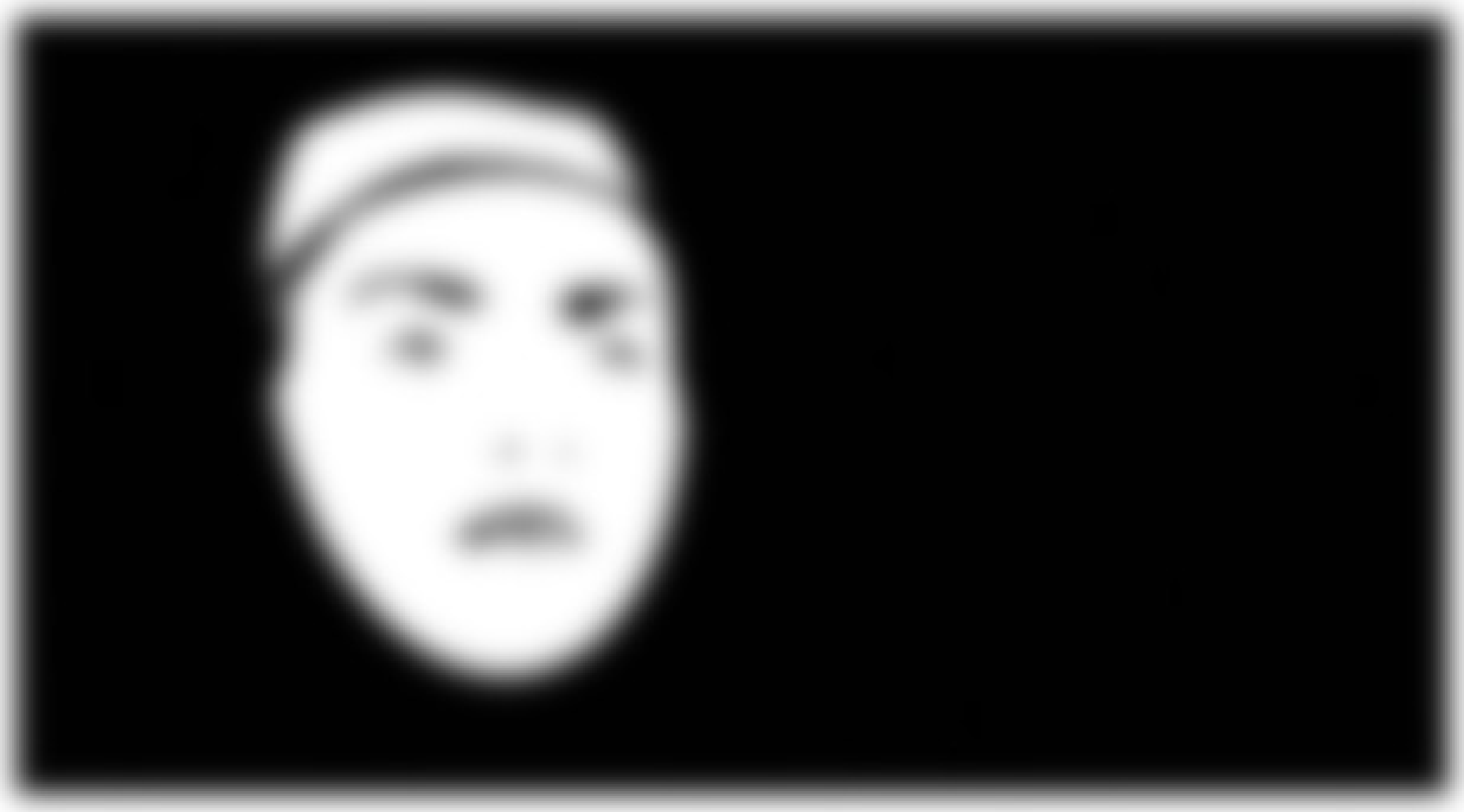
- Press Track Forward Then Reverse. Processing will take some time as the software tracks the face and constructs a tracking matte.

When the analysis is complete, you will see a collection of green trackers outlining the woman's facial features.



To ensure the highest quality of the selection, you should check the matte of the face before proceeding with any adjustments. The matte quality can be compromised when analyzing a subject whose skin tones closely match their hair, clothes, or surroundings. In this example, the subject fits all three of these criteria.

- In the AI Face Refinement settings, click the Skin Isolation header to expand it, and then select Show Mask.
- Deselect Show Overlay at the top of the settings to hide the green trackers in the viewer.
- Zoom inside the viewer to get a clearer view of the subject's face.



The selection appears clean overall. However, the upper segment of the mask has included part of the sun hat that the woman is wearing, which you will remove in the next exercise.

Face Refinement — Manual Adjustments

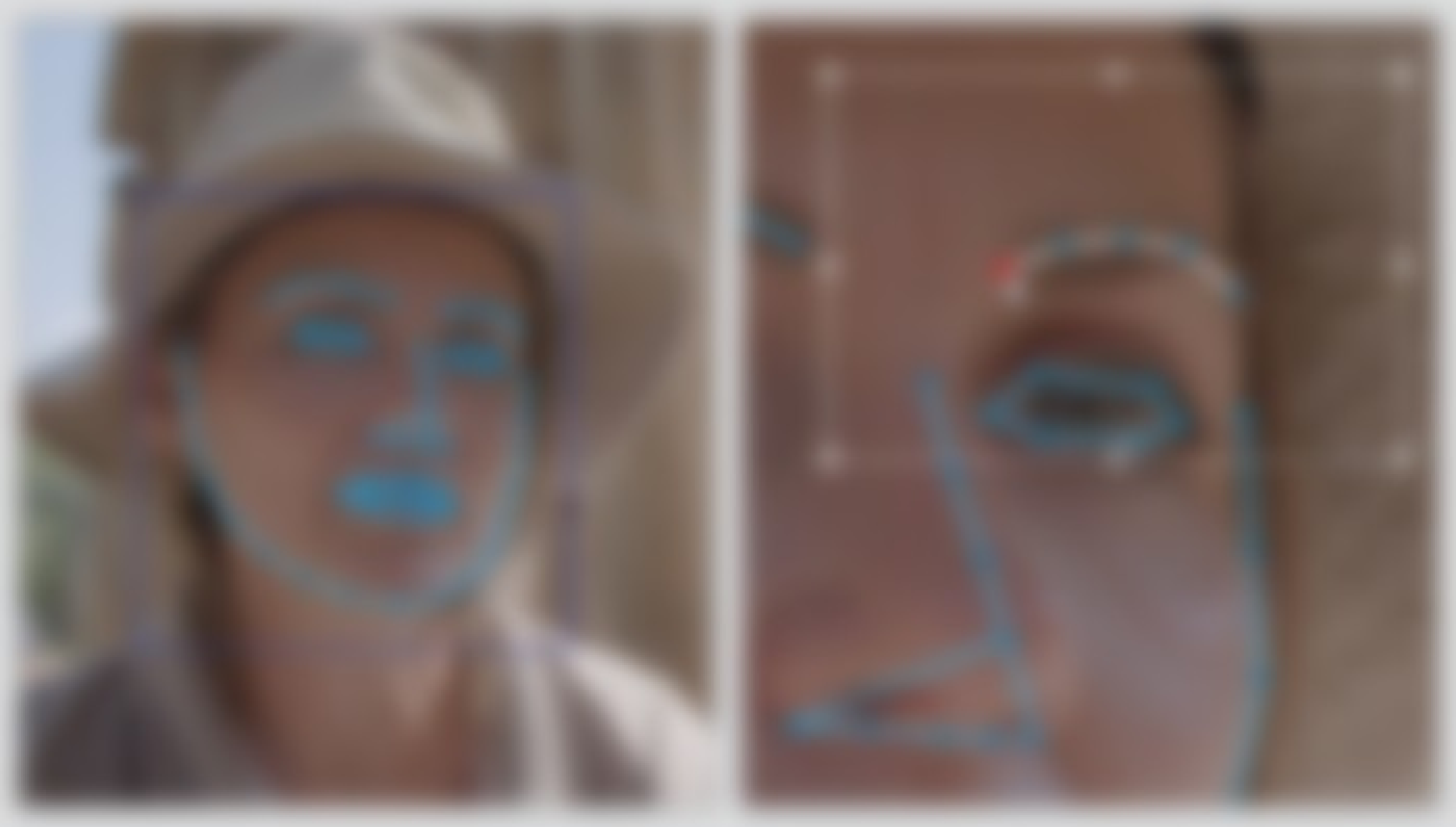
When a subject's head moves too quickly or their face leaves the frame, the Face Refinement tracking points might disconnect from the facial features. When that occurs, you have the option to manually correct the Face Refinement track in the same way that you can correct a tracked window track.

First, drag the playhead to the last frame with usable (good) tracking data.

Then, in the Face Location category, select Interpolate (Keyframed) to activate keyframing.

Finally, move the playhead to the frame where you wish to correct the face refinement tracking points. The tracking points will appear blue in the viewer, meaning they are accessible for manual correction.

Click an empty region of the bounding box and drag to move all the facial tracking points. A gray outline will indicate where the original analysis predicted their position.



You can adjust any tracking point on an individual feature (such as an eyebrow, nose, or chin) and drag its bounding box to correct a feature's placement.

Combining Windows with Face Refinement

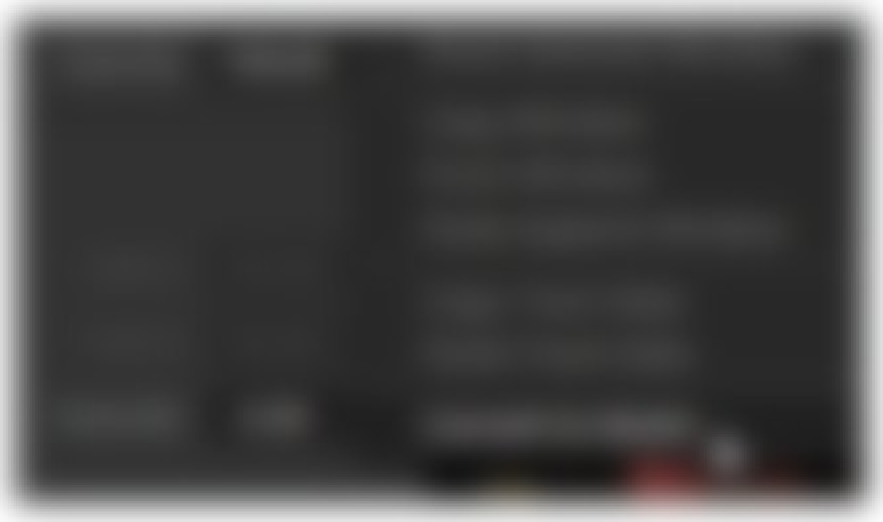
To remove the unnecessary hat selection from Face Refinement, you will use a window to exclude the top of the matte.

1. Move the playhead to the last frame of the clip, where the subject's head appears more level.

- With the Face node still selected, open the Window palette.

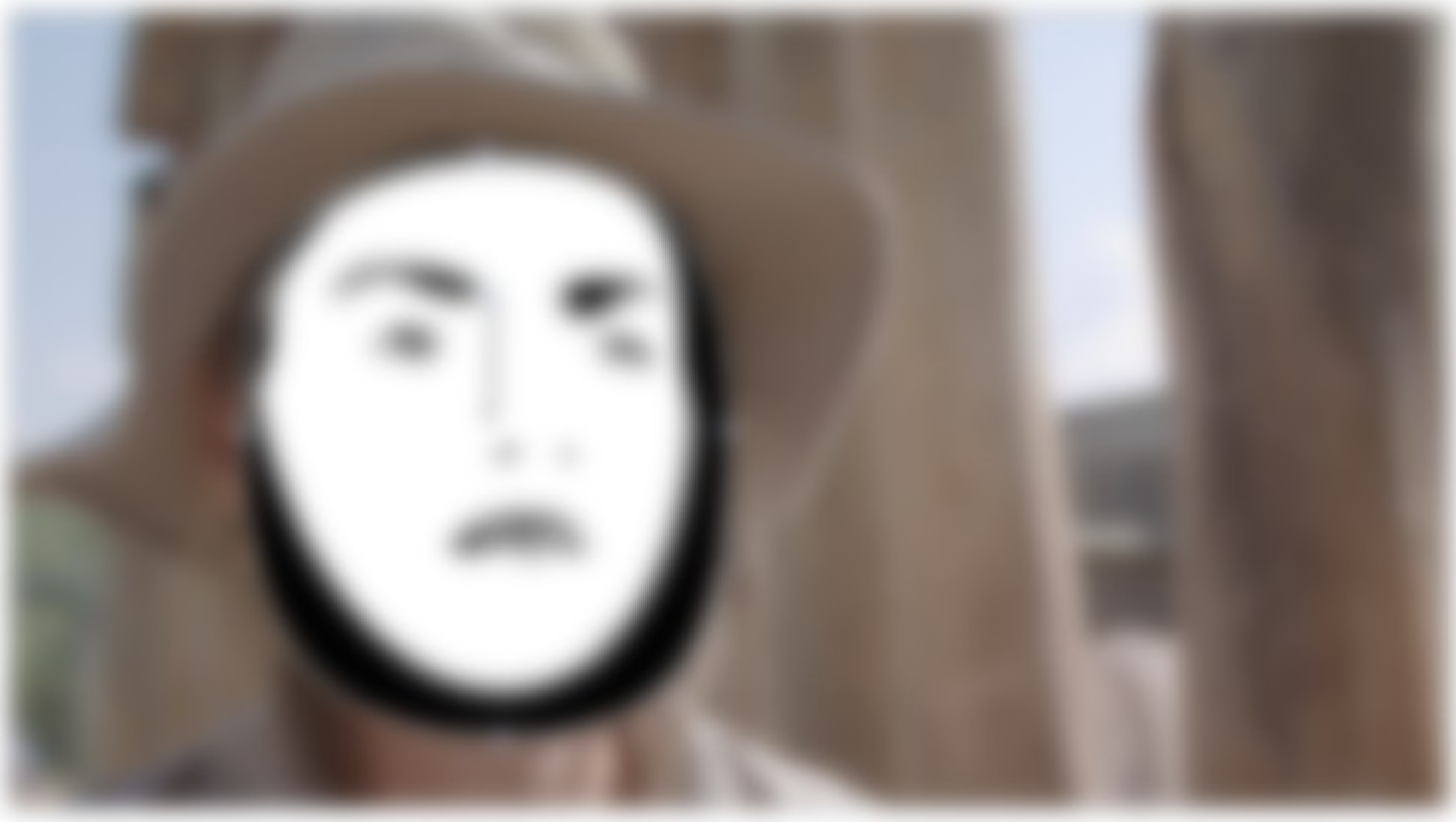
- Create a new circle window and place it over the woman's face.

- In the upper right options menu of the Window palette, choose Convert to Bezier to transform the circle's points into Bezier curves.



- Label the resulting curve window **Face Window**.

- In the viewer, adjust the points to fit around her face, paying extra attention to excluding the hat.



- In the AI Face Refinement settings, disable Show Mask.

- Enter the Tracker palette.

9 Click the Track Reverse button to track the motion of her face backward through the clip.

10 When tracking is completed, refine the shape of the face window throughout the clip in Frame mode, if necessary.

11 Use the viewer's onscreen controls menu in the lower left corner to turn off the window outline.

The face matte has now been prepared for optimal grading and compositing. At times, you may find that a matte or key appears correct until you start grading, at which point you may notice rough edges, holes, or poorly selected regions. In those cases, you can always return to your matte controls and secondary selection tools (like the qualifier and windows) to continue refining the matte.

Improving Skin Quality

There are a variety of reasons why skin might need adjustment:

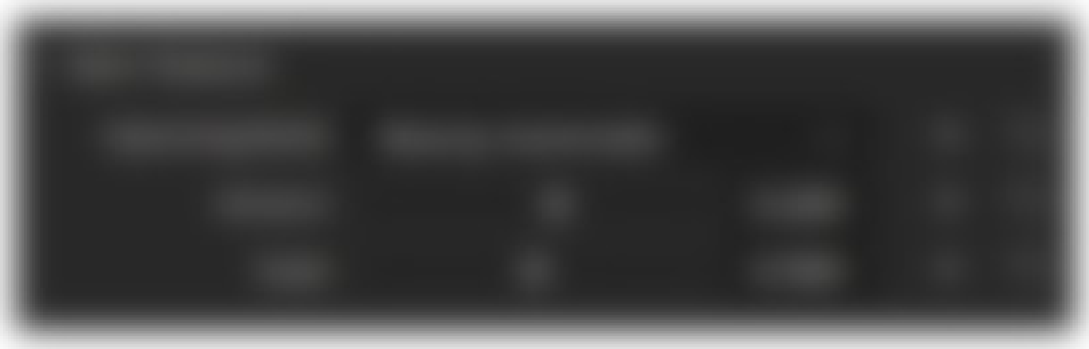
General skin imperfections, such as variations of color, spots, dryness, oiliness, and so on – By applying the appropriate brightness, contrast, and blurring, you can reduce these issues and put the focus back on the performance.

Some skin undertones are prone to reflecting light with unpredictable tints – The most common variants are skin tones that appear magenta or green under harsh artificial lighting, such as from fluorescent office lights. The purpose of grading in this case is to remove the tint and bring the performer's skin tone to a neutral position that more closely resembles their skin under natural light.

Overpowering primary grade – When a shot has been strongly graded at the primary stage to look a certain way (for example, to make the environment look cold), the skin can end up looking overpowered or washed out as a result. This type of dominant grade can drain the life out of a shot and make it look dull. By bringing back the skin tone, the shot develops chromatic contrast (also known as "color separation") and once again becomes vibrant.

In this exercise, you'll look at some of the commonly used settings of the AI Face Refinement tool with a focus on reducing minor imperfections and achieving a natural result, known in the industry as "beauty work."

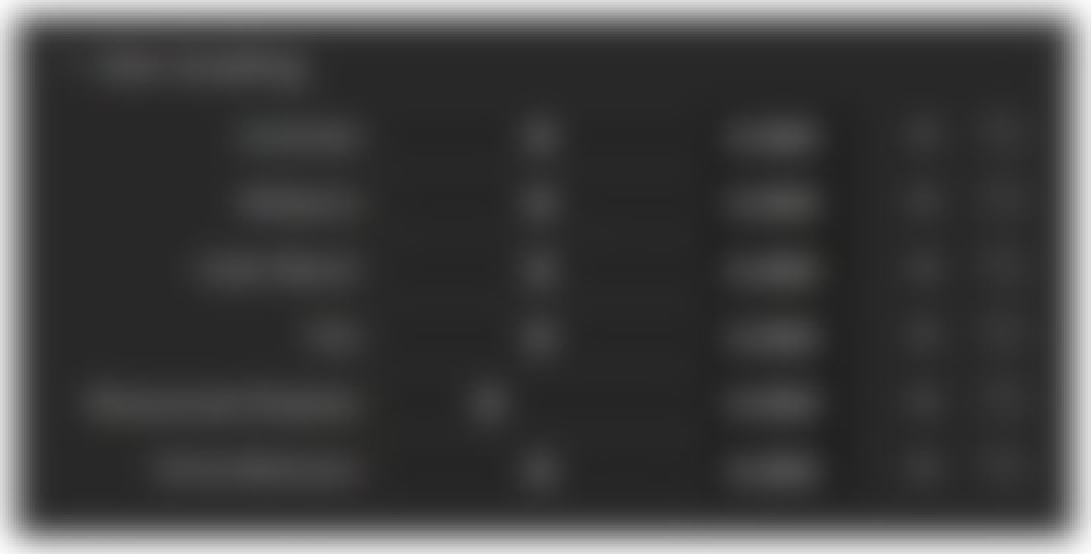
- In the Workspace menu, choose Full Screen Viewer or press Shift-F to expand the viewer to fill your screen while still giving you access to the Effects panel to the right.
- In the AI Face Refinement Settings, under Skin Texture, adjust the Amount to [illegible]. Doing so will gently blur the skin to soften minor wrinkles and imperfections.



Be careful not to push this setting so far that skin starts to look plastic. You should not aim to remove wrinkles but merely soften them.

TIP To see a wider range of skin smoothing options, change the Skin Texture Operating Mode to Smoothing or Beauty Advanced. These modes break up the smoothing process into individual steps in which you can define texture detail, size, and diffuse lighting.

- Scroll down to the Skin Grading section to begin work on the woman's skin tone.



The Midtone parameter is responsible for the overall brightness of the skin. You can use it to lighten the shadows on her face.

- Drag the Midtone slider to the right ([illegible]) to brighten the skin, but don't drag it so far that the results become distracting.

TIP For more precision, drag within the numeric field of a parameter instead of the slider.

Color Boost enhances saturation in areas of the skin that are undersaturated.

5. Drag the Color Boost until you reach 0.500.

   This is responsible for undoing the green or magenta color cast that some skin tones reflect.

6. Drag Tint to -0.100 to reduce the redness in the skin.

   With the shadows lightened and the skin more balanced, you can return to the Contrast parameter to give her face more depth.

7. Raise the Contrast (0.100) to return some details into the shadows of her face.

   There is a prominent highlight on her chin where her hair no longer casts a shadow. The Shine Removal parameter is ideal for handling strong highlights on skin.

8. Raise Shine Removal (1.000).

   Most of the highlights are successfully reduced, but there is an area on the lower right of her chin that is not included in the mask matte. You'll need to expand the mask to include this area.

9. Return to the Skin Isolation section and select Show Mask.

10. Increase the Region Size (0.200) to expand the mask matte.

11. Increase the Region Softness (0.200) to ensure that the matte's edge remains undetectable in the viewer.

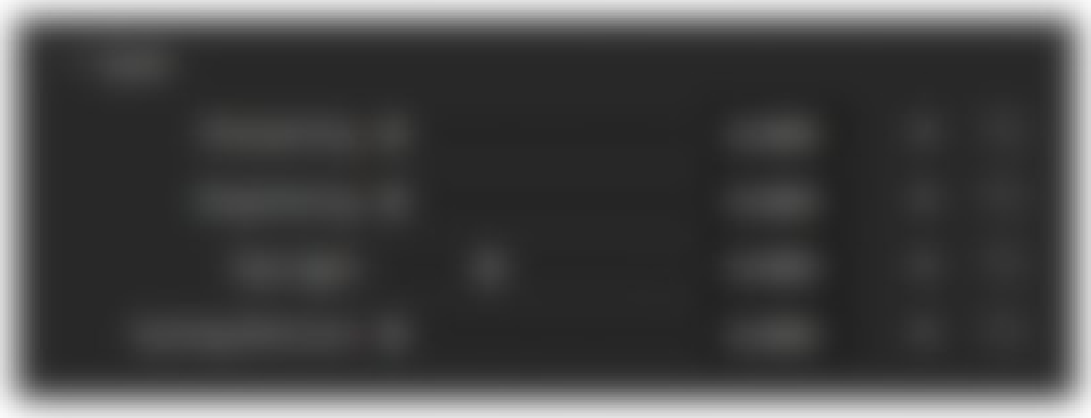
12. Deselect Show Mask.

13. Return to the Skin Grading section and adjust Shine Removal (0.600) to remove the light glare on her chin while keeping the highlight natural.

    The next category in the list is Side Lighting. Use these settings if your subject was captured next to harsh directional lighting or if they did not have a fill light to counter a strong light source. In this case, the subject is evenly exposed, so an adjustment will not be necessary.

    After that, the Eyeshadow category allows you to artificially apply eye makeup to a subject. The detailed parameters give you control over hue, saturation, size, gamma, and so on across the upper and lower lids. The project narrative does not call for this type of adjustment, so you can skip these settings too.

[illegible] Scroll down to the Eyes category and click the header to expand it.



The controls in this section allow you to enhance details in the irises of the speaker, as well as brighten and soften the skin around the eyes.

[illegible] Set Sharpening to [illegible] to refine the iris, eyelashes, and eye shape.

[illegible] Set Eye Light to [illegible] to gently increase the brightness around the eye area.

[illegible] Adjust Eyebag Removal to [illegible] to soften and lighten the area directly under her eyes.

The Lips category allows you to saturate and change the hue of a subject's lip color and to smooth upper lip wrinkles in close-up shots. As usual, context is key. The park ranger in question is not wearing lipstick, nor do you have a justifiable reason to glamorize her as she talks about the issue of rhino poaching in South Africa. In this case, the Lips tool is necessary only to add minor contrast to her skin tone.

[illegible] In the Lips section, raise Saturation to [illegible] to better define her lips against her skin.

The same guidelines apply to Teeth and Blush Retouching.

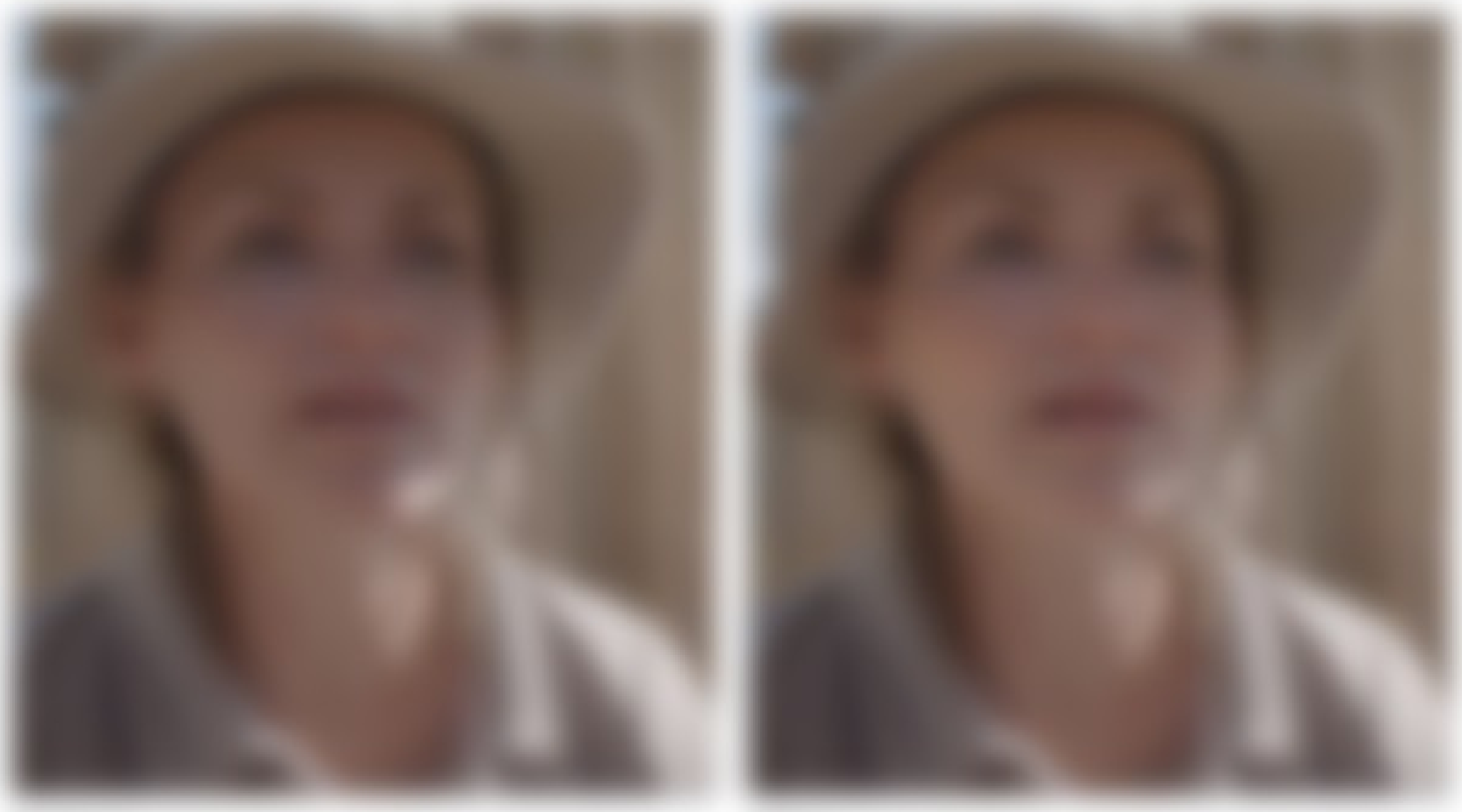
[illegible] In the Teeth section, slightly increase the Gamma [illegible] to make her teeth more visible, which might help some viewers better follow what she is saying.

[illegible] In the Blush Retouching section, set Saturation just high enough ([illegible]) to define her face shape without making it look like makeup.

[illegible] Additionally, expand the Size to [illegible] to spread the blush across either side of her face without concentrating it on the apples of her cheeks.

Other features, like the forehead, cheeks, and chin, all have their own categories for dedicated correction. These can be valuable when you are dealing with unusual lighting or patchy skin tones.

You have completed the work required on this clip. If you are generally happy with the result but find that it's a little too overpowering, you can scroll up to the Face Location controls at the top and reduce the Effect Strength slider.



Before

After

With just one node, you have successfully enhanced your subject's skin tone, made it more pronounced by brightening and warming it, and added chromatic detail to her features. In the original clip, it now becomes apparent how much the shadow of her hat was affecting the visibility of her face and facial expressions.

> **TIP** Another tool designed for professional-level skin touch-ups is Beauty Resolve FX. Its Ultra Beauty operating mode smooths rough skin textures while recovering finer details to produce natural results that complement the subject.

13 When you're done with the adjustments, choose Workspace > Full Screen Viewer or press Shift-F to exit Full Screen mode.

> **TIP** To remove a Resolve FX plug-in from a node, right-click the node and choose Remove OFX Plugin, or click the bin icon in the upper-right corner of the Effects Settings panel.

The AI Face Refinement tool is ideal when working with interview subjects, portrait compositions, or fashion shoots. When handling profile shots, or subjects with a lot of motion, more appropriate solutions might be tools such as the Beauty Resolve effect or the primary grading palettes combined with secondary grading selection techniques.

Adjusting Skin Tones Manually

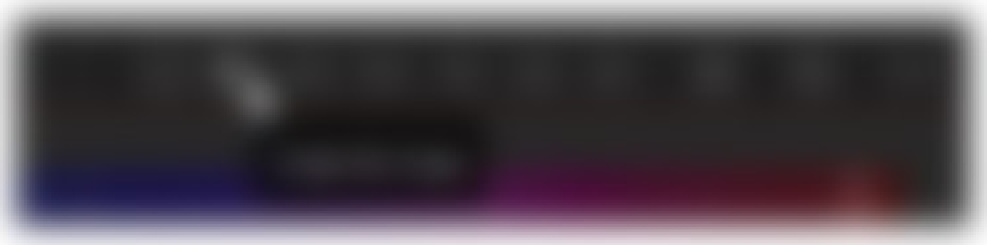
The Curves palette's HSL curves allow you to make rapid, targeted secondary adjustments to an image based on hue, saturation, or luminance ranges. This makes the HSL curves a popular tool for skin hue and saturation correction.

In this exercise, you will remove the magenta tint from the subject's skin.

- In the yellow flag filtered timeline, select clip [illegible].

This clip has already been normalized with Primaries color wheels in node 01.

- Create a new serial node and label it **Skin Hue** (node 02).
- Open the Curves palette, and in the upper right corner, choose the Hue Vs Hue curve.



> TIP The naming convention of the hue curves describes the selection method followed by the change type. Hue Vs Sat implies that you are targeting a specific range of color (hue) in order to adjust its saturation (sat), whereas Sat Vs Lum suggests that you are targeting a certain saturation range (sat) with the aim of adjusting its brightness (lum).

The Hue Vs Hue palette displays the full range of colors in a linear fashion, looping around the red hue. It enables you to sample a specific color and shift it toward another hue.

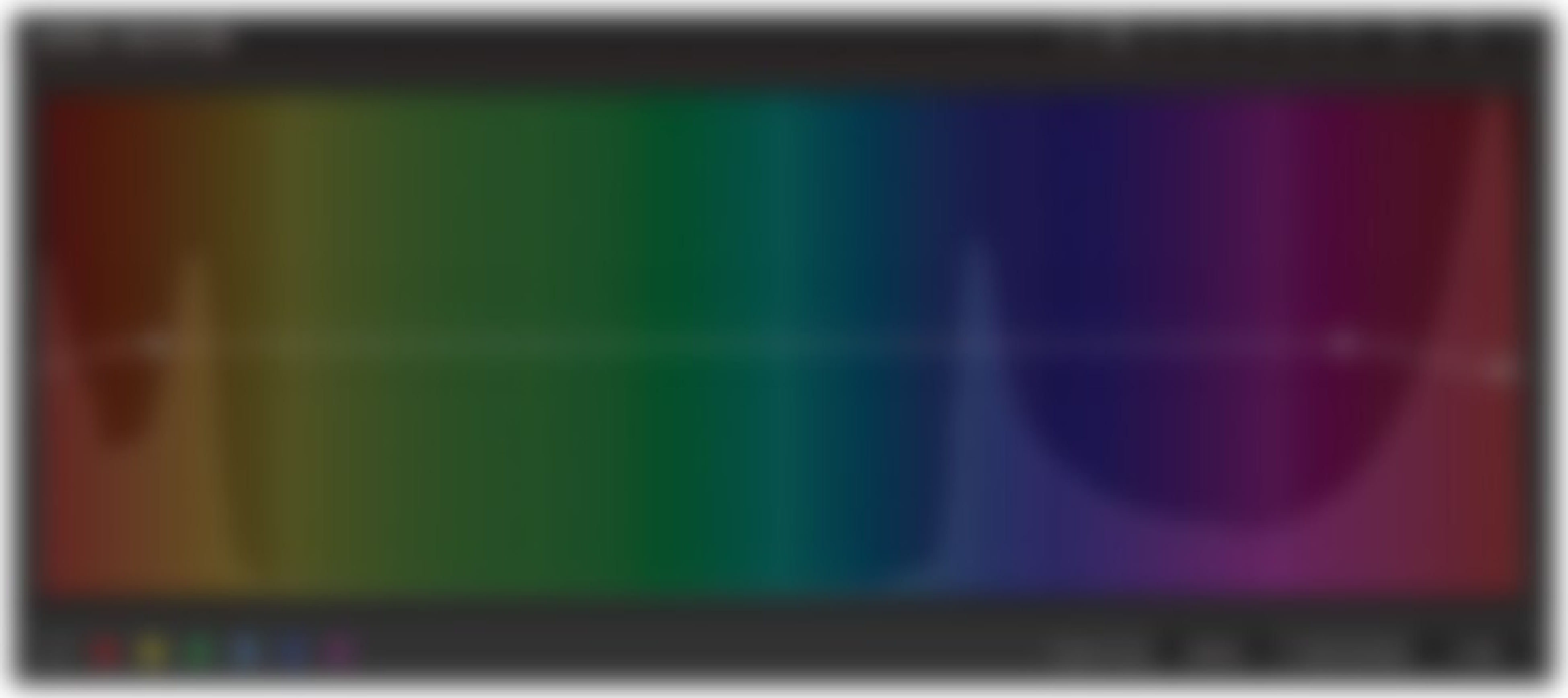
One method of hue selection is to use the swatch buttons at the bottom of the curve graph. Another method is to click in the viewer to sample pixel values.

- In the viewer, click an evenly exposed patch of the man's face.

Three control points are added to the Hue Vs Hue curve. The center point identifies the selected hue, and the control points on either side act as anchors that limit the range of hue that is affected.

TIP If a hue selection lands near the left or right edge of the palette, the anchors might appear on opposite ends as the hue range cycles around.

- Drag the center control point down slightly to remove some of the red tint in the man's skin tone. Be careful not to introduce too much green. If necessary, drag the two control points on either side farther apart to define a wider hue range for the skin tone.

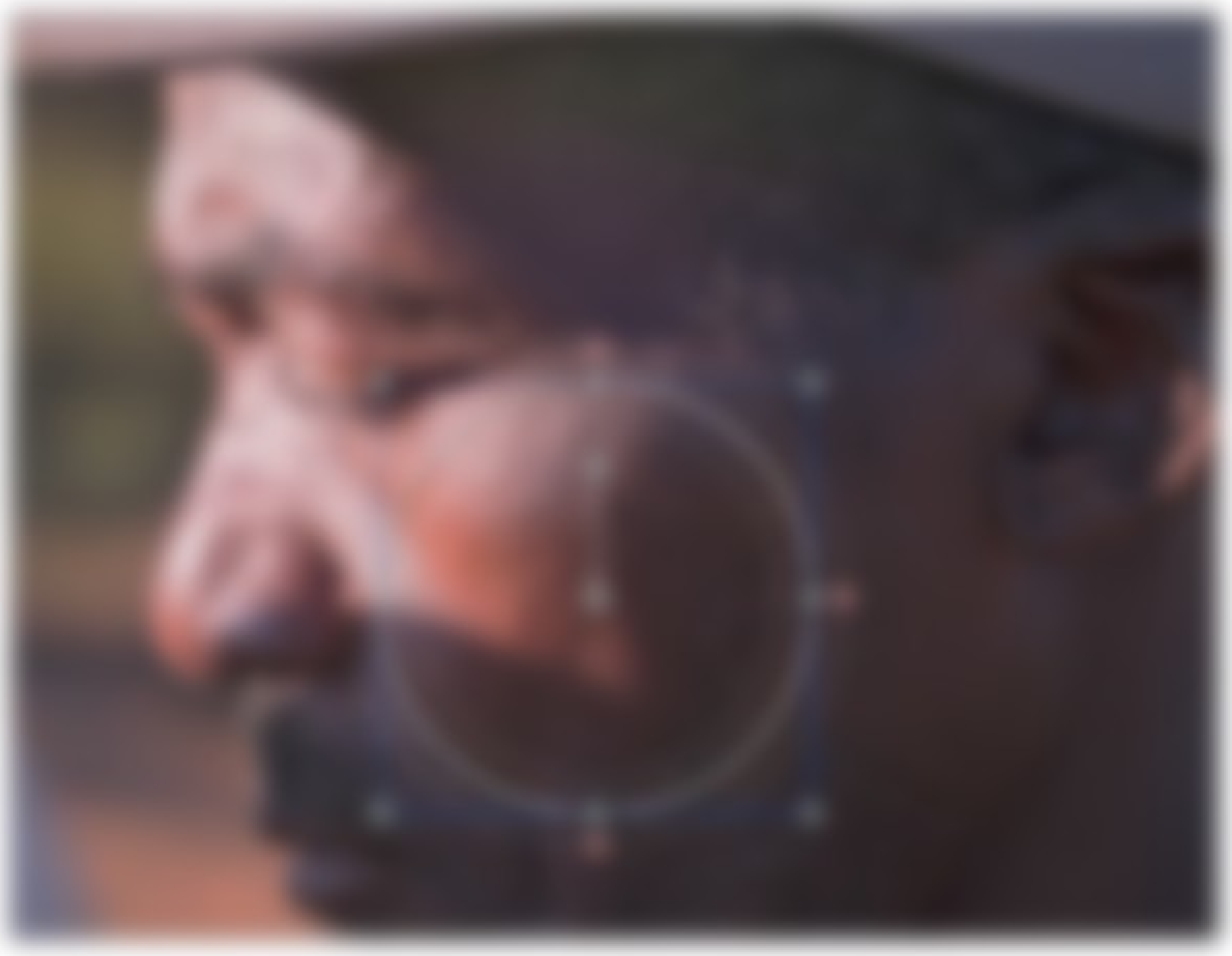


TIP For more precision when moving a control point, use the Input Hue and Hue Rotate fields in the lower right corner of the palette.

This might feel a bit like a guessing game. What is the right hue for his skin? For more certainty, you can open the vectorscope and check what the adjustment is doing to the skin.

First, you will get a cleaner view of the face by using a window to remove interfering elements.

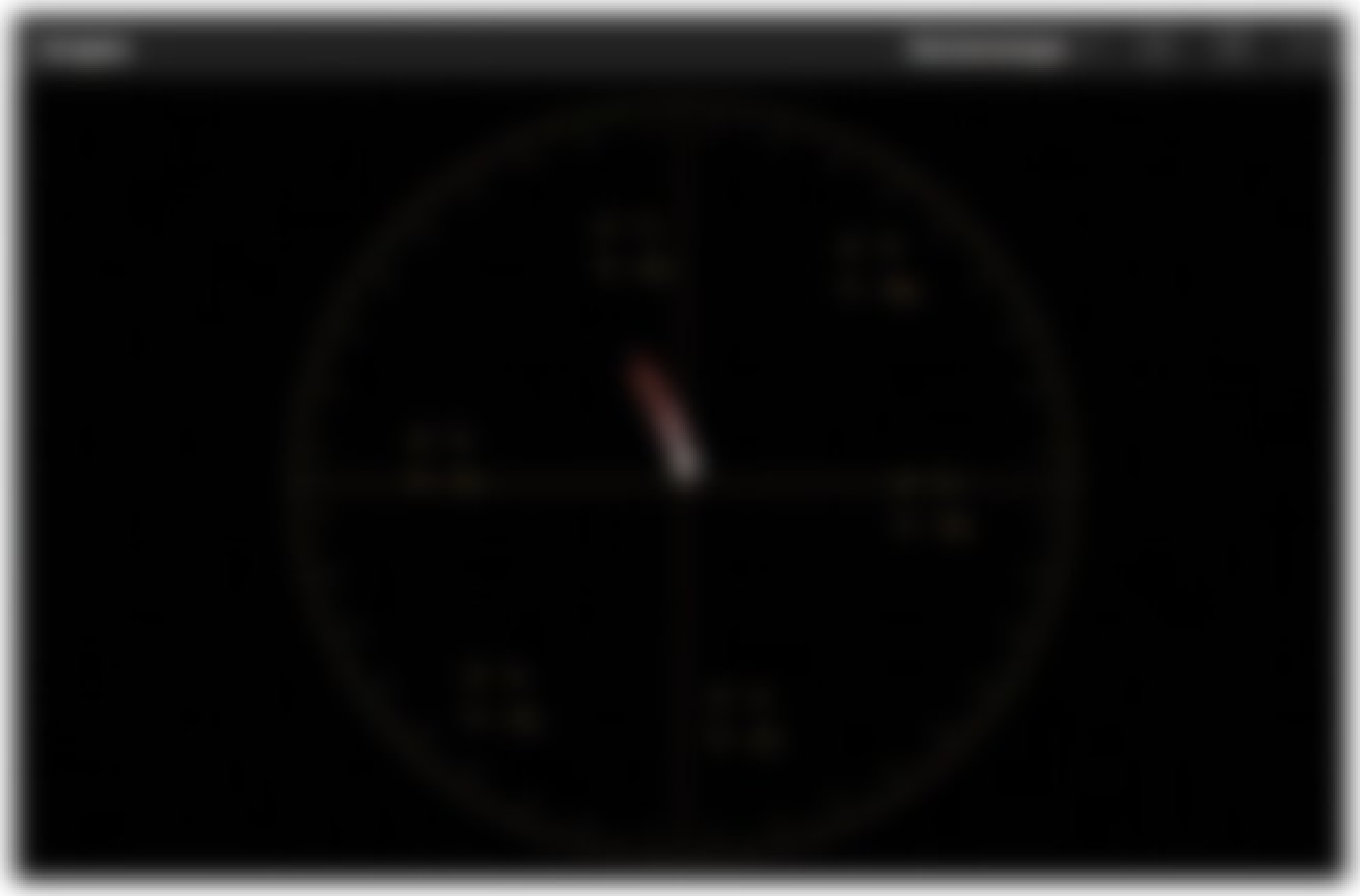
- Open the Window palette.
- Create a circle window and label it **Face Window**. Position it over the man's face to isolate a clean patch of skin.



- Reduce the window's Softness Soft 1 parameter to 0.00 to get a sharp edge on the selection.
- Click the Highlight button.

The temporary window will aid in providing a clean readout of the skin values in the vectorscope.

- In the Scopes palette, choose Vectorscope as the scope type.

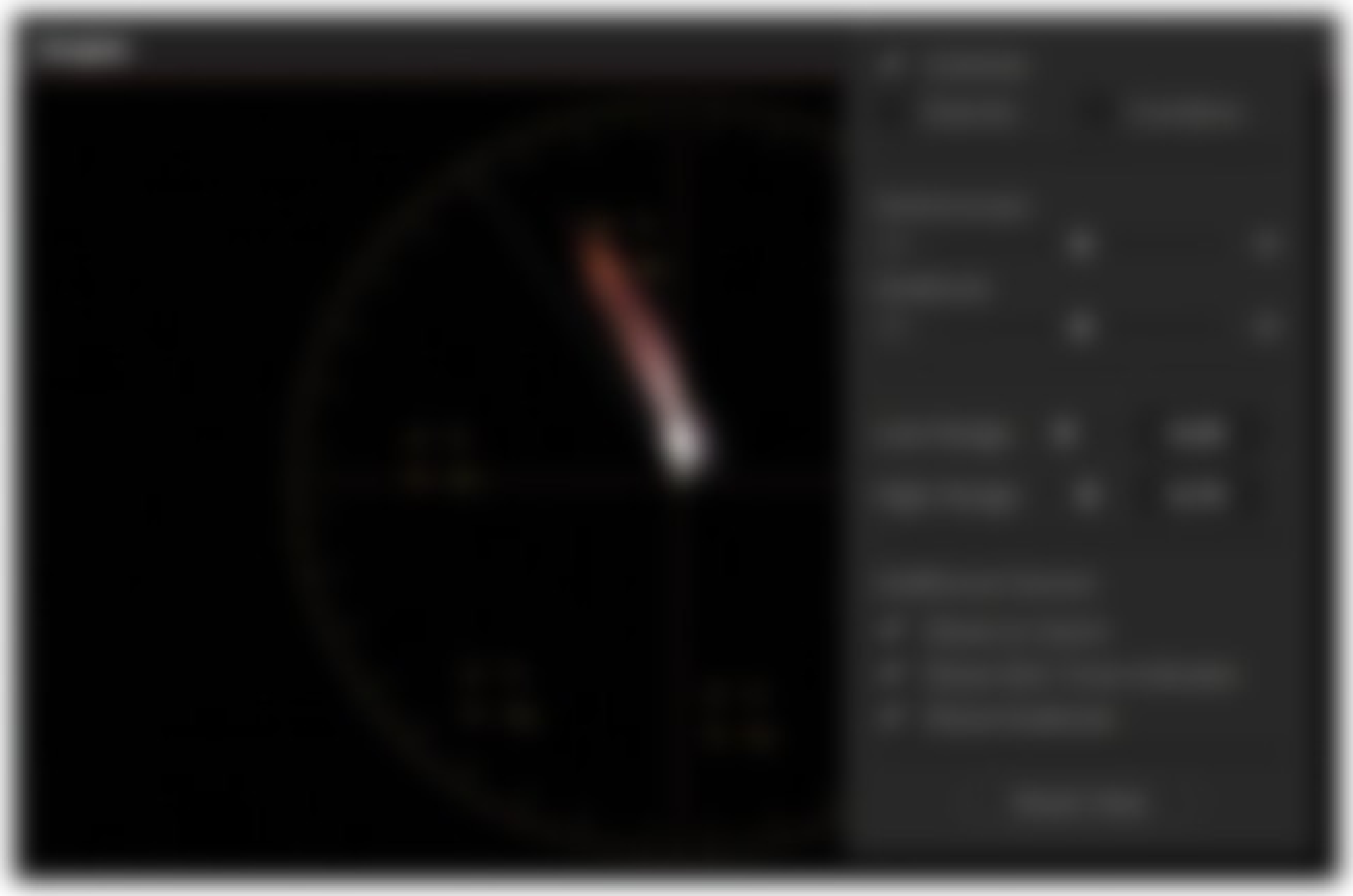


A vectorscope distributes visual data on a circular graph to represent hues and their saturation levels. A well-balanced image will generally appear as a cloud of pixels in the center of the vectorscope. Scenes with prominent colors will appear with broader traces and deviations toward specific hues. You encountered a vectorscope previously when working with the Color Warper tool.

- In the upper right corner, click the settings icon to adjust the appearance of the scope for easier readability.
- Select Show 2x Zoom to increase the size of the trace.

NOTE When 2x Zoom is enabled in the vectorscope settings, you will no longer get an accurate representation of saturation values. However, the setting is still helpful for checking hue distribution in low-saturation images.

- Select Show Skin Tone Indicator to display a line that indicates the angle for skin tone hues.

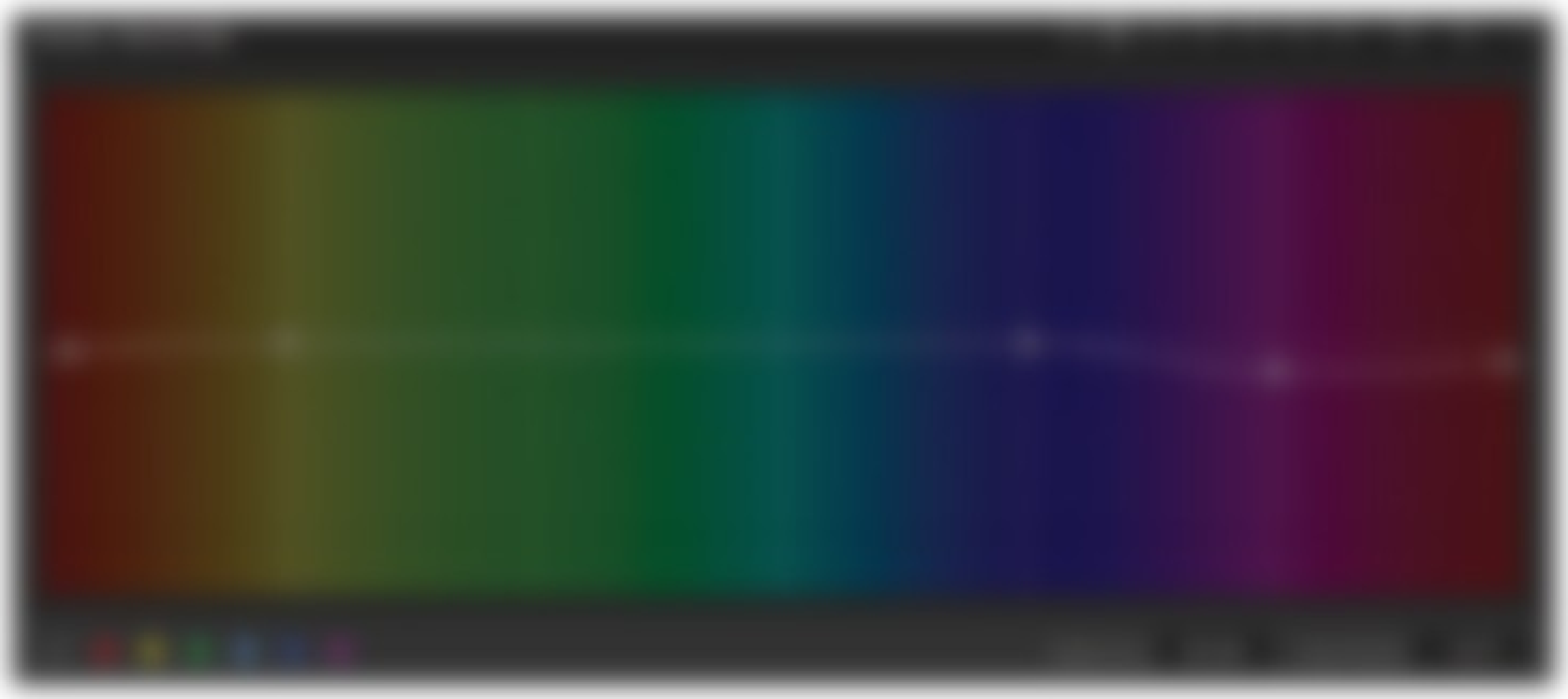


When working with skin tones, the vectorscope can be helpful for determining whether a subject's skin is deviating toward unflattering hues. However, the skin tone indicator line itself is not meant as a strict determiner of all skin hues. Some skin tones have cool undertones, which naturally lean toward red, or warm undertones, which lean toward yellow. When grading, focus on any obvious arcs or distortions in the trace that might indicate an incorrect color cast on the skin.

- Click anywhere in the color page to close the settings pop-up window.
- Drag the center control point in the Hue Vs Hue palette up and down to observe the movement in the vectorscope.

A significant part of the man's skin is in shadow, where it appears to have a prominent magenta tint.

- Add additional control points in the Hue Vs Hue curve and push to place the man's skin accuracy again trace parallel to the Skin Tone Indicator line.



- When you are happy with the skin tone hue, turn off Highlight mode.

  With the highlight off, the HSL grade is still confined to the circle window.

- Go to the Window palette and deactivate the window by clicking the circle icon.

While the Color Warper allows you to intuitively adjust two values at once, the HSL curves are ideal for single-purpose precision, such as for warming or skin tones. These tools should be your first choice when you're trying to quickly adjust the hue, saturation, or luminance of an object. If the result is not immediately satisfactory, you can then switch to working with more advanced tools like the HSL qualifier or Magic Mask, which offers a greater degree of control over your matte selection. Also, keep in mind that you can use the Color Warper and HSL curves in combination with secondary selection tools for an even more refined selection.

How Do We Color Grade Skin?

With light meters, color charts, skin tone indicator lines, and more than a century of filmmaking, you would think that there would be a well-established standard for color correcting skin tones to produce an "optimal" result. And although a set of recommended values can be found for portrait and fashion photography, they tend to be absent when working with moving images. Why? Because there are too many variables to allow for a single working standard.

There are far too many skin tones and undertones to categorize people, thereby eliminating a set of standards on a geographical or racial basis. Modern films tend to feature a lot of camera and subject movement, causing the lighting to be in constant flux, which means any corrections applied to a single frame are undone as the scene progresses. Many scenes make use of dramatic lighting and shadows or bright color gels that artificially distort a subject's skin tone, all of which results in imagery that cannot be corrected in a consistent fashion.

The subject in this exercise is a perfect example of these factors: he is simultaneously overexposed by direct sunlight and underexposed in the shadows, and there is even a faint lens reflection near his hat, casting a slight green hue on his forehead.

Ultimately, the best practice is to correctly color manage or balance footage to bring out the most natural skin hues, ensure that the skin is not overexposed in the scopes, and maintain the middle grays as captured by the cinematographer. Creatively, you should grade your subject in a way that will produce the most aesthetically pleasing result on your grading monitor. If the result is satisfactory to you, then the grade can be considered successful.

TIP As you balance, match, and work on skin, you may find yourself often switching between scopes. Click the Expand button in the upper right of the Scopes palette to turn the scopes into a floating window. Set single, dual, and quad views (enlarging the window if you are unable to change the view amounts) and use the upper right settings to specify each scope type and adjust its settings. You can save your configuration as a preset for future grading sessions by going to Workspace > Layout Presets > Save Layout as Preset.

Setting Skin Tone Saturation

With the skin hue adjusted, you can make use of another HSL curve to address skin saturation.

1. Create a new serial node, and label it **Skin Sat** (node 13).

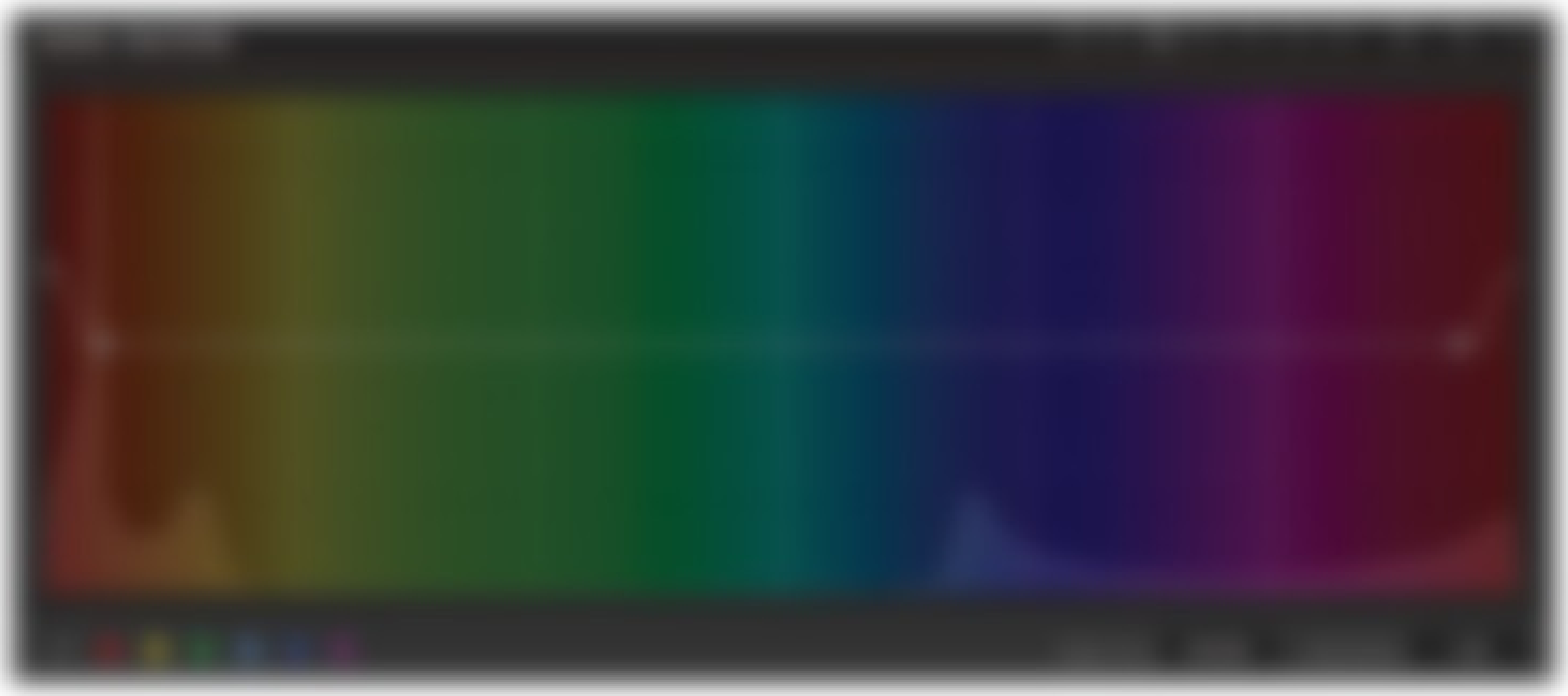
2. Change the Curves palette mode to Hue Vs Sat.

   You can use the Hue Vs Sat palette to make undersaturated items pop or make oversaturated colors less distracting. When dealing with skin tones, saturation can be subjective and dependent on factors like lighting and project genre. For example, colors naturally appear less saturated on overcast days, and more pronounced in comedy films. In this image, the saturation in the man's skin needs very little adjustment.

3. In the viewer, click the man's face to drop the three control points in the Hue Vs Sat curve. Aim for the desaturated skin near his ear to focus saturation on the areas that need it.

4. Drag the two surrounding anchor points in opposite directions to widen the selected hue range.

5. Drag the central point up slightly to increase the saturation of the skin, taking care to keep the colors natural.

   In the vectorscope, ensure that the section of the trace you are affecting does not extend farther than any other hue region. Even if it is within safe saturation and RGB channel scope limits, an area that is more saturated relative to the rest of the image will appear oversaturated on the screen.

Be careful not to get too aggressive when adjusting skin tones. The aim is not to produce a magazine cover look but to reduce minor imperfections and enhance the visibility of the face. Getting too aggressive with the Resolve FX or HSL controls can result in plastic looking or overly saturated skin that is even more distracting than the original imperfections.

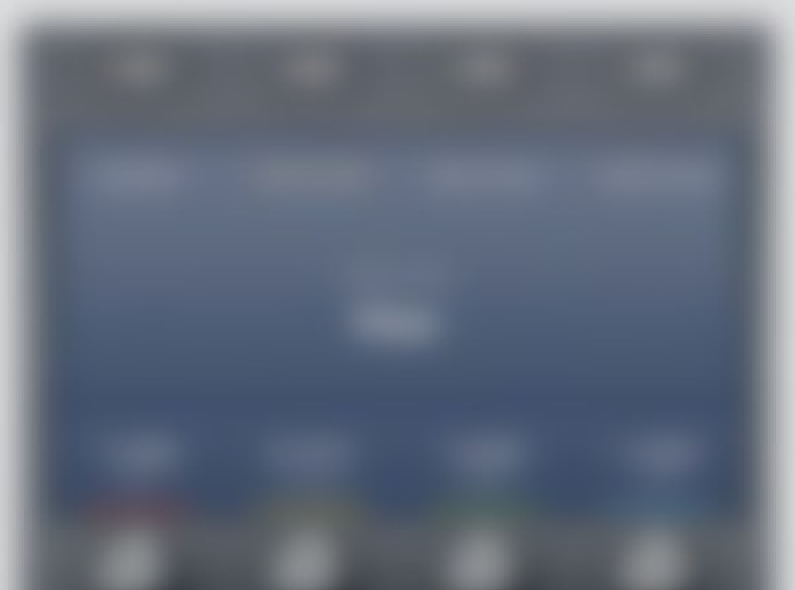
Memory Colors

Memory colors are colors for which human beings have an instinctive reference. The most common of these are sky, grass, and skin tones that tend to be deeply imprinted in our perception of the world. As you grade, try your best to keep skin hue and saturation natural to ensure audience immersion, unless the narrative specifically calls for distortion. Man-made objects tend to have less color memory associated with them, so you have more freedom to tweak the hue of a car or the saturation of a character's dress.

Continue using these techniques in new ways and combining qualifiers/Power Windows with your own footage. If you're uncertain how to proceed with a certain shot, write out a workflow to help determine how you want the final output to look, and then work backward to choose the tools and adjustments that will realize your grade. You'll always have several possible workflow options, so with experimentation and experience you will learn which are the most visually successful and time efficient for you.

Using the Mini Panel – Hue Curves

When working with HSL Curves, the color presets and swatches are available as knobs below the Mini Panel screens. You can find additional curves and tools by pressing the Left Arrow and Right Arrow buttons on the panel.



Self-Guided Exercises

Complete the following exercises in the unfiltered 03 Matched Timeline to test your understanding of the tools and workflows covered in this lesson.

Clip 01 – Use Lum vs Sat in the HSL Curves to increase the saturation of the deer in the center of the shot but keep the saturation of the blue gate the same.

Clip 02 – Apply a window to isolate the Prism Head between the bars, and then apply the Contrast Pop effect (Resolve FX Color category) to increase the contrast in that portion of the frame. The effect should immediately guide the eye without being overpowering.

Clip 03 – Apply a window and use any sharpening method (Blur palette, Sharpen Edge effect, or Soften & Sharpen effect) to enhance the numbers on the scale and make them more readable. Track the window to the movement of the scale.

Clip 04 – Apply a subtle circular vignette at the end of the pipeline in the shot with the Prince and horses. Create another node before the vignette and increase the brightness and contrast of the shot to enhance the color and detail.

Clip 05 – Use the Color Warper's Chroma Warp to tint the ground green, matching the overall look of the scene to clip 04. Apply a window to limit the correction to the field.

Clip 11 – Use the Tilt-Shift Blur effect to create an artificial shallow depth of field in the shot with the man and his dog. Consider the composition of the clip – you might want to rotate the angle of the depth of field.

When you've completed these exercises, open the 05 Completed/Effects Timeline to compare your work to the "solved" timeline. If you're working in the free version of DaVinci Resolve, open the 04 Completed Timeline to review the solutions without any Studio effects.

Lesson Review

1. How are secondary color corrections different from primary color corrections?

2. In the Window palette, which setting would you use to subtract the area of one window from another window?

3. What does the Hue Vs Lum HSL curve do?

4. Which tool can you use to create a vignette?

5. True or false? Track data generated in the Tracker palette can be copied and pasted onto another window or node.

Answers

1. Secondary color corrections affect only a part of the image, whereas primary corrections affect the whole frame.
2. The "Mask" setting found to the right of the "Invert" property in the individual window controls allows you to subtract one window from another.
3. The Hue Vs Lum HSL curve increases or decreases the brightness of a selected color. In the naming convention of HSL curves, the first word prompts the selection, and the second word effects the change.
4. A circle Power Window can be used to create a custom vignette, or you could use the Vignette effect from the Resolve FX Stylize category of the Effects Library.
5. True. The function to copy and paste track data is found in the options menu of the Tracker palette.

Part II

Managing Nodes and Grades

Lessons

- Conforming an XML Timeline
- Mastering Node Trees
- Managing Grades Across Clips and Timelines

In Part II of The Colorist Guide to DaVinci Resolve 20, you'll look at workflows beyond primary and secondary color correction to improve your speed and consistency when grading. Along the way, you'll learn how to conform timelines from other applications, build grading node structures with purpose, and use stills and versions to copy and retain grade data.

Project File Location

You will find all the necessary content for this part of the book in the folder R20 CG – Project 02. Follow the instructions at the start of every lesson to find the necessary folder, project, and timeline. If you have not downloaded the second set of content files, see the "Getting Started" section of this book for instructions on how to do so.

Lesson 4

Conforming an XML Timeline

XML (eXtensible Markup Language) is one of the file types commonly used to migrate timelines between different editing applications.

However, XML migration can partially fail due to variances in software design. Migration inconsistencies can cause problems when you receive content edited in an external application and want to grade and finish it in DaVinci Resolve 20. Upon import, you may find that some areas of the timeline contain incorrect clips, changed trims, or missing transform changes and effects.

Time

This lesson takes approximately [illegible] hours to complete.

Goals

Importing an XML Timeline [illegible]
Syncing an Offline Reference [illegible]
Conforming a Timeline [illegible]
Maximizing the Dynamic Range [illegible]
Lesson Review [illegible]

To ensure that an imported timeline is an exact replica of the editor's work, you must use a verification process known as conforming to compare the reconstructed edit with a reference video and confirm that every cut and effect is reproduced within DaVinci Resolve. When an element is mismatched or missing, you must manually correct it in the timeline.

In this lesson, you'll look at the most common issues and practices associated with the conforming workflow. You will also look at more advanced project setup practices using DaVinci Resolve's color management to produce optimal grading conditions.

Importing an XML Timeline

The project you will be working on is a film trailer for a film called Too Much Life.

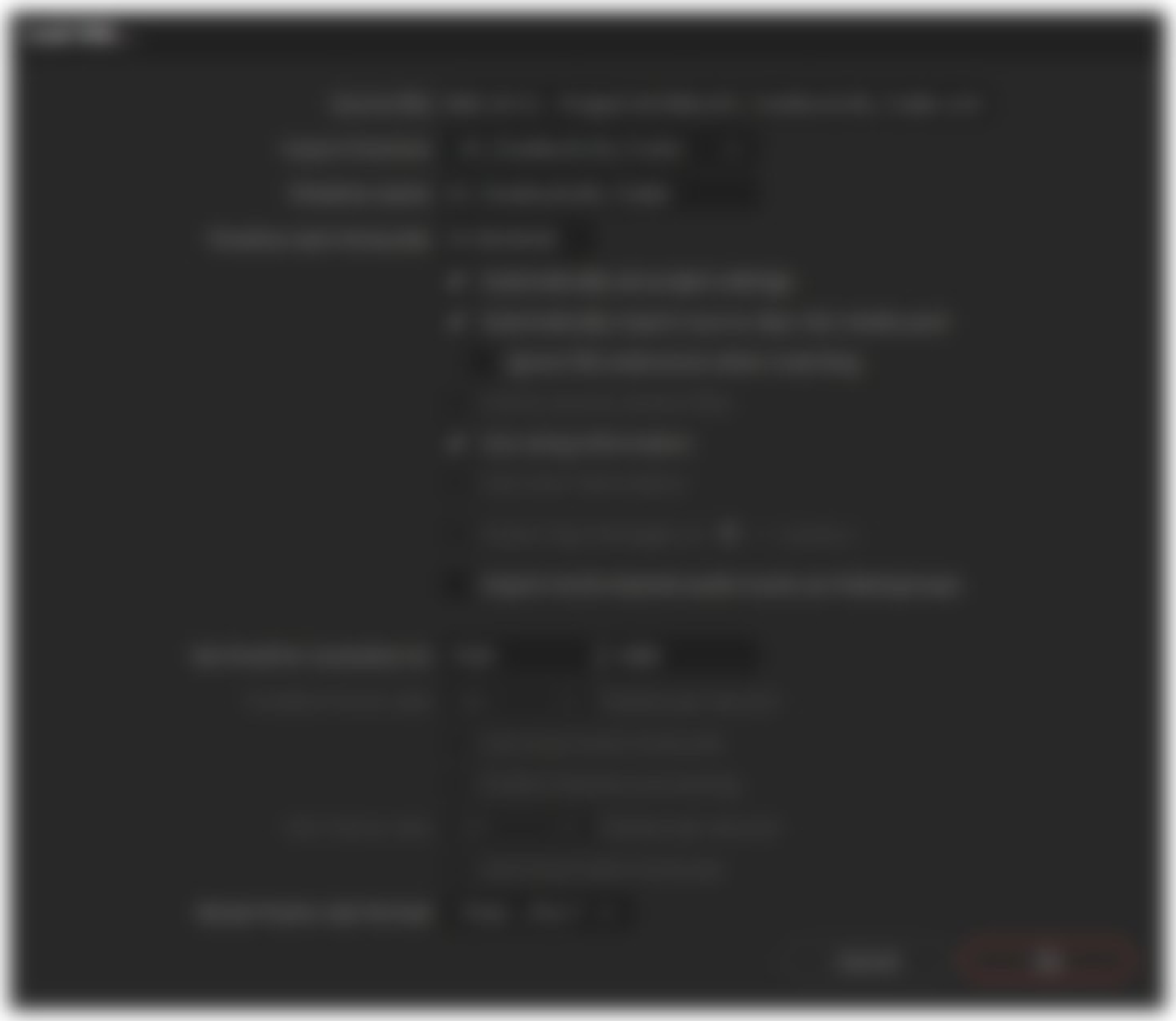
You will start by reconstructing the trailer timeline from an XML file exported from the editor's software. You would ordinarily do this in a new DaVinci Resolve project, but for the purposes of the upcoming lessons in Part II, you will import a .drp file that has been prepared for you.

1. Open DaVinci Resolve 15.
2. Right-click within the Project Manager window and choose Import Project.
3. On your hard disk, locate the BMD 15 CC - Project 03 folder.
4. In the folder, select and import the Project 03 - Too Much Life Trailer.drp file.
5. In the Project Manager, double-click the Project 03 - Too Much Life Trailer thumbnail to open the project.

   The project is already set up with bins but contains no media or timelines. You'll import the timelines and link the media required for the exercises in this section.
6. In the edit page, select the empty 03 Timelines bin as the destination for the XML timeline and choose File > Import > Timeline.

[illegible] In the R16D 20.0 - Project 02 folder, navigate to the XMLs subfolder. Locate the **[illegible]** file and import it.

The Load XML dialog that appears allows you to set how your XML timeline and associated media are imported.



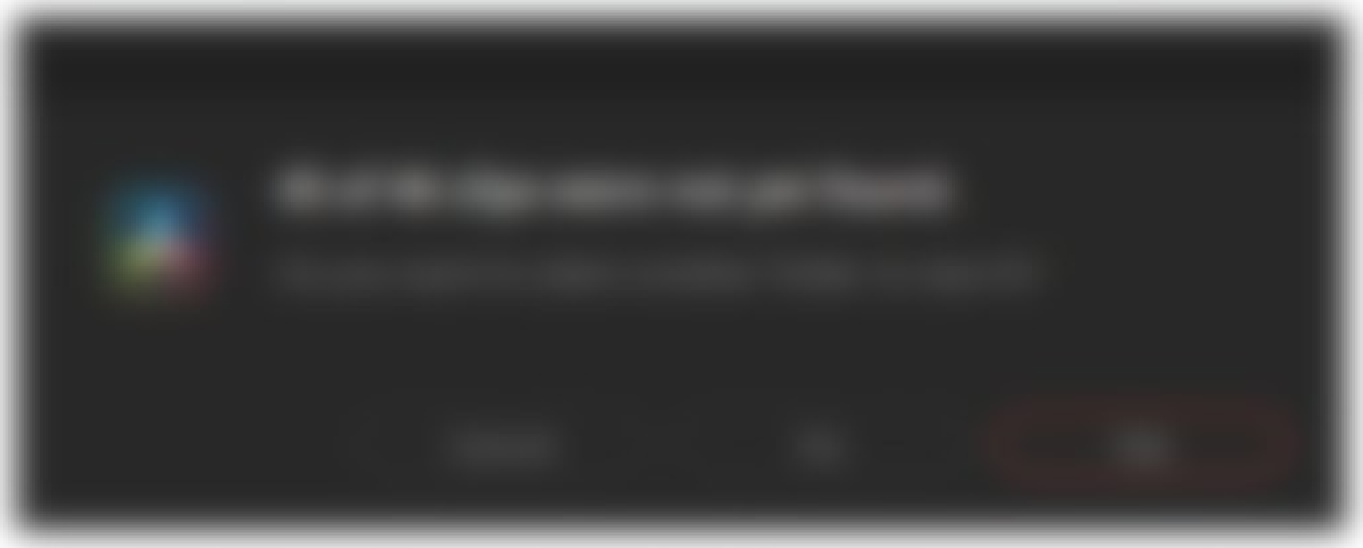
The default settings can be left as they are because you want the project settings to match that of the timeline and for DaVinci Resolve to automatically import the source clips associated with the XML file into the media pool.

TIP Selecting 'Ignore file extensions when matching' will allow you to choose media that is in a different file format from the original timeline media, provided that the filenames have remained the same. This option can be extremely useful when switching between offline and online workflows, which you will learn about later in this lesson.

- Click OK to close the dialog.

  DaVinci Resolve will search for the files based on their last known locations in relation to the XML file. Most often, drives and paths change during transfer, and a dialog will ask for help in locating the missing files.

- If this dialog appears, click Yes to locate the missing clips.

  You will indicate the specific location of the various media files in this timeline.

- Navigate to the BMD 20 CC - Project 03 folder and select the Video subfolder. Click OK at the bottom of the dialog.

  This action should reconnect most of your media. However, the dialog will appear again, suggesting that some remaining clips ([illegible] of [illegible]) have not been located. This is because you've specified the location of the video clips only.

- Click Yes again to locate the audio.

- In BMD 20 CC - Project 03, select the Audio subfolder and click OK.

  The dialog will again state that some clips ([illegible] of [illegible]) are missing. The number of clips is smaller this time, suggesting that successful links are being established, but you are still missing the graphics and VFX clips.

- Click Yes to return to the storage dialog.

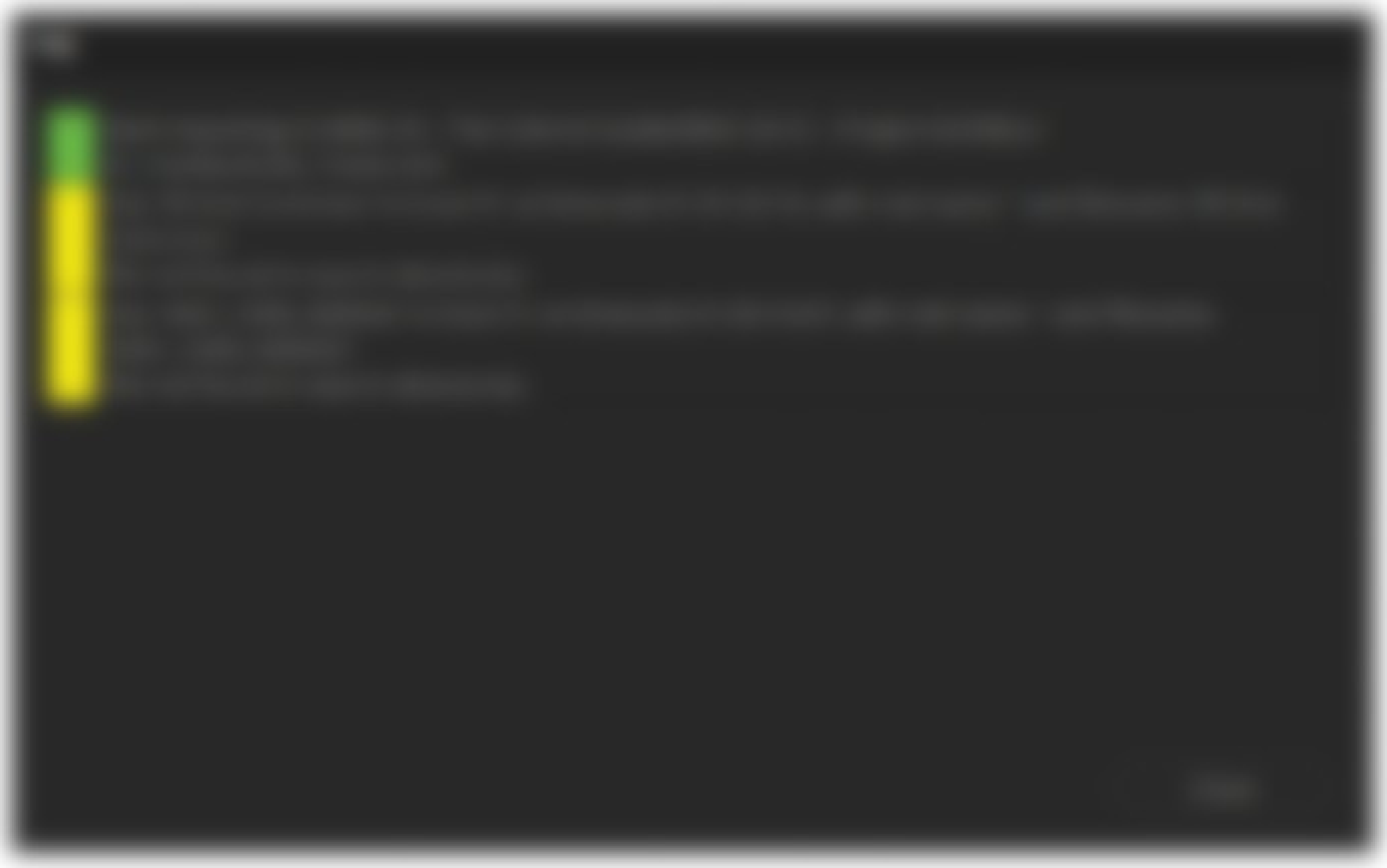
- Expand the Other folder and repeat steps [illegible] for the Graphics subfolder and then the VFX subfolder.

  Two remaining clips will not be found. This sometimes occurs when media in the timeline is renamed, changed, or moved after the XML file has been generated. Because of this change, DaVinci Resolve cannot establish a connection with the missing media. You will resolve this during the conforming stage.

- Click No to indicate that you do not wish to keep searching for media and want to proceed with the timeline import.

  Another window appears. The log displays a summary of the migration process, including a confirmation of the imported timeline and a list of migration issues (translation errors). This summary can help eliminate some of the guesswork from the conforming process.

- Read the log to see the name of the missing clips and click Close when you are done.



The timeline should now appear in the edit page and its media in the media pool.

TIP You can view the log of an imported timeline at any time. With the timeline open in the edit page, click the media pool options menu in the upper-right corner and choose Show Import Log.

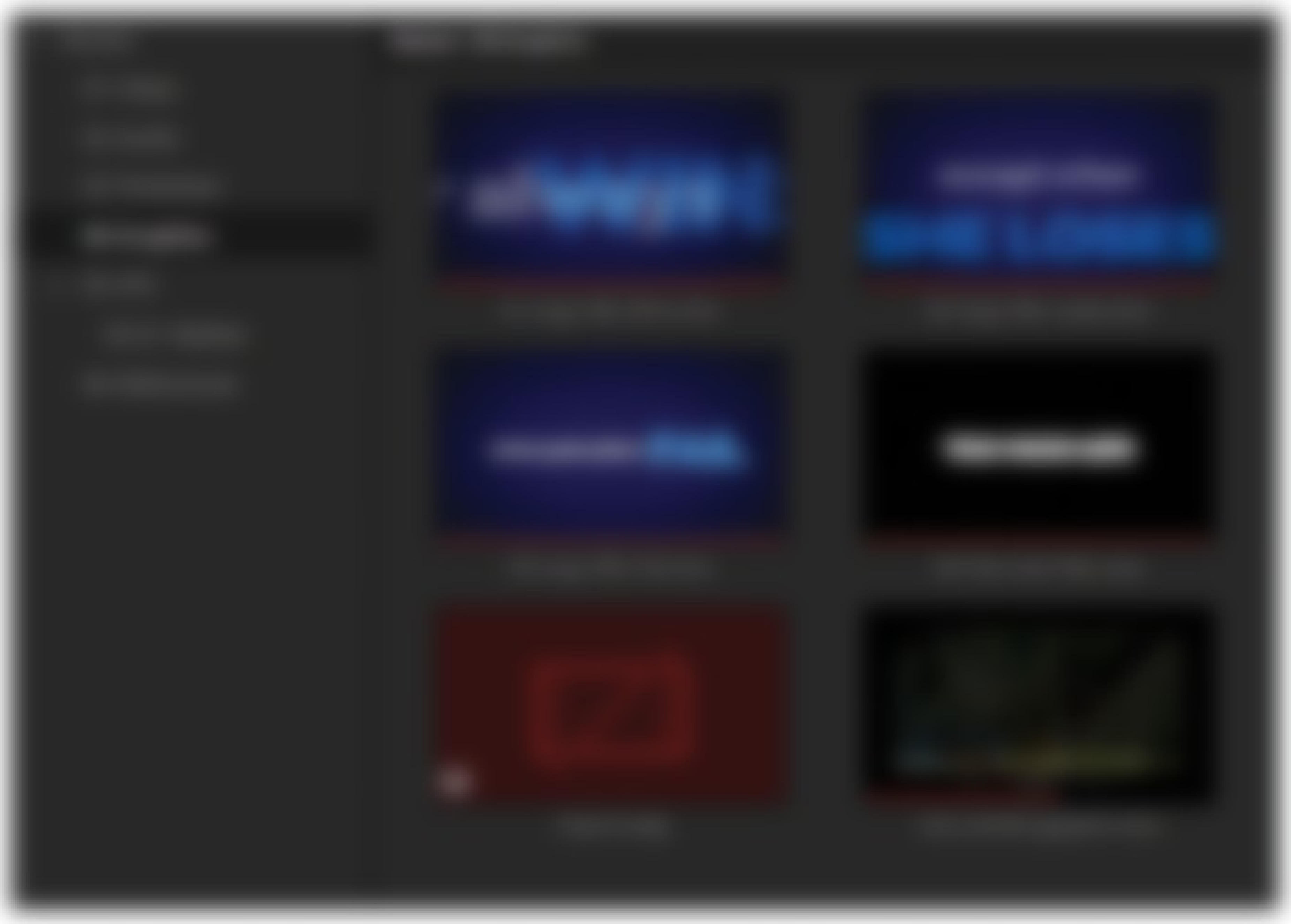
As long as the filenames of media files are not changed, relinking is a straightforward process. For this reason, it is highly advisable never to rename media and to work with the original camera filenames throughout the entire post-production process.

Project Housekeeping

For easier project management, you will organize the imported files into bins and color code your bins.

- The timeline thumbnail is identified by a white timeline symbol in the lower left corner and indicated as the active timeline by an orange icon in the upper left corner. It can remain in the Timelines bin.

- The video clips all feature their original camera filenames, which start with the camera angle letter followed by three digits, such as A001. Drag all 33 video clips into the 01 Video bin.
- The audio clips are all in the WAV format and feature a waveform in the thumbnail. Drag the three audio files into the 02 Audio bin.
- Drag the remaining six video and graphic clips into the 04 Graphics bin.

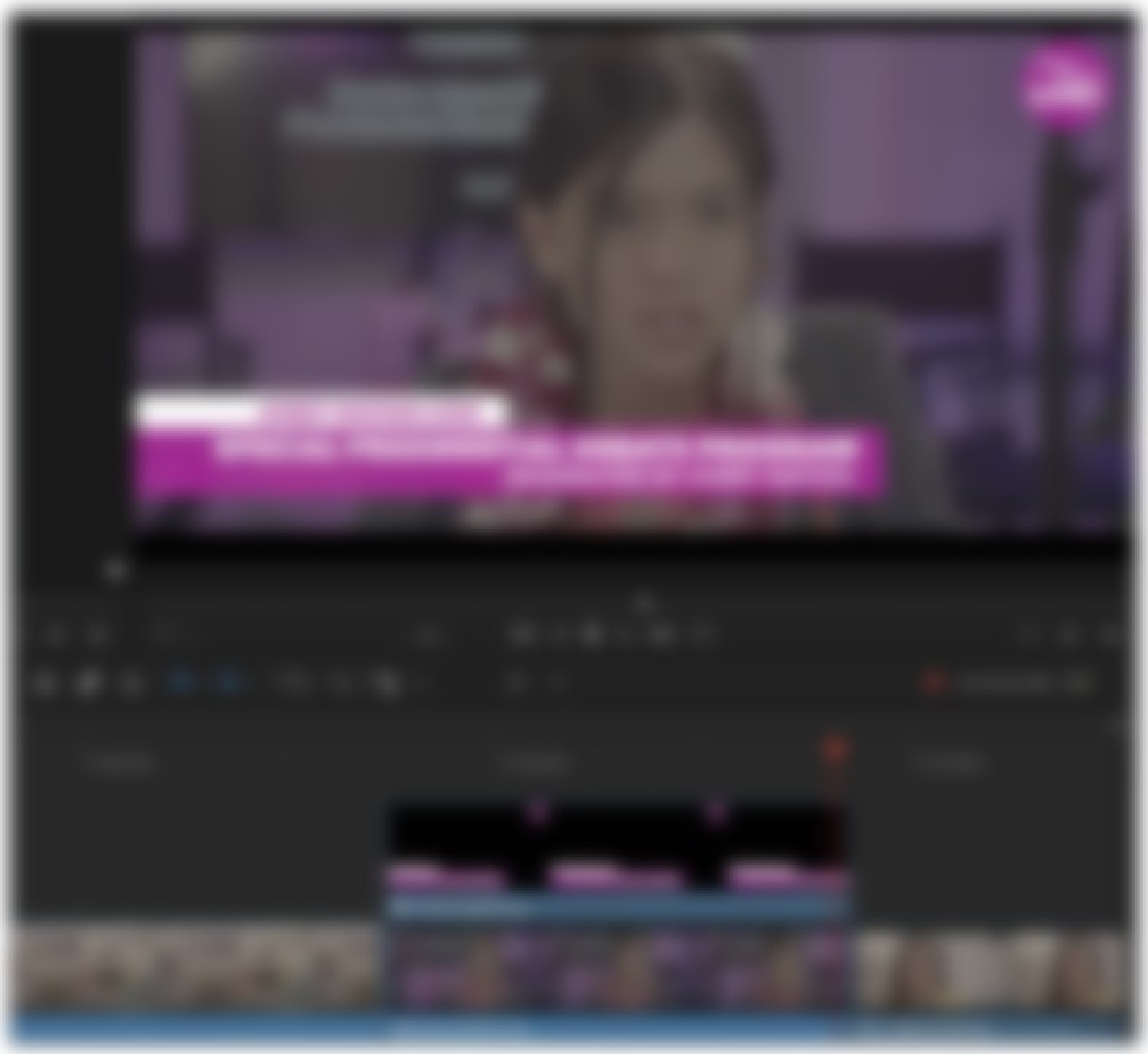
  

  Among the graphics is a PNG file that appears to be offline. Most likely, the image was moved or renamed after the XML was generated. However, the XML file provided enough metadata to still represent the image in the timeline and media pool without a link to the actual file asset. You will replace the file source to re-establish a link with the renamed image.

NOTE In some operating systems, the [illegible] may be absent from the media pool when the XML timeline is imported in this exercise. If so, you will import the graphic as a stand-alone image. For now, skip to step [illegible] of this exercise.

- In the [illegible] Graphics bin, right-click [illegible] and choose Clip Operations > Replace Selected Clip.
- In [illegible] > Project [illegible] > Other > Graphics, select [illegible].

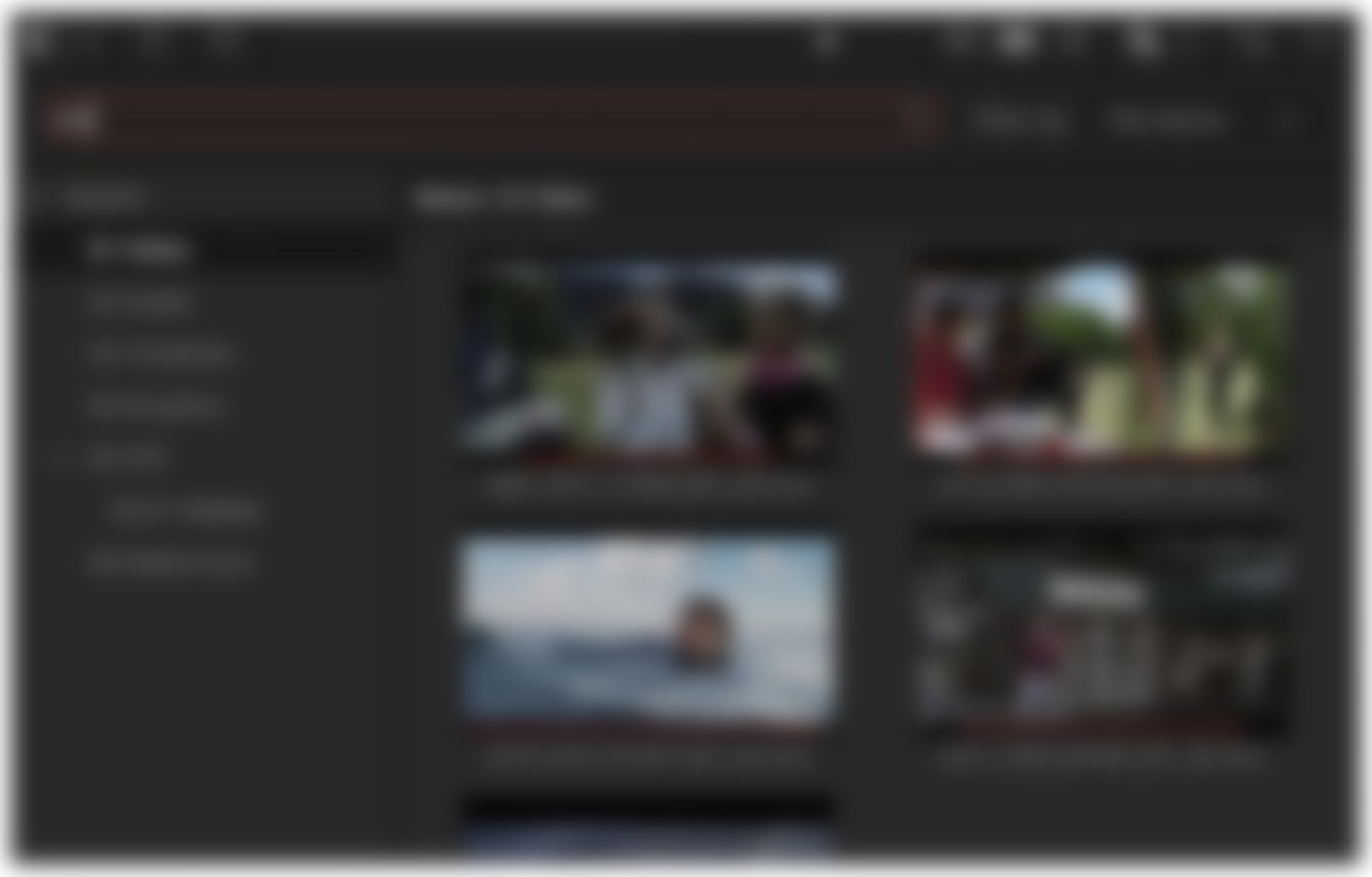
  The red thumbnail and Media Offline placeholder in the timeline update to display the graphic with the updated name.



You can further organize your media by separating the VFX composites from the general video clips. This is easy to do when all the clips have a consistent naming convention. In this case, all the VFX clips feature _vfx as a suffix.

7. Open the 01 Video bin and click the Search magnifying glass icon in the upper right of the Media Pool panel.

8. Type **vfx** in the search field to filter the VFX clips.

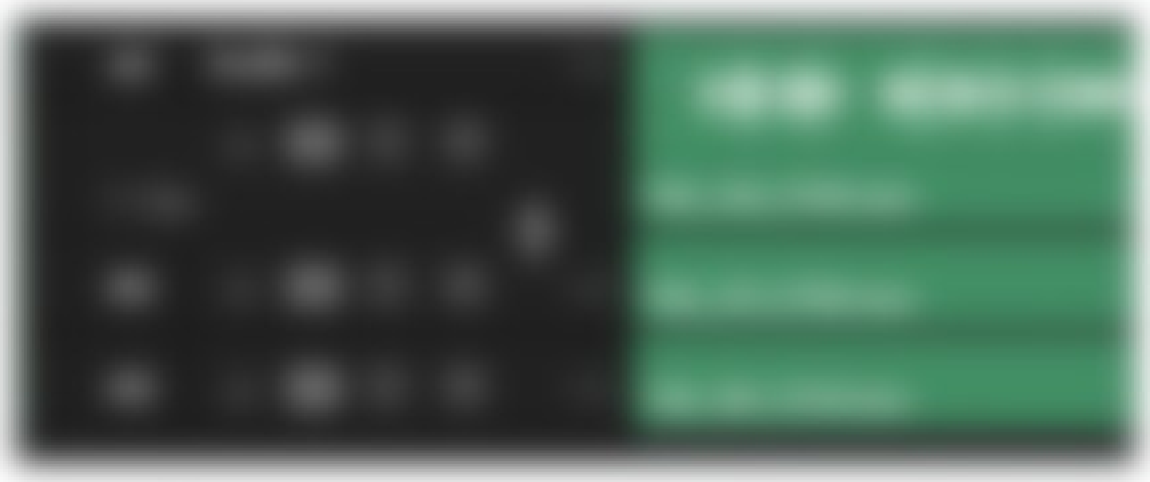


9. Drag the five VFX clips into the 03 VFX bin.

10. Click the Search icon to disable the filter.

The timeline features three audio stems that contain the dialogue, sound effects, and music on separate tracks. You can improve project navigation by labeling and color coding these tracks.

11. If you are working with short track heights, drag the A1 track header to expand it. This will give you access to the customizable track label.

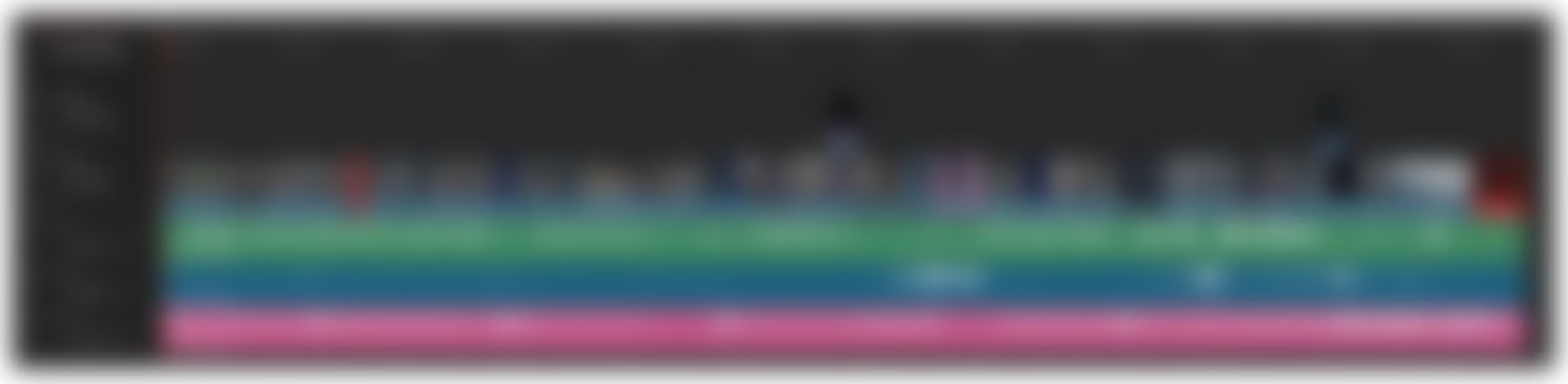


12. In the A1 header, click Audio 1 and enter the new name **DIA** for "Dialogue."

13. Repeat steps 11–12 for Audio 2 (new name **SFX** for "sound effects") and Audio 3 (new name **MX** for "music").

14. Right-click the SFX audio track header and choose Change Track Color > Navy.

15. Right-click the MX audio track header and choose Change Track Color > Violet.



By labeling and color coding video and audio tracks, you can more easily distinguish which tracks to bypass during playback or where to drag new assets.

Syncing an Offline Reference

With the XML timeline imported, you should now check the edit to ensure that every clip, cut, and effect has successfully migrated. To aid in this stage of the conforming process, the editor should provide a reference movie: a single exported video file of the final timeline that you can use for visual verification of the imported timeline.

In this exercise, you'll associate a reference movie with a timeline and ensure that it is synced.

1. Go to the media page.

2. In the media pool, select the 04 Reference bin as the target for the new media you are about to import.

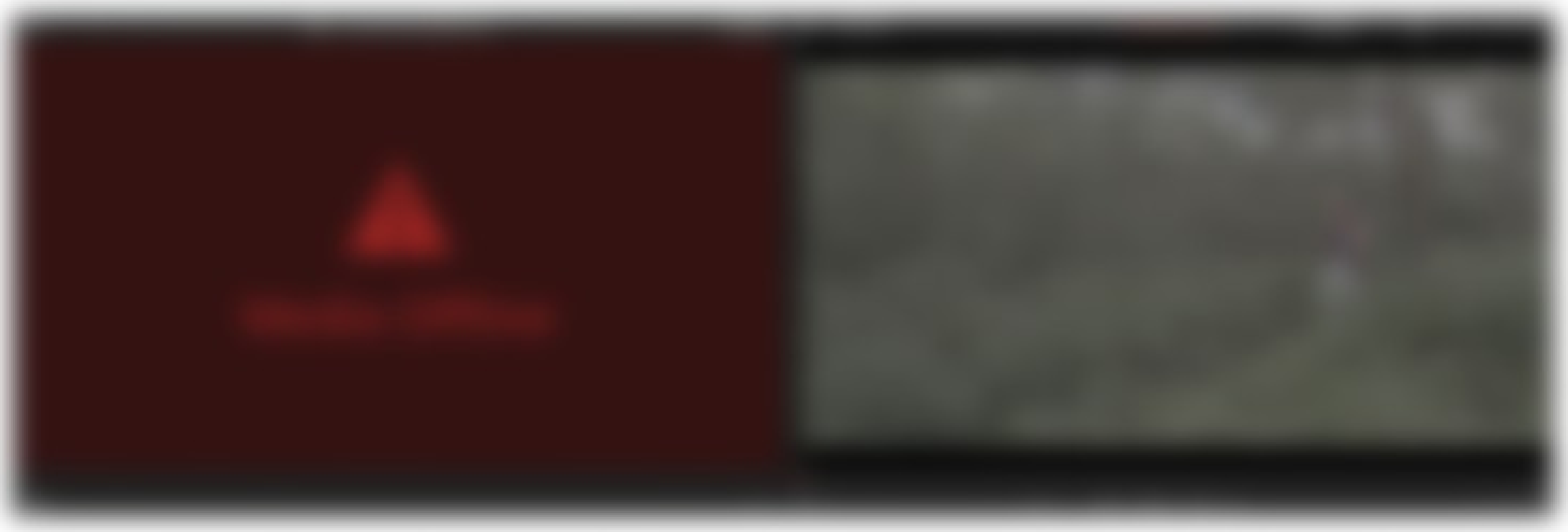
3. In the media storage browser, navigate to the [illegible] > Project 03 folder.

4. In the Other subfolder, right-click [illegible] and choose "Add as Offline Reference Clip."

The reference movie appears in the bin with a checkerboard icon in the upper-left corner, which indicates its status as an offline reference clip.

- Open the edit page.
- In the 02 Timelines bin, right-click 01 [illegible] Trailer and choose Timelines > Link Offline Reference Clip > [illegible] REFERENCE.mov.

- In the lower-left corner of the source viewer, open the mode drop-down menu, and choose Offline. Doing so will switch the source viewer from showing source materials to displaying the offline reference clip associated with the active timeline.



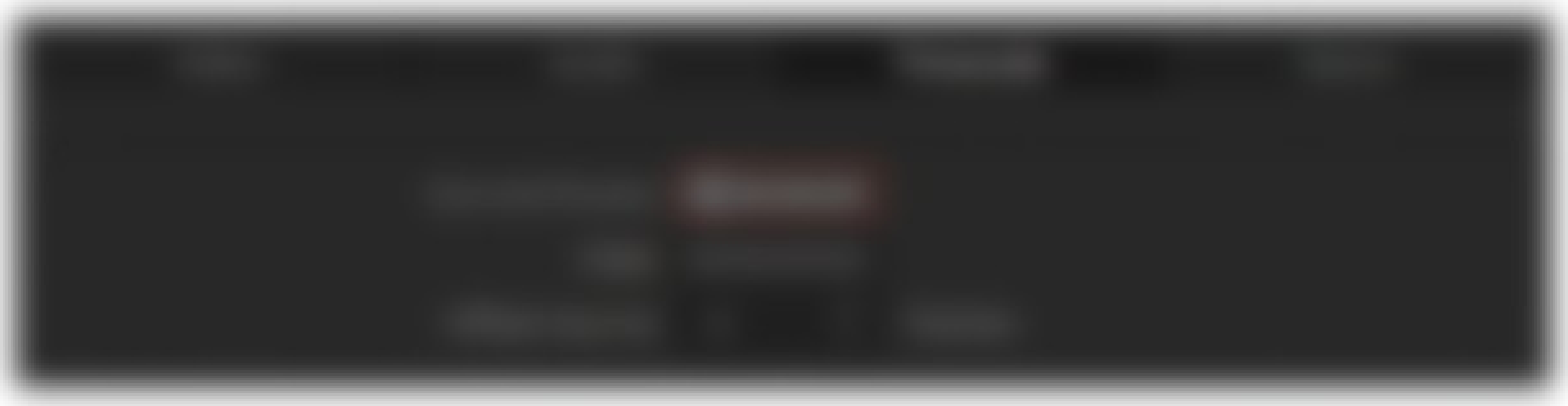
However, the viewer currently shows the red Media Offline frame. One of the most common reasons a reference clip would appear offline is because its timecode does not align with the timeline timecode.

- Open the 00 References bin and click the List View icon at the top of the media pool to view the media metadata.
- In the Start TC column, look at the start timecode of the reference clip and compare it to the start timecode of the timeline.

  In editing programs, timelines tend to begin at the one-hour timecode 01:00:00:00 to allow for leaders, color bars, and 1 kHz test tones before the broadcast starts. Rendered video clips, as seen in video players and online video sites, tend to begin at 00:00:00:00, as is the case with this reference. You can easily correct this by changing the start timecode of the reference clip to match the timeline.

- Right-click the reference clip in the media pool and choose Clip Attributes.

10 In the Clip Attributes window, click the Timecode tab and enter **01** as the Current Frame Hour. Click OK to close the window.



If the reference movie does not immediately appear in the source viewer, check the source viewer mode dropdown menu to ensure that Offline is still selected and jiggle the timeline playhead to refresh the frame.

11 Drag the timeline playhead to verify that the timeline and reference movie are linked.

TIP You can also drag and drop regular clips into the source viewer when in Offline mode to link them to the active timeline.

You have likely noticed that the contrast and saturation of the clips in the two viewers appear different. This is because the reference clip was rendered in the Rec.709 color space, while the source media is still encoded with its original log curve. You will address this with the help of DaVinci Resolve's color management at the end of this lesson.

Conforming a Timeline

With the reference movie in place, you can now inspect the timeline to address any visual inconsistencies. Your primary task will be to ensure that the correct clips are on the timeline and to check that their cuts are occurring at the right time. To accomplish this, you must review the edit, cut by cut.

First, you will address the missing end credits graphic at the end of the timeline.

1 Go to the media page.

2 In the media storage browser, navigate to the BMD 20 CC - Project 02 folder > Other > Additional_Media.

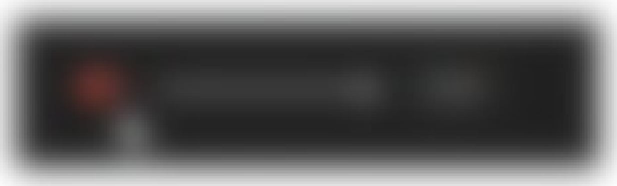
3 Drag [illegible] into the 04 Graphics bin of the media pool.

NOTE If your [illegible] graphic was missing during the Project Housekeeping exercise, navigate to the [illegible] > Project [illegible] folder > Graphics and drag [illegible] into the [illegible] bin of the media pool.

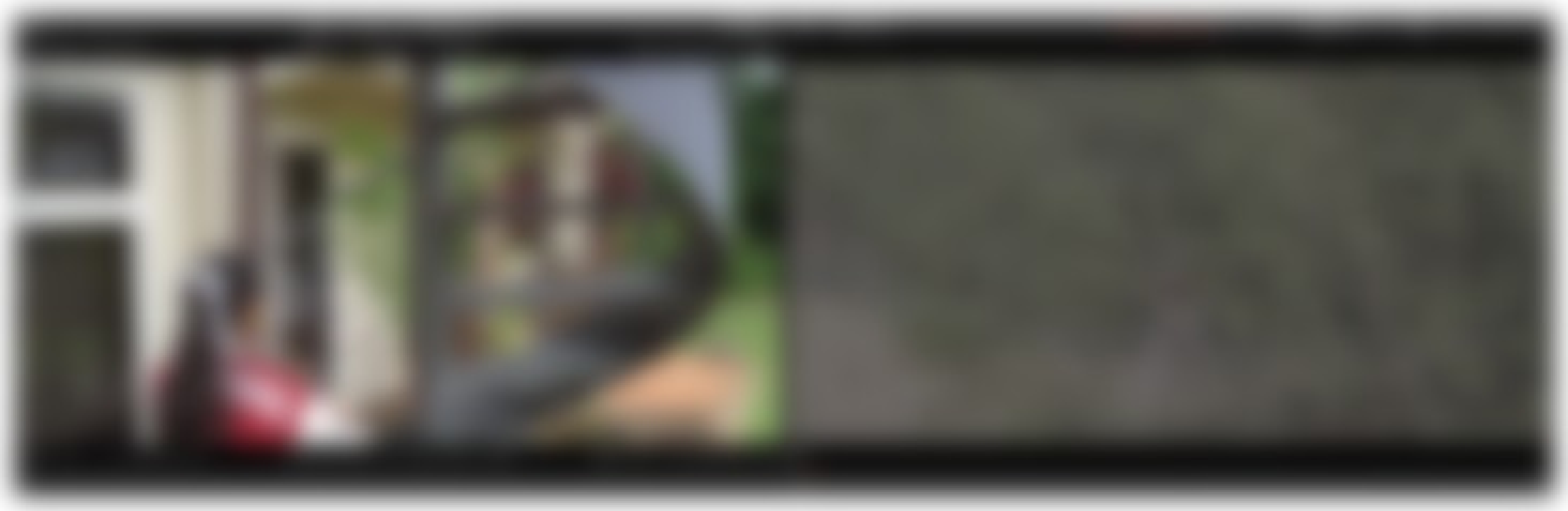
- Return to the edit page.

  The end card media file is automatically recognized and assigned to the missing media clip at the end of the timeline. Whenever source media maintains the same name as the file path in an XML file, it will immediately appear in the timeline, even if imported after the XML reconstruction.

- To prevent being distracted by the timeline audio during conforming, click the Mute button to the right of the timeline toolbar.



- Move the playhead to the start of the [illegible] Trailer timeline.
- Press the Down Arrow on your keyboard until you navigate to the first video cut.



It's obvious that the timeline clip does not match the clip in the reference video. The text rendered with the reference video (called a burn-in) tells you that the clip should be [illegible], whereas the clip in the edit page timeline is [illegible]. This mismatch could be caused by a clash in the reel names or the editor making a change after exporting the XML file.

To resolve this, you can manually import and assign the correct clip to the timeline.

- Enter the media page.
- In the media storage browser, return to the [illegible] subfolder.

[illegible] Drag all the remaining video clips [illegible], [illegible], and [illegible] into the 01 Video bin of the media pool.

[illegible] Return to the edit page.

[illegible] In the 01 Video bin of the media pool, click the [illegible] thumbnail to highlight it.

[illegible] In the timeline, right-click the second clip and choose "Conform Lock with Media Pool Clip."

Doing so replaces the clip in the timeline with the selected media pool clip, which now matches the clip in the reference movie.

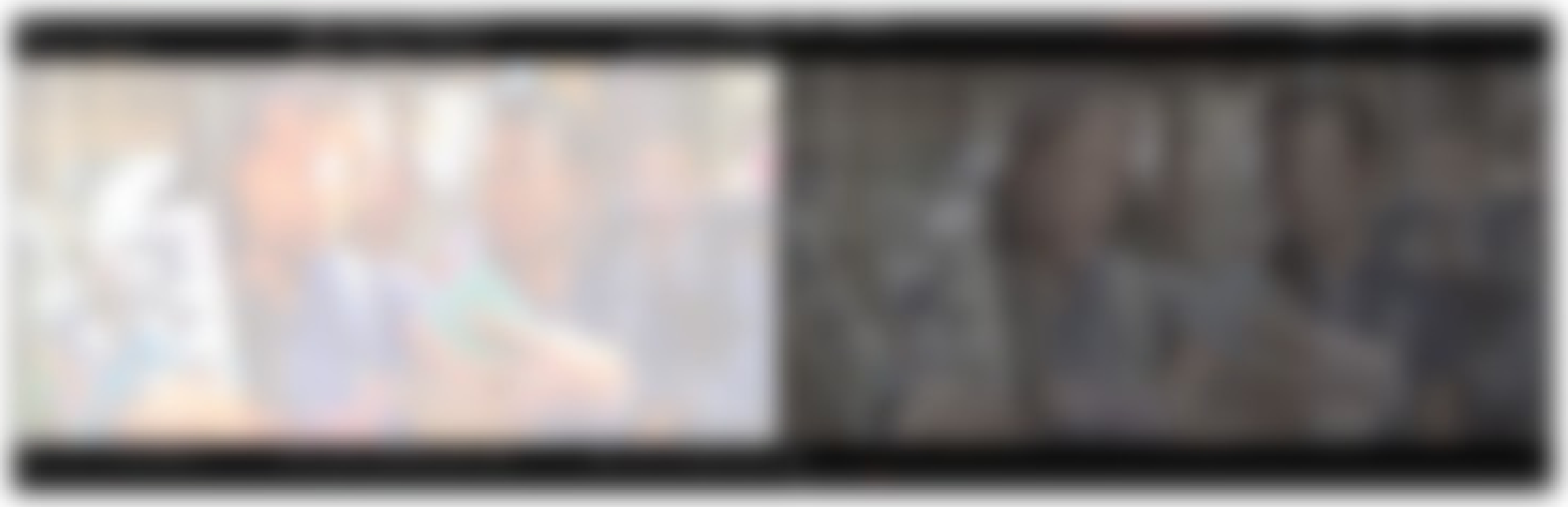
> **NOTE** If the [illegible] graphic is still offline on the timeline, perform "Conform Lock with Media Pool Clip" with the [illegible] you recently imported.

If the clip in the media pool and the clip in the timeline have the same available timecode range, the conform action will place the incoming clip using the same In and Out points as the original cut. If the incoming clip does not have the necessary timecode range, the first frame of the incoming clip will be aligned to the cut point.

Fixing Translation Errors

Continue to navigate down the timeline and look at the reference movie to check the clips, edit points, transitions, and effects.

1 Press the Down Arrow key until you reach the video transition between clips 4 ([illegible]) and 5 ([illegible]_01.mov).



In the reference movie, the transition is a bright flash, mimicking the camera flash and sound effect at that point in the trailer. Many transitions and effects are unique to their respective applications, which means they are not retained when an XML is generated. Instead, the code in the XML file will replace them with their nearest generic equivalent. In this case, the transition in the timeline was swapped for a basic cross dissolve.

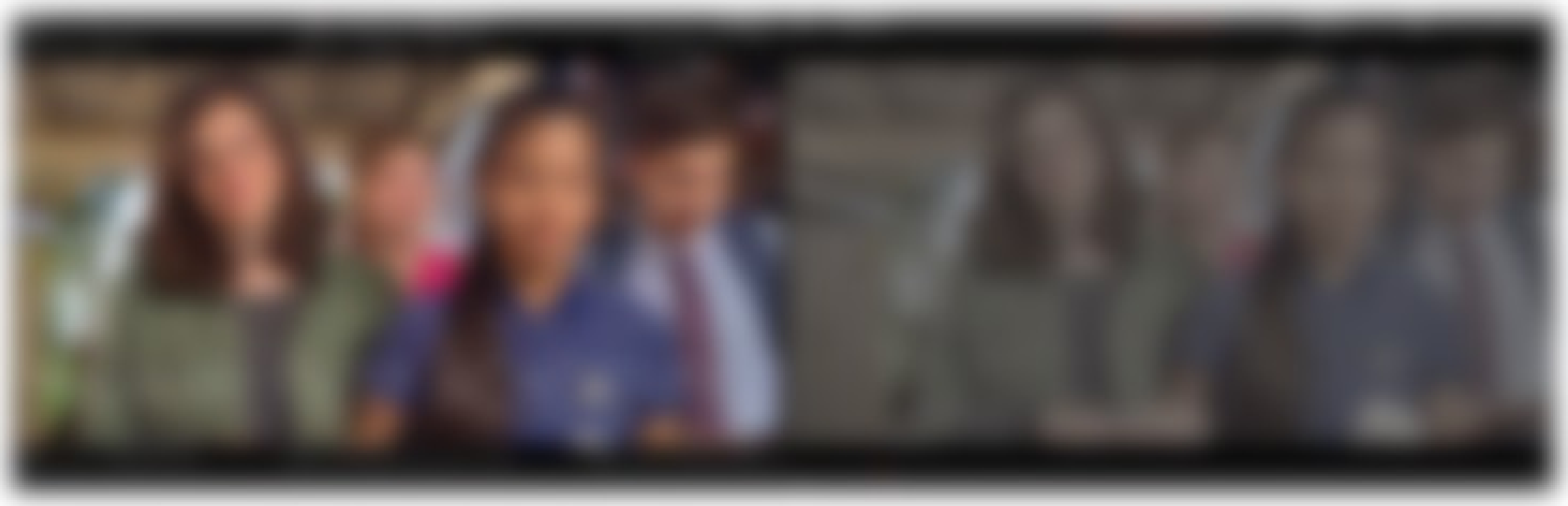
NOTE When effects, transitions, or speed changes are lost during the XML creation process, some applications will generate a "translation report" that lists all the elements that could not be included in the XML metadata file. The report usually appears alongside the XML and can be shared with you to assist you with the conforming process.

DaVinci Resolve has a bright transition available in its effects library, so you will be able to replace the generic dissolve with one that better matches the trailer.

- In the interface toolbar at the top of the edit page, open the Effects panel.
- In the panel sidebar, open the Video Transitions folder.
- Under the Fusion Transitions header, find the Brightness Flash transition and drag it directly over the Cross Dissolve overlay in the timeline.

  The Brightness Flash transition adopts the properties of the Cross Dissolve, such as duration and alignment, and now better emulates the camera flash effect.

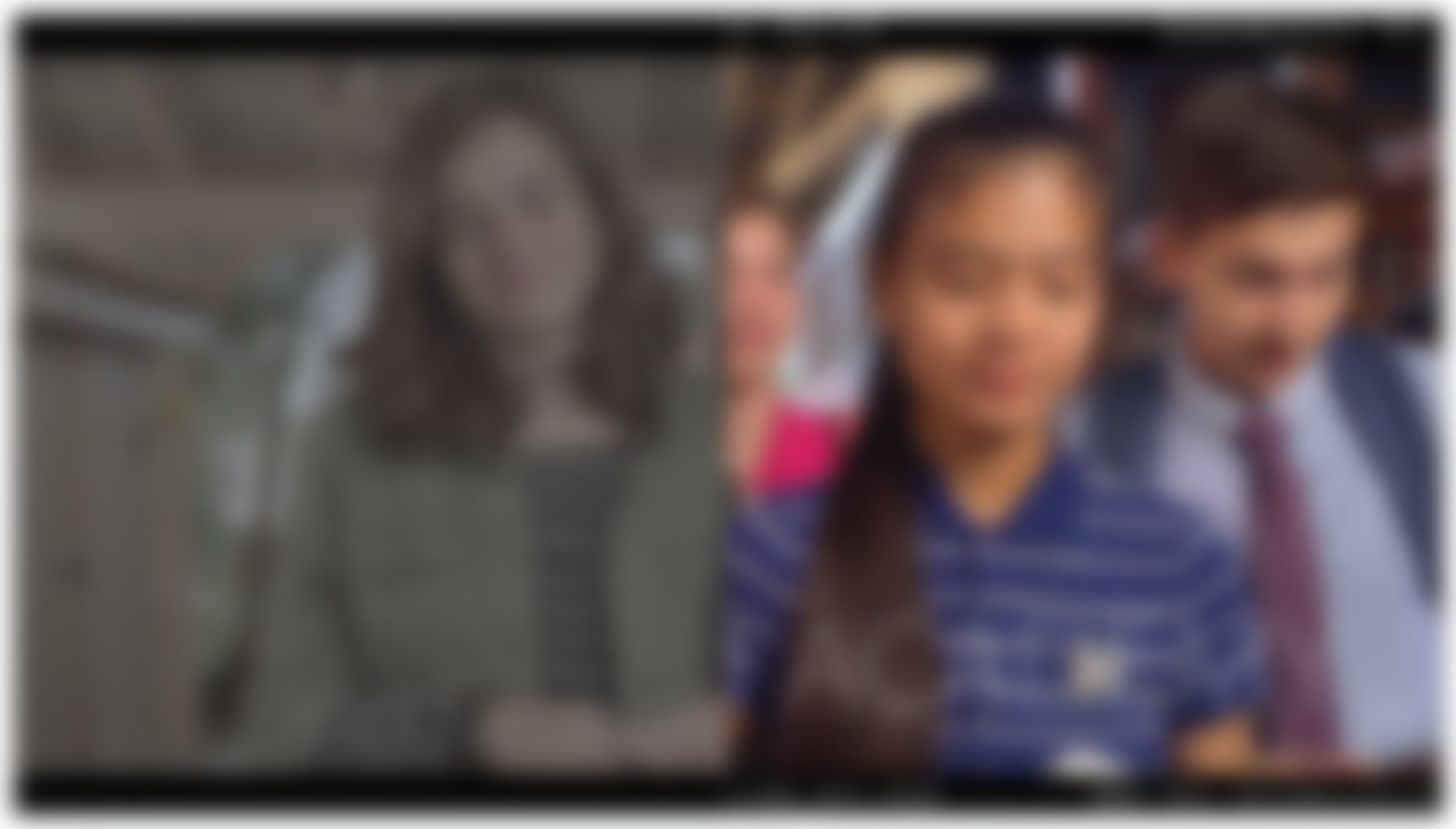
- Drag the playhead across clip 3 ([illegible]) to review it past the transition.



In addition to checking the timeline clips and their edit points, your conforming process should ensure that all frame transforms and speed changes are present. A simple side-by-side comparison cannot always achieve this, so DaVinci Resolve provides the option to superimpose the reference movie on the timeline viewer. This can help you check whether clips are identically framed.

- Right-click the timeline viewer and choose Horizontal Wipe.

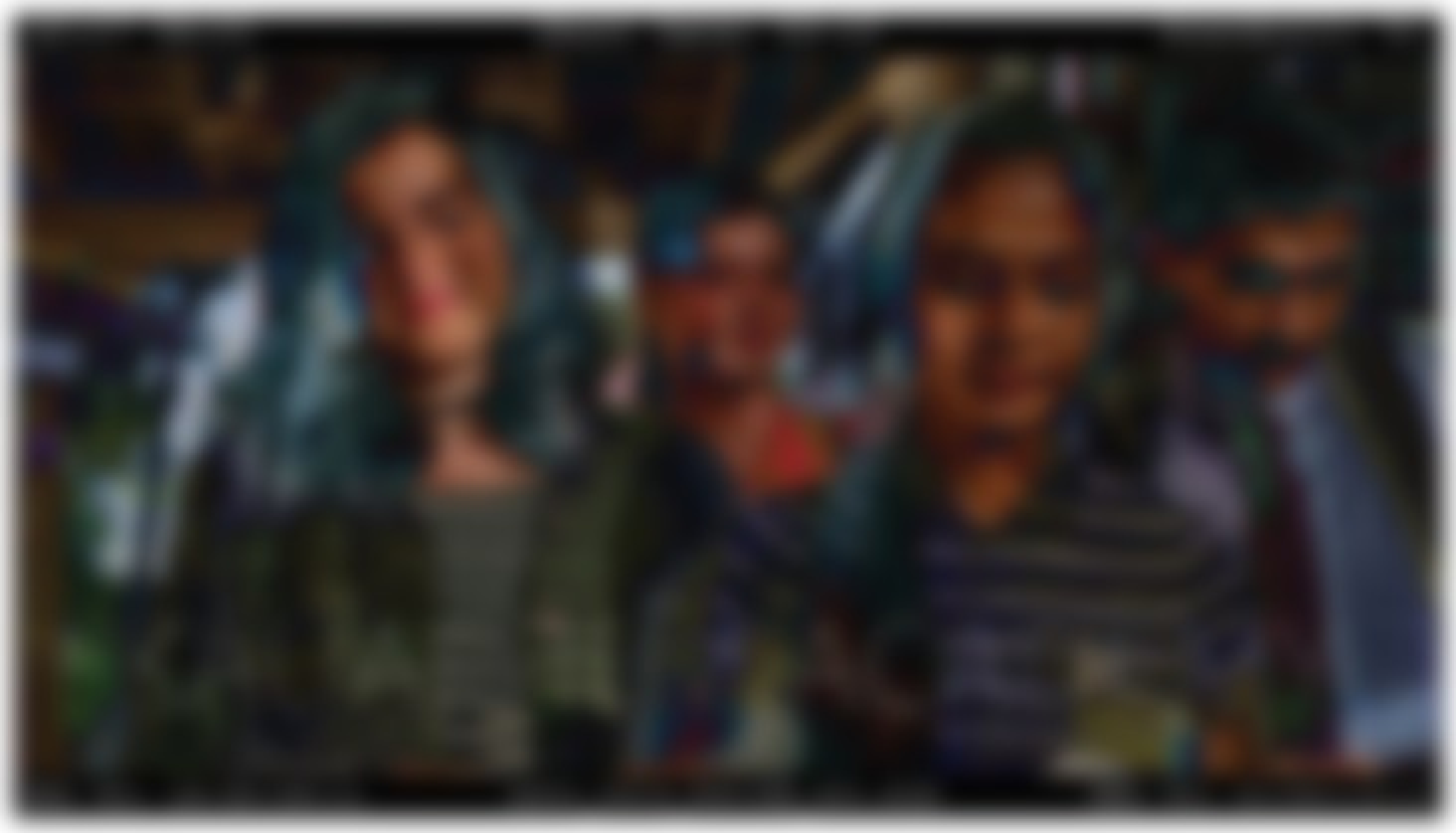
  The timeline clip is displayed to the left, while the reference clip is displayed to the right.



- Drag the wipe line left and right to compare the placement of the timeline clip to the reference.

  Using the wipe for comparison reveals a mismatch in the shot framing. To fix it, you can switch to a composite mode that directly overlaps the images.

- Right-click the timeline viewer and choose Difference to highlight where the clip is misaligned.



[illegible]

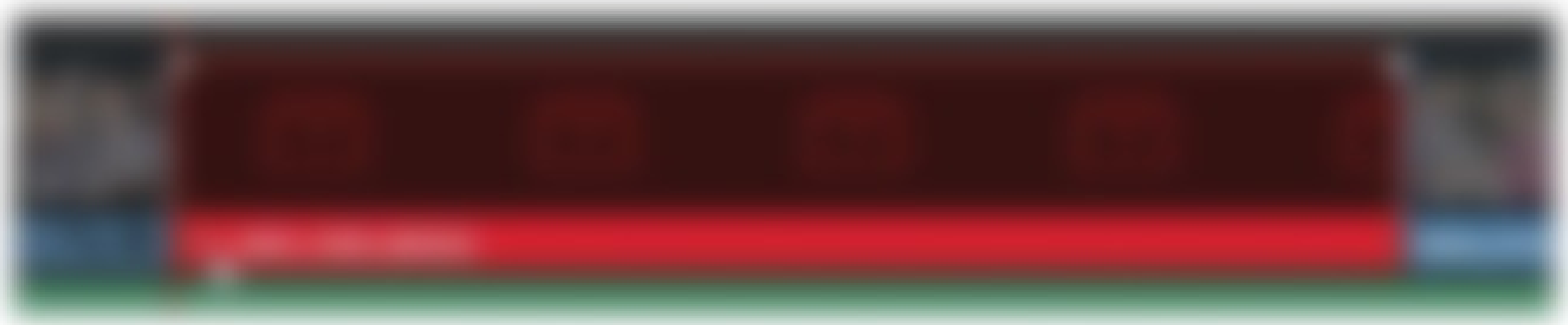
[illegible]

[illegible]

[illegible]

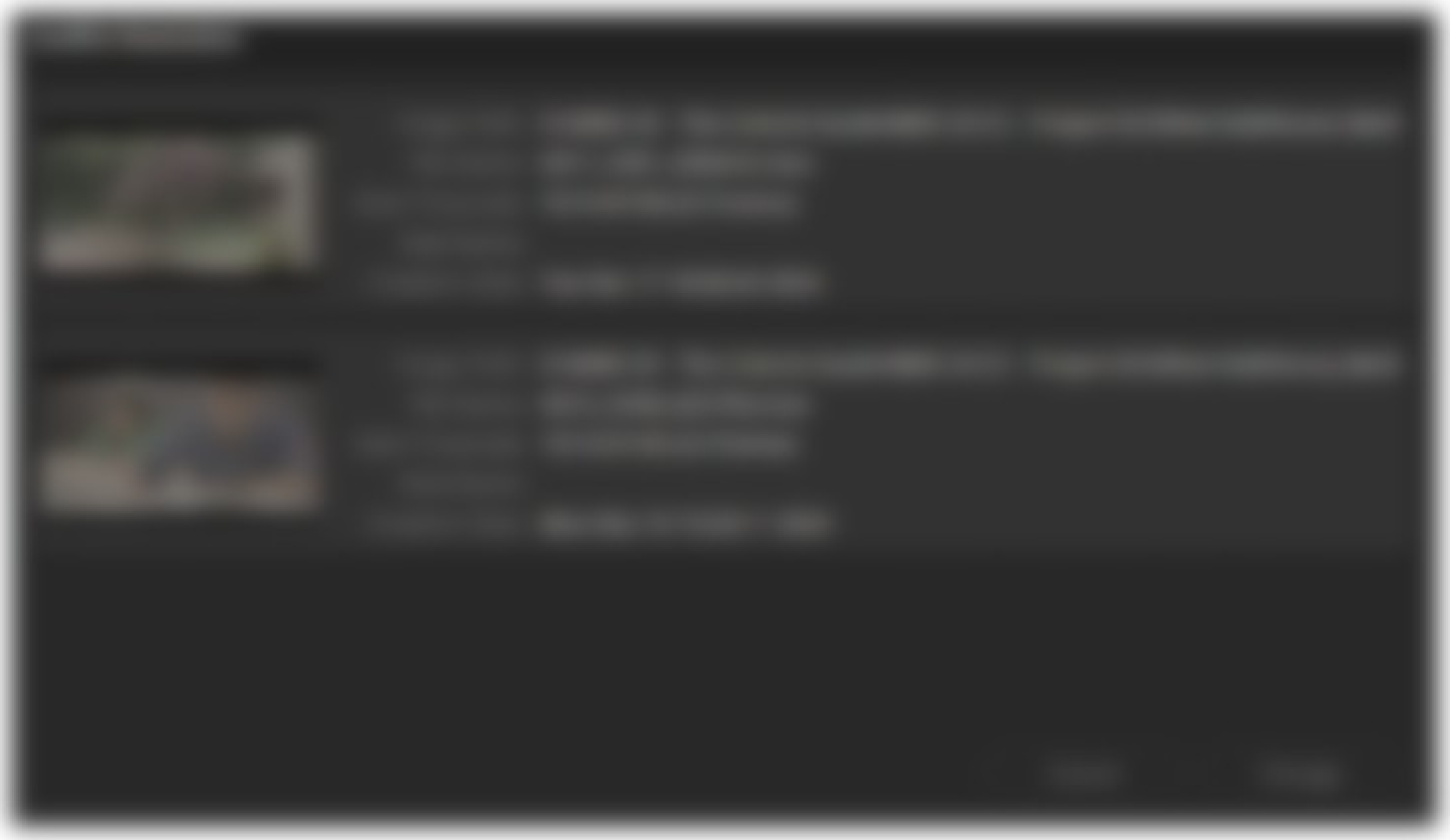
[illegible]

- Right-click the timeline viewer and choose No Wipe to return to the standard viewer.
- Close the Inspector. If you are working on a 1920 x 1080 resolution (or smaller) monitor, this action will bring back the source viewer.
- Press the Down Arrow to navigate to the next video cut. This is the clip that was missing when the XML timeline was imported.
- Press Command-= (plus sign) in macOS or Ctrl-= (plus sign) in Windows to zoom in to the offline clip in the timeline.
- Right-click the clip and choose Conform Lock Enabled to disable the conform lock. The clip is now receptive to all media that contains similar metadata to the one specified in the XML.

  In the lower left corner of the timeline clip, a red attention badge icon (!) indicates a potential metadata clash with another clip in the media pool.
- Double-click the attention badge on the clip.

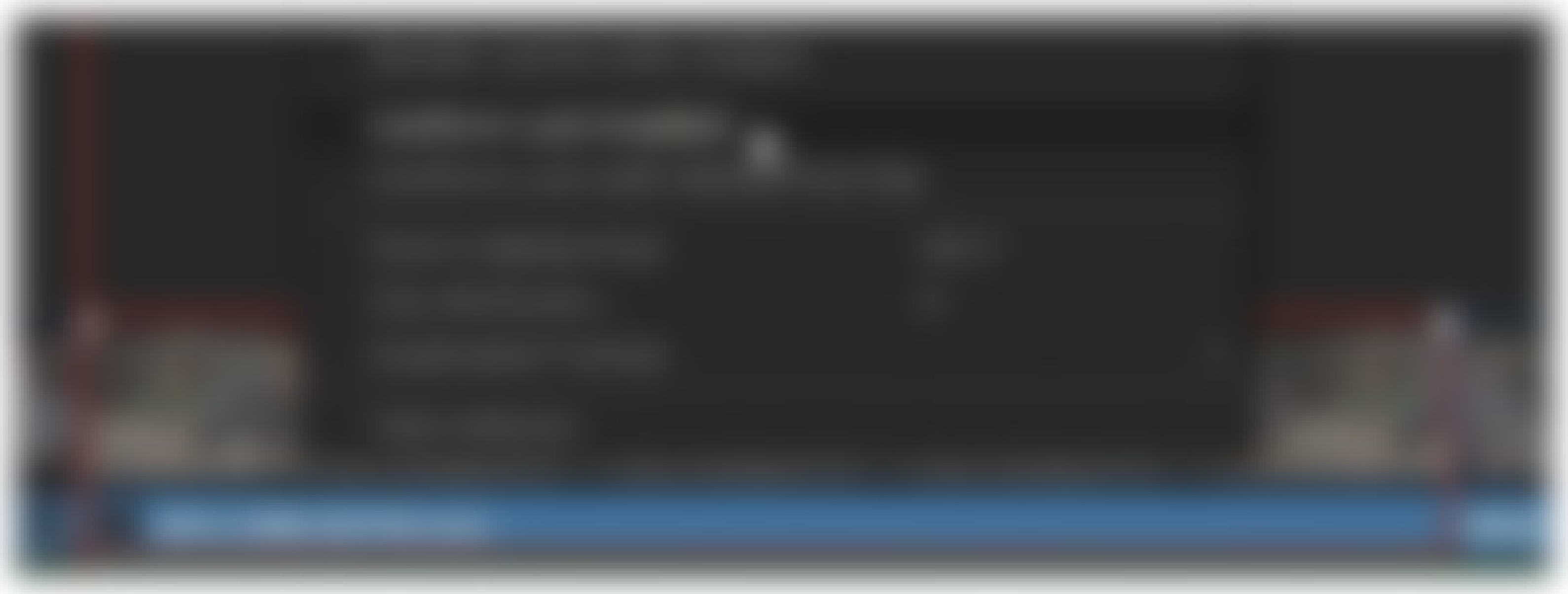
  The Conflict Resolution window appears, displaying all the clips in the bin that potentially match the clip in the XML timeline. You can now select the correct clip according to the reference movie and burn-in.

[illegible] In the Conflict Resolution window, select the clip of the boy in the classroom [illegible] and click Change.

The correct clip is placed in the timeline and matches the reference movie. To remove the now black colored resolved badge and confirm the new clip as correct, you can lock the conformed selection.

[illegible] In the timeline, right-click the clip and choose Conform Lock Enabled.

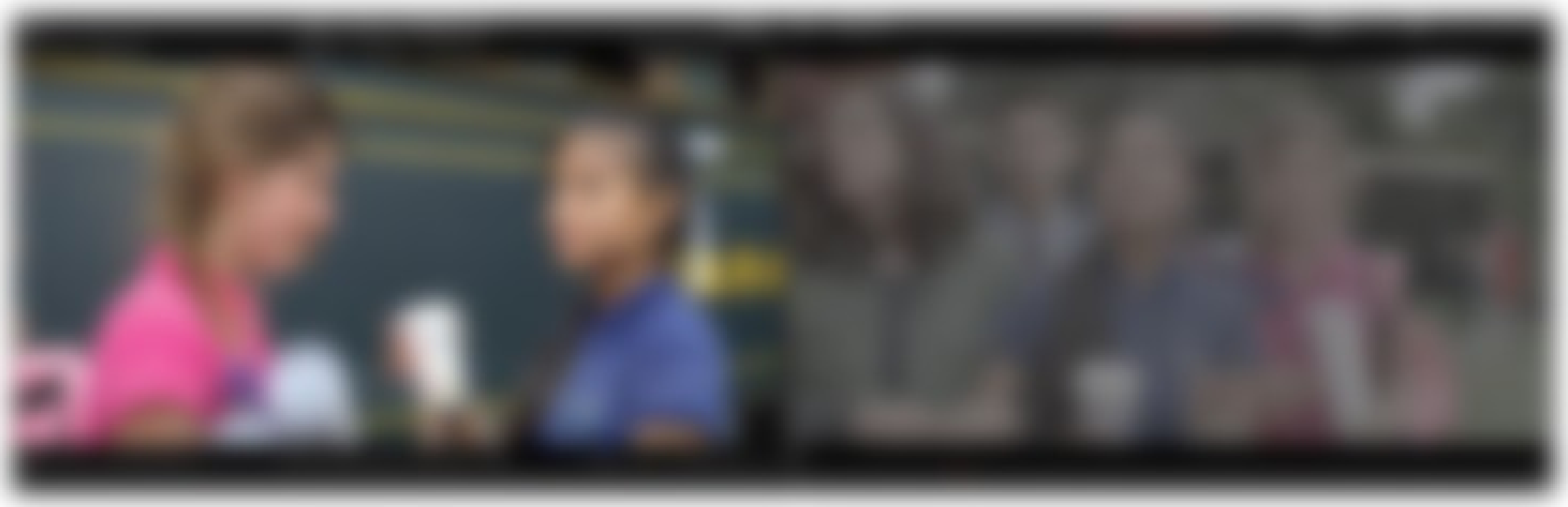


In addition to conforming clips with clashing metadata, the Conflict Resolution window is also popular with VFX workflows. When bringing in new versions of rendered VFX clips, instead of manually editing them into the timeline, you can opt to disable the conform lock, open the conflict resolution window, and choose the latest version of the VFX clip.

Trimming Media

As you continue conforming the timeline, make sure to keep an eye on the exact occurrence of cut points and the timing of the content within the clips.

1 Press the Down Arrow until you reach the cut between clips [illegible] and [illegible] at [illegible].



The image in the timeline viewer does not match the reference movie.

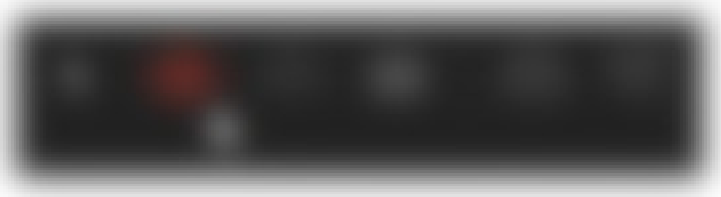
- Press the Right Arrow until you reach the cut in the reference movie, which should be at [illegible].
- Drag the trim point between clips 10 and 11 until it matches the cut in the reference movie.

> **TIP** For finer trim control, select the cut point and press the Comma (,) and Period (.) keys to nudge the cut one frame at a time.

- Press the Left and Right Arrow keys to verify that the cut now lines up between the two clips.

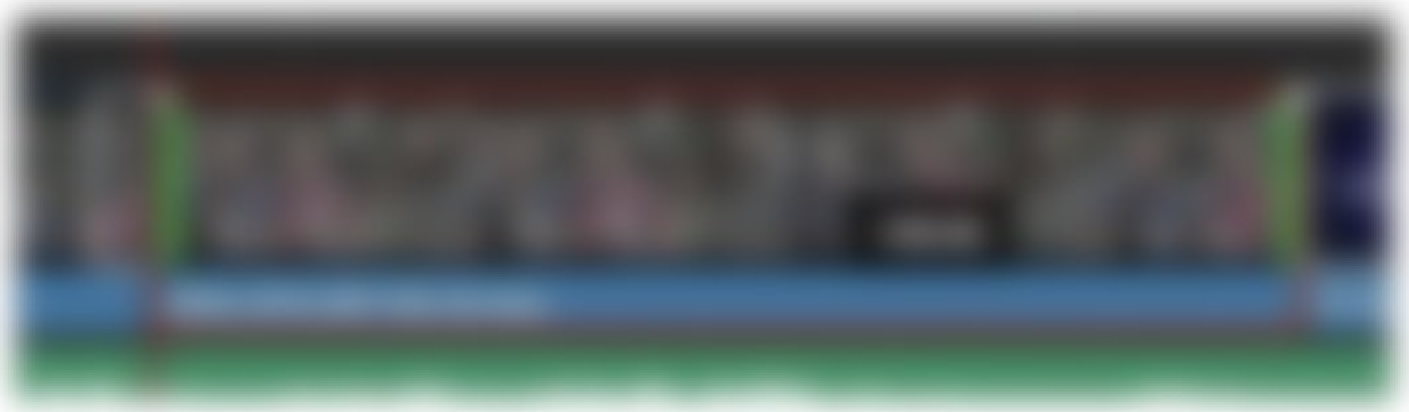
  Though the cut now matches, the content of clip 11 is not accurate. It appears to be a few frames ahead of the reference. You can use the trim editing tool to slide the content of the clip.

- In the timeline viewer, enable the Wipe mode to blend the reference and timeline clips.
- In the timeline toolbar, change the edit mode to Trim Edit mode.

  This will allow you to perform rippling, trimming, slipping, and sliding functions that are not possible in the default Selection mode.

- Click the center of clip 11 ([illegible]) and drag in either direction to see the change in the timeline viewer.

  By slipping the clip, you keep its place in the edit while changing the range of media that appears between the In and Out points.

- Slip the clip right until the mixed images in the timeline viewer are lined up, and then release the mouse button.

Before After

- Turn off the Wipe mode and compare the frames in the two viewers.
- In the timeline toolbar, change the edit mode back to Selection mode.
- Press the Left Arrow and Right Arrow keys to ensure that the actors' movements remain consistent with the reference clip.
- Continue to press the Down Arrow to check the remainder of the clips.

  When finished, the last remaining element to match will be the frame itself. You may have noticed that most of the timeline clips have a 2:1 aspect ratio (with baked-in letterboxing), while some of the graphics and clips are full frame. Changing the aspect ratio of footage within a standardized frame (in this case, 1.77:1, also known as 16:9) is called blanking. You will apply blanking to make the timeline framing consistent.

- Choose Timeline > Output Blanking > 2.0.

> **TIP** When changing a project's aspect ratio, it's usually advisable to apply blanking to a timeline rather than setting a custom resolution. This is because most projection and professional deliverable formats anticipate a standardized resolution, such as HD (1920 x 1080), 2K DCI Scope (2048 x 858), 4K DCI Flat (3996 x 2160), and so on. Setting a custom resolution carries the risk of your project being rejected or incapable of playback on a device.

You have now successfully conformed this timeline. Although it is natural to feel that something has gone wrong with your workflow when the timeline presents issues during XML migration, it's important to remember that this is a completely normal and anticipated stage of post-production. It is encountered in projects of all calibers and stems from the fact that each of the dozens of applications that you may use when collaborating on a film has a different interpretation of the XML tags.

Tips for Preparing Timelines for XML Export

You can reduce the amount of conforming you need to do by asking your collaborators to follow a few rules before generating an XML file from their editing software:

1. Flatten the timeline to one video track, if possible. If there are graphics and overlays, reduce to the lowest possible number of tracks. Delete all empty tracks.
2. Remove all audio clips and provide a final stereo or 5.1 mixdown.
3. Decompose, flatten, or render any compound clips, subsequences, or nested timelines.
4. Remove software-specific effects, grades, adjustment layers, and plug-ins. If they must be incorporated in the grade, video media should be rendered with the effects already baked in.
5. Break up feature-length projects into 20-minute timeline reels.

In recent years, a new format called OTIO (Open Timeline IO) has been created by the Academy Software Foundation to act as a single standard for importing and exporting timelines between applications without the need for extensive conforming. The format uses consistent tagging and offers greater compatibility between platforms and applications than XML, AAF, or any other migration format. If it is available to your collaborators, request that they send you their timelines in the OTIO format.

One of the major advantages of performing your entire post-production workflow in DaVinci Resolve is the substantial reduction of migration and project management issues. An edit can be ingested, edited, graded, mixed, and delivered without ever needing to be conformed.

TIP When sharing a timeline with someone who is also working in DaVinci Resolve, you have several options:

- Export the **timeline** from the media pool in the native DaVinci Resolve Timeline (**.drt**) format for uniform free migration.
- Export the entire **project** from the Project Manager as a DaVinci Resolve Project (**.drp**) file to share all project metadata, bins, and timelines.
- Export the project **archive** from the Project Manager as a DaVinci Resolve Archive (**.dra**) to share the entire project and all its media contents.

Offline and Online Workflows

In post-production, media generally undergoes two phases: the offline stage and the online stage.

When editors and their assistants receive the original camera footage (rushes) from production, it is typically in a raw camera format that is far too processor intensive to play back in real time. Since playback speed is of the utmost importance to editors, they will usually compress it into a format that is much lighter on the workstation, with the intention of relinking it to the camera originals after editing is completed. Compression of camera footage for editing is called transcoding and typically employs intermediary codecs such as ProRes or DNxHD/HR. Working with transcoded (also known as proxy) media is referred to as *offline editing*.

When the final edit is locked, it will typically be forwarded to the colorist and/or finishing artists. Unlike the editors, their priority is not in the playback performance of the media but rather its visual fidelity. They will meticulously relink all the proxy media to the camera originals to allow for optimal quality when grading and delivering the film in a process known as online editing.

The media in this project's timeline is encoded in the intermediary DNxHD 115 1080p codec, which is commonly used for editing but not typically for grading or deliverables. It will act as a stand-in for the camera originals in this project, as the raw files would be too large to share with you. If you are curious, the untrimmed camera footage for this 2-minute trailer is over 700 GB.

Swapping Transcoded Media for Camera Originals

If you receive a timeline that is edited with transcoded media, you can link it to the camera originals using the Reconform function in DaVinci Resolve.

> **NOTE** You do not need to complete this exercise for the [illegible] timeline. This section is designed to familiarize you with the process of swapping proxy media with camera originals for your own future projects.

It's a good idea to make a copy of your timeline before you attempt to make major changes to its structure.

1. Right-click the transcoded timeline and choose Duplicate Timeline. Rename the new timeline according to your preferred naming convention.
2. Double-click the new timeline to launch it in the edit page.
3. Drag to select all the video clips on the timeline.
4. Right-click any clip in the timeline and deselect Conform Lock Enabled. Doing so will disable the clips' lock on their media file paths and prompt them to acknowledge all media that shares similar metadata.
5. From the File menu, choose Reconform From Media Storage.

The Conform from Media Storage window allows you to refine the media that is associated with the clips in the timeline.

TIP In cases where your camera originals have already been imported into the media pool, you can select "Reconform from Bins."

6. Under Timeline Options, choose "[illegible] to reconform Selected Clips in timeline."
7. Under Choose Conform Folders, select the location of the camera originals.
8. Under Conform Options, deselect Timecode if you know the transcodes didn't retain the original camera timecode. Otherwise, leave this option enabled.
9. Next, select File Name and choose "Loose filename match."

This allows you to replace proxy files with camera originals (or vice versa) if only the extension of the filename has changed during transcoding.

10. Click OK.

The camera originals will populate the media pool and replace the clips in the active timeline.

11. To lock the clips to the timeline, select them, right-click, and choose Conform Lock Enabled again.

This method of swapping source files gives you full control over the media used in the timeline without the need to import additional XMLs or change the file paths of the clips in the media pool. An important component of this workflow is a well-organized and consistently labeled file system, which is a practice recommended across all post-production workflows.

Exploring DaVinci Resolve Proxy Workflows

If you are using DaVinci Resolve for the entirety of your post-production, you can opt for some faster and more efficient options when switching between transcoded proxy media and original camera footage in your timeline.

Generate Proxy Media in the Media Pool

You can generate proxy media directly in the media pool after importing your source clips. Select the necessary clip(s) in the bin, right click, and choose Generate Proxy Media. This will prompt proxy media to be generated in the location specified in the Working Folders ("Proxy generation location") of the Project Settings. If you already have transcoded media on hand, you can link it to the camera originals in the media pool by selecting the clips, right clicking, and choosing Relink Proxy Media.

Blackmagic Proxy Generator

DaVinci Resolve comes with a stand alone application that can generate proxies in the background while you continue to work on your project. The Blackmagic Proxy Generator features a Watch Folders list, which creates a live link between a location on your drive and its respective proxy folder. As soon as you drag media from each day's shoot into the watch folder, the proxies will automatically begin generating and will then link to the camera originals as soon as those are added to the media pool.

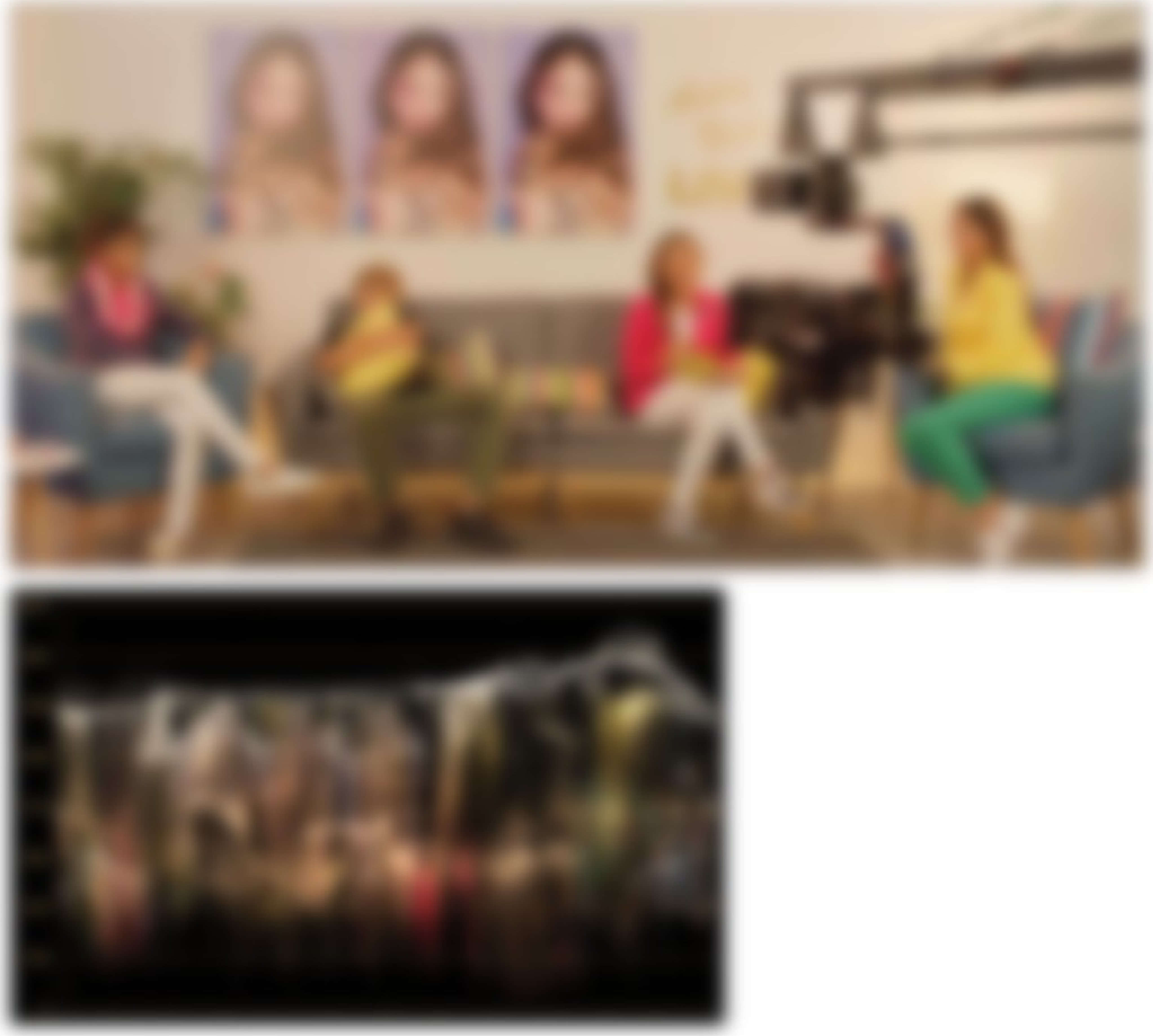
Switching Between Proxy Media and Original Camera Footage

In both instances described above, the proxies and camera originals will occupy the same space in the media pool. This enables you to edit and grade with just one set of media and choose which version you wish to see at any given time. To switch between the versions, go to the Playback menu and navigate to Proxy Handling. Selecting Disable All Proxies will force only the camera originals to be visible in the timeline. If the original media is absent, you will see a red Media Offline frame in the viewer. This is optimal for final grading and delivery when you want to be certain that you're only working with the original media. Selecting Prefer Proxies will switch all media to its associated proxy clips, where available. If any clips have no proxies, the original camera footage will be used. The same applies to Prefer Camera Originals, which will display proxy media in instances where the original camera footage cannot be found. These last two options are optimal if you want to avoid the red Media Offline frame from appearing in your timeline and final render. You can also quickly access all these proxy controls in the upper right corner of the viewers in the media, cut, edit, color, and deliver pages.

Maximizing the Dynamic Range

The grading potential of an image is determined primarily by its dynamic range, which is the range from its darkest point to its brightest point, and the method with which that range is encoded in the digital video file.

All consumer and broadcast video cameras tend to record using a standard dynamic range and encode it with a gamma curve that mimics human vision. This ensures that the image looks as close to real life as possible and displays as such on an HDTV or computer monitor. However, high end prosumer and professional digital film cameras can capture and encode higher dynamic range footage along a logarithmic curve that prioritizes preservation of detail (especially in the highlights) over a realistic depiction of the original colors and contrast. This curve gives you greater flexibility for manipulating brightness and contrast in post production without distorting the image.



Ungraded video with a 2.4 gamma curve

Ungraded footage within a log curve

A byproduct of encoding footage with a log curve is that footage initially appears flat and desaturated.

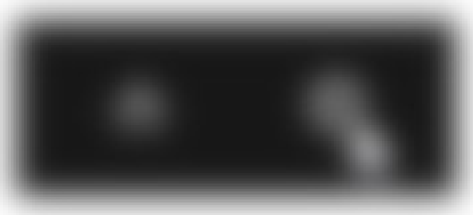
One method of addressing this is by using the primary grading tools to increase the contrast and saturation of the image until it seems to look "correct" in the viewer (as you did in Part 1 of this guide). This manual process of correcting log footage is called display referred color management. Because DaVinci Resolve receives no direction on how the source media is meant to look, configuring its luminance and saturation is left to the colorist and their color grading display. This process can also involve using lookup tables (LUTs) to convert the footage from log to the intended deliverable output, such as Rec 709 Gamma 2.4.

Another method of processing log encoded media is by having DaVinci Resolve automatically map the colors from the original camera color space to the intended deliverable standard. This is known as scene referred color management. DaVinci Resolve interprets the color profile of the camera sensor used to capture the media and precisely calibrates the luminance and saturation levels to replicate how the scene appeared on the day of the shoot. This adjustment is far more accurate because every camera manufacturer will have a unique RGB channel configuration and a unique log curve shape that cannot easily be replicated using standard primary grading adjustments. Another advantage of this method is that you can color manage media from different sources to a single output for quick and consistent project setup.

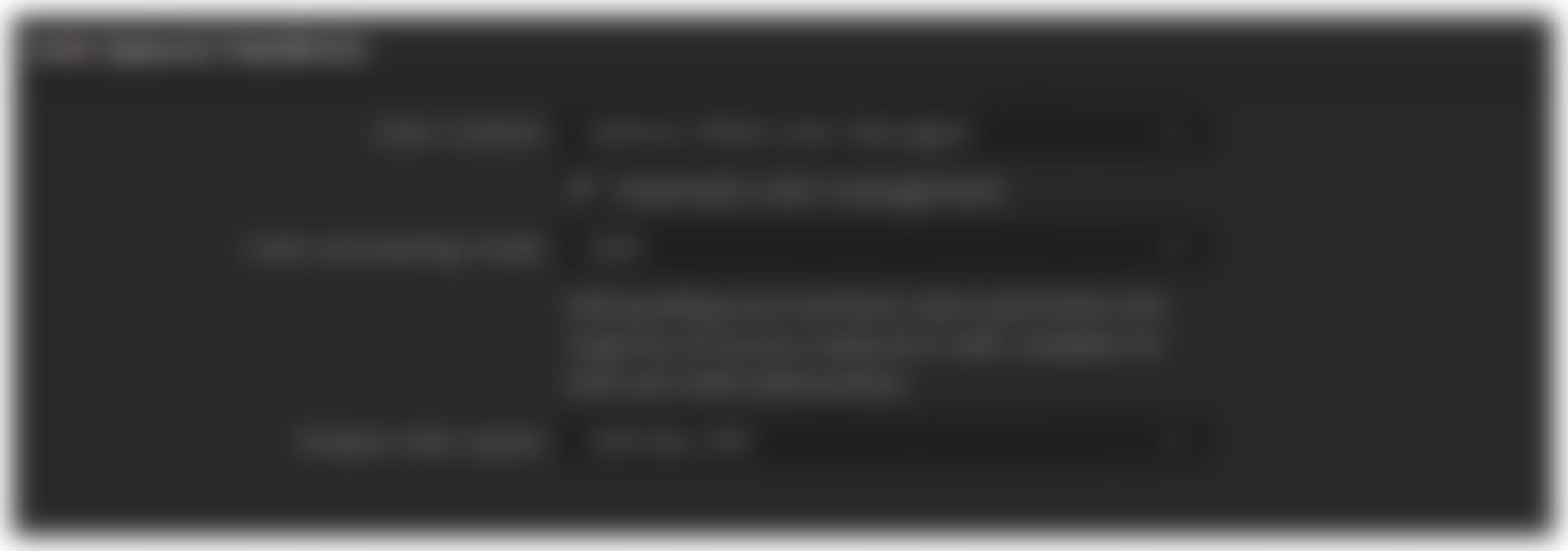
Setting Up Color Management

In this exercise, you will color manage the log-encoded media of the Too Much Lift project to output to a more visually accessible and grade-friendly color space.

- Open the Project Settings by clicking the gear icon in the lower-right corner of the workspace.



- Click Color Management in the Project Settings sidebar.
- In the Color Space & Transforms section, set the "Color science" menu to DaVinci YRGB Color Managed. Doing so will activate scene-referred color management and reveal the color processing modes and output color space options.



Color Space & Transforms

Color science DaVinci YRGB Color Managed

☑ Automatic color management

Color processing mode SDR

Output color space SDR Rec.709

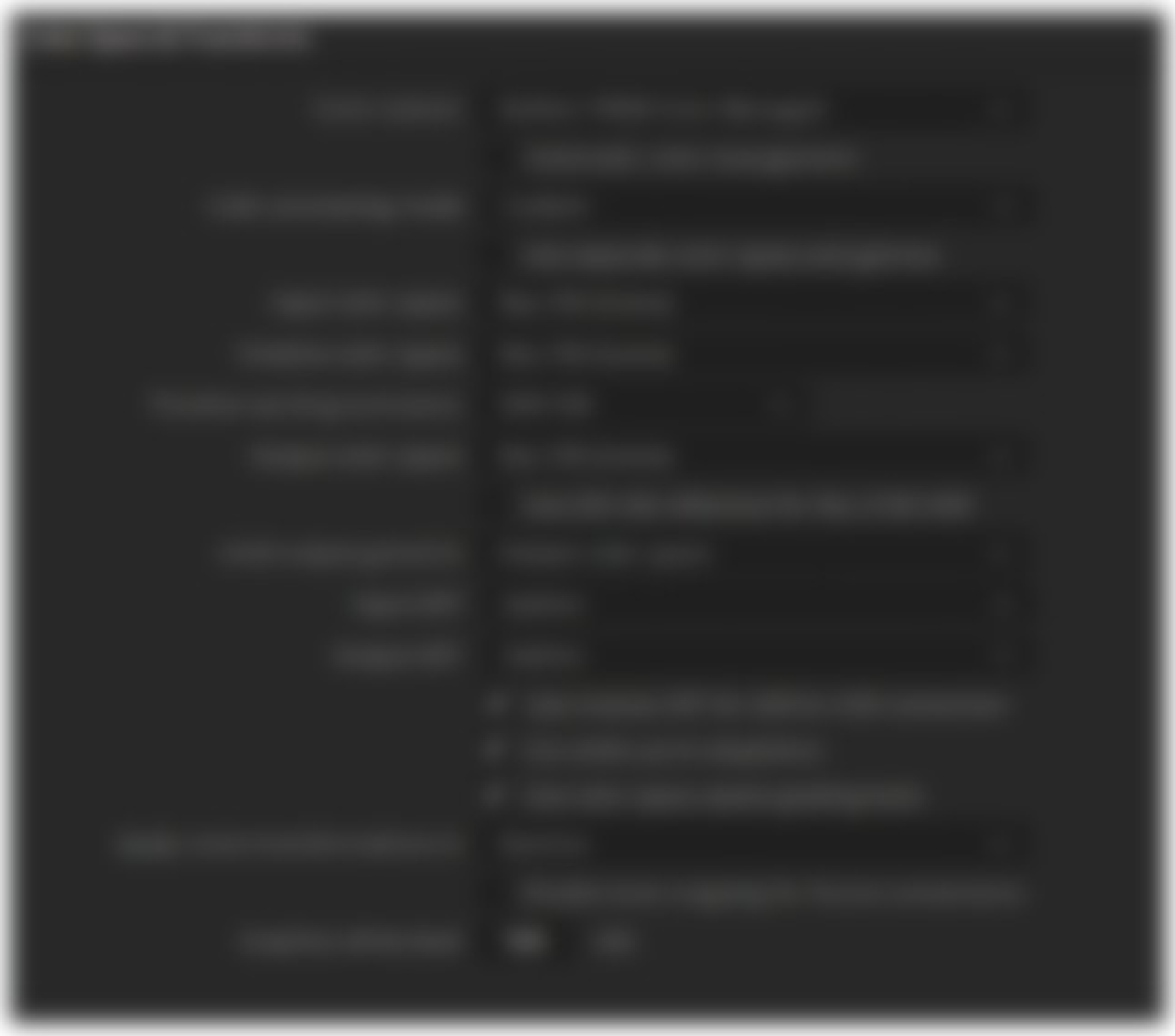
With "Automatic color management" enabled, the color processing mode is simplified to just two working environments: SDR (standard dynamic range) and HDR (high dynamic range). When you select a preset in this dropdown menu, a brief description underneath will summarize the preset's intended use.

- Deselect "Automatic color management."

  The color management options have mostly stayed the same, but you now have a wider selection of color processing modes and output color spaces for more precise setup. By default, the project is set to operate in SDR Rec.709, which is the ideal environment when working with SDR footage with the intention of delivering to the web.

  As your footage is log encoded, it makes sense to operate in a wider gamut and with a higher dynamic range to allow for greater grading potential and a multitude of deliverable options (both SDR and HDR).

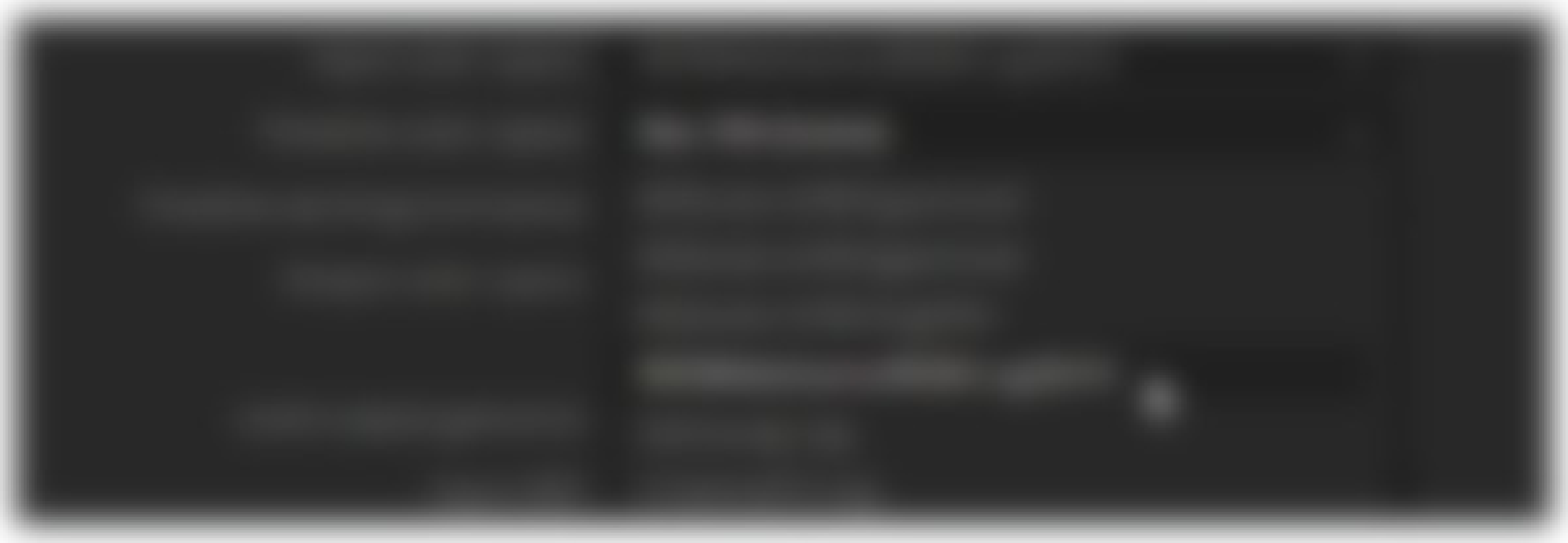
- Set the "Color processing mode" to Custom to unpack the full list of color management parameters.



- Set the "Input color space" to REDWideGamutRGB/Log3G10, which is the original camera color space designed to encompass all colors that can be recorded by RED cameras without clipping.

  The timeline color space is your working environment and determines the behavior of the color page grading tools and nodes.

- Set the "Timeline color space" to REDWideGamutRGB Log3G10 too.



In addition to being a camera color gamut, REDWideGamutRGB is also a great working environment that ensures accurate mapping of RED footage. DaVinci Resolve features several wide gamut standards, including ARRI WideGamut and Blackmagic Design's DaVinci Wide Gamut, allowing you to work with any camera source.

The timeline working luminance affects how high dynamic range images are mapped to the timeline color space. The default setting, HDR 1000, will map a 1000 nit HDR signal to be viewable on an SDR monitor while gently rolling off highlights to prevent clipping or bunching at the top of the waveform. If you are uncertain of the number of stops (or the nit count) in your incoming footage, you can maximize this value to ensure that all highlights are rolled off, no matter how high.

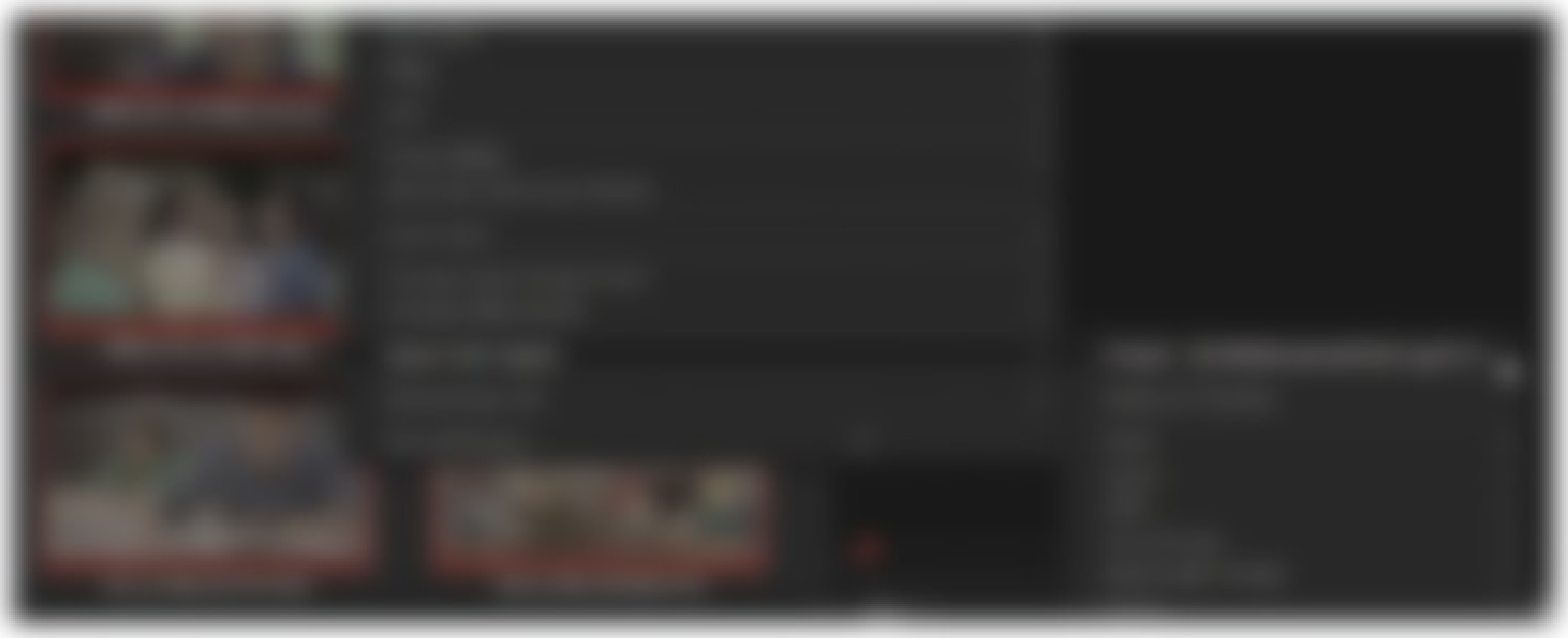
- Set the "Timeline working luminance" to Custom and enter `10000` nits.

The output color space determines the deliverable standard that the Timeline color space is mapped to. This should generally be the color space of your computer or grading monitor or your intended deliverable format.

- If you're working on a standard computer monitor, leave the "Output color space" set to Rec.709 (Scene). This is an appropriate setting for most web deliverables and will emulate the appearance of SDR broadcasts with the gamma function baked directly into the image. If you're new to color grading or if your output is mainly web content, this setting is perfect for you.

> **TIP** If you're using a Mac display, you'll need to choose an output color space based on your ICC display profile. To find the display profile in your macOS, go to System Preferences > Displays > Color tab. On newer displays, the profile will usually be Display P3. To set the correct output color space for Display P3 in the Project Settings, select "Use separate color space and gamma" under "Color processing mode," and in the "Output color space" field, set the left parameter as P3-D65 and the right parameter as sRGB.

- Right-click any of the selected clips and choose Input Color Space > Project - REDWideGamutRGB Log3G10. This will not only indicate the input color space of the clips but also link their behavior to the Project Settings.



By correctly setting up the input color space of the media, the colors of the timeline clips will shift from the REDWideGamutRGB color gamut and Log3G10 log curve to Rec.709 with the standard 2.4 gamma curve. As a result, the clips will appear more vibrant and with more pronounced contrast.

DaVinci YRGB color management applies to all the clips in a project. If certain clips come from different sources, you can reassign their individual input color spaces through the media pool's contextual menu (or the color page's clip timeline).

- In the media pool, open the 03 VFX bin.

The VFX clips with the _LN suffix that you filtered earlier were rendered out with no gamma (or transfer function), making them linear. VFX artists and post houses will commonly work with and render composites in this way.

- Select the five VFX clips.
- Right-click any of the selected clips and choose Input Color Space > Linear > Linear.

The VFX media and its corresponding timeline clips will now more closely match the rest of the footage in the project.

The graphics elements were all rendered in Rec.709 or sRGB, so you will not need to change their input color spaces.

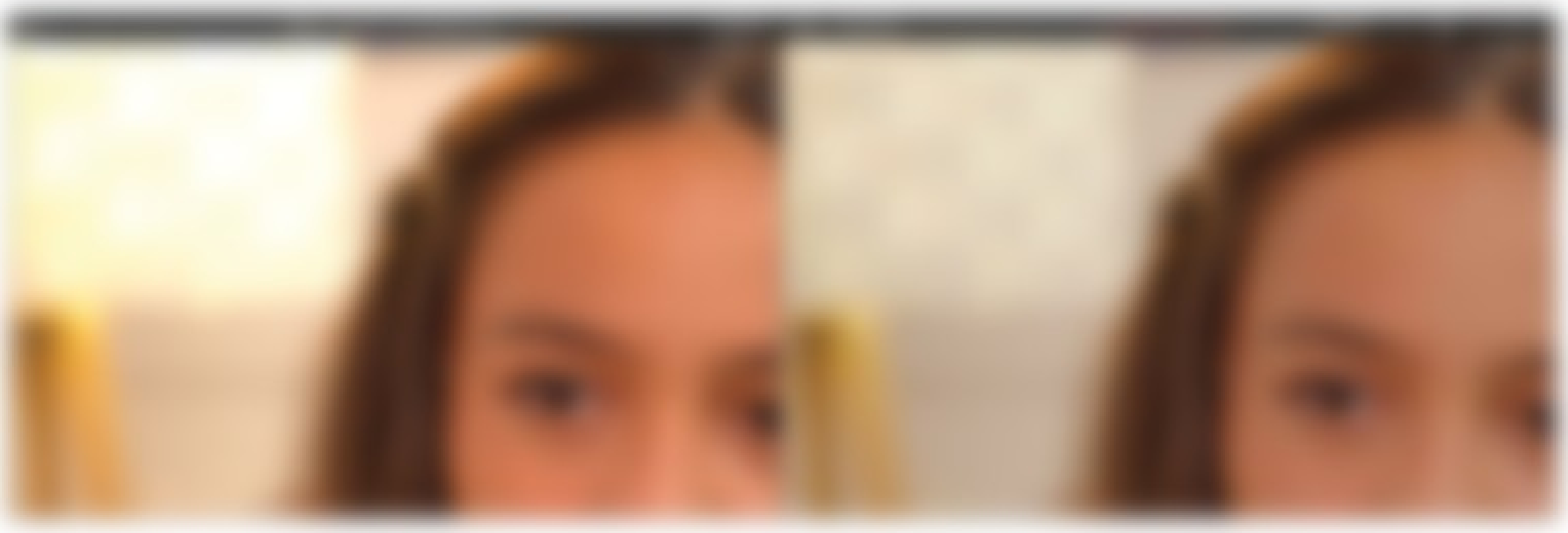
TIP You can use a smart bin to filter clips based on their sources and then set their input color spaces in batches to save time.

With project-wide color management set up, you are ready to begin grading. In later lessons, you will see other methods of color management within DaVinci Resolve, like node-based Color Space Transforms (CSTs), ACES, and LUTs.

Using DaVinci Resolve with Mac Displays

The macOS internal color management utility, ColorSync, uses metadata to match colors between its applications. As third-party software, DaVinci Resolve is not impacted by ColorSync, which is why the videos rendered out of DaVinci Resolve might look different when viewed in Safari or QuickTime. To avoid this, you can choose to include DaVinci Resolve in ColorSync's internal matching. Go to DaVinci Resolve > Preferences > System, and in the General category, select "Use Mac Display Color Profile for Viewers." This will enable DaVinci Resolve to use whichever color profile you have selected in the macOS Color preferences, including custom color profiles and calibration software profiles. Please note that this will only affect the appearance of the footage in the viewers. In Lesson 10, "Delivering Projects," you'll find additional instructions on how to correctly render videos to appear the same across all applications and web browsers.

DaVinci YRGB color management offers a structurally solid foundation for color grading by mapping the starting point of video media from any number of sources to a single, grade-appropriate color standard. Its advanced tone mapping ability means that highlights are gently rolled off, preserving maximum quality. Compare the treatment of the highlights in the reference movie (which underwent standard log to Rec.709 conversion) to the DaVinci YRGB color management tone remapping.



This method of color management results in higher-quality visual output, more consistency in the performance of the color page grading tools, and an easier delivery process in which the project output color space can be remapped to any number of professional deliverable standards.

Note that color management does not eliminate the need for balancing and matching. Although the color mapping process takes the guesswork out of normalization and saturation adjustment, it does not account for the internal color balance/temperature setting of the camera, over/underexposure, and the differences in lighting conditions between shots. It is standard practice to balance and match shots even when employing color management.

When You Don't Know the Camera or Format

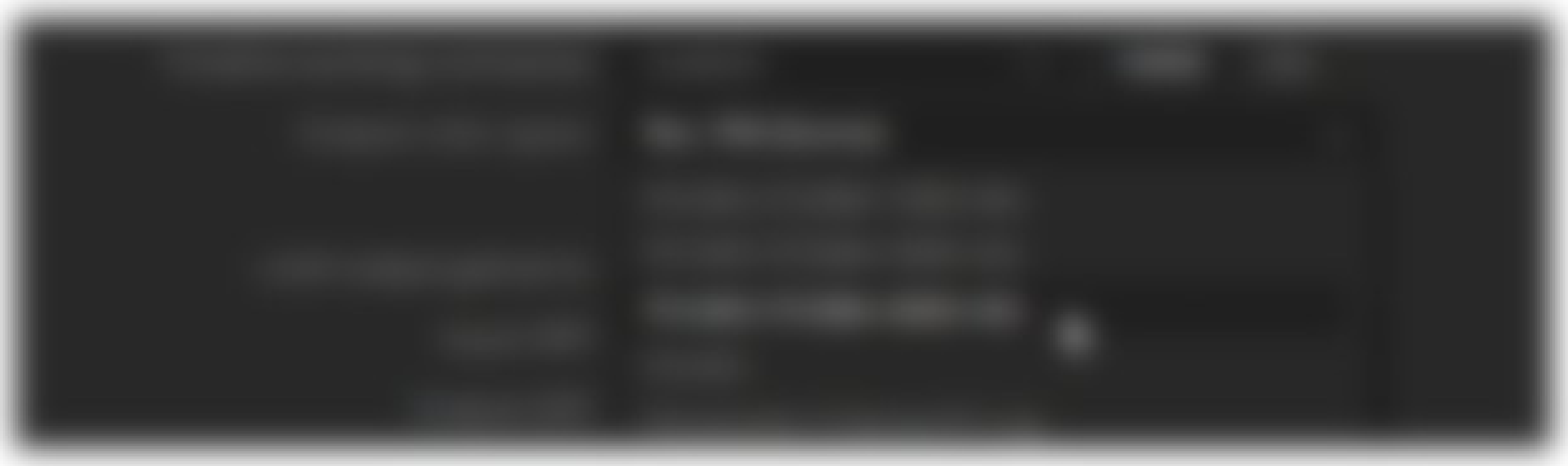
DaVinci YRGB color management operates at its best when you know and indicate the camera input color space data. But identifying that data can be tricky when the origins of the footage are unknown or when the color space details were not included during the transfer. You can derive some useful data by examining clip properties, but that will not always provide information about the camera model or log curve. You can acquire the most definitive information by contacting the filmmakers directly and requesting this information. If all else fails, you can bypass DaVinci YRGB color management altogether and manually normalize the clips using the primary grading palettes.

NOTE Due to the size of the project, the video clips were compressed to allow for sharing via the web. As a result, you will see some compression artifacting, such as posterization and macro blocking, in the viewer and scopes. When working on actual projects, you should aim to work only with camera originals or high-quality 10- and 12-bit depth compression formats like ProRes 4444 and DNxHR to avoid such artifacts.

Changing the Output Color Space

One of the most powerful aspects of using a color managed workflow in DaVinci Resolve is that you can change the output color space at any time. Doing so is particularly helpful when you need to output multiple masters to different destinations. For example, you might need one master for broadcast (Rec. 709), another for UHD television (Rec. 2020), and yet another for digital cinema (DCI-P3). DaVinci Resolve manages these color transformations without the need to regrade the timeline.

- Open Project Settings > Color Management.
- Set the Output Color Space to P3-D65 ST2084 4000 nits.



- Click Save.

  The color space is changed, and the viewer reflects the updated results. On a standard computer monitor, the colors will now appear flat. However, if you had a calibrated HDR P3-D65 monitor capable of displaying 4000 nit luminance, the clips would look nearly identical to their appearance on your HD Rec.709 display with the previous output settings. This is how you can use color management to effortlessly switch between different monitoring and deliverable standards.

Accurate Color Monitoring in DaVinci Resolve

DaVinci Resolve was designed to work with industry standard calibrated external displays connected via video output interfaces for critical color evaluation.

Most computer monitors are incapable of displaying the color gamut and dynamic range required for broadcast and theatrical distribution. Additionally, most computer displays have their own color and contrast calibration as determined by the manufacturer, which is further altered by the operating system's internal color management. For this reason, their color accuracy cannot be guaranteed upon delivery, and the resulting video could even shift in appearance when viewed in different video players on the same machine.

Ideally, you should use an external monitor and video interface if color accuracy is important to you. Alternatively, you could use a color calibration probe to analyze your computer display and generate a LUT that will map the display to the correct standard.

- Open Project Settings > Color Management.
- Set the Output Color Space back to the default Rec.709 Gamma or your preferred display.
- Click Save.

TIP If you know in advance that you will deliver content in multiple standards, you should start your workflow in the widest gamut and then work your way down. For example, if delivering for web (Rec.709/Gamma or Gamma 2.2), digital cinema projection (DCI-P3), and HDR broadcast (Rec.2100 ST2084), the best option would be to grade your project for HDR first. Then, duplicate the project and calibrate the output color space to DCI-P3. Review the timeline, make the necessary highlight adjustments, and render the cinema grade. Finally, repeat the process for the web deliverable.

NOTE You will continue to work on the timeline created in this lesson over the next two lessons. If you would like to verify that your timeline is correct or are uncertain of the accuracy of your conforming, import the **03 Conformed HDR Timeline.drt** (under BMD 20 CC - Project 03 > Timelines) into the media pool. If any media appears offline, click the red Relink Media button in the upper left corner of the media pool and specify the location of the Project 03 media on your workstation.

To ensure the project management is set up correctly, right-click the imported timeline and choose Timelines > Timeline Settings. Select Use Project Settings in the lower left of the settings panel to link it to the project-wide color management settings. Set up color management as described in the "Maximizing the Dynamic Range" exercise in this lesson.

You can then use this ungraded, conformed timeline to complete the next two lessons in this book.

Lesson Review

- During project migration, what is a translation error?
- How do you assign an offline reference movie to a timeline?
- When loading an XML file, why would you opt to "Ignore file extensions when matching"?
- How do you apply letterboxing in the edit page?
- Where do you activate DaVinci YRGB Color Management?

Answers

1. Translation errors are inconsistencies that appear when reconstructing timelines between applications.
2. Right-click a timeline and choose Link Offline Reference Clip to assign a reference movie to it. You can also drag and drop any clip from the media pool into the source viewer while it is in Offline mode to associate it with the active project timeline.
3. You would choose to ignore file extensions to link to media in a different format during timeline reconstruction. This is commonly used when switching from offline to online editing or vice versa.
4. Timeline > Output Blanking features a list of standard letterbox ratios. You can also create custom letterboxes using a couple of Solid Color generators.
5. In Project Settings > Color Management, set Color Science to DaVinci YRGB Color Managed.

Lesson 5

Mastering Node Trees

The Node Editor is a powerful feature of the color page that enables you to maintain precise control over the final appearance of images. You can use it to separate the different stages of grading while ensuring an enhanced color output with minimum quality degradation. Additionally, the Node Editor allows for some truly advanced secondary grading configurations, the foundations of which you will explore in this lesson.

Time

This lesson takes approximately [illegible] hours to complete.

Goals

Understanding Node-Based Grade Compositing [illegible]
The Importance of Node Order [illegible]
Creating Separate Processing Branches with a Parallel Mixer Node [illegible]
Compositing Color Effects with the Layer Mixer Node [illegible]
Using External Mattes [illegible]
Self-Guided Exercise [illegible]
Lesson Review [illegible]

Understanding Node-Based Grade Compositing

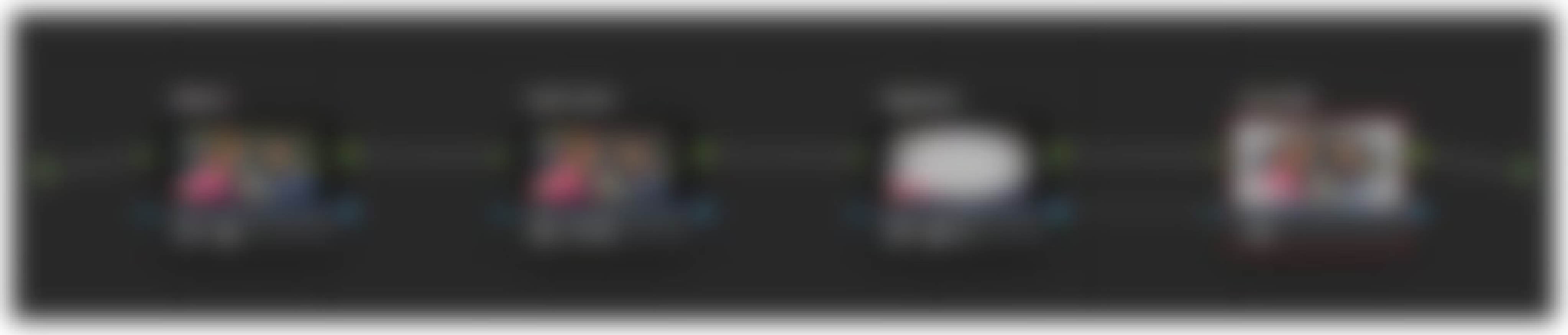
Node-based compositing differs from the layer-based system familiar to many post-production software users. Unlike layers, in which the visuals are compounded based on their order in the layer stack, nodes process a single RGB signal, modifying it along the way.

As each node affects the image, it outputs the altered signal via an RGB connection line until the final RGB data reaches the output node of the Node Editor. This output node presents the image in its final state to the viewer and determines how the media will look when rendered.

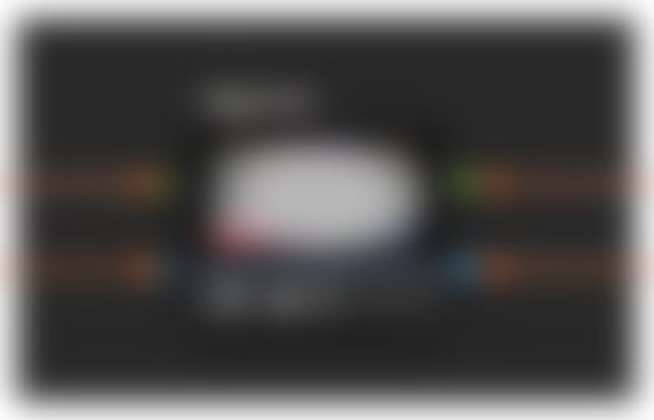
Nodes are capable of reusing information generated in earlier nodes, substantially reducing the amount of processing power required to assemble and output a final image. This capability is particularly useful when working with keys, such as those generated by qualifiers and Power Windows.

The Anatomy of a Node

The color page's node graph is read from left to right. The RGB signal that constitutes the image begins at the leftmost green node — the source input — and travels through the connection lines that link the corrector nodes until it reaches the node tree output to the right. The RGB signal must be uninterrupted for the node grades to be correctly compiled and output.



Standard corrector nodes have two inputs and two outputs.



The green triangle and square shapes at the top of either side are the RGB inputs and outputs. These carry the pixel data of the image, which is manipulated within the node using the grading tools and effects of the color page. Corrector nodes can accept only one RGB input but can output multiple RGB signals to other nodes.

The blue shapes are the key inputs and outputs. These enable you to transfer the key data generated by the secondary grading palettes and tools (or external mattes) to be used by other nodes.

The Importance of Node Order

The RGB signal output of each node incorporates all the adjustments made within that node and directly affects how subsequent nodes interact with it. The following set of exercises demonstrates how nodes impact one another.

NOTE The node structures of every exercise in this segment can be found in the Node demos album of the gallery in the color page.

Influence of Color and Saturation Across Nodes

You can see how a node placed at an early stage of the grading pipeline influences the following nodes by removing its saturation and observing the results.

1 Open the Project 02 - Too Much Life Trailer project.

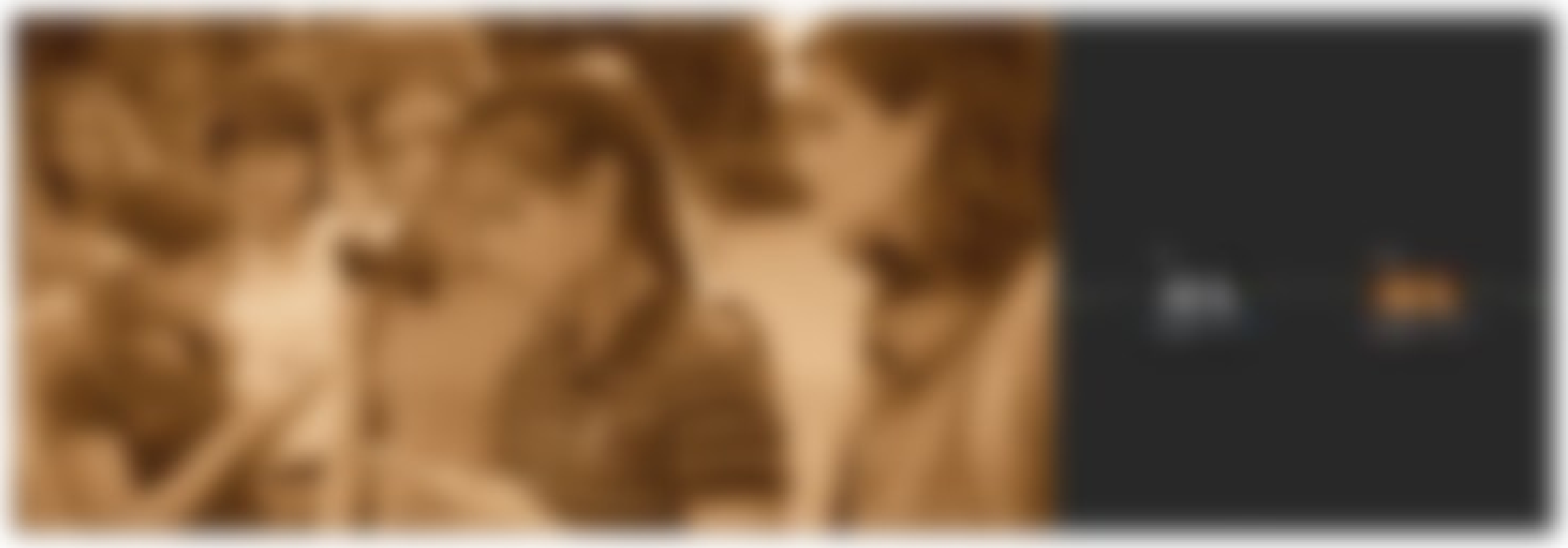
2 Enter the color page.

3 Select clip 13 [illegible] in the [illegible] timeline.

4. Label the first node **BW**.
5. In the left palettes, open the RGB Mixer palette.
6. Select Monochrome at the bottom of the palette to convert the image to black and white.

   The RGB Mixer allows you to remix different amounts of red, blue, and green data from one channel to another for creative and practical purposes. When in monochrome mode, it gives you complete control over the strength of the individual RGB channels and can be used for tweaking black and white images to create an aesthetically pleasing balance of natural elements such as skin, sky, and trees.

7. Drag up the Red Output's Y-bar to increase the strength of the red channel in the image. This change will brighten the performers' faces and darken some of the clothing, giving the image a satisfying contrast.
8. Create a second node and label it **Sepia**.
9. Open the Primaries color wheels palette and drag the Offset color wheel toward orange-yellow to give the image a sepia tint.



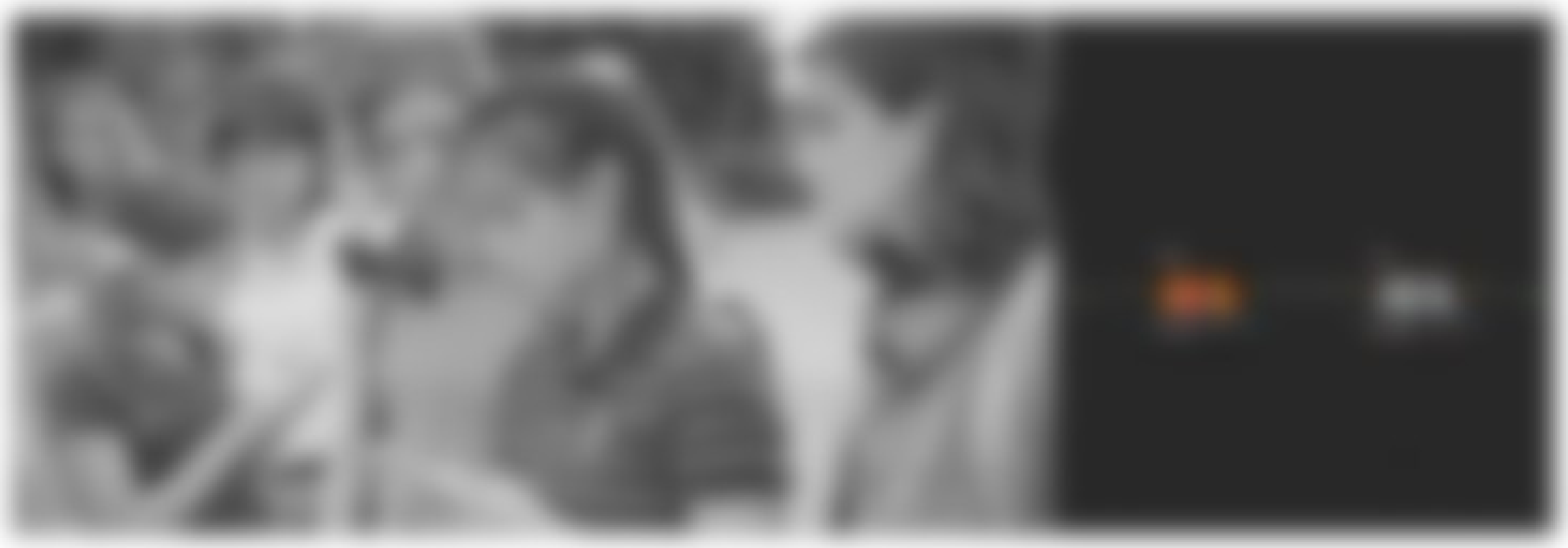
10. Click node 01 (BW) and return to the RGB Mixer palette.
11. Drag the Blue Output's Y-bar up and down to increase and decrease the strength of the blue channel in the image.

    The effect on the final sepia grade shows that the contrast created in the first node continues to impact the final image even after a second node dramatically changes its appearance.

    For an even clearer visualization of how node order impacts the grade, you can swap the two nodes.

- Click node 02 (Sepia) and press E to extract it from the node tree.
- Drag the disconnected node onto the connection line to the left of node 01 until the line turns yellow and a + (plus sign) appears.

TIP A quick way to swap two nodes is to hold Command-Shift (macOS) or Ctrl-Shift (Windows) and drag one node over another.



When reconnected, the image becomes black and white. Although the sepia grade still performs its function in the first node, it appears to be overridden by the BW node.

NOTE Nodes that follow the active node in the node tree are referred to as being downstream. Nodes that precede the active node are upstream.

- To further demonstrate upstream nodes' continued impact on downstream nodes, select node 01 (Sepia) and drag the Offset color wheel toward blue.

  Once again, there is a change in the viewer despite no visible blue hues in the final image. This is because you initially boosted the red channel output in the BW node's RGB Mixer, making it sensitive to changes in the red channel. Dragging the Sepia node's Offset wheel toward a cooler shade directly impacts the brightness achieved by the RGB Mixer in the BW node.

What If You Made Both Adjustments in One Node?

The order in which the RGB signal is impacted by the tools in the color page is determined by a predefined order of operations.

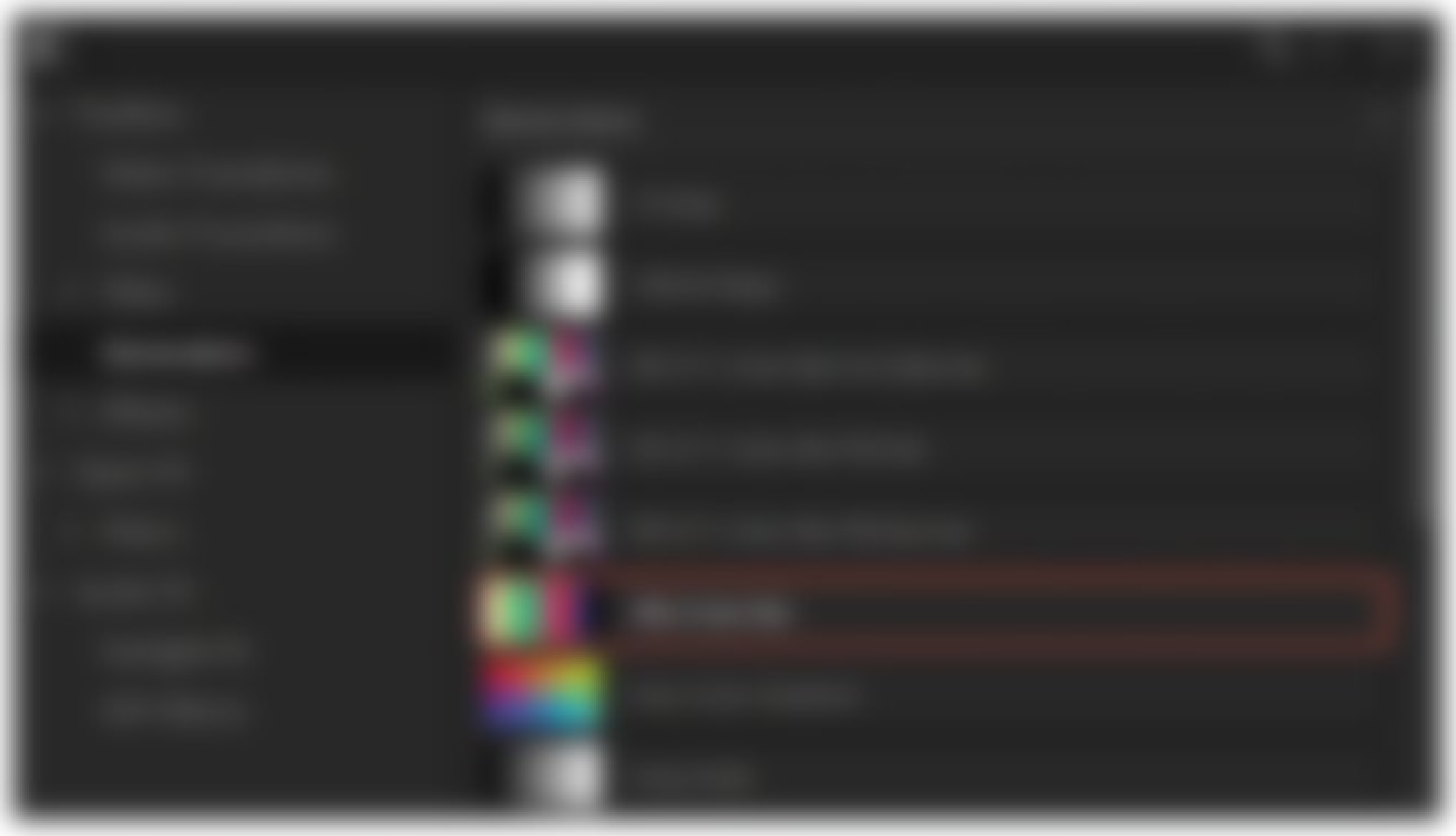
In the preceding example, the image would first be impacted by the Lift/Gamma/Gain operation followed by the monochrome Channel Mix, resulting in the same elevated black and white image you saw at the end of the exercise.

If you want to maximize the pipeline, you could technically perform multiple operations within a single node with a clear idea of how the tools affect one another. However, this approach could lead to needlessly slow and complex grading workflows. Having separate nodes for every stage of the grade helps keep the workflow light, intuitive, and consistent.

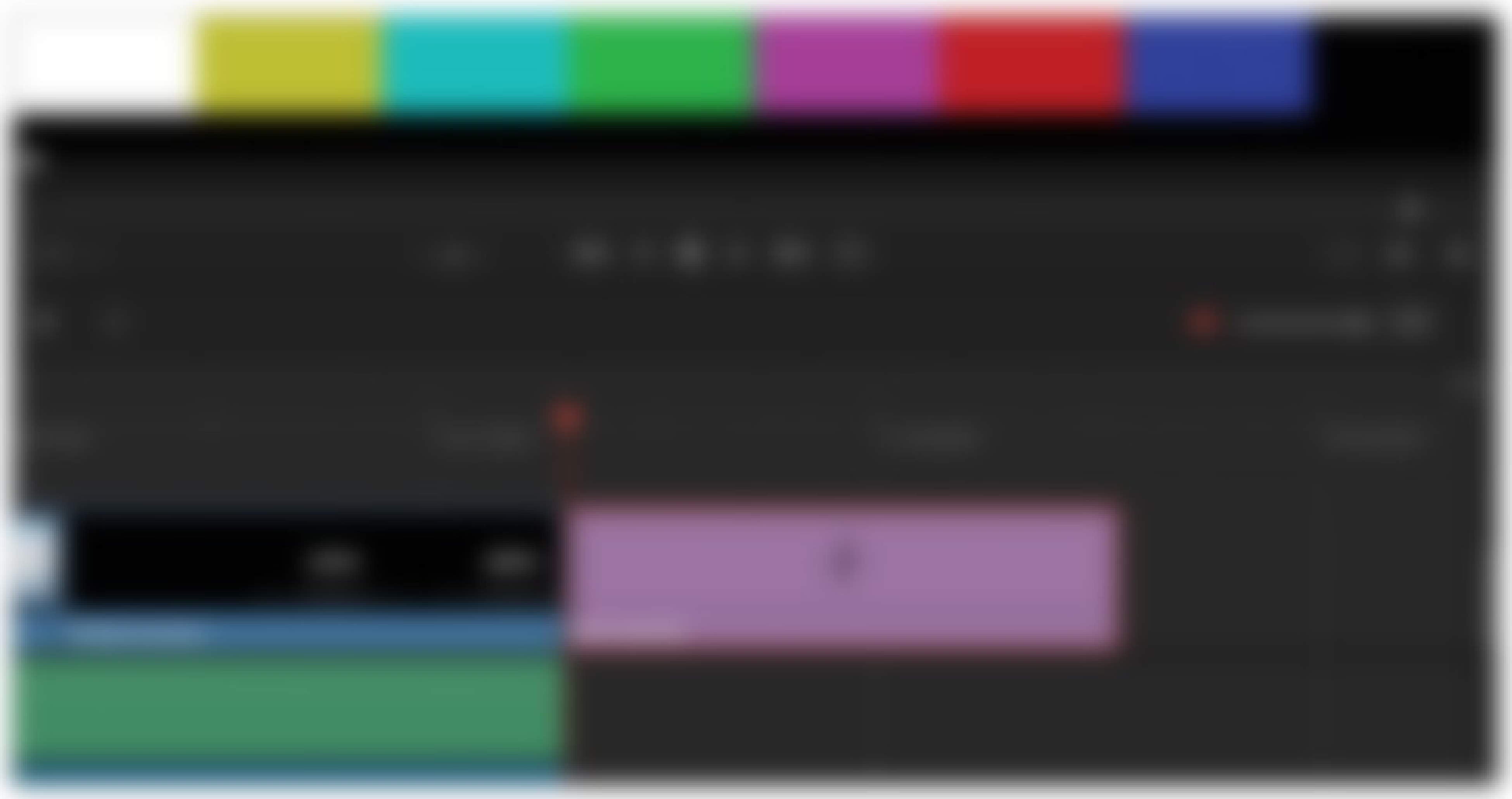
Visualizing Node Processing

While it's good to see how grading tools operate in practice, using DaVinci Resolve's generators can sometimes help develop a clearer understanding of tool mapping and node processing. In this exercise, you will analyze hue selection with the help of color bars.

1. Enter the edit page.
2. Open the Effects Library.
3. Within the Toolbox > Generators, locate the EBU Color Bar.

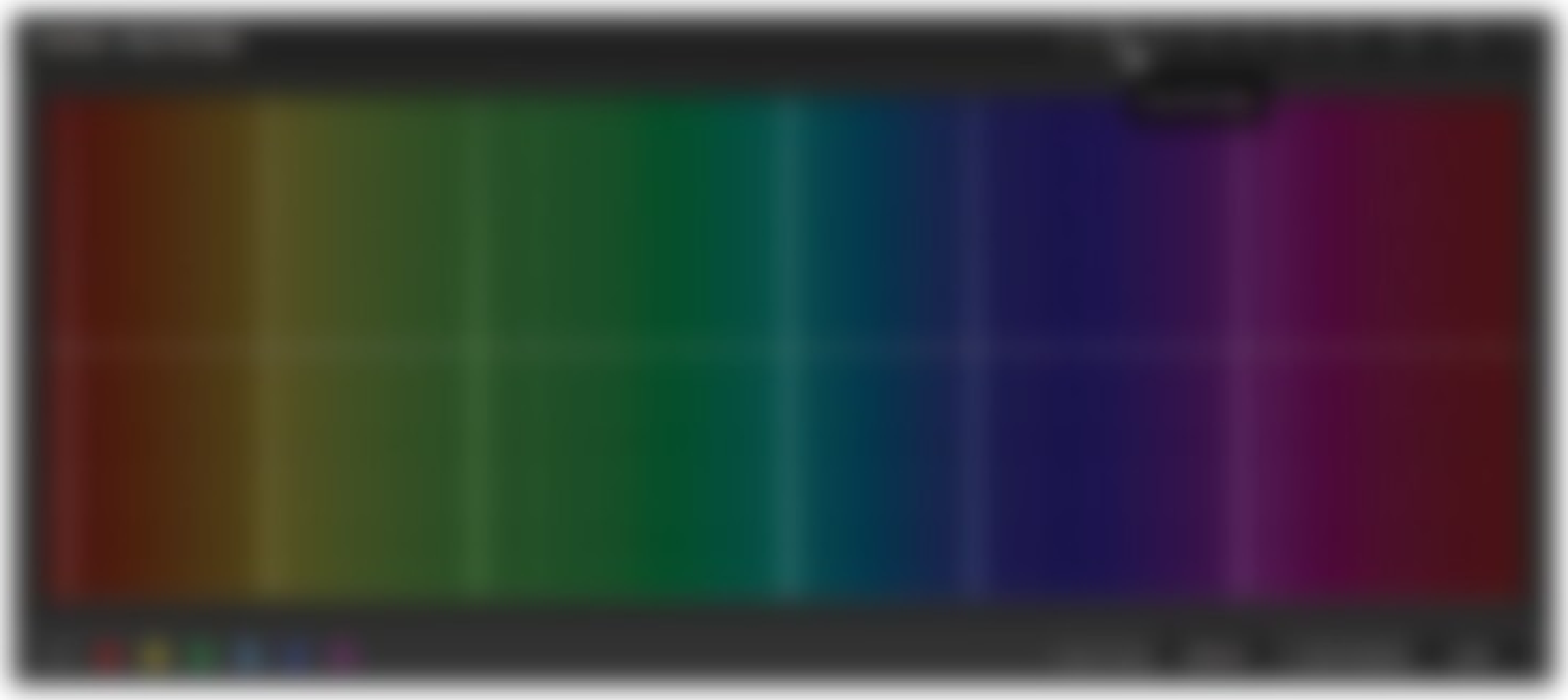


4. Drag the EBU Color Bar generator to the end of the timeline.



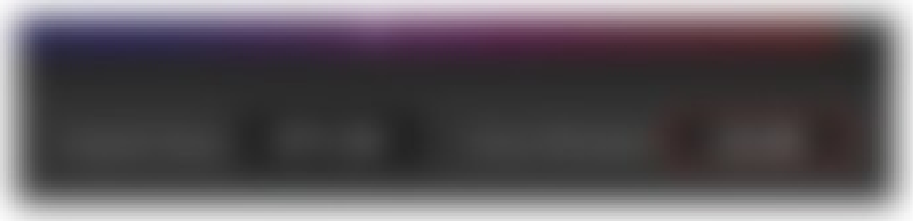
To work on a generator in the color page, you must first transform it into a compound clip so that it can take on video properties.

5. In the timeline, right-click the generator and choose New Compound Clip.
6. Name the compound clip **Color Bars**.
7. Enter the color page.
8. In the Curves palette, change the mode to Hue Vs Hue.



The color bars are represented by distinct spikes in the curves histogram.

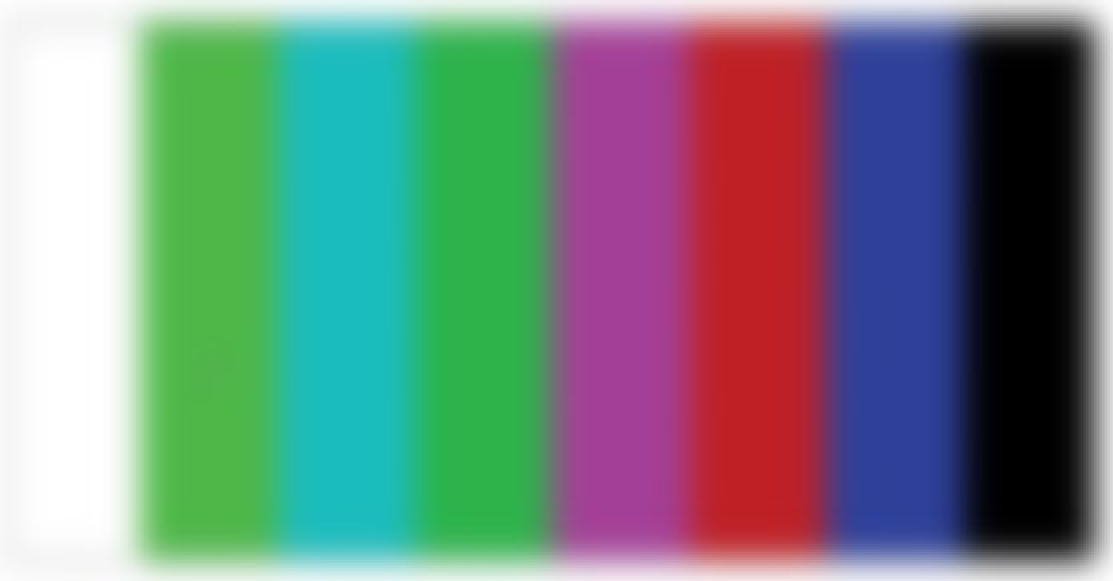
9. Click the yellow bar in the viewer to drag a control point and two anchors in the Curves palette.
10. In the lower right of the palette, drag the Hue Rotate parameter to turn the bar in the viewer green.

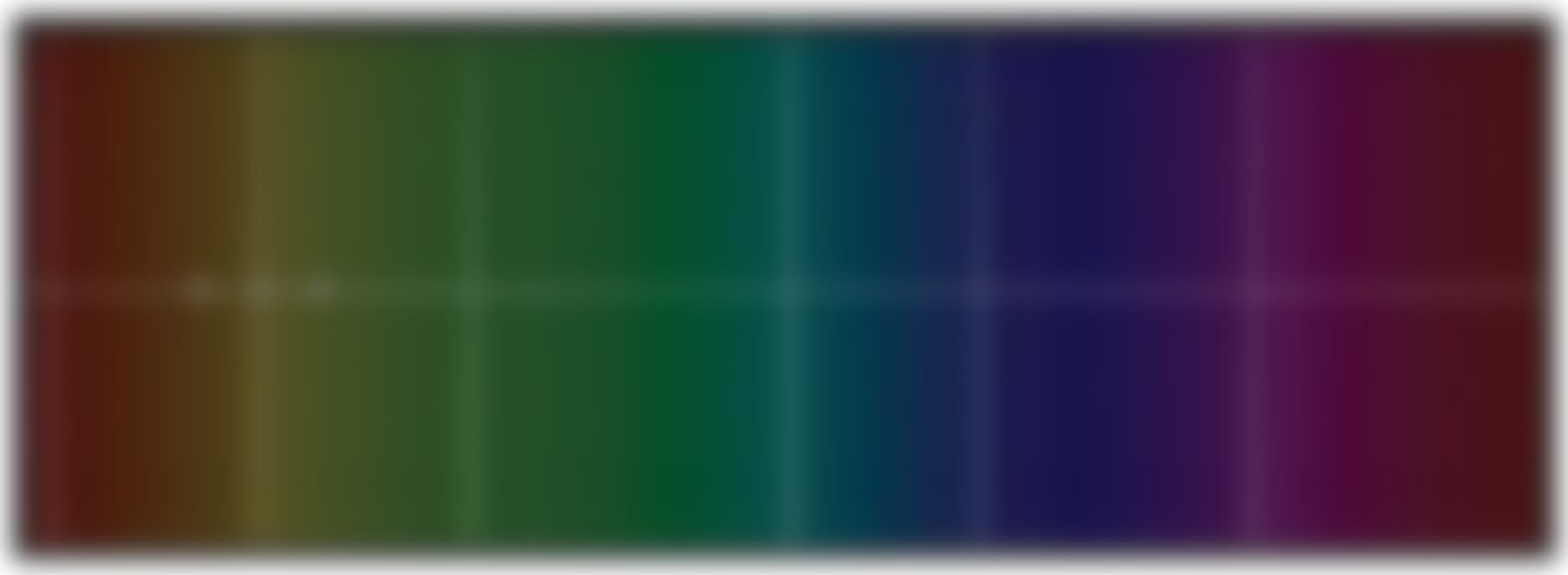


You will also adjust the luminance to get a better match on the other green bar in the generator.

11. In the Curves palette, change the mode to Hue Vs Lum.

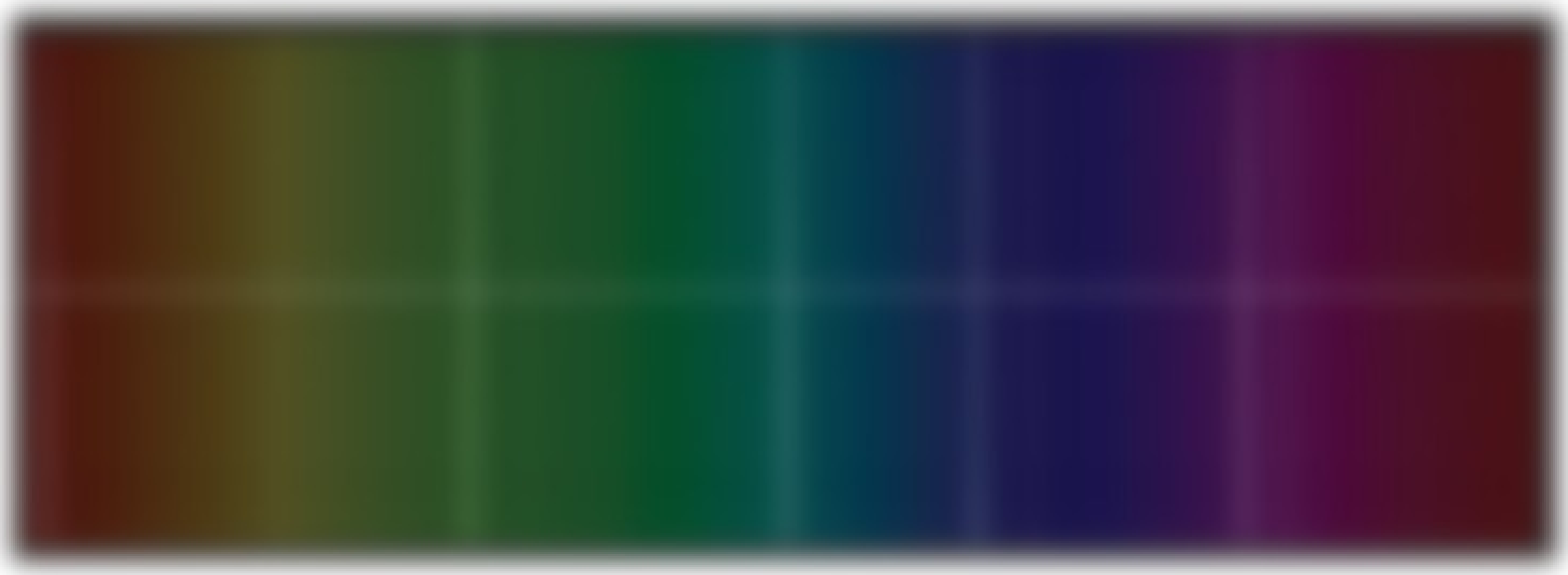
- Click the newly green (previously yellow) bar in the viewer.



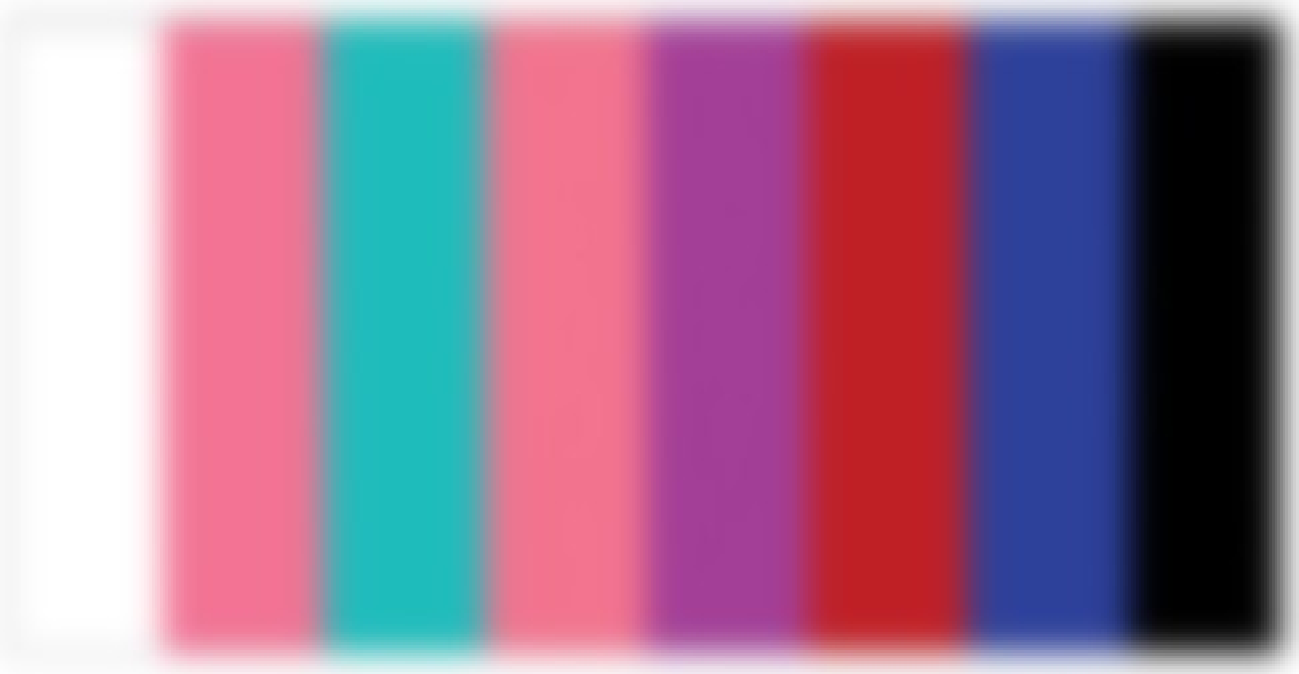


Despite the bar appearing green in the viewer, the control points still land on the yellow sector of the HSL Curves. This is because a corrector node will continuously process the incoming signal, no matter how many changes you make. Disabling a node (Command-D on macOS or Ctrl-D on Windows) is a good way to evaluate the state of the image you are actually working on.

- In the lower right of the palette, drag down the Lum Gain parameter until the bar matches the other green bar in the generator.
- Create a new node.
- In the Curves palette, change the mode to Hue Vs Hue. Notice that there is no longer a spike on the yellow sector.

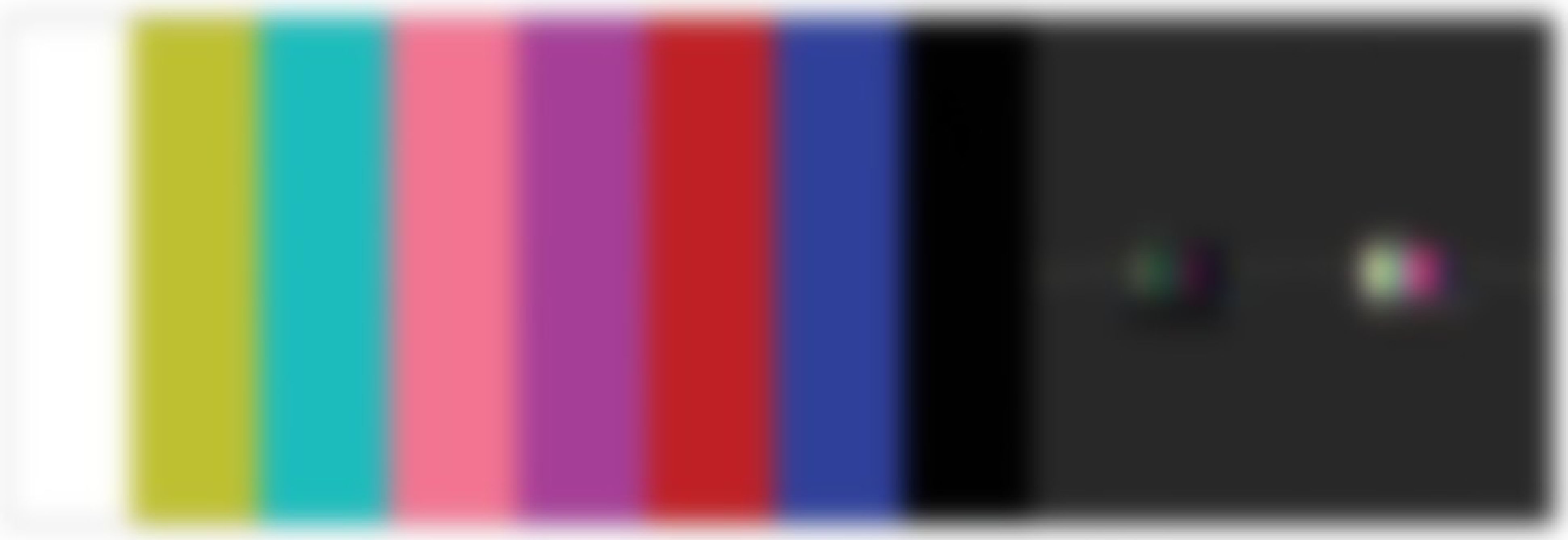


- In the viewer, click either of the green bars.
- Drag Hue Rotate to turn both bars in the viewer pink.



The second corrector node is now processing the video signal as it appears after its node 01 adjustment, meaning that both bars are registered and treated as green.

- Disable node 01.



The pink hue correction in node 02 no longer affects the yellow bar.

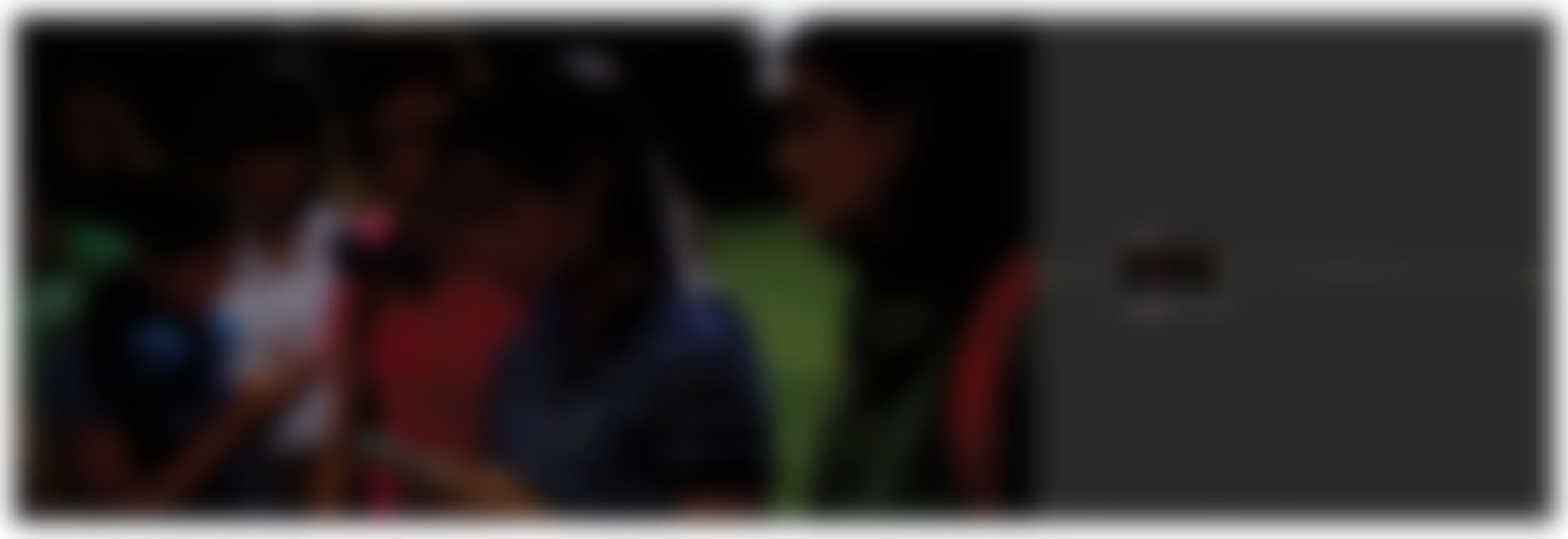
Understanding this behavior is fundamental when working with nodes. When you alter the brightness, color, or contrast of your image, it will impact how downstream nodes process and interact with the video signal. This has huge implications for keying, too—the qualifier will respond differently to an image based on the accuracy and vibrancy of the colors in the signal it receives.

NOTE When designated in the Project Settings, the qualifier becomes a "color space aware" tool. That means that in a color managed project, its behavior will be mapped to the tonal range of the incoming video signal to produce high quality keys. Conversely, this means that log footage is treated more like Rec.709 and does not require additional processing prior to keying.

Adjusting Contrast and Luminance on Nodes

With a deeper understanding of the function of RGB inputs and outputs, you can now check how adjustments to luminance and contrast can impact node-tree signal quality.

1. Return to clip [illegible] and press Command-Home (macOS) or Ctrl-Home (Windows) to reset the grade.
2. Label the first node **Crush**.
3. In the Primaries palette, drag the Lift master wheel to the left until it reaches [illegible].



The clip loses a great amount of detail in the shadows, and the bottom of the waveform trace appears crushed along the floor of the scopes graph.

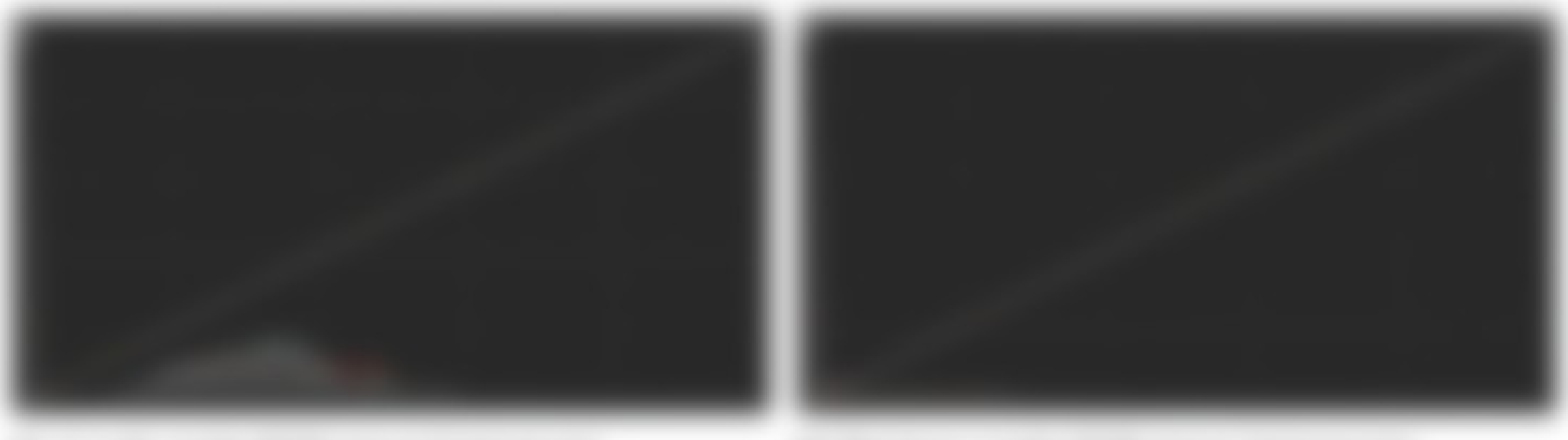
4. Create a new node and label it **Restore**.

You will first attempt to restore the shadow data using the Curves palette.

5. Open the Curves palette and ensure that the RGB channels are linked.

You can use the palette itself to read how the tool interprets the incoming signal.

6. Click node 01 (Crush) and review the Curves palette histogram trace.
7. Click node 02 (Restore) to compare the histogram trace in the same graph.



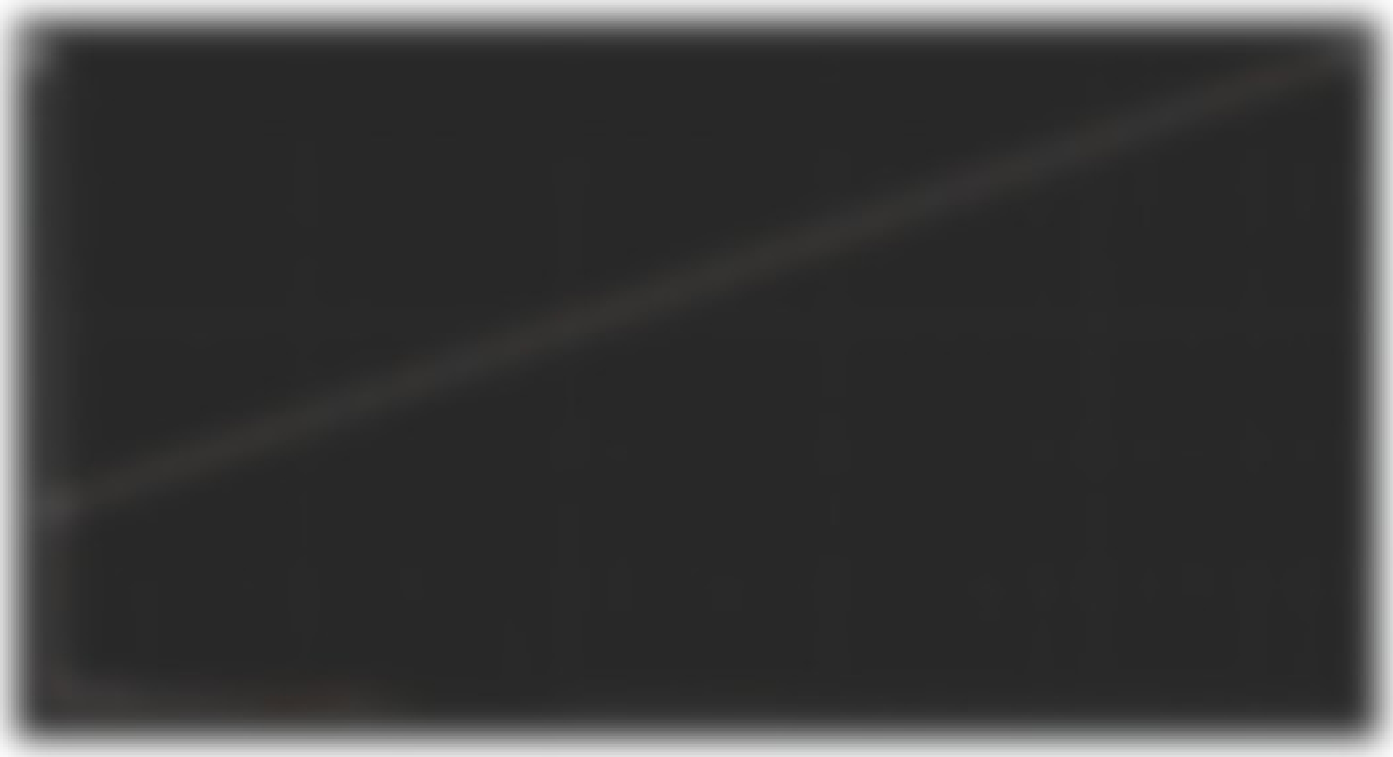
01 Crush node RGB input histogram

02 Restore node RGB input histogram

[illegible]

> [illegible]
>
> [illegible]

- [illegible]



Although the waveform distribution appears similar to the original, ungraded signal, the resulting image appears distorted. The shadows appear lifted and flat, and the skin tones patchy and oversaturated. This demonstrates a "destructive" workflow in which the changes made in one node restrict the RGB data available to subsequent nodes.

NOTE The Curves palette black point is functionally identical to the Color Wheels' Lift. However, when you enabled color management in this project, you kept the default "Use color space aware grading tools" parameter, which modifies the behavior of certain palettes based on the tonal range of the incoming signal. This means that the Color Wheels and Curves palettes have unique interpretations of and impact on image luminance. Disabling "color space aware" in the Project Settings would result in the Curves black point behaving like the Lift again, meaning you could restore the video signal to its original configuration using the Curves palette.

Regardless, it is generally a good idea to keep "color space aware" enabled, as it allows for better keying with the qualifier and a more rational approach when grading high dynamic range media with the Curves palette.

Thankfully, you cannot truly destroy RGB pixel data in the pipeline. By using a tool with the same tonal mapping as the original adjustment, you can restore the shadows of the image.

- Right-click node 02 and choose Reset Node Grade.
- Drag the Lift master wheel right to restore data.

The tonal range mapping is identical in nodes 01 and 02, so this correctly restores the video. The Lift values of the two nodes are different since you will have impacted different ranges of the overall luminance.

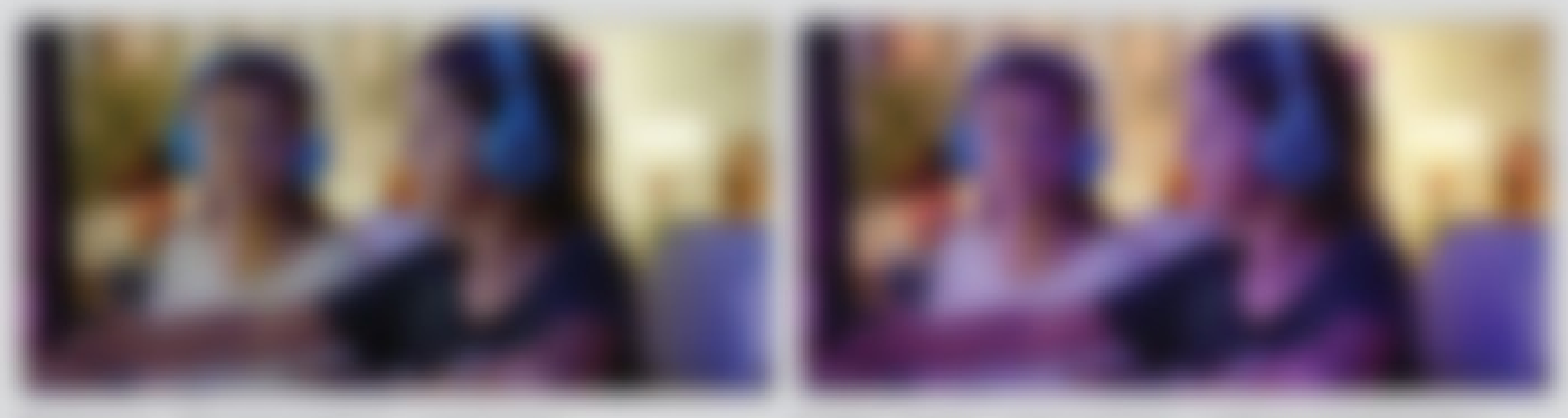
Although you were ultimately able to restore the image in this instance, you can imagine how subtler changes to the brightness and contrast of an image in upstream nodes can impact the quality of adjustments made to the shadows and highlights in downstream nodes. Most palettes and adjustment tools have different tonal distributions across the video signal, and a change made in one cannot easily be undone in another.

It's important to keep in mind the potential for destructive grades. As a rule, balancing, matching, and secondary grades should come before bold contrast adjustments and dynamic creative grades. It is far more acceptable to distort and crush data in the final nodes because no other nodes rely on them for RGB info.

Breaking Rules to Preserve the Video Signal

In previous chapters, you adjusted image luminance and balance to create a "clean slate" for creative color grading. However, the grading workflow proposed in the first lesson also came with a word of caution: do not let these steps rigidly dictate all your grading decisions. Certain scenic compositions require a lateral approach that enhances the captured image instead of merely correcting it. Imagine a scene in which a cave explorer hears mysterious growling just as her flashlight goes out. Would you expand such footage to the full height of the waveform scope? How about a nightclub scene in which the environment and talent are bathed in red light? Would it need to be white balanced?

As you gain experience with color grading, observe when these rules work in the project's favor and when they work against it. In the following example images, a scene with creative lighting was graded using two separate approaches. The first grade used the established grading rules, while the second took a creative approach with an emphasis on color, saturation, and background separation.



Balanced, desaturated, contrast

Color wash, saturation, softer highlights

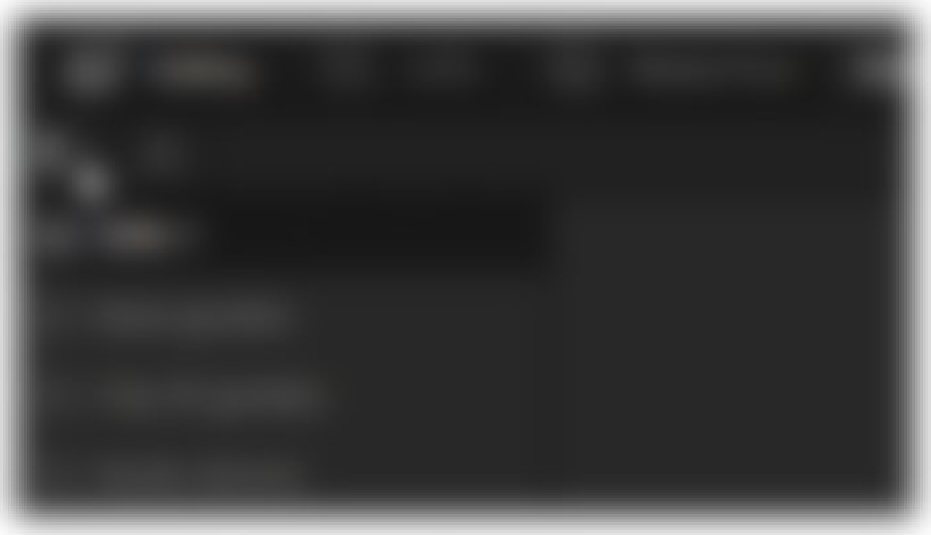
With the balanced version, it would be harder to achieve the clean, rich look of the second example. The skin tones have been washed out, the background flattened, and the color composition has been lost.

Impact of Dominant Color Grades on Surrounding Nodes

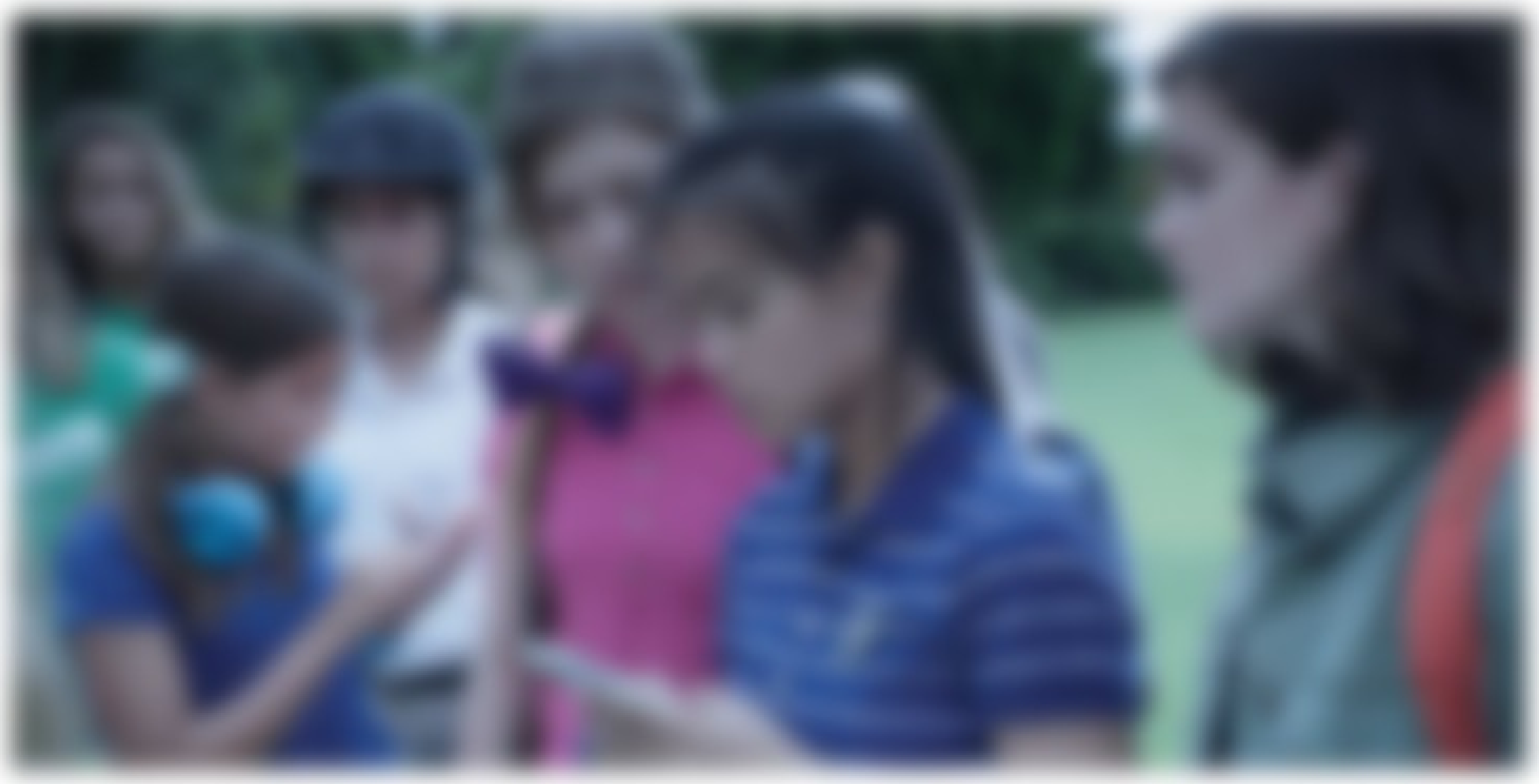
Another consideration when grading is choosing the order in which to apply color changes to an image. In this exercise, you will try to create a clip with a distinct blue cast while retaining control over the subjects' skin tones.

1. Reset the grade on clip 13.

- To save time, a Balance node for this clip has already been created. Open the gallery and click the Still Albums icon to reveal a side panel with a list of available albums.



- Open the Base grades album.
- Right-click the 1.13.1 Balance still and choose Apply Grade.
- Create a new serial node called **Blue look** (node 02).
- In the Primaries palette, drag the Gain and Gamma wheels toward blue and cyan, respectively, to cool down the image.
- Use the Contrast and Pivot parameters to deepen the shadows and create more pronounced detail in the image.
- Finally, reduce Saturation to 30 to lessen the blue vibrancy and end up with a cold, desaturated look.



This look has a strong, purposeful design. It effectively conveys a somber mood or suggests a different point in time in a nonlinear narrative. However, its impact on the performers' skin tones reduces its effectiveness and could end up tiring the viewer's eyes.

For a more dynamic look, you will aim to create color separation between the performers and the overall scene hue. Color separation occurs when the vectorscope trace sends in two separate (usually opposite) vector quadrants for great visual impact and appeal. This can be achieved with set design, lighting, and primary and/or secondary grading.

- Create a new serial node called **Skin** (node 03).

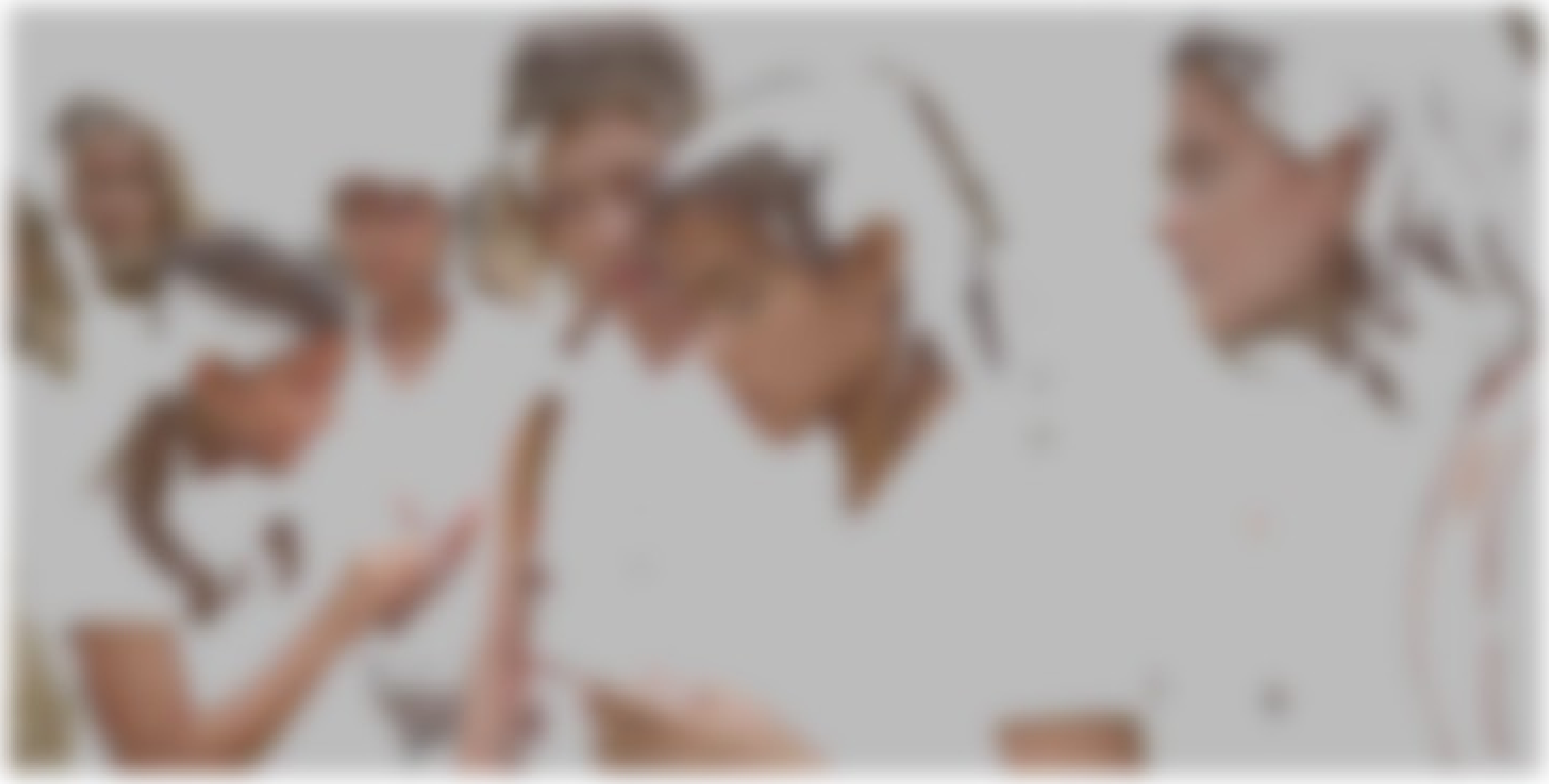
The performers' faces are awash in blue, so using HSL curves might not be the most effective choice for secondary grading. A qualifier selection would give you a better chance of isolating the skin in this shot.

- Open the Qualifier palette and drag across the lead performer's face to grab a sample range.

Due to the RGB signal passing through the Blue look node, the qualifier is forced to work with overlapping red and desaturated values. This is not an ideal point in the node tree for keying or grading skin.

- Select the Skin node and press E to extract it from the node tree.
- Drag it onto the connection line between nodes 01 Balance and 02 Blue look.

- Reset the qualifier on the Skin node and drag to select the skin again. In the Qualifier palette, adjust the HSL and Matte Finesse controls to get the best extraction. Remember to turn on the Highlight mode in the viewer to best observe the result of the selection.



This time, the qualifier produces a much cleaner result.

- In the viewer, turn off the Highlight mode.
- In the adjustment controls, raise the Sat value of node 02 (Skin) to 60 and drag the Offset wheel slightly toward orange.

The resulting grade is much more appealing. You were able to produce a clean key for the skin tone and adjust it to act as chromatic contrast to the blue grade. However, because Blue look is the final node to impact the image before the node tree output, you know that the original skin tone hues and luminance will always be tinted blue no matter how much you grade the Skin node.

This exercise demonstrates how you might determine the placement of nodes based on your RGB needs. For example, when using a qualifier, you almost always want to process the ungraded or balanced version of the image, free of any dominant color or contrast impact.

In the next exercise, you will learn how to further finesse the placement of nodes and improve the clarity of the resulting RGB signal with the help of mixer nodes.

Creating Separate Processing Branches with a Parallel Mixer Node

Mixer nodes allow you to combine multiple nodes into a single RGB output. The two mixer node types, parallel and layer, have identical structures but process the incoming node data differently.

The parallel mixer combines grades by blending them to an equal degree. The result appears similar to when working on a linear node tree, with the difference being that corrector nodes can extract RGB data from the same point in the node tree, optimizing input signal quality.

1 Continue to work on clip [illegible].

  Before making major changes to your grade, save it as a still in the gallery.

2 Right-click the viewer and choose Grab Still.

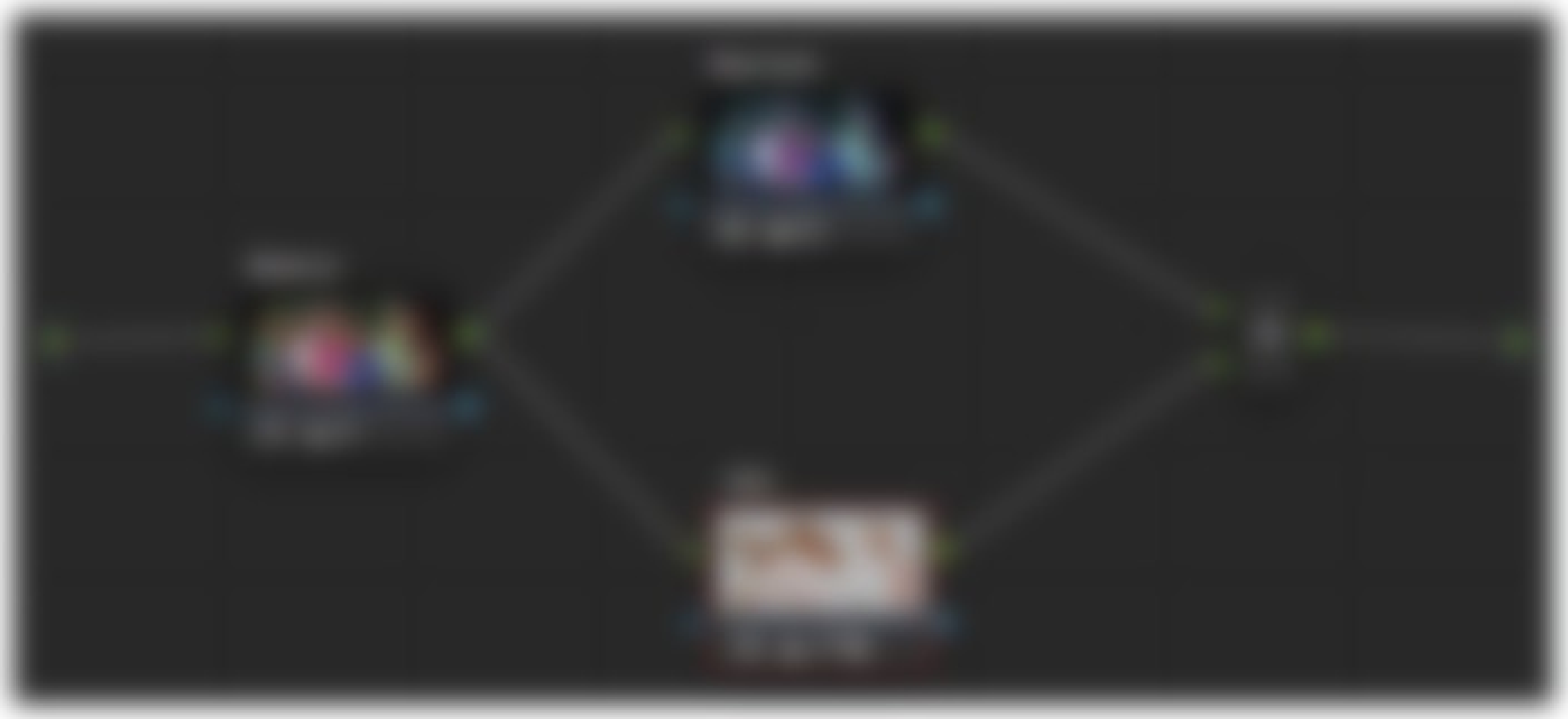
  Next, you will place the Blue look and Skin nodes parallel to each other for optimal routing of the RGB signal.

- Right-click node 03 (Blue Isol) node and choose Add Node > Add Parallel or press Option-P (macOS) or Alt-P (Windows) to add a parallel mixer node.

  A new corrector node (node 05) is created, as well as a parallel mixer node that combines the RGB outputs of the two upstream nodes.

- To reuse the qualifier skin tone selection, select node 02 (Skin) and press Command-C (macOS) or Ctrl-C (Windows) to copy the node data.
- Select node 05 and press Command-V (macOS) or Ctrl-V (Windows) to paste the Skin node data.
- With the qualifier copied, you can delete the old node 02 (Skin) by selecting it and pressing the Delete or Backspace key.

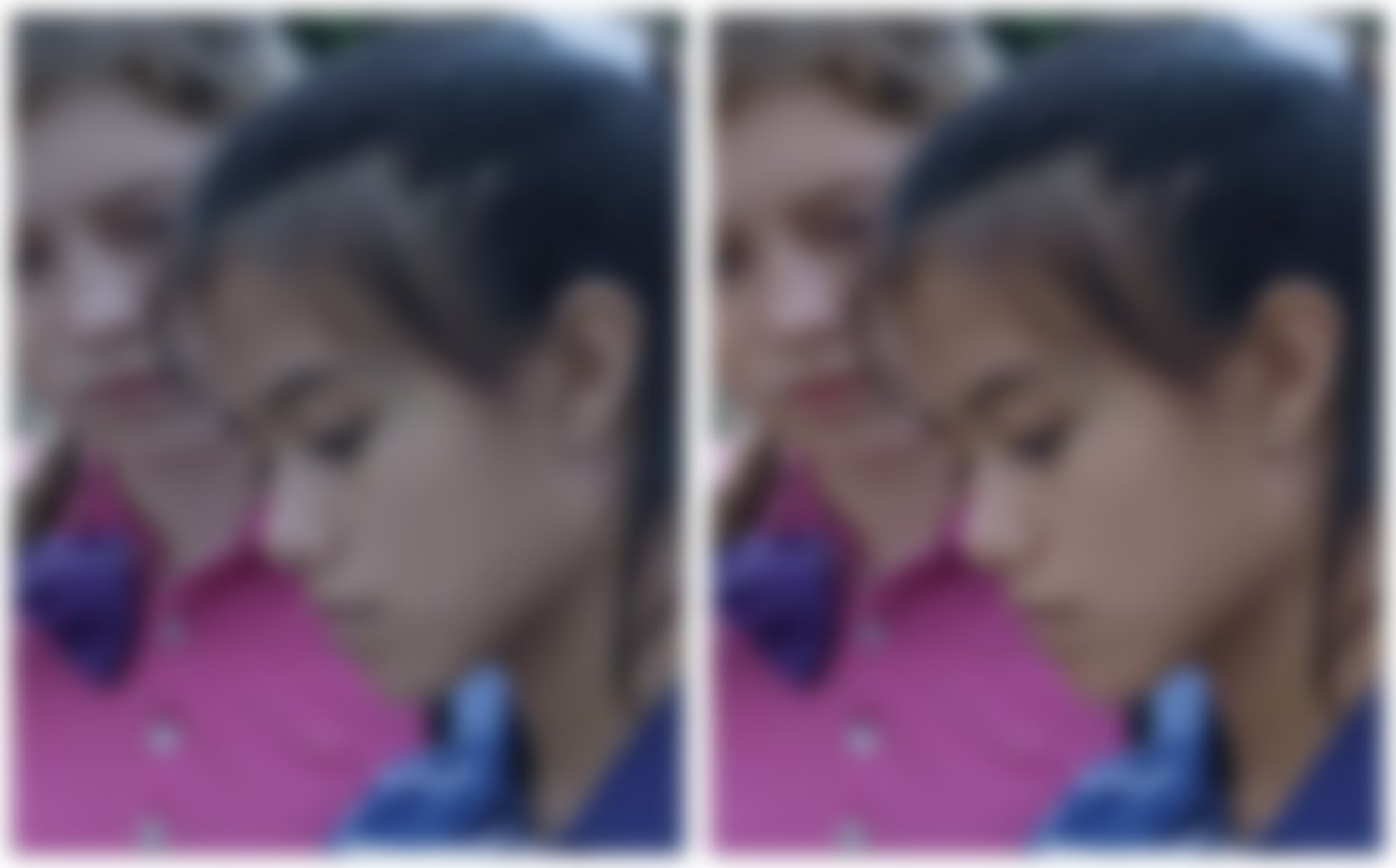
  You now have a node structure in which both the Blue Isol and Skin nodes use the same RGB data from the optimal Balance node. Their respective grades are combined in the parallel mixer node, which sends a single RGB signal to the node tree output.



- In the gallery, hover over the still you grabbed. If you have Live Preview enabled in the gallery options, you should see the still grade projected onto the active clip in the viewer.

TIP To enable, disable or change Live Preview behavior in the gallery, click the options menu (...) in the upper right corner. Select Live Preview to enable it, or move your mouse pointer over Hover Scrub Preview to choose if the image will scrub in the Thumbnail and Viewer, Thumbnail only, or neither.

In the viewer, you should notice a subtle change in skin saturation. This is because the Skin node is now impacting the neutral colors of the Balance node rather than countering the blue hues of the Blue look node, resulting in greater color fidelity.



Skin tone adjustment using linear nodes (left) and mixer nodes (right)

- Select the Skin node and reduce the saturation to 35.00 for a more natural look.

The parallel mixer is perfect for organic and natural-looking adjustments, such as when performing skin tone correction or when subtly pushing colors into a scene based on a tonal range (i.e., creating warm shadows or magenta highlights).

Morphing Mixer Nodes

An alternative to the parallel mixer is the layer mixer. Over the next few exercises, you will explore the differences between the two in more detail. Meanwhile, you will morph the current clip's parallel mixer into a layer mixer node to see the impact it will have on the image.

- Continue to work on clip 15.

- [illegible]

[illegible]

[illegible]

- [illegible]
- [illegible]
- [illegible]

[illegible]

[illegible]

Visualizing Mixer Nodes

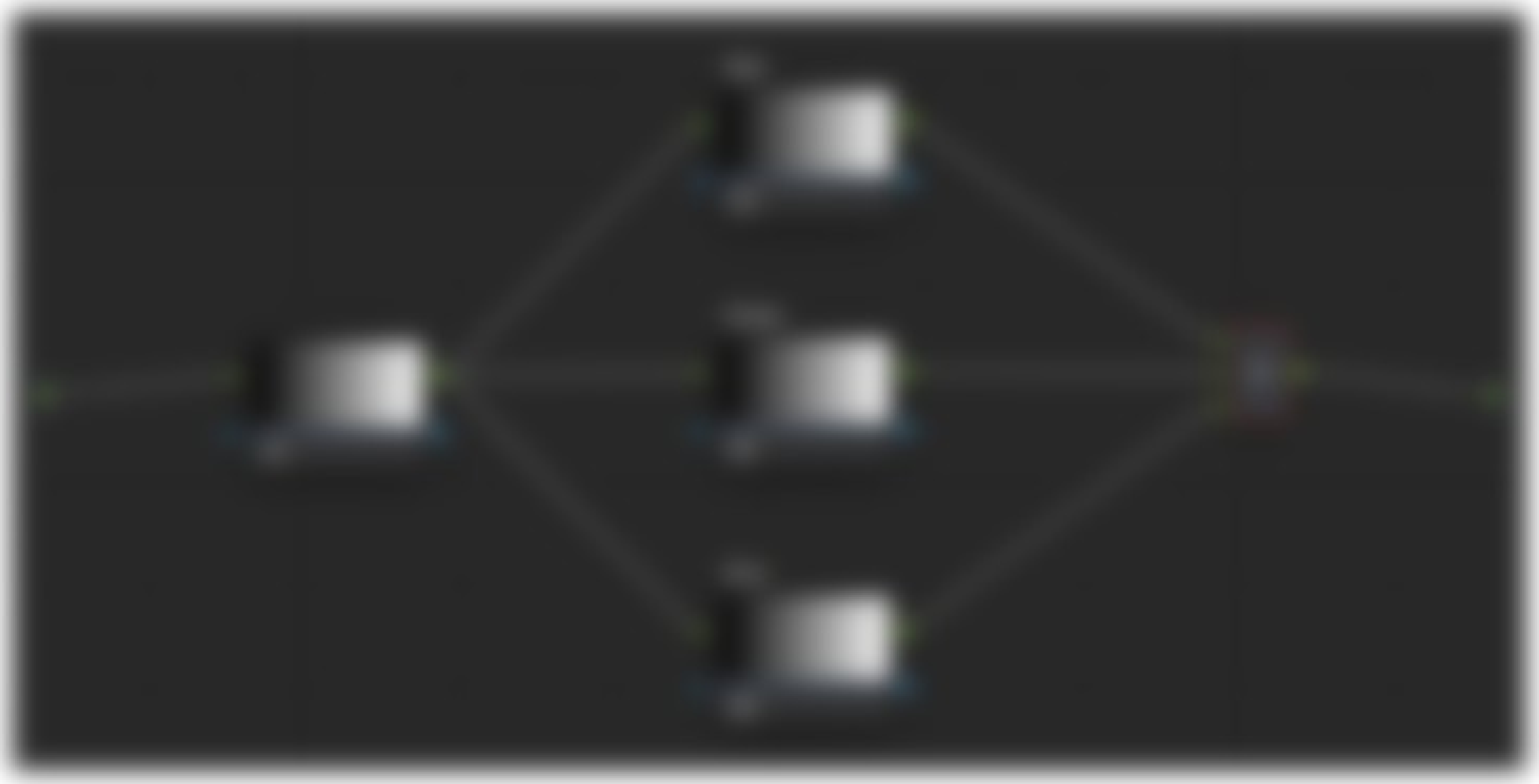
You will create a basic RGB graphic setup that will clearly demonstrate the operation of both mixer nodes. Understanding their behavior will help you determine when to choose one mixer over another.

First, you will need a plain grayscale background.

1. Enter the edit page.
2. Open the Effects Library, and inside Toolbox > Generators, find the Grey Scale generator.
3. Drag the Grey Scale generator to the end of the timeline.
4. Right-click the generator and choose New Compound Clip. Name it **Grey Scale**.
5. Enter the color page.

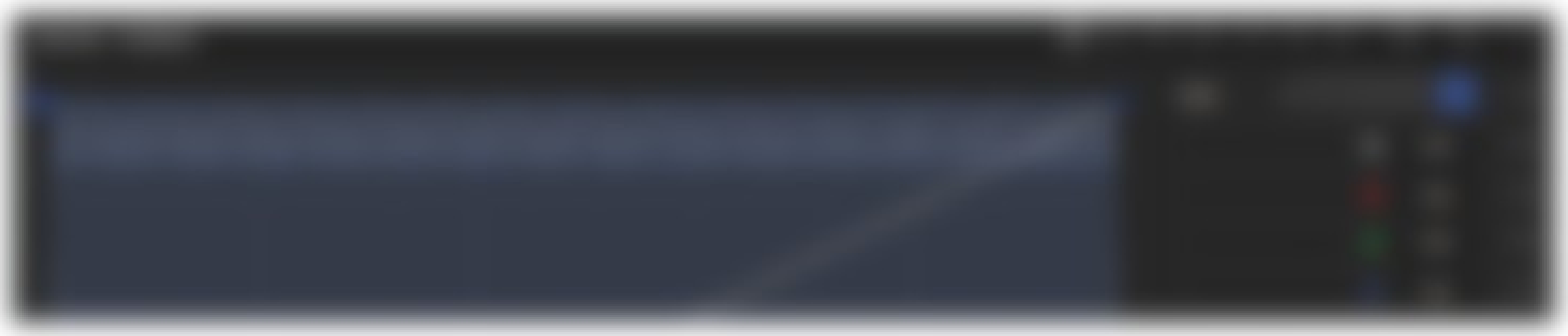
   To help with visualization, you'll bypass the project color management on this clip to operate in the generator's native Rec.709 color space.

6. Right-click the Grey Scale clip in the timeline (clip 48) and choose Bypass Color Management.
7. Create a new serial node (02).
8. Right-click node 02 and choose Add Node > Add Layer or press Option-L (macOS) or Alt-L (Windows) to add a layer mixer node.
9. With node 02 still selected, create another layer node to produce a stack of three layer nodes.
10. Label the nodes (from top to bottom) **Red**, **Green**, and **Blue**.

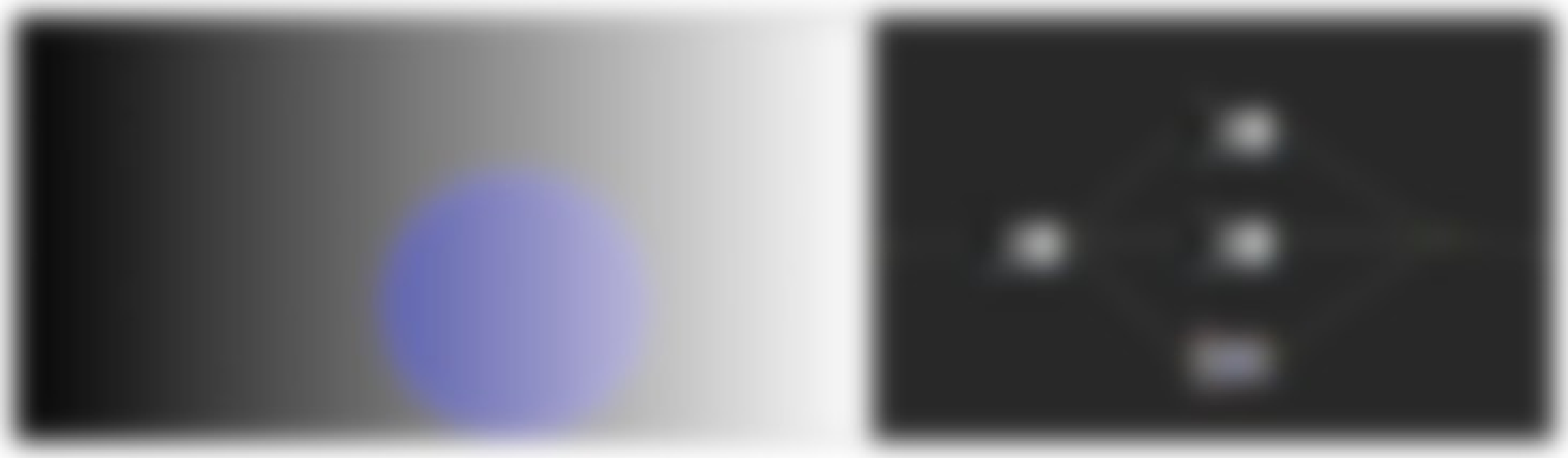


Leaving a blank node before the layer mixer makes it easier to add upstream ("serial before") nodes and navigate the node tree when needed.

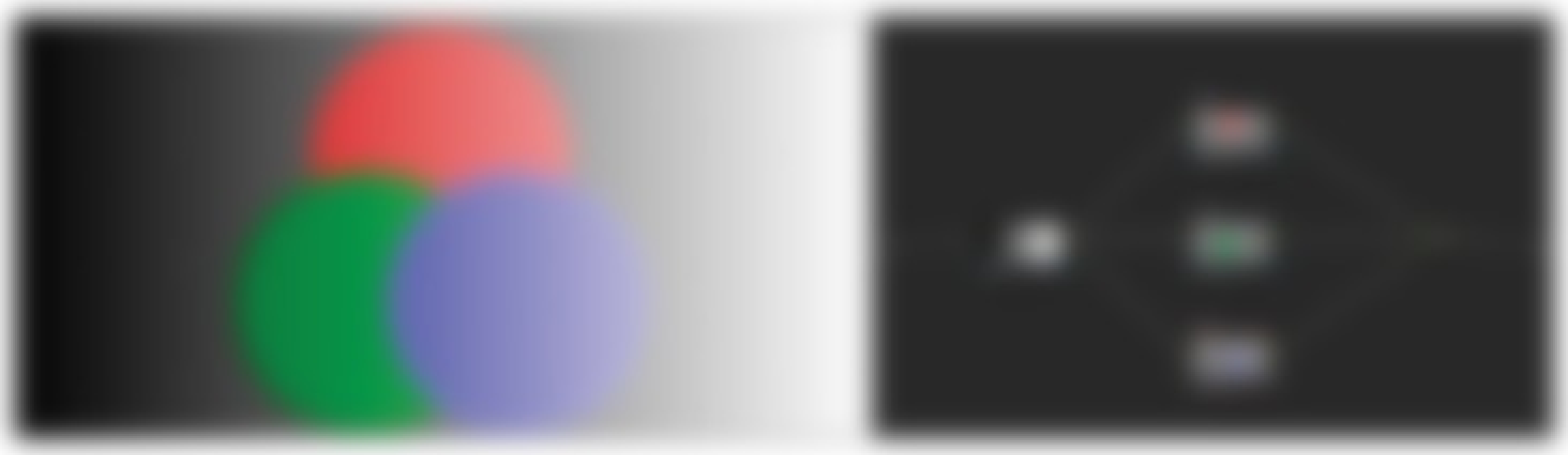
- Select the Blue node at the bottom of the stack.
- Open the Window palette and create a circular window.
- Open the Custom Curves palette and isolate the blue channel.
- Drag the lower left control point (black point) to the top of the graph to turn the circle blue.



- Move the circle window to the lower right of the viewer. Your goal is to create three intersecting circles (red, green, and blue).



- Select the Green node and create a circle window in it.
- In the Curves palette, make the circle green by dragging up the green channel's black point.
- Move the Green node window to the lower left of the viewer.
- Finally, repeat these actions to create a red circle in the Red node.

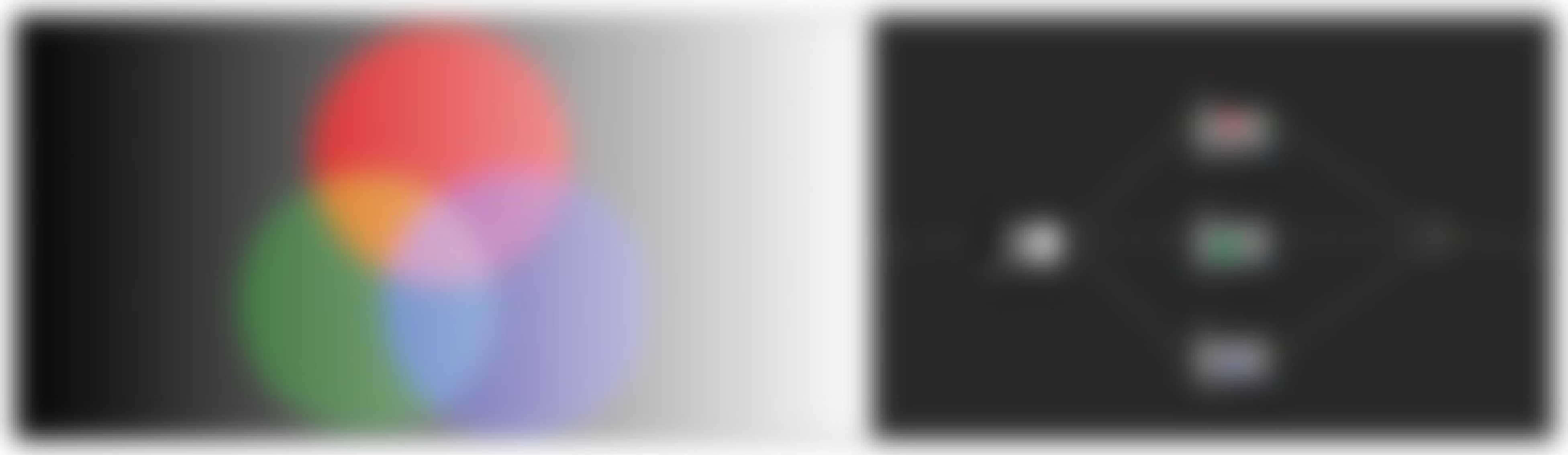


The result demonstrates how nodes interact when combined in a layer mixer node. Their behaviors are reminiscent of layer-based systems in which the uppermost RGB input of the layer mixer constitutes the lowest layer and is compounded by each subsequent RGB input. By default, the nodes are at full opacity until a Power Window, qualifier, or other secondary tool introduces transparency.

[illegible] Right-click the layer mixer node, navigate to the Composite Mode submenu, and hold Option (macOS) or Alt (Windows) while hovering over the list of blending options.

Doing so allows you to preview how the nodes interact under the different hue and luminance blending methods. Note that all the top nodes are blended into the bottom layer (Red), which remains at full opacity.

[illegible] Select Lighten to apply the composite mode.



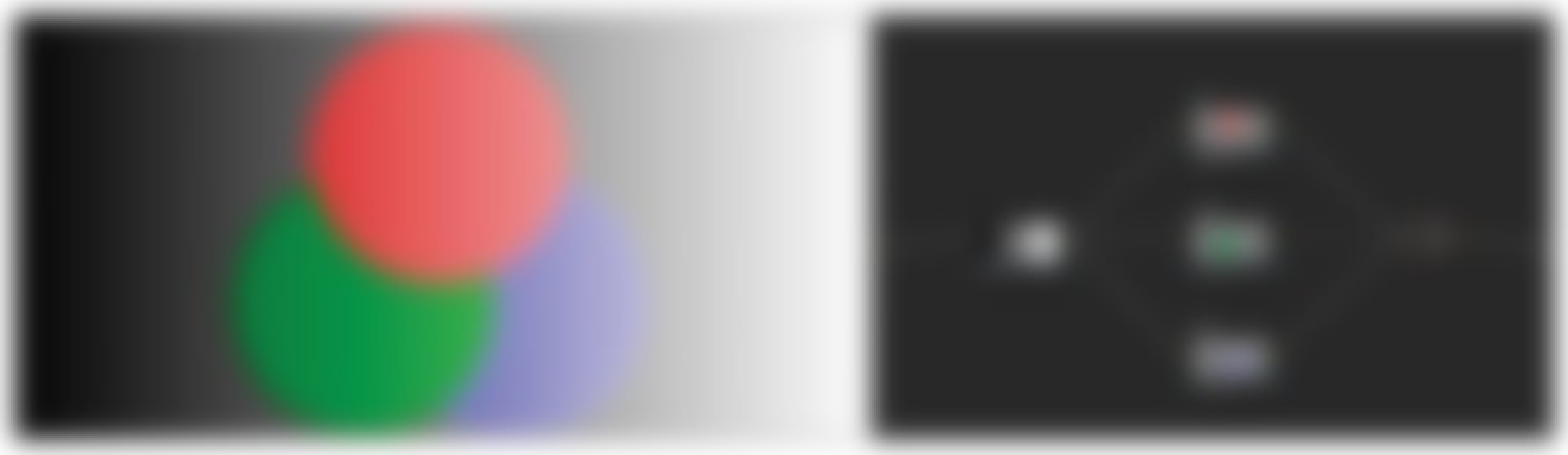
[illegible] To remove the color blending, return to the Composite Mode submenu and choose Normal.

NOTE Standard corrector nodes also feature blend modes in their contextual menu. In that case, the RGB output of the video signal is blended with the RGB input.

Next, you'll change the order of the node layers.

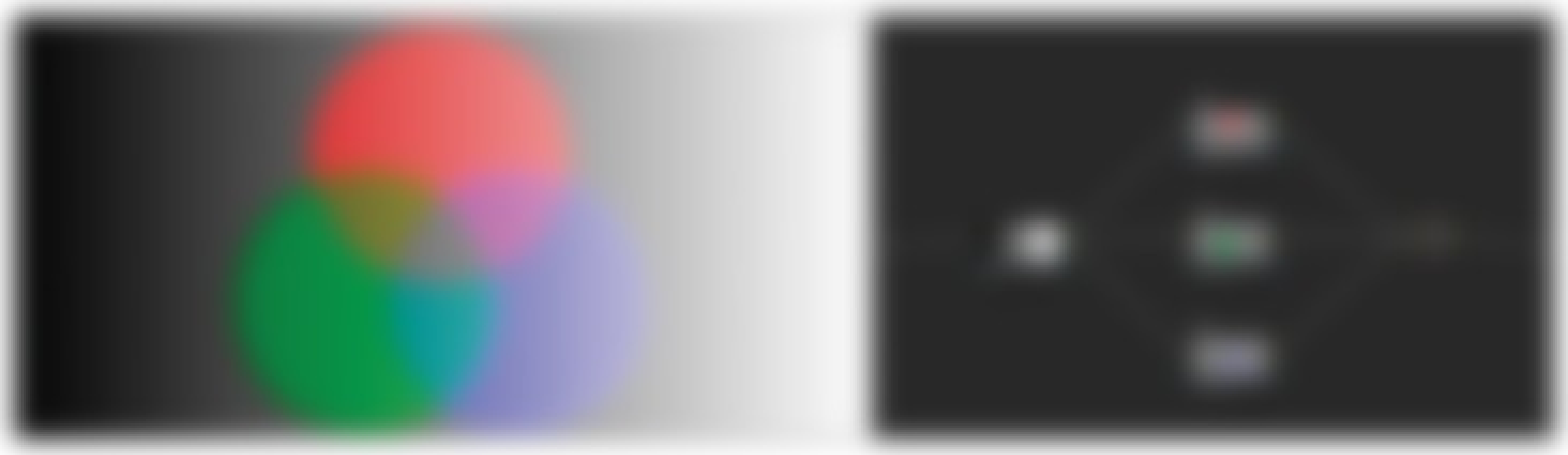
[illegible] Move your mouse pointer over the connection line between the Red node and the layer mixer until you see a blue highlight. Drag the connection to the bottom input of the layer mixer to change the Red node order and disconnect the Blue node from the layer mixer.

- Drag the RGB output of the Blue node to the top input of the layer mixer.



The red circle now overlaps the green and blue. This further demonstrates how the RGB input order in the mixer node works. Additionally, it emphasizes that the physical location of the nodes within the Node Editor has no impact on the grade or the results in the viewer.

- To compare the interaction of the color circles in the parallel mixer, right-click the layer mixer node and choose "Morph into Parallel Node."



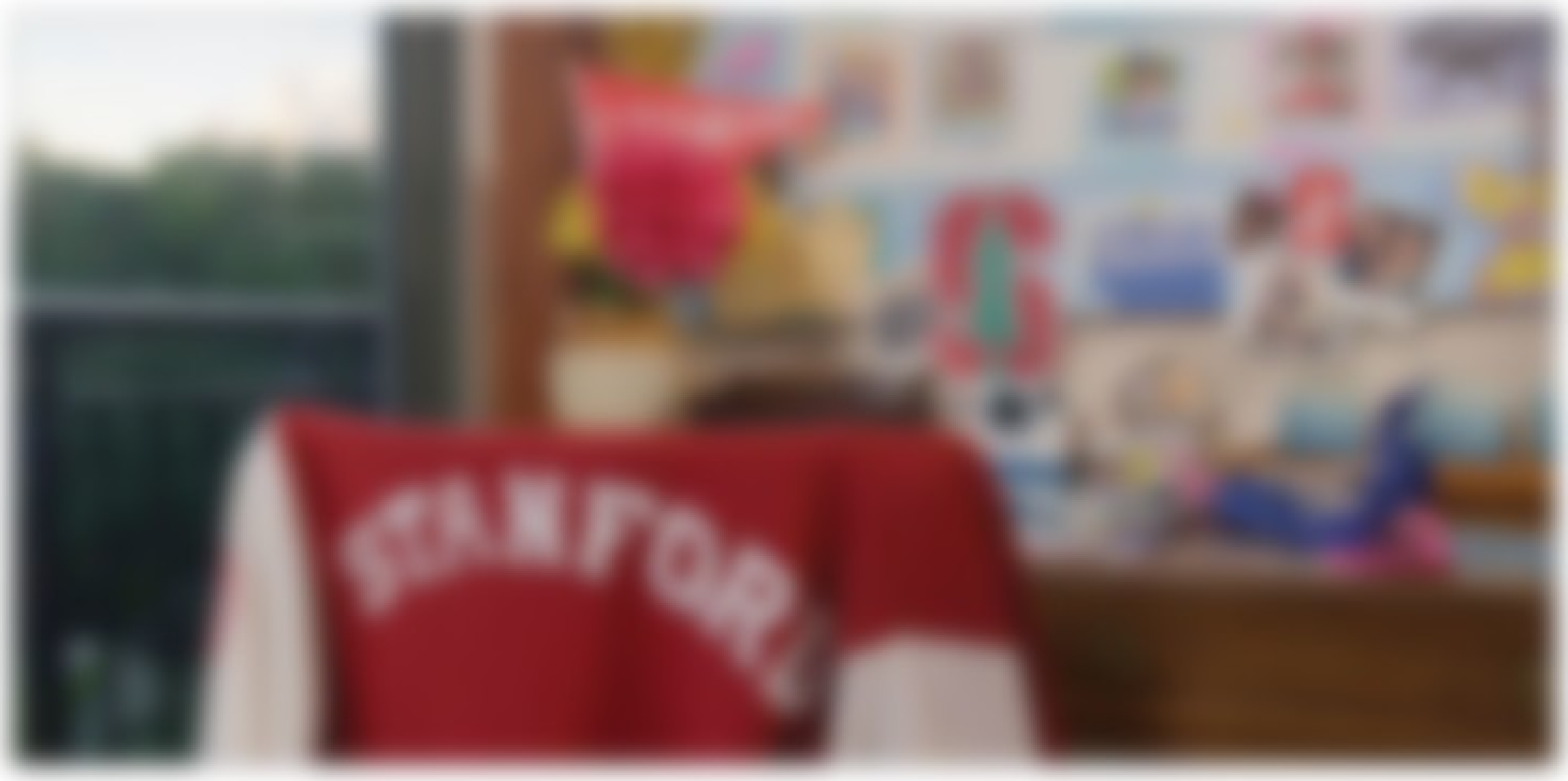
This operation changes the behavior of the three circles. Instead of displaying the layers at full opacity, it blends them equally into one another.

The composite modes in the corrector and layer mixer nodes can help produce dynamic looks. You can use them to emphasize certain areas of a scene, imitate lighting effects and natural shadows, or even composite graphic design elements.

Compositing Color Effects with the Layer Mixer Node

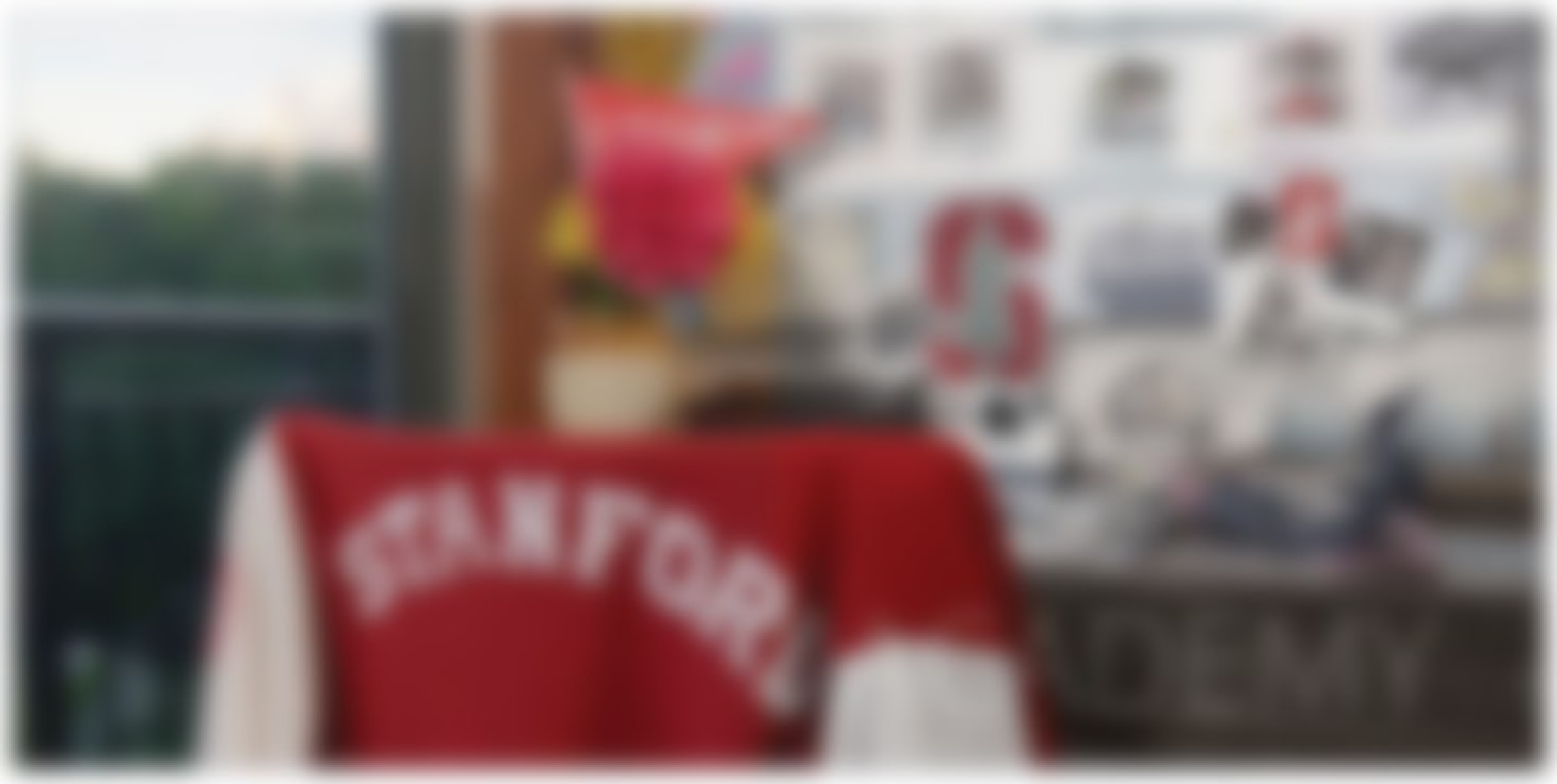
In this exercise, you will use a layer mixer to construct an image that has several secondary grading needs. Unlike the previous example with the blue balls, the focus is not on seamlessly blending the colors of the image into each other but to work on each distinct element separately.

- Select clip 03 in the [illegible] timeline.
- In the viewer, drag the playhead to the last frame of the clip, where you can clearly see the poster, desk, and background.



The client for this project requested that the poster in this sequence be emphasized to communicate the protagonist's motivations to the audience. The editor applied a preliminary grade to the clip to visualize what that might look like and included it in the reference video.

- To bring up the reference video in the color page, go to the viewer options in the upper right corner and choose Reference Wipe mode > Offline. Doing so will set the Image Wipe mode to use the reference clip associated with the timeline instead of the gallery stills.
- In the upper left corner of the viewer, click the Image Wipe icon to compare the current clip to the one in the reference video.



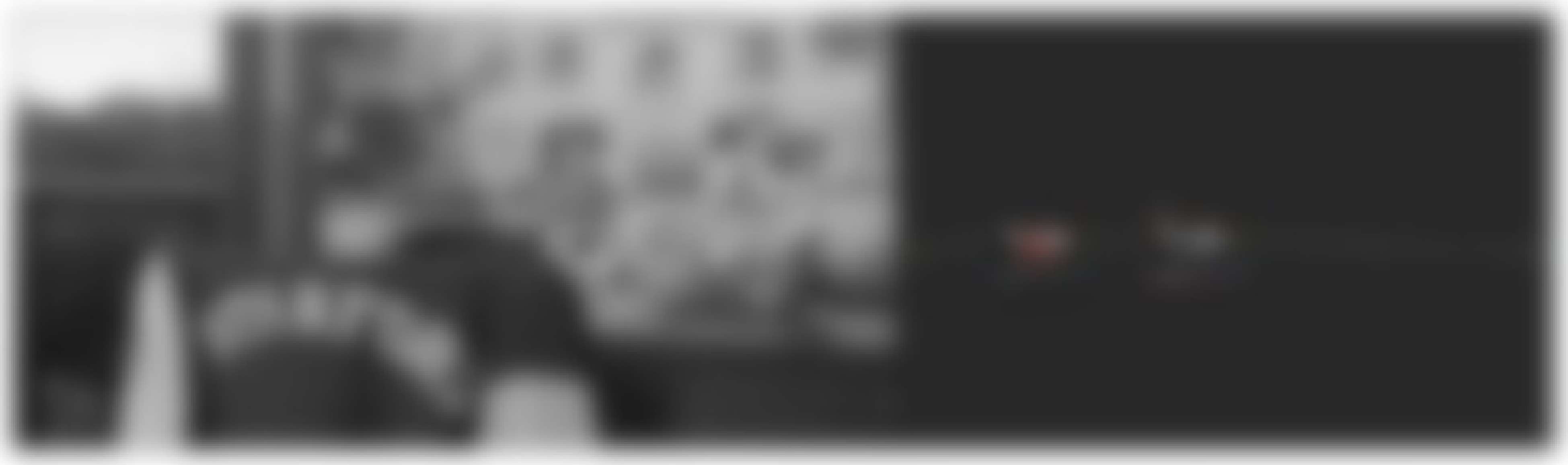
As you can see, the client's vision is to enhance the red elements, especially the jacket on the chair, to stand out against the clutter in the shot. There are several ways to approach this secondary grade. You could use HSL curves or the qualifier together with the RGB mixer, color wheels, or custom curves. When confronted with a specific grade challenge, it's common to cycle through several options until you find the optimal grading solution. In this instance, you will use a combination of techniques, including primary grading tools, layer mixer nodes, and the 3D qualifier.

5 With the review complete, disable Image Wipe.

6 Leave the first node (01) empty for easier node tree management.

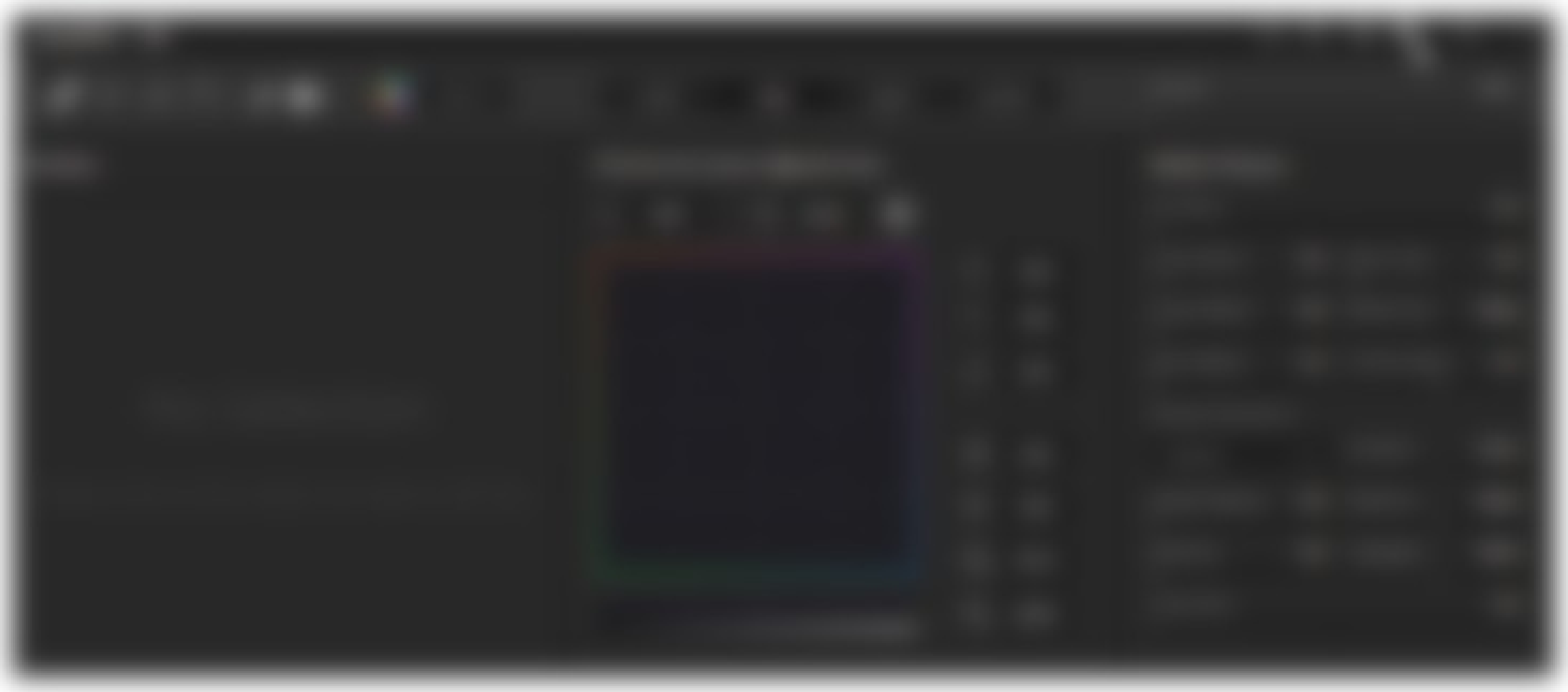
7 Create a second node and label it **BG**. You will use this node to set the overall look of the room.

8 For now, set the saturation of this node to 0 to more easily review your keying in the other nodes. You will return to this node toward the end of the process.



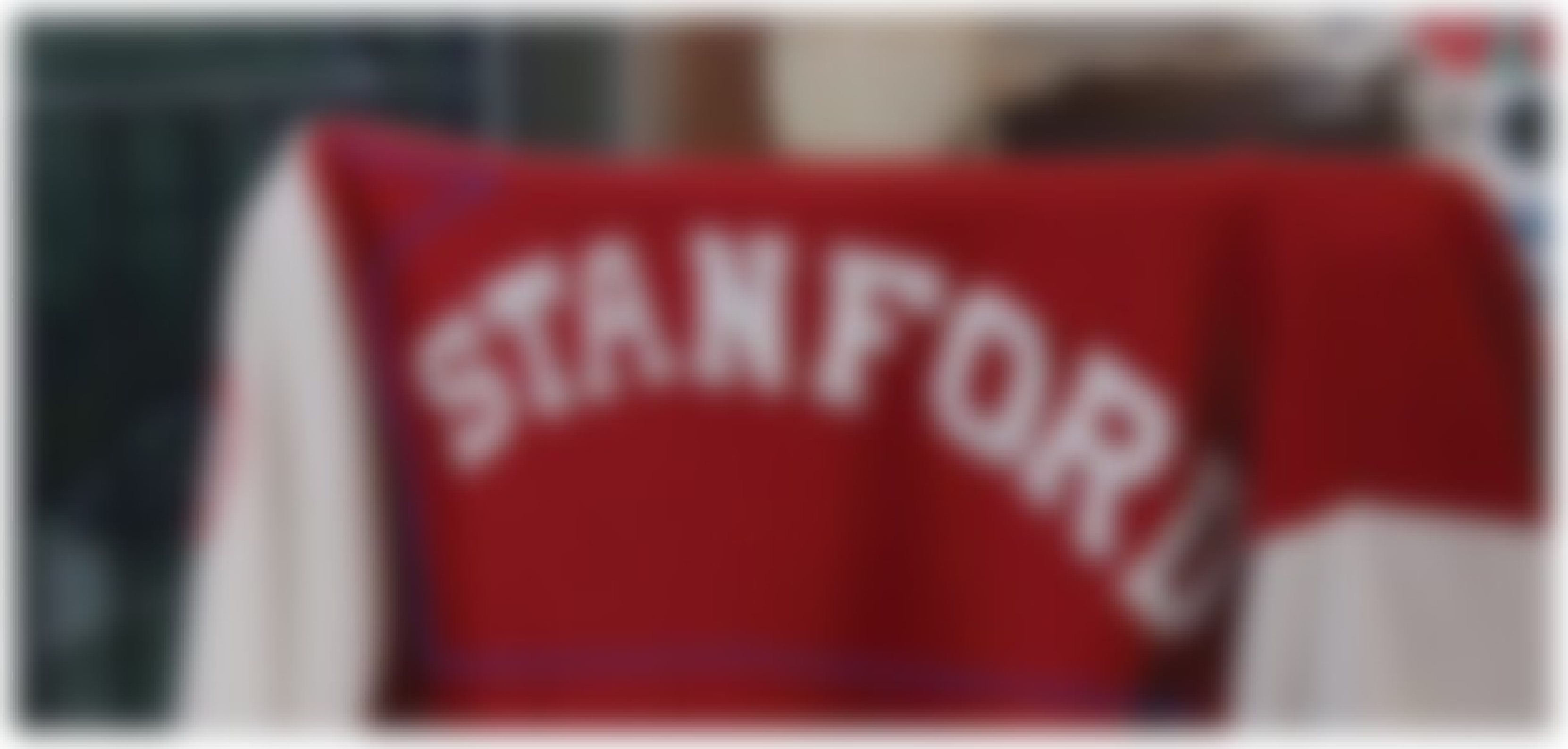
9 Press Option-L (macOS) or Alt-L (Windows) to add a layer mixer and a new node inside it. Label the new node **jacket**.

10 Open the Qualifier palette and, in the upper right corner, change the mode from HSL to 3D.



Whereas the other qualifier modes are linear, the 3D qualifier features a radial distribution of the color vectors, making it optimal for complex color selections. It was originally designed for chroma key work because of its ability to intuitively include hue and shadow fluctuations commonly found on green screens. It even features a Despill slider for removing chroma spill from performers.

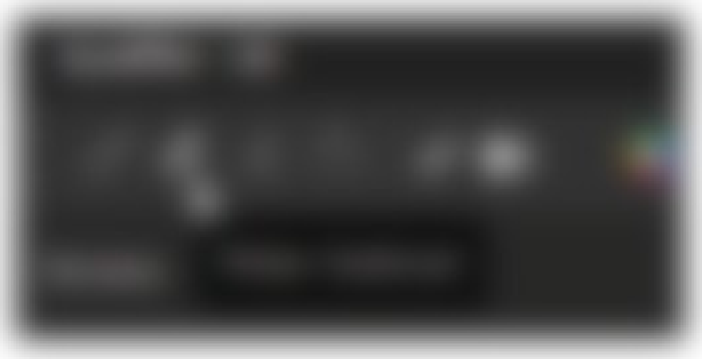
- In the viewer, drag the qualifier across the red section of the coat, ensuring that you include both highlights and shadows in the stroke.



- Enable Highlight mode in the viewer and change it to B/W mode to review the initial selection.

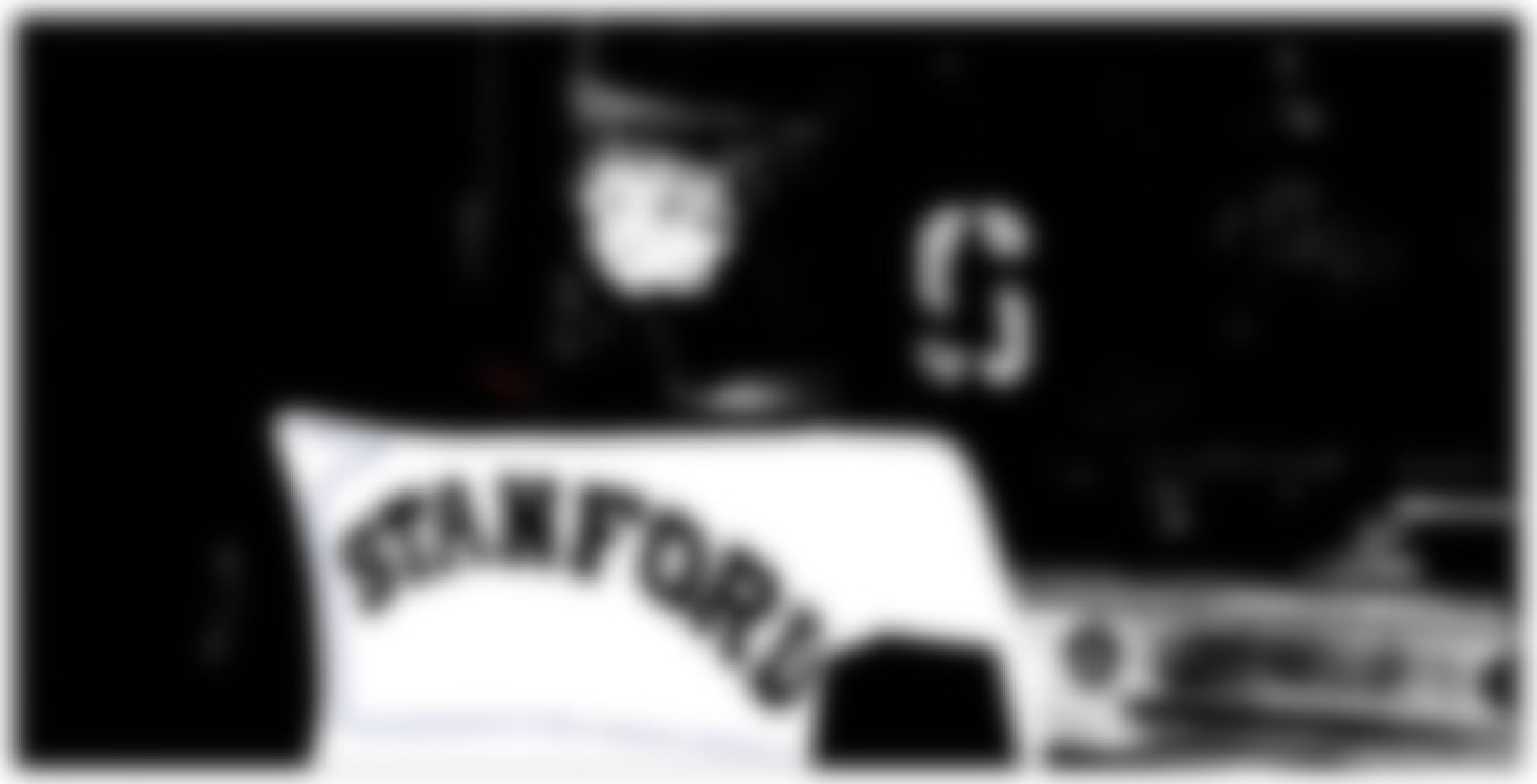
  To get a more accurate result, you will add more strokes to build a reliable color reference.

- Select Picker Subtract in the Qualifier palette.



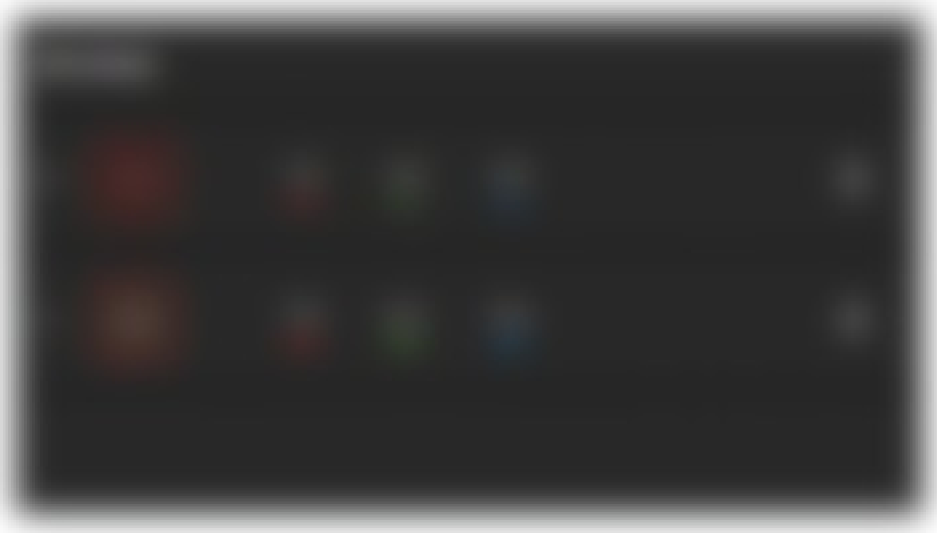
- Drag in the viewer to remove the qualifier selection from the wooden paneling behind the desk.

Before



After

Every time you create a stroke addition or subtraction, a swatch is added to the 3D qualifier stroke list to document the hues that are sampled for the key.



Depending on the image, sometimes a selection can be improved when made in an alternative color model. Color models refer to the different methods used to geometrically map and represent colors in digital environments, with the most significant distinction usually being in how they approach image luminance. The four models available in the 3D Qualifier palette are YUV, HSL, HSP, and LAB.

There are no strict rules for when you should use one model over another. Generally, the default YUV produces optimal results, but in this case, you need a model that can better differentiate between the desaturated red of the wood and the bright red of the poster.

- Set Color Space to LAB.

The 3D Qualifier modes to the right of the Color Space parameter determine the tolerance of your hue selection. The default, Flat, will result in a 100% selection of the hue, allowing for minor variations in color. To the left, Soft will result in a softer key that accounts for greater variation in color, and to the right, Tight will only select the colors you click. Luma features the same tolerance level as Tight but ignores chroma data, making it ideal for white-only selections, such as when working with overexposure.

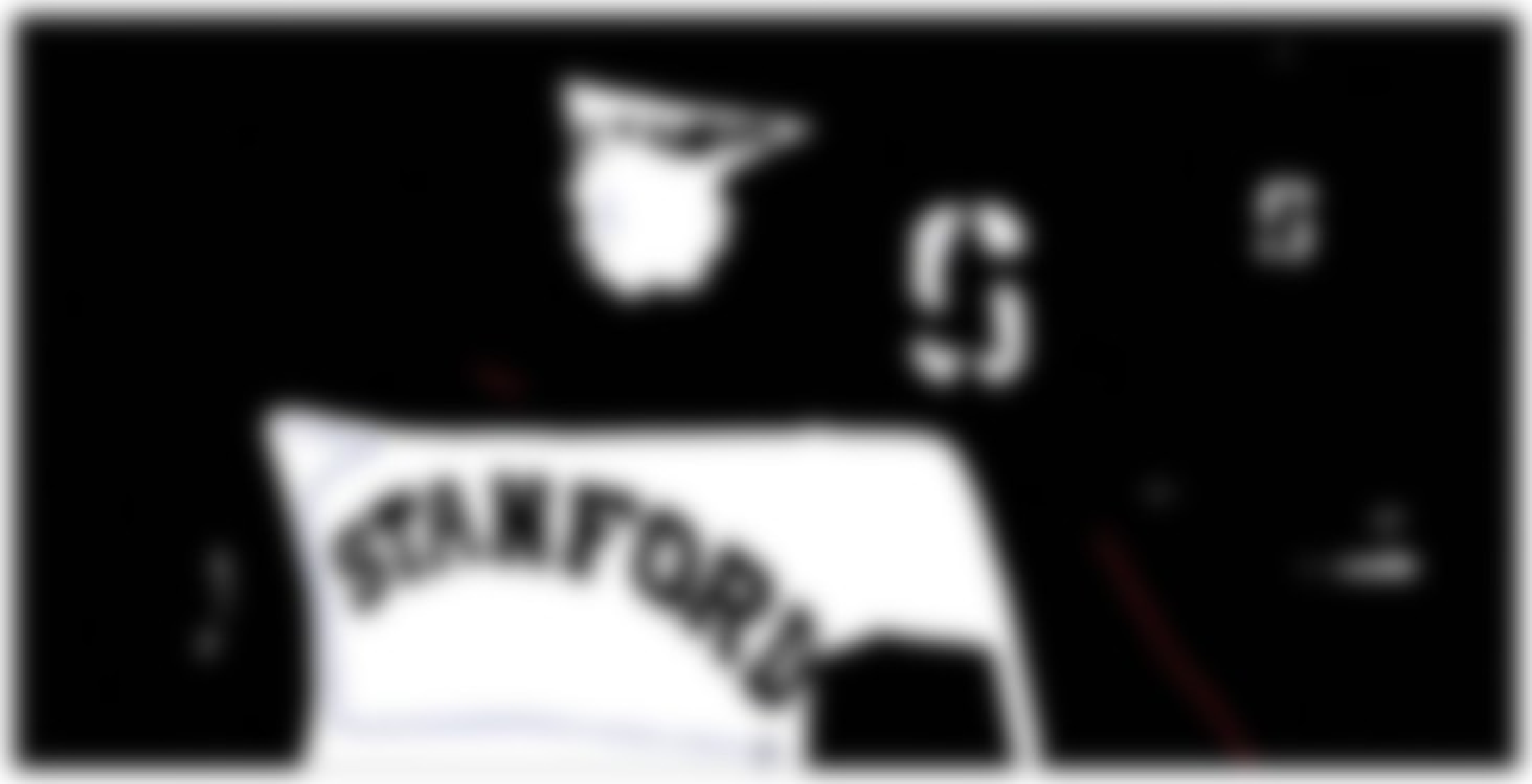
- Leave the 3D Qualifier mode on the default Flat.

Underneath, you will see the Color Space box that represents your 3D hue selection, surrounded by the Chroma and Luma Adjustments fields. Use these parameters to control the chroma tolerance and softness of the selection, manually move the selected sample within the Color Space box (X, Y, Angle), and adjust the selection based on hue luminance (Low, High, Low Soft, High Soft). When enabled, Adaptive Chroma Softness ensures that the selection is consistent regardless of saturation.

- Drag the High parameter up (100.00) to increase the selection in the bright sections of the image. The white matte becomes more pronounced on the bright red letter "I" and the flowers on the wall.

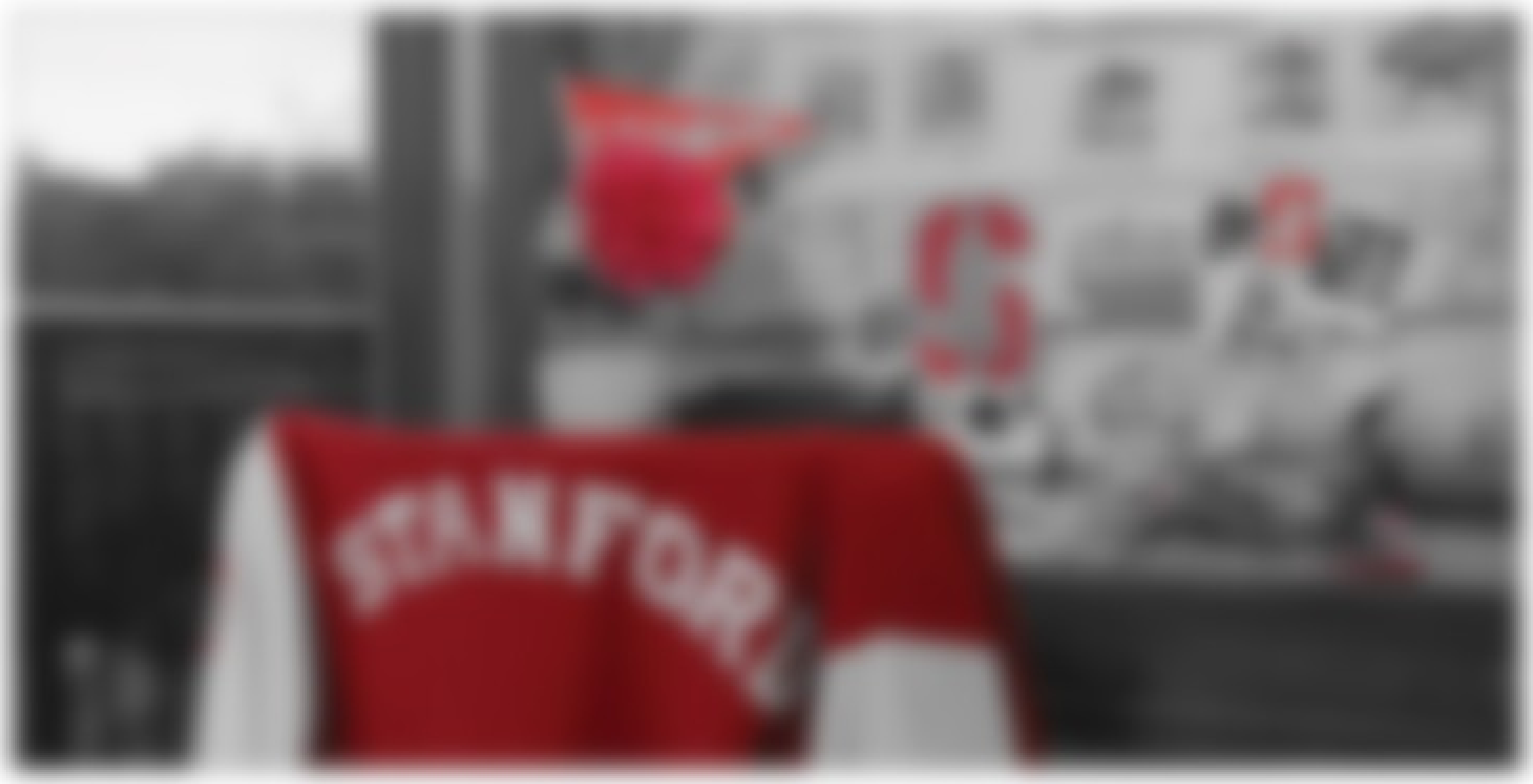
To ensure a clean key throughout, scrub the playhead to review the selection in the viewer.

- Drag the playhead to the first frame and use the Picker Add and Picker Subtract tools to further clean up the matte. Ensure that you remove the selection of the chair and desk to the right of the jacket.
- When finished, adjust the Matte Finesse controls to clean up any remaining unselected areas.



A few rough edges are not a big issue when it comes to moving objects (such as the jacket at the start), but the final frame of the composition should look clean.

- In the viewer, disable the highlight mode.
- In the Qualifier palette, deselect Show Paths to hide the selection lines.



You have successfully extracted the red objects in the scene.

10 Return to node 02 (BG), raise the saturation (65.00), and cool the Temp (-700.00) in the Primaries palette.

Rather than going with a direct interpretation of the reference movie grade, which is stylistically inconsistent with the remainder of the project, you'll instead focus on getting the red elements to pop while toning down the background hues.

11 Click node 04 (jacket), raise the saturation (55.00), and lower the gamma (-0.02) for denser red hues.

Reusing and Refining Keys Between Nodes

In this clip, the greatest emphasis is meant to be on the jacket. You have successfully isolated the red objects in the scene, but the background elements still draw too much attention. You will create a new layer and use Power Windows to refine which objects are emphasized and which are flattened.

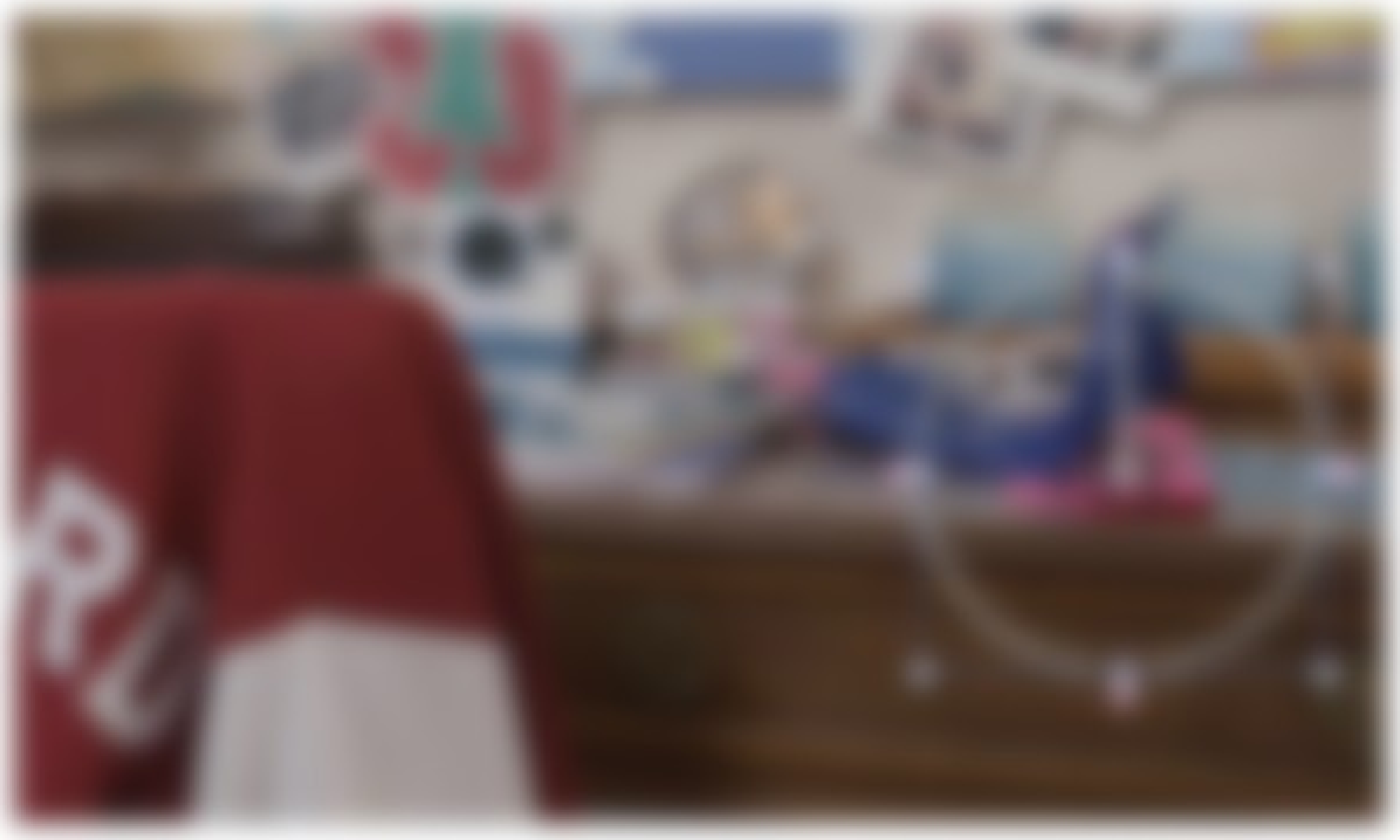
First, you will remove the pink koala on the right side of the desk from the original selection.

1 Drag the playhead to the last frame of clip 05.

2 Select the jacket node.

3 Open the Window palette and create a circular window. Label it **Pink koala**.

4 In the viewer, move the circle to the pink koala on the right side of the screen.



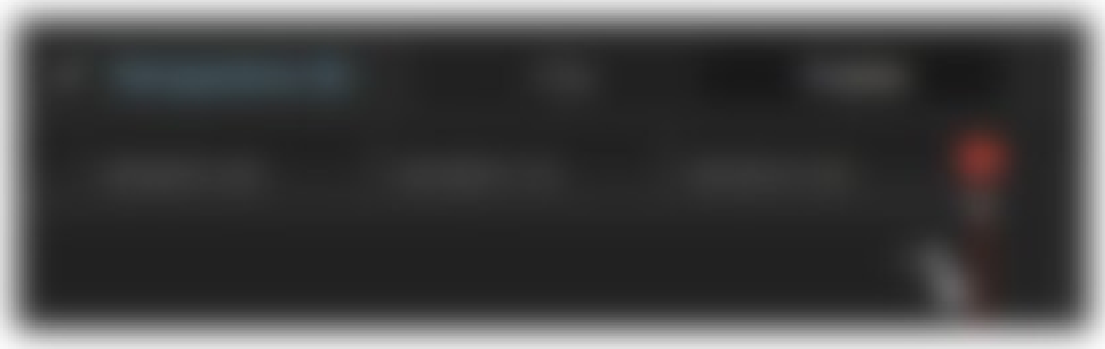
5 Toggle the Highlight mode on and off to ensure that your window selection affects the whole koala and no other red elements.

6 In the Window palette, click the Invert icon to remove the pink/violet selection from the [illegible] node key.

This clip has too much foreground interference to allow for a clean track. You will manually animate the window to follow the camera motion.

7 Open the Tracker palette and switch the mode to Frame.

8 Click the diamond shape in the center of the keyframe navigation controls in the upper right corner of the Tracker graph.



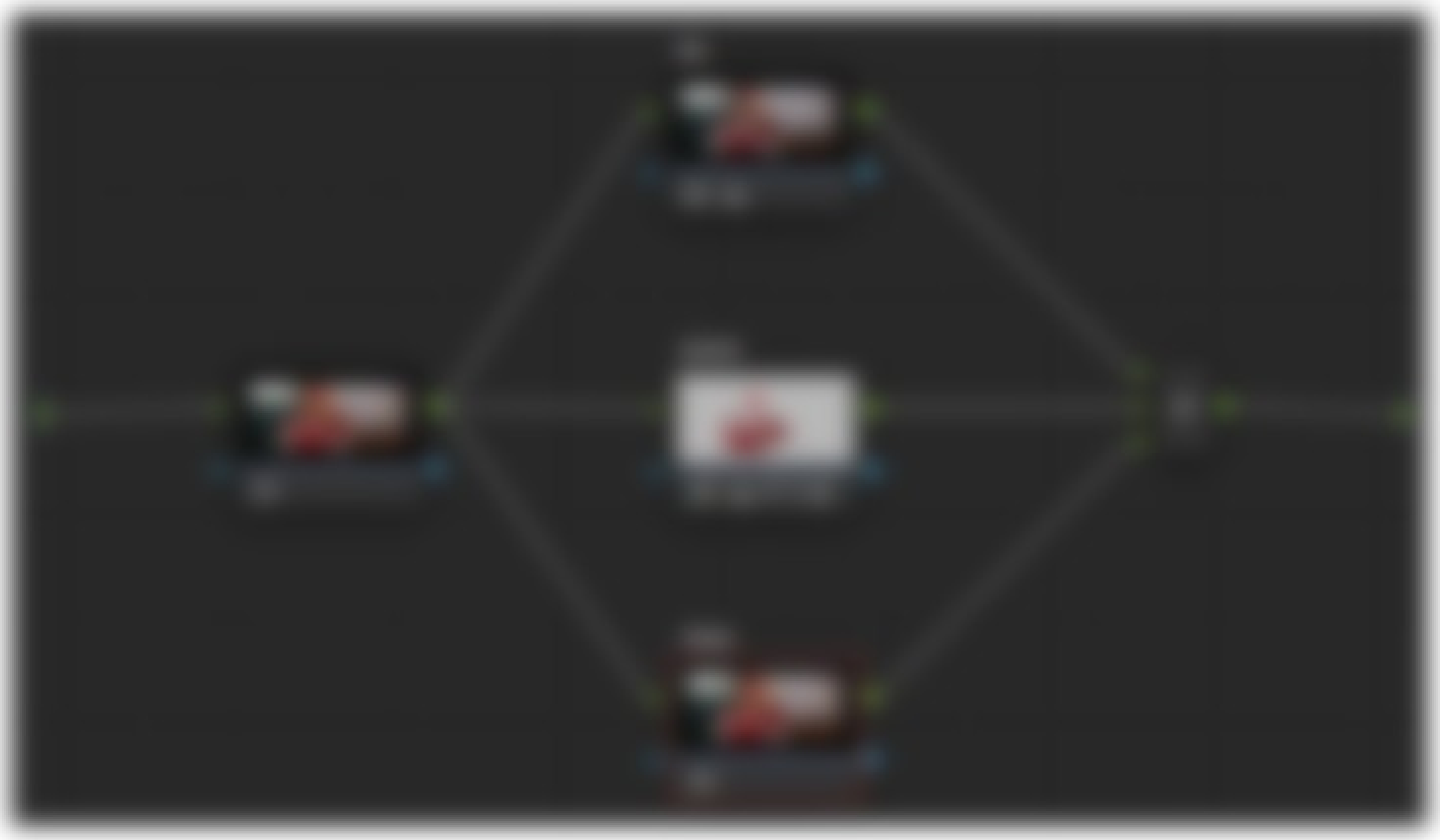
Doing so places a keyframe in the current position of the circle window.

9 Drag the playhead to the start of the clip and reposition the circle window to the estimated position of the tinsel outside the viewer frame.

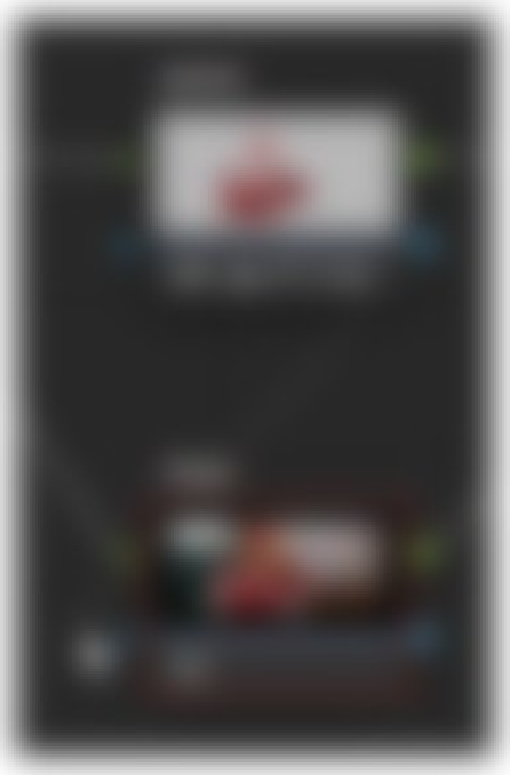
10 Scrub through the clip timeline to ensure that the window is following the tinsel's motion with the camera.

You have removed the red saturation adjustment from the tinsel. Next, you will use a separate layer node to reduce the intensity of the red background elements above the desk.

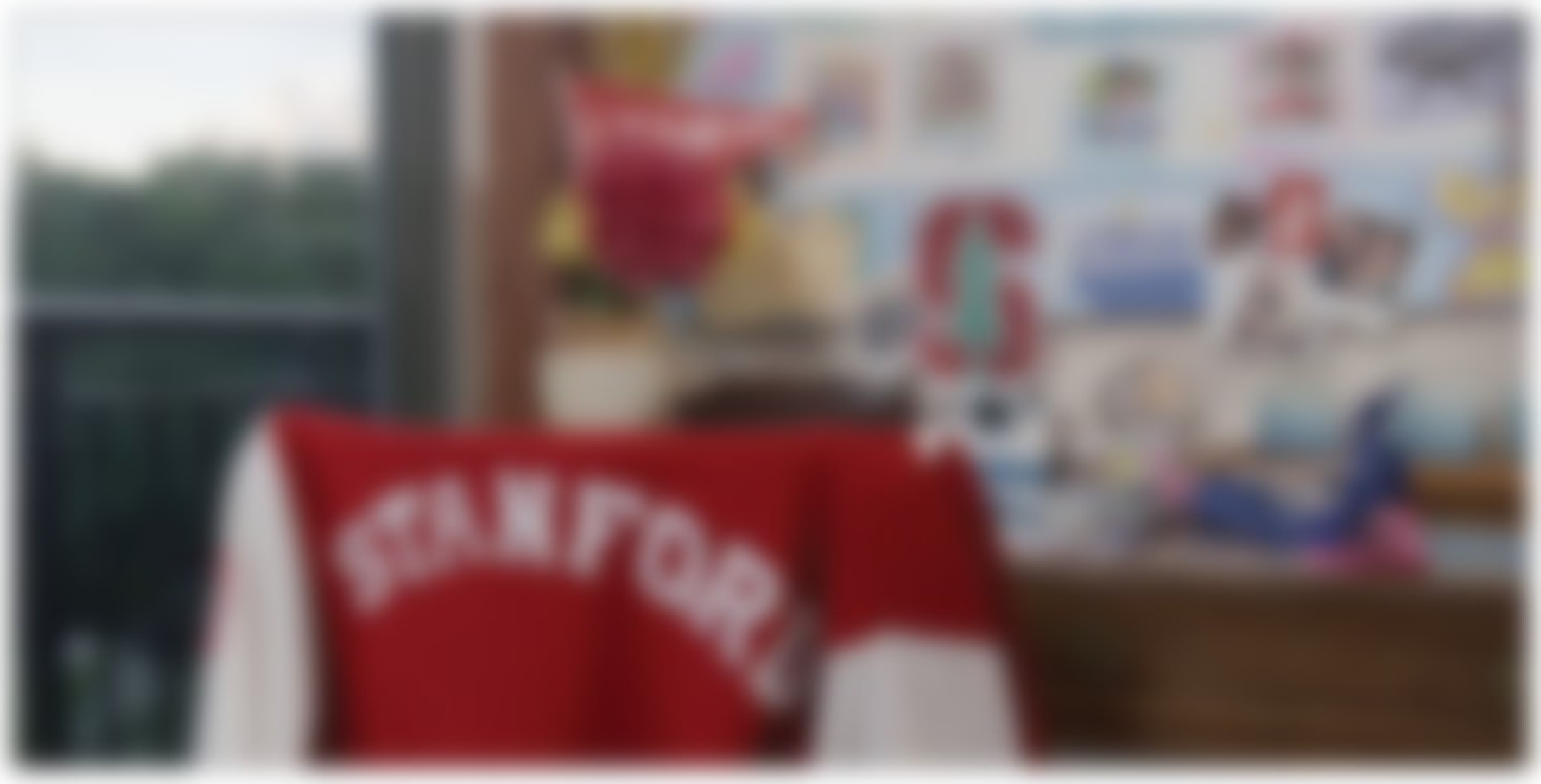
11 Press Option-L (macOS) or Alt-L (Windows) to create a new layer node, and label it **Desk**.



- To reuse the matte data of the keyed pennant node, drag the key output square of the pennant node toward the key input triangle of the Walls node.



- Drag the playhead to the last frame of clip 05.
- In the Window palette, create a gradient window and label it **Upper wall**.
- Position the gradient so that it separates the top half of the screen from the pennant below.



- Reduce the saturation (35.00) and lower the gamma (-0.03) for less pronounced colors compared to the pennant.

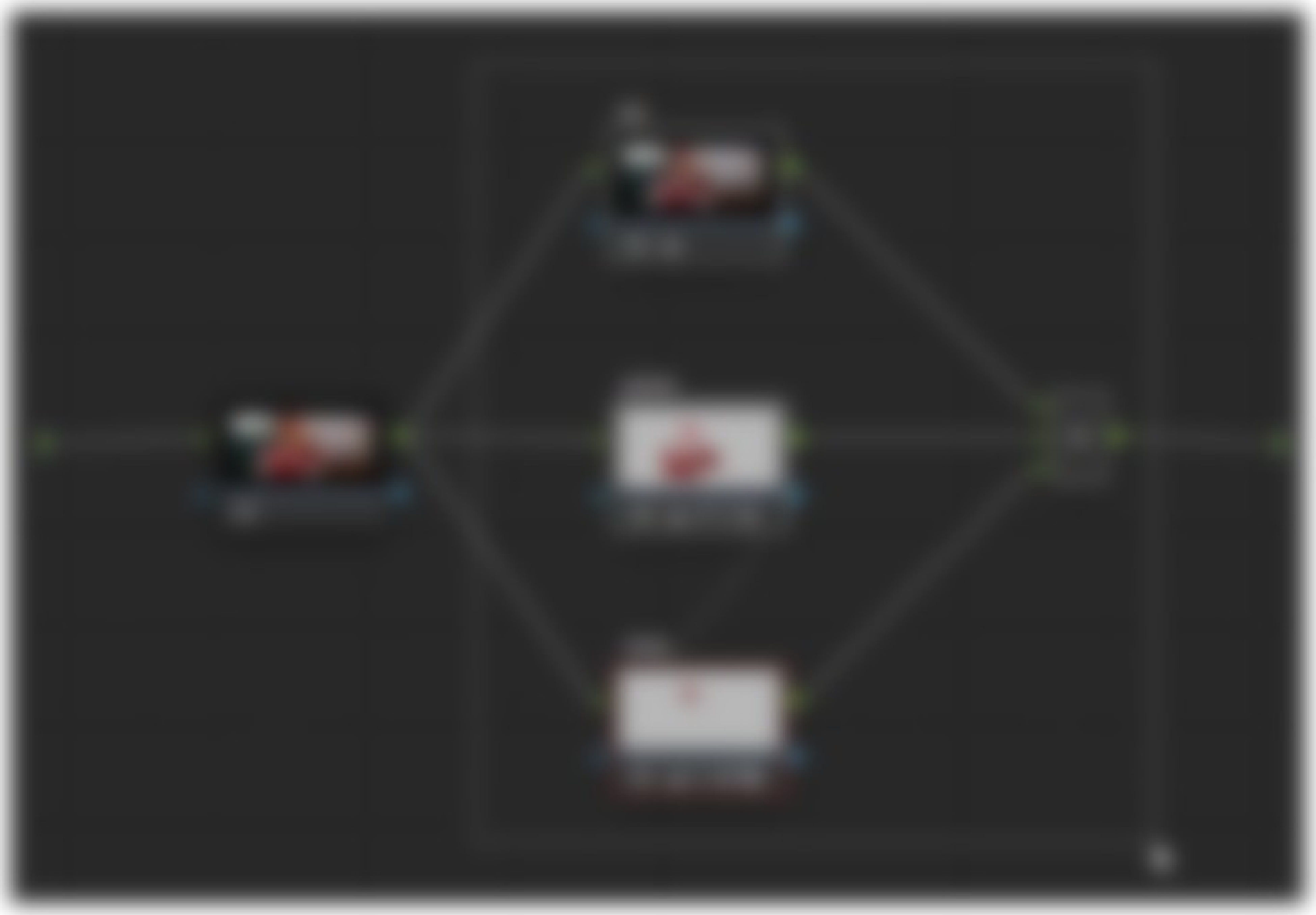
  The pennant's position changes between the start of the shot and the end. You will use the same custom tracker method to animate the gradient.

- Open the Tracker palette, set it to Frame mode, and create a keyframe at the end of the clip.

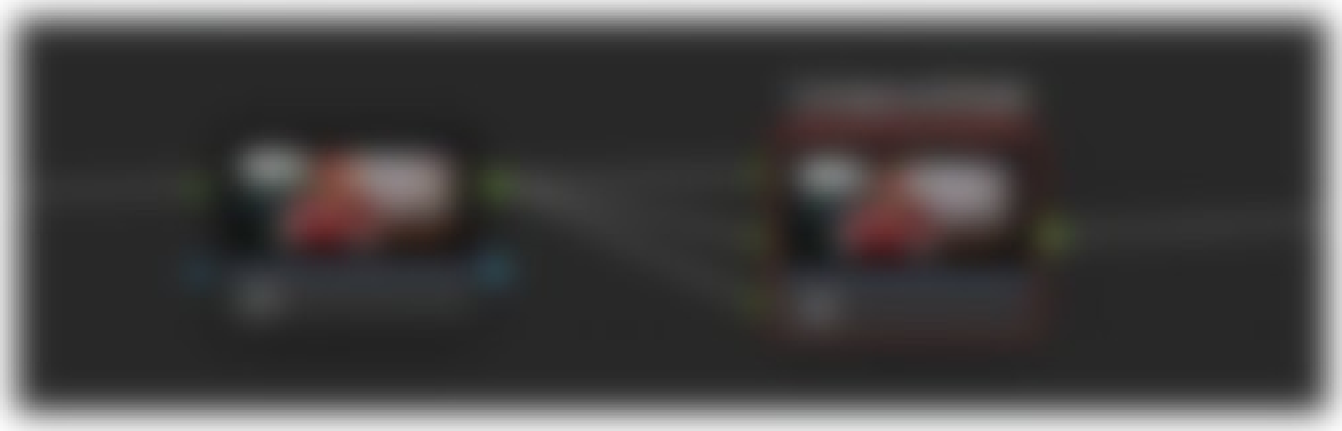
- Scrub through the clip and change the gradient position and rotation until the secondary grade is undetectable in the viewer.

  Next, to simplify your node tree and prepare it for new grading nodes, you can combine all the layer mixer nodes into a single compound node.

- Drag in the Node Editor to select all the nodes except node 01.



- Right-click any selected node and choose Create Compound Node.



  This is an effective organizational tool when working on clips with large node trees. You can quickly disable a compound node to bypass all the color corrections within it without having to make complex selections or affecting other nodes in the tree.

  And you still have access to the original layer mixer structure within the compound node.

- Double-click the compound node, or right-click and choose Show Compound Node.

  The nodes appear just as they did before you turned them into a compound node.

[illegible] To navigate back to the main Node Editor, double-click Project 02 – Too Much Life Trailer in the breadcrumb navigation path at the bottom of the panel.

Project 02 - Too Much Life Trailer > Compound Node

[illegible] If you want to bring back the original node structure of the compound node to the main Node Editor, right-click it and choose Decompose Compound Node.

> **TIP** Another method for decluttering the Node Editor is to hide node thumbnails. In the upper-right corner of the Node Editor, click the options menu (...) and deselect Show Thumbnails. Doing so will collapse the nodes to just their labels, numbers, and palette icons.

Using External Mattes

In previous lessons, you saw that the keys generated by secondary grading tools can also be expressed as black and white mattes, as seen in the Highlight B/W mode of the viewer. Keying relies fundamentally on this graphic dynamic, meaning that any image or video that is black and white (or grayscale) can technically be treated as a matte. This includes externally generated mattes that is imported purely for compositing or secondary grading purposes.

In this exercise, you will use a premade matte to refine the look of a tricky-to-select element.

1. Select clip [illegible] in the [illegible] timeline.

   This VFX shot features composited sunbeams in the background. For optimal results, you'll want to use dedicated mattes to control the intensity of the sunbeams in the scene. Thankfully, the compositing artist has shared the sunbeam mattes with you so that you do not have to spend time making the selection yourself!

2. Enter the media page.
3. In the Media Storage panel, find the [illegible] – Project 02 folder and navigate to Other > Mattes.

4. Drag Rainbow_matte.png into the 05 VFX > 05.01 Mattes bin of the media pool.

   The black-and-white matte was generated in an sRGB graphic environment, meaning that it will perform optimally when mapped from sRGB rather than the default project color space.

5. Right-click Rainbow_matte.png and choose Input Color Space > sRGB > sRGB.

6. Enter the color page.

7. Increase the contrast (1.200) in clip 05 for easier viewing. Label the node **Contrast**.

8. Right-click and choose Add Node > Add Serial Before, or press Shift-S. Label the new node **Rainbows**.

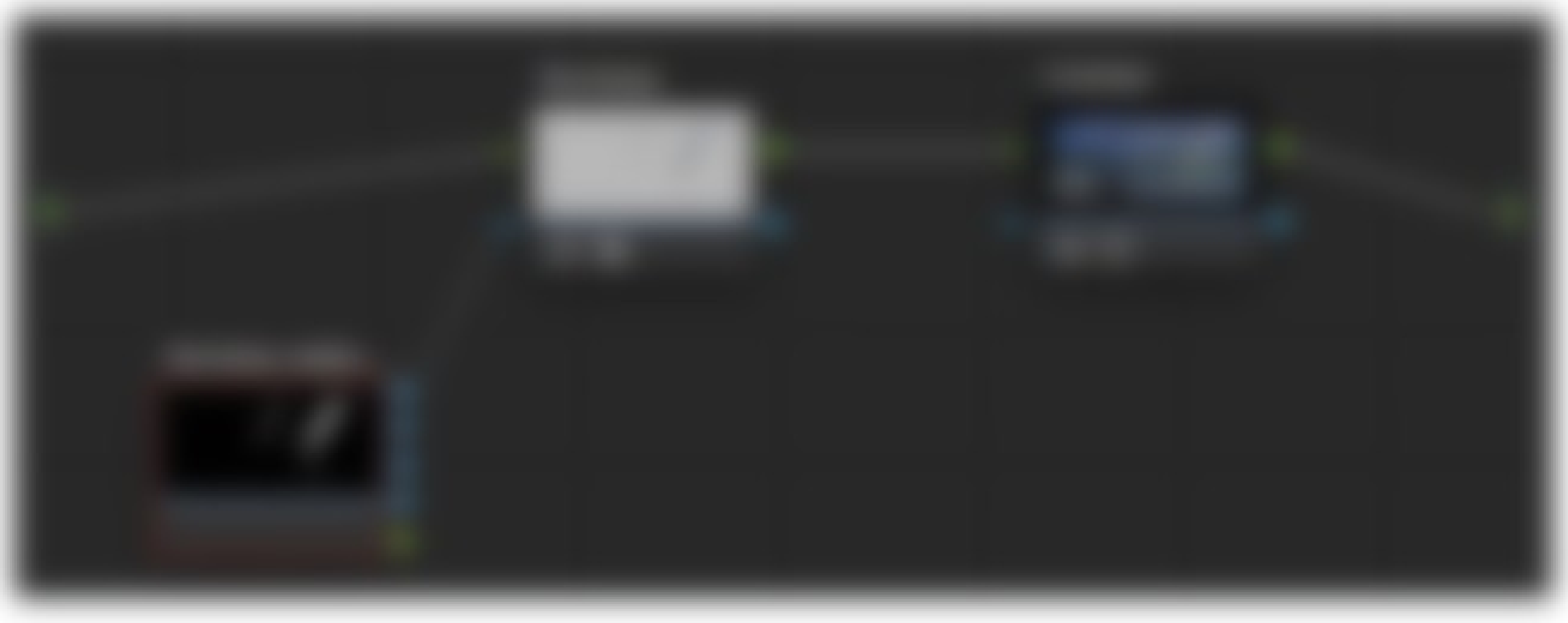
9. Click the Media Pool button in the interface toolbar at the top of the color page.

10. From the 05.01 Mattes bin, drag Rainbow_matte.png into the Node Editor.

   The matte PNG appears in a dedicated external matte node in the Node Editor. Notice that the node has no inputs and contains multiple outputs.

   The uppermost blue square is the standard luminance, or alpha output. The three blue squares under it are RGB outputs that enable you to work with each channel independently. The green square at the bottom outputs a standard RGB signal of the black-and-white matte.

11. Drag the uppermost key output to the Rainbows node's key input.



   The key is imposed in the Rainbows node thumbnail.

12. Select the Rainbows node and raise the saturation (75.00) to create more prominent rainbows.

When working on projects that feature a lot of CGI and 3D compositing, it is standard for colorists to receive such matte assets from post houses since these mattes are generally more easily available to the people behind the VFX. Alternatively, in cases where complex grading is required, some colorists use dedicated rotoscope artists or assistant colorists who will exclusively create mattes while the lead colorist focuses on grading.

Working with Image Sequence Mattes

It is also possible to work with animated layer elements, known as traveling mattes. In this shot, a person in the background is disrupting the emotional scene playing out on the beach. You will use a pre-generated traveling matte to remove them.

NOTE The following exercise requires DaVinci Resolve Studio to complete.

1 Enter the media page.

2 In the Media Storage panel, navigate to Other > Mattes > Beach_closeup.

Traveling mattes are usually exported as a series of still images. You have the option of changing how DaVinci Resolve interprets images with sequential naming. This is because, depending on your workflow, you will sometimes want these images to be compiled into a moving sequence (such as in the case of this matte), and sometimes you will want to keep the images individual (such as when working on a project with image assets labeled pic_1, pic_2, pic_3 etc.).

3 From the options menu (...), choose Frame Display Mode > Sequence.

4 Drag the [illegible] image sequence into the [illegible] Mattes bin of the media pool.

5 Right-click [illegible] and choose Input Color Space > [illegible] > [illegible].

6 Enter the color page.

7 Create a new node after [illegible] and label it **Cleanup**.

8 Open the Effects panel.

9 Under Resolve FX Revival, find the Object Removal effect and drag it onto the Cleanup node.

Object Removal analyzes the content of a moving shot to build a clean backplate of an environment. It can then use key data to paint out specific objects from a scene. Ordinarily, you would use a Power Window to select and track the object you wish to remove. In this case, you can connect the external matte to provide the key data.

10 From the [illegible] Mattes bin, drag [illegible] into the Node Editor.

11 Drag the uppermost key output to the Cleanup node's top key input.

12 In the Object Removal settings, select Show Mask Overlay.

This will allow you to preview what the external matte looks like and verify that it suits the content of the shot.

- Zoom in to the viewer to review the external matte overlay. Scrub the playhead to check the timing.

It's close, but something appears off. In the last few frames, the matte appears to jump to a different position in the viewer. Depending on the timecode and duration of the clip and its associated matte, their playback may not sync. You can offset the matte's playback in the Key palette.

- Open the Key palette.
- Select the beach cleanup matte node in the Node Editor. The Key palette's mode in the top right corner switches to External Matte.

The beach cleanup matte was created specifically for the movement of the person on the beach. That means you need to sync the start time of the matte to the video clip.

- Click the Loop parameter checkbox to disable looping.

  Clip 20 has 12 frame trims, meaning there is additional footage on either side of its in and out points. The matte is lining itself up to the first frame of the source clip, which results in it being 12 frames too early for the edit.

- Enter the Offset value as 12.

  With the matte synced to the video, you can proceed with the object removal.

- Select the Cleanup node to bring back the Object Removal settings in the Effects panel.
- Turn off Show Mask Overlay.
- Click Scene Analysis.

  The effect will use the DaVinci Neural Engine to interpret the content of the shot and gain the necessary data to reconstruct a clean background. When complete, the walking person will temporarily be replaced with gray pixels.

- Select Assume No Motion. When working with a locked-off shot such as this one, this setting will ensure less intensive processing and produce cleaner results.
- Click Build Clean Plate.

  The person on the beach disappears.

- Scrub the playhead to review the cleanup throughout the clip.

- If you see any artifacts in the viewer, increase the Search Range parameter.

The exercises in this lesson gave you an advanced overview of the potential of the Node Editor. Although you've practiced a variety of workflows, there is ultimately no single correct way to utilize nodes when grading. Continue to practice using nodes for more complex grading, and you will soon arrive at your own preferred style. Above all, aim for the dual goals of workflow efficiency and the preservation of image quality.

Self-Guided Exercises

Complete the following exercises to test your understanding of the tools and workflows covered in this lesson.

Clips 01-02 – To create a cohesive opening sequence, transfer the node tree from clip 03 and refine the result. Make the outdoor clips warm.

Clip 04 – Use a layer mixer to darken the red bag and saturate the blue shirt. Apply the same warm look as clips 01 and 02.

Clips 10-16 – Transfer clip 13's blue look with the parallel mixer to the remainder of the clips in this scene and ensure the contrast, colors and skin look consistent throughout.

Clips 20-24 – Use a parallel mixer to create a look for these clips in the principal's office. Aim for a cold, clinical feel to convey the negative nature of the interaction between the characters while keeping their skin tones natural.

When you've completed these lessons, you can import 01 Outbreak Node Trees COMPLETED.drt to compare your work with the "solved" version of this timeline. If any media appears offline, click the red Relink Media button in the upper left corner of the media pool and specify the location of the Project 02 media on your workstation.

To ensure that the project management is set up correctly, right-click the imported timeline and choose Timelines > Timeline Settings. Select Use Project Settings in the lower left of the settings panel to link it to the project-wide color management settings.

Lesson Review

- True or false? A corrector node can have multiple RGB inputs.
- What are the blue symbols on either side of a node?
- True or false? A node key can be connected to the input of a node that is in the same parallel or layer node stack.
- In the Key palette, what does the Key Output Gain affect?
- How would you import an image sequence into the media pool as a single video file?

Answers

1. False. A connector node can have only a single RGB input, although it can have multiple RGB and key outputs.
2. The blue symbols represent the key input and key output.
3. True. A node output (both RGB and key) can be connected to any downstream input, as well as to other nodes in a node tree.
4. Key Output Gain affects the opacity of a selected node.
5. In the Media Storage panel, click Options > Frame Display Mode and select Sequence to force an image sequence to display and import as a single video file.

Lesson 6

Managing Grades Across Clips and Timelines

Grading a film or video project requires considerable attention to detail and the use of a variety of tools throughout both primary and secondary stages. However, once a look is established, a project often makes repeated use of existing grades that propagate throughout the timeline. An obvious example is when you're working on multiple clips that came from the same source file or clips used from different takes of the same scene.

DaVinci Resolve 20 offers multiple solutions for reproducing and refining grades across clips. These include a straightforward copy and paste, extracting individual nodes for isolated adjustments, and even migrating grades across whole timelines. In this lesson, you'll examine the workflows that will enable you to efficiently copy and manage grades within a single node, clip, timeline, and beyond.

Time

This lesson takes approximately 2.5 hours to complete.

Goals

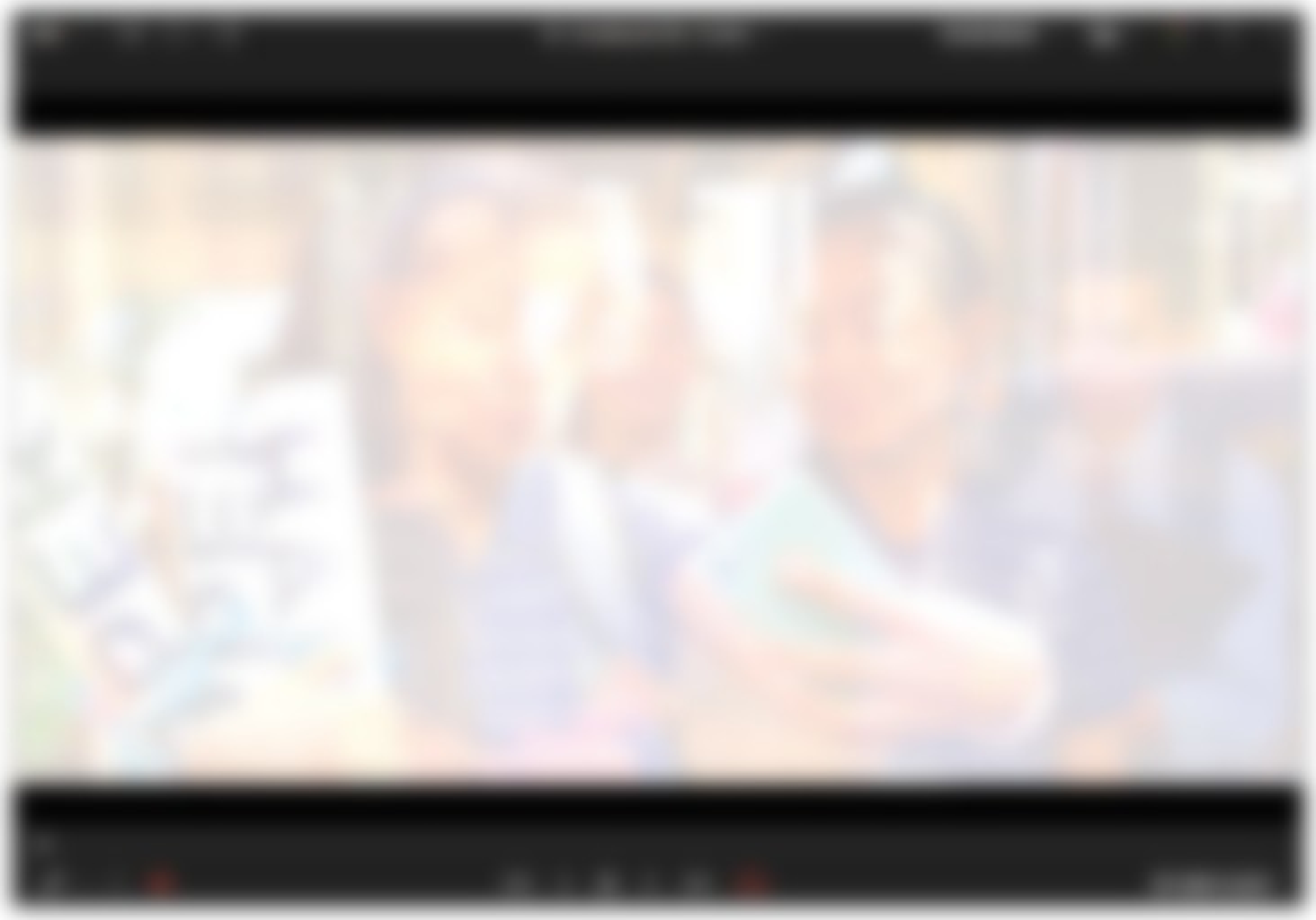
Working with Versions [illegible]
Appending Grades and Nodes [illegible]
Saving Node Tree Templates [illegible]
Saving Stills for Other Projects [illegible]
Migrating Timeline Grades Using ColorTrace [illegible]
Copying Grades Using the Timelines Album [illegible]
Self-Guided Exercise [illegible]
Lesson Review [illegible]

Working with Versions

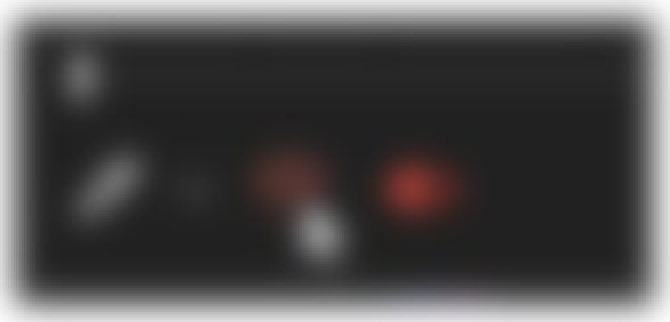
Versions enable you to associate multiple grades with a single clip in a timeline. You can use versions to preserve a grade at earlier stages of the grading process or when creating look variants to share with a creative supervisor for review and approval. Each version remains intact and can be recalled when needed. Versions are easily accessible in the contextual menu of each clip and can be created, deleted, bypassed, and switched between local and remote.

In this exercise, you will begin by creating a new grade on a clip, after which you'll apply preexisting grades from the gallery to quickly build a set of grade versions.

- In the [illegible] Trailer timeline, click clip [illegible].
- Drag the playhead to the start of the clip.



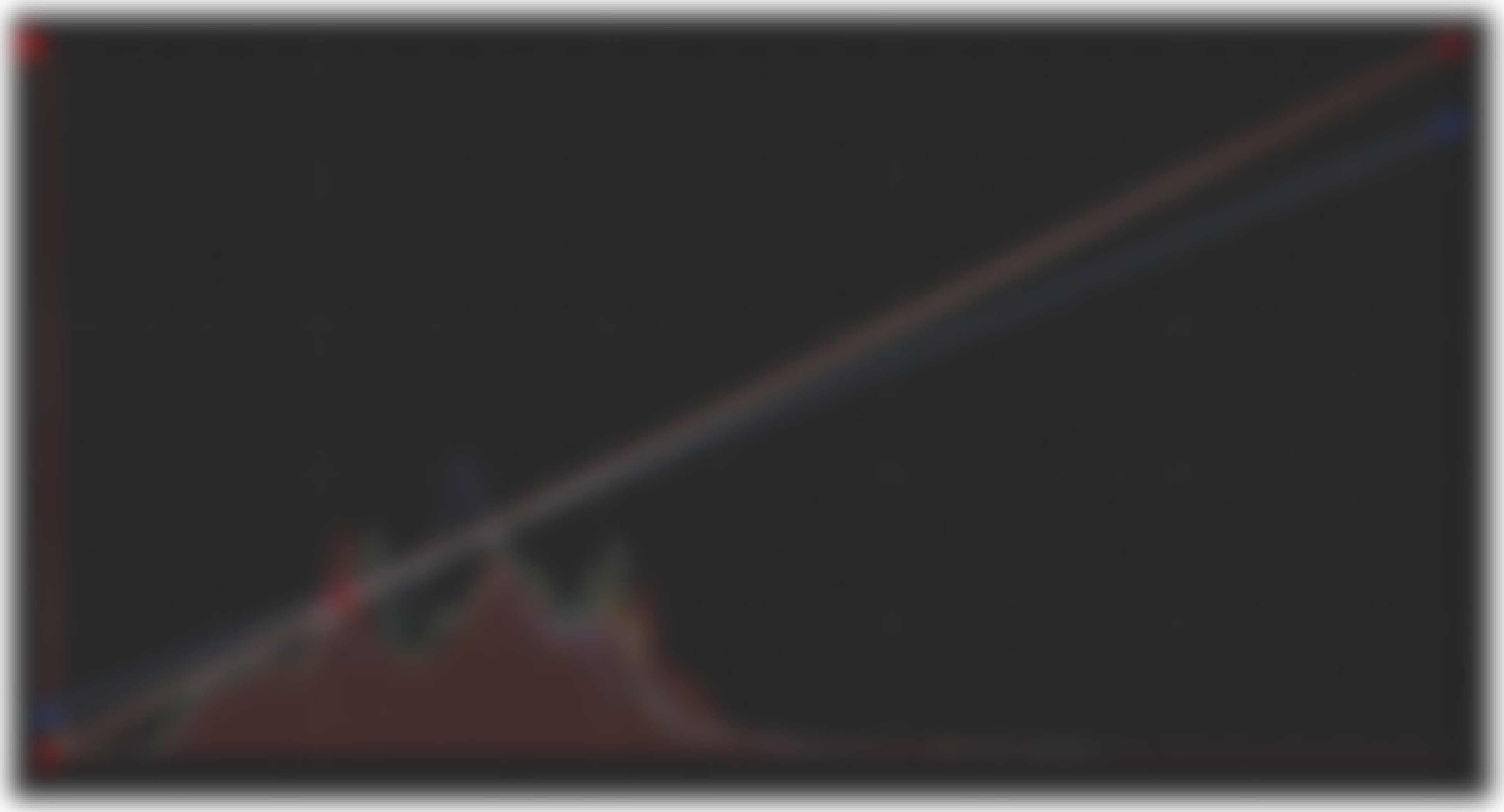
- The start of clip [illegible] is in mid-dissolve with clip [illegible]. To disable transitions and effects on the edit page timeline, click the [illegible] button in the lower left corner of the viewer.



4. In the gallery, open the Base grades album and apply the 1 Col Balance still to balance clip 01.

> **TIP** If you have a three-button mouse, you can click the middle button (scroll wheel) to quickly apply grades from stills.

5. Create a second node and label it **Split tone**.
6. Open the Curves palette. To create a split-tone look, you can push opposing complementary colors into the image highlights and shadows. This tends to result in a retro film look.
7. Click the RGB link to ungang the channels.
8. Isolate the blue channel and drag the black point up to turn the shadows blue. Then, drag the white point down to turn the highlights yellow.
9. Isolate the red channel, create a new control point in the lower midtones, and drag upward to add a slight red tint to the midtones.



[illegible]

- [illegible]

  [illegible]

- [illegible]

  [illegible]

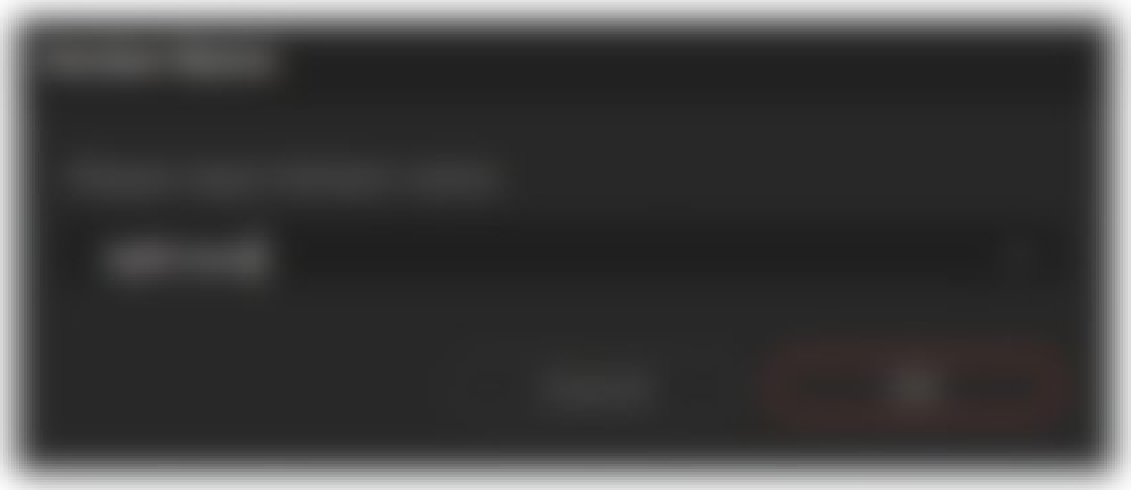
- [illegible]
- [illegible]
- [illegible]
- [illegible]

TIP The Highlights and Shadows parameters in the adjustment controls feature unique tonal ranges designed for better retrieval of detail from the highlights and shadows of an image. To study their impact, go to the compound clip grayscale generator at the end of the timeline and drag these ranges to identify their range and overlap.

Creating New Local Versions

You have now successfully created the first look for this shot. By default, every clip begins as Local Version 1. You can rename clip versions to identify a specific look or purpose of a grade.

1. In the timeline, right-click clip 05, and under Local Versions, choose Version 1 > Rename.
2. In the Version Name dialog, enter the name **light leak** and click OK.



light leak

You will apply several grades to this clip, each of which will be designated as a new version. To save time, you will use some preexisting grades in the Clip 05 grades gallery album.

3. Right-click clip 05 and choose Local Versions > Create New Version.

4. Enter the name **Bleach bypass**.

- Reset the split-tone grade by choosing Color > Reset > All Grades and Nodes or press Command-Home (macOS) or Ctrl-Home (Windows).

  This is a necessary step if you want to start with an ungraded clip every time you design a new look. Otherwise, you can continue tweaking the image using the previous grade's settings.

- In the Clip 05 grades album, middle-click the [illegible] Bleach bypass still to apply the grade.

  This look emulates another physical film practice in which filmmakers would skip (or "bypass") the final chemical (bleach) bath of the film development process, resulting in a high contrast, low saturation look. Digitally, this look has been re-created with the help of a layer mixer, an Overlay composite mode, and two separate nodes handling color and contrast.

- To make another version, right-click clip 05 and choose Local Versions > Create New Version. Enter the name **Sitcom**.

  > **TIP** You can also press Command-Y (macOS) or Ctrl-Y (Windows) to create a new version in a clip.

  You could reset the grade again, but because you are simply overwriting the current grade with the still grade, that won't be necessary.

- In the Clip 05 grades album, middle-click the [illegible] Sitcom still to apply the grade.

  This look is more suited for a light-hearted narrative, such as a comedy, romance, or television sitcom. It prioritizes bright, cheerful colors and a warm overhead glow.

  > **TIP** Double-click repeatedly under a clip thumbnail to change the metadata on display. You can opt to see the media codec, clip name, or version label (local version 1 will always appear blank).

In the next exercise, you will create one final look using the Film Look Creator Resolve effect.

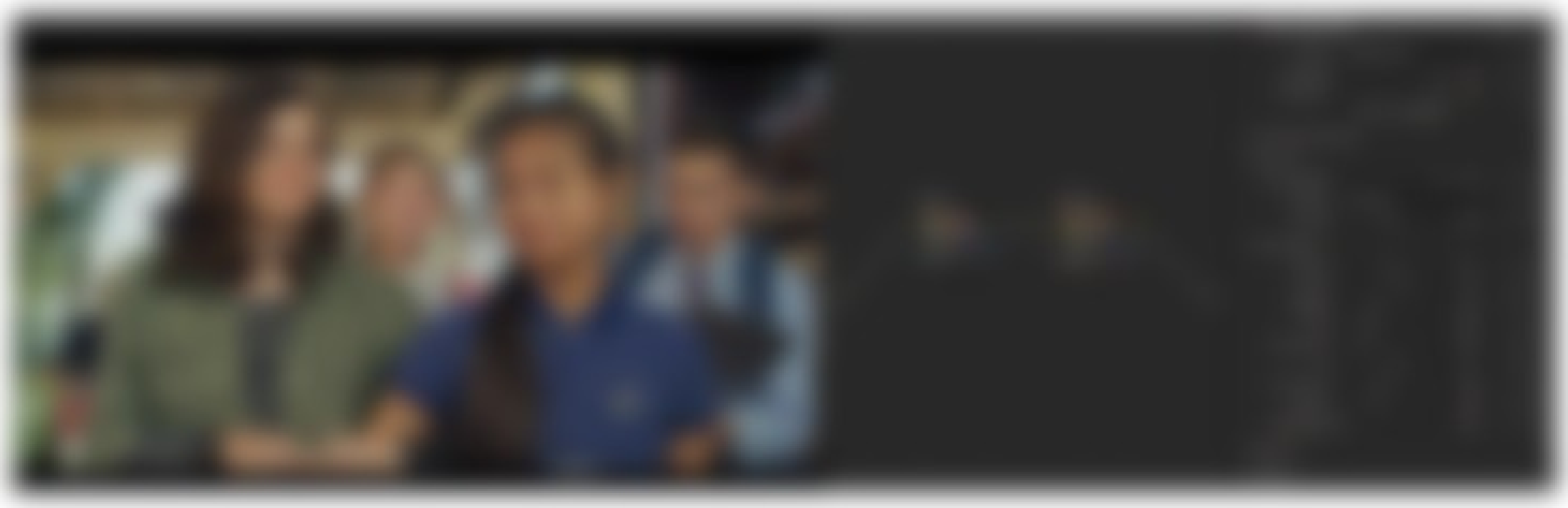
Designing Grades with the Film Look Creator

The Film Look Creator is a collection of tools that emulate the appearance of film stock. When applied, it remaps the tonal distribution of the image to react photochemically to properties such as exposure and balance. It also allows you to add elements associated with physical film properties, such as halation, bloom, flickering, and gate weaving.

NOTE The following exercise requires DaVinci Resolve Studio to complete.

1. Create a new local version called **Film look** creator.
2. Delete all the nodes except node 01 (Balance).
3. Create a new node 02 and label it **Film look**.
4. In the Effects Library, under Resolve FX Film Emulation, drag Film Look Creator onto node 02.

   The clip's appearance instantly shifts to reflect the new tonal processing and preset film look. The contrast is more pronounced, and the colors appear denser.

   At the top of the settings, you can use the Presets parameter to set a starting point for your look. The Blend modes underneath determine the relative strength of the Color (Color Settings and Split Tone categories) and Effects (every category after Split Tone) controls.

5. Leave the Presets set to Default 65mm.

   Under Film Look, use Core Look to determine the treatment concept of the video signal and how it is interpreted by the look's parameters. Film Look Blend adjusts the strength of the base look, and Skin Bias tweaks skin tones relative to the base hues.

6. Leave the Core Look set to Cinematic.

Use the Color Settings to affect the photometric properties of the footage. Notice that dragging certain parameters, such as Exposure, feels more like changing the exposure on a physical camera rather than a digital adjustment.

7 Raise the Highlights [illegible] for a brighter sky in the background.

8 Lower the White Balance [illegible] to cool the scene. A unique property of this parameter when compared to the Temp setting in the Primaries palette, is that it mimics how unbalanced cameras capture light and color. With a lower temperature, instead of the image turning blue uniformly, the skin tones shift at a slower pace, meaning you still see natural skin colors in a cool environment.

9 Raise the Tint [illegible] to remove the green undertone.

10 The Split Tone category allows you to quickly emulate the appearance of color-timed film stock. As you have already made a curves-based split tone look, you can leave this category unselected.

11 Leave the default Vignette settings for a subtle, darkened frame.

Halation and Bloom refer to distinct lighting artifacts commonly found in film. Halation presents as a soft, usually red, glow around very bright areas of the frame. Bloom refers to the light spill that occurs when an image is projected, resulting in a slight brightening of areas close to light regions.

12 Leave the default Halation and Bloom settings for a subtle filmic effect.

13 Under Grain, change the Preset to 35mm for more pronounced film grain. Lower values will result in larger grain because when a smaller film stock is projected on a large screen, small imperfections, like scratches and grain, are blown up more than those on larger film stock.

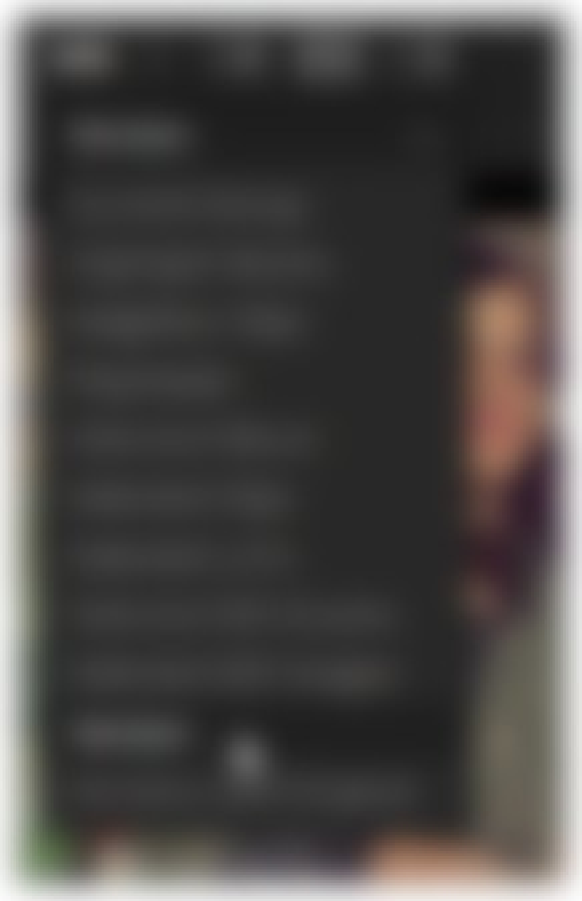
Flicker, Gate Weave, and Film Gate refer to the physical properties of film projection. Flicker is caused by the rotating shutter, Gate Weave is the horizontal and vertical shift seen as the film is mechanically pulled through the camera's gate, and Film Gate refers to the blanking of the edges as seen in various projection or telecine alignments.

14 Leave the default Flicker, Gate Weave, and Film Gate settings for a gentle flicker and shake of the frame.

TIP Select 3D LUT Compatible at the top of the settings to eliminate any parameters that cannot be retained when generating a look-up table (LUT). This will allow you to generate LUTs for monitoring and post-production collaboration based on the looks you create in the Film Look Creator.

Having created four distinct looks for this scene, you can now compare them in the viewer using the split screen display.

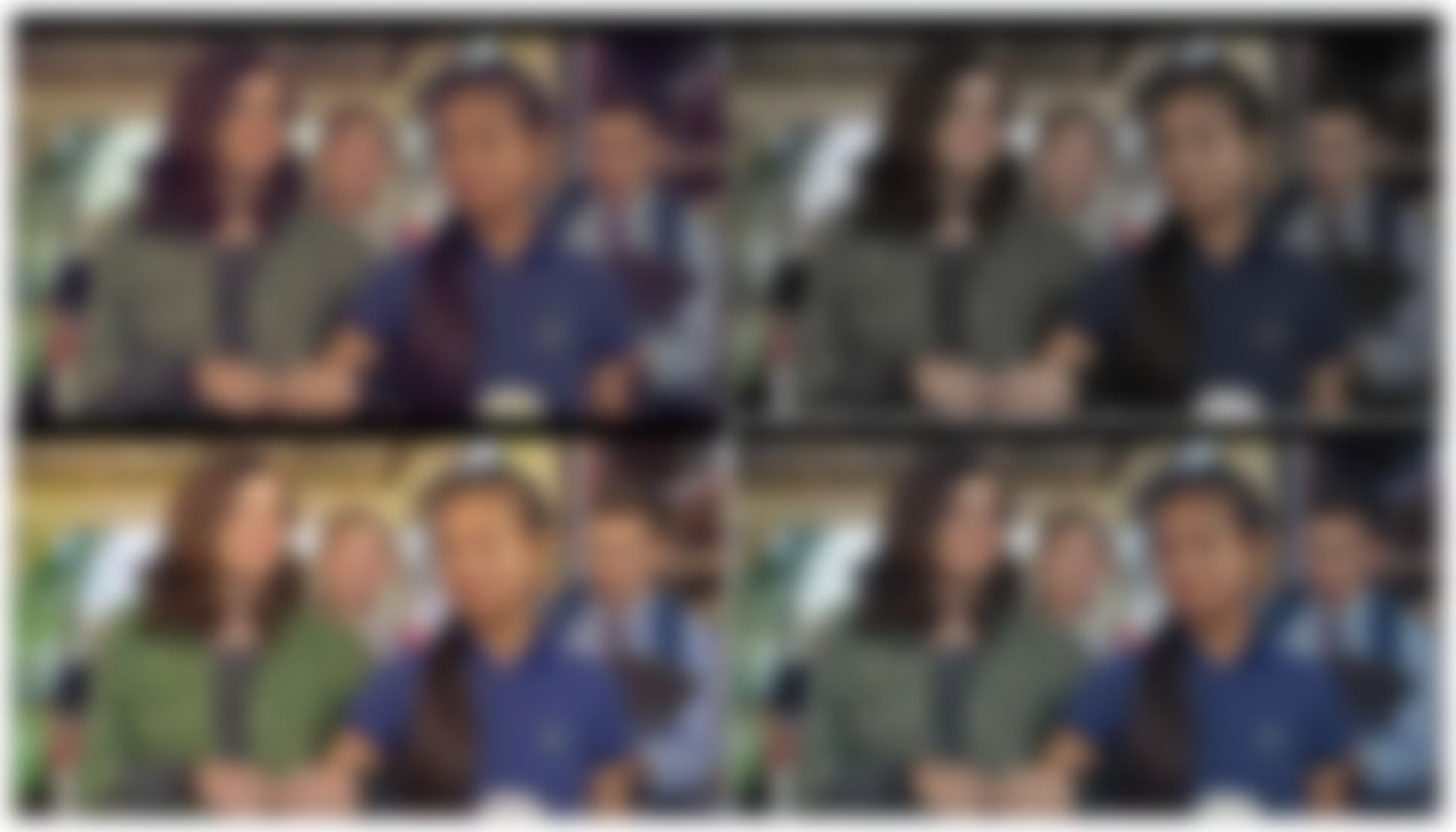
- In the upper left corner of the viewer, click the Split Screen button.
- In the drop-down menu below, make sure Version is selected.



The split screen view is enabled, displaying all four grades in a grid.

Comparing the versions might be difficult now because they have been scaled down to fit the small viewer window. You can [illegible] the viewer for full screen playback and optimal viewing.

- Choose Workspace > Viewer Mode > Cinema Viewer or press Command-F (macOS) or Ctrl-F (Windows).



TIP To remove the white outline around the active version, go to the viewer Options menu and choose Split Screen > Show Outline.

In the next few exercises, you will apply the split-tone look to other clips in the timeline.

[illegible] In the upper-left corner of the split screen view, double-click the "Split tone" version to select it.

[illegible] Press Esc to exit the full screen mode.

[illegible] Disable Split Screen in the viewer.

TIP Press Command-B or Command-N (macOS) or Ctrl-B or Ctrl-N (Windows) to cycle through the versions of a clip in the viewer.

Remote Versions

In the contextual menu, under the Local Versions options, you might have noticed a similar section for Remote Versions. This area offers another method of retaining multiple grades in a clip.

Remote versions are different from local versions in two ways. First, when a grade is remote, it affects all other timeline clips derived from the same source media. Second, the grade appears on all subsequent uses of the source clip in all other timelines of the same project (provided that the clips in those timelines are also set to use remote versions).

One popular application for remote grading is when working with master timelines. After importing the footage from a shoot, you can place all the media on a remote timeline and apply preliminary grades to the clips. When you eventually create a cut in the edit page or import the editor's timeline, those remote grades will automatically transfer to the new remote timeline, saving you time with the grade. You can then use the clip timeline's contextual menu to Copy Remote Grades to Local and continue to grade locally without affecting the master timeline.

In short, local grades are applied on a clip basis, whereas remote grades are applied on a project basis.

Appending Grades and Nodes

Having created a look on the key shot of this sequence, you will now transfer this grade to the clips that follow it. Most of the footage was captured at different locations and times of day, so you will have to pay extra attention to keep the montage cohesive.

Previously, you applied still grades by choosing the Apply Grade contextual menu option or by pressing the middle button of your mouse. Doing so overwrites the existing grade on a clip and replaces it with the entire node tree of the copied grade. Sometimes, you will want to add the node tree *after* a clip has been matched or apply only parts of that node tree.

The following exercises show you how to be selective when copying grades.

- Select clip [illegible]. You will apply the previously created split-tone look to this clip.

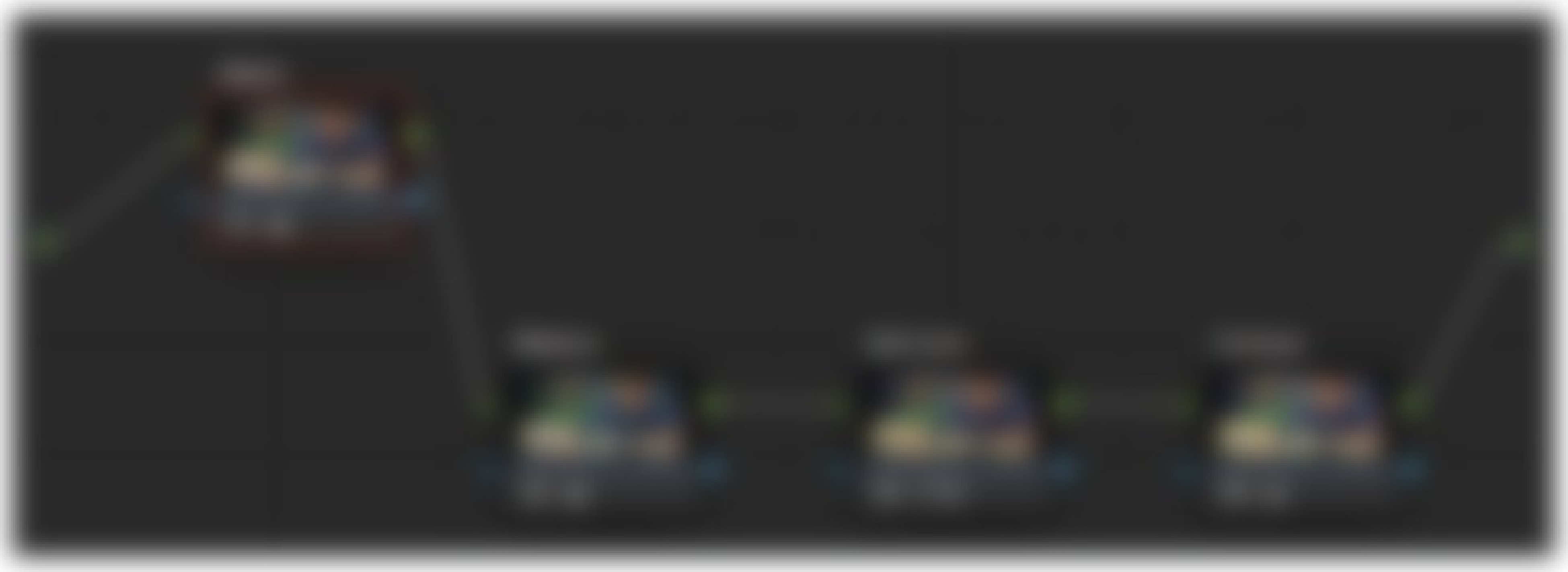
Clip [illegible] is unbalanced and has a slightly warm temperature. You could balance it, but that would not necessarily optimize it for the split-tone grade. As you learned in Lesson 2, clips must be matched to share grade data accurately. Without matching, grading tools will behave less predictably, and the differences between the clips will be preserved even if the same creative grades are applied.

To save time, a match grade for this clip has already been created for you.

- Open the Base grades album and apply the **[illegible] Match** still to the clip. To more closely match clip [illegible], the clip has been darkened and cooled.
- Open the Clip [illegible] grades album.

A split-tone grade is already prepared in the gallery. If you directly apply the split-tone still from the gallery, it will overwrite the Match node you just applied to this clip. Instead, you will append the split-tone grade to the current node tree.

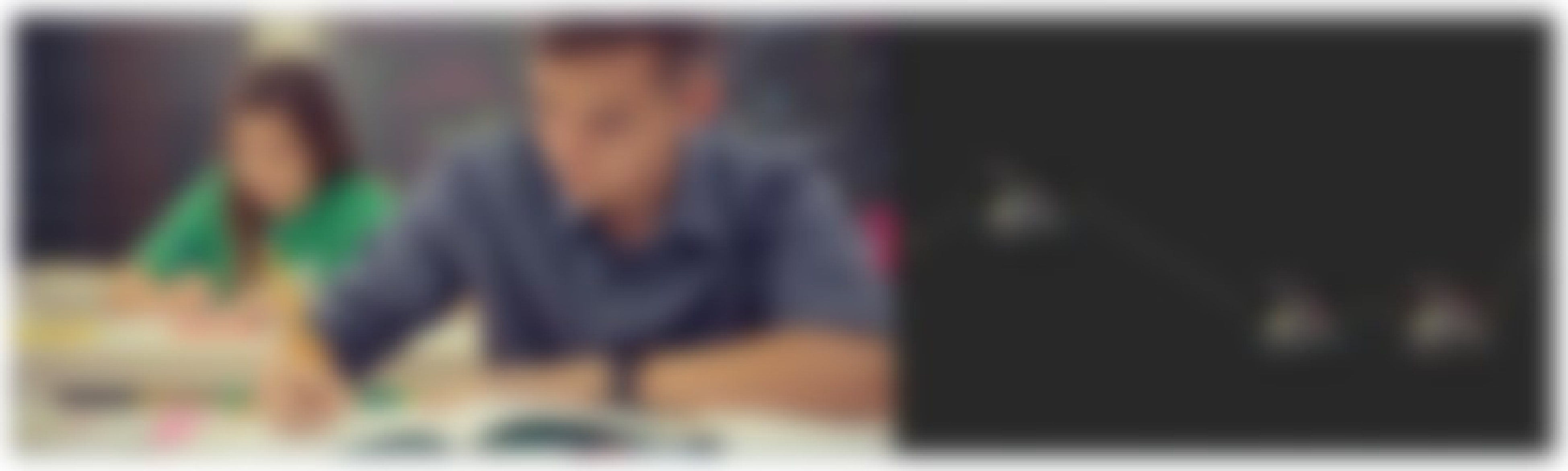
- Right-click the 1.6.1 Split-tone still and choose Append Node Graph.



TIP You can also drag a still from the gallery onto a connection line in the node graph to append it to an existing grade.

The Clip 02 Match node is now followed by the split-tone node tree. However, the grade still does not look entirely right – its shadows look more cyan compared to clip 05. By appending the grade, you added all the nodes from the original split-tone grade, including the original Balance node that was created specifically for clip 05. The Balance node is not necessary for clip 05 and should be deleted.

- Select node 02 (Balance) and press the Delete or Backspace key.



You now have a clean split-tone look that more closely resembles the one in clip 05. Next, you'll apply this same look to the upcoming clip but without the Balance or Contrast nodes.

TIP Window tracking data is reset when applying grades from stills in the gallery, which allows you to run new tracks based on the unique content of each clip. However, when appending nodes, window tracking data is preserved.

Copying Individual Nodes

So far, you've used all the grading data stored in the stills. You copied and appended an entire node tree to the Node Editor and tweaked the nodes based on the clips' needs. However, you can also access and extract individual nodes from a still or timeline clip.

- Select clip 07.

This clip looks relatively neutral but has a distinct color and contrast compared to the opening looks of clips 05 and 06. As in the previous exercise, you will apply a still to prepare it for the split-tone look.

- Open the Base grades album and apply the 1.1.1 Match & Contrast still to the clip.

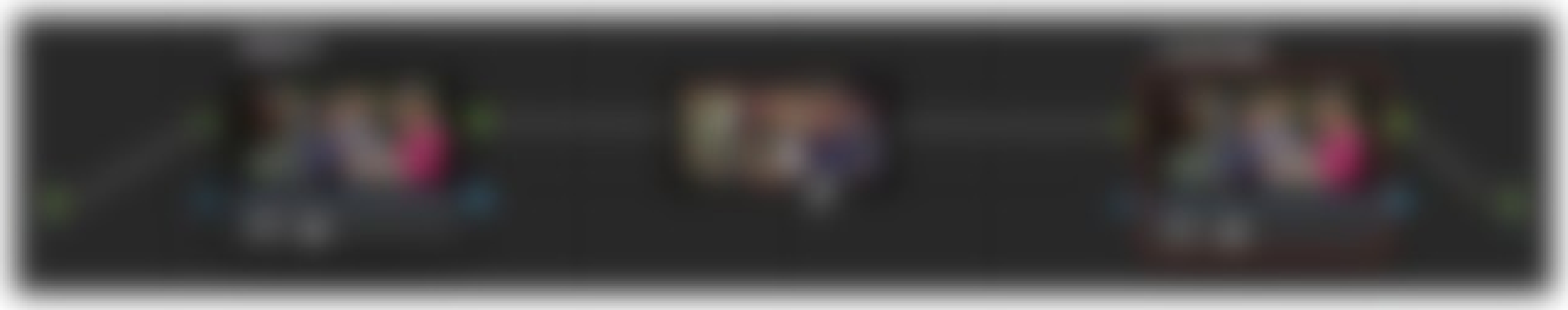
Doing so creates a good base for the incoming grade. The Match node mimics the temperature of the balanced clip 05, while the Contrast node addresses the tonal distribution and detail for more consistent contrast.

You can now apply the split-tone grade. Because the clip is balanced and has the correct contrast, you only need to transfer the split-tone node itself.

- [illegible]

[illegible]

- [illegible]



[illegible]

- [illegible]

[illegible]

[illegible]

Shared Nodes

In this exercise, you copied the same split-tone look across three clips while retaining their individual balance and contrast adjustments. Should you decide to tweak the creative look of the sequence, you might find the task of rippling the grade across the clips time consuming. Shared nodes are a grading optimization function that allows you to link and lock a single node across multiple clips.

To turn a standard corrector node into a shared node, right-click the node and choose Save as Shared Node. Two blue arrows in the label indicate the node's new status, and a lock symbol in the lower right corner prevents unwanted changes from being made to the grade. Label the shared nodes the same way you would regular nodes. When you right-click and choose Add Node in the Node Editor of any clip in the current project, you will now see the shared node at the bottom of the node list.

This method allows you to quickly ripple grades between clips and even make global tweaks by disabling Lock Node in the shared node's contextual menu. Note that because the Undo function is enabled per clip in the color page, changes to shared nodes cannot be undone.

Saving Node Tree Templates

So far, you have built node trees based on the individual needs of each clip. But realistically, you will not want to create and label new nodes every single time you work on a new clip. It is more efficient to build an ungraded (but labeled) node tree template to give you a quick start when grading.

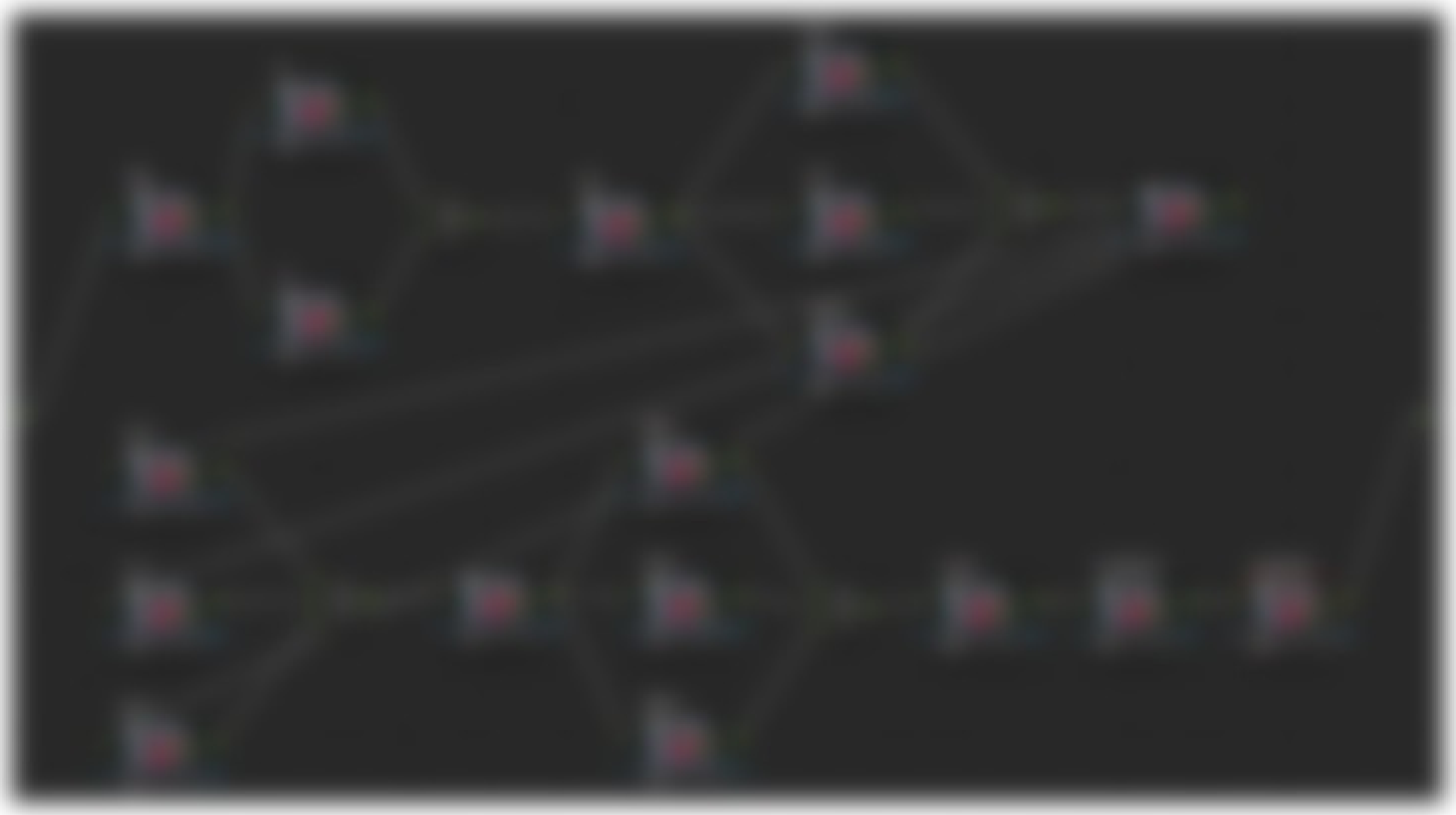
In this exercise, you will create a template still and use it to ripple grades across clips in a sequence.

1 Select clip 17.

2 Build a node tree based on your preferred approach to color grading. Label the nodes, but do not make adjustments in the color page palettes.

   Node trees tend to be unique to each colorist. This book is designed to help you understand the color page and its tools well enough to build your own grade structures with confidence. Node trees tend to vary based on media type, project genre, color management method, and so on. You will likely modify your preferred node tree template throughout your entire professional career as you gain experience, acquire more tools, and develop your own grading techniques.

Generally, you will want to start with corrector nodes aimed at addressing luminance, color balance, and saturation. You will then want to address the secondary needs using various keying and selection tools and finish off with the look and photochemical "texture" of each shot.



A sample template can be found in the Templates album in the gallery. It follows the broad rules of a grading workflow and, due to the prevalence of memory colors in the film, features dedicated skin, sky, and grass parallel nodes.

- Once you have built your template, right-click in the viewer and choose Grab Still.
- In the gallery, label the still **TEMPLATE**.
- Select clips [illegible] (excluding the graphic clips [illegible] and [illegible]) and apply the TEMPLATE still.

All the clips in the beach sequence will now have the same node tree.

Next, you will learn how to quickly transfer grade changes across clips.

- Return to clip [illegible].
- In the Node Editor, select the Look node (node [illegible], if working on the sample template).
- Open the RGB Mixer palette.
- Next to Red Output, select Auto Normalize.

This setting forces the channels to maintain constant luminance as you mix their red, green, and blue values.

- Drag up the red channel [illegible] of the Red Output.

Before

After

The red elements in the viewer become brighter, while the blues become denser and more cyan.

- Select all the clips in the sequence ([illegible]), including the graphic ones.

12 In the Color menu, choose Ripple Node Changes to Selected Clips.

Every instance of the Look node across the sequence adopts the normalized RGB Mixer adjustment. The graphics clips are unaffected, as they do not have a node with that number in their upgraded node trees. This demonstrates that rippling is based on node number, not node position.

Rippling works well in stable template node trees but can fall apart if you create a new node mid-tree, which will cause all downstream nodes to be renumbered in an effort to keep them sequential. A DaVinci Resolve setting allows you to preserve node numbers when creating new nodes.

13 In DaVinci Resolve > Preferences, navigate to the User controls and open the Color settings.

14 Under General Settings, check "Preserve node numbers when adding nodes." Now when you add new nodes, the original node numbers will be maintained. With this setting, rippling is more effective since new nodes will not throw off the numbering convention upon which it relies.

15 In the same Preferences section, next to "Switching clips," choose "Select a same node." This will ensure that when you are performing a grading pass (like when balancing or adjusting secondary selections), you will automatically land on the same node in every clip.

16 Click Save.

17 In the node tree, select a secondary node (node 7 in the sample template).

18 Use the Color Warper to reduce the saturation of the pink shirt and bring it left toward a slightly warmer hue.

19 Ripple the Color Warper change to all the clips that feature the pink shirt.

TIP You can assign a custom shortcut to the ripple commands in the Keyboard Customization interface.

As with most secondary adjustments, you will need to make tweaks based on the individual lighting and shadow conditions in every shot.

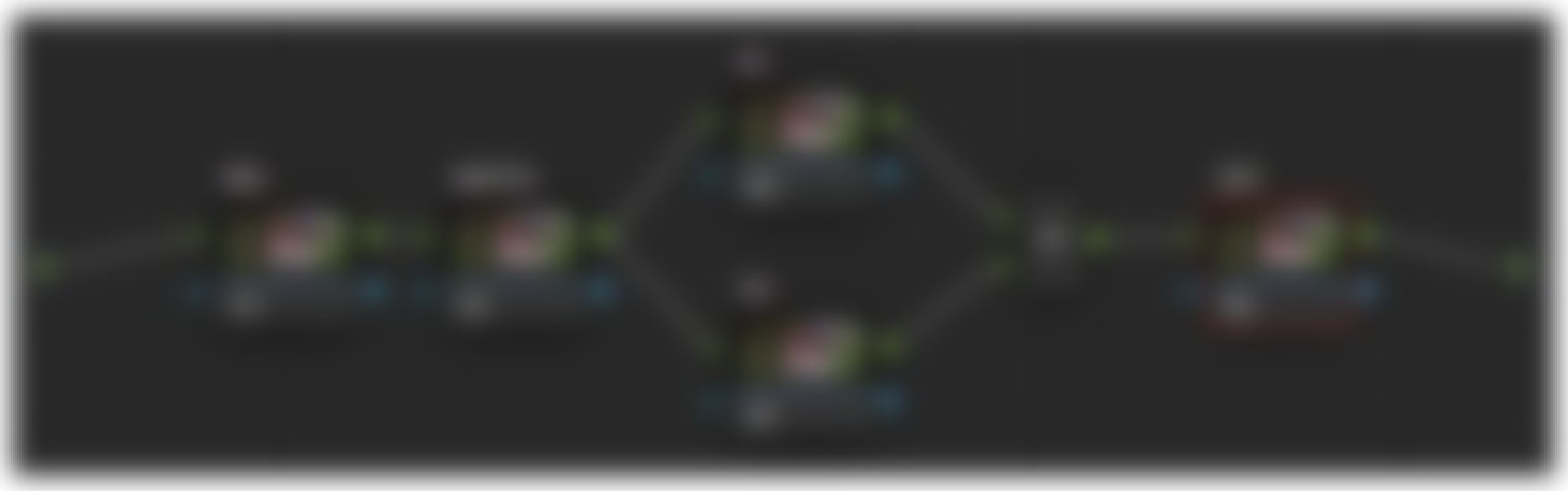
20 Go through the clips in the sequence and adjust the Color Warper to match the shirt color and saturation.

Activating Node Stacks

While some colorists love having every stage of the grade under their fingertips, others find a busy node tree hard to navigate and counter productive. Neither idea is wrong; it comes down to how one personally uses the software and the structures that best facilitate their workflow.

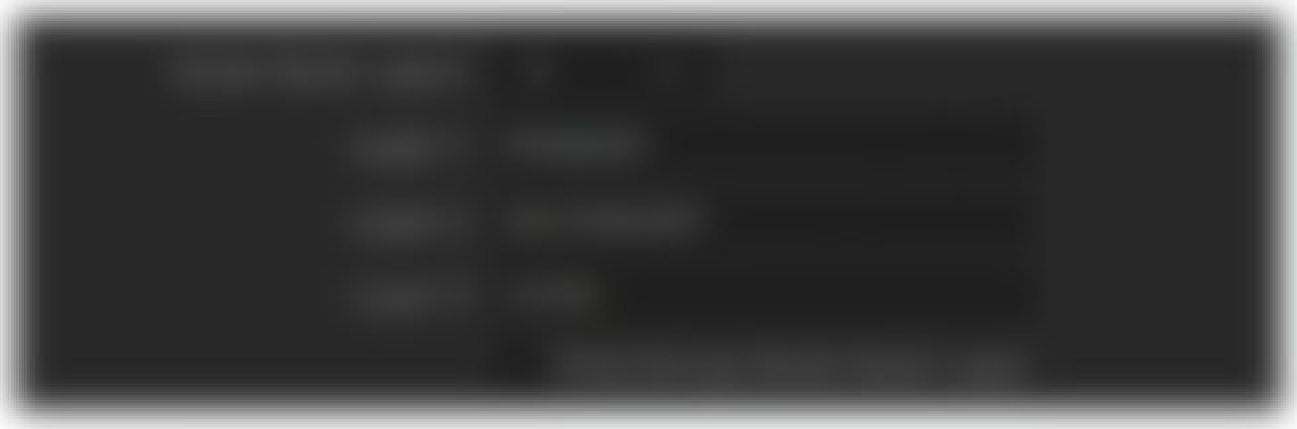
In DaVinci Resolve, you have the option of breaking up your node tree into a node stack composed of multiple Node Editor segments called layers. In this exercise, you will create a node stack and copy grades based on layers.

1. Select clip 28.
2. Build a node tree specific to primary color correction only.

   You can use the same nodes as in the previous exercise or apply the sample template from the Templates album.

3. Go to Project Settings > General Options, and in the Color section, change the amount of Node Stack Layers to 3.
4. Rename the layers **PRIMARY**, **SECONDARY**, and **LOOK**.

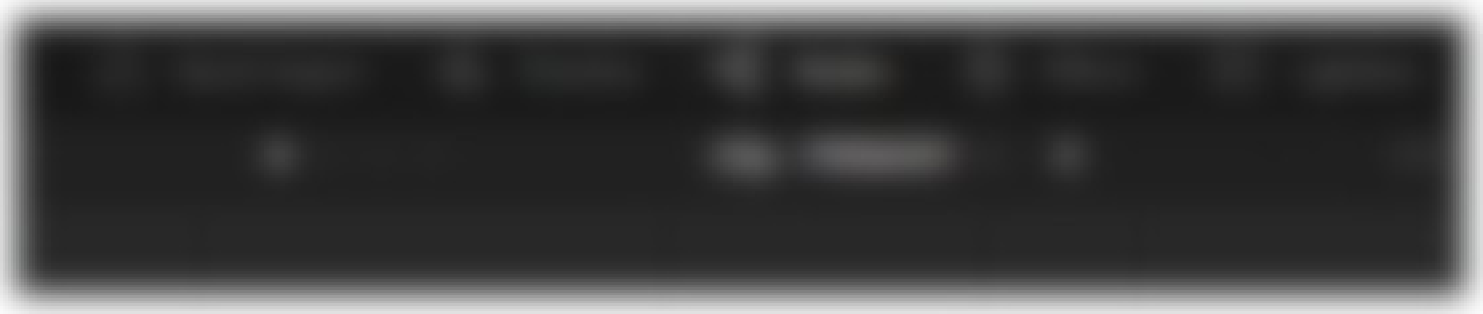
   Node Stack Layers 3

   Layer 1 PRIMARY

   Layer 2 SECONDARY

   Layer 3 LOOK

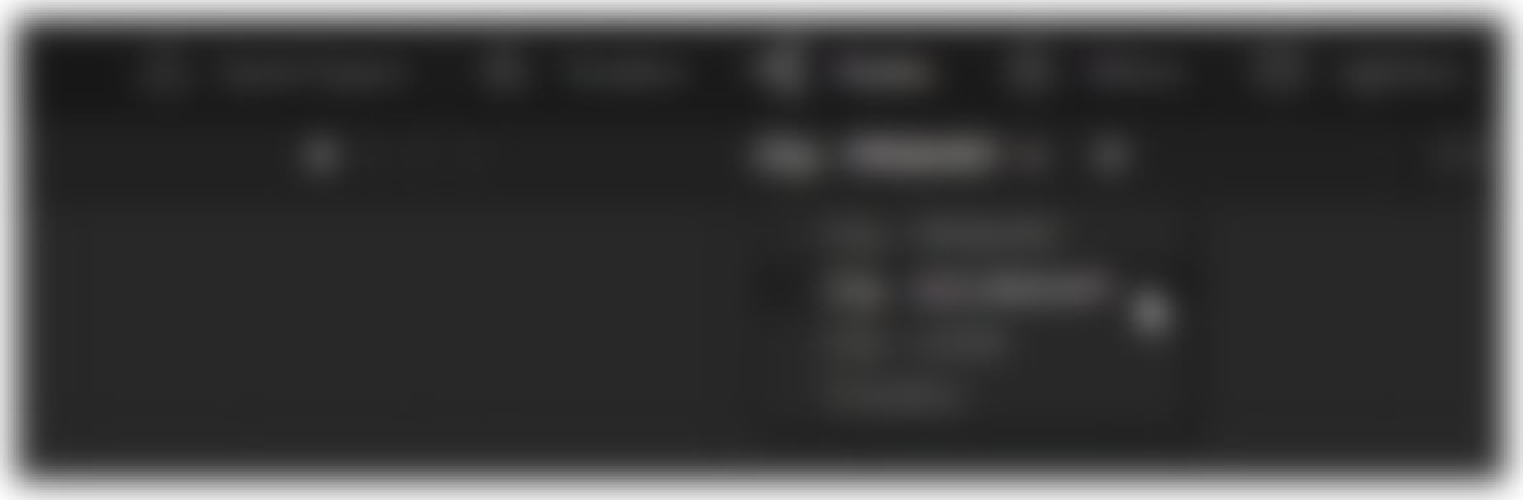
5. Click Save.

   Clip - PRIMARY

   The Node Editor now has the label "Clip – PRIMARY" in the upper right corner.

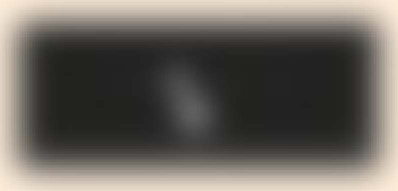
6. Click the dropdown arrow next to the label.



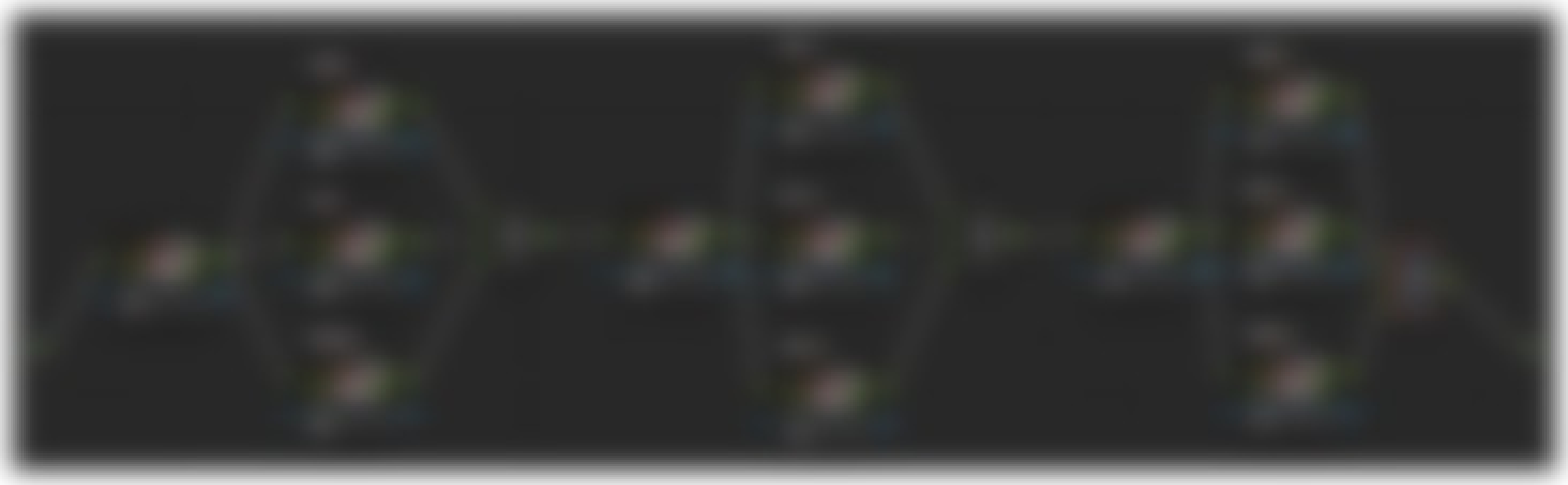
The Node Editor comprises three layers, followed by the Timeline Node Editor. You can think of a node stack as a segmented node tree. The output of one layer is the input of the layer that follows it.

7. Open the SECONDARY layer.

TIP If your screen resolution supports it, you can use the dot UI above the Node Editor to navigate between the different node stack layers.



8. Build a node pipeline dedicated to secondary color corrections.



9. Open the LOOK layer.
10. Create nodes for Look and Contrast.
11. Add a third node for Halation.

Halation is a natural analog film artifact that occurs when light travels through the emulsion layer and bounces off the film's base layer, resulting in a chromatic edge around bright objects and light sources.

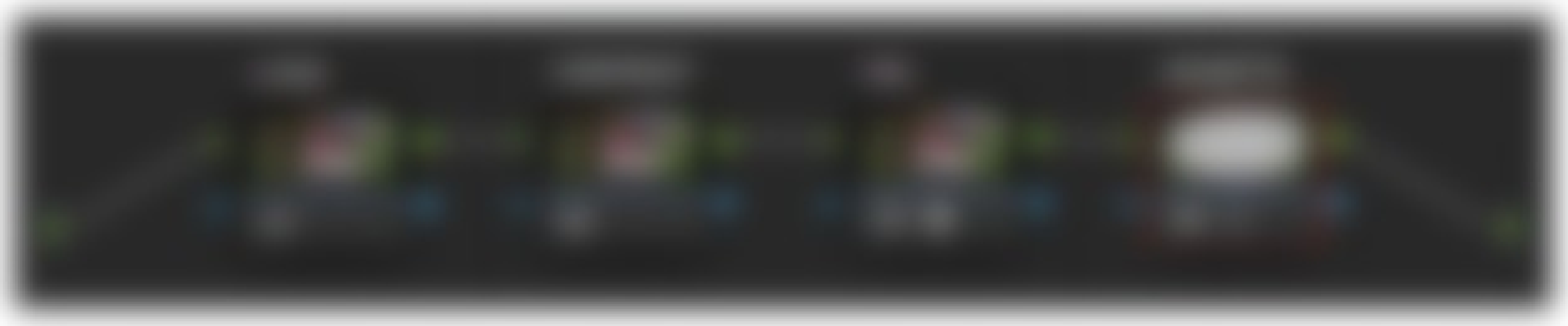
You encountered a halation tool when working with the Film Look Creator effect, but this stand-alone version gives you much more control over the final look.

- Open the Effects panel and drag the Halation effect onto the node.

  You can preemptively adjust the effect to suit the project style in the template.

- In the Halation settings, under Spr Layer Reflections, reduce Strength to [illegible] and Saturation to [illegible].

- Add a fourth node to the LOOK node tree for the vignette.



- Open the Window palette and apply the Vignette preset you generated in Lesson [illegible], or create a new one.

- Right-click in the viewer and choose Grab Still. Label the still **[illegible] TEMPLATE**.

- Select clips 27-31, right-click the template still, and choose Apply Grade. This will transfer all the layers of the node stack to all the selected clips. Middle-clicking will transfer only the active layer.

- With the PRIMARY layer active in the Node Editor, go through the clips and perform a primary pass. Ensure the clips are well exposed with matched contrast and saturation.

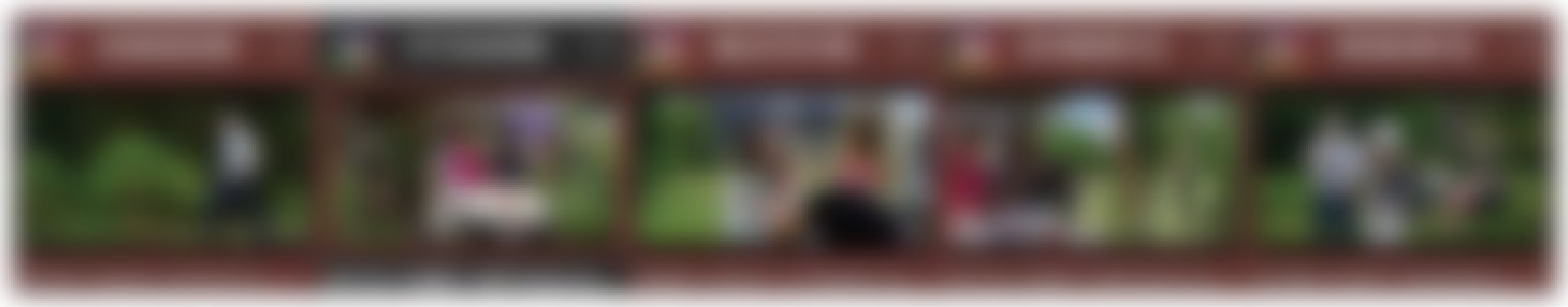
- Open the SECONDARY layer and perform a secondary pass. Focus on matching the skies and skin tones, particularly in clips 29 and 30.

- Open the LOOK layer.

- Using clip 28 as the hero shot, design a look for the sequence.

- Select clips 27-31 (excluding clip 28).

- Right-click clip 28 and choose Apply Active Layer to copy the node tree from the active LOOK layer **only**.



Applying a look grade will sometimes accentuate the differences between mismatched clips, requiring another primary or QC (quality control) pass. Depending on the source and quality of the footage, some colorists opt to apply a look first before doing primary and secondary passes.

Node stacks can help keep your workflow manageable by reducing the complexity of the tree in the Node Editor.

Another use for node stacks is for color management. In the next project, you will use the Color Space Transform effect to color manage footage within the Node Editor. With node stacks, you can have dedicated layers for end-to-end image treatment or for alternative outputs when needing to quickly switch between SDR and HDR standards.

Saving Stills for Other Projects

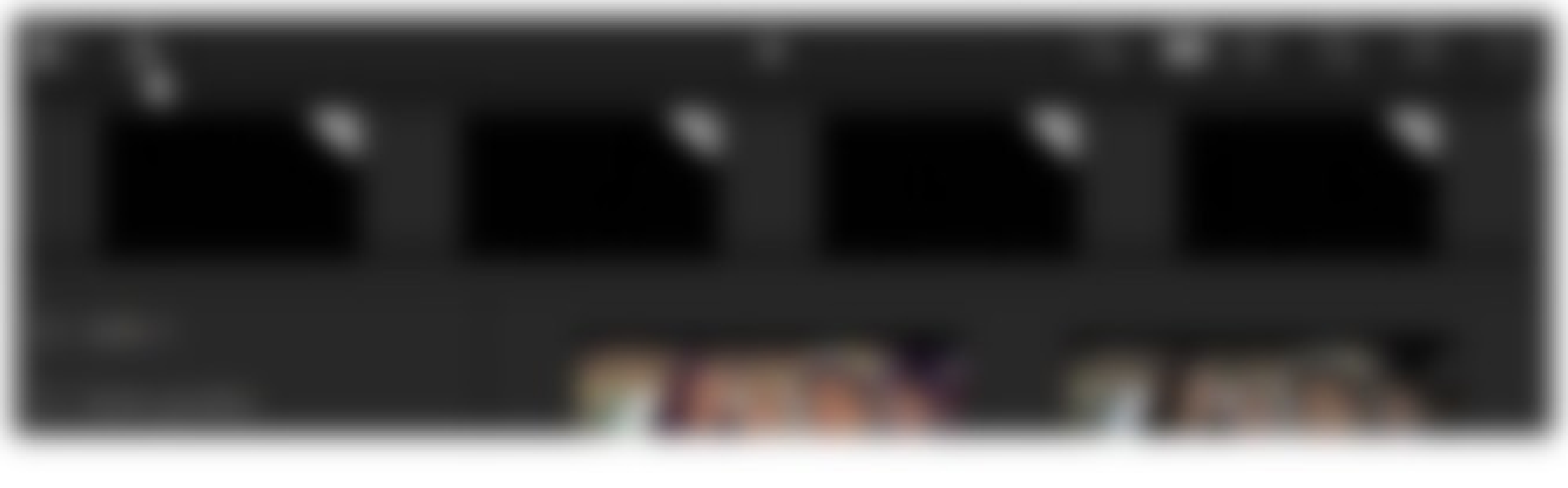
The stills in gallery albums are usually only available in the active project. A different kind of gallery album, the PowerGrade album, makes stills accessible to all projects in the active project library.

1. Open the Clip 01 grades album.
2. Click the **1.5.1 Bleach bypass** still to highlight it. Then hold the Command (macOS) or Ctrl (Windows) key and drag to the PowerGrade 1 album near the bottom of the Stills Albums list.

   This will move a copy of the still to the PowerGrade album.
3. Click the PowerGrade 1 album to view its contents. This copy of the bleach bypass grade will now appear in the PowerGrade 1 album of all the projects you create in the same project library.

   > **TIP** Double-click a PowerGrade still to append the grade to a selected clip on the timeline. Middle-clicking will apply the grade, just as it does with regular album stills.

   Another way of preserving commonly used grades and node structures is with memories.
4. Click the Memories button in the upper left of the gallery.

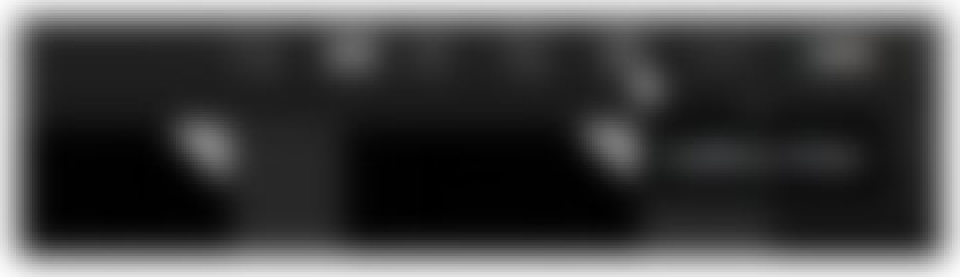


This reveals a section of the Gallery panel that can retain stills for quick access. You will create a memory still for converting footage into black and white.

- Select any ungraded clip on the timeline.
- Set Saturation to 0.00.
- Right-click in the viewer and choose Grab Still. Label it BW.

You can drag the still into a memory slot or expand the Gallery panel for additional features.

- In the upper-right corner of the gallery, click the Gallery View button.



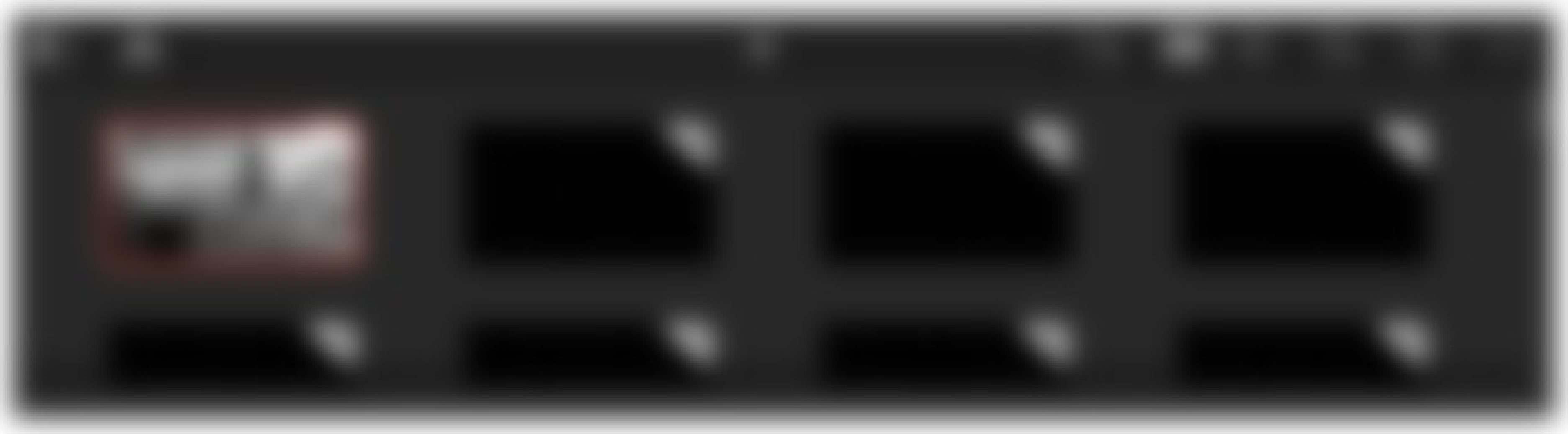
A separate window opens, displaying the full contents of the Gallery View.

The Stills sidebar in the upper left features a collection of DaVinci Resolve looks and provides access to stills from other projects and project libraries. The Group Stills panel at the top right shows the contents of the selected project's gallery.

The bottom of the window shows the current project's gallery, and to the left is the Project Memories panel.

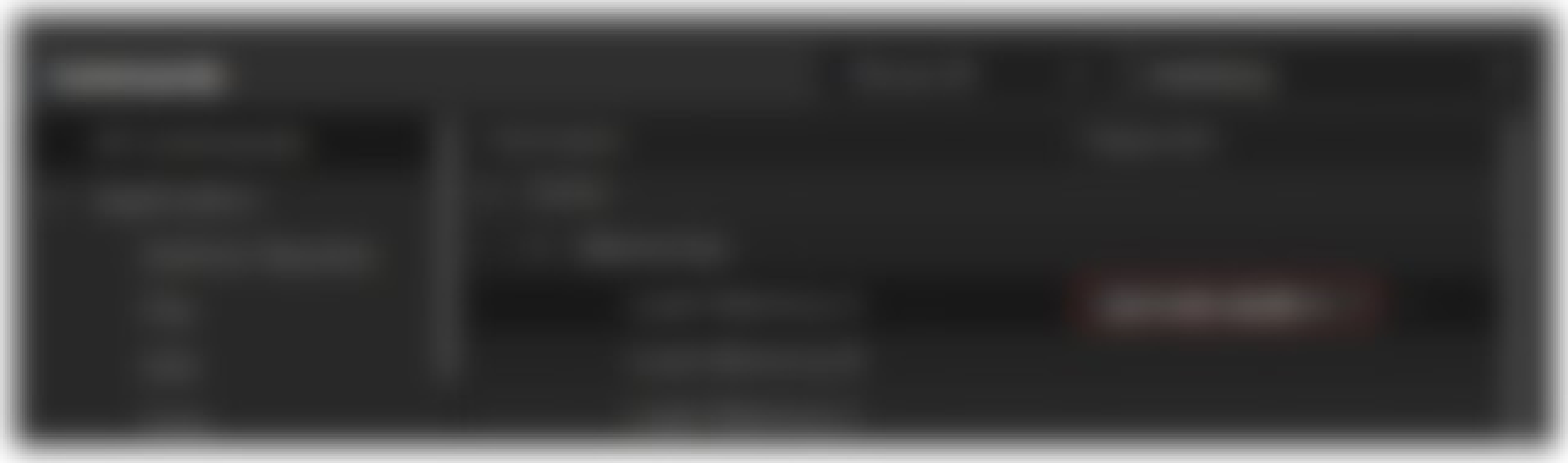
- Drag the BW still into the Project Memory A slot.

- Close the Gallery View window.



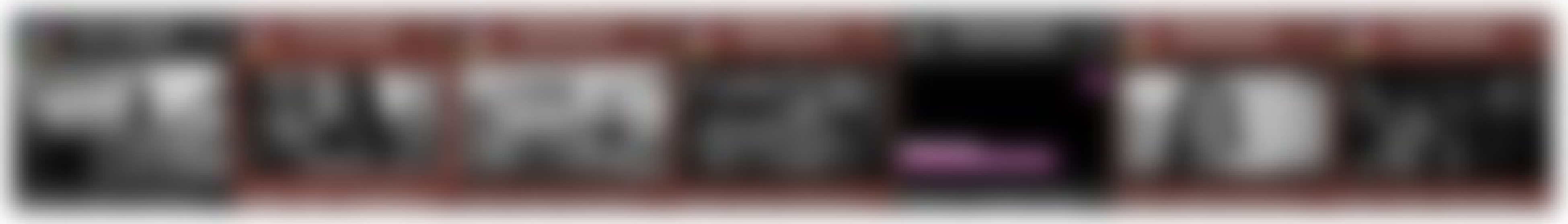
  You can now apply grades and arrange them directly from the Memories panel. You can also assign a shortcut to the memory for even quicker application.

- Open DaVinci Resolve > Keyboard Customization.
- Enter **memory** in the Commands search field, expand the Color > Memories list, and enter a shortcut keystroke for Load Memory A.



  When assigning memory keystrokes, use numbers that correspond to the letter of the memory as expressed numerically (A = 1, B = 2, etc.). A good choice for memory A would be Command-Option-Shift-1 (macOS) or Ctrl-Alt-Shift-1 (Windows).

- Click Save to close the Keyboard Customization window.
- Select clips 21–26 (excluding the graphic clip 24) and press your BW memory shortcut keystroke.

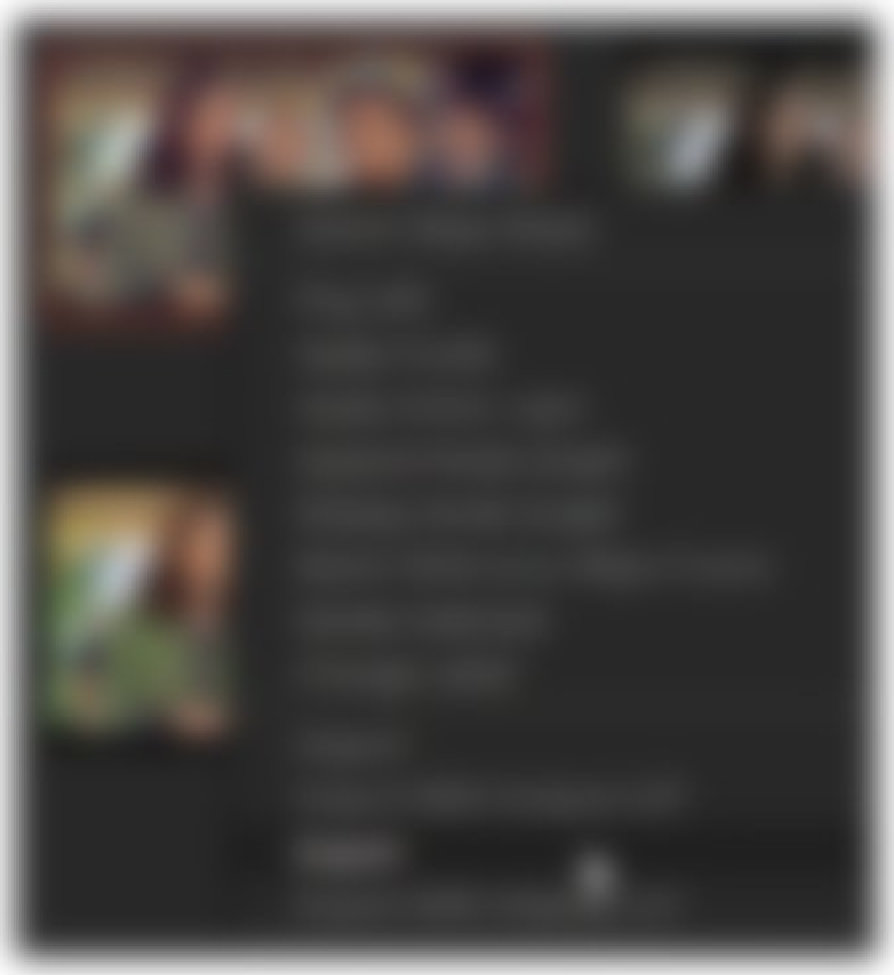


Storing stills in PowerGrade albums is convenient when working with established looks, such as when working on episodic projects or when retaining trade look templates for quick setups of new grading jobs. Memories can make for faster workflows when you need rapid and repeated application of specific grades. Couple them with keyboard shortcuts to significantly reduce the time you spend managing and applying stills.

Exporting and Importing Stills

Outside of using project libraries and PowerGrade albums, you can also share grades across different workstations by exporting them from the gallery.

- Open the Clip [illegible] grades album.
- Right-click the [illegible] still and choose Export.



The still's visual and grading information is exported and contained in two files. The DPX file is a high quality image format used for visual comparison and review. The DRX file contains the node tree and grading data. You need both files to migrate stills with grade information.

> **NOTE** If you have loaded a display LUT in the Project Settings Color Management > Video monitor lookup table, selecting Export With Display LUT will generate the DPX and DRX files after LUT signal processing.

- Indicate a location in your storage and create a new subfolder for the two files.
- Name the export **[illegible]** and click Export.

5 Open the file browser on your workstation and locate the two files.

You can share the DPX file as you would any regular image across applications that support the format. The DRX file is a DaVinci Resolve exchange format used to store grading (and effects) data that can only be processed together with the DPX image file. To import a still grade into DaVinci Resolve, both files must be in the same folder or directory.

Next, you'll import a grade that was created for one of the clips on the timeline.

6 Open the PowerGrade 1 album.

7 Right-click in the Gallery panel and choose Import.

8 In the file browser, locate the [illegible] – Project 02 folder and navigate to Other > Stills.

9 Select [illegible] and click Import.

Notice that you only need to select and import the DPX file. The DRX file is bound to the DPX, and its grading data will be included automatically upon import.

10 Apply the [illegible] still grade to clip 21 ([illegible]) in the timeline.

Here are some additional still options that colorists use for organizational and practical purposes:

- **Right-click in the viewer and choose Grab All Stills.** Doing so will generate a gallery still for each clip in the timeline (from either the first or middle frame). Colorists use this option to keep track of their grading process over time (day 1 album, day 2 album, and so on) or to separate the stills based on passes (balance pass album, secondary pass album, and so on).
- **Right-click in the gallery and choose One Still Per Scene.** This choice restricts the number of stills you can generate from any given clip to a single still. This option is popular among colorists who frequently grab stills of their clips and do not want for their galleries to become cluttered with thumbnails.

Migrating Timeline Grades Using ColorTrace

ColorTrace is a DaVinci Resolve feature that allows for transferring grading information across timelines. It is a much faster and more organized method of copying mass grade data than using stills.

You may use ColorTrace when multiple project types use the same source materials (film trailer, teaser, behind-the-scenes, and so on). Another scenario is when an external editor creates changes in a timeline that a colorist has already begun grading. In both cases, manually transferring the grades could be a mammoth task: a still would need to be generated for each clip and then carefully mapped to each corresponding clip on the new timeline. The workflow would be slow and would have a high potential for error since the overworked colorist would have to generate, organize, and rematch dozens (if not hundreds or thousands) of stills in the gallery.

ColorTrace bypasses all that by presenting two timelines side-by-side and helping the colorist identify their common media. The colorist needs only to accept (or reject) the match, and the grading data is transferred instantaneously.

1 Enter the edit page, and in the media pool, open the 02 Timelines bin.

2 Choose File > Import > Timeline.

3 Navigate to the BMD 17 CC - Project 02 folder, open the XMLs subfolder, and import **02 OutBackXML Mass.xml**.

4 In the Load XML window, deselect the option "Automatically import source clips into media pool" and click OK.

A pop-up window will prompt you to indicate the bins where the timeline's media is located. All the video media necessary to reconstruct this timeline was imported during the initial XML setup. Only the audio track has changed.

5 Click the disclosure arrows to expand the bin structure and deselect the 02 Audio bin. Click OK.

The 02_TooManyFools_Shawsons_Trailer edit appears in the Timeline panel of the edit page. The log window informs you that the audio track, TML_27 (source).wav, has failed to link.

6 Enter the media page and navigate to BMD 18 CC - Project 02 > Audio in the Media Storage panel.

7 Drag the missing audio file TML_27 (source).wav into the media pool's 02 Audio bin.

In the edit page, the timeline will now be fully imported and linked.

8 Enter the color page to check the grade status of the clips.

None of the grades created in 01_TooManyFools_Trailer are visible in this newly imported timeline. Each clip has a blank Node Editor with only the default ungraded node 01.

9 Return to the edit page.

10 In the media pool, right-click the 02_TooManyFools_Shawsons_Trailer timeline and choose Timelines > ColorTrace > ColorTrace from Timeline.

NOTE The ColorTrace option will only be visible in the contextual menu if the timeline you are right-clicking is the active timeline in the edit page.

In the ColorTrace Setup's Project List window, expand the project library folder and locate the Project 02 - Tea Much Life Trailer project.

Effects and Definitions

The Effects and Definitions panel under the Project List allows you to define a set of naming conventions for clips whose names have changed between timeline versions.

A common example where this may happen is in VFX workflows. Assume that the original filenames of two timeline clips were [illegible] and [illegible]. Both clips were sent to the VFX department for some compositing work. The VFX department returns the finished composites under the names [illegible] and [illegible] and they are inserted into a new version of the timeline. When ColorTrace is used to transfer the grading data from the original timeline, the new VFX clips are not recognized because of their new filenames. By entering "_vfx" in the Effects and Definitions panel, DaVinci Resolve can exempt the suffix when associating media between timelines.

Select the 01 TeaMuchLife Trailer timeline and click Continue to launch the ColorTrace tool.

At the top of the interface, you'll find tabs for switching between the Automatic and Manual modes.

Automatic attempts to locate the same clips used in both timelines based on source name, timecode, and other metadata, regardless of changes in position or trim.

Manual allows you to identify and match clips yourself. Using this method, you can assign grades when the original filenames or metadata were changed between edits.

The bottom of the interface provides additional information and control over the copy parameters. To the left is a table that compares the metadata of the source and target clips, which is useful when verifying that two clips are derived from the same take. To the right is a list of criteria that will be included or ignored during the grade transfer.

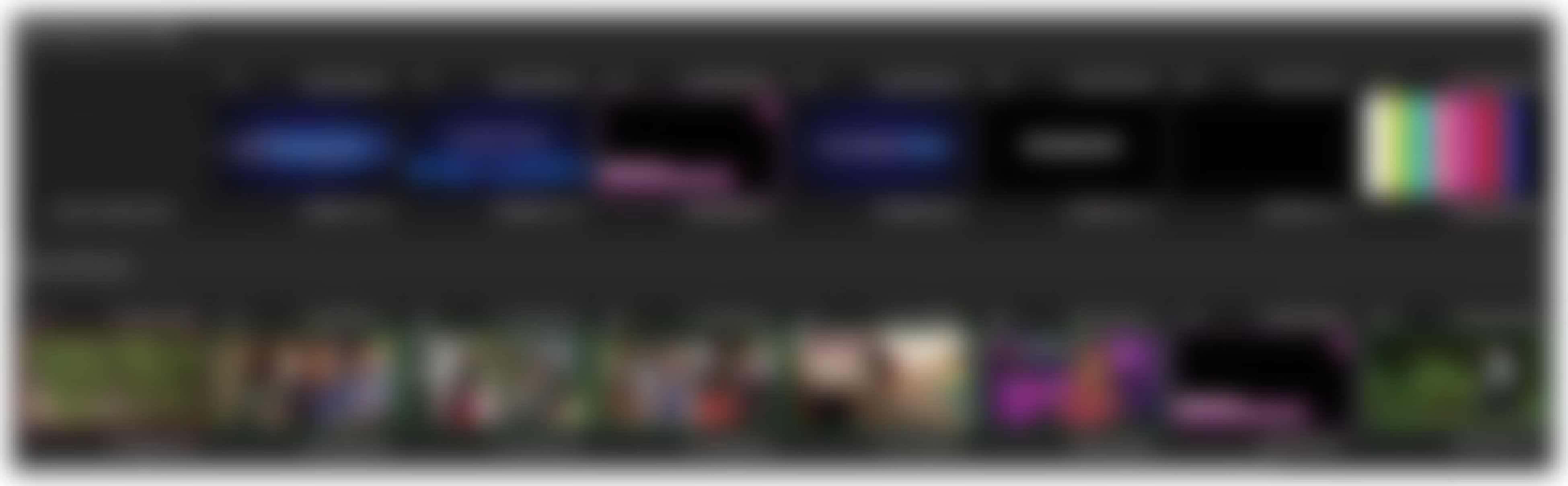
The clips in the Target Timeline have colored outlines that indicate their grade match status:

- **Green** – An exact match was found.
- **Blue** – Multiple matches were found.
- **Red** – No match was found.

You will need to review the Target Timeline to ensure the matches are accurate and any conflicts are resolved.

> **TIP** Select Hide Matching Clips at the bottom of the interface to remove all clips that are successfully matched in the timeline. Doing so will allow you to focus on the clips with multiple or no matches.

[illegible] In the Target Timeline, the graphic on clip 07 has a blue outline. Select it to see which clips are proposed as possible options in the Matching Source Clips list above it.



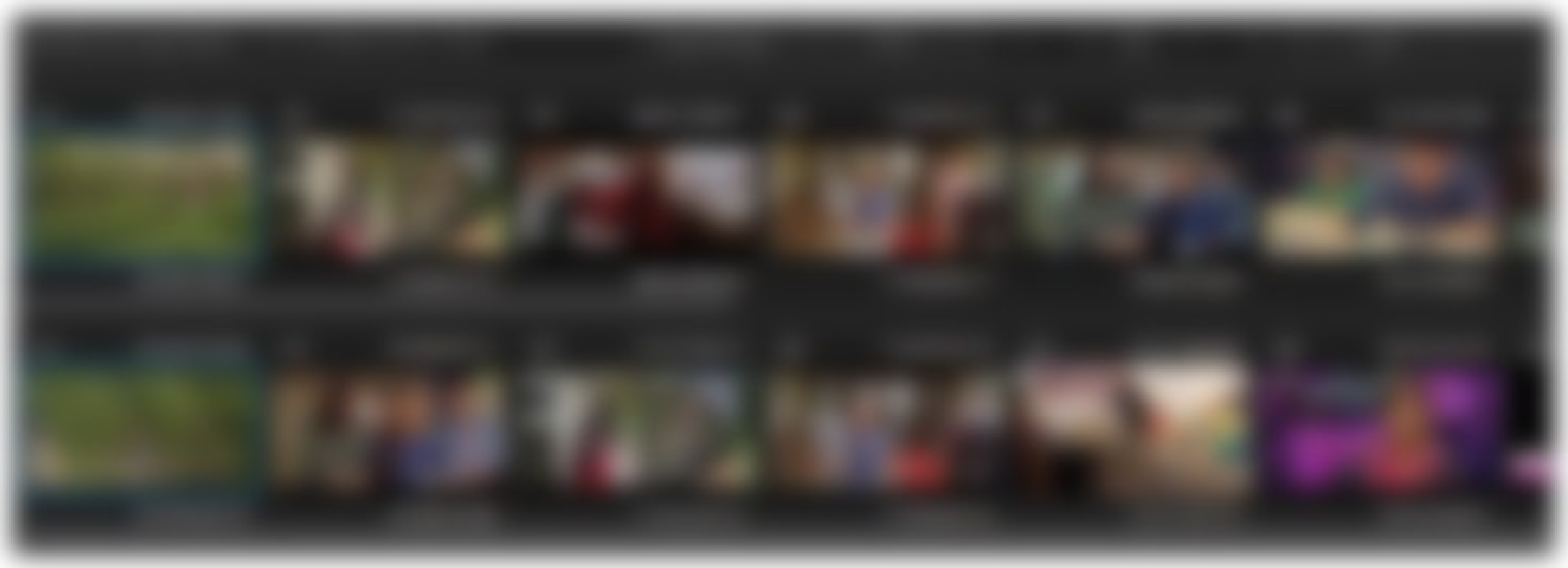
Clip 07 clearly corresponds to the clip numbered 04 in the Matching Source Clips window. You can verify this by looking at the table at the bottom left of the ColorTrace interface and checking the Name property of the Source and Target clips.

> **NOTE** If timelines in the ColorTrace interface feature blank thumbnails or missing clips, it may be due to missing thumbnail metadata. To fix this, open the affected timeline in the color page and briefly navigate around the timeline to prompt a thumbnail cache render.

- Double-click clip 04 to approve the match. Both clips' outlines will turn magenta as confirmation.
- Clip 11 also has a blue outline. Select it and double-click the corresponding clip 18 above to confirm the correct match.
- Scroll down the Target Timeline and confirm the matches for remaining blue-outlined clips: 15, 16, and 20.
- Clip 01 has a red outline and offers no options in the Matching Source Clips list. You will address this clip manually after committing the automatic matches.

> **NOTE** You can choose not to take time to define clips with no links to the original timeline. They will appear ungraded after the ColorTrace is performed.

- At the bottom of the window, click Copy Grade to transfer the grade data between the green and magenta clips.
- To resolve the red clips, click the Manual tab at the top of the window.
- In the Target Timeline, select clip 01.



The source timeline does not contain this clip. However, it features a similar clip 01 which was captured outdoors in a similar location, with the performer wearing the same clothes.

[illegible] In the source timeline, select clip 01 and click Paste to confirm the grade transfer.

[illegible] Click Done to exit ColorTrace.

[illegible] Enter the color page to verify that all the clips that were graded in 01 [illegible] Trailer were successfully copied to 02 [illegible] Trailer.

> **NOTE** Keying and tracking data is preserved when copying grades using ColorTrace.

Just as regrading timelines requires conforming, the ColorTrace workflow also calls for some manual review to ensure that all grades have transferred correctly. Regardless, ColorTrace is still a substantially faster and more accurate process compared to manual color migration and will greatly reduce your grading workload.

Copying Grades Using the Timelines Album

One of the quickest ways to transfer a single grade between clips in different timelines is by using the Timelines album in the gallery.

In this exercise, you will perform a quick grade on a clip in the active 02 [illegible] Trailer timeline and transfer it to the original timeline using the Timelines album.

[illegible] In 02 [illegible] Trailer, select clip 06.

[illegible] Reset the grade.

[illegible] In the ColorSlice palette, drag the Magenta vector's Density up to deepen the pink background.

[illegible] Drag the Hue parameter to change the background color from pink to purple.

[illegible] Enable Highlight mode in the viewer to preview the vector's range.

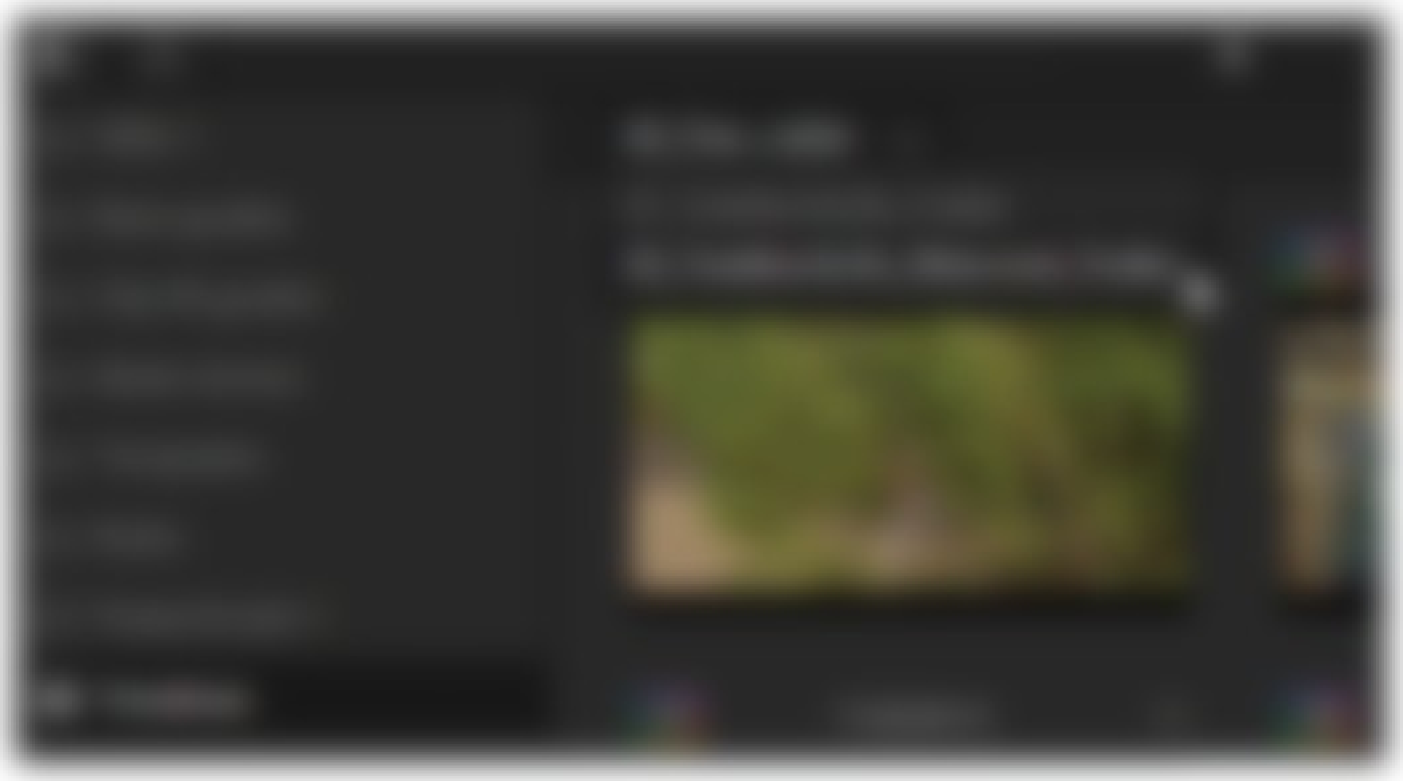
- Drag the Magenta Center parameter to adjust the vector range. You want the selection to focus more on the background and furniture and less on the pink flowers in the foreground.
- Disable Highlight mode.

Before

After

- Use the pop-up menu above the viewer to return to the 01 [illegible] Trailer timeline.
- In the gallery's Still Albums side panel, open the Timelines album.

- Use the pop-up menu at the top to access the [illegible] grade contents.



The gallery now displays the current state of all the clips in the [illegible] timeline. Note that even the ungraded graphics clips are included. This helps you keep track of both graded and ungraded clips in various timelines.

- In the [illegible] timeline, select clip [illegible].
- In the gallery, middle-click clip [illegible] to transfer the graded interview clip.

The exercises in this lesson presented a broad list of options for grade setups and duplication. When copying grade data, it's important to consider your needs on a project-by-project basis. In most cases, a combination of one or more of these copying techniques is ideal. In other cases, a mix of methods could be less efficient than employing a more global solution such as ColorTrace or remote timelines.

Self-Guided Exercises

Complete the following exercises in the [illegible] timeline to test your understanding of the tools and workflows covered in this lesson.

Clips [illegible] – Transfer the montage grade from clips [illegible] to the remainder of the clips in the sequence.

Clip [illegible] – Remove the black and white grade from the clips. Then, using the Broadcast Studio grade on clip [illegible] as a starting point, transfer the vibrant purple and yellow look across the rest of the broadcast studio sequence.

When you've completed these lessons, you can import [illegible] COMPLETED.drt and [illegible] COMPLETED.drt to compare your work with the "solved" versions of these timelines. If any media appears offline, click the red Relink Media button in the upper left corner of the media pool and specify the location of the Project 01 media on your workstation.

To ensure the project management is set up correctly, right-click the imported timeline and choose Timelines > Timeline Settings. Select Use Project Settings in the lower left of the settings panel to link it to the project-wide color management settings.

Lesson Review

- How do you create a new local version of a grade?
- How many layers are in a node stack?
- True or false? You can access stills saved in other projects and project libraries.
- How do you copy just one node from the node tree of a still in the gallery?
- True or false? You can create keyboard shortcuts for your favorite grades and stills.

Answers

1. Right-click and choose Local Versions > Create New Version or press Command-Y (macOS) or Ctrl-Y (Windows).
2. You can choose to have up to four layers in a node stack.
3. True. Click the Gallery View button to launch the expanded gallery and access the galleries of other projects and project libraries in the Stills sidebar.
4. Right-click the still in the gallery and choose Display Node Graph. Then, drag the necessary node into the Node Editor of the active clip.
5. True. You can create keyboard shortcuts for grades in the form of Project Memories.

Part III

Optimizing the Grading Workflow

Lessons

- Using Groups
- Adjusting Image Properties
- Setting Up Raw Projects
- Delivering Projects

Welcome to Part III of The Colorist Guide to DaVinci Resolve 17. This section covers more advanced image processing efficiency and DaVinci Resolve processes that manipulate and render image data. You will create group grading workflows based on shared criteria, adjust common optic image properties, set up raw materials in the industry standard ACES framework, and deliver the final project.

Project File Location

You will find all the necessary content for this part of the book in the folder [illegible]. Follow the instructions at the start of every lesson to find the necessary folder, project, and timeline. If you have not downloaded the third set of content files, see the "Getting Started" section of this book for instructions on how to do so.

Lesson 7

Using Groups

In this lesson, you will focus on an organizational feature of the color page that enables clip grouping based on shared contextual or visual criteria.

Although generating and organizing groups is incredibly simple, the time-saving and future-proofing benefits can lead to much more efficient workflows and advanced grading techniques. In addition to applying group-wide color management and grades via the Node Editor, the grouping feature allows timeline filtering based on group name and the use of the split screen to quickly compare clips in the same group.

Time

This lesson takes approximately 2.5 hours to complete.

Goals

Preparing Media Using Scene Cut Detection 264
Creating a Group 272
Applying Base Grades at the Pre-Clip Group Level 277
Making Clip-Specific Adjustments at the Clip Group Level 288
Automatically Tracking People and Objects 295
Creating a Unifying Look Using the Post-Clip Group Level 312
Working with Lookup Tables 317
Using the Timeline Level 322
Self-Guided Exercises 330
Lesson Review 337

Preparing Media Using Scene Cut Detection

The first video project in this section is a single self-contained video file. Placing the video directly onto a timeline in DaVinci Resolve would result in it being treated as a single clip and all grading changes on the color page would affect it uniformly. To avoid this, you can place cuts throughout the timeline to separate the individual shots and allow for content-specific grading. Doing this manually can be extremely time consuming and prone to human error.

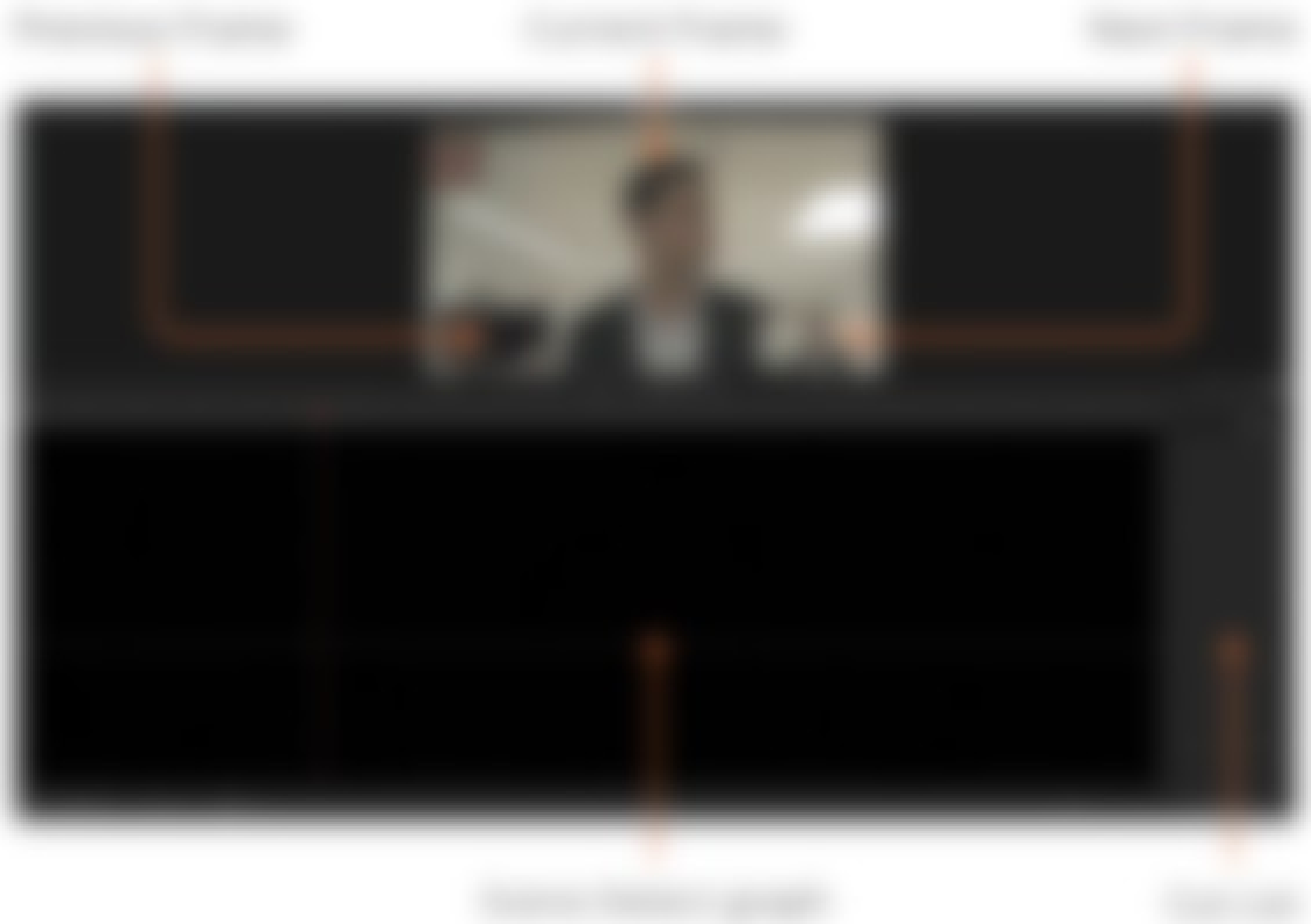
Fortunately, the Scene Cut Detection feature automates this process. It analyzes edited video files before import and splits their content into subclips to facilitate clip-by-clip grading.

- Open DaVinci Resolve [illegible].
- In the Project Manager, click the New Project button.

  When you create a new project, a dialog will prompt you to enter the project name and specify a storage location for all media generated within DaVinci Resolve, such as voiceovers and ADR (automated dialogue replacement) that are recorded directly to the audio track.

- Enter the name **Project [illegible] - The Long Birthday Commercial**.
- If necessary, click Change Location and select an optimal folder for your generated media.
- Enter the media page.
- Create two new bins in the media pool labeled **Video** and **Timelines**.
- Select the Video bin as the destination for the media you are about to import.
- In the media storage browser, locate the [illegible] – Project [illegible] folder.

9 In the Folder, right-click the [illegible] file and choose Scene Cut Detection.



You will use this interface to run the edit analysis and import the resulting subclips. At the top of the window, three viewers display the current frame (middle), the previous frame (left corner), and the next frame (right corner). Below the viewers, the Scene Detect graph displays the location of the video's cut points after the analysis. To the right, the Cut List identifies the scene cuts and their timecodes.

10 In the lower-left corner of the window, click Auto Scene Detect.

As the analysis runs, the assumed edit points are marked with green lines in the Scene Detect graph, and their timecodes are recorded in the Cut List.

TIP The height of the vertical green cut lines indicates DaVinci Resolve's confidence that a cut has been correctly identified. Cuts that fall under the horizontal magenta "confidence line" are omitted from the cut list and appear gray on the graph.

When a video has many jump cuts and whip pans, the Scene Cut Detection tool might place many cuts beneath this confidence line. To include low-confidence cuts in the final Cut List, drag down the magenta line until the vertical lines turn green.

- To review the edits, scrub through the timeline by dragging the orange playhead or click inside the Cut List and press the Up and Down Arrow keys to navigate and verify the identified cut points.

TIP You can also press P (previous) and N (next) to jump between the cut points in the Scene Detect graph.

A correctly identified cut will display a unique image in the left corner viewer, followed by two similar images in the center and right corner viewers.

- Navigate through the edits in the Cut List until you reach scene 12.

Although DaVinci Resolve detected a cut here, it is actually part of the same take. The false detection occurred because of a headlight lens flare that created enough of a visual change in the frame to make DaVinci Resolve identify it as the start of a new shot.

[illegible] With the cut already selected, in the lower left of the Scene Cut Detection window, click Delete to remove it.

[illegible] Press the Down Arrow key to continue navigating through the Cut List and ensure that all the remaining cuts are correctly identified.

Toward the end of the timeline, you'll find a large cluster of cut points. Dissolves and transitions are prone to misidentification and will sometimes be marked as a series of rapid cuts.

[illegible] Drag the playhead to the left of this cluster and press I to create an In point in the Scene Detect graph.

TIP Drag the scroll bar under the Scene Detect graph to zoom in and out.

[illegible] Drag the playhead to the right of the dissolve cluster and press O to place an Out point.

[illegible] On the right side of the toolbar, click the Prune icon to delete this batch of false cut points.

[illegible] Ensure that no other cut points from this transition area remain. If one is still present, drag the playhead over it and press Delete.

[illegible] Press the Left and Right Arrow keys to move through the video frame by frame and identify the exact cut point between the last clip and the solid white color matte at the end of the timeline.

[illegible] Click Add to add this edit to the Cut List.

A green line appears under your playhead to indicate an edit point. A new item also appears in the Cut List with the frame number ([illegible]) and start timecode ([illegible]) of the cut point.

You have now reviewed all the cut points on this timeline. At this point, you should have [illegible] scenes in your Cut List.

[illegible] In the lower-right corner, click Add Cuts to Media Pool.

NOTE When importing media, if a dialog appears informing you that your clips' frame rates don't match the project's frame rates, click Change to update the project settings to accommodate the media. However, you shouldn't change a project's frame rate if you have set it up with a specific deliverable in mind. In that case, the media will automatically be retimed to accommodate the timeline frame rate.

When working on longer films or with edits featuring frequent jump cuts, reviewing scene cut detection can be a time-consuming process. You can choose to break up the task into several sessions, backing up your progress as you go.

[illegible] To back up the completed scene cut, go to the Options menu at the upper right of the window and choose Save SceneCut.

[illegible] Choose a location to save the .scc file.

[illegible] When finished, click X in the upper-left corner to close the Scene Cut Detection interface.

The commercial now appears in your media pool as a series of subclips in the Video bin.

TIP In DaVinci Resolve Studio, scene cut detection can be performed on media after it has been imported and added to a timeline. In the edit page, click to select a clip on a timeline, or use In and Out points to indicate a range of clips, and then choose Timeline > Detect Scene Cuts. The resulting cuts can be edited via the rolling trim tool or deleted using the Delete (Backspace) key.

Although colorists ordinarily prefer to work with raw camera materials, flattened video renders are still popular for their lighter file size and faster transfer speed. This method of content migration is particularly popular when working on short-form projects such as commercials, music videos, and mini documentaries. It simplifies project sharing when working with remote clients who don't have access to servers or fast internet connections. Additionally, this workflow is often necessary when working on older projects for which the original media no longer exists and only the master render is available. In both cases, it's crucial to use the highest quality codec and file format possible and to avoid overlaid text, effects, or transitions that cannot be disabled in the rendered video file.

Creating a Timeline from Selected Media Pool Clips

Before you can start grading, you must arrange these subclips in a timeline. To ensure that the clips populate the timeline in the correct order, you will organize your media pool by timecode.

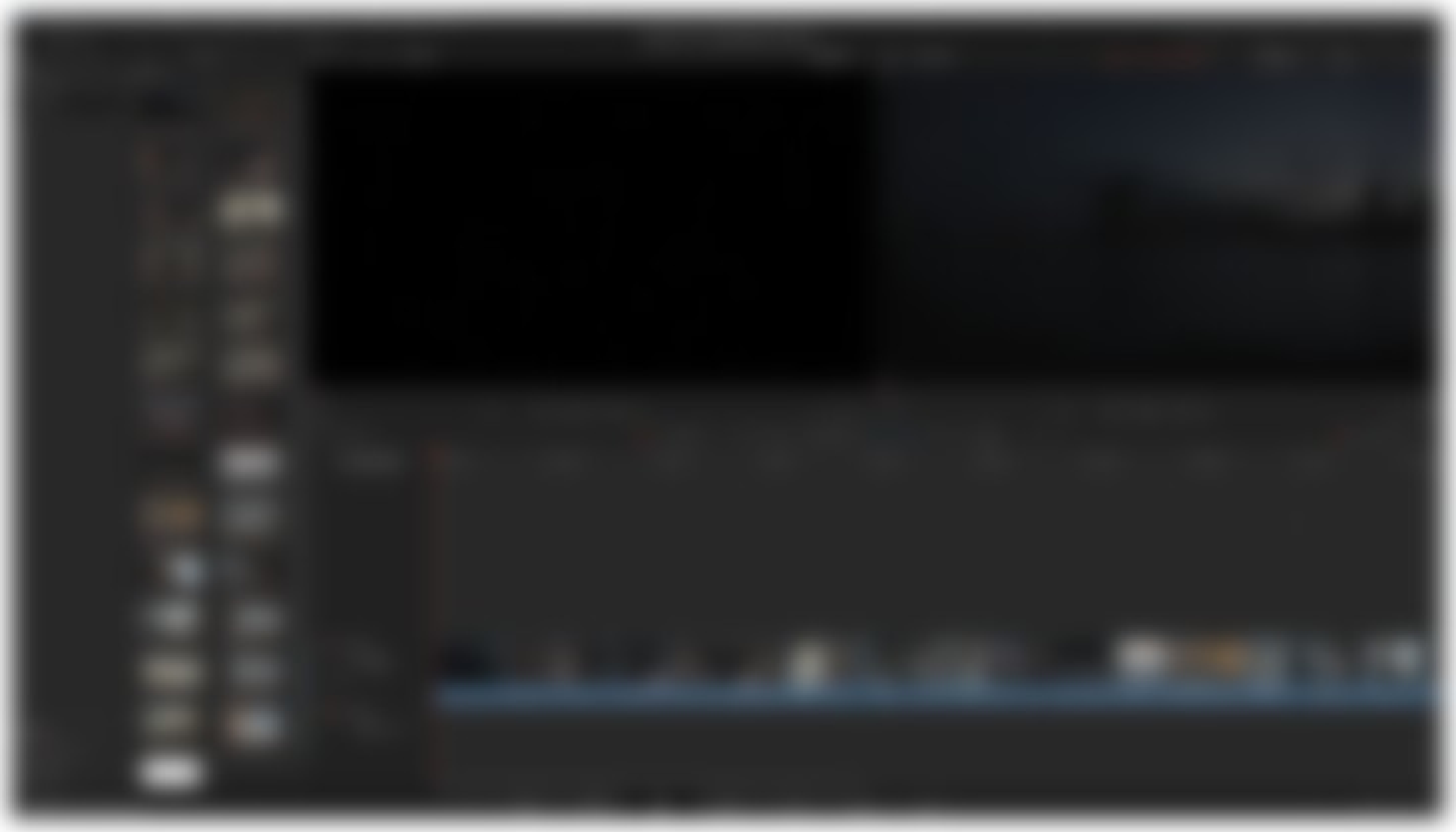
1. In the upper right of the media pool, click the List View button to access the metadata columns.

2. Click the Start TC column title to sort the clips by their start timecodes.

With the clips listed in their correct order, they are now ready to be placed into a timeline.

TIP Clicking any column title will sort the contents of a bin by that criterion. Clicking the column title again will toggle the order from ascending to descending.

- Enter the edit page.
- Select all the media in the Video bin by clicking one clip and pressing Command-A (macOS) or Ctrl-A (Windows).
- Right-click any of the selected clips and choose Create New Timeline Using Selected Clips.
- Name the new timeline **Project 02 - The Long Workday** and click Create.



A new timeline appears on the edit page containing the 27 selected clips in the media pool.

- Drag the timeline into the Timelines bin.

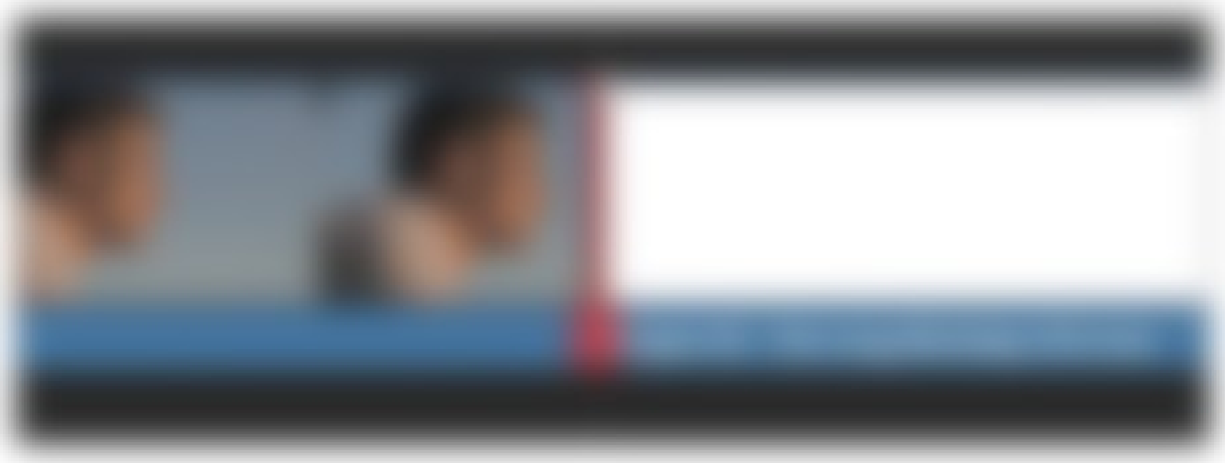
Your import process is now essentially complete. At this stage, you can set up color management and start grading.

However, let's look closer at another factor that may impact your work and set up the timeline for more seamless grading.

- Navigate to the last cut in the timeline, where the shot of the man fades to white.

This might prove difficult to grade because you will need the final look of the shot to fade to white as the commercial ends. Normally, you'd apply a video transition to facilitate this, but that is not possible on a subclip. Instead, the color will abruptly shift to white as the playhead reaches the cut point.

This is why clients should be advised not to leave transitions in self-contained video renders and, preferably, to include handles (extra media frames) around the media trims to allow for later transition application. If you were to attempt to add a dissolve to the timeline right now, it wouldn't take because of the lack of trim data in the subclips. In the timeline, this is indicated by red trim lines.



By changing how the media is conformed on the timeline, you can alter the behavior of cut points while maintaining control over the individual clip properties.

Importing Pre-Conformed EDLs

In this exercise, you will rebuild the same timeline using a pre-conformed EDL process to ensure a smoother overall workflow. With this method, your clips will have trimmable cut points and unique attributes (which are necessary for inputting metadata, adding flags, and assigning input color spaces).

You'll start by returning to the Scene Cut Detect interface in the Media Storage panel.

1. Go to the media page.
2. In the Media Storage panel, right-click Project 03 - The Long Birthday EDL.mov and choose Scene Cut Detection again.

   If DaVinci Resolve has not been closed since the last exercise, the Scene Detect window will appear with all the previous cuts loaded in the Scene Detect graph and cut list. If the window is empty, go to Options > Load Scene List and import the .cc file you generated earlier (or rerun the entire Auto Scene Detect exercise).

3. In the Options menu in the upper right, choose Save EDL.
4. When the Conform Settings dialog appears, click OK and choose a location to save the EDL file.

   In the second part of this book, you conformed a timeline from an XML file. An EDL serves the same function, although with significantly less metadata. It's usually insufficient for sharing timelines with collaborators but works very well when the only data you need are the edit points in a self-contained video file.

5. Click X in the upper left corner to close the Scene Cut Detection interface.

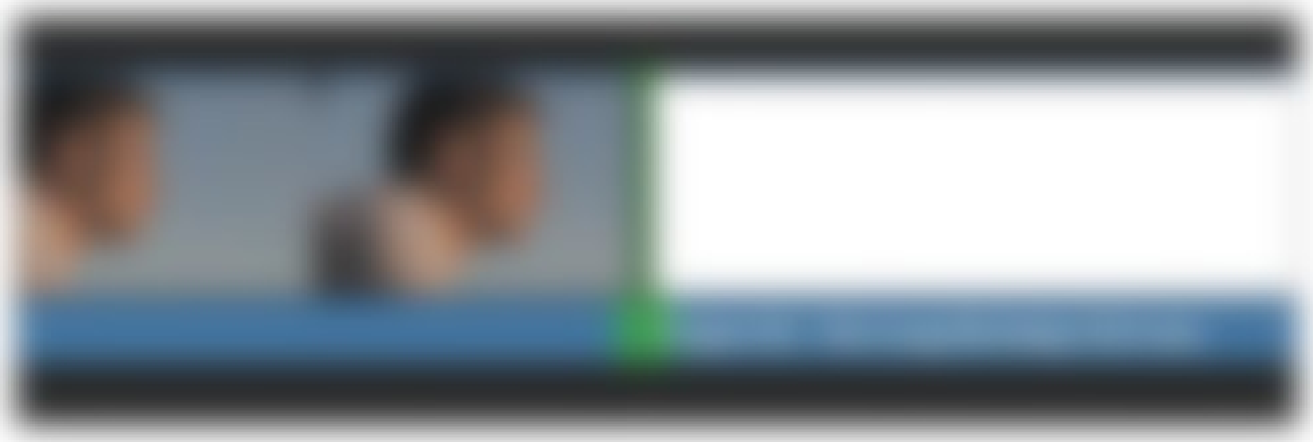
   To reconstruct the timeline with trim data, you'll need to work with a non-trimmed version of the video file.

6. Delete the timeline in the Timelines bin and all the subclips in the Video bin.
7. Drag **Project 03 - The Long Workday DCE.mov** into the Video bin.
8. Click the Timelines bin and choose File > Import > Pre-conformed EDL.
9. Navigate to the location of the EDL file you had generated and import it.
10. In the "Force preconform options" dialog, click OK.
11. A pop-up will prompt you to indicate where the media for the timeline is located. Since the self-contained video file is already in the Video bin, you can click OK to confirm.

    The timeline Project 03 - The Long Workday EDD appears in the Timelines bin.

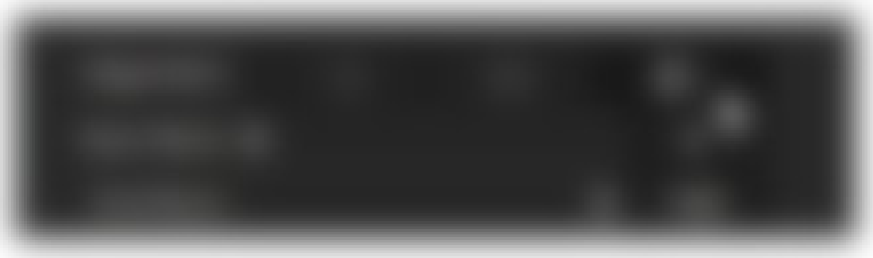
12. Double-click the timeline to launch it in the edit page.
13. Navigate to the last cut in the timeline, where the shot fades to white.

    The cut point now highlights green when you click it. This means you can add a video dissolve to it.



    To test this, you will grade the penultimate clip and ensure it fades to the white solid at the end.

14. In the edit page, open the Effects panel.
15. From Toolbox > Video Transitions, drag Dip to Color Dissolve onto the cut point.
16. Select the dissolve on the timeline and open the Inspector.
17. Double-click the Color swatch box and change the color to white.
18. Set the Alignment to Right.



- Go to the color page.
- Select clip 26.
- Drag the Gain color wheel toward orange.
- With looping disabled in the viewer, play the end of the timeline to watch the vibrant orange look dissolve seamlessly into the white matte at the end.
- Reset the grade on clip 26.

The additional steps you took to create this timeline after the original Scene Cut import will not always be necessary but will be invaluable when working with limited media trims that require dissolves. This solution is particularly helpful when working with dissolves between two video clips, where a simple solid matte would not solve the issue.

Enabling Smart Caching

Caching is a process in which a clip is rendered while it is still in the timeline so you can play it back in real time when reviewing it. It's similar to exporting, except the rendered clip is automatically viewable as part of the timeline media.

Some of the tools you will use in the upcoming exercises will be processor intensive and might impact playback speed. You will enable Smart caching to automatically render certain clips as you work on them.

- Choose Playback > Render Cache > Smart.

  Using the Smart Cache option leaves it up to DaVinci Resolve to determine which media or nodes are computationally intensive enough to require caching.

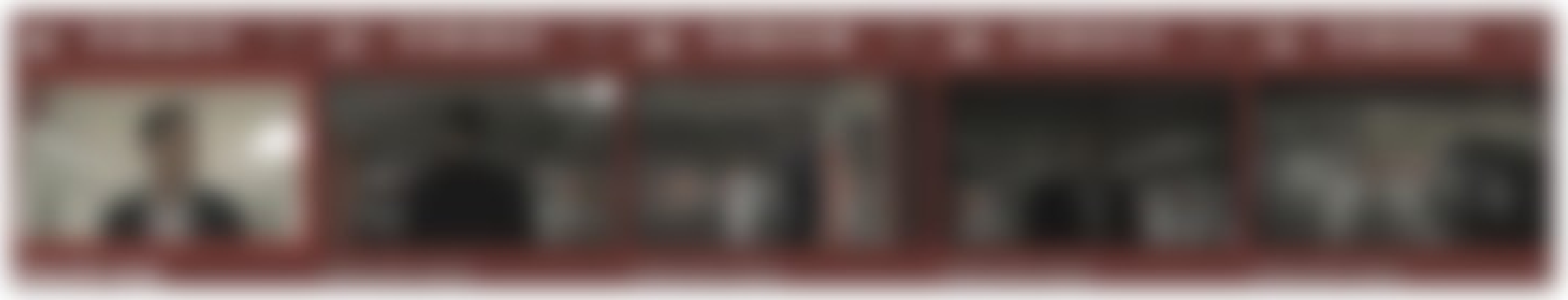
You'll learn about caching in much more detail in Lesson 8, "Adjusting Image Properties."

Creating a Group

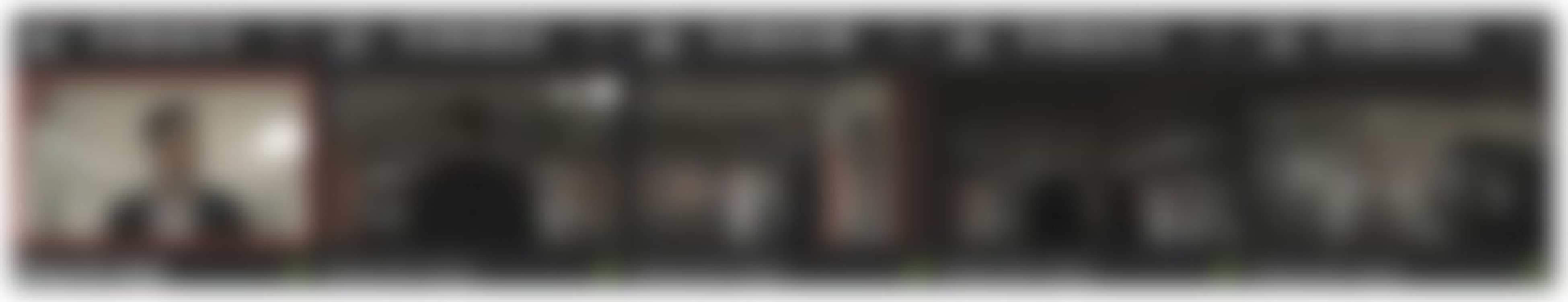
When incorporating groups into a grading workflow, your first task is to choose a grouping strategy for your timeline. Depending on the project, you can base groups on source cameras, locations, scenes, color schemes, or any criteria of your choice.

In the commercial project in this lesson, you will create groups to differentiate between scenes based on their locations and times of day.

- Select clip 06 and Shift-click clip 13 to select the eight consecutive garage clips in the timeline. Ignore for now that clip 13 is a highway clip.



- Right-click any of the highlighted clips and choose Add into Current Group.



A green link symbol appears in the lower-right corner of the clips to indicate their group status. These clips will now react uniformly when you utilize the group-level Node Editors in later exercises.

- Right-click any of the grouped clips and choose Groups > Group 1 > Rename.
- Enter the group name **Garage**.

Upon closer inspection, it appears that clip 13, the highway shot, does not belong in this scene and should not be included in this group.

- Right-click clip 13 and choose Remove From Group.

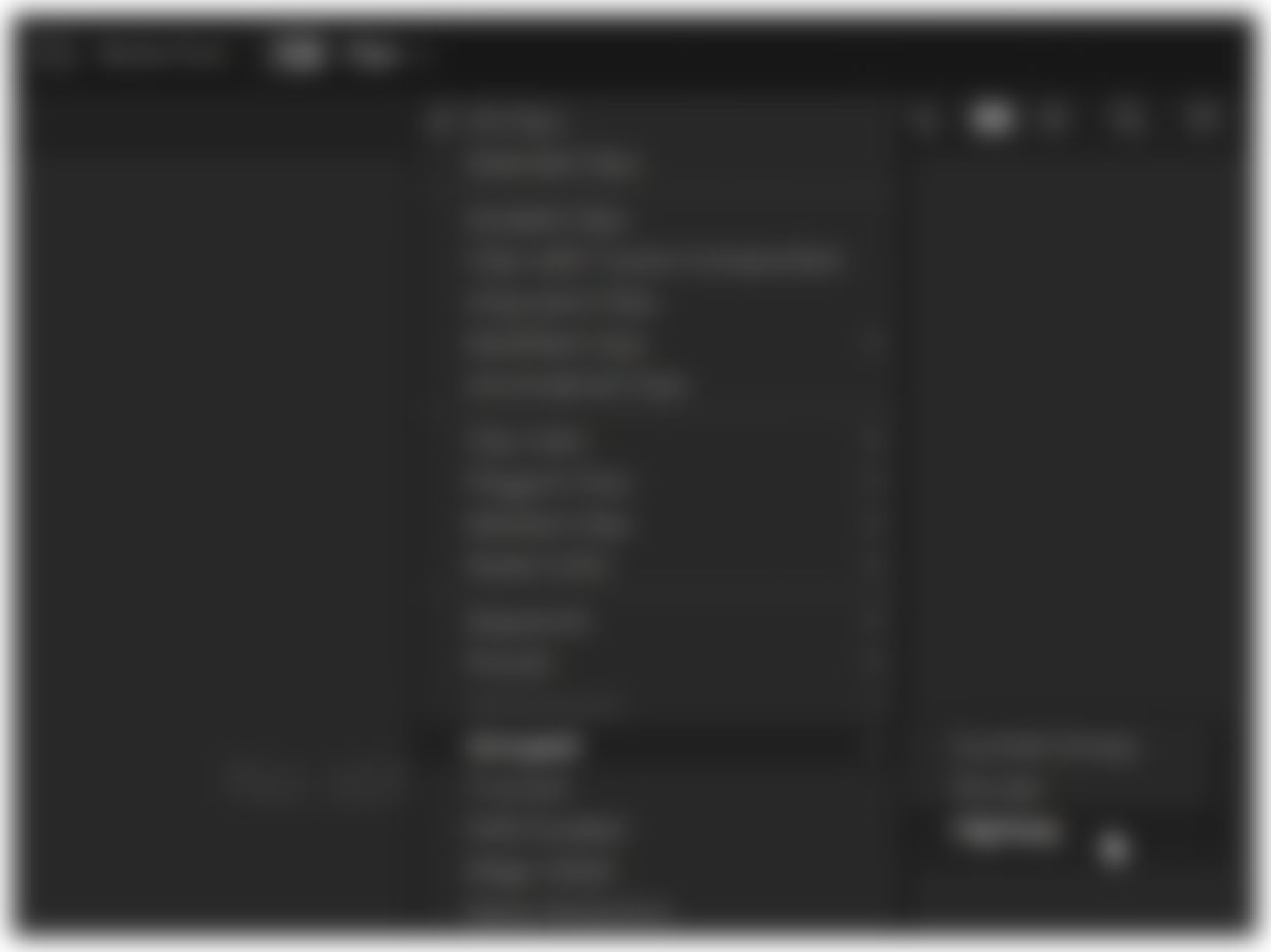
You can also use groups for filtering purposes.

- In the timeline, Command-click (macOS) or Ctrl-click (Windows) clips 02 and 13.
- Right-click one of them and choose Add into a New Group.
- Enter the group name **Highway**.

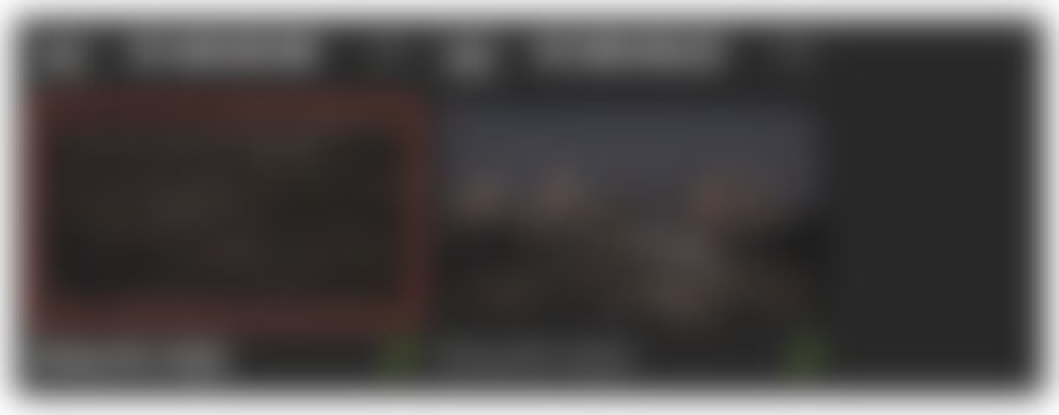
The link symbols on the Garage group disappear and are now visible only on the Highway group clips. From now on, the green link symbols will appear only for the actively selected group clips.

The two Highway clips are relatively far apart on the timeline, so matching them could become tedious as you navigate up and down the timeline to compare them.

9 In the interface toolbar, choose Clips > Groups > Highway.



The filter hides all media except the two highway clips, which now appear side by side. You can quickly compare and match them using the Up and Down Arrow keys.



10 Select Clips > All Clips to remove the timeline filter.

You'll need to create three more groups to prepare for the exercises in this lesson.

11 Scroll down the timeline, select clips 15 to 26, and add them to a new group called **Home**.

Note that the final clips 25 and 26 were shot outdoors, meaning their lighting conditions are different from the indoor sequence. It is advisable to grade clips with different light sources separately.

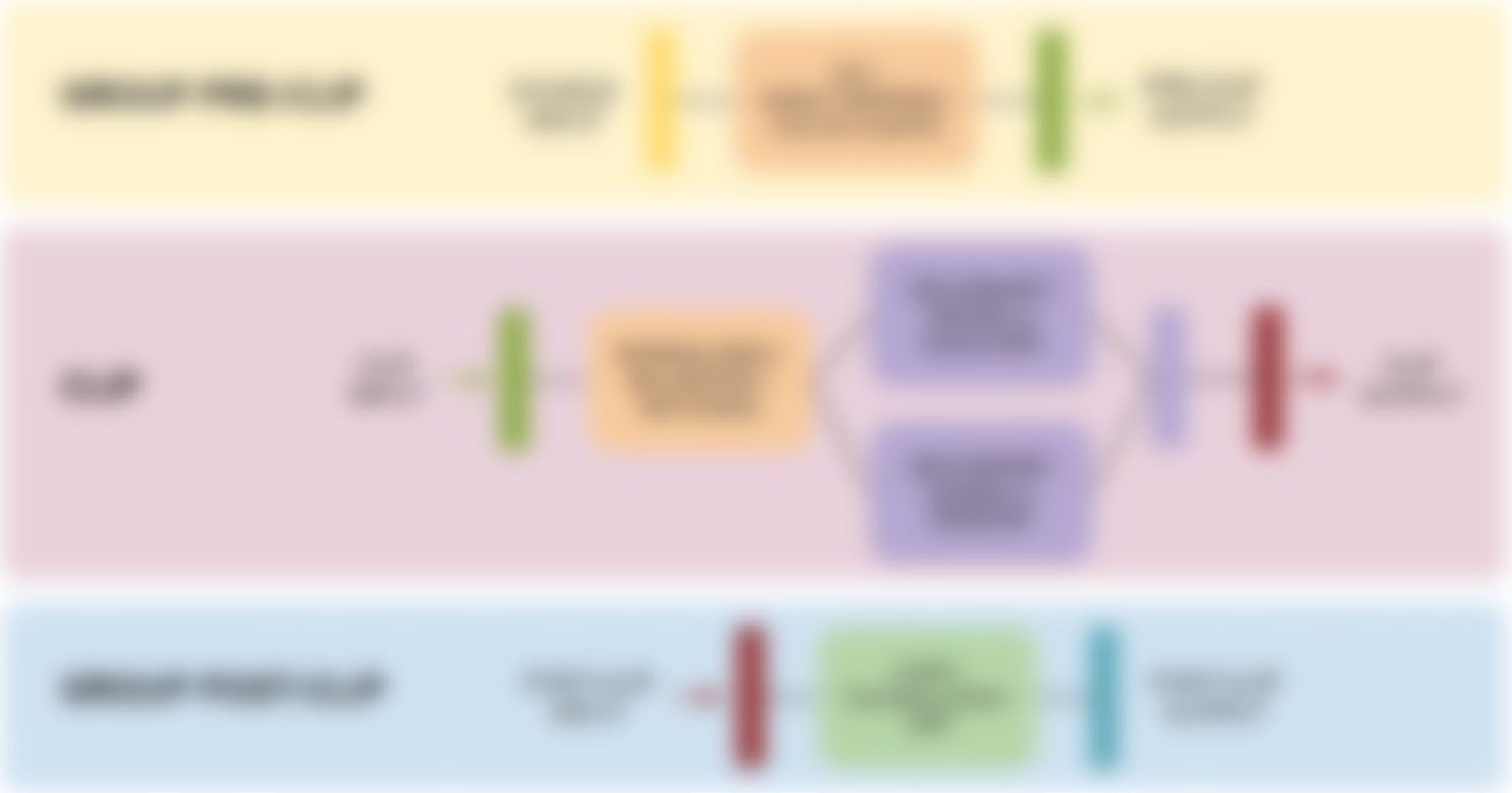
12 Add clips 23 to 25 to a new group called **Office**.

13 Add clips 10 to 14 to a new group called **Morning**.

Adapting Groups in a Classic Color Grading Workflow

With your clips sorted into groups, you can now choose how their grading will be targeted. You can continue to make individual adjustments or apply group-wide changes. Doing so will result in a faster workflow in which you'll no longer need to duplicate and reapply grades or nodes to individual clips. Reducing the duplication of effort will also lessen the chance that mistakes will creep into your workflow. Instead of readjusting specific nodes on multiple clips or keeping track of dozens of edits, you can tweak a group grade to adjust all a scene's clips at once.

The following figure shows how the classic color grading workflow, previously expressed as a node tree in Lesson 1, can be represented in a group-based node structure.



IDT and ODT refer to Input and Output Device Transforms such as CST (Color Space Transform) and ACES Transforms.

As with node trees, you can think of groups as segmented node trees. Although in this case, the two group levels (pre-clip and post-clip) will impact all the clips in the group. These are all the available grading modes in the Node Editor and their recommended usage:

- **Group pre-clip** is intended for preparatory grading adjustments such as node-based color management (CST), gamut and gamma mapping, and color chart auto correction.
- **Clip** mode enables you to address the individual needs of each clip in a group, including balancing, matching, and secondary grade adjustments.

- **Group post-clip** is best utilized for creative scene grading. By this stage, your clips should be matched, and their individual secondary requirements met. This will ensure the uniform application of the creative grades and will require only minimal tweaking on a clip-by-clip level. This mode is also commonly used for node-based color management.
- **Timeline** will affect every clip on the timeline. Color correction and creative grading are not recommended at this stage, but you could use this mode to implement artificial grain and film effects, apply vignettes to short-form projects, or remap the color space of a timeline to a single deliverable standard.

This breakdown suggests the signal order in which the visual data is processed, but you should not see it as a strict order of grading operations. As with any grading workflow, it's entirely acceptable and expected to jump between group levels throughout the grading process. Note that the output of earlier group modes is the direct input of later modes (for example, the pre-clip output leads to the clip input). When considering node order, think of the group modes as being one long node tree, the signal impact of which was explored in Lesson 5.

Applying Base Grades at the Pre-Clip Group Level

At the pre-clip group level, you can make adjustments that will uniformly affect the RGB input signals of all the clips in a group.

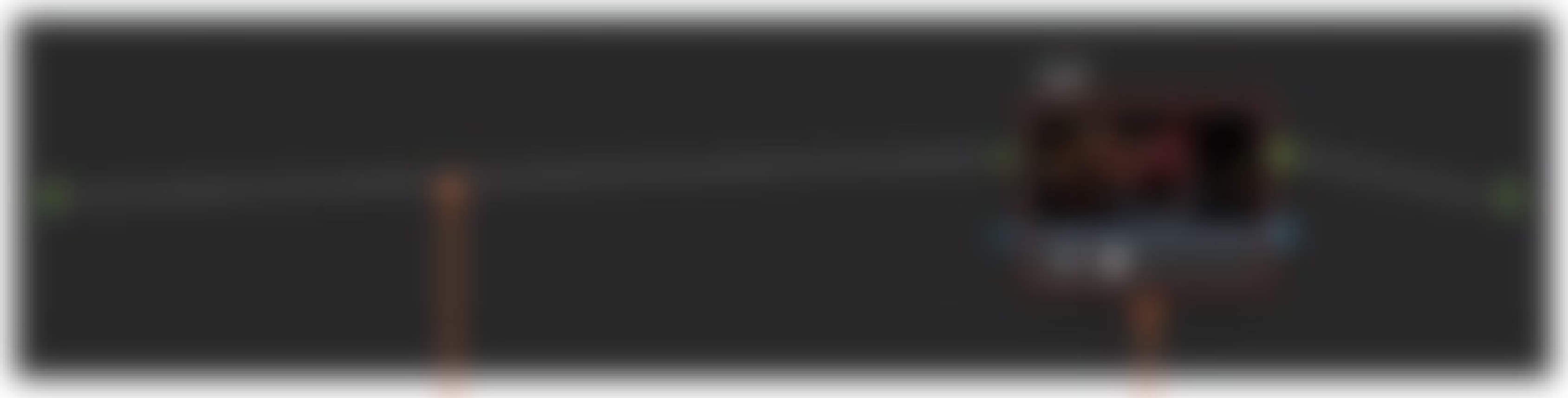
The content of each clip in a scene will vary due to differences in framing and lighting, so this level is not advised for achieving a perfectly neutral starting point. Instead, use this level to set up a scene with the help of broad color management tools, such as Color Space Transforms (CSTs), ACES Transforms, Lookup Tables (LUTs), color charts, Gamut and Gamma Mapping, and others.

Setting Up Node-Based Color Management

In this project, you will use node-based color management. Rather than transforming clips on a project level, you will use the Color Space Transform (CST) effect to map clips individually. This will allow you to quickly set up and apply the color spaces of clips from different sources and choose the precise point in the processing pipeline when the colors are mapped. With project color management, the output color space is the definitive last step of the signal pipeline, whereas with CSTs, you can add more grade adjustments and effects after the color map, such as vignettes, halation, and grain.

There is no limit to how you employ CSTs in your workflow, but two common approaches are:

- Using a single CST node to map from the camera input color space to the deliverable output color space. In such a setup, the CST would usually be among the last operations in the node tree. In a group structure, it should be placed in the Group Post-Clip layer (or Timeline layer), and all grading operations should be performed on upstream nodes.

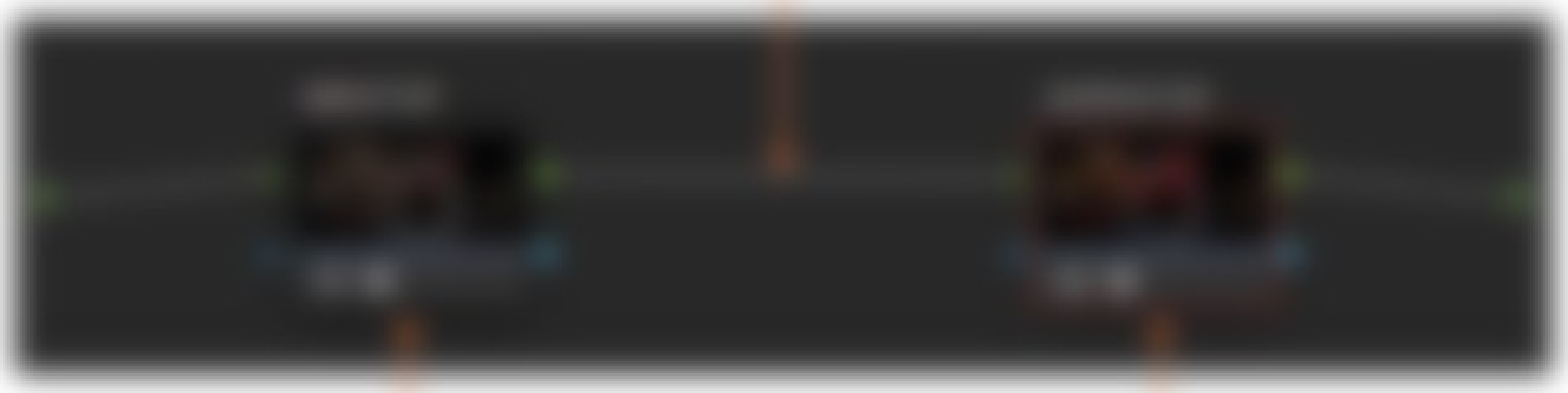


Grading operations

Input > Output

- Using two CST nodes to first map the footage to a working timeline color space at the start of the node tree and then to the output color space near the end of the node tree. In a group structure, these nodes would usually be placed at a Group Pre-Clip and Post-Clip layers, respectively, with most grading operations placed in between.

Grading operations



Input > Timeline

Timeline > Output

In this exercise, you will use two CSTs to map the footage to the optimal HDR-ready DaVinci Wide Gamut working color space.

1 Select clip 01.

2 Label node 01 **INPUT CST**.

- Open the Effects panel and drag the Color Space Transform effect onto the node.

Some of the settings will look similar to those found in the Resolve Color Management section of the Project Settings. Additionally, there are Tone and Gamut Mapping controls for dedicated per-clip management.

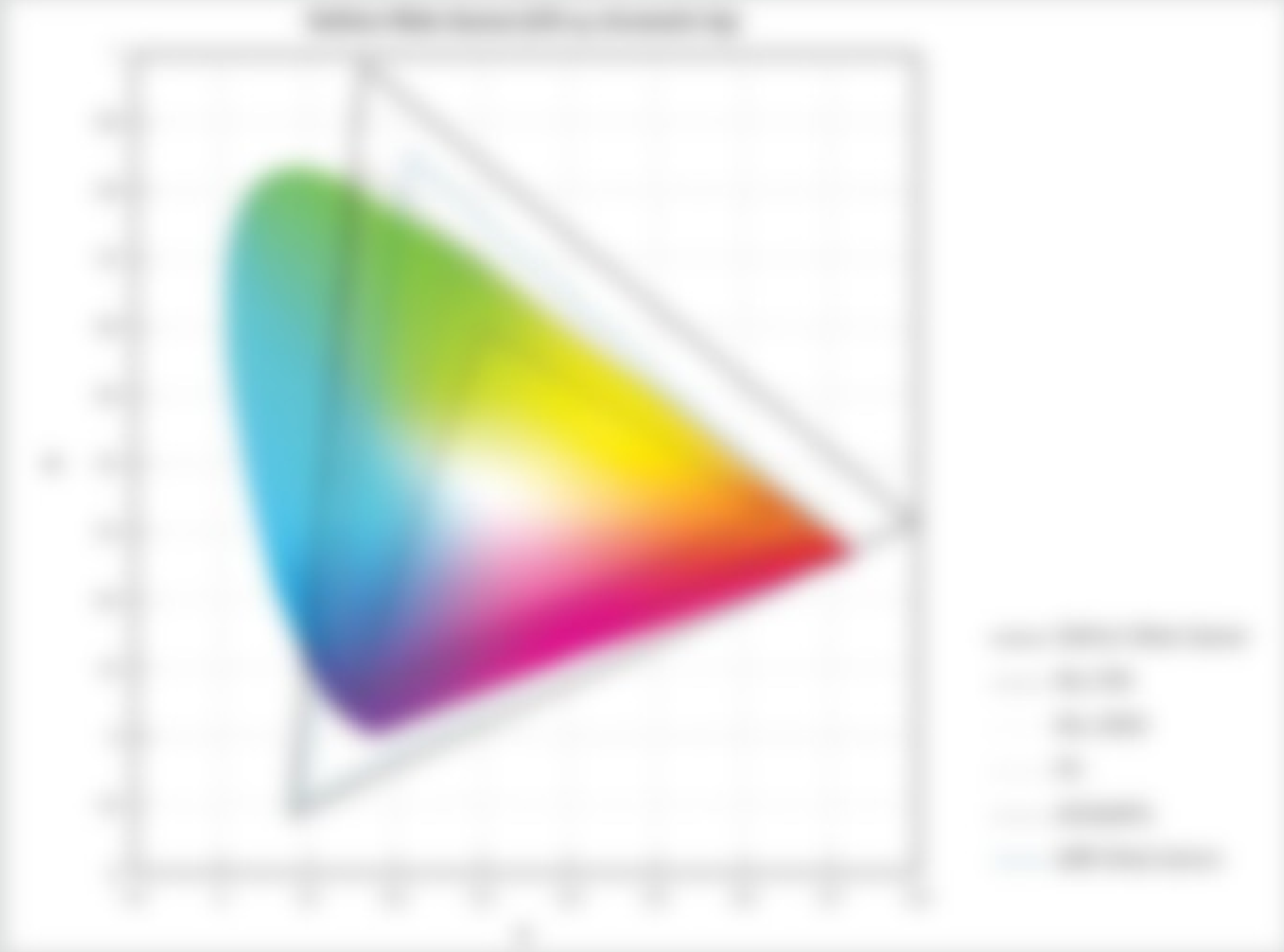
- Set the Input Color Space to Blackmagic Design 4K Film Gen 1. This was the camera model, data level, and firmware version used to capture the footage.
- Set the Input Gamma to Blackmagic Design 4K Film to map the transfer function correctly. This will set up the image's luminance and contrast.

  Since the intention is to use two CSTs to color manage this clip, the output settings of the first CST node should map the signal to a working color space, not to the deliverable output.

- Set the Output Color Space to DaVinci Wide Gamut.

What is DaVinci Wide Gamut?

The DaVinci Wide Gamut and Intermediate transfer function allow for an internal color space that encompasses the maximum value of image data that any given camera can capture. The color gamut is greater than BT. 2020/CIEXYZ/ARRI Wide Gamut, and ACES AP 1, which means visual data is not compressed or lost, no matter where it originates from.



DaVinci Wide Gamut's primary color values are set up to produce extremely accurate results, even when mapping color spaces from multiple camera sources. This results in perceptually consistent grading behavior among the color page's palettes. The DaVinci Wide Gamut is accompanied by the Intermediate transfer function, which provides suitable internal luminance mapping of high precision image data for mastering and delivery in both SDR and HDR standards for broadcast, projection, streaming, and web.

7. Set the Output Gamma to DaVinci Intermediate.

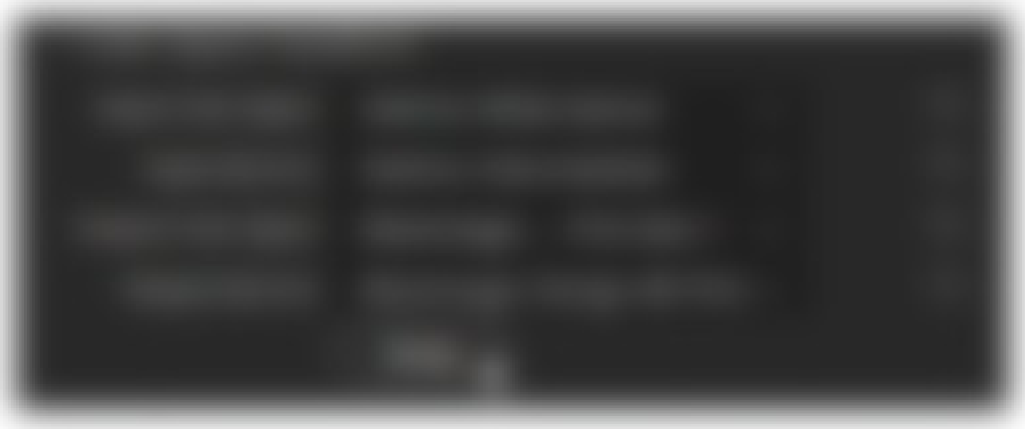
   With the footage mapped to a working color space, you can now add a second CST to map it to your monitoring standard.

8. Select the INPUT CST node and press Command-C (macOS) or Ctrl-C (Windows) to copy it.

9. Create a new node (S).

10. Press Command-V (macOS) or Ctrl-V (Windows) to paste the INPUT CST node. Change the label to **OUTPUT CST**.

11. In the Effects panel Settings, click Swap under the Color Space Transform parameters to swap the inputs and outputs. This saves a little time in having to re-input the working color space.



12. Set the Output Color Space to Rec.709 or your preferred monitoring gamut.

13. Set the Output Gamma to Rec.709 or your preferred monitoring transfer function.

   Rec.709 as a Gamma setting is equivalent to the Rec.709 (Scene) option in the Project Settings. Visually, it achieves the look of Rec.709 Gamma 2.4, but rather than applying the OOTF (opto-optical transfer function) as metadata in the rendered file, it bakes it into the final image to ensure it looks the same when uploaded to the web as it does in your DaVinci Resolve viewer.

   Even if you do not enable project-wide color mapping (as we did in the last project), the Color Management controls in the Project Settings will impact the behavior of the color page and output of your media.

14. Open the Project Settings and go to the Color Management section.

   With "Color science" set to DaVinci YRGB, the only two color management options will be the Timeline and Output color space dropdown menus.

15. The Timeline color space will impact the operation of your grading tools and effects. Since some effects benefit from operating in a wider gamut, set the Timeline color space to DaVinci WG/Intermediate.

6. The Output color space will determine the color space metadata encoded in your rendered video file. This should match your deliverable standard when you export your final project. Leave the Output color space as Rec.709 Gamma 2.4.

   Note that because there is no project-wide color management enabled in the Project Settings, even if you were to change the output color space, no change would occur in the viewer.

This is an example of how a single clip can be color managed with CST nodes. The majority of the grading and effects can be applied on the connection line between the two CSTs, but you can also add nodes before and after the CST nodes. When used with node templates, CSTs can be pre-emptively set up within a larger node tree to accommodate a wide range of workflows and media sources.

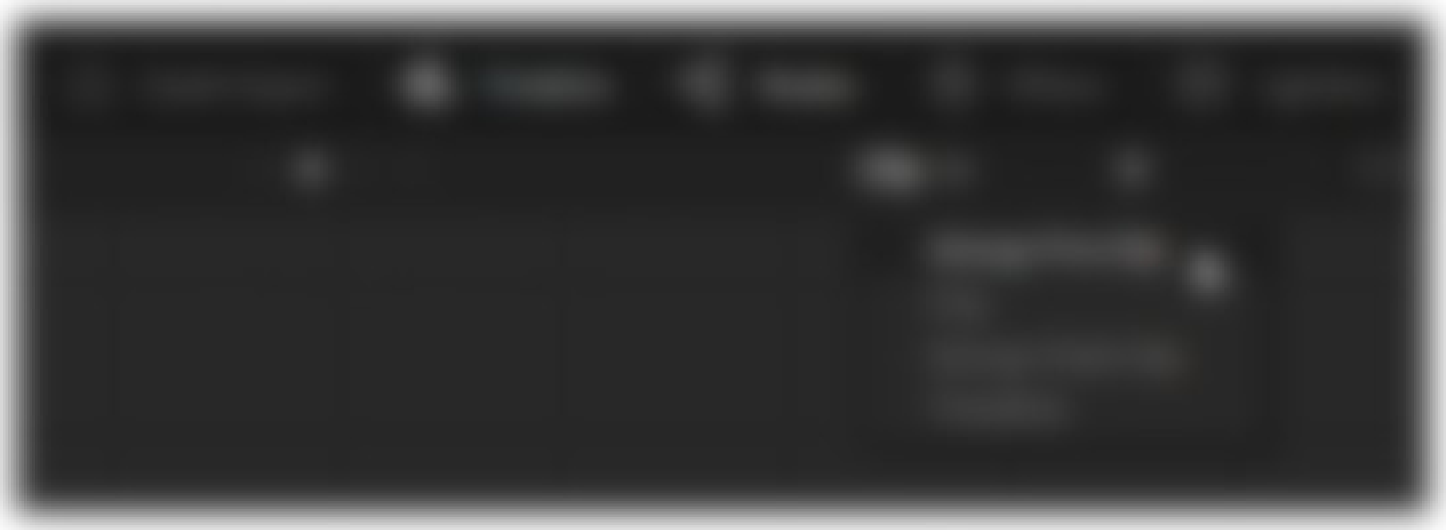
Using CSTs in Groups

In this exercise, you will apply CST color management to a group.

1. In clip 01, select the INPUT CST node and press Command-C (macOS) or Ctrl-C (Windows) to copy it.

2. Select clip 08, which is in the Garage group.

3. In the dropdown menu in the upper right of the Node Editor, switch to Group Pre-Clip mode.



   In this mode, all adjustments you make will apply to the whole group. Note that the node's outline has changed to yellow, which will act as a visual reminder that you are not working on the clip level.

4. Select node 01 and press Command-V (macOS) or Ctrl-V (Windows) to paste the INPUT CST node.

   A different camera was used to capture the footage.

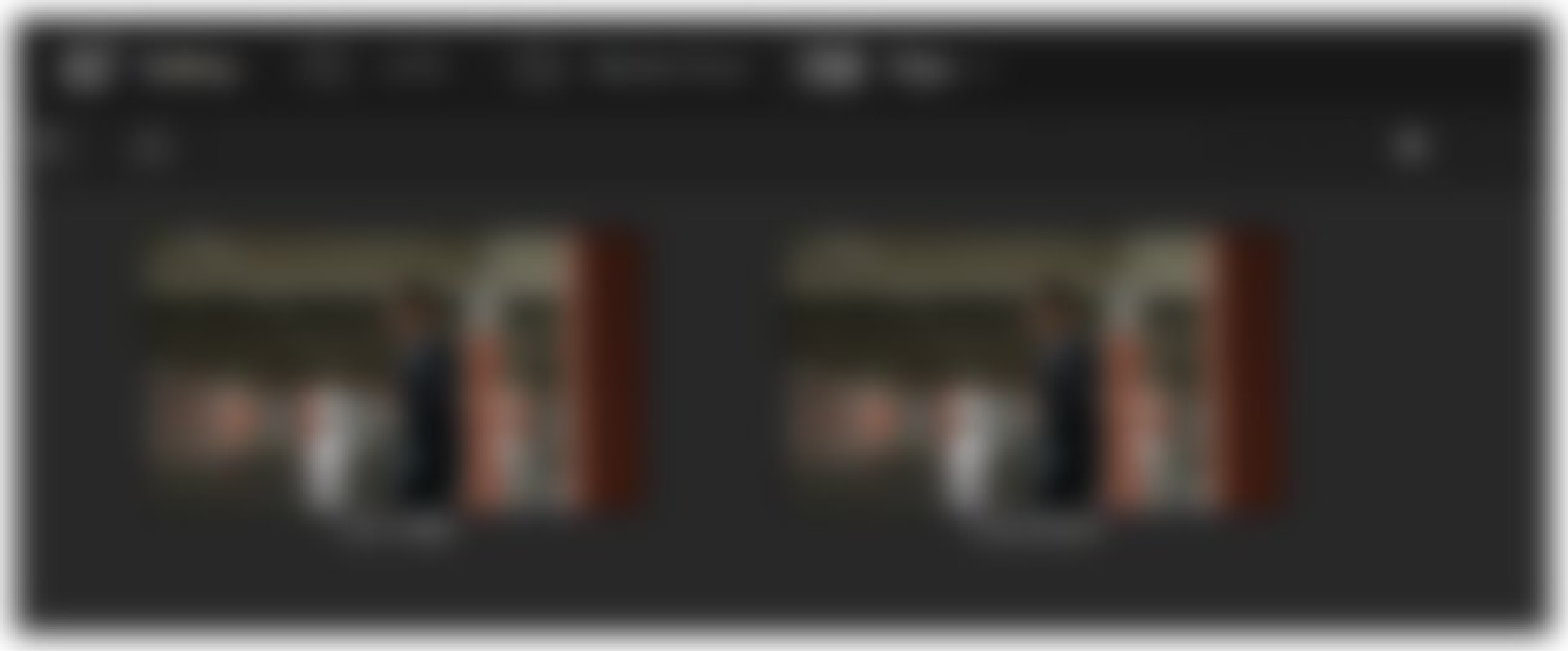
5. Select INPUT CST and change the Input Color Space to Blackmagic Design 4.6K Film Gen 1 and the Input Gamma to Blackmagic Design 4.6K Film.

   Next, you will apply the CST mapping from the timeline to the output color space at the end of the group node tree.

6. In the dropdown menu at the top of the Node Editor, switch to Group Post-Clip mode.
7. Select node 01 and press Command-V (macOS) or Ctrl-V (Windows) to paste the CST node again. Change the label to **OUTPUT CST**.
8. As with the previous exercise, swap the input and output parameters and then change the both outputs to Rec.709 or your preferred output standard.

   To save time, you can save Group grades as stills and apply them to other groups in the timeline.

9. Right-click in the viewer and choose Grab Still. This will create a POST still in the gallery.
10. Switch to Group Pre-Clip mode and grab another still. This will generate a PRE still in the gallery.



11. With clip 06 (or any clip that is currently in a group) still selected, press Command-A (macOS) or Ctrl-A (Windows) to select all the clips in the timeline.
12. Middle-click the PRE still or right-click it and choose Apply Grade.

    This applies the Input CST node to all clips with a pre-clip mode. Non-grouped clips are ignored. The same principle applies when rippling node changes within group node trees.

13. Switch to Group Post-Clip mode, and with all the clips still selected, apply the POST still grade.

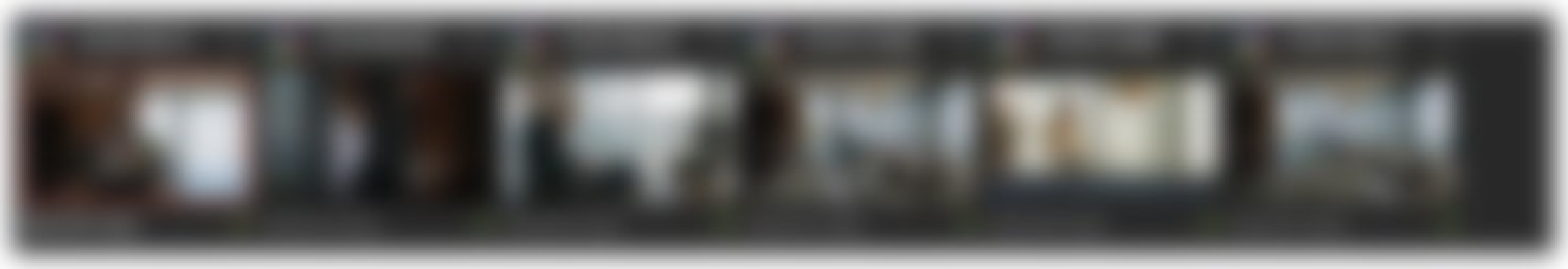
    All the timeline groups (Highway, Office, Garage, Morning, and Home) should now be color managed in their Pre- and Post-Clip Node Editors.

Using a Color Chart to Balance a Group

One method of balancing a sequence of clips is to use the calibration charts that are typically captured at the start of the same shoot. Calibration charts can produce more accurate color correction than regular balancing because of their meticulously designed color swatches that extend beyond just fixing the white balance.

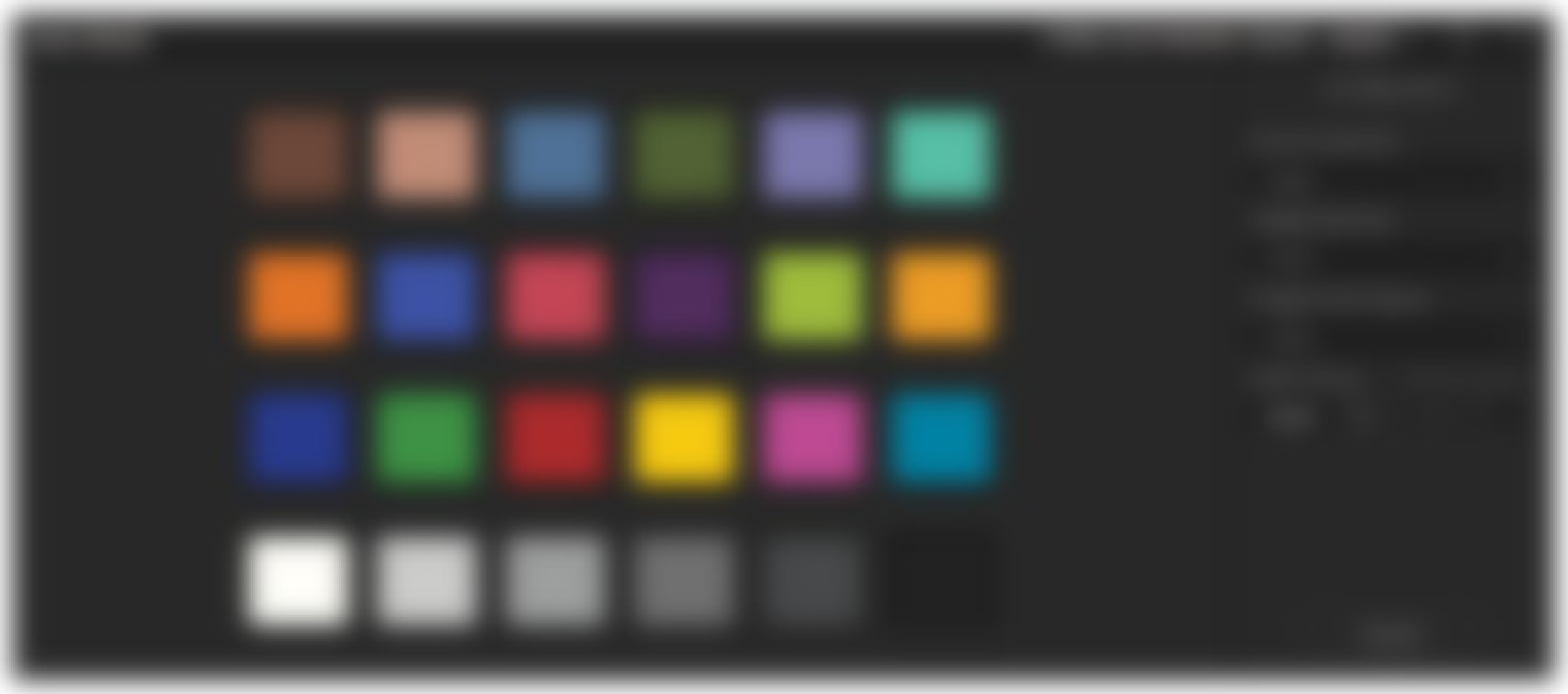
NOTE The remaining exercises in this lesson require you to have imported, grouped, and color managed the timeline based on the previous exercises. If you have not done so, open [illegible] > Project 03 > Timelines and import the [illegible] timeline. In the media pool, relink or replace the [illegible] video file if necessary and set the Timeline Settings to use Project Settings.

- Change the Clips timeline filter to display only the Home group.

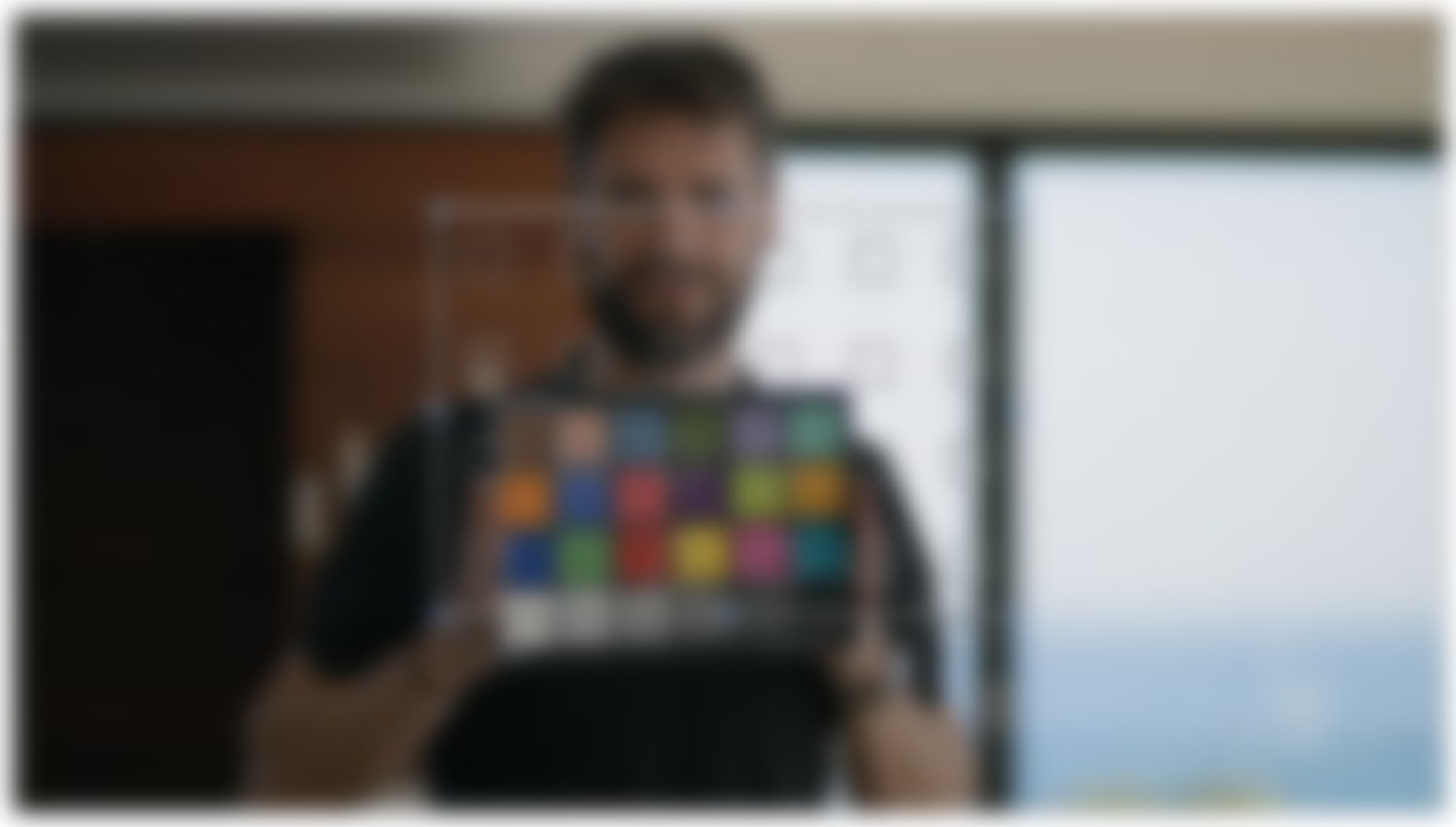


When using a color checker, a new shot of the chart should be captured at the start of every new scene, light change, or location during filming.

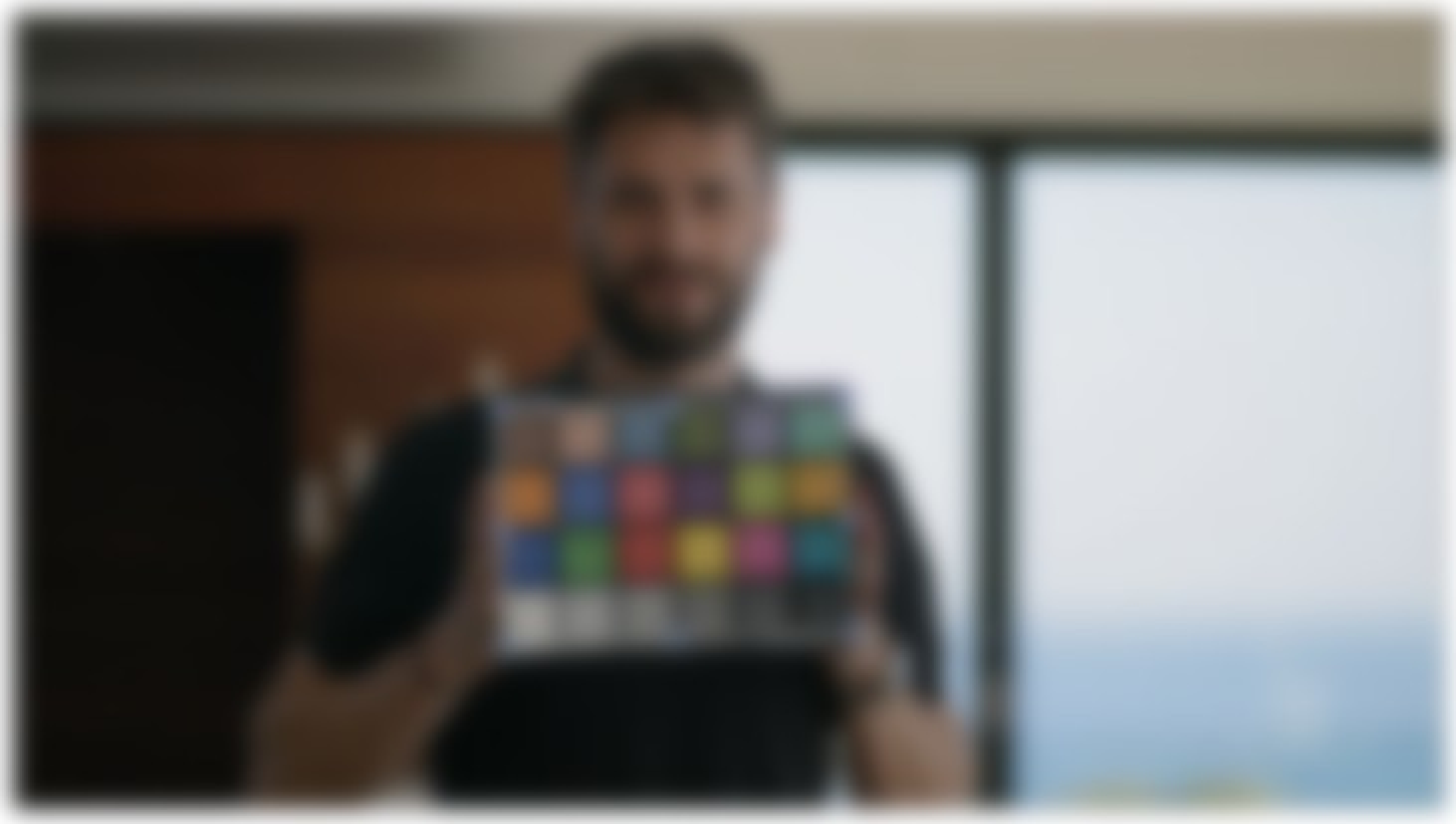
- Select clip 01.
- In the Node Editor, switch to Group Pre-Clip mode.
- Create a new node (02) after the INPUT CST and label it **Color Match**.
- In the left palettes, open the Color Match palette.



- In the viewer's onscreen controls dropdown menu, choose Color Chart.



- Drag the corners of the color chart overlay to the corners of the chart in the image. Ensure that the small squares within the color chart outline are filled with the colors they are meant to be analyzing. Any interference with the black borders or the man's fingers will affect the quality of the analysis.



- At the top of the Color Match palette, verify that X-Rite ColorChecker Classic - Legacy is chosen. This selection is based on the manufacturer and version of the chart captured in the shot.

9 Set the Source Gamma to DaVinci Intermediate.

If color management is not enabled, Source Gamma must be set to the encoded gamma (or log or TG curve) of the source footage. This allows Color Match to map the tonal encoding of the image to the timeline gamma.

If color management is enabled (whether via the Project Settings or nodes), Source Gamma must match the timeline gamma of the project or whichever transfer function is currently being applied to the signal at that point in the node tree.

10 Set the Target Gamma to DaVinci Intermediate.

It may feel counterintuitive to use the same setting for both source and target, but it makes sense when you consider that the Color Match palette in this instance is not being used for the purpose of mapping the tonal range of the footage. This has already been accomplished with the CST nodes. Right now, you are only interested in calibrating the colors of the scene based on the source lighting.

11 Set the Target Color Space to DaVinci Wide Gamut to keep the result consistent within the CST-defined timeline color space.

12 The Color Temp parameter lets you manually adjust the image's target color balance. The default 6500K will produce a neutral result. Leave it as it is.

13 At the bottom of the Color Match palette, click Match. You will see a shift in color and luminance as the waveform and parade are reset and balanced according to the chart.

TIP The numbers that appear under the color boxes in the Color Match palette indicate the percentage that a value needed to be adjusted to match the color patch samples to the precalculated color chart targets. A change of less than 10% is ideal, implying a clean starting point with a distortion-free adjustment.

14 Set the viewer's onscreen controls to Off to remove the Color Match overlay.

15 Navigate down the timeline to verify that the rest of the clips in the Home group have been calibrated. Since these were captured in the same location, under similar lighting conditions, the automated color balance benefits them equally.

With this chart, you have quickly created a better starting point for all the clips in the scene while retaining the full dynamic range and color quality to perform individual corrections and creative grading later.

Making Clip-Specific Adjustments at the Clip Group Level

When working with groups, you continue to have access to the standard Node Editor in Clip mode. It remains the ideal way to color correct, match footage, and make secondary amendments on a clip-by-clip basis.

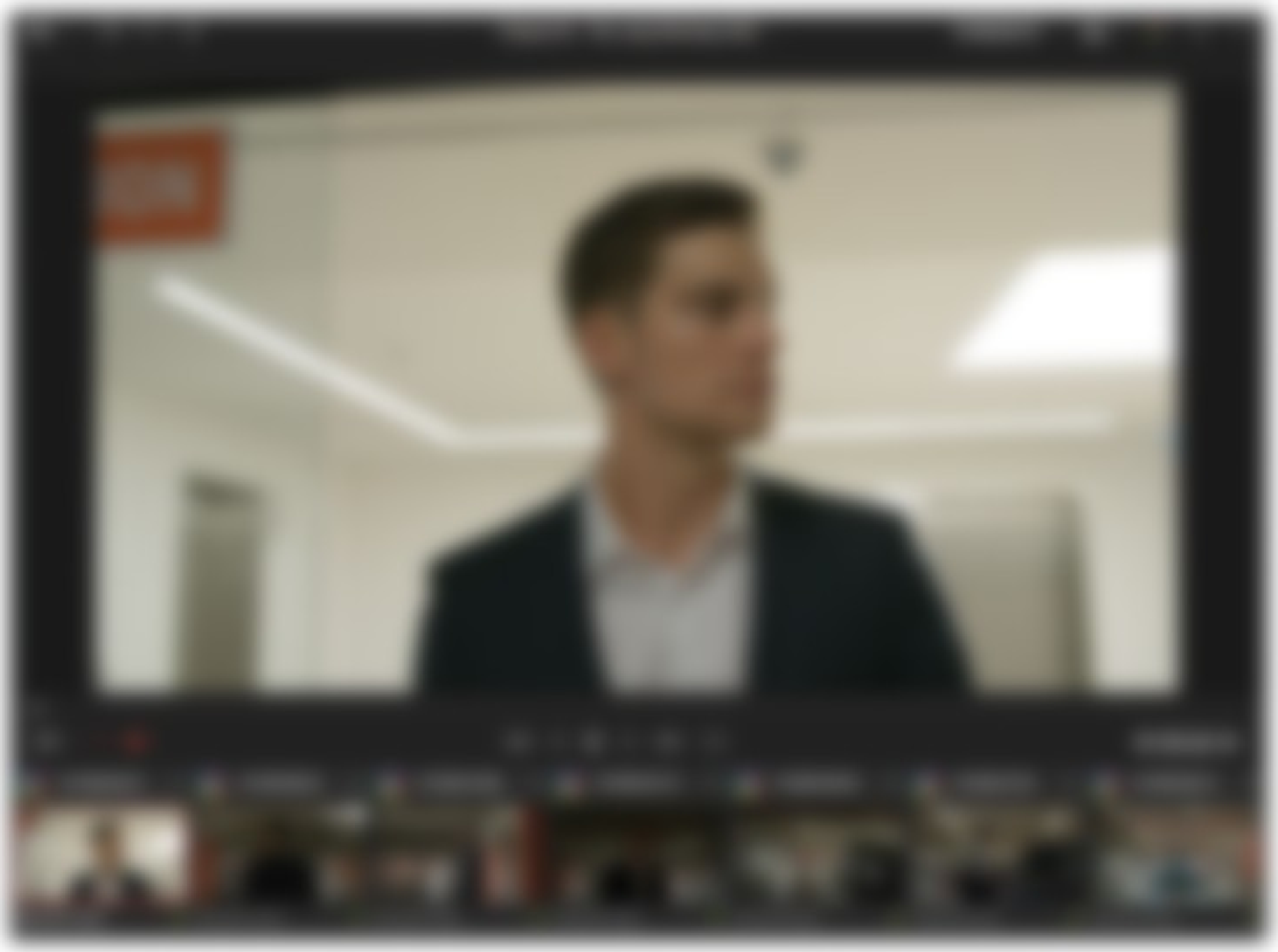
Matching Shots at the Clip Group Level

To ensure creative grades look consistent when applied to groups, it's important that all the group clips have matching color balance and equal luminance distribution.

1 Filter the timeline to show only the Garage group clips.

2 Switch the Node Editor to Clip mode.

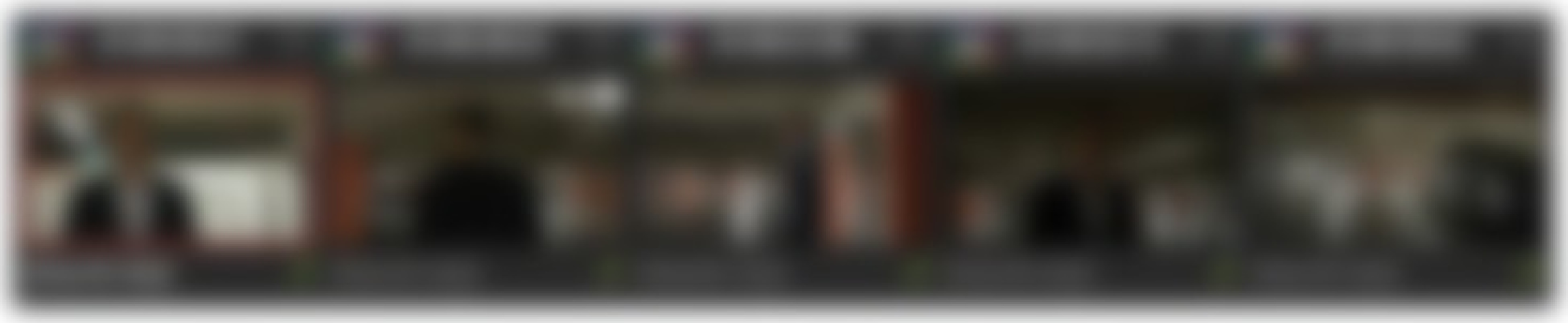
3 Select clip 01. At first glance, the shot appears to be substantially brighter than the other clips in the scene.



- Drag the viewer playhead to the end of clip [illegible].

  However, after the man enters the garage, the shot appears to be exposed similarly to others in the sequence and does not require matching.

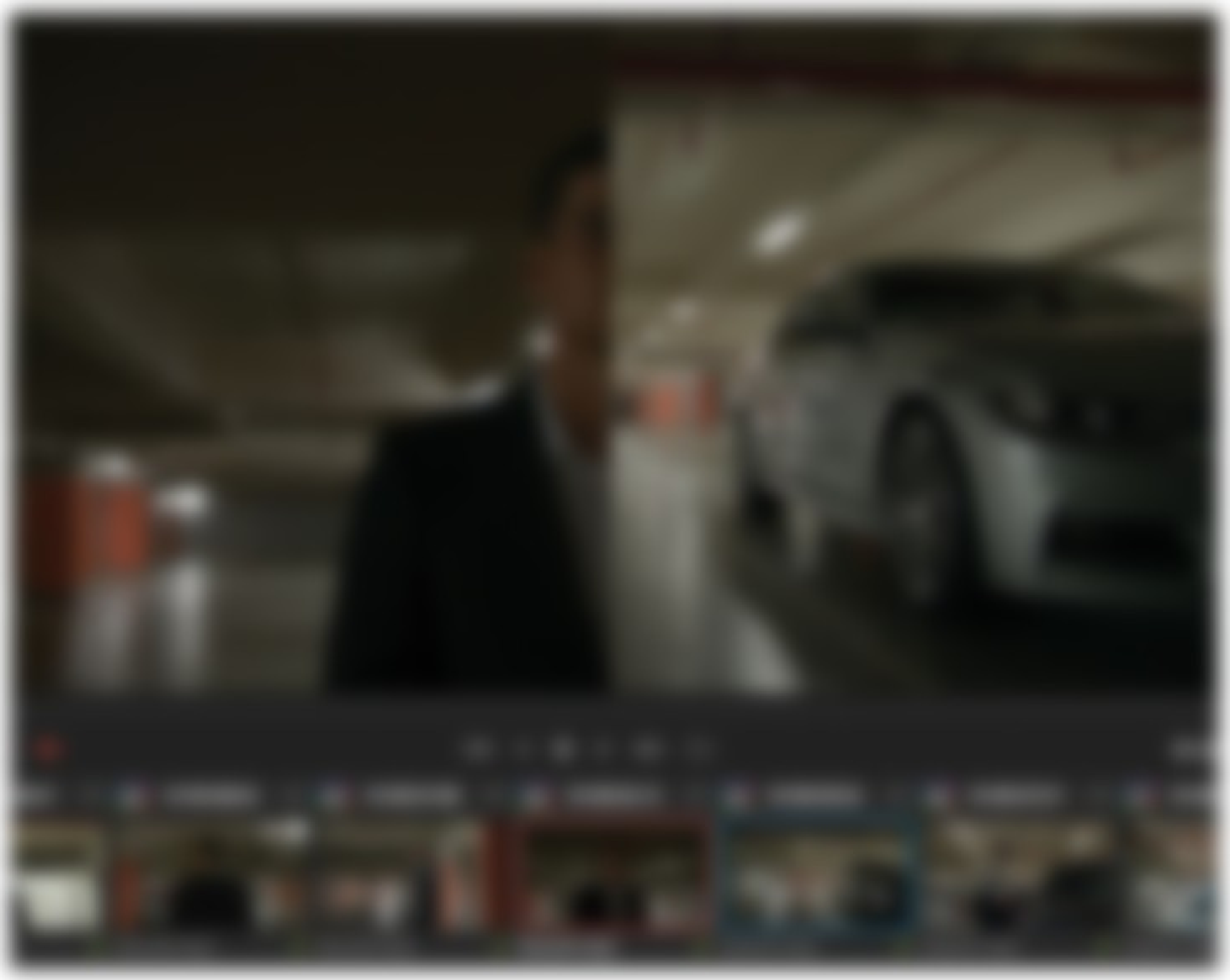
- By default, the images in the Thumbnail timeline show the first frame of every clip. Click and drag within the thumbnail to change the frame.



When comparing clips, remember that the first frame is not always the most reliable for matching. You should always play through the entire clip before making a grading decision. In this case, you can leave clip [illegible] as it is.

- Select clip [illegible]. This shot is definitely darker than the rest of the sequence.

- Right-click clip [illegible] and choose Wipe Timeline Clip to enable the Wipe mode in the viewer.



[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

- Drag the red Gamma and Gain bars down to address the resulting warmth.

- Press Option-Y (macOS) or Alt-Y (Windows) to exit the Comparison viewer mode but leave the Wipe mode on.
- Reset the Reference Sizing mode of the Sizing palette.
- Select clip 07.

The clip colors are already a good match for the rest of the timeline, but the shot is too bright overall, which will affect the consistency of the post-clip grade.

- Label node 01 **Match**.
- Drag the Offset master wheel left to darken the shadows to the same level as the reference clip. A good area to watch as you adjust the image luminance is the garage ceiling, which should match in all shots.

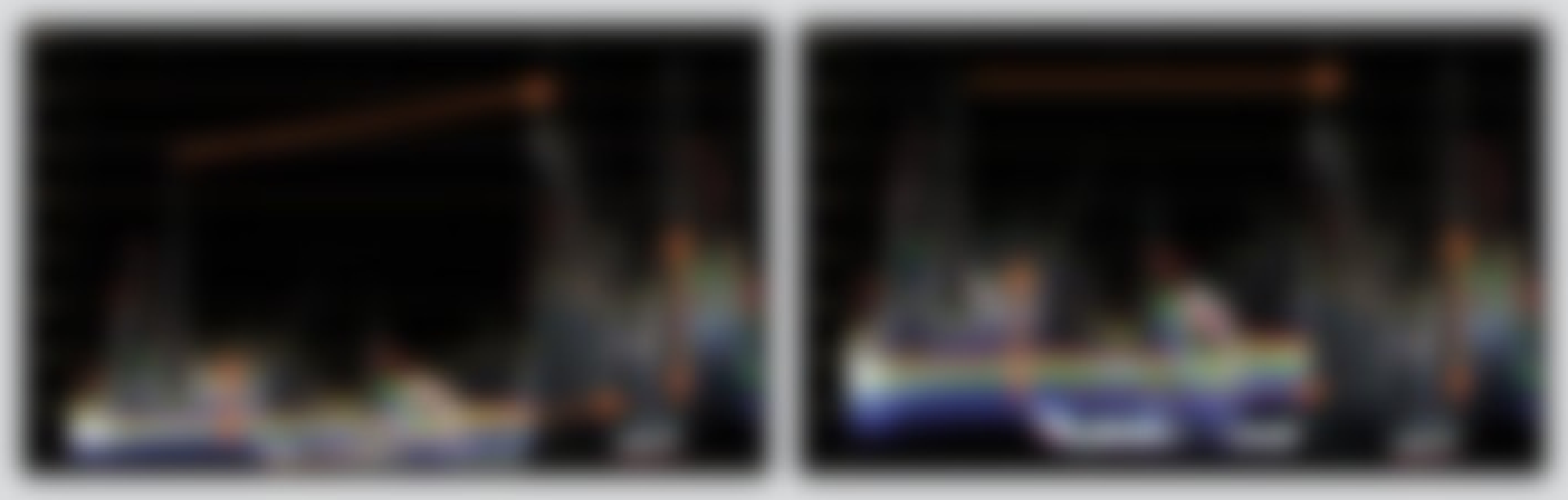
The Waveforms Don't Look the Same. Are the Clips Really Color Matched?

When matching clips using waveforms, your goal is not to make the waveforms look identical. Rather, you should use the reference waveform as a guide to inform the overall spread of the channel mass, the heights of the lightest parts of the image, and the depths of the shadows.

In this example, clip 04 will always have a waveform concentrated at the bottom of the graph because it features a tight close-up of the man and his dark suit.

In clip 05, the suit occupies a very small part of the shot and appears in the waveform as a small dip in the shadows – the depths of which are now matched. Likewise, the lights in both waveforms follow a similar trajectory.

Lastly, the overall waveform for clip 04 is spread similarly to the one for clip 05. Bypass the grade in clip 04 to compare how compressed the waveform used to look.



Intermediary Matching Between Clips

At times, you'll want to grade shots to show a gradual change in color or brightness between clips. Doing so is not strictly a color match but rather an intermediary grade designed to transition between clips with different looks without jarring a viewer's perception of the scene.

In this exercise, two clips captured at sunrise are intercut with media captured later in the day. You will match the daylight clip between them and then grade the preceding clip to suggest a natural change in sunlight throughout the sequence.

1. Remove the timeline filter to show all clips.
2. Shift-click clips 22 to 25 to select them.
3. In the viewer, enable Split Screen mode.
4. From the dropdown menu in the upper left of the viewer, choose Selected Clips.
5. Press Option-F (macOS) or Alt-F (Windows) to expand the viewer.

6. In the split screen viewer, ensure that clip 24 (lower left) is selected.
7. Open the Node Editor and label node 01 **Match**.
8. Drag the Gain wheel toward yellow until the color of the sky matches the skies in the surrounding clips 23 and 25.

9 Reduce the contrast in the adjustment controls until the window frames and furniture have the same flat shadows.

10 Copy the Match node grade from clip 24 and paste it into the first node of clip 22 (upper left).

To ensure a smooth transition between clips 21 and 22, you will reduce the severity of the grade in clip 22.

11 Open the Key palette and change the Key Output Gain to 0.600. The grade intensity is nearly halved, and the original colors of the image now show through for a smooth transition between the first and second halves of the scene.

12 Press Option-F (macOS) or Alt-F (Windows) to exit the Enhanced viewer mode.

13 Exit the split-screen viewer.

TIP You can use the Split Screen mode to review the contents of an entire group by changing the mode dropdown menu to Current Group. Clicking any grouped clip in the timeline will immediately display all other clips from the same group in the viewer.

Automatically Tracking People and Objects

The Magic Mask is a DaVinci AI Neural Engine powered selection tool that can identify and track human figures, physical features, objects, and surfaces based on user clicks in the viewer. Additional tools, paint stroke, and matte finesse controls allow for the refinement of initial selections to achieve optimal results. The resulting matte can then be graded using the standard primary palettes.

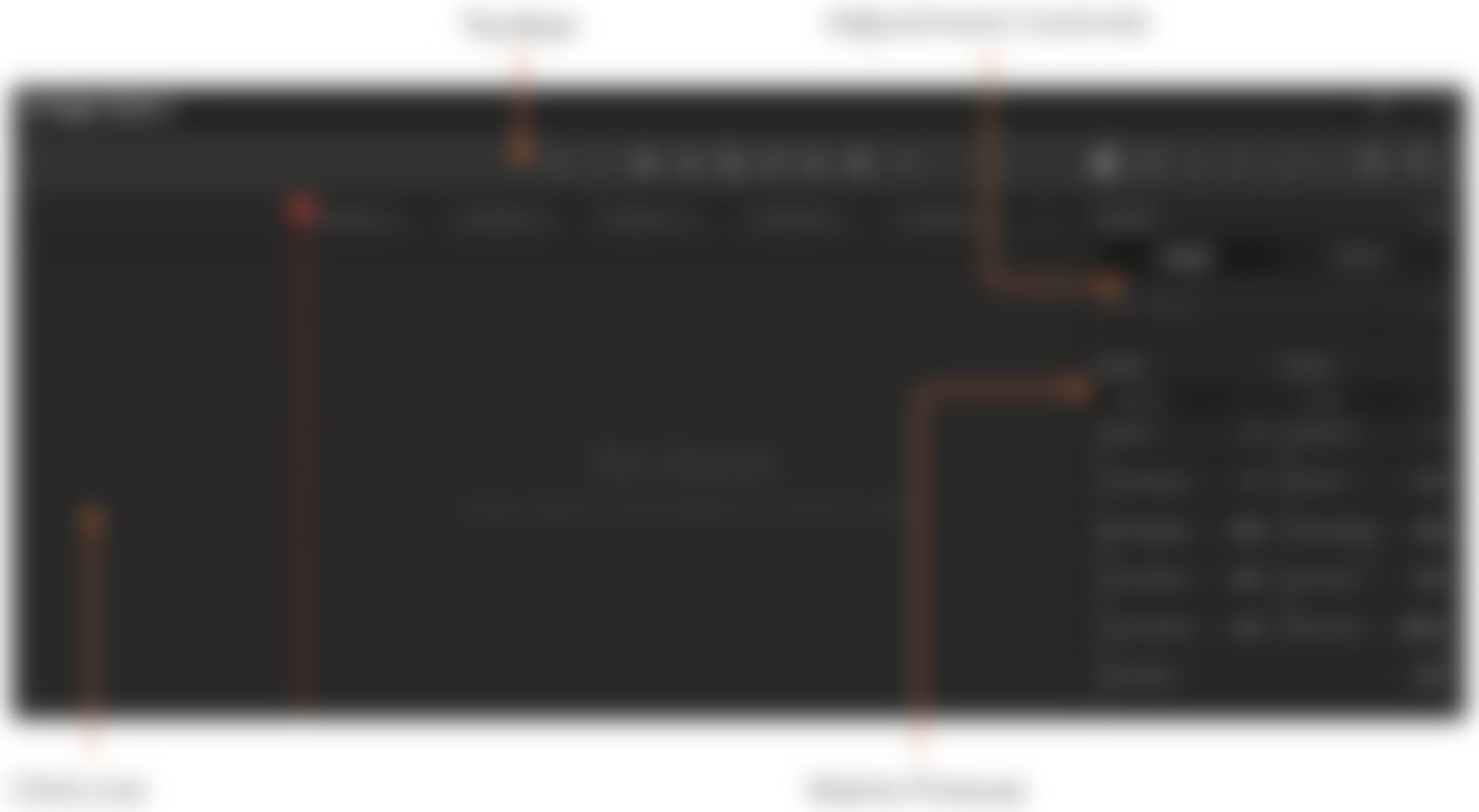
NOTE The following exercises require DaVinci Resolve Studio to complete.

Tracking a Person

When the AI Magic Mask 2 palette is active, the tool is primed to analyze the first thing you click in the viewer. It primarily focuses on the immediate object or physical feature you select and then broadens its interpretation as you provide it with more data.

In this exercise, you will familiarize yourself with the AI Magic Mask 2 palette interface and track a person to grade the environment around them.

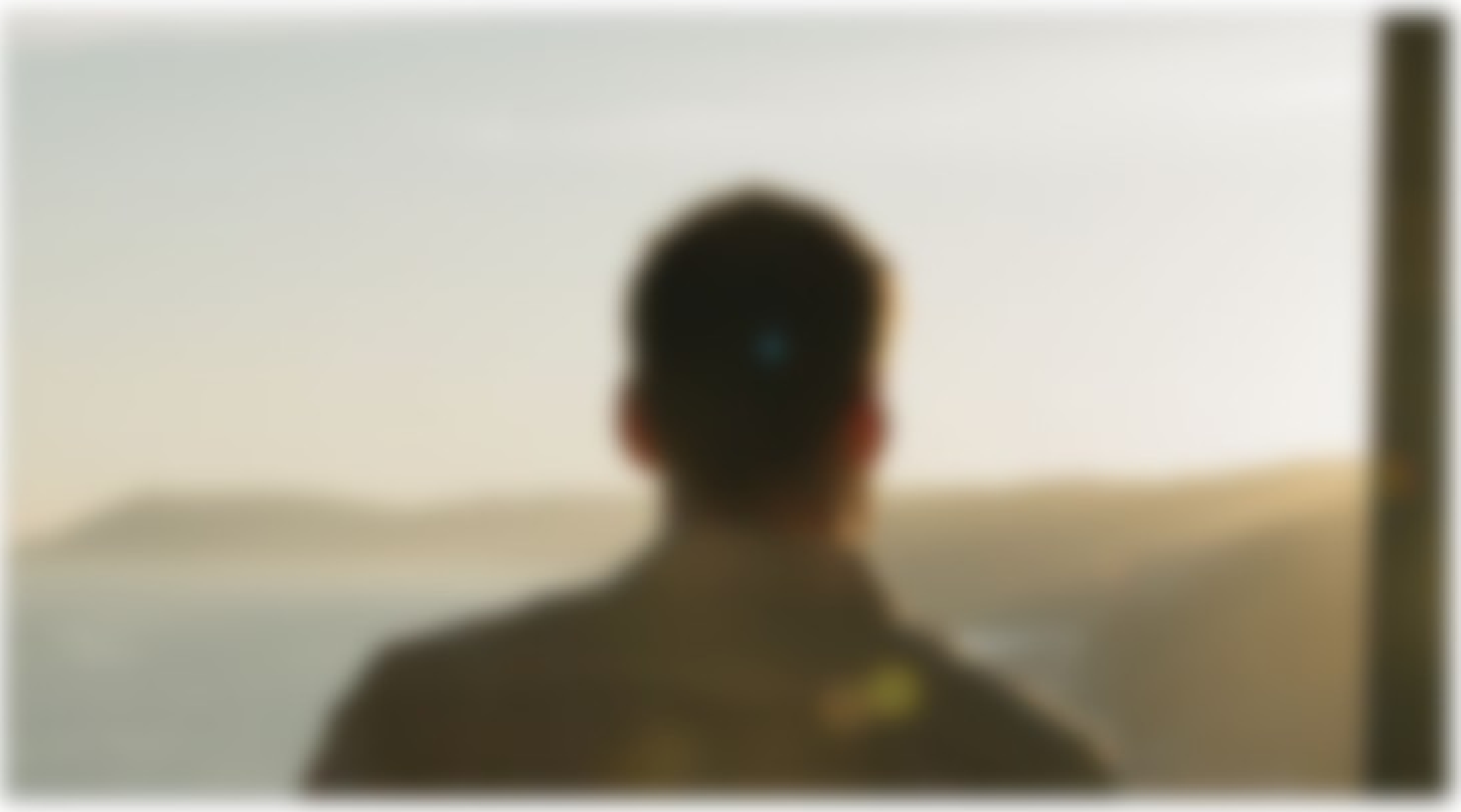
1. Select clip 25.
2. Create a new node after INPUT CST and label it BG.
3. In the central palettes, open the AI Magic Mask 2 palette.



The AI Magic Mask 2 palette is made up of three areas:

- **Toolbar:** Features tracking controls, click and paint stroke tools, and mask overlay.
- **Click List:** catalogs additive and subtractive clicks and displays their collective frames.
- **Adjustment Controls and Matte Finesse** in the sidebar are used to refine the resulting mask. Most of the matte finesse controls operate similarly to those in the Qualifier palette.

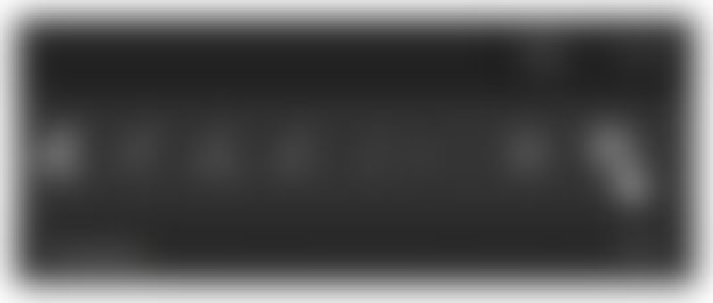
- In the viewer, click the back of the man's head.



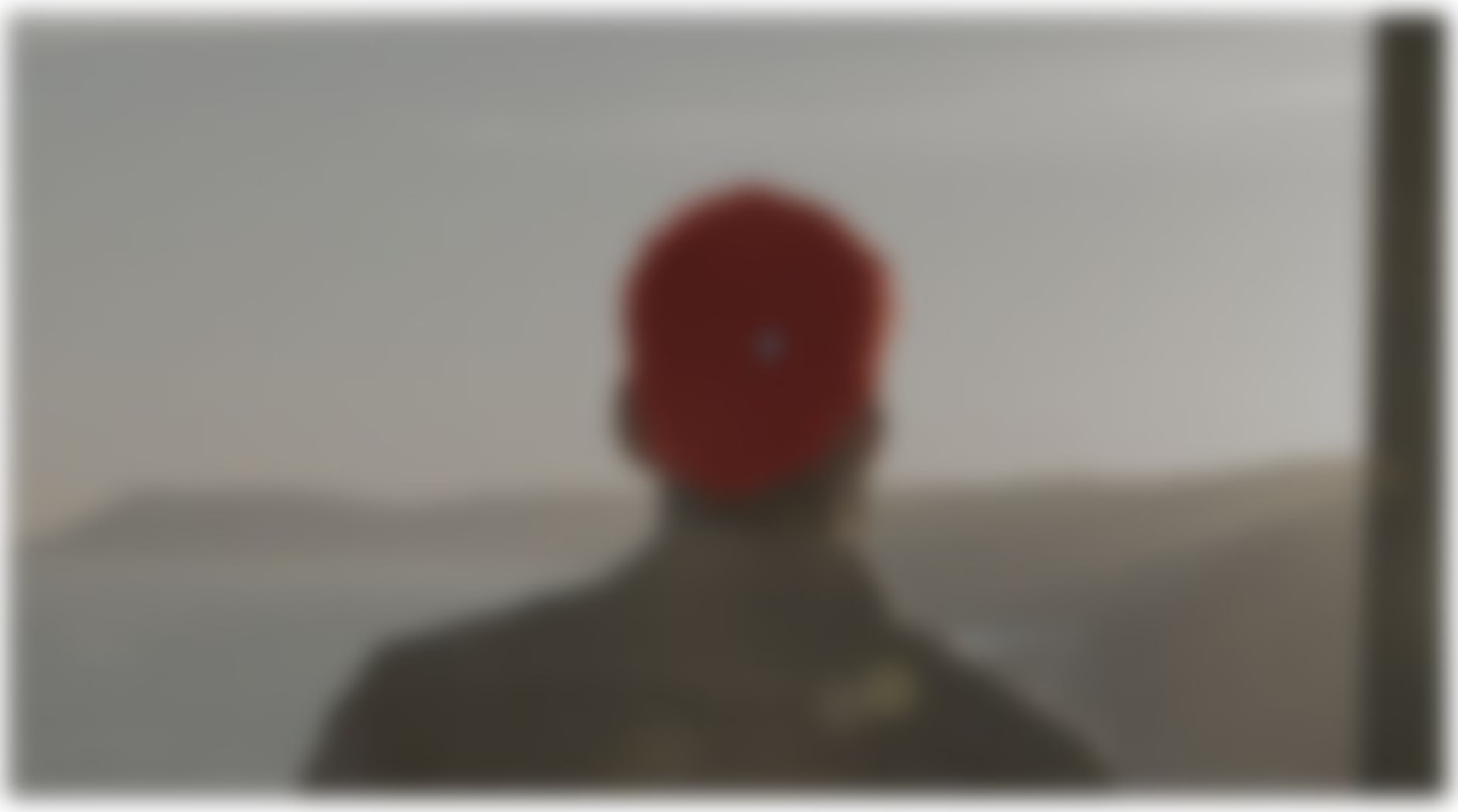
NOTE If the blue click dot is not visible in the viewer, ensure that the AI Magic Mask 2 palette is active and the onscreen control in the upper-left corner of the viewer is set to Qualifier.

Click 1 is catalogued in the Click List of the AI Magic Mask 2 palette.

- On the right side of the Magic Mask toolbar, click Toggle Mask Overlay to review the initial selection in the viewer.

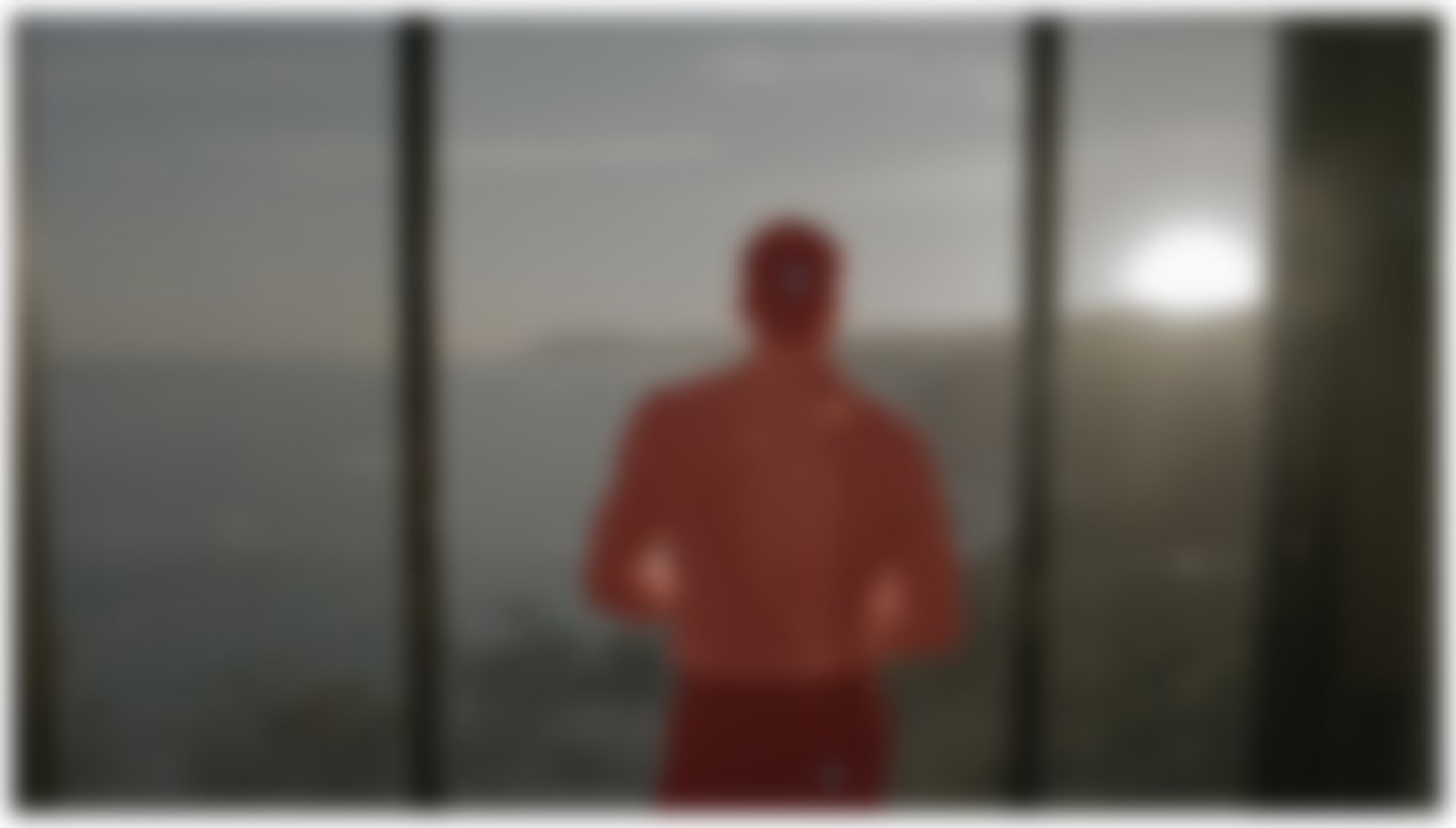


With only a single click to guide it, the Magic Mask has highlighted the man's hair.



To track his entire body, you will use another click to expand the Magic Mask's analysis.

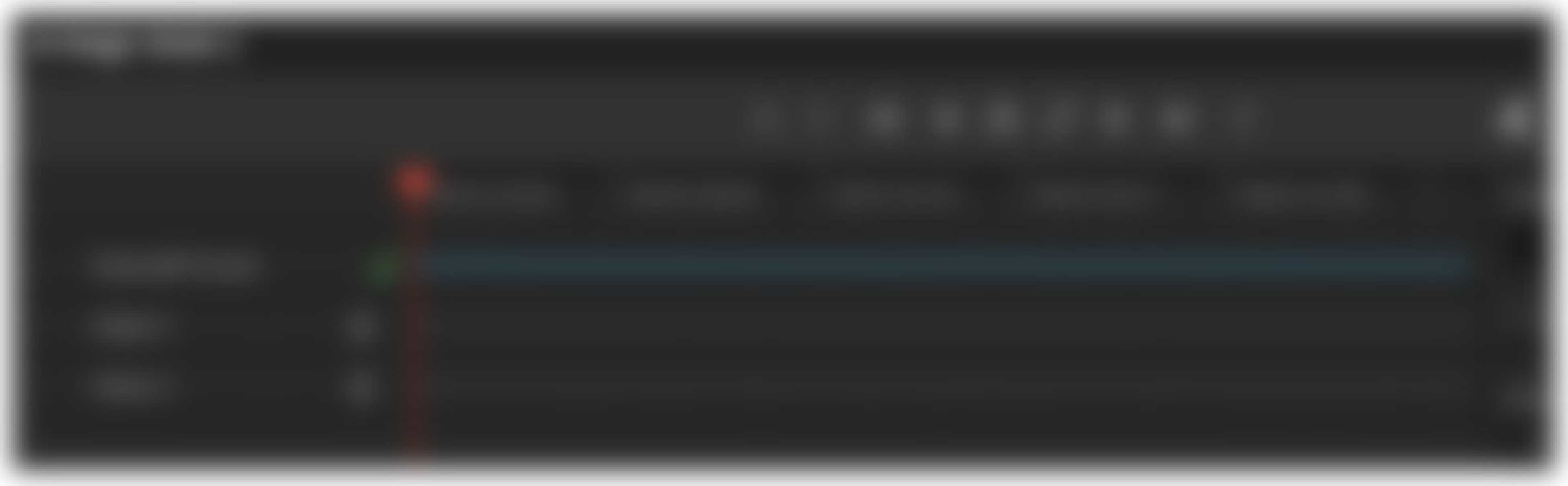
- In the viewer, click the man's trousers. This will indicate to the Magic Mask that you want it to focus on the full height of the man's body rather than just the head or upper torso.



The mask overlay now includes the man's entire body. With the subject identified, you can now track the mask.

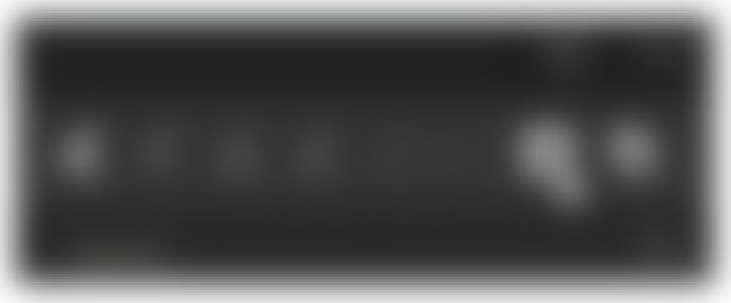
- In the Magic Mask toolbar, click Track Forward.

A blue line in the Overall Track row indicates a successful track.



To grade the scene around the man, you will need to invert the selection.

- In the Magic Mask toolbar, click Invert Mask.



- Click Toggle Mask Overlay to remove the red highlight from the viewer.
- In the Primaries palette, increase the Midtone Detail [illegible] to sharpen the beach and enhance the ripples in the water.
- Use the Offset master wheel to brighten the background and drag the Offset color wheel toward orange to emphasize the warm sunrise.

- Use Contrast and Pivot to create a dynamic look with enhanced shadows and highlights.

Before

After

The Magic Mask has been trained on hundreds of video references of people and physical features, making it exceptionally adept at tracking the motion of the human body. In this case, it was able to recognize a man as he walked into the shot, revealing his legs and arm. In clips with multiple people, you can use additional strokes to mask and track each person or use dedicated nodes for each individual.

Masking Physical Features

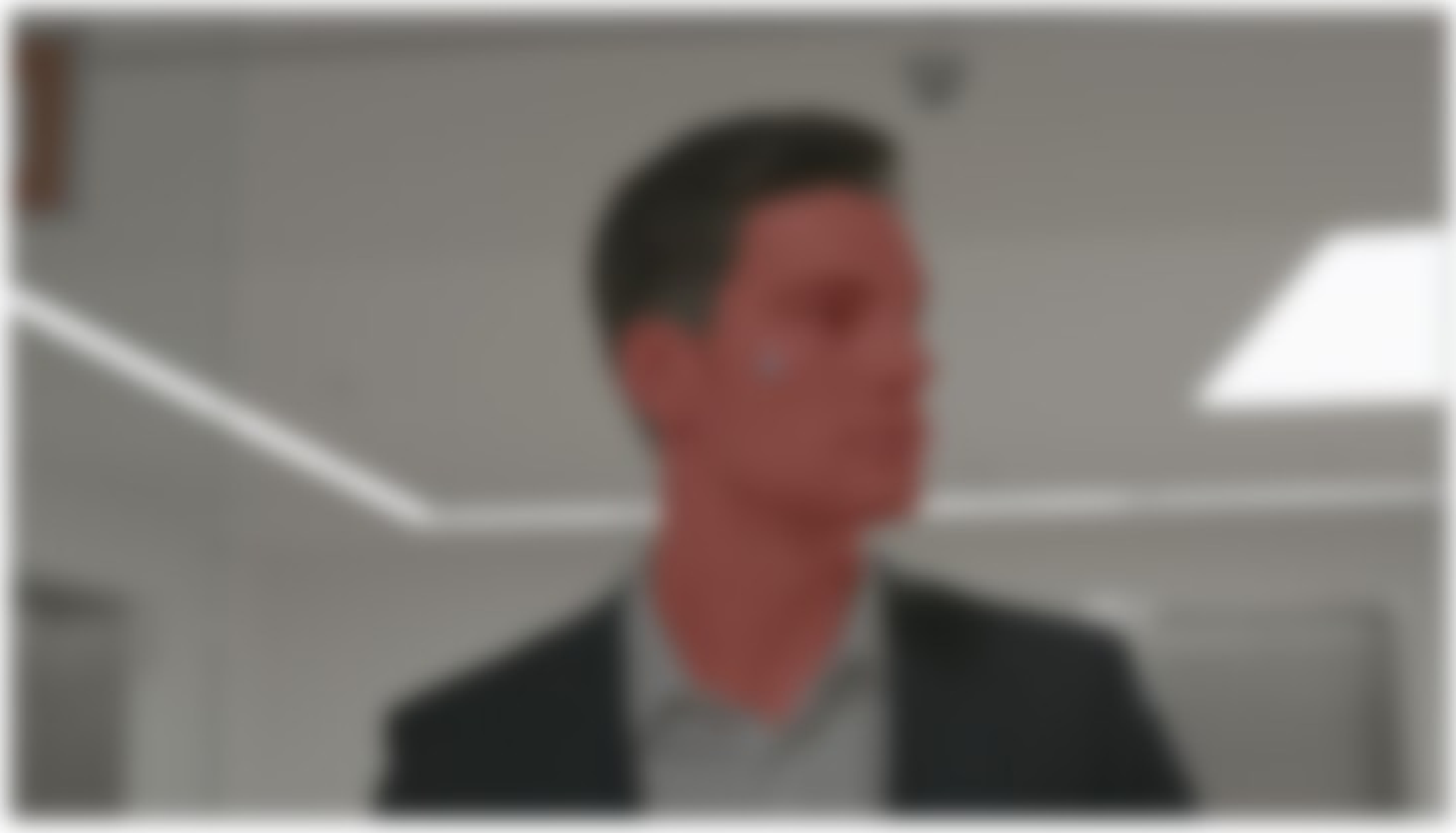
Often, you will want to focus on a specific feature of a person—for example, to correct the color of a shirt or to perform skin/beauty work. This exercise demonstrates how you can quickly isolate a face for grading and how you can improve the selection with the Magic Mask's adjustment controls.

1. Select clip 06.
2. Play the clip to review it.

Because of the dark environment and rapidly changing light in the garage, the man's face is underlit. You will use the Magic Mask to track and brighten his face.

3. Return to the start of the clip.
4. Label node 01 as **Face**.
5. Open the AI Magic Mask 2 palette.
6. In the viewer, click the man's cheek.

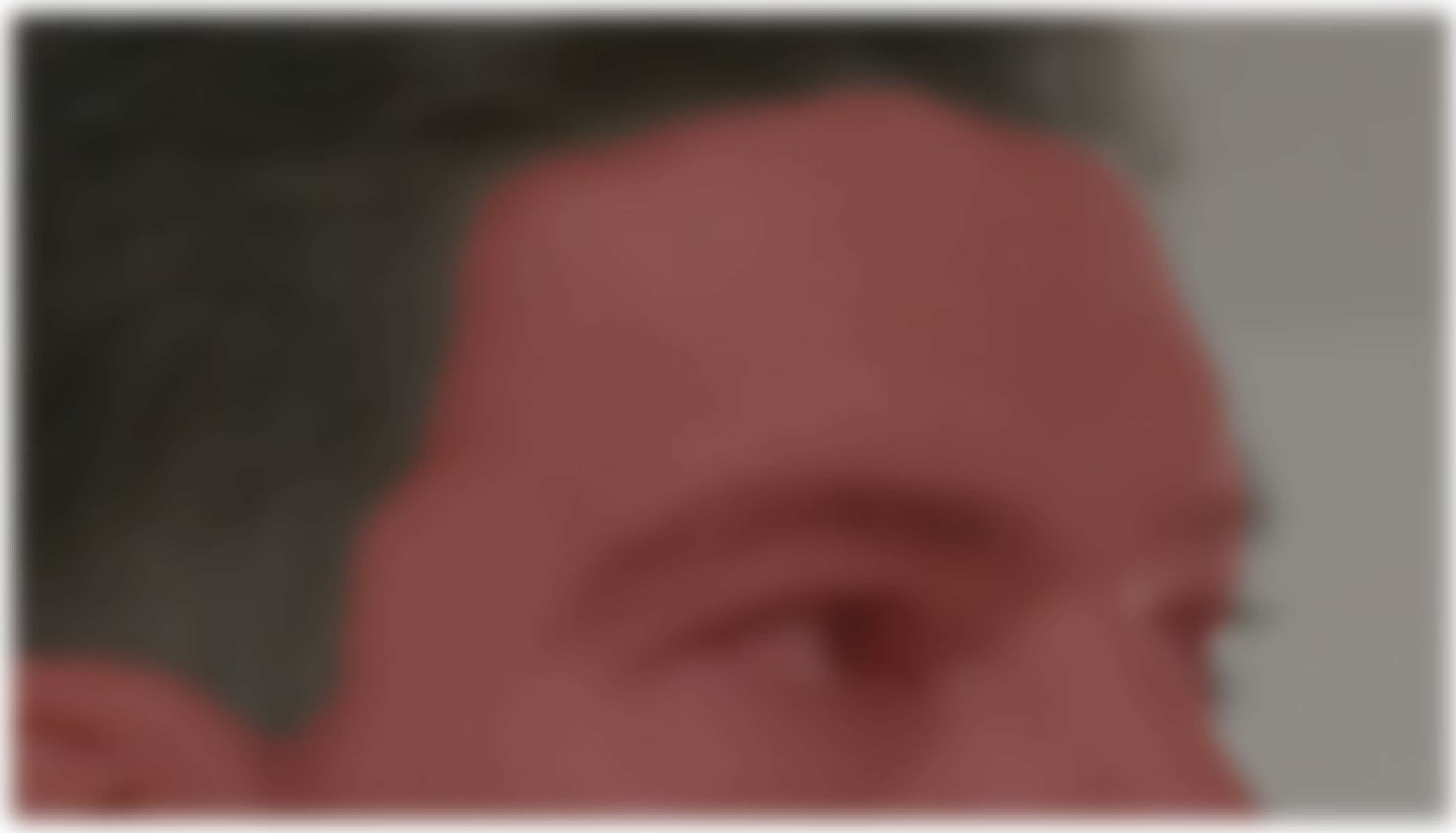
- Click Toggle Mask Overlay to review the selection.



The selection is immediately successful – it has isolated the skin on his face, ear, and neck while avoiding his hairline and clothes.

Let's look closer at the mask edge to see if the selection can be further improved.

- Zoom in on the viewer to more closely observe the mask around his hairline and forehead.



Although accurate, the edge is harsh and might stand out when you start grading.

The Magic Mask adjustment controls feature a Quality parameter that determines the accuracy of the mask analysis. In cases where a garbage matte or rough approximation will suffice, the Faster option will provide a quick result at the expense of quality. When precision is crucial, Better is the preferred option, but it comes at the expense of processing time and computational power.

- Click Better and wait a moment while the Magic Mask re-analyzes the subject.

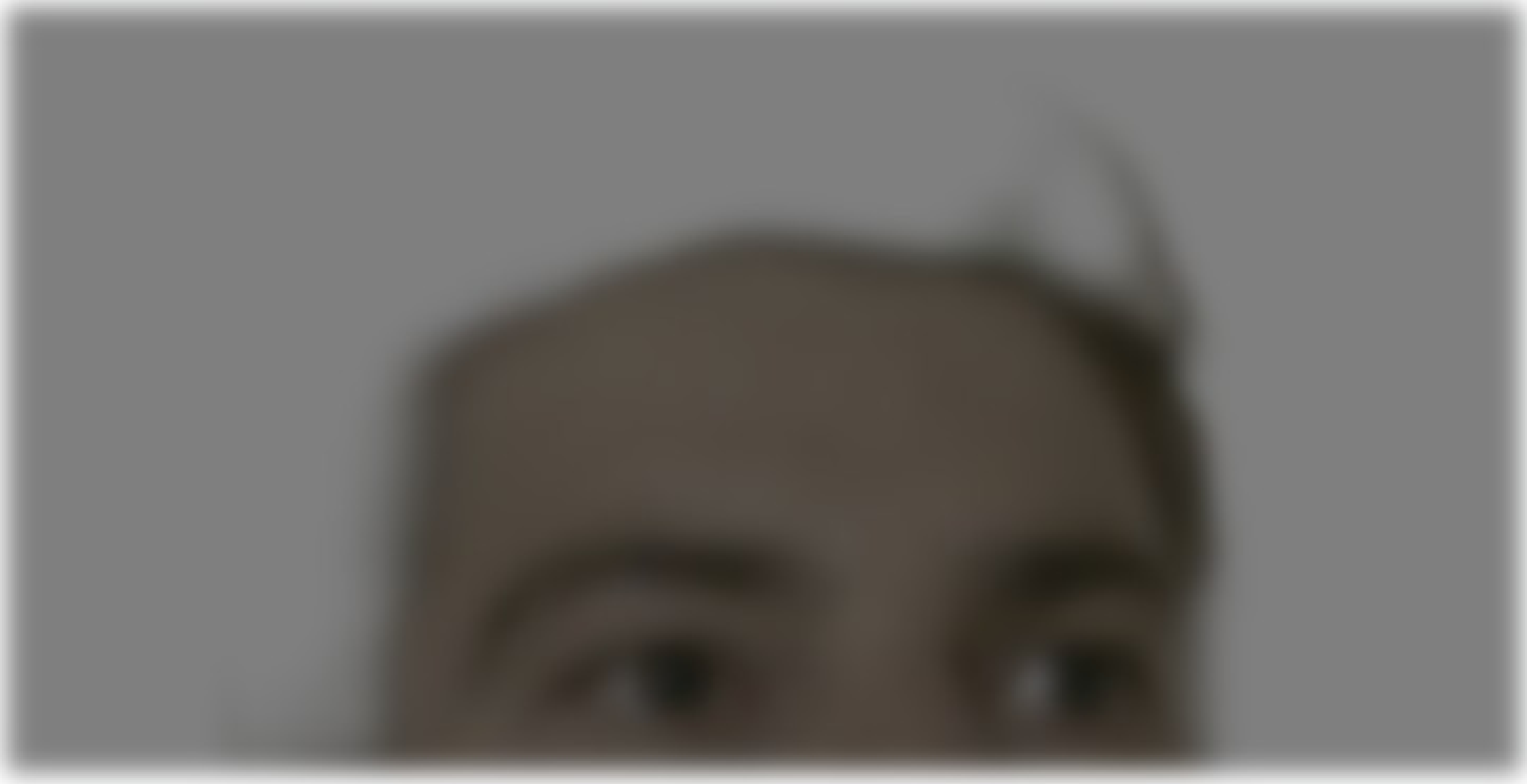
The resulting mask is much improved. The edge of the mask is softened around the hairline, ensuring a smooth blending of the grade. Even the eyelashes are included.

With the face successfully selected, you can proceed with the track.

- In the Magic Mask toolbar, click Track Forward.

When the track is finished, review the resulting mask.

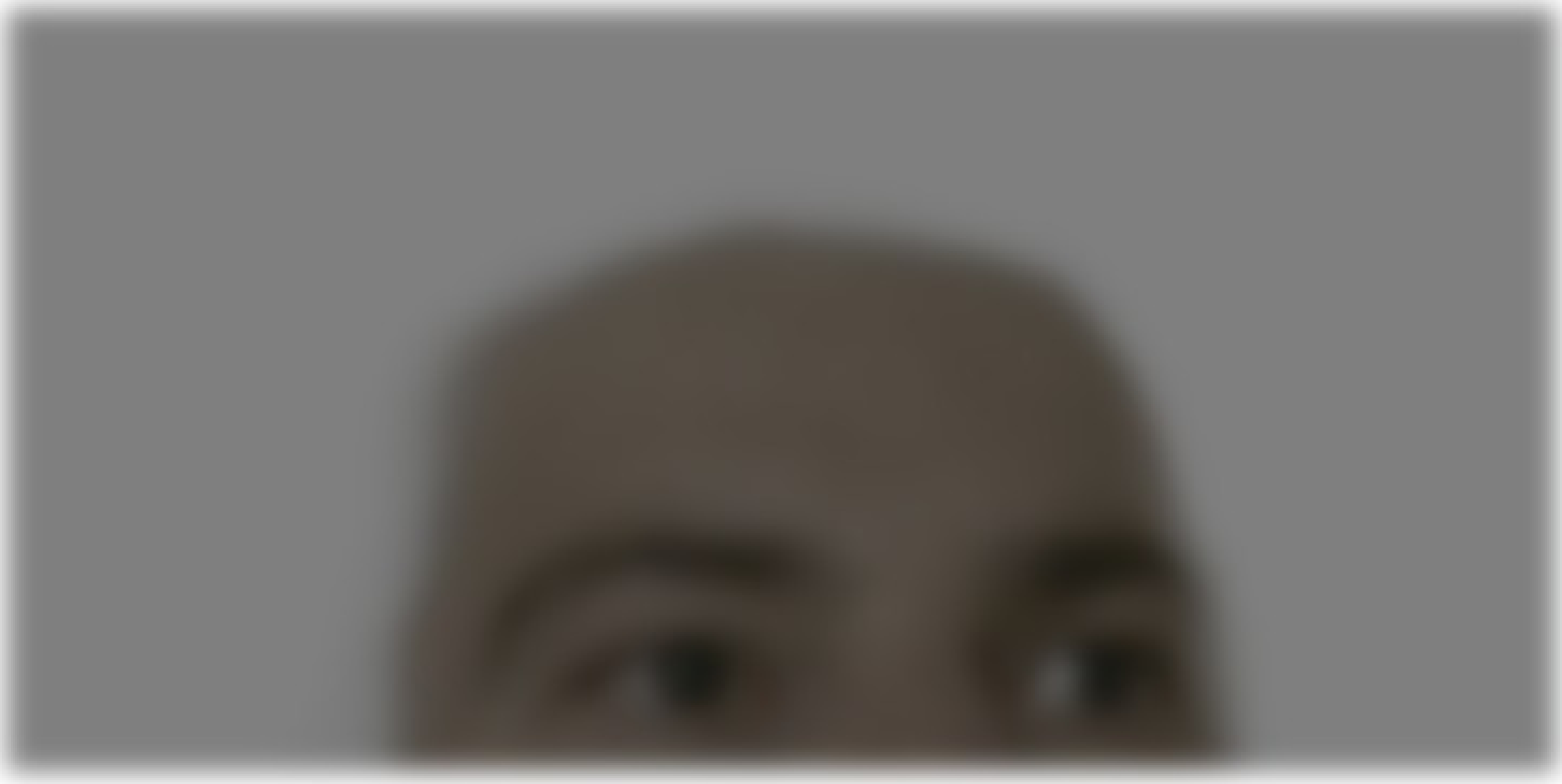
- On the last frame of the clip, enable highlight mode in the viewer.



Toward the end of the shot, the mask picks up too much of the man's hair.

The Smart Refine parameter allows you to expand or contract a mask based on the internal image analysis. Smart Refine will prioritize preserving edges that it is certain are part of the subject while reducing/expanding areas in which it has "low confidence."

- Reduce Smart Refine [illegible] and retrack the Magic Mask.



The resulting mask is contracted around the hair, while preserving the "high confidence" edge around the rest of the face.

- Disable Highlight mode in the viewer.
- Click Toggle Mask Overlay to hide the mask in the viewer.

> **TIP** To remove the blue dot from the viewer, choose Off from the onscreen dropdown menu, or press Shift-~ (tilde) or the key to the left of 1 on your keyboard.
>
> Another quick method for removing the Magic Mask onscreen overlays is to open a different tool in the central palettes, such as the Curves or Color Warper.

- To brighten the man's face, drag the Gamma master wheel (0.02) to the right.

> **TIP** Another unique parameter in the Magic Mask's Finesse controls is Smoothing, which is designed to reduce mask edge jitter in areas of low confidence. Jitter is most likely to occur in masks with rapid movement or a high volume of edge detail, such as loose clothes blowing in the wind or curly hair. Increase Smoothing to analyze the surrounding frames of a mask and produce a more stable average of the selection on any given frame.

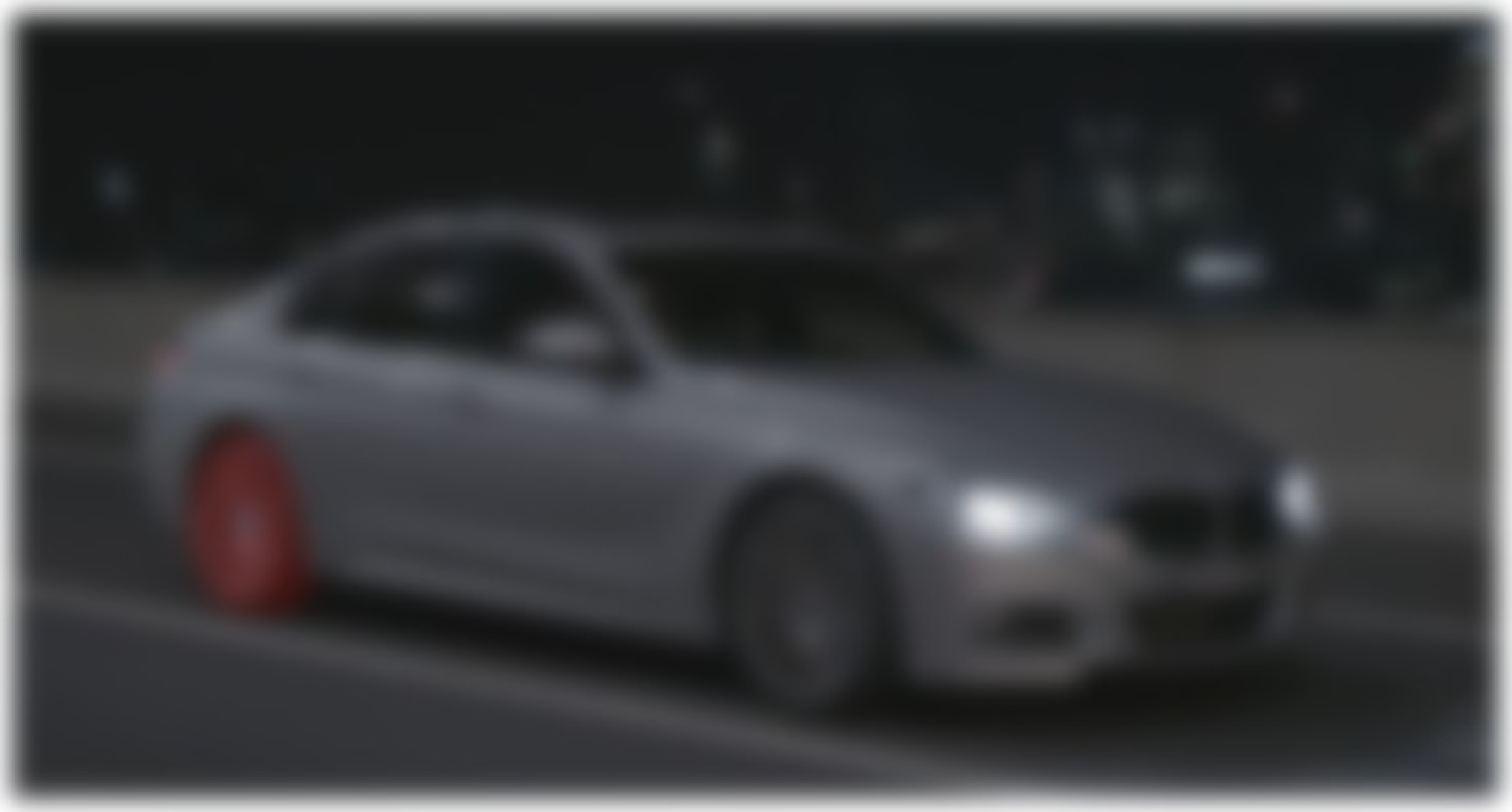
Tracking an Object

In addition to people, the Magic Mask has been trained on thousands of objects and surfaces – from vehicles, buildings, and skylines, to animals, clouds, and flames – it boasts an extraordinary recognition rate. You can use the Magic Mask to emphasize products in commercials, perform sky replacement, enhance production design, or any number of creative applications that we haven't even thought of yet!

In this exercise, you will track an object with a high level of detail and use the mask Finesse controls to refine the result.

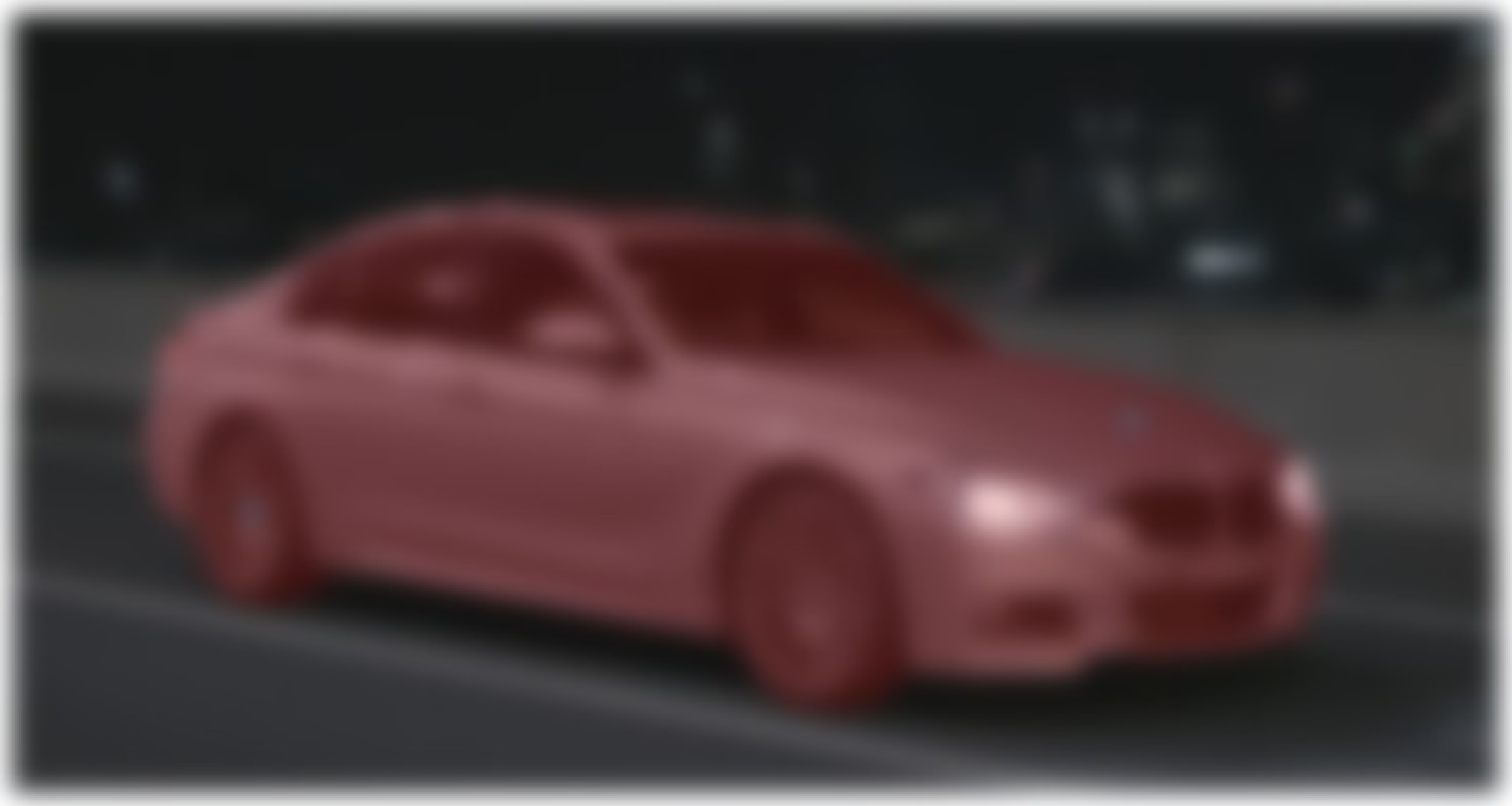
1. Select clip 15.
2. Create a new node after the INPUT CST and label it **Balance**. Use the Primaries palette to brighten the image and remove the magenta tint from the highlights.

- Create a new node after the Balance node and label it Car.
- Open the AI Magic Mask 2 palette.
- In the viewer, click the car's rear wheel.
- In the Magic Mask toolbar, click Toggle Mask Overlay.



The wheel alone is highlighted. To indicate that you wish to capture a whole object, you should click a surface on the opposite side of it.

- In the viewer, click the car hood.



- If satisfied, click Track Forward.

  Otherwise, click the bin icon in the click list and try again with another click. If needed, make additional clicks to further improve the car selection in the viewer.

The resulting mask is satisfactory but features hard edges. As in the previous exercise, you can opt to change the Quality parameter to Better to instantly improve the result. However, due to the computational intensity of the Better setting, you may opt to enhance the Faster quality mask with the help of the Matte Finesse tools instead.

- In the Matte Finesse controls, drag the Blur Radius (10.0) to soften the edge of the mask.
- Drag the In/Out Ratio (20.0) to slightly expand the mask blur outward.
- Increase Post Filter (3.0) to reintroduce some of the edge detail from the original video source.

- Click Toggle Mask Overlay to remove the red highlight from the viewer.

  With the selection complete and the overlay hidden, you can resume the grading process.

- In the Primaries palette, drag the Gamma master wheel right ([illegible]) to brighten the car.
- Increase the Contrast ([illegible]) and drag the Pivot left ([illegible]) to emphasize the shine on the car body.
- Raise the Midtone Detail ([illegible]) to sharpen the headlights, rims, and reflections.

Before

After

With a few clicks, you were able to isolate the car and emphasize it against its environment using standard primary grading controls. Notice how the Magic Mask tracked the car even with dramatic fluctuations in light. The Magic Mask goes beyond chroma and luma keying when identifying a selection and can follow objects through dynamic changes in environments, strong shadows, and even motion blur.

NOTE You may have noticed that the colors and contrast in the viewer are dimmed when viewing the Magic Mask overlay. This is because the Magic Mask operates independently from any color management or upstream node grades. This allows it to produce consistent results regardless of how the image signal is treated, ensuring that it does not need to be re-analyzed and re-tracked after adjustments are made to upstream nodes.

Blurring the Background to Draw Attention

Another way to draw attention to an object or person in the foreground is by blurring, or defocusing, the background. The Defocus Background effect produces a blurring pattern reminiscent of an optical lens, making it more aesthetically pleasing than a standard blur effect when used in shot composition.

Standard Blur

Defocus Background effect

1. Select the Car node.

2. Press Option-S (macOS) or Alt-S (Windows) to create an Outside node, and label it **Defocus BG**. The Defocus Background effect relies on matte data to apply the focus blur. Reusing the Car's mask key gives you a quick starting point for the scene matte.

3. In the Effects panel, under Resolve FX Stylize, find the Defocus Background effect and drag it onto the Defocus BG node.

   The Defocus Background effect classifies the white sections of the matte as the foreground and the black sections as the background. To apply this effect correctly, you must invert these values.

4. Under Adjust Mask, select Mask Invert.

5. In the Defocus Background settings panel, under Effects, reduce the Blur to 0.400.

   Due to the motion blur on the road, the result already looks satisfactory, but if you wish to be more precise with the focal length of the shot, you can isolate the blur to just the skyline in the background.

6. Open the Window palette.

7. Create a Linear window and label it **Skyline**.

8. Place the linear window on the top half of the frame, ensuring that the bottom line matches the start of the wall in the background.

9. Open the Tracker palette.

10. Change the Tracker to Frame mode and manually keyframe the linear window to raise slightly with the wall toward the end of the clip.

As with other tools and effects that generate mattes, you can reuse the tracked Magic Mask key data as much as needed throughout the node tree, modifying the key to suit the needs of specific grades and effects as you do so.

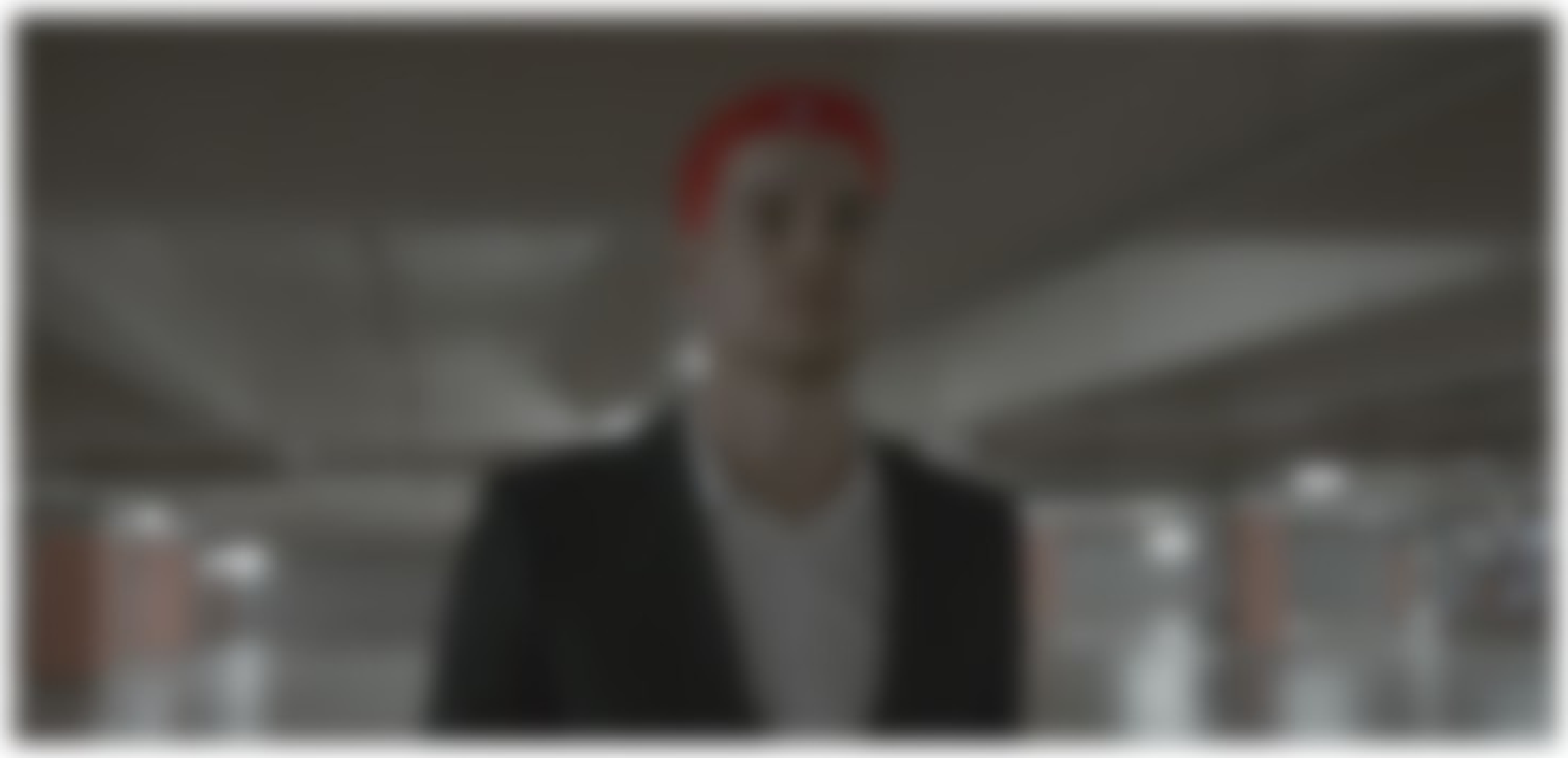
Fixing Difficult Tracks

Despite its great accuracy and intuition, the Magic Mask is also designed to work with difficult-to-track data. It's possible to exclude sections with subtraction clicks, track one frame at a time, and use paint strokes to add or remove mask sections in a frame. This exercise requires you to combine some of these techniques to produce a clean track.

1. Select clip 05.

   This clip has been successfully matched to the rest of the Garage sequence, but there is still a green dominance in the darker elements on the man – specifically, his hair and suit.

- Create a new node and label it **Beanie**.
- Open the AI Magic Mask 2 palette.
- In the viewer, click the man's hat.
- Click Toggle Mask Overlay to review the selection.

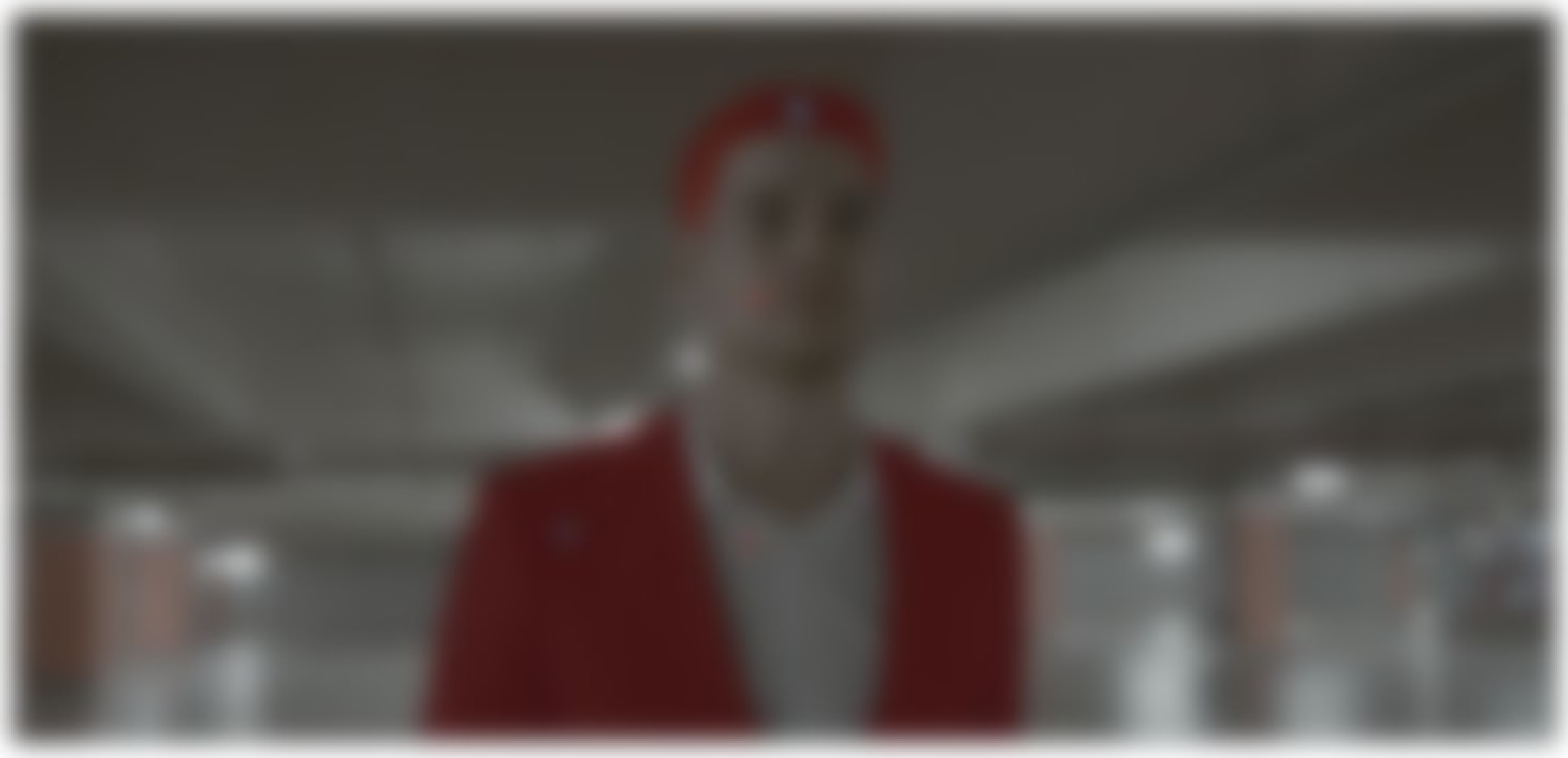


As expected, the Magic Mask has identified and selected his hat.

- Click the man's shoulder to include his suit.

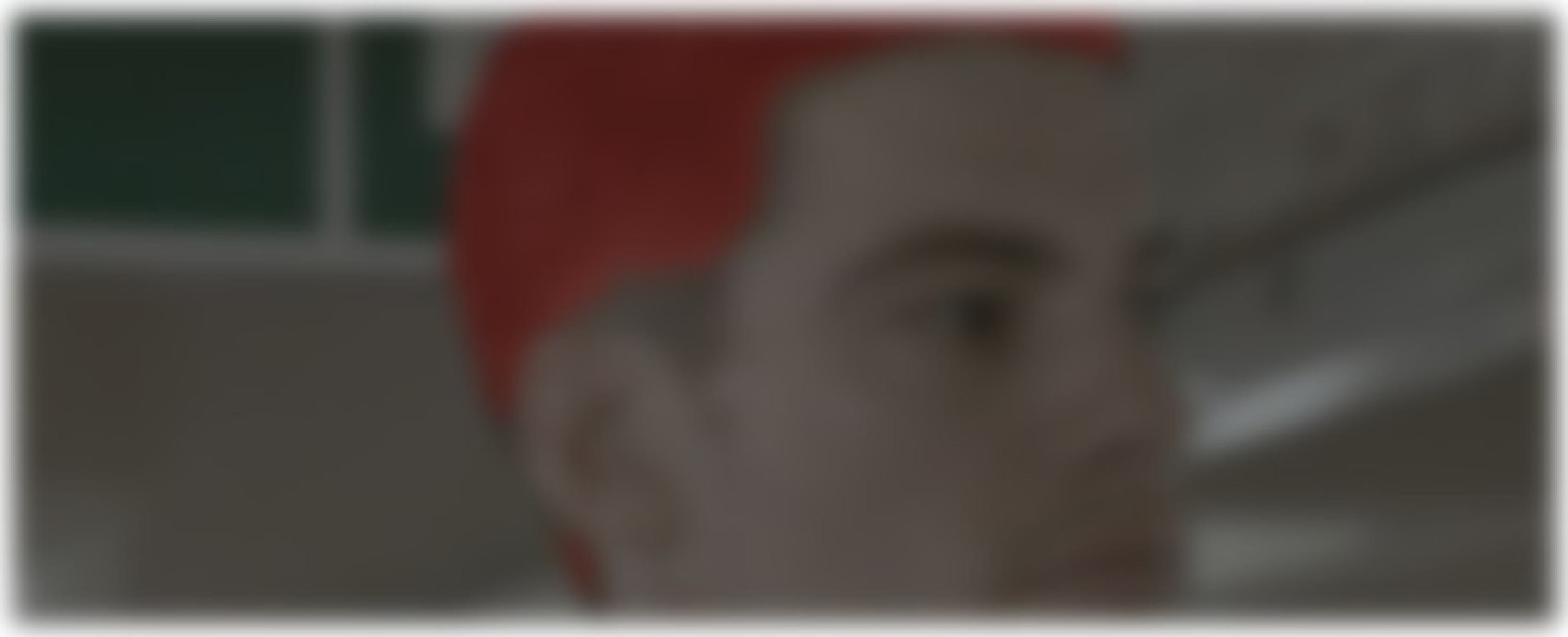
With this broader input, the Magic Mask assumes that you want to mask the entire man. You will use subtraction clicks to fine-tune the selection.

- In the Magic Mask toolbar, select Subtract Click.
- Click the man's white shirt.
- Click the man's face.



The highlight is removed from his shirt and face, resulting in clean selections on just his hair and hat. Note that subtractive clicks are indicated with red dots.

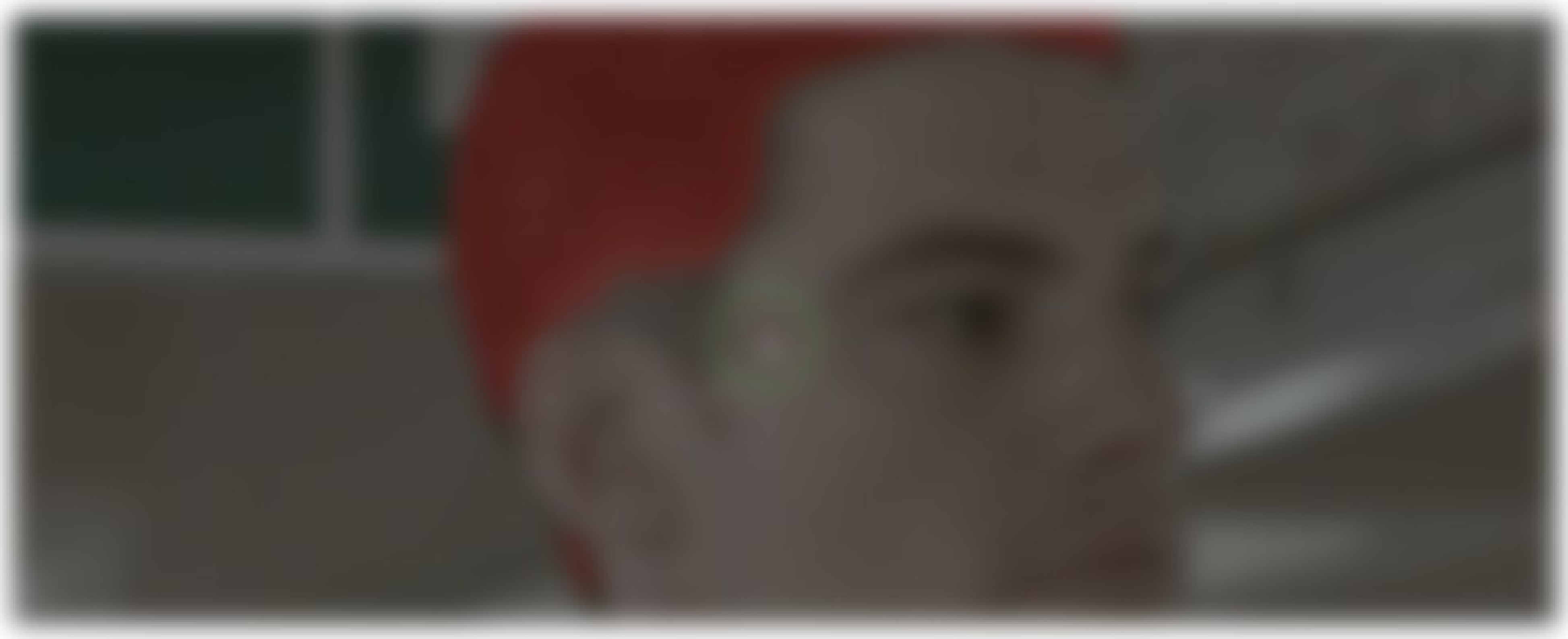
- In the toolbar, click Track Forward.
- When the tracking is complete, drag the playhead to review the accuracy of the mask.



The mask is mostly successful but may appear incomplete around his sideburns halfway through the clip.

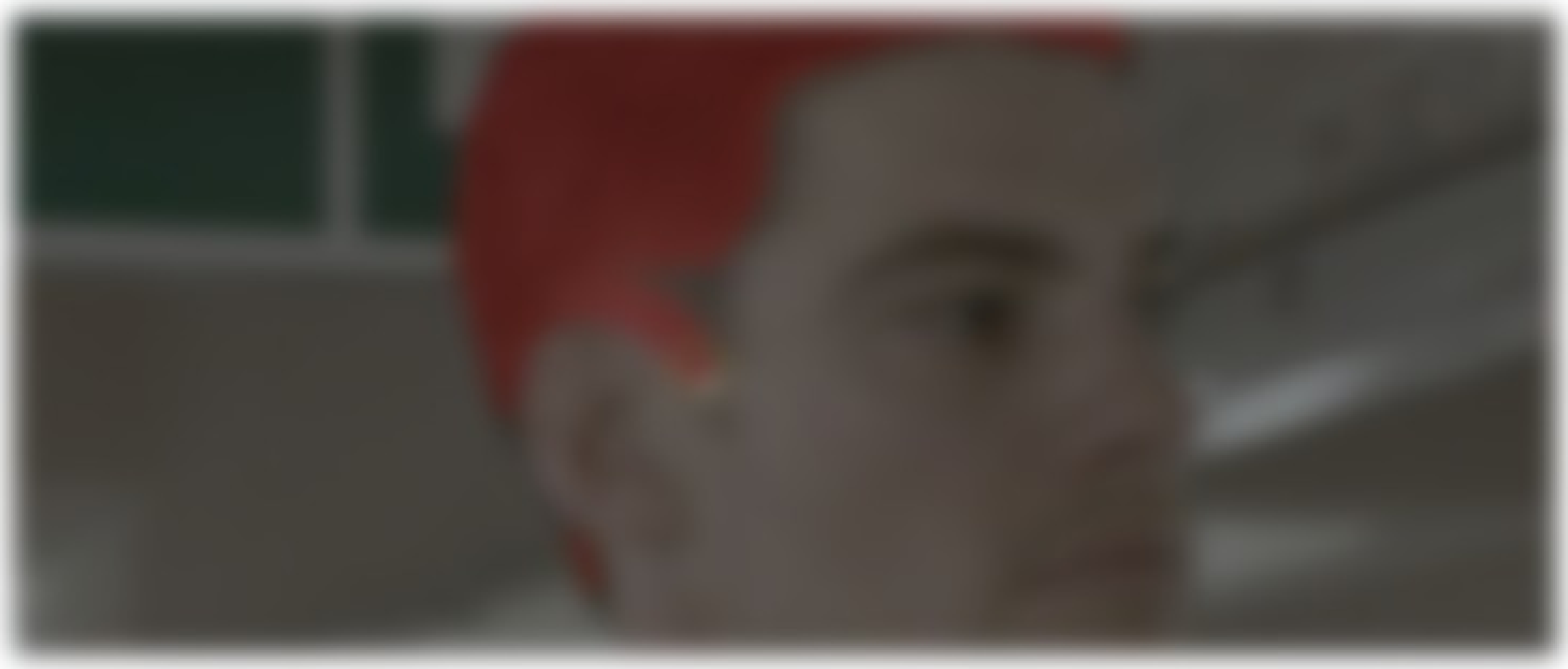
As this only affects a few frames, it makes sense to paint in the missing data manually.

- Zoom in on the man's face in the viewer.
- In the Magic Mask toolbar, select Add Paint Stroke.



In the viewer, your cursor will adopt a green paintbrush overlay.

- Hold Command (macOS) or Ctrl (Windows) and drag in the viewer to resize the brush. Alternatively, use the Brush Size slider in the Magic Mask toolbar. Aim to match its diameter to the detail of the area you will select.
- With the brush size set, click in the viewer to select the man's sideburns.



- When finished, press the Left Arrow and Right Arrow keys to navigate to previous and following frames and fill in the same area in every frame.
- Click Toggle Mask Overlay to remove the red highlight from the viewer.
- Use the Primaries palette to slightly darken the shadows with the Lift master wheel and gently raise the blue Lift bar to match the color of the sun in the preceding clip.

Masking a person's motion using traditional vector shape-based methods can take hours or days. Typically, this involves breaking up the human figure into a dozen dedicated windows and animating them to match the person's movement. The Magic Mask produces tracking mattes instantly, allowing you to focus more of your time on the color grading process.

NOTE An earlier version of the Magic Mask allows you to select objects, people and physical features with the use of strokes. It is still accessible in the AI Magic Mask 2 palette via Options > Legacy Object Mask.

Creating a Unifying Look Using the Post-Clip Group Level

The post-clip group level is the point in the video pipeline where you will design and apply creative grades on a scene-by-scene basis. This can occur after corrections have been made on the pre-clip and clip group levels or, ideally, at the very start of the grading process to establish the final look of the project before tweaking the upstream correction nodes.

When developing looks, other members of the creative process, such as the director and cinematographer, usually get involved to discuss the film's aesthetic and narrative needs.

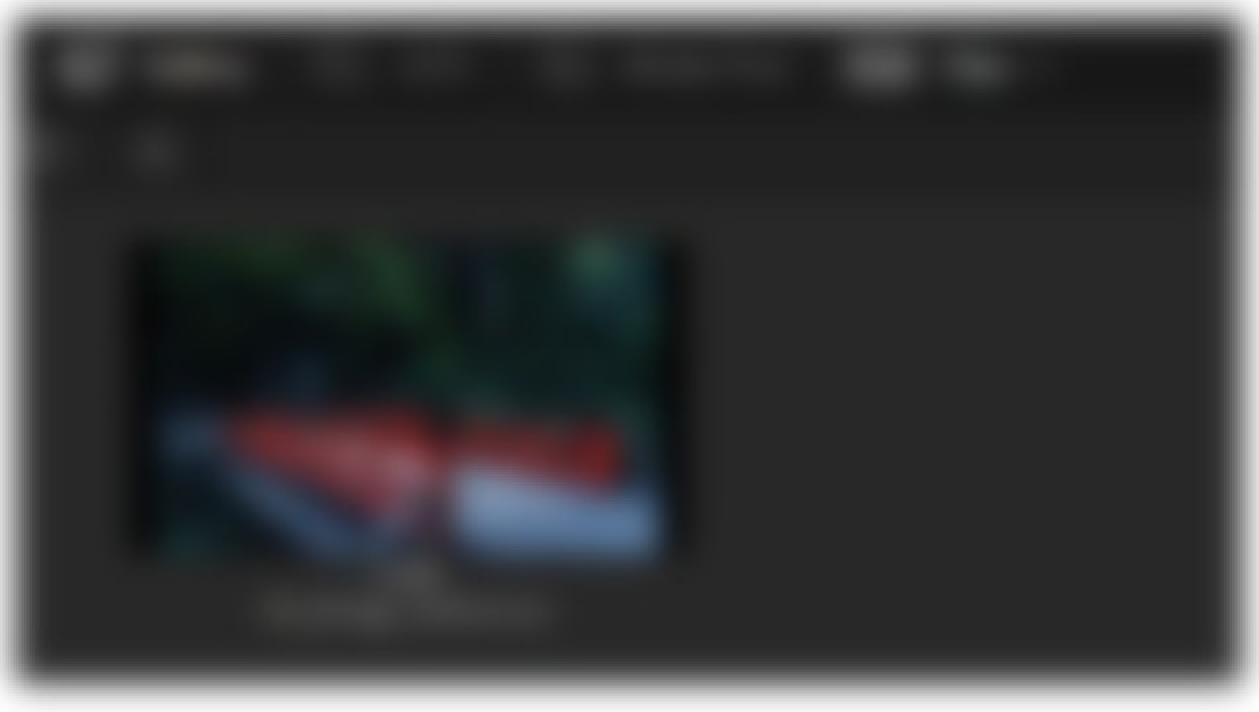
Applying a Post-Clip Grade with an External Reference

In this exercise, you will work with a reference image that a client has shared with you. You will import it into the gallery as a still and use it for visual comparison.

1. Filter the timeline to show only the Garage group clips.
2. Switch the Node Editor to Group Post-Clip mode.
3. Select clip 07. This is the hero shot you will use to grade the rest of the group.
4. To import an external reference image, right-click in the Gallery and choose Import.
5. In your file browser, navigate to the BMD 18 CC - Project 03 folder and open the References subfolder.

   If you don't see any images in the folder, ensure that your browser window is set to identify all files rather than just the default .dpx format files.

6. Select the 01 Bridge Reference.png image and click Import.

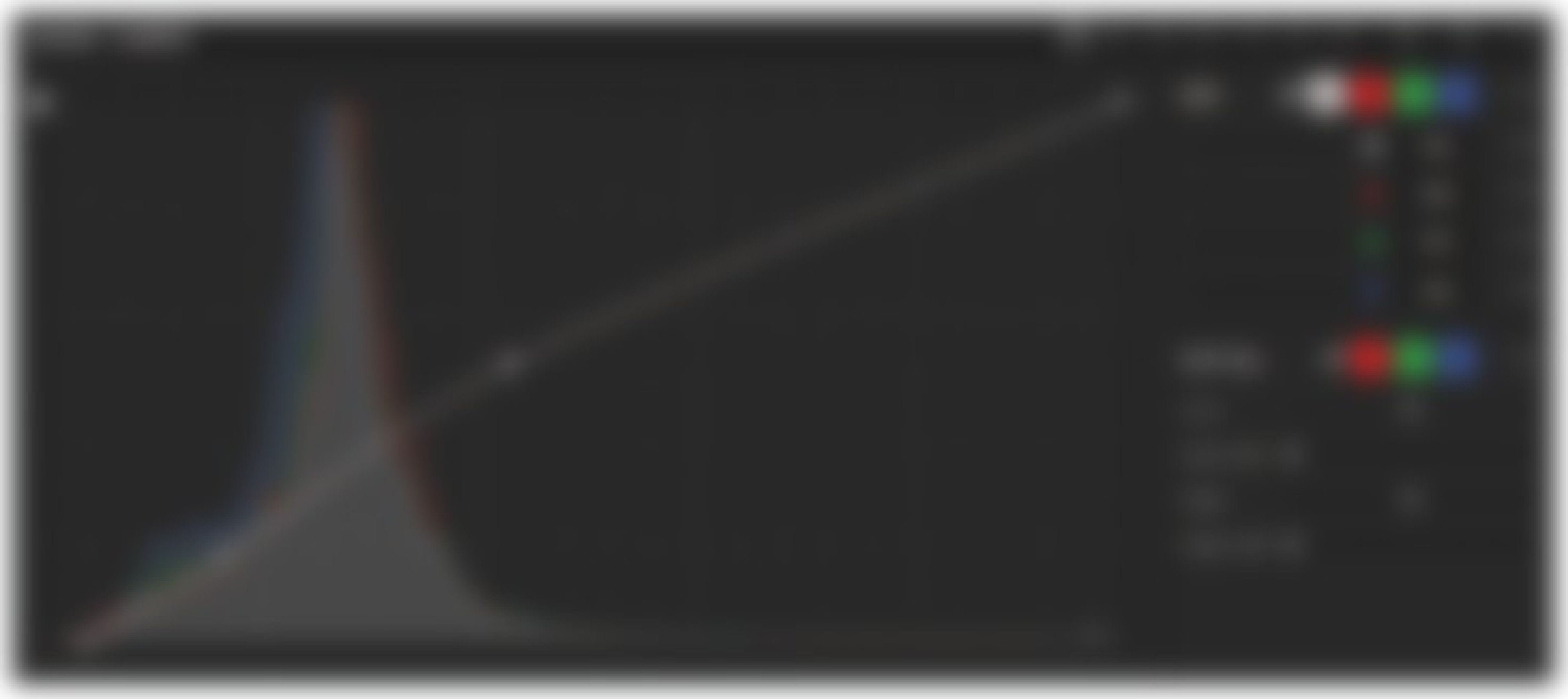


- Double-click the still to wipe it in the viewer.

Clients often use visual references from existing film and television properties, as well as other art forms, such as photography and painting, to communicate their desired looks for a project. In this case, the highly stylized reference image points toward a high-contrast, saturated scene with neutral shadows and cool midtones.

First, let's match the contrast and cold look of the reference.

- Create a serial node before OUTPUT CST and label it **Dark Blue**.
- In the Curves palette, drag the master curve black point across the bottom of the graph until the shadows under the car is almost pitch black. Add control points to gently increase contrast by raising the upper midtones.



Recall the message about breaking rules in Lesson 5. When designing a look, it's perfectly acceptable to make more aggressive grading adjustments since your primary focus is no longer the total preservation of the video signal but rather the creation of a look you find aesthetically pleasing.

Still, to prevent the shadows from being crushed completely, you can offset the lowest point of the signal while gently rolling off the bottom of the waveform trace.

- In the Curves palette, drag the Low Soft slider until you can see a small gap between the bottom of the trace and the waveform graph. This will allow you to achieve deep shadows and high contrast without losing actual detail.
- In the Primaries palette, drag the Gamma wheel toward cyan-blue to create a strong cool tone that matches the reference image.

You can address the oversaturated blue headlight reflections on the floor using the Lum Vs Sat curve.

- In the Curves palette, open the Lum Vs Sat HSL curve.
- Click the white swatch under the curve grid to generate an anchor next to the rightmost point of the saturation graph. The area between the two points represents the most saturated areas of the frame.
- Drag down the rightmost point until the reflections are not overly saturated.
- Drag the white swatch anchor point left to expand your target region. If necessary, create a new adjustment point and use it to refine the section of the frame you are desaturating.

The overall look of this scene is set. You can now place a second node to enhance the garage's red columns and pipes.

It's uncommon to create secondary grades in post-clip group node graphs, but it can work when a scene has a consistent color scheme or frame composition.

Previously, you saw that you could get a better secondary grade result if you used the original RGB signal of a clip instead of a heavily graded and contrasted one, like the Dark Blue node. However, in this instance, the graded node is helping to contrast the red pipes against the originally warm scene. Making a secondary selection based on the cool grade will produce a cleaner red key with minimal impact on the walls and the actor's skin tone.

- Create a new serial corrector node and label it **Red Pipes**.
- In the HSL curves, open the Hue vs Sat HSL curve.
- Click the red swatch at the bottom of the palette and increase the Sat by 20% to enhance the reds.
- Open the Hue vs Lum HSL curve, click the red swatch, and reduce the Lum by 10%. This makes the reds denser, matching them more closely to the dark environment.

- Create a Vignette node after the Red Pipes node for a moodier environment and to draw attention to the action in the center of each shot.

> **TIP** To bypass the entire node tree within a specific grade level, press Option-D (macOS) or Alt-D (Windows). Doing so will leave your other node levels active so you can assess the changes you've made within the current clip level.

In addition to importing still images, you can export a frame in various image formats for client reference and review.

- Go to File > Export > Current Frame as Still and export the frame from clip 07 in the PNG format.

Occasionally, a joint clip grade will emphasize or reveal tonal and color inconsistencies in a sequence of clips. In such cases, you should return to the Clip mode of the Node Editor to make further adjustments.

Adjusting Clips After a Post-Clip Grade

In this exercise, you will return to the Clip mode to apply an effect to the hero shot and then fix a discrepancy that was revealed in one of the shots on the timeline.

1. With clip 07 still selected, return the Node Editor to Clip mode. You will apply an effect to make the headlights more dramatic.
2. Create a second node and label it **Headlights**.
3. Open the Effects panel.
4. Find the ResolveFX Light category and drag the Aperture Diffraction effect onto the Headlights node.

   The result is an optical effect that mimics the diffraction around light sources. The settings in the Effects panel allow you to refine the pattern, intensity, and color of the diffraction.

5. Under Aperture Controls, change the Iris Shape to Square.

   TIP In the Output category of the Aperture Diffraction settings, change Select Output to Diffraction Pattern Alone to get a clearer view of the light patterns as you adjust the settings. Change the output back to Final Composite to see the result superimposed on the original image.

6. Under Compositing Controls, increase the Brightness to 0.80.

- Increase the Colorize value to [illegible] and use the swatch underneath it to change the color to purple.
- To reduce the effect intensity, expand the Global Blend parameter at the bottom of the settings and set Blend to [illegible].

This simple effect dramatizes the sequence's final shot as the car drives away. A variety of light-based plug-ins in the Effects panel can similarly help you stylize your shots and make features "pop" in subtle or exaggerated ways.

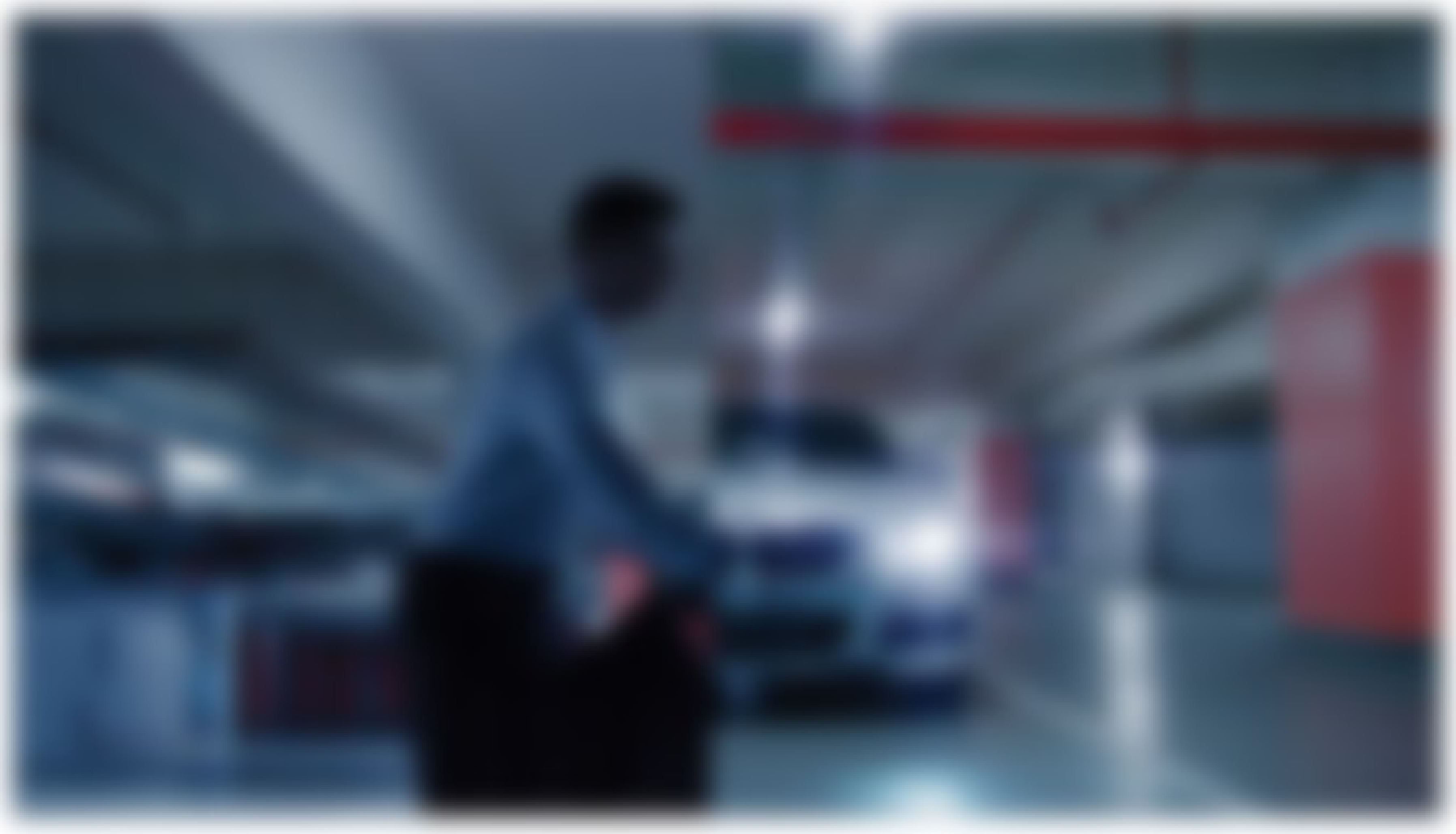
Next, you will check the remainder of the garage sequence to ensure that all shots match.

- Navigate the timeline and check the clips for consistency.

You can see that the lower midtones in clip [illegible] are substantially bluer when compared to the environments in clips [illegible] and [illegible]. Clip [illegible] is also darker, making it difficult to see the man's face.

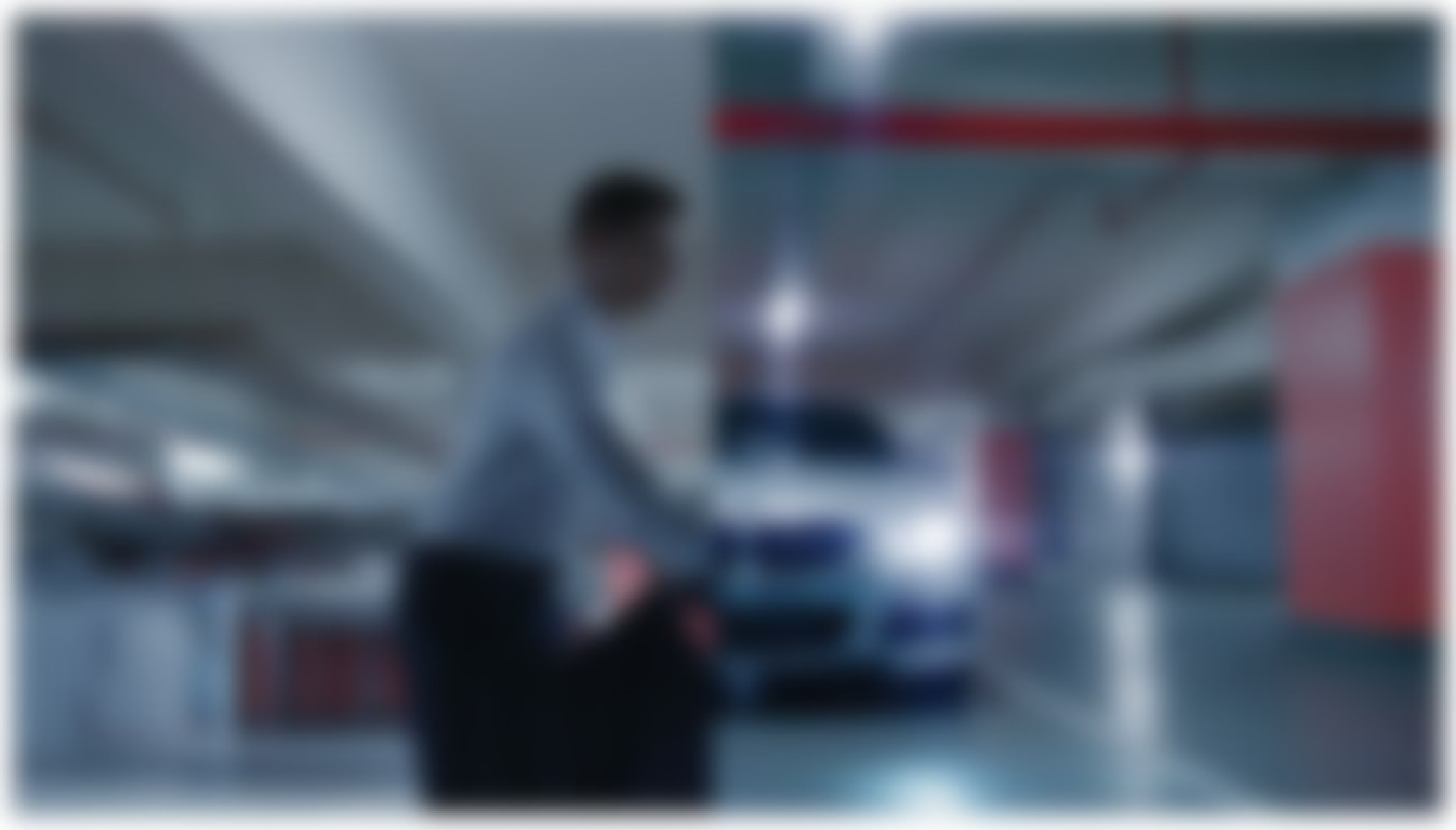
- Select clip [illegible].

- Right-click clip 07 and select Wipe Timeline Clip.



- Label node 01 **Match**.
- Switch the Primaries palette to Log Wheels mode and drag the Shadow master wheel right to reveal more detail in the background and on the man's face.
- Drag the Shadow wheel control point toward orange.

  The overall blue dominance of the shot is reduced, and the man's face is more visible.



- Disable Wipe mode in the viewer.

  The convenience of the group grading workflow is that no single stage or node is permanent. It's easy to jump between different group modes and tweak them as needed, all while continuously seeing the final output in the viewer.

Working with Lookup Tables

A lookup table, or LUT, is a digital file containing a number array for image processing operations. In color grading, these operations are most commonly used to process an image's incoming tone and color pixel data to return a set of new, precalculated values.

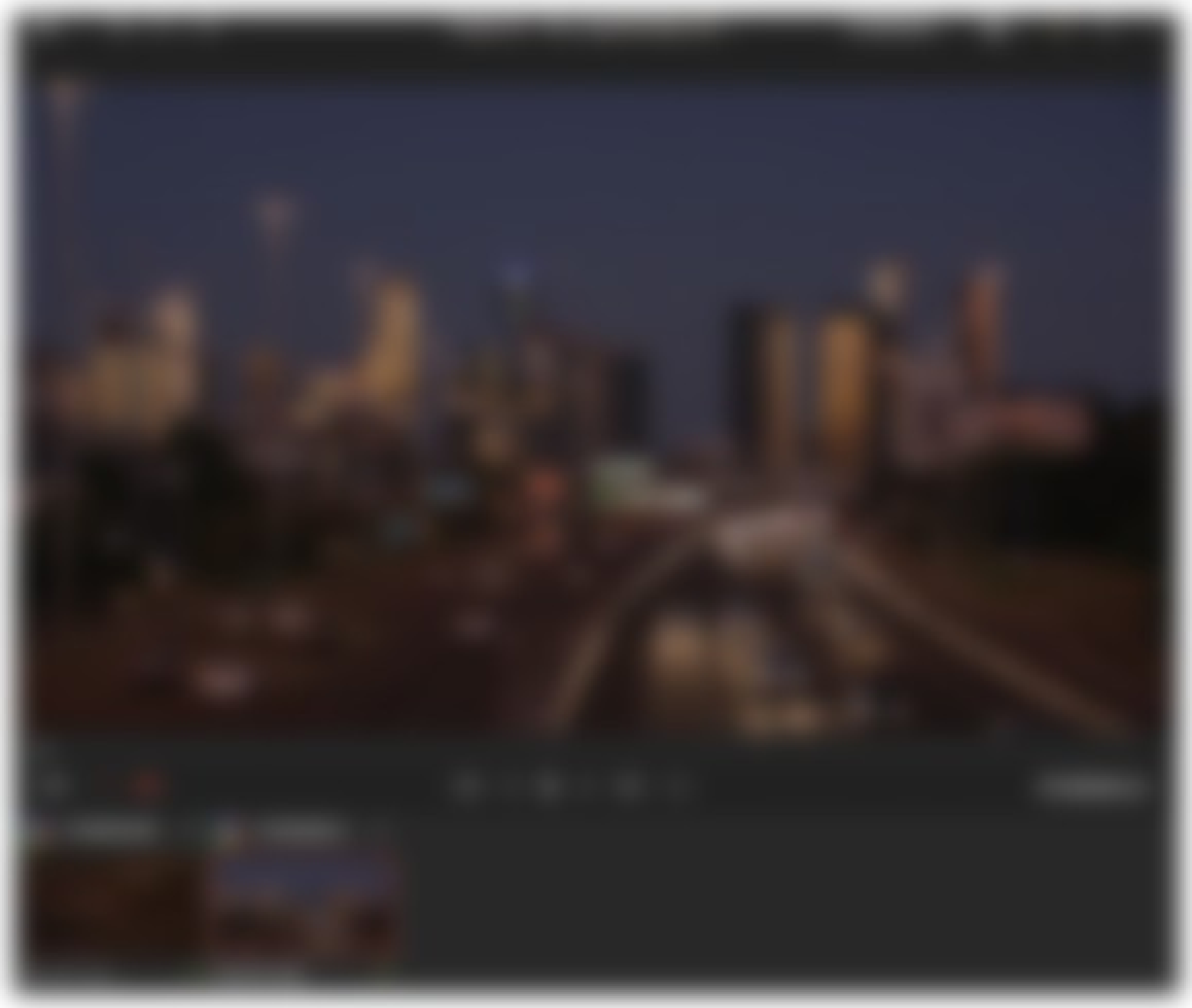
LUT application ranges from studio color management and monitor calibration to stylistic processing and creative grading. On the surface, LUTs may appear to behave similarly to stills, CDLs, and grade plug-ins. However, rather than using formulas or tools to transform colors, the values in LUTs are predetermined. The reliability of their results and their near universal software (and hardware) support make LUTs very popular industry-wide for on-set monitoring, calibration profiles, and show looks.

1D LUTs (commonly .ilut) control a single value of the image and are generally utilized as gamma transformers. 3D LUTs (commonly .cube) map hue, saturation, and brightness while offering varying levels of precision based on point value. 17 x 17 x 17 cubes are recommended for monitoring and calibration, while 33 x 33 x 33 and 65 x 65 x 65 cubes are more appropriate for grading.

In the next set of exercises, you will import and apply a LUT, generate and export your own LUT, and learn to work with emulation LUTs.

1. Change the Clips timeline filter to display only the Highway group.

2. Select clip 02. You will apply a look to these sundown shots using a LUT.



NOTE A LUT designed to encapsulate the look of a project (or sections of it) is known as a show LUT. They can be used for generating dailies, as a starting point for the grade, or as part of the final grade composition.

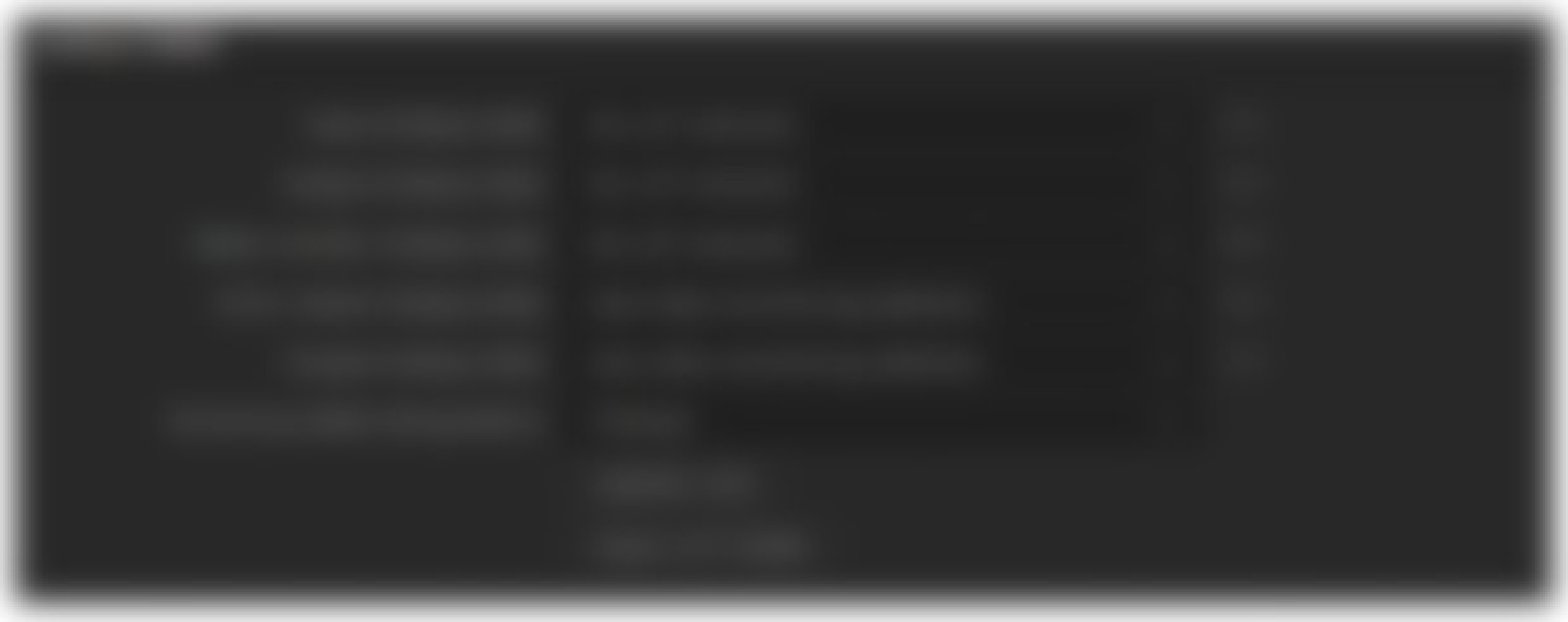
3 In the Node Editor, switch to Group Post-Clip mode.

4 Create a serial node before the OUTPUT CST and label it **LOOK**.

For a LUT to be accessible in DaVinci Resolve, it must first be placed in a folder that is a recognized LUT location. DaVinci Resolve features a default LUT folder, but you can specify custom LUT locations in the Preferences.

5 Open the Project Settings.

6 In Color Management, scroll down to the Lookup Tables section.



The Lookup Tables parameters allow you to load LUTs to different points of the signal processing pipeline. You can map videos before and after they enter the Node Editor pipeline, load a color calibration profile for your video monitor, and change the operating color space of the viewer and scopes.

7 Click Open LUT Folder to reveal the default DaVinci Resolve LUT folder location in your file browser.

8 In the LUT folder, create a new subfolder called **Colorist Guide**. You can delete it after you have completed the exercises in this book.

9 Open another file browser window, and in R18 CG - Project 03, find the LUTs subfolder.

10 Drag Highway_DWGtoDWG.cube into the Colorist Guide subfolder.

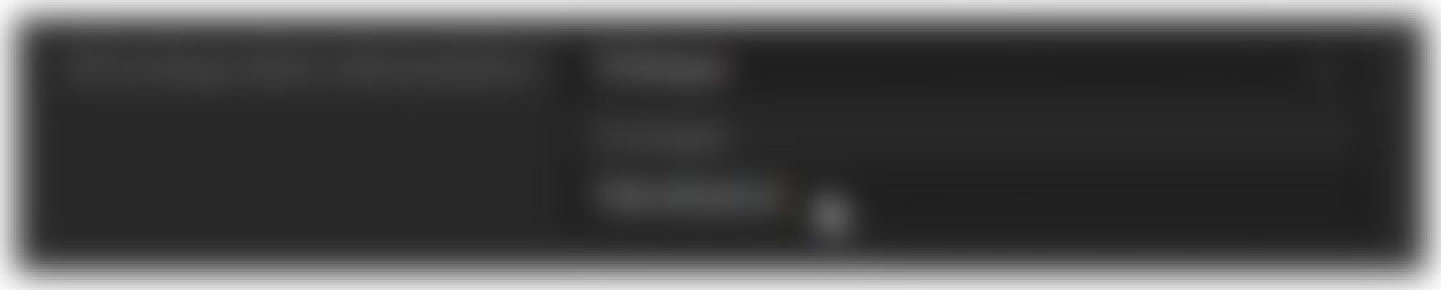
LUTs only work correctly when their specific input and output conditions are met. In some cases, these conditions are specified in the LUT text when viewed in a word processor. In others, the conditions are indicated in the LUT name. The suffix "DWGtoDWG" in the filename indicates that the LUT was created in a DaVinci Wide Gamut environment (input to output).

- Return to the Project Settings window and click Update Lists to refresh the LUT folder.

> **NOTE** You can load your own LUT storage locations for more precise LUT management. In DaVinci Resolve > Preferences, open the System controls and select the General settings. Use the Add and Remove buttons under the LUT Locations table to load custom LUT folders.

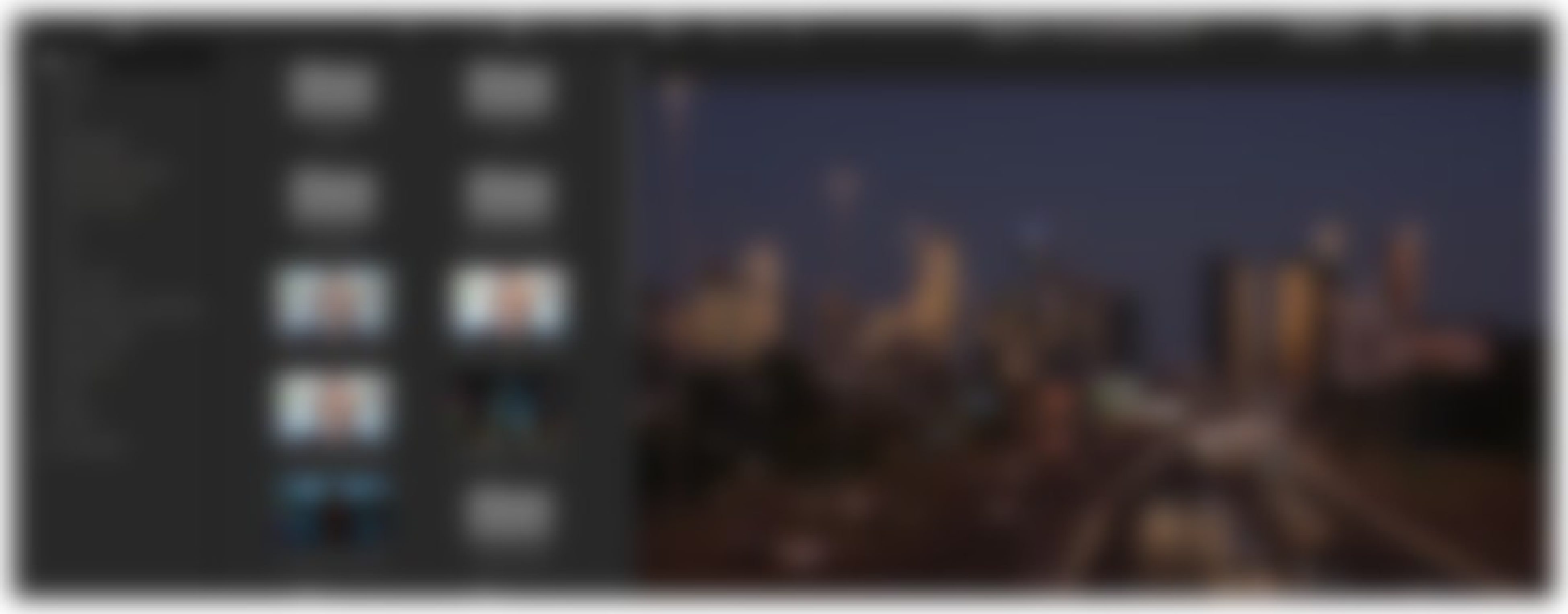
Before leaving the Project Settings, you can also address how LUTs handle interpolation. Due to the finite number of values represented in a LUT, parts of a source signal might be approximated during conversion, which can limit the final grade. When a LUT is generated in a lower bit depth format and applied to high bit depth (or raw) media, it can result in posterization (banding) in areas with soft gradients. Changing the interpolation method can reduce such artifacts in the image.

- Set "3D lookup table interpolation" to Tetrahedral. This will ensure that unmapped values in the LUT array are smoothly interpolated.



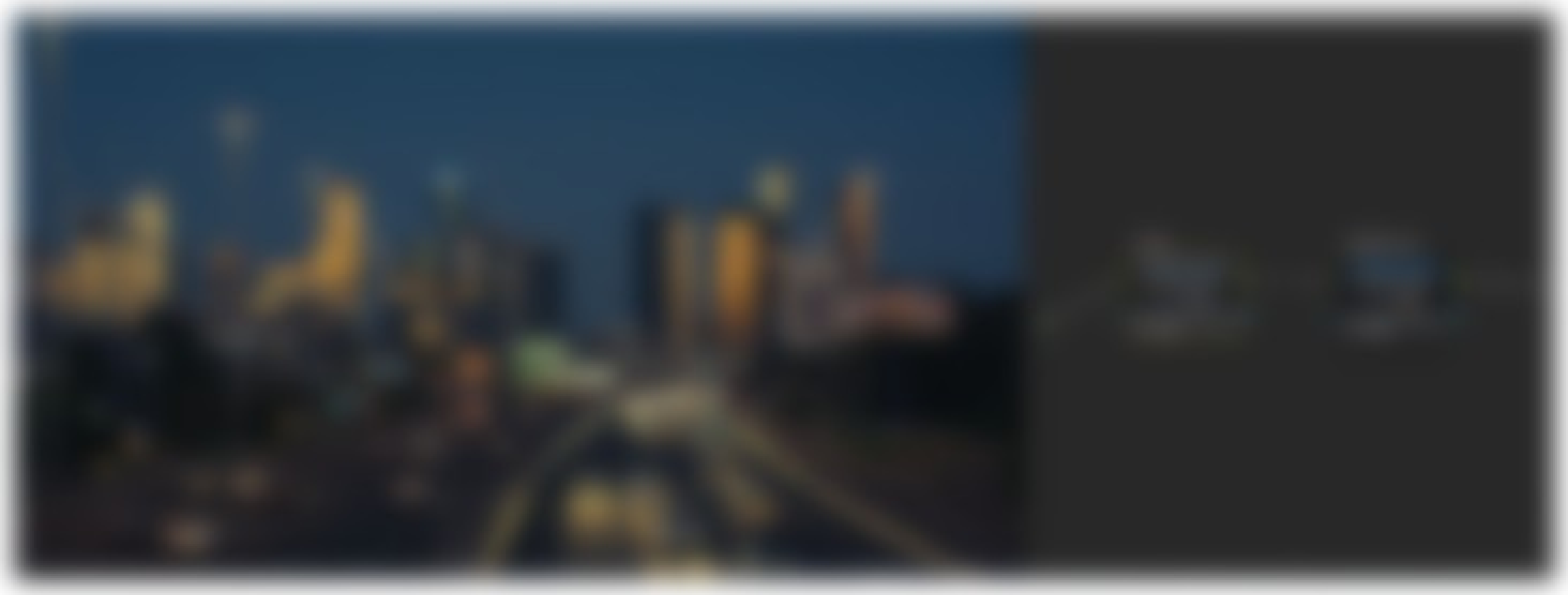
- Click Save to close the Project Settings.
- In the interface toolbar, open the LUTs panel.

The panel's sidebar features the contents of the DaVinci Resolve LUTs folder, including the Colorist Guide subfolder you just created. When you mount custom LUT locations, these will also appear in the sidebar. If Live Preview is enabled, hovering over the LUT thumbnails will give you a preview of their operation.



Notice that many of the LUT names indicate their color mapping. If you check the Blackmagic Design folder, the LUTs have names like "Blackmagic 4.6K Film to Rec709," indicating these are transform LUTs intended for raw or log BMD footage for conversion to the Rec709 viewing and deliverable standard.

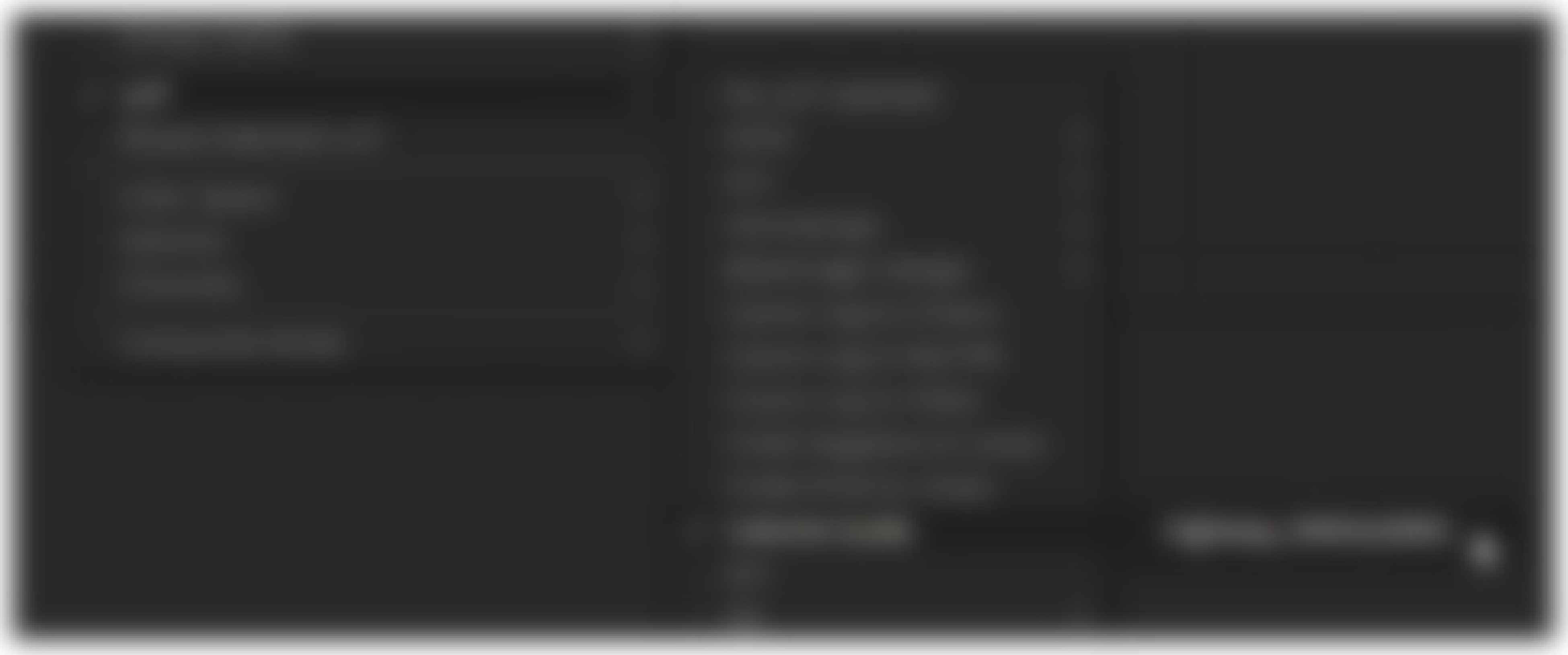
- Open the Colorist Guide subfolder.
- Drag Highway_[illegible].cube onto the LOOK node.



This alters the appearance of both clips in the Highway group, giving them a densely saturated evening look.

You also have access to LUTs in each node's contextual menu.

- Right-click the LOOK node and navigate to LUT. Here, you can see the same list of files as in the LUTs panel. Custom LUT locations will also appear in this contextual menu.



Now that you understand how to upload and apply LUTs that have been shared with you, you will next learn how to generate your own LUTs to share with others for use in DaVinci Resolve, third-party applications, and monitoring hardware.

Developing a Monitoring LUT

Generating a LUT file is a straightforward process. However, ensuring the LUT operates correctly in the intended media color space and looks consistent across all shots is a different matter.

First, you must decide on the color space transform of the LUT. If you create a look with active input and output CST nodes, that transform data will be baked into the resulting LUT, and you will not need those CSTs when applying the LUT. Common starting points for LUTs include camera color space profiles, wide gamut working spaces, and Cineon Log.

1 Remove the timeline filter to show all clips.

2 Select clip 03.

3 In the Node Editor, switch to Group Pre-Clip mode.

The INPUT CST maps the signal from Blackmagic Design 4.6K Film Gen 1. If you leave this enabled, this transform will be baked into the LUT, making the LUT applicable only to other Blackmagic Design 4.6K Film Gen 1 profile clips. This is ideal if you are creating a monitoring LUT or you anticipate that all the media in a project will come from the same camera.

If you wanted to generate a LUT for another source color space (for example, Cineon Film Log or ARRI Wide Gamut), you would need to change the input color space mapping in the CST from the camera color profile to that standard.

4 Leave the INPUT CST as it is.

5 In the Node Editor, switch to Group Post-Clip mode.

Similarly, the OUTPUT CST determines the color space to which your footage will be transformed. If you aim to create looks that can be output to a specific monitor or a wider gamut than Rec.709, you'll want to change the CST's output color space.

6 Leave the OUTPUT CST as it is. It will operate correctly in a Rec.709 (Scene) project and produce results consistent with your DaVinci Resolve viewer on a Rec.709 monitor with a gamma 2.4 curve. This is due to the OOTF transformation occurring in the Rec.709 (Scene) gamma within the CST.

You are now ready to create a Rec.709 monitoring LUT for Blackmagic Design 4.6K footage.

- Create a new serial node before the OUTPUT CST node and label it **Contrast**. Technically, this node can be placed at any point in the node tree between the input and output CSTs. The benefit of placing it here is that it will also apply a group grade to the other clips in the Office group.

The next factor in creating a LUT is identifying and maintaining the middle gray.

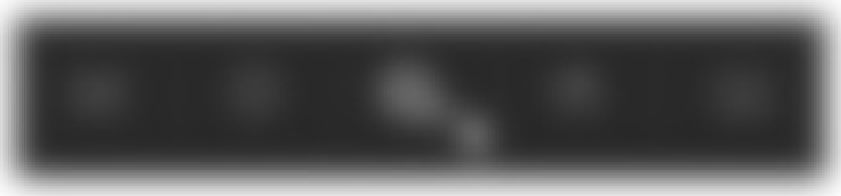
Every camera sensor and working color space has its own middle gray value around which you can consistently adjust contrast. Middle gray is important in photography because it tends to be the value to which cinematographers expose the camera's subject, which is usually a person, though it can also be an environment or inanimate object. Maintaining middle gray ensures that the subject looks its best no matter how dramatic the contrast and colors in the grade are.

Skin tone and middle gray swatch on the Color Checker chart

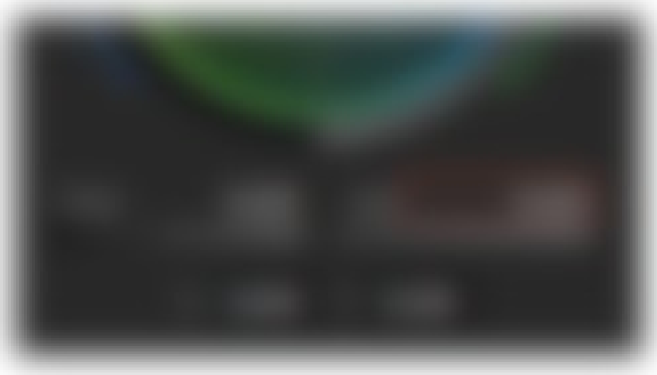
One parameter that allows you to work directly around middle gray is the Pivot control in the Primaries palette. If you know the middle gray value of a color space on the 1.000 index, you can enter it into the parameter's numeric field and drag the Contrast parameter to manipulate the dynamic range around it.

Another method of identifying middle gray is to remove the contrast and saturation in a shot in the active color space and match the resulting spike in the Curves palette.

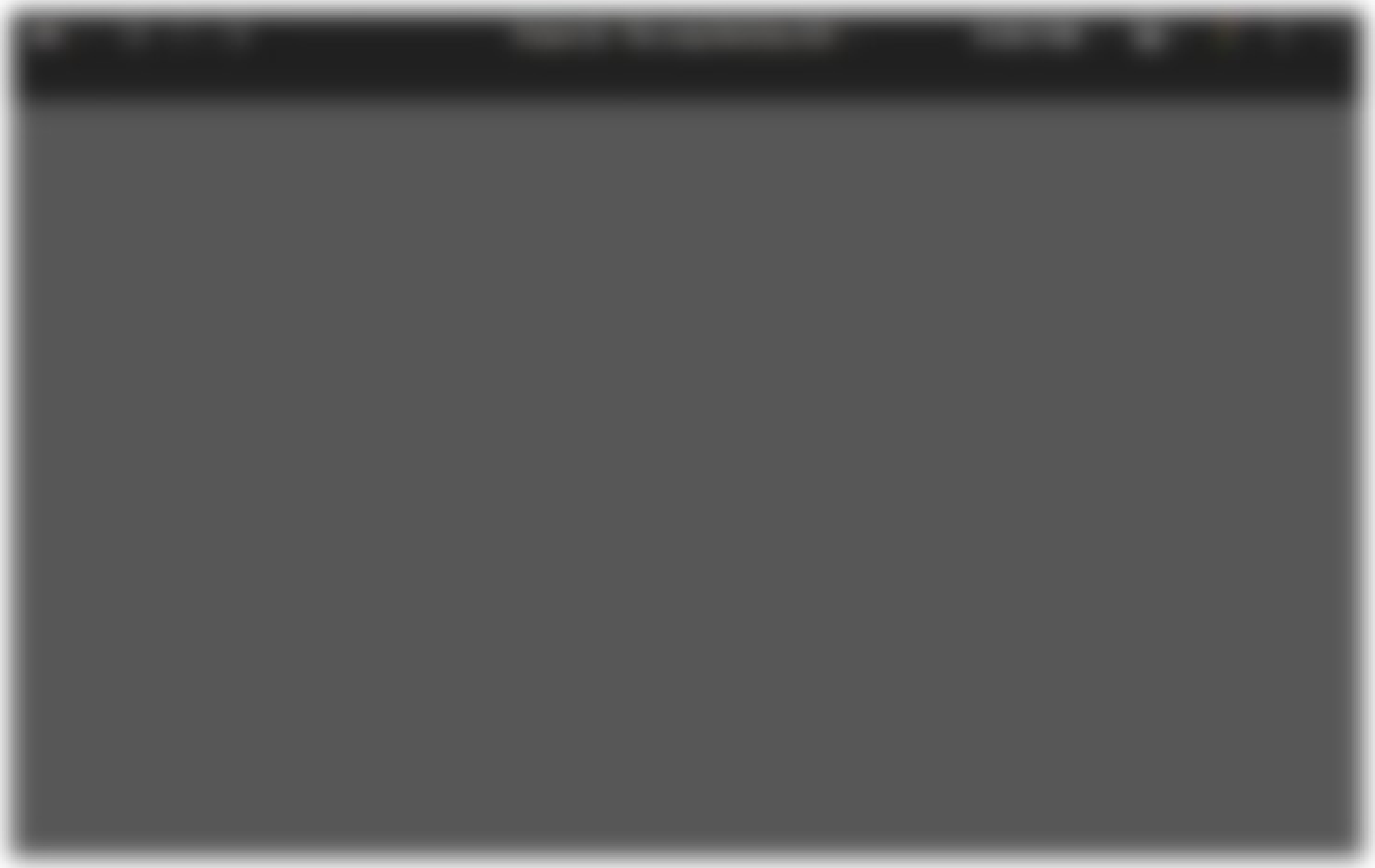
8 In the left palettes, open the High Dynamic Range Color Wheels palette. You will examine this palette more closely when you start working with RAW media in Lesson 9. For now, you will use its internal color management (by default set to the project's timeline color space, DaVinci Wide Gamut) to identify the clip's middle gray.



9 Under the Global wheel, set the Sat parameter to 0.00.



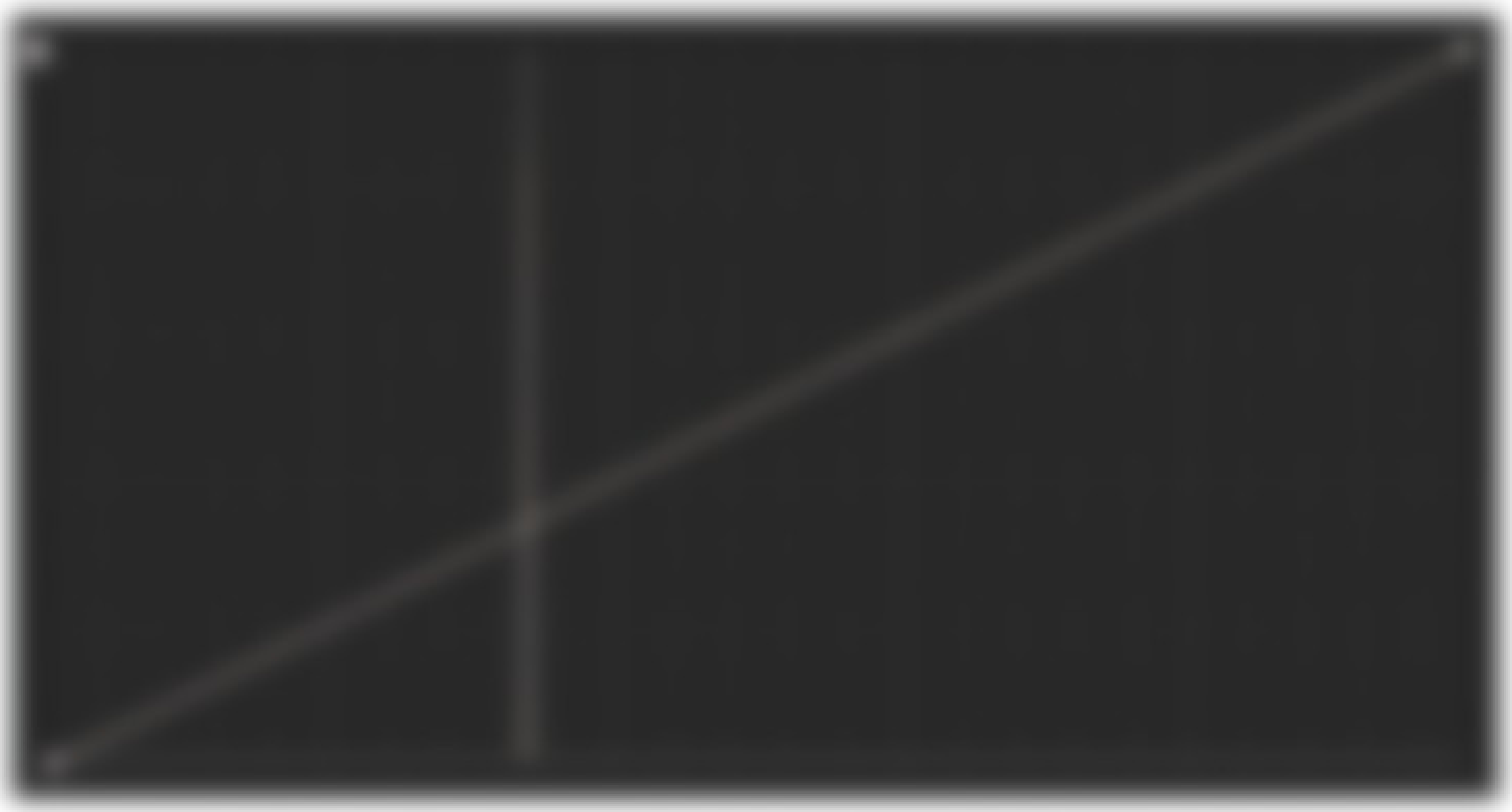
10 In the Adjustment Controls at the bottom, set the Contrast to 0.000.



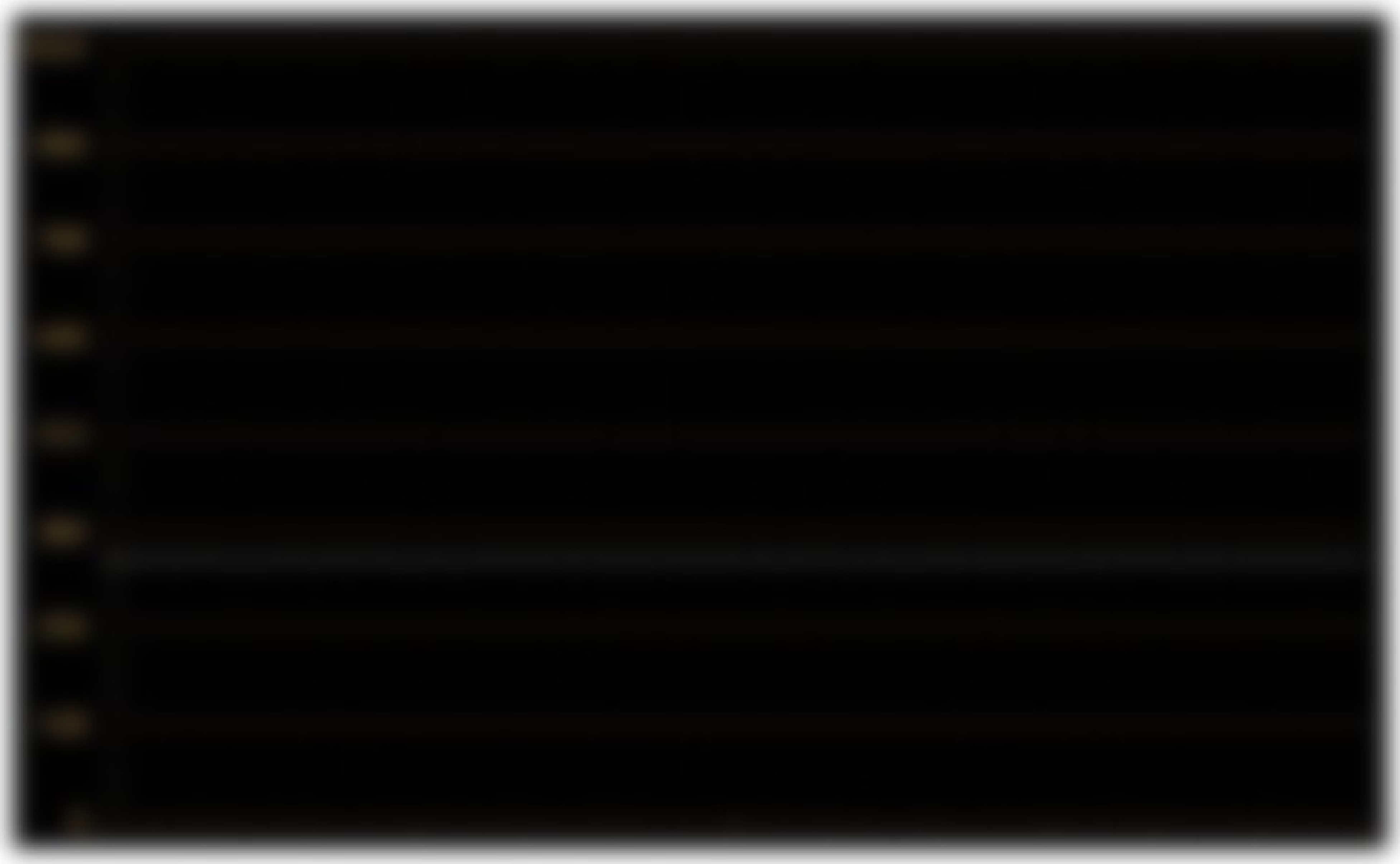
The Contrast pivots around DaVinci Intermediate's middle gray, meaning that reducing it to 0 produces the project's middle gray. This applies to the Blackmagic Design 4.6K Film media because it is sandwiched between two CSTs that are mapping to and from RWG. If you wanted to change the middle gray standard that you are trying to extract, you could do so by clicking the HDR palette Options menu and choosing a different Gamma, such as ARRI LogC3.

The middle gray value is reflected in the scopes, but you can also reveal it in the Curves histogram graph.

- In the Curves palette options, choose Histogram > Output. The Curves histogram will display the output signal of the node, meaning you will now only see the gray frame represented as a spike in the graph.



DaVinci Intermediate middle gray in the Curves palette histogram



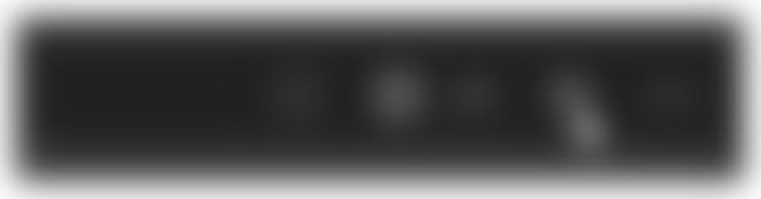
DaVinci Intermediate middle gray in the waveform scope

NOTE The middle gray may appear a little brighter than expected in the scopes due to the OUTPUT LUT at the end of the node tree. If you were to temporarily disable the LUT node, you would find the middle gray around 0.336 for DaVinci Intermediate. In the curves graph, the spike will be in the correct position whether you have the LUT node enabled or not.

- Hold Shift and place a control point on the custom curve directly over the middle gray spike.

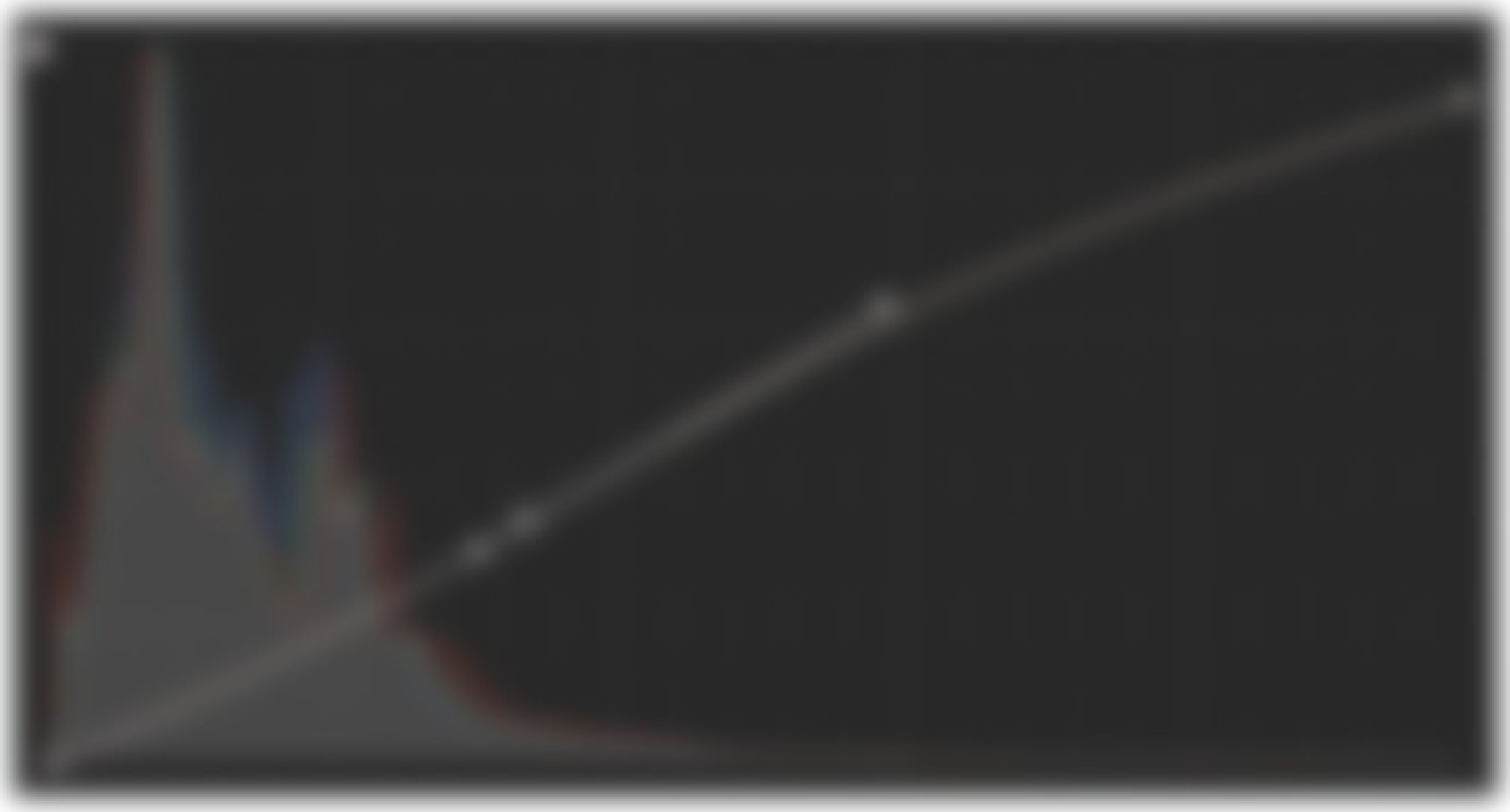
Having marked the middle gray, you can now remove the gray frame.

- In the HDR palette, click the Reset All arrow in the header to bring back the original image.



You can now build contrast around the middle gray control point.

- In the Curves palette, click the Options menu and choose Editable Splines.
- Use the Bezier handles on the control points to build custom contrast in the image. Drag down the white point if the highlights get overpowered and pivot (but don't move) the middle gray point to raise visibility in the upper midtones.



NOTE In the industry, this is known as an s-curve and is commonly used as a shorthand for filmic-based contrast.

Ordinarily, you could build satisfactory contrast with just these two points and a constant middle gray, but if you are working with consistently light or dark footage, you can also opt to offset the overall luminance of the signal.

- In the Primaries palette, drag the Offset master wheel right to lighten the scene to your liking. Keep tweaking the curve's control points to refine the contrast.

NOTE Another way to find the middle gray of a color space is in the Fusion page. Create a Background node with Red, Green, and Blue values set to 0.18, and use a Color Space Transform to map it from linear to any camera or color space standard you need. Hovering over the gray frame in the viewer will give you numeric readouts in the status bar at the bottom of the page, which you can input into the pivot parameter in the color page.

Third-party plug-ins can also help you quickly determine middle grays in DaVinci Resolve. Another common approach is to use the middle gray swatch in color charts as a reference point.

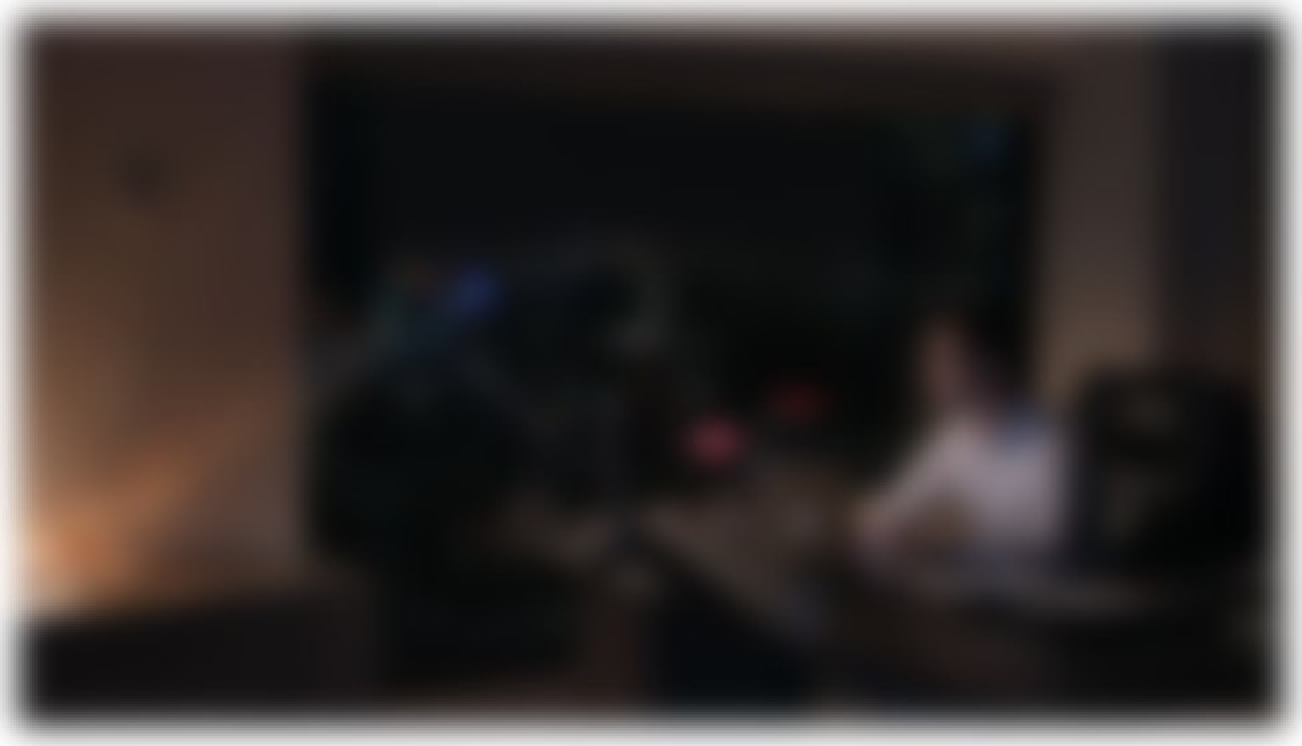
To adjust the colors, you can continue to work in the Curves palette around the same middle gray or create a new node for a different approach to the signal treatment. When generating a LUT, all your primary color grades will be compounded, no matter how many nodes you use. Secondary and keyframed grades (like the qualifier, Power Windows, tracker, Magic Mask, etc.) will be ignored during LUT generation.

- Create a new serial before the Contrast node and label it **Look**.

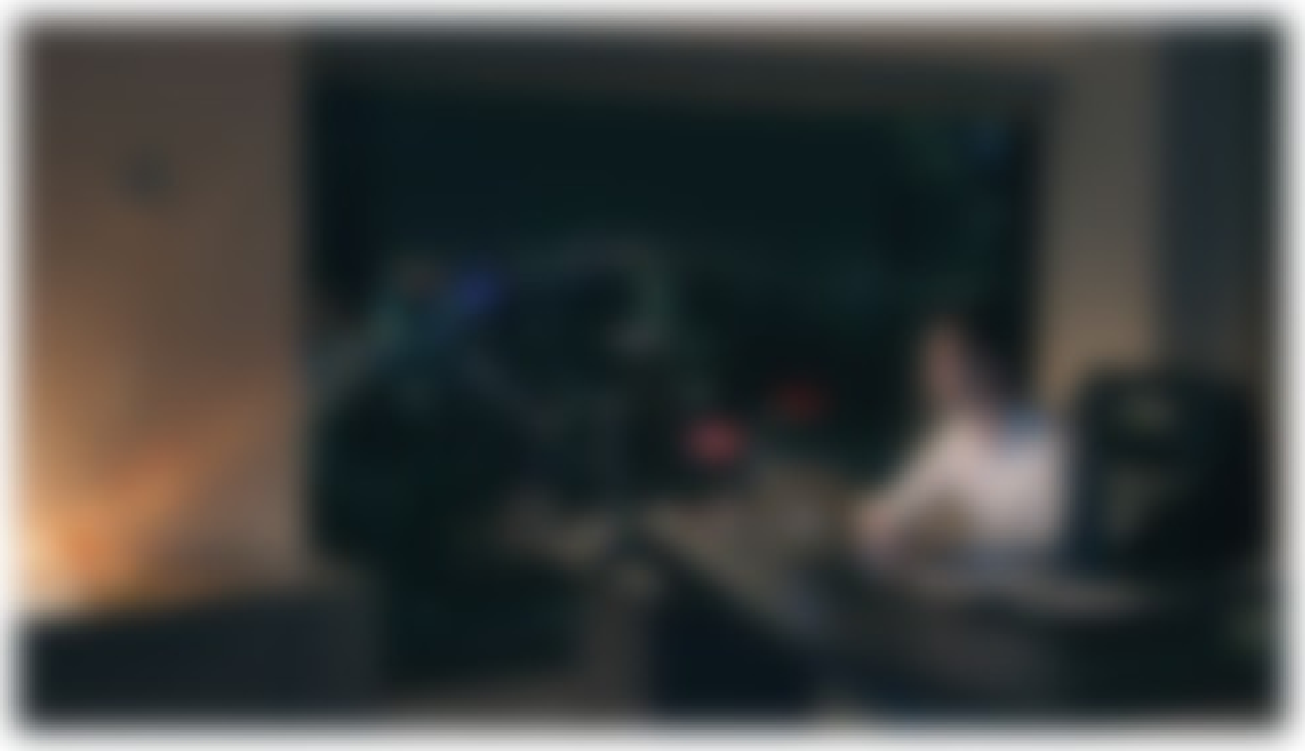
  This node order will result in less saturated shadows.

- Drag the Gain color wheel toward red for dramatically warm light with a [illegible] overlap.
- Drag the Lift color wheel toward cyan for a [illegible] look.

- Go to the Color Slice palette and increase the global Density parameter for deeper, more saturated hues.



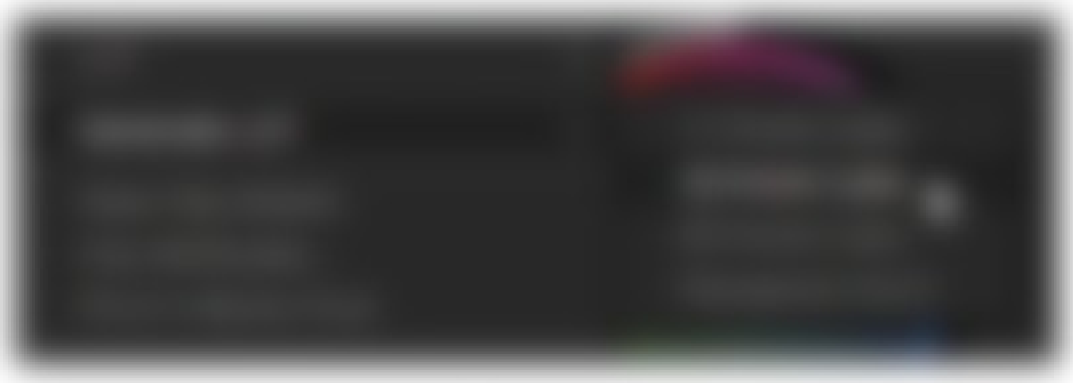
Before



After

If necessary, return to the Contrast node and further tweak the final look.

- When finished, right-click clip 03 and choose Generate LUT > 33 Point Cube.



- Save it as **[illegible]**.

> **TIP** You can generate looks in the Film Look Creator effect and export them as 3D LUTs. At the top of the settings, select 3D LUT Compatible to ensure only parameters that can be retained in a lookup table remain available.

[illegible] In your file browser, place the Office_BMDfilm709.cube file in the Colorist Guide folder you created earlier. If you no longer have the folder open, you can find it in the Project Settings, within the Color Management section, by clicking the Open LUT Folder button.

[illegible] Click clip 14.

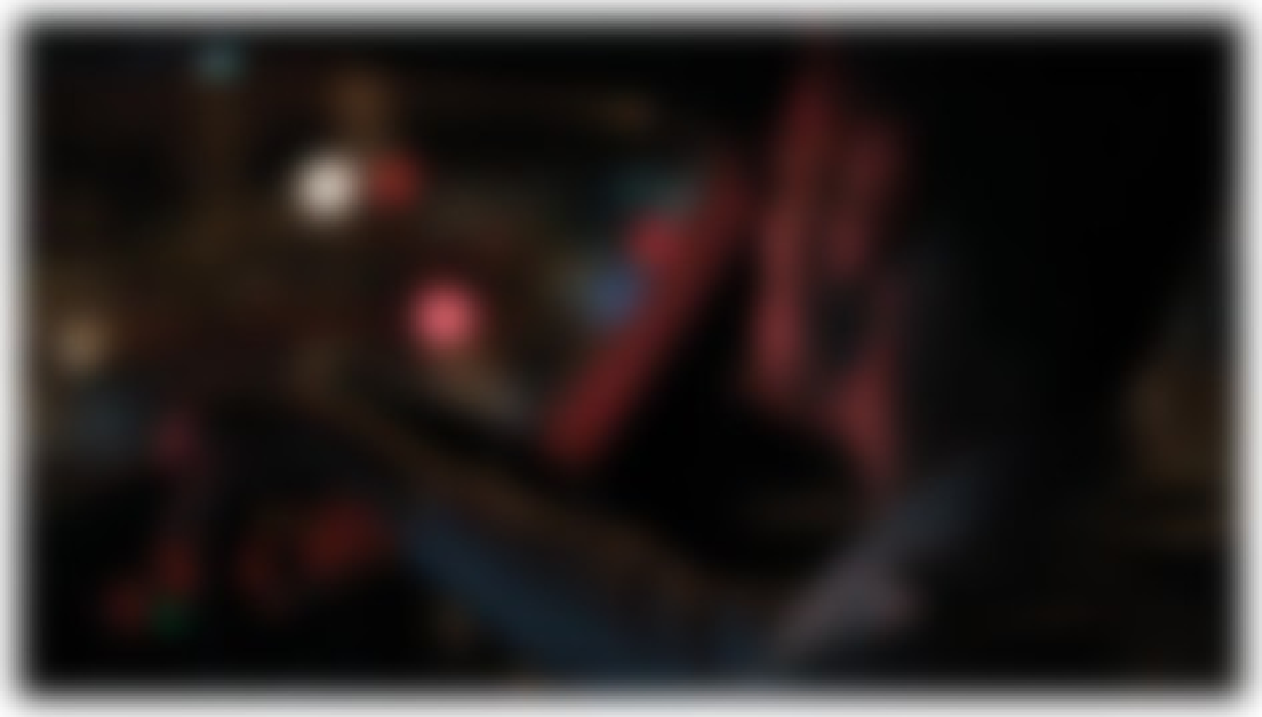
Your office look LUT was developed with the two CST conversions already in place. That means they will be baked into the LUT values, and applying them between the two existing CSTs will result in a double mapping of those values.

[illegible] Disable (or delete) the two CST nodes in the Node Editor.

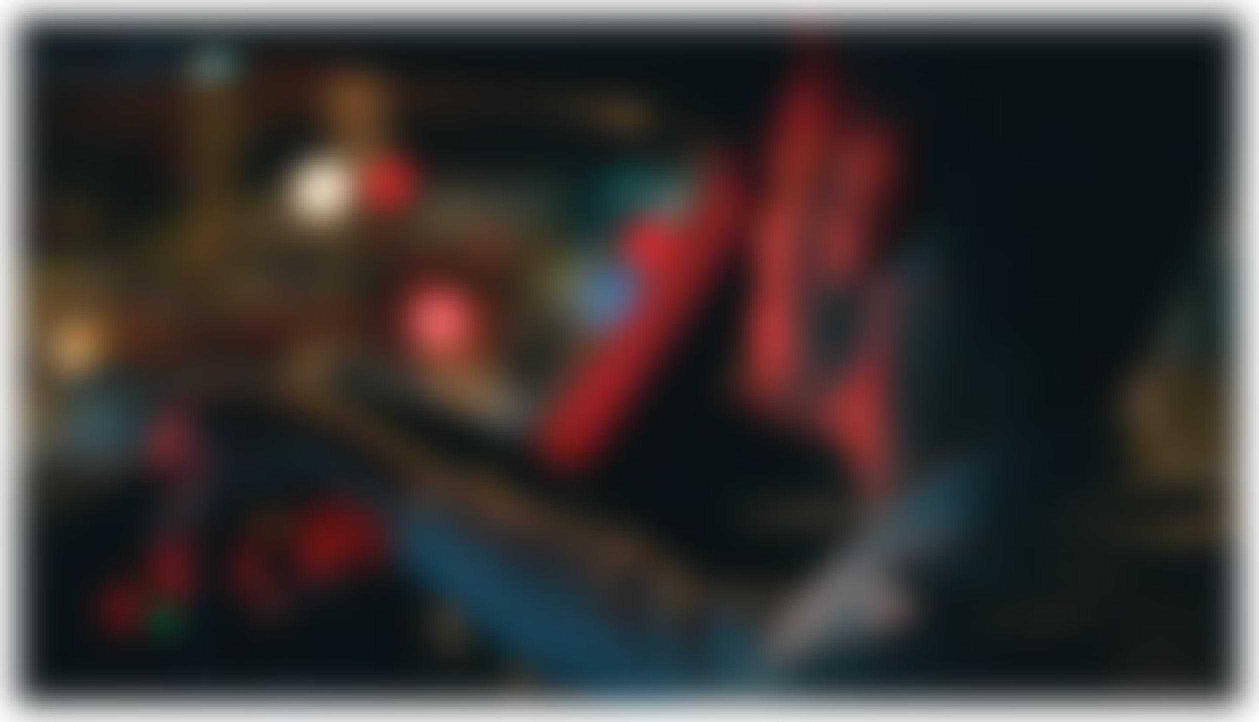
[illegible] Create a new node.

[illegible] Right-click the node and choose LUT > Colorist Guide > Office_BMDfilm709.cube.

In the viewer, the image is transformed from Blackmagic Design 4.6K Film to Rec.709 with the baked-in [illegible] look. This is how you can generate monitoring LUTs for cinematographers to act as guides for the final grade while shooting or convert entire timelines of raw media to a preliminary look when generating proxies for online workflows.



Before



After

NOTE LUTs can also be applied to clips in the media pool via the contextual menu.

In addition to using LUTs to modify individual clips or groups, you can apply them on a timeline basis when you have an overarching show look, to review different color management deliverable options, or to assess how the project will look after printing.

Using the Timeline Level

The Timeline level is available in the Node Editor whether or not you use group workflows. As the name implies, adjustments made at this level affect every clip on the timeline uniformly. This function can be useful for broad image property or special changes such as color space transforming, gamut/gamma mapping, halation, vignettes, inserting film grain, analog video effects, and so on.

In the next few exercises, you will apply an emulation LUT, develop an analog video look, and overlay data burn-ins that will make it easier to keep track of timecodes and clip names during project review and feedback.

Applying an Emulation LUT

So far, you have worked with creative and monitoring LUTs. Another common application for LUTs is film stock emulation. In the beginning, film emulation LUTs were almost exclusively used by colorists to check how a project would look after it was printed on film stock. Over time, film emulations LUTs also began being used creatively to replicate the look of film in digital deliverables.

1 In the LUTs panel, open the Film Looks folder.

2 Change the LUTs panel to List view so you can more easily read the LUT names.

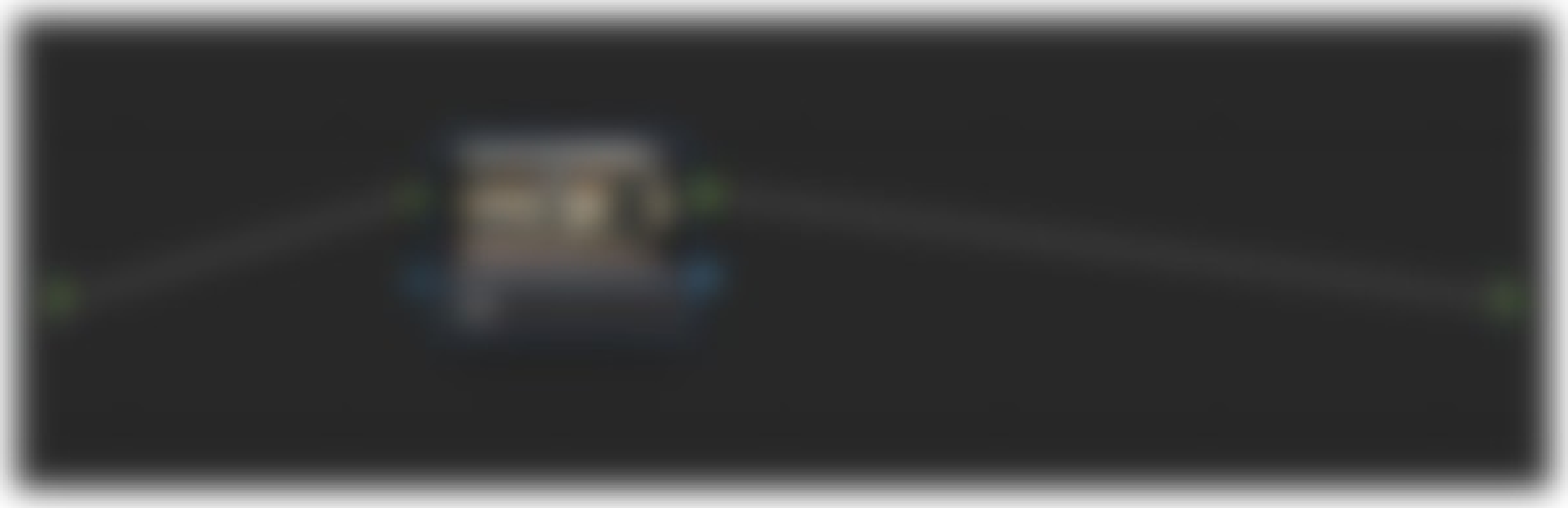
[illegible]

```
[illegible]
```

- [illegible]
- [illegible]

[illegible]

- [illegible]



[illegible]

[illegible]

- [illegible]
- [illegible]

NOTE The gamma has been remapped several times at this point. This is acceptable for demonstration purposes, but you should strive for cleaner workflows in your own projects. If you are aware that you will be using a LUT emulation or otherwise in an upcoming project, you should build a workflow that accommodates it without compromising the video signal. This can mean incorporating the LUT into the working color space section of the node tree or using a single output CST to configure the entire project in the deliverable standard in the Timeline Node Editor with the LUT placed before it.

8. Set the Output Gamma to Cineon Film Log.
9. Add a new node after the CST.
10. From the LUTs panel, drag the Rec709 Kodak 2383 D65 emulation LUT onto the node.
11. Select both nodes and turn them into a compound node called **KODAK LUT**.

    You can now navigate up and down the timeline and preview how the emulation LUT affects the footage. You will notice that some clips look better than others. This is because you had already started grading some of the scenes without considering how they would look after printing. This is why emulation LUTs and primary LUTs that will be retained in the final grade are usually applied before primary passes.

12. Bypass or delete the KODAK LUT node to prepare for the next exercise.

TIP You can combine film emulation LUTs with the Film Grain effect in the Resolve FX Film Emulation category to achieve the physical look of celluloid film. It comes with a variety of film stock presets (8 mm, 16 mm, 35 mm) as well as a collection of grain parameters for optimal customization on a timeline or clip-by-clip basis. In the Advanced Controls, you can enable "Animate on Every Refresh" to force the grain to move as you grade, giving you an even more accurate representation of the final look as you work on each clip.

Next, you will look at another form of emulation that re-creates the look of analog video.

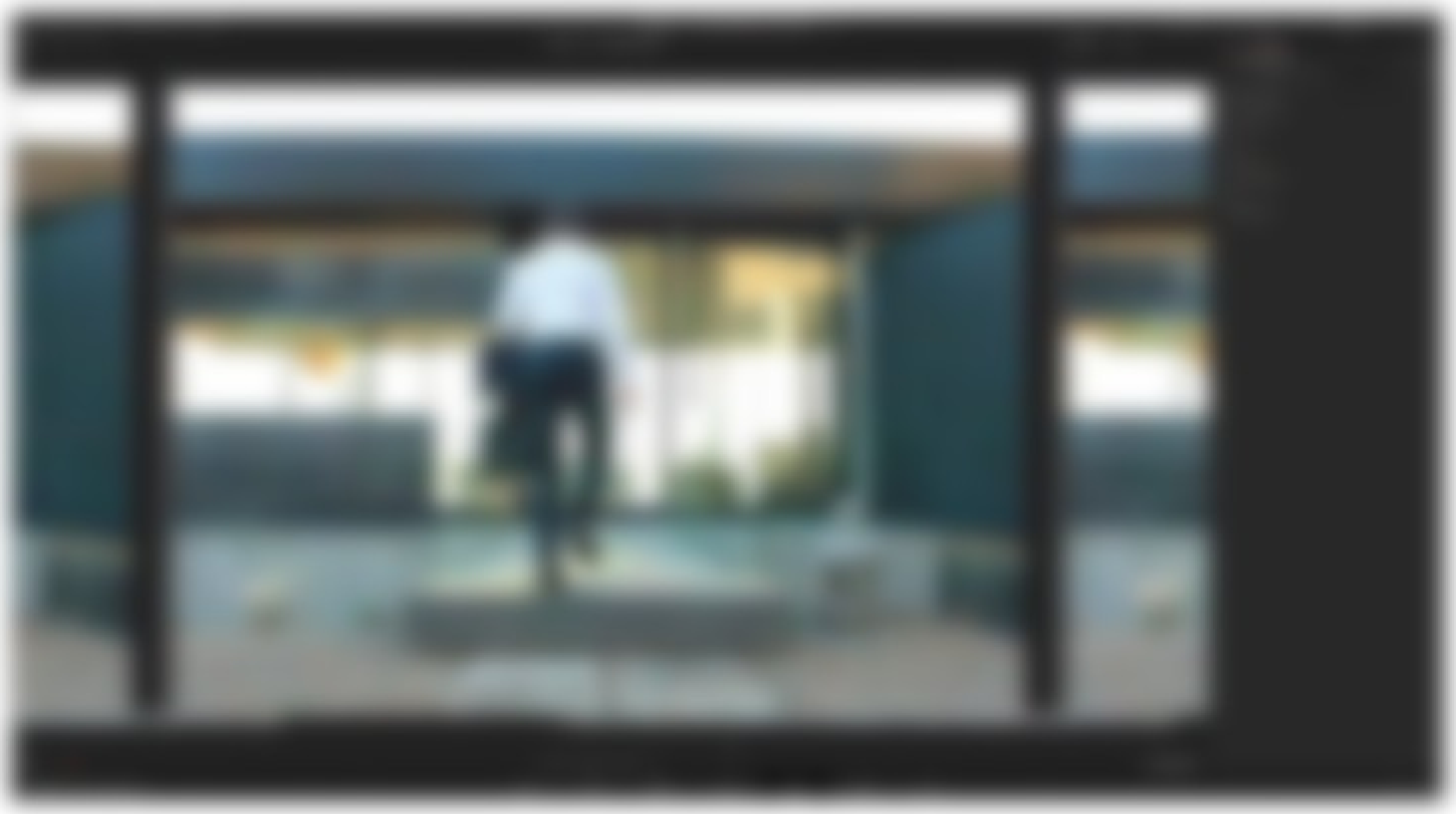
Creating an Analog Video Look on an Entire Timeline

Artificial film grain and analog video artifacts can be added to digital media for a variety of reasons. In some cases, the film should look outdated as a component of the storyline (such as flashbacks, home movies, found footage, and so on). Film grain and damage can also add realism to shots with artificially imposed elements or CG graphics by making them appear to have been captured on tape or celluloid film. Finally, film grain and damage are often an aesthetic choice.

NOTE This exercise requires DaVinci Resolve Studio to complete.

You will continue to work in the Timeline mode of the Node Editor.

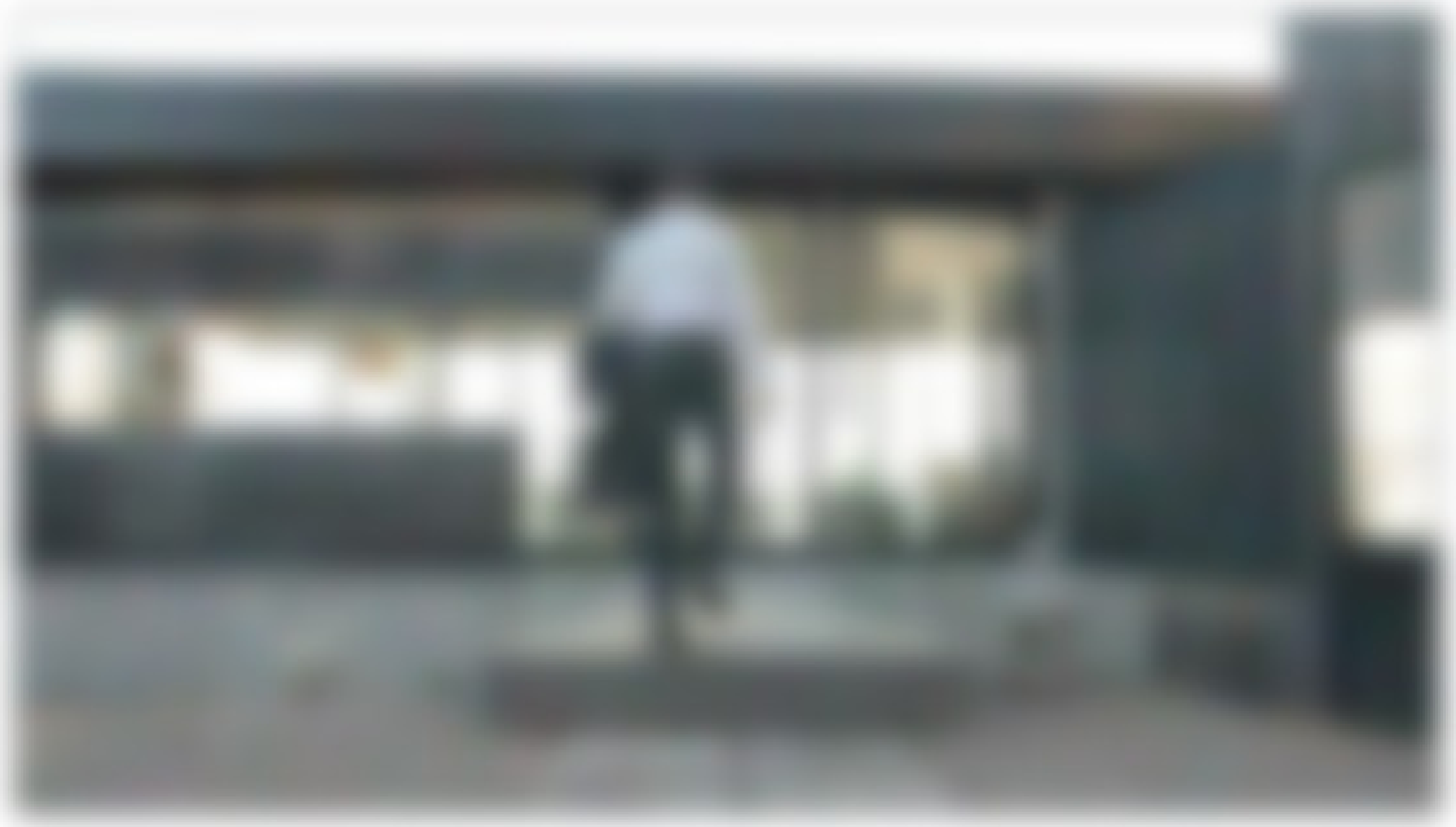
1. Create a new node and label it VHS.
2. Open the Effects panel.
3. Find the ResolveFX Texture category and drag the Analog Damage effect onto the VHS node.
4. Press Shift-F to expand the viewer and improve access to the Analog Damage settings panel.



The top of the panel features a preset menu with a collection of common analog looks—B&W and color television transmissions through the decades, VHS, and so on. Beneath, individual parameter controls allow you to adjust a wide variety of damage components, such as signal ghosting, noise, scan lines, screen curvature, fast jitter, and many others.

- Set the preset to Old VHS.
- Under Broadcast Signal, reset Detail Loss to 0.000 for a clearer image.
- Under Scan, deselect Adjust CRT Framing to remove the horizontal and vertical frame lines.

Before



After

- Click Play to review the result.

  All the clips on the timeline are impacted by the VHS look.

- Press Shift-F to exit the full screen viewer.
- Before moving on to the next exercise, bypass the VHS node. The Analog Damage effect is processor intensive, so it's advisable to disable it until you are ready to export the project.

Adding Data Burn-In to the Viewer and Final Video

Another common feature usually applied on a timeline basis are data burn-ins, which can include timecodes, clip metadata, or any variety of customized text and watermark overlays. This feature works independently from the Node Editor and can be used in program for editorial purposes, as well as in the render of a video for review and feedback.

1. Choose Workspace > Data Burn-In.

The left side of the Data Burn-In window features a list of metadata elements that you can superimpose over the video in the viewer. The right side of the interface changes according to the selected parameter and allows you to adjust the text placement, font, color, and so on.

The Project and Clip buttons at the top of the Data Burn-In window allow you to apply data across the length of a timeline or on a single instance of a clip. This option can be helpful for leaving instructional comments—for example, when communicating with the audio or VFX departments about what needs to be done on specific shots.

2. Select Record Timecode to display the timeline's timecode in the viewer.
3. Select Source Clip Name to display the name of each clip as it plays. Note that in this case, because all the clips are sourced from a single flattened video file, they will all have the same source clip name.

- Select Custom Text1, and in the Custom Text field on the right, type **PLEASE DO NOT DISTRIBUTE**.
- In the Data Burn-In options, deselect Using Render Text Styles. This will enable you to modify the appearance of the data burn-in fields individually.

  You will use the Custom Text field as a form of distribution protection for your video.
- Remove the black box behind the text by reducing the Background Opacity to [illegible].
- Increase the Text Size ([illegible]) to expand the warning to the width of the viewer.
- Reduce the Text Opacity ([illegible]).
- Reposition the text in the center of the viewer using the Position Y parameter.

  The Data Burn-In window features around [illegible] default parameters. However, you can access an even wider range of metadata elements via the Custom Text fields.
- Select Custom Text2.
- Type **%**. A dropdown list of fields appears, showing the contents of the Metadata panel.
- Start to type **codec** and press Enter to select Video Codec when it appears in the filter.
- Use the Position parameters to place the codec metadata to the right of the record timecode under the source clip name.

> **TIP** To apply an image watermark over a video, use one of the Logo options in the Data Burn-In interface. You can import a custom image file and adjust its opacity using the transform controls on the right.

- Close the Data Burn-In window.

Tip A quick way to remove data burn-ins from the viewer is to press the Reset All icon in the upper right corner of the Data Burn-In window.

Data burn-ins can be extremely useful for quick and accurate communication between departments and clients. Instead of describing clips visually, exact clip source names can be used in feedback. Likewise, the precise timecodes ensure that your collaborators are not using the generic timecodes of their video players (which usually start frame data). Frequently used burn-in layouts can be saved as presets in the Data Burn-In options menu.

Self-Guided Exercises

Complete the following self-guided exercises in the Project 03 - The Long Workday [illegible] timeline to gain more experience with groups, primary and secondary grading, and creative grade construction. Note that these exercises are designed foremost for group grading practice and not necessarily to produce a single cohesive color narrative on the timeline.

Home Group

- In clip 03 of the Home group, use the Magic Mask to mask the man while excluding his coat. Invert the mask selection and use Lum Vs Sat to desaturate his surroundings.
- Create a post-clip group grade on the Home group. Import the 01_Home Reference.png image from the BMD [illegible] - Project 03 > References subfolder into the gallery as a reference. Aim to create a light, warm look. Use HSL Curves to emphasize the blue of the sky and water outside the windows.

Highway Group

- Match the shadows in clip 01 to clip 02.
- From the Resolve FX Light category, add the Lens Reflections effect to clip 01, and in the Global Controls, change the reflection preset to Bokeh. Adjust the reflecting elements until you have a string of faint, out-of-focus white bokehs at the bottom of the screen. Then, append the node to clip 02.

Office Group

- Match the brightness of clip [illegible] to the other clips in the Office group.
- In clip [illegible], use the Magic Mask to track the man's face and hands, and then use adjustment controls to add contrast and detail to the man's skin.

Morning Group

- Perform contrast and color matching on the clips in the Morning group using clip [illegible] as the hero shot.
- In clip [illegible], use the Magic Mask to select the sea, and increase the contrast and midtone detail to emphasize the ripples in the water.
- Create a post-clip group grade in the Morning group. Darken the shadows slightly to add depth. Then use the Color Warper to gently tint the mountains red and warm the atmosphere. Experiment with achieving this look in both the Chroma-Warp and Hue-Saturation grids. Compare them using versions and keep your favorite.

When you've completed these exercises, open the Project [illegible] - The Long Weekday Commercial COMPLETED.drp and review Lesson [illegible] Timeline COMPLETED to compare your work with this "solved" timeline. If the media appears offline, click the red Relink Media button in the upper left corner of the media pool and specify the location of the Project [illegible] media on your workstation.

Lesson Review

- True or false? A clip can belong to more than one group.
- Which group level is ideal for performing shot matching?
- Which Magic Mask parameter is ideal for removing matte chatter on flowing clothing?
- Where can you find the anticipated input color space of a LUT?
- How is data burn-in enabled?

Answers

1. False. A clip can have only one pre-clip and post-clip Node Editor mode. Adding a clip to a new group will remove it from any previous group it was in.
2. Clip mode is ideal for performing shot matching since it will be unique to every clip.
3. The Smoothing parameter analyzes the surrounding frames of a matte to produce a more consistent matte when working with jitter-prone surfaces, such as flowing clothing or hair.
4. The input and output data of a LUT can sometimes be discerned from the naming convention of the LUT file or from the size of the LUT itself.
5. Choose Workspace > Data Burn-In.

Lesson 8

Adjusting Image Properties

Although the grade tends to be the primary focus for a colorist, there are also many optical and transformative changes that can impact the narrative and aesthetics of a project. Such changes can include alterations to the scaling and positioning of the frame, noise reduction, and the animation of grades over time.

Some of the tools required to achieve these transformations can impact the speed at which your computer is able to play back the media on the timeline. For this reason, it's helpful to leverage the automated (Smart) and manual (User) render cache methods to get the most efficient processing of clips and nodes across the multiple cache levels in DaVinci Resolve.

Time

This lesson takes approximately [illegible] hours to complete.

Goals

Understanding Timeline Resolutions and Sizing Palette Modes [illegible]

Using Keyframes to Animate Grades [illegible]

Applying Noise Reduction [illegible]

Optimizing Performance with Render Cache [illegible]

Self-Guided Exercise [illegible]

Lesson Review [illegible]

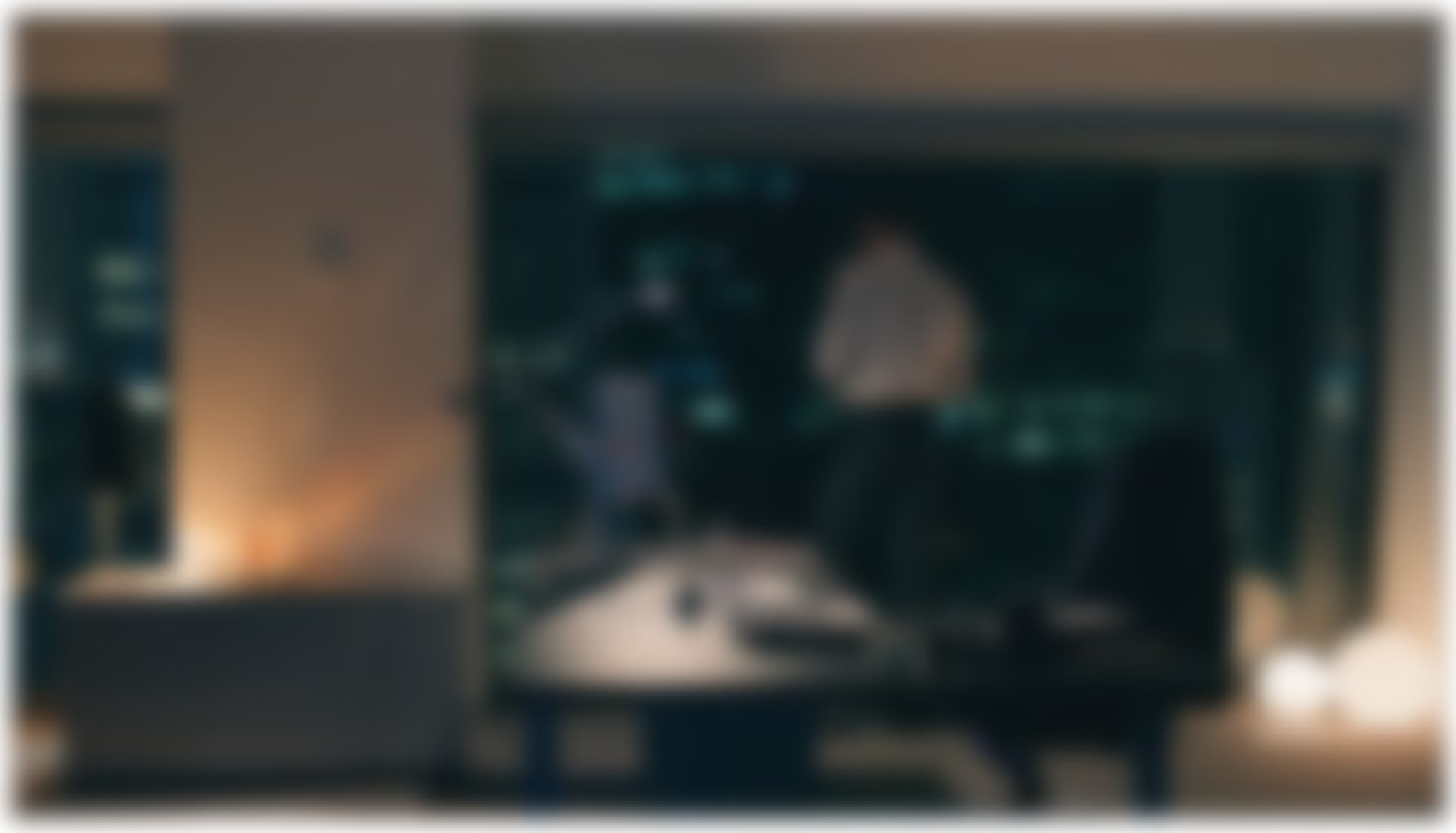
Understanding Timeline Resolutions and Sizing Palette Modes

In the following set of exercises, you will address the variety of ways in which you can impact the frame of your project in DaVinci Resolve 20. Specifically, you will change the project resolution, reframe individual shots, and sample portions of an image at the node level.

Changing Timeline Resolutions

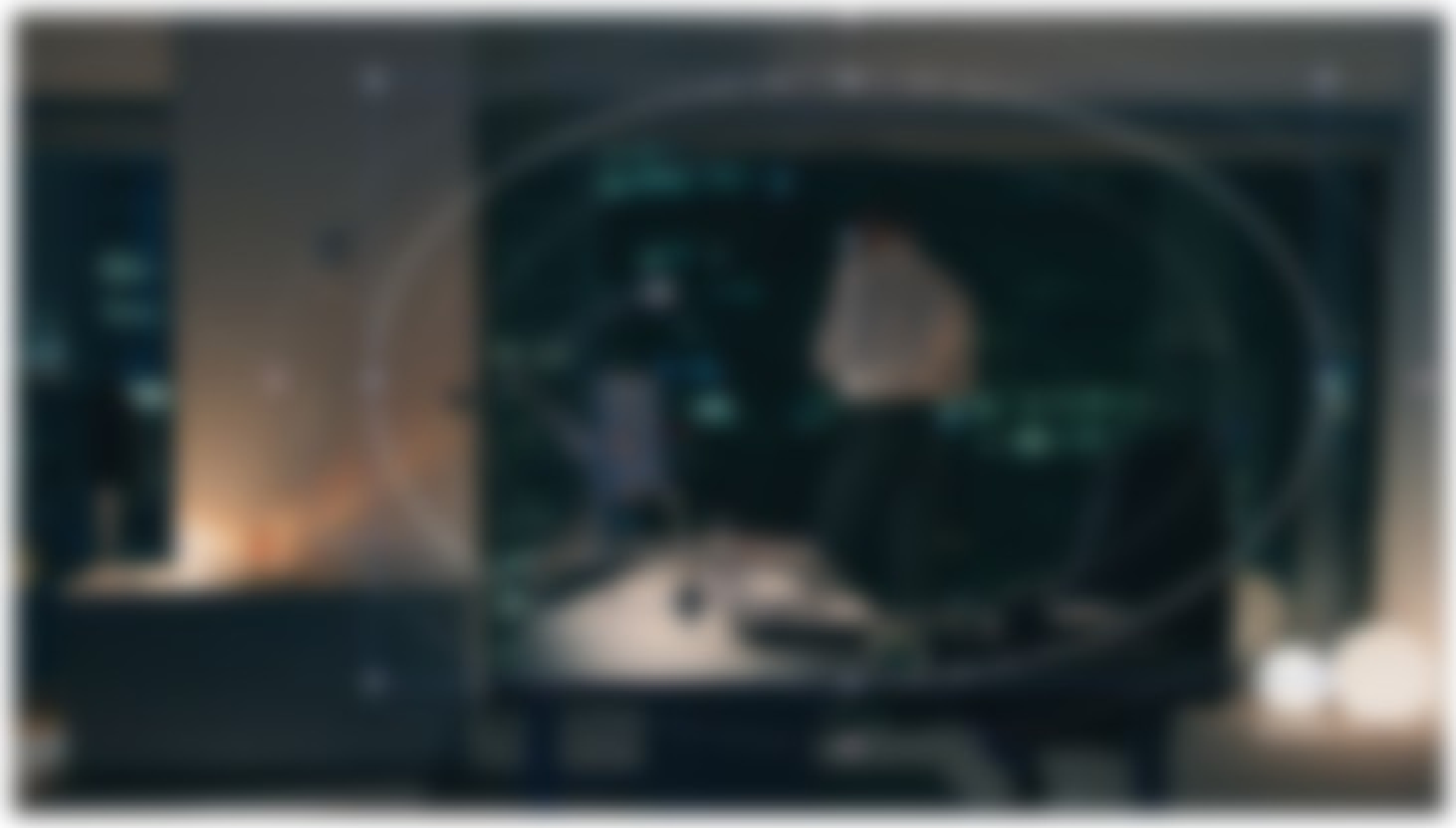
In this exercise, you will change the project resolution to evaluate how secondary grades in your timeline are impacted.

- Select clip 05 on the Project 05 - The Long Workday SCC timeline.



- In the Node Editor's Clip mode, create a new node called **Vignette**.
- In the Window palette, apply the Vignette preset from Lesson 11 or create a new one. Resize and reposition it to the man on the window.

- Drag the Gamma master wheel left to darken the edges of the frame and then drag the color wheel control point toward blue/cyan to give the room a cool atmosphere.

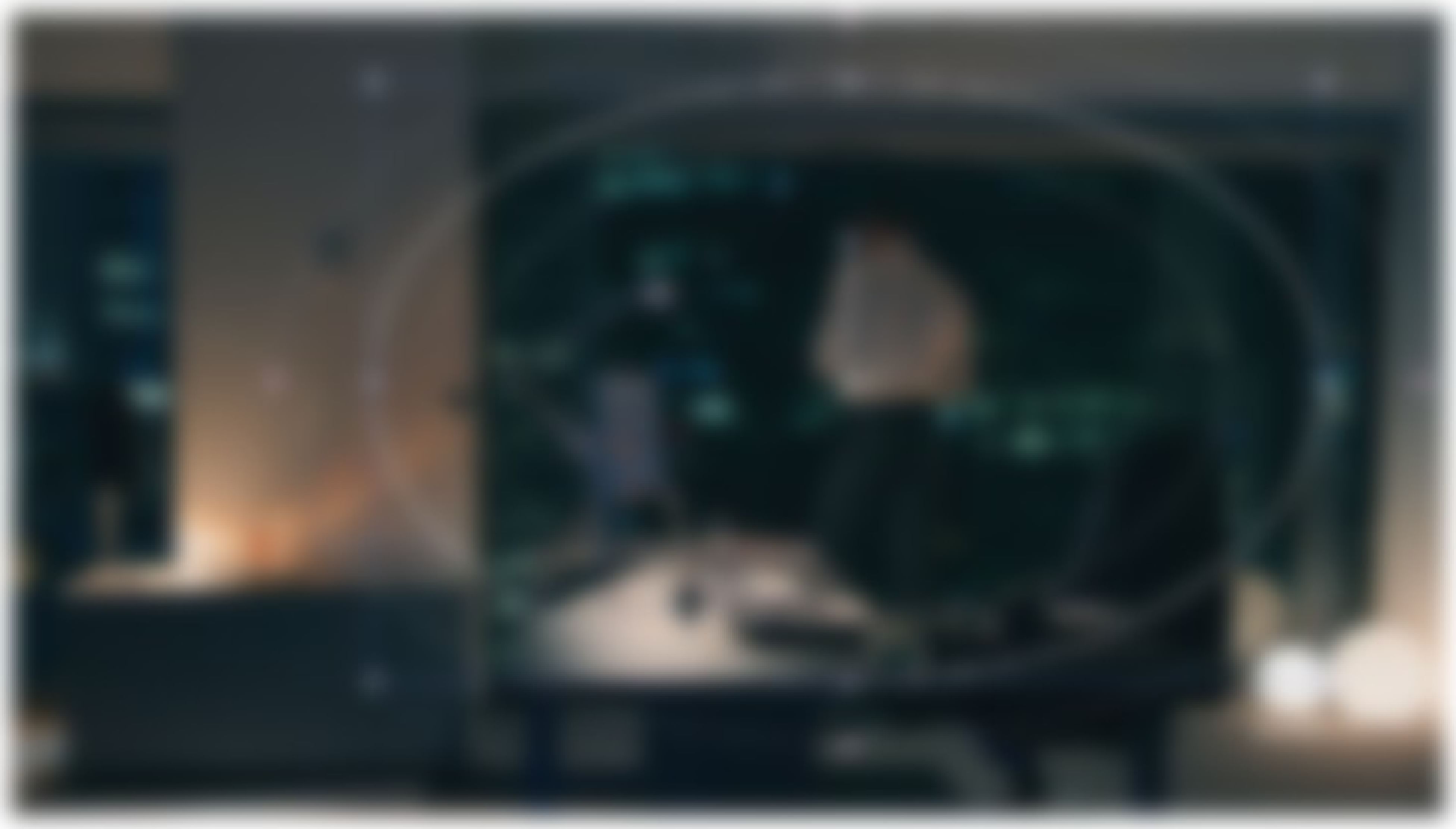


- Open the Project Settings and choose the Master Settings tab.

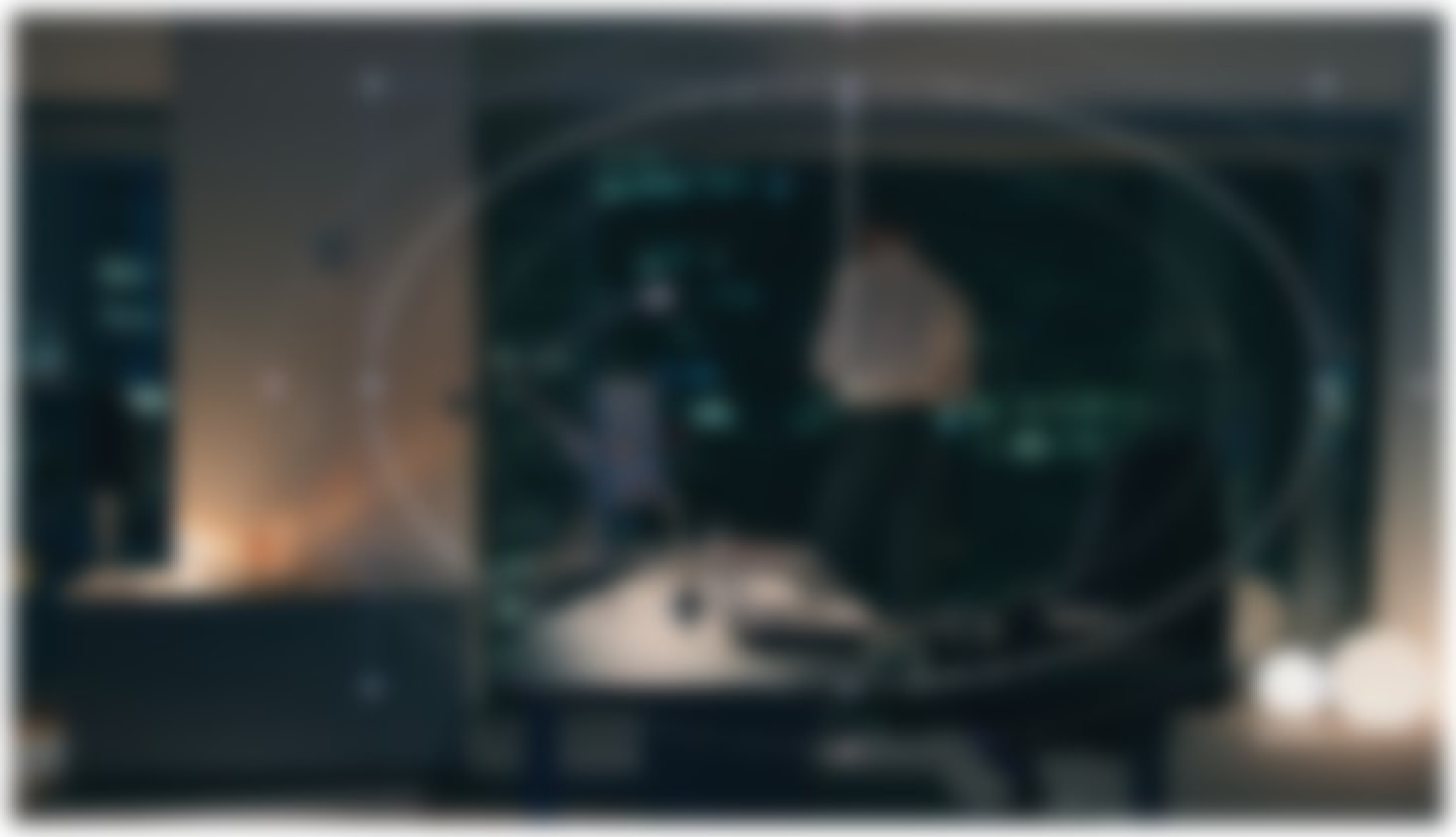
- Change the Timeline resolution to 3840 x 2160 Ultra HD, a standardized 4K resolution with the same aspect ratio (1.77:1, aka 16:9) as 1920 x 1080 HD.

> **TIP** When rescaling media to a higher resolution (for example, converting 1080p content to a 4K timeline), you can activate a high quality upscaling feature called Super Scale. To do so, select and right-click the lower resolution clips in the media pool and choose Clip Attributes. Within the Video tab, in the Super Scale menu, choose 2x or higher to double the resolution. Doing so will substantially improve the method by which the image is upscaled in higher resolution projects, though it is a processor-intensive operation that may compromise real-time playback.

- Click Save to exit the Project Settings.
- If the video appears zoomed in, press Shift-Z to fit the video frame to the viewer panel.



1920 x 1080



3840 x 2160

Note that the clip's frame and positioning in the viewer have not changed. Additionally, the vignette window is rescaled to the new resolution while maintaining its placement relative to the clip frame. The only change is the new anchor handle length in the center of the Power Window.

This behavior is one of the most invaluable features of DaVinci Resolve when grading and applying effects. The program is resolution independent, allowing you to change a project's frame size and aspect ratio without affecting the positions of clips, images, secondary grades, effects, and generators created on the cut, edit, Fusion, or color pages.

TIP When working on vertical resolutions (for web deliverables), click "Use vertical resolution" under the timeline resolution settings. In addition to maintaining the positions of your timeline assets, this setting will reconfigure the layout of the pages in DaVinci Resolve to optimize the panels for a vertical viewer.

9 Open the Project Settings and reset the Timeline resolution to 1920 x 1080 HD.

10 Delete the Vignette node.

Custom Resolutions and Aspect Ratios

Under the Timeline resolution presets of the Project Settings, you may enter a custom resolution with the aspect ratio of your choosing. Be aware that changing the resolution or aspect ratio to a non-industry standard could mean that the rendered video may not be playable on some projectors or video players. When outputting to equipment that only recognizes standard video formats, it is safer to use a common (preset) resolution and apply custom blanking to change the aspect ratio. In either case, the custom blanking will appear as black bars during playback.

Reframing Individual Clips

The Sizing palette becomes an increasingly versatile tool when you take advantage of its sizing modes. These modes allow you to switch the sizing focus from clips to entire timelines to individual nodes. In this exercise, you will rescale and reposition clips on an individual and timeline basis.

1 Continue to work on clip 05.

2 Enter the Sizing palette and set the Zoom value to 1.500 to scale up the image.

- Select clip [illegible].

  Notice that clip [illegible] was not affected by the reframing of clip [illegible]. In fact, every clip in the timeline has remained unchanged because clip [illegible] was changed at the clip level (Input Sizing) in the Sizing palette.

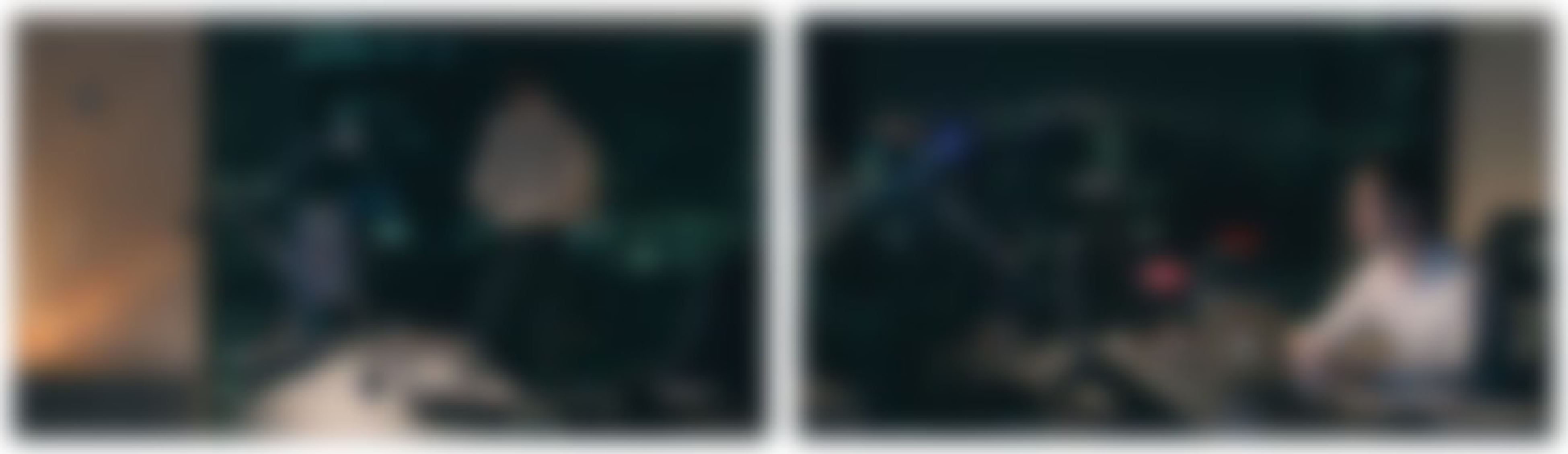
- Return to clip [illegible] and reset the Zoom parameter.
- In the upper right of the Sizing palette, choose Output Sizing.

- Set the Zoom value to [illegible] again.
- Click the other clips in the timeline to verify that they are affected by this change in timeline scale.

  Sometimes, rescaling makes sense on a timeline basis, such as when adapting media to a different resolution. However, clip reframing still needs to be performed to account for the visual content of each shot.

  Let's reframe shots [illegible] and [illegible] based on content.

- Change the Sizing palette mode back to Input Sizing.
- In clip [illegible], change Pan to [illegible] and Tilt to [illegible].
- In clip [illegible], change Pan to [illegible] and Tilt to [illegible].



- Switch between the clips to verify that they have retained their Output Sizing zoom but adopted different pan and tilt values.

> **TIP** When copying grades or stills, you can indicate if you want to include color data, sizing data, or both in Match > Keyframe Timeline Mode. This setting can help streamline your workflow if you frequently copy clip data but want to exclude resizing from the color grade or vice versa.

- Reset the Input and Output sizing data on clips 05 and 06.

> **NOTE** Output sizing is also commonly used to adapt footage with a different aspect ratio to a new standard. For example, 4K DCI will appear to have horizontal blanking (black bars) in a 4K UHD timeline. Output sizing can be used to quickly fit the frame of the video.

These changes used two Sizing palette modes – Input and Output. Previously, you also resized and reframed a separate still using the Reference Sizing mode.

The full list of sizing modes and their impact on the image is as follows:

- **Edit Sizing** refers to the transform changes applied to a clip in the Inspector of the edit page.
- **Input Sizing** applies transform changes to a clip in the color page. It targets clips on the same level as Edit Sizing but the two modes are distinct to their respective pages, allowing the editor and colorist to adjust transforms without interfering with each other's settings.
- **Output Sizing** applies to the entire timeline.
- **Node Sizing** applies to the selected node in the Node Editor.
- **Reference Sizing** applies to the reference movie or still that is active in the viewer's wipe mode.

4K to 1080p to 4K Workflow

Switching the timeline resolution is an effective method for optimizing workstation performance during editing. It ensures that clips are rendered and played in real time without lag and without altering the quality of the final file. A common workflow for 4K footage is to set the timeline to 2K or 1920 x 1080 during the editing process and then reset it to 4K before rendering.

Be aware that the grading potential and accuracy of key-dependent secondary grading tools (such as the qualifier) are reduced at a lower image resolution. Therefore, you are advised to change the timeline to the full master resolution before grading and compositing.

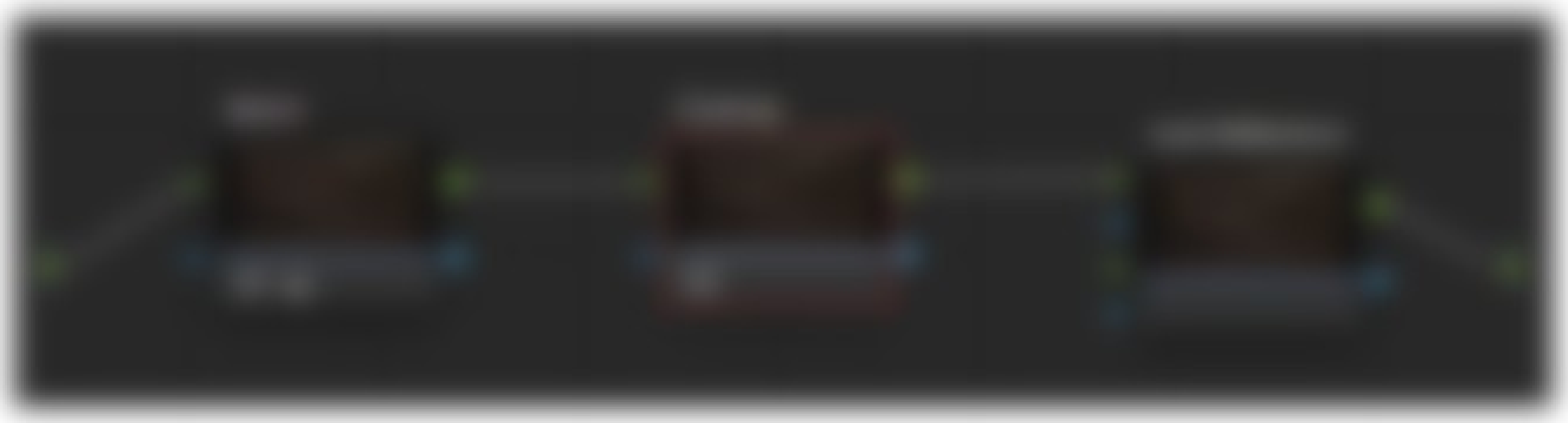
Sampling Visual Data with Node Sizing

The ability to change a clip's sizing data at the node level allows for some practical solutions and interesting creative applications. For example, you could clone an image to display multiple versions of itself within the viewer or fix continuity errors by sampling portions of the image for clean-up work.

In this exercise, you will remove some signage from a shot by sampling the video data around it. Practically, this is done for various reasons. Perhaps the filmmakers wish to replace the signs with [illegible] markers that reflect the city the film is based in, or it may need to be done for localization purposes — not everyone measures height in feet.

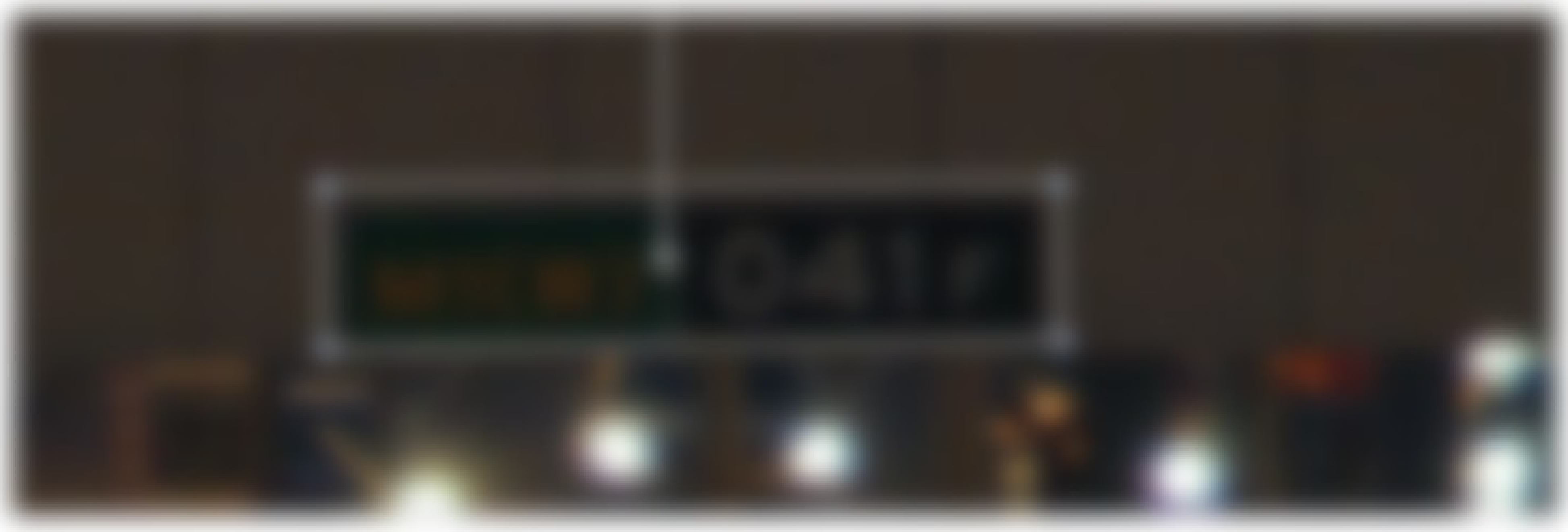
1 Select clip [illegible].

2 In the Node Editor's Clip mode, create a new serial node called **Cleanup**. If you have completed the previous lesson's self-guided exercises, this node should be between the Match and Lens Reflections nodes.



3 Open the Window palette.

4 Create a curve window and click around the [illegible] sign near the top of the frame. You are selecting the area you will "remove" from the scene. Label the window **Left sign**.



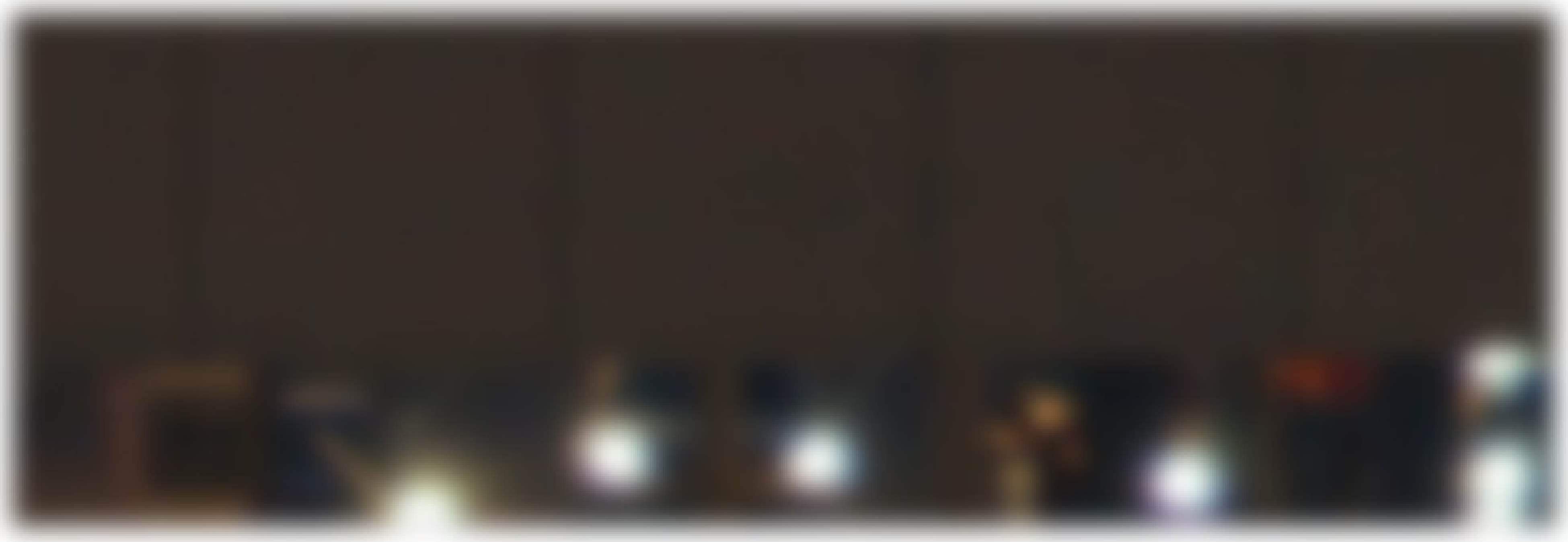
5 In the Window palette, change the Softness > Soft 1 parameter to [illegible] for a slight edge blur.

6. Open the Sizing palette and set it to Node Sizing mode.

   One way to perform the clean up is to move the window above the sign and then use the Sizing Tilt parameter to lower that section down, covering the sign. Another method reverses this operation – you move the clip frame while keeping the Power Window static.

7. In the Sizing palette, select Key Lock.

8. Drag down Tilt until the empty section of the paneling covers up the sign.

9. Return to the Window palette.

10. Create a new curve window and label it **Right sign**.

11. Click around the second sign on the right side of the frame.

    Because you have already applied a Key Lock and moved the placement of the frame, the right sign will disappear as soon as you finish creating the curve window. To refine the window's control points, you can disable the node to see the sign as you work on the window overlay.

    > **TIP** You can create a new node for every clean-up instance if the areas you wish to clean up are not aligned as in this example.

This simple clean up works for various reasons: the shot is locked off, the lighting is consistent, and there is enough content around the signs to clean them up neatly. In the next exercise, you will use a more advanced solution to clean up an object in a moving shot with changing light.

Creating Cover-Ups with the Patch Replacer Effect

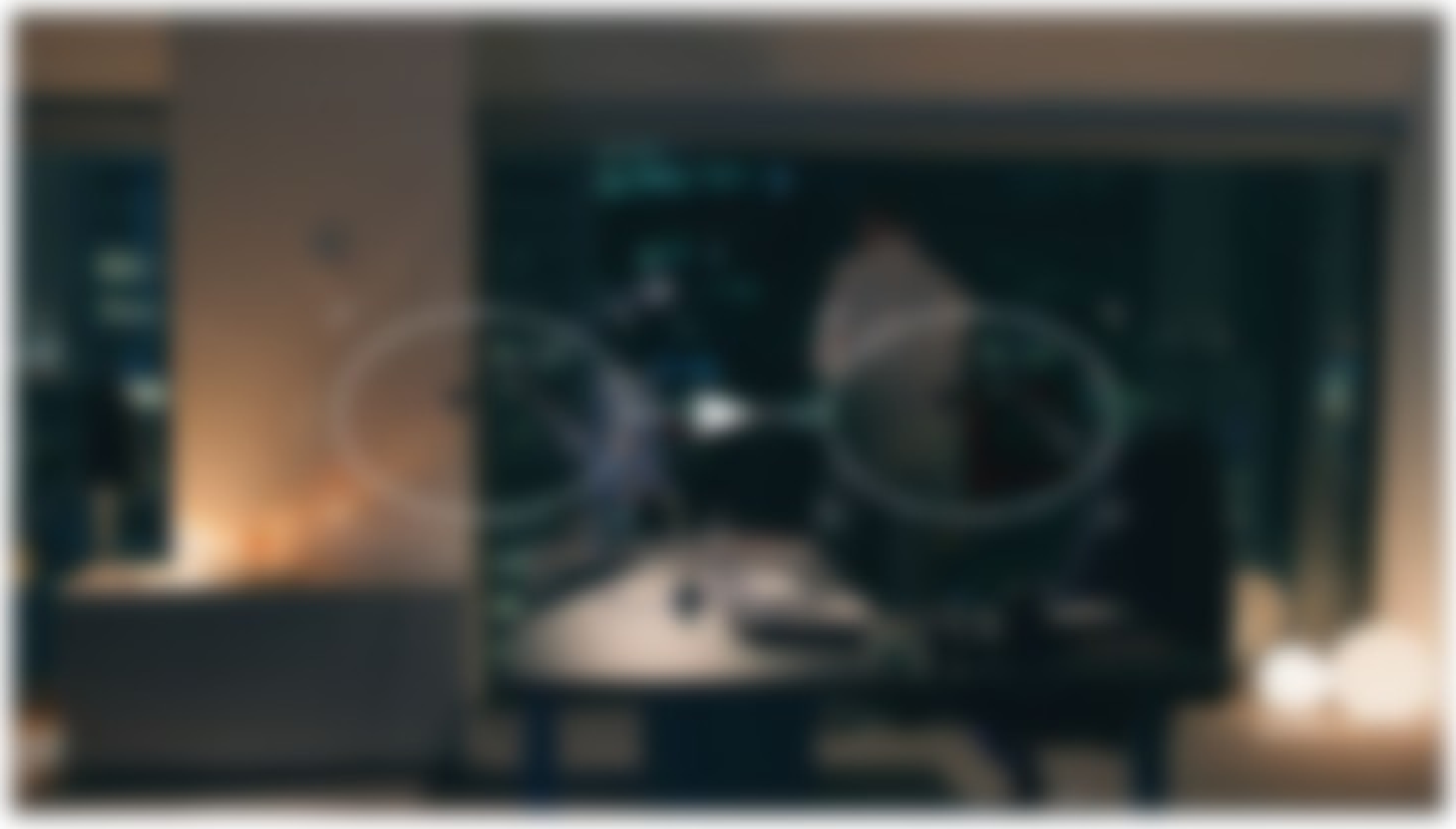
In this exercise, you will use the more sophisticated Patch Replacer effect to perform a quick cover-up and automatically adjust the grade of the sampled area to match the region of the frame it is applied to.

NOTE DaVinci Resolve Studio is required to complete the following exercise.

1. Select clip 05.

   This is a visually interesting shot with a good set design and a great choice of location. However, one minor element is distracting from the luxurious effect: the wall thermostat. You will remove it by covering it with a sample of the wall.

2. Create a new serial node and label it **Coverup**.
3. Open the Effects panel.
4. From the Resolve FX Revival category, drag the Patch Replacer effect onto the Coverup node.



Two oval outlines appear in the viewer. The left oval represents the source patch, which is actively sampling the portion of the video under it. The right oval is the target patch, which is receiving visual data from the source and actively grading it to match its surroundings.

- [illegible]
- [illegible]
- [illegible]

- [illegible]
- [illegible]

[illegible]

- [illegible]
- [illegible]

[illegible]

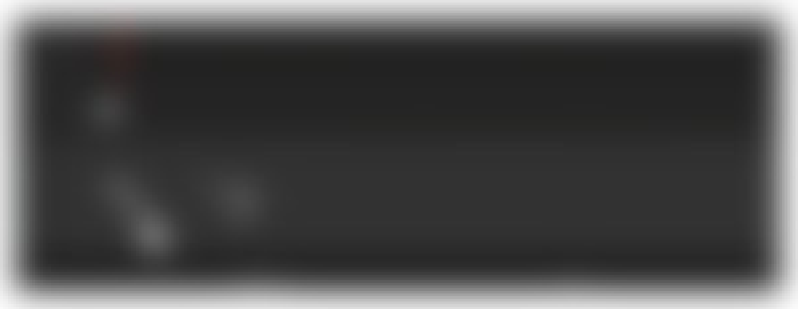
- [illegible]
- [illegible]

NOTE When working in Window mode, you also have the Cloud Tracker option, which follows the motion of the pixel data within a Power Window.

- If you are working in DaVinci Resolve Studio, choose the AI IntelliTrack tracker type. Otherwise, continue to work with the Point Tracker.

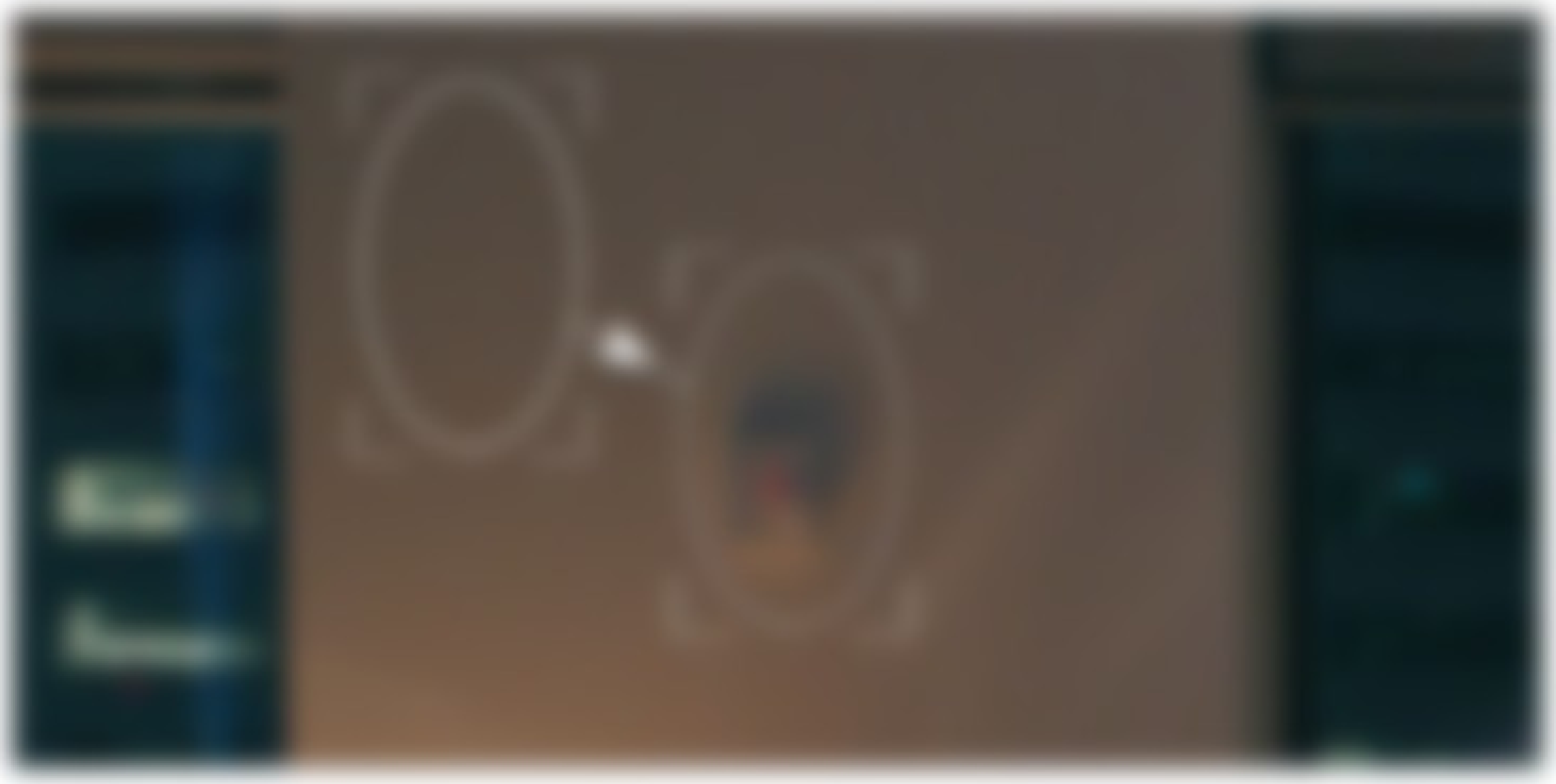
  To perform motion tracking, you must place at least one tracker point in the viewer. Ideally, you want to place this point on the element you are tracking or on a trackable area that is on the same plane as that element. For this clip, the thermostat itself is an ideal tracking point.

- In the lower left corner of the Tracker palette, click the Add Tracker Point button.



  Blue crosshairs appear in the center of the frame. These crosshairs indicate the area of the image that will be analyzed for tracking.

- Drag the crosshairs over the thermostat on the wall.

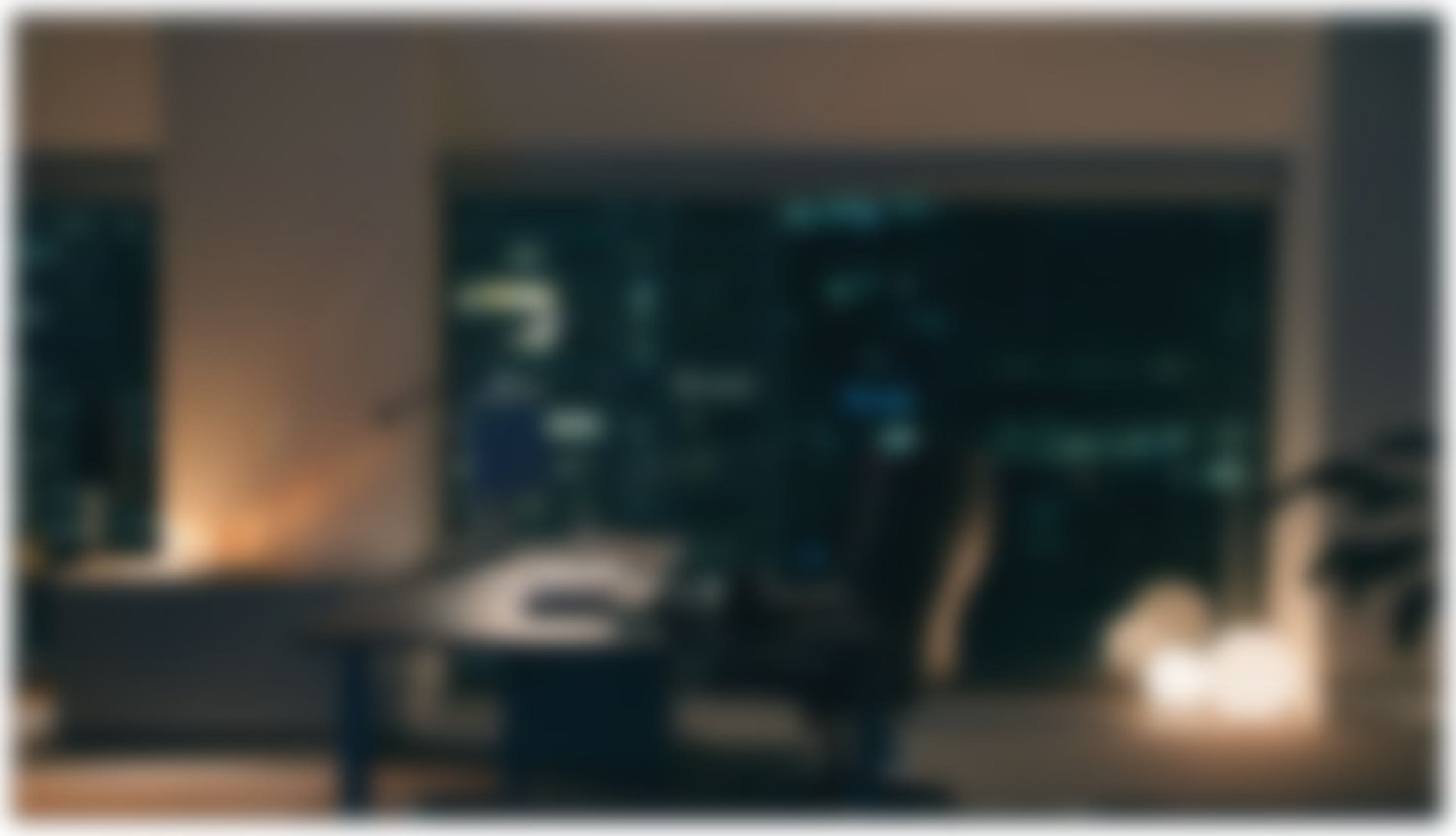


  The crosshairs turn red when the default tracker position is altered.

- In the Tracker palette, click Track Forward to perform the track analysis.

- After tracking is completed, deselect Keep Original Detail to bring back the target patch cover up.

- If necessary, turn off the viewer onscreen controls to hide the tracking point and patch overlays.



- Play the clip to check the accuracy of the cover up. Make further adjustments to the size and placement of the source and target patches, if necessary.

The result is a clean cover up of the wall that is ready for further editing and grading.

Node-based cover ups are frequently employed to address a scene's aesthetic needs or resolve issues that were not noticed during the shoot (for example, removal of visible set equipment). The workflows covered in these exercises tend to work best on footage with limited movement and good sample areas. For more complex cover ups, you can use the Fusion page.

Using Keyframes to Animate Grades

To understand keyframing, you need only grasp the concept that just two keyframes are required to create animation. Those keyframes must communicate just two things: their position in time and their values. By placing the keyframes at different points in the timeline, you indicate the duration of time through which the change occurs, and by giving those keyframes individual values, you specify the nature of the change. Using this principle, you can make the sun rise in a shot over 10 seconds or turn all the shadows in a scene blue over 20 frames.

Animating Position Values with Dynamic Keyframes

Dynamic keyframes animate parameter values across frames, creating the effect of smooth, consistent change over time. Over the next few exercises, you will animate the transform values and color grade of a clip to imitate a camera move and sunrise effect.

1. Select clip 01.

   This video was captured late in the evening and appears very dark. Before you begin grading it creatively, you should expand its luminance range to take advantage of the available visual information. You will use a similar process to the mountain range exercise in Lesson 1, where you combined color and log wheels to target and expand a dark section of the waveform.

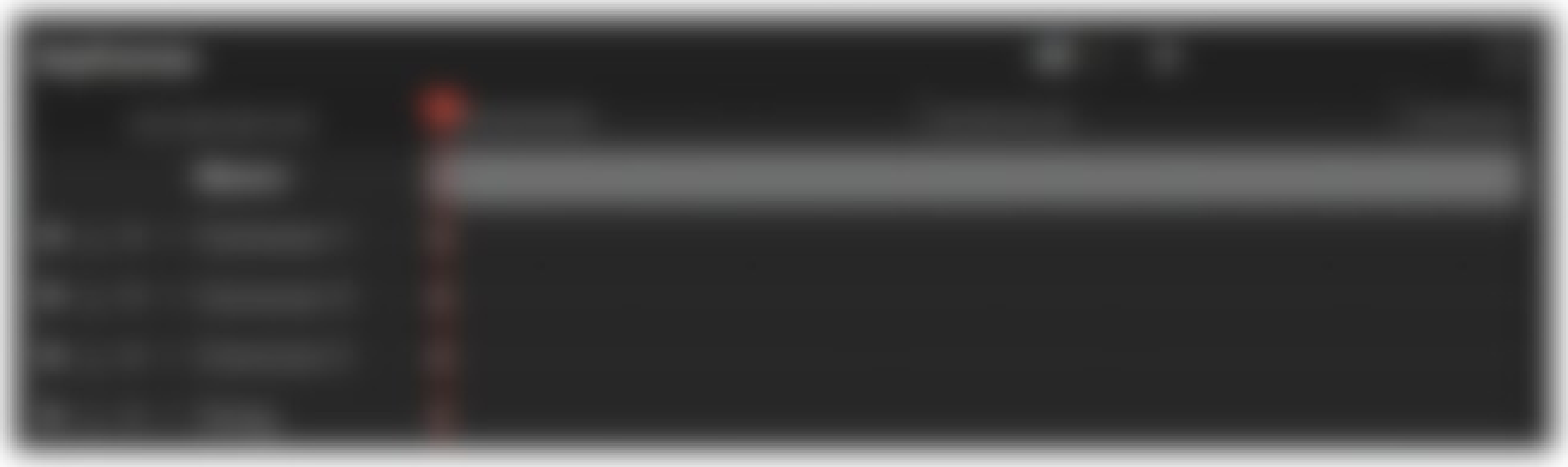
2. Create a new node after INPUT CST and label it **Lum**.

3. Drag the Gamma master wheel right (0.23) to increase the waveform spread, and then drag the Shadow master wheel right (0.20) to further brighten the dark foreground. These steps reveal substantial digital noise in the image, which will be addressed after the grade is completed.

   The clip is a locked establishing shot. However, even though it was captured in real time, it has a timelapse feel. Your goal is to use animation to imitate the fast passage of time.

   Your first task is to create a pan and zoom motion starting from the original wide shot and ending with a close-up of the city skyline.

- To the right of the palettes in the color page, open the Keyframes Editor.



The palette features two animation categories: the individual Corrector controls for each node and the Sizing parameters of the overall clip. The Master header at the top displays a keyframe summary of all the changes made in the clip.

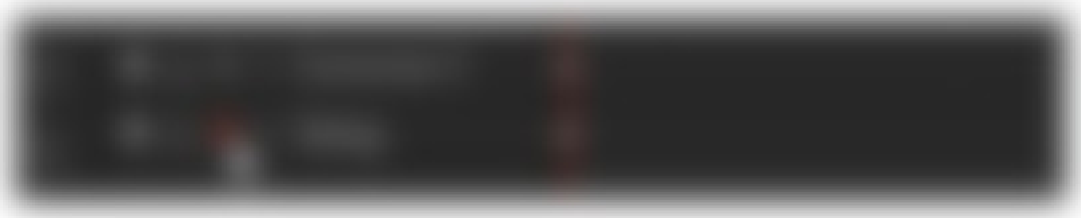
- Create a new serial node and label it **[illegible]**. A new corrector will appear in the Keyframes sidebar matching the number of the new node.

NOTE The exact number of the node and corrector will depend on whether you chose to preserve node numbers in the Preferences. If you did, [illegible] will be node [illegible]. If not, the [illegible] node would have renumbered itself as node [illegible].

Each new node you create will be accompanied by a corrector header and controls in the Keyframes Editor.

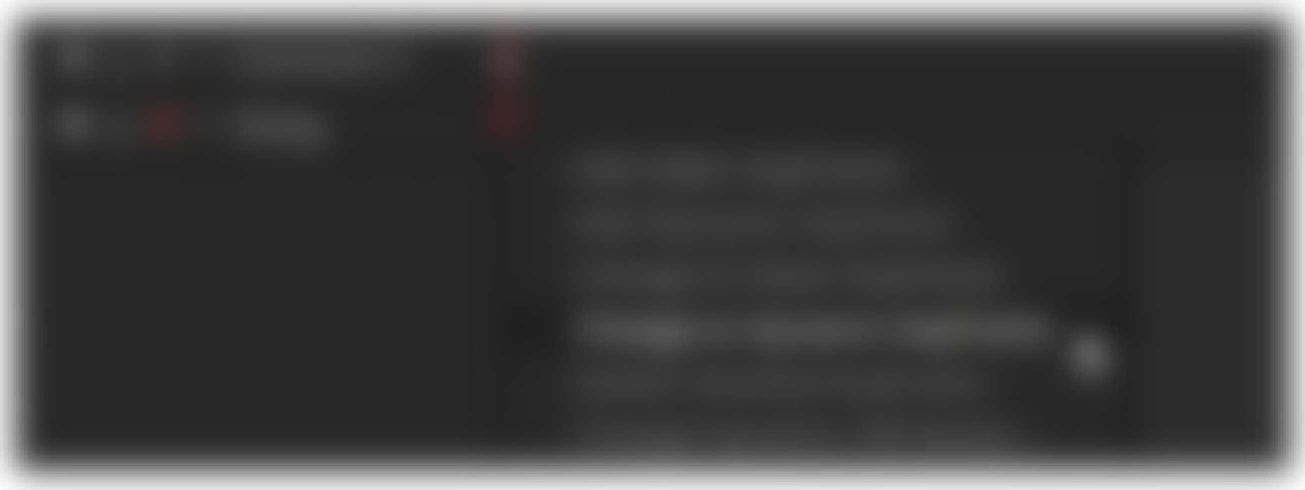
TIP Clicking the disclosure arrow next to the Corrector and Sizing headers expands the list of keyframeable categories. These enable you to specify which color page feature you wish to target and allow for multiple distinct animations within a single node. However, in most cases, you will animate just one element per node, so it will not be necessary to expand and search for the category you need every time you animate.

- Click the diamond-shaped keyframe symbol next to Sizing to activate animation in that parameter.



From now on, any changes you make to the clip's Input Sizing controls will be logged as dynamic keyframes.

- While on the first frame of the clip, right-click the circular keyframe next to Sizing and choose "Change to Dynamic Keyframe" to convert the default static keyframe to a dynamic one.



The circular keyframe becomes diamond shaped.

- Drag the playhead to the last frame in the Keyframes timeline.
- With the Sizing palette in Input Sizing mode, change the Zoom to [illegible], the Pan to [illegible], and the Tilt to [illegible].

A new dynamic keyframe is automatically added to the Keyframes timeline. Dimmed triangles extending from the keyframes indicate that a dynamic animation has been generated.

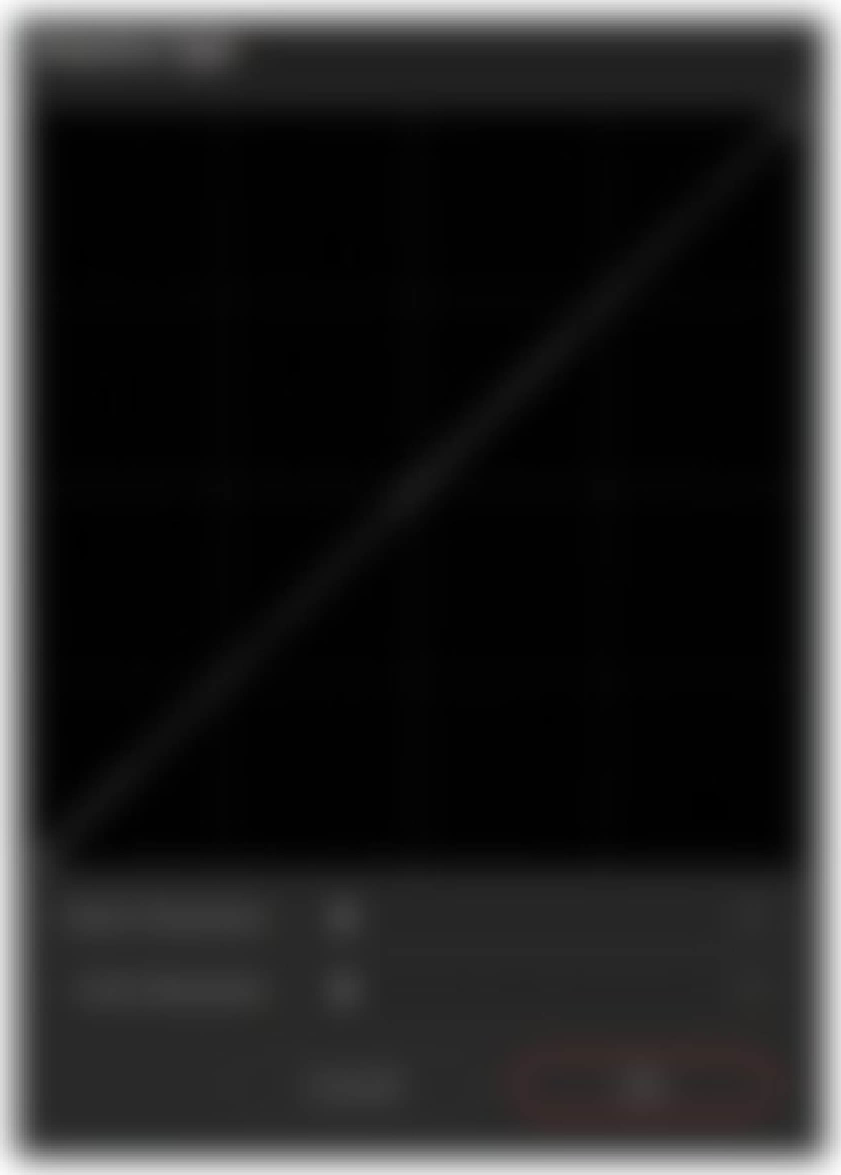
- Play the clip to review the pan and zoom motion. The shot begins with a wide view of the city and then zooms in on the skyline in the distance.

> **TIP** There is no limit to how many keyframes you can use in a parameter. If needed, you can move the playhead and make further changes to create more complex positions or color animations.
>
> You can also drag the keyframes in the Keyframes palette timeline to retime an animation. Placing keyframes farther apart will result in slower change, while dragging them closer together will force the animation to speed up.

Modifying Dynamic Attributes

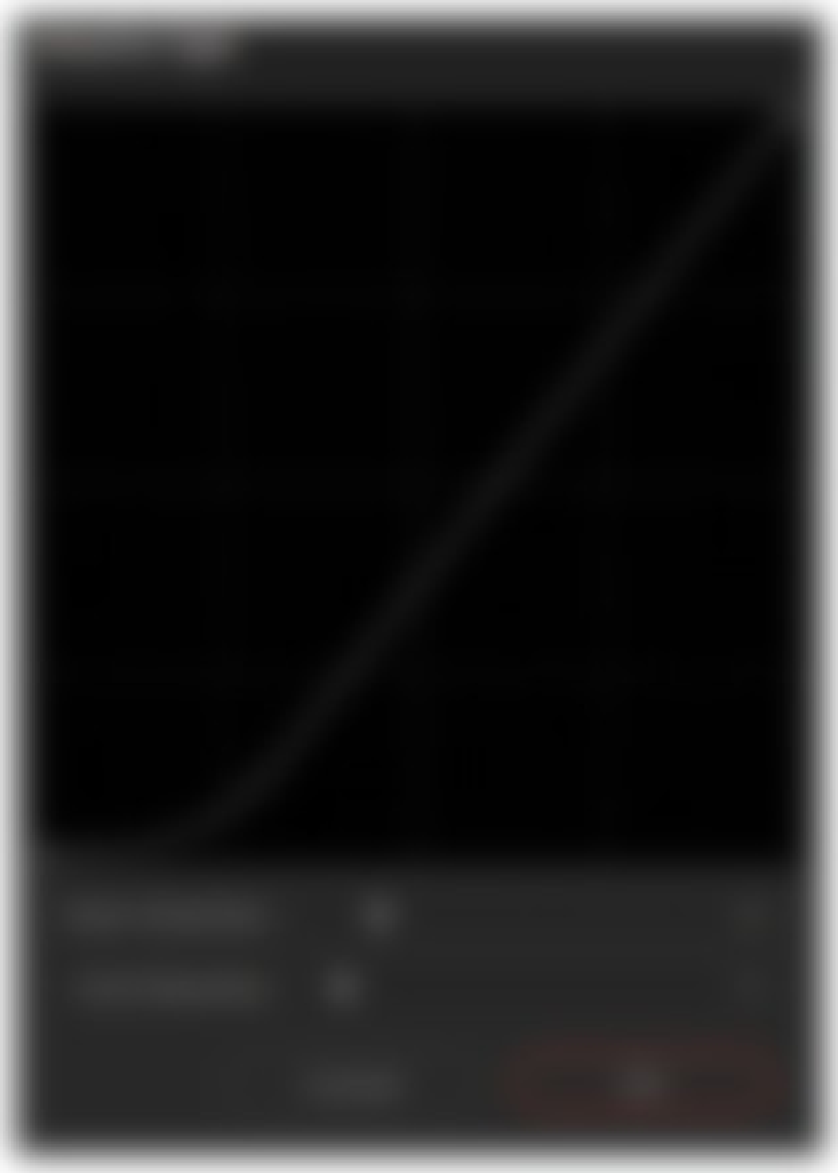
The animation in this exercise was created successfully, but the zooming motion appears a little artificial due to its linear nature. In this exercise, you will simulate a more realistic camera zoom by altering the animation speed and style using dynamic attributes.

- In the Keyframes palette, select the first keyframe of the Sizing parameter.
- Right-click the keyframe and choose Change Dynamic Attributes.



The Dissolve Type interface controls animation behavior between the keyframe you selected and the keyframe that follows it.

- Set the Start Dissolve value to 2. The almost horizontal shape of the line at the start indicates that the animation will begin slowly and then gradually accelerate to a constant (linear) speed toward the end.



- Click OK to confirm.
- Play the clip and note the ease-in to the animation. This small change helps make the zooming effect more realistic, mimicking the motion of a camera operator physically rotating the lens zoom.

Using Static Keyframes

When creating a new keyframe in the editor, the alternative to dynamic keyframes is static keyframes. Static keyframes don't animate the change between values. Instead, they abruptly change the value when the playhead reaches the keyframe.

You can combine static and dynamic keyframes within a single animation to achieve specific results—for example, a lightbulb that turns on abruptly (static) and then gradually increases in brightness and temperature (dynamic).

Changing Color Values Over Time

Next, to animate the color values of the clip, you'll target the node's corrector controls.

1 Drag the playhead to the first frame of clip 01.

> **TIP** Press the [(left bracket) and] (right bracket) keys to navigate between keyframes in the Keyframes palette. This shortcut can save you time when reviewing the start and end positions of an animation or when synchronizing the animation of other parameters and nodes.

2 Select the Sunrise node.

3 In the Keyframes palette, click the keyframe symbol in the Sunrise node's corrector header to activate keyframing.

To imitate the look of the sun rising, you will first need to create a pre-dawn look.

4 Drag the Gamma master wheel left to darken the midtones and then drag the Gamma color wheel toward blue to imitate a cool night color temperature.

5 Reduce Saturation to [illegible] to imitate the limited perception of color in dark environments.

6 Go to the last frame of clip [illegible].

TIP You can click the Expand button ("Split Primary and Secondary Views") in the upper-right corner of the Keyframes palette to increase the interface size. Doing so will move all the control palettes to the left of the color page, giving you more room to focus on keyframing.

You will now create the post-sunrise look in the same node.

7 Return the Saturation to [illegible] to bring back the original colors to the scene.

8 In the Primaries palette, click the reset arrow in the upper right of the Gamma wheel to remove the dark blue look.

9 Increase the Contrast ([illegible]) to create a silhouette effect on the skyline.

10 Drag the Gain color wheel toward yellow to warm the image.

- Increase the Highlights [illegible] in the adjustment controls to brighten the sunlight on the horizon.

- Play the clip to see the colors animate from the dark blue look to the light warm look.

With two frames, you have created a new narrative in this clip. Keyframing has wide applications that range from the practical to the creative. One common reason for keyframing color grades is to address color temperature fluctuation. Shoots in which the camera operator might maneuver from indoor to outdoor locations (documentaries, wedding videography, and so on) benefit greatly from these types of animated grade workflows. Creatively, animated grades can help communicate a character's change in emotional state or location.

If you are new to keyframing, it can take some getting used to, but in time, and with consistent practice, generating keyframes and animating changes can become a common part of your grading workflow.

Applying Noise Reduction

DaVinci Resolve's noise reduction feature runs on a powerful video engine that can distinguish noise from environmental data by performing a temporal analysis of the video frames. This feature allows for a strong reduction of noise while preserving a high level of detail in the subjects of an image. Applying the additional spatial method of noise reduction further cleans up the image by analyzing and removing repeating noise patterns.

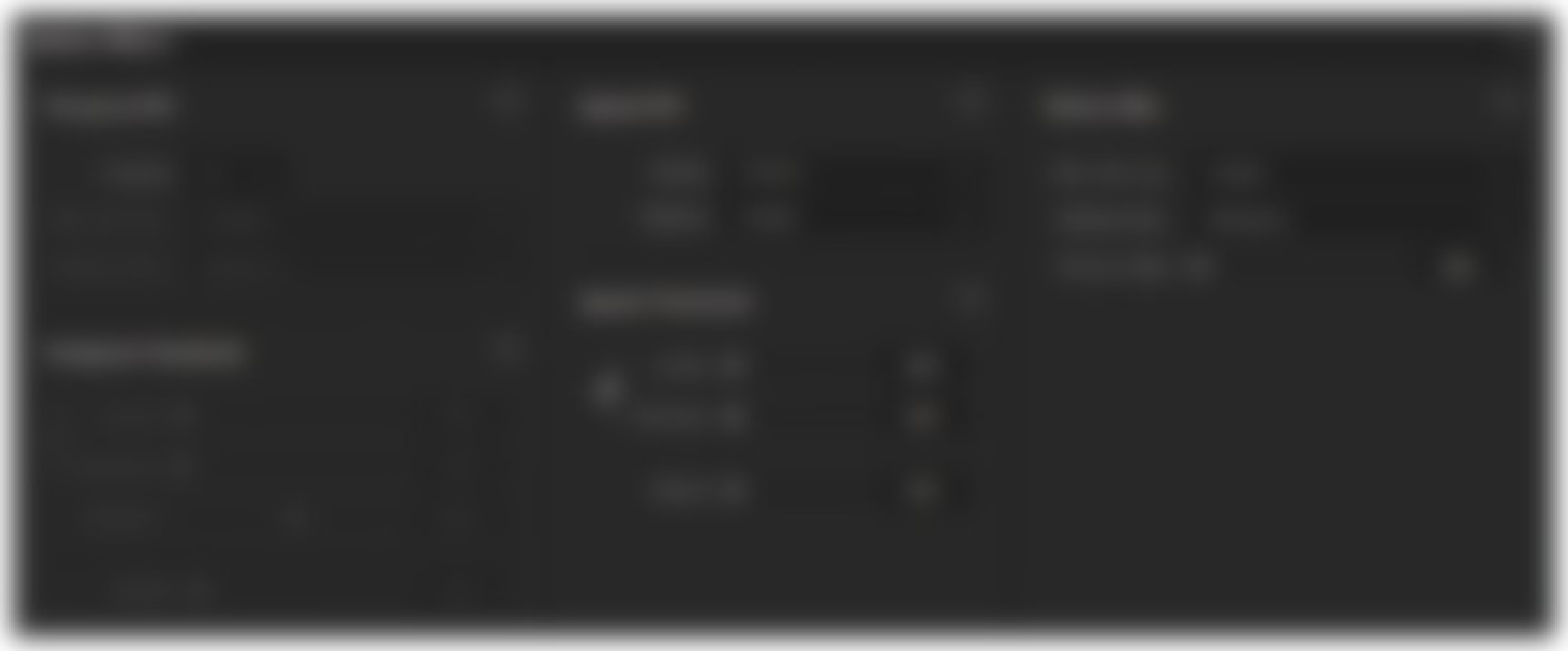
NOTE DaVinci Resolve Studio is required to complete the following exercise.

- Continue to work on clip 01 in the Project 05 - The Long Workday 022 timeline.
- Go to the last frame of the clip to work on the scene at its brightest.

  Because of the low light conditions in which this footage was captured, the brightening of the gamma in the Lum node has revealed digital noise in the shadows and midtones.

- For a better view of the noise detail, increase the viewer Zoom between 150%–700%.

- Create a new serial node after Gamma and label it **Denoise**.
- Open the Motion Effects palette.



This palette is divided into three control areas:

- **Temporal NR** analyzes the video across several frames to detect moving subjects and backgrounds. It excludes moving elements from the most aggressive noise reduction to prevent unwanted blurring of vital information.
- **Spatial NR** softens high-frequency noise while retaining data in areas of high detail. This tool is extremely effective for reducing fine grain noise that Temporal NR might miss.
- **Motion Blur** does not perform noise reduction but uses the same analytical engine as Temporal NR. This tool helps make action shots more dynamic by adding artificial motion blur to moving subjects.

Under Temporal NR, you will first need to choose the number of frames that will be averaged to separate the subject detail from the noise.

- For this shot, which features no camera movement or moving subjects, selecting Frames = 2 for analysis is sufficient. The higher the number, the more accurate the analysis, but at the expense of extra processing time. A higher analysis rate could also produce artifacts in shots with overlapping moving subjects.

The Mo. Est. Type (motion estimation type) indicates which method is used to detect motion in the image. A setting of Faster prioritizes speed of output over quality, whereas Better produces a finer result at the expense of extra processing. When there is no movement in a shot, choose None to exclude motion analysis from the result and apply noise reduction to the entire image.

- For clip 01, choose Better. This will prevent the ripples in the water from being too aggressively denoised and account for the kayak being in motion.

Motion Range allows you to specify the speed at which the subjects are moving to exclude areas with motion blur from the noise reduction effect.

- Clip 01 has almost no motion, so Small is a good choice.

The Temporal Threshold controls how aggressively noise is reduced in the luma and chroma channels. These are linked by default, but if the image has monochromatic noise (or vice versa), it's advisable to unlink the two parameters and target the luma/chroma noise separately.

This adjustment will activate noise reduction in the image, so you can begin by entering any number and then dragging left or right to refine the result.

[illegible] Enter **[illegible]** as the starting Threshold for the linked channels.

To see how much the Temporal NR is affecting the image, you can use the highlight tool to assess the pixel difference.

[illegible] In the viewer, enable highlight mode.

[illegible] In the upper left of the viewer, click the A/B icon to activate Difference mode.

The grainy texture you see in the viewer shows the amount of noise that has been removed from the original image. When you start to recognize distinct outlines of objects in the noise pattern, it's an indication that the noise reduction has become so aggressive that it is now removing legitimate visual information.

[illegible] Drag the Threshold left ([illegible]) until only noise remains.

Overly aggressive noise reduction

Good noise reduction

The Motion value acts as a pivot for the point at which moving objects are excluded from noise reduction. A lower value excludes larger areas of the image, whereas a higher value assumes less motion and targets more of the image.

[illegible] Leave the Motion parameter as it is.

The Blend value allows you to mix the original image back into the noise-reduced output. This adjustment can be helpful when noise reduction gets too aggressive and areas of the image take on a plastic appearance.

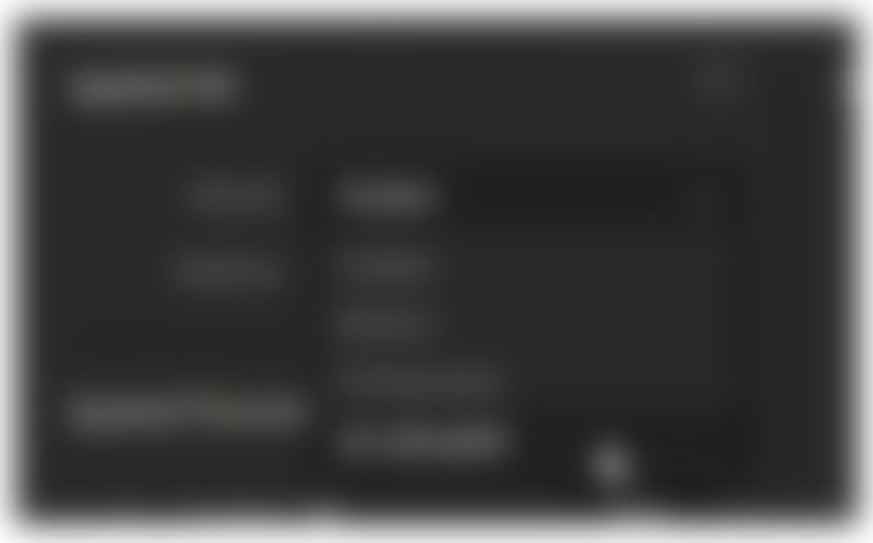
[illegible] Leave the Blend parameter as it is.

[illegible] Turn off the highlight mode in the viewer.

[illegible] Disable and enable the Denoise node to compare the image before and after Temporal NR.

The noise reduction is targeted but subtle. To further improve the result, you will use Spatial NR to analyze and remove the generic noise pattern in the frame.

At the top of the controls, you can select which noise reduction mode you wish to use.



- **Faster**, **Better**, and **Enhanced** modes will all run their pattern analysis within a given radius size and configure their output based on the set threshold. They are listed in order of processing complexity.
- **AI UltraNR** is an AI-driven noise pattern identifier that will extract the noise pattern from the signal by locating and analyzing the "flattest" section of the frame for pure noise.

- Under Spatial NR, set the reduction mode to AI UltraNR.

- Click Analyze.

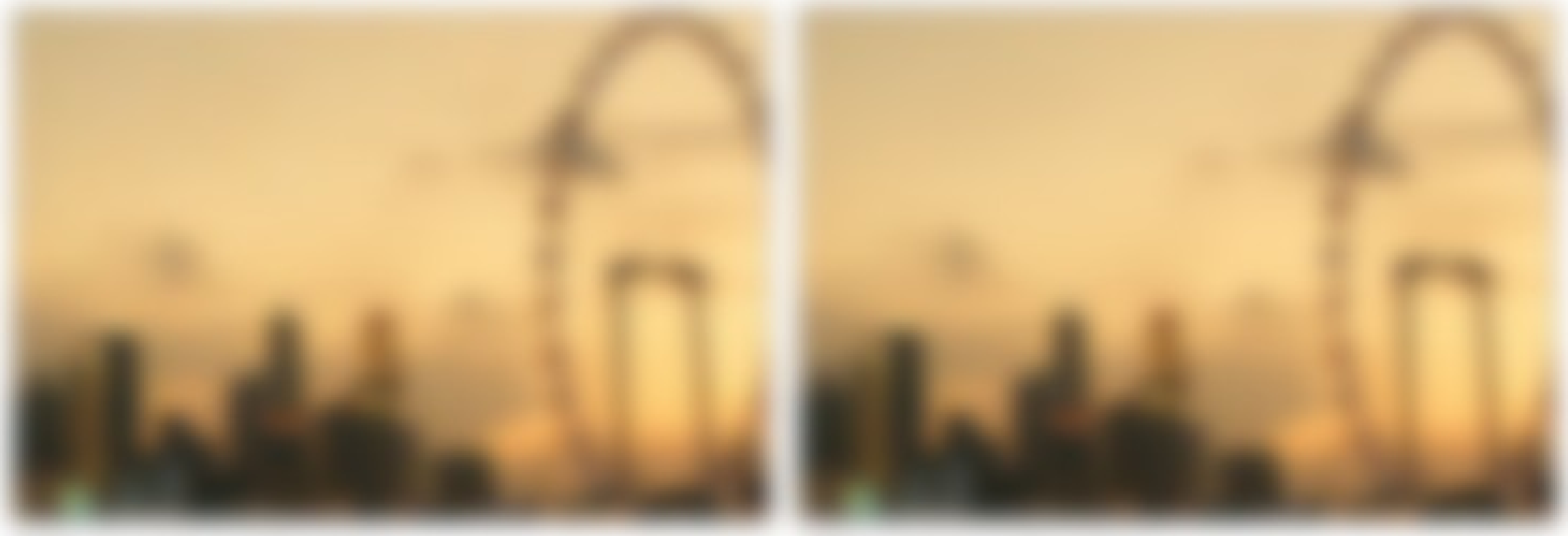
A bounding box appears in the frame, identifying the "emptiest" area of pixel data in the given frame. With no tangible visual content, the data within the square is ideal for extracting the digital noise produced by the camera sensor.

You can reposition and resize the bounding box in the viewer if you wish, but it is generally not advised—AI UltraNR is better at detecting optimal analysis regions than our eyes.

You can also manually adjust the Noise Profile Luma and Chroma Threshold settings, but again, AI UltraNR tends to automatically achieve the ideal mix of thresholds for clean noise reduction.

> **TIP** Noise Reduction is available in the Effects Library under the Resolve FX Revival category and features all the same settings. You can use it to apply noise reduction to clips directly in the edit or cut page timelines.

14 Press Command-D (macOS) or Ctrl-D (Windows) to bypass the Denoise node and compare the image before and after noise reduction. Pay particular attention to the preservation of the fine detail in the image – like the Ferris wheel spokes and the windows of the buildings in the skyline.



Before noise reduction

After noise reduction

Before moving on, it is also worth checking at what point in the node tree noise reduction is optimal.

15 Create a new local grade version (version 2).

16 Select the Denoise node and press E to extract it from the node tree.

17 Drag the Denoise node over the link between the INPUT CST and the Lum node. Doing so will reduce noise on the clip before any grading or animation occurs.

In this instance, the change softens the impact of the noise reduction and produces a better visual output.

You can also check how noise reduction works when applied to the signal prior to color management.

13 Create a new local grade version (version 3).

14 Hold Command-Option (macOS) or Ctrl-Alt (Windows) and drag the Denoise node over the INPUT CST to swap their order. Noise reduction is now applied to the original RGB camera signal.

Without color mapping, AI UltraNR is forced to analyze log-encoded media, making the noise pattern harder to detect. This results in more aggressive noise reduction and a smearing effect in the frame.

15 Label the versions **node 4**, **node 2**, and **node 1** for easier reference when you compare the different Denoise node position results in the viewer.

16 Press Command-N (macOS) or Ctrl-N (Windows) repeatedly to cycle between the three versions.

17 Leave the clip on version 2 (node 2), in which the Denoise node is placed after the INPUT CST.

Where Is the Best Place for the Noise Reduction Node?

Applying NR at (or near) the start of the node tree is advisable because it analyzes and treats the original RGB data. However, this placement may potentially result in softer edge detail that will affect every downstream node in the grading process.

Applying NR toward the end of the node tree will usually result in sharper edge detail but may struggle to accurately identify and completely remove noise after it has been graded and composited. When unsure, experiment with the placement of the NR node in the Node Editor until you find the optimal position.

It's always advisable to use a dedicated node for noise reduction. After the noise is reduced to a satisfactory level, you can opt to disable the NR node to reduce the amount of processing and caching that takes place as you grade. Keep in mind, however, that a substantially noise-reduced signal might have an observable impact on downstream nodes, especially chroma and luma key-based nodes like the qualifier. In such cases, it is recommended to keep the NR node active to get a more accurate representation of your final look. If this impacts processing and real-time playback on your workstation, you can enable render caching to ensure smooth system performance.

Optimizing Performance with Render Cache

Almost anyone who has worked with raw footage or done graphic-intensive work on a computer will be familiar with the frustration of experiencing lag when the workstation cannot process the data in real time.

DaVinci Resolve offers various methods for improving workstation performance, such as reducing the playback resolution, changing debayer quality, generating proxy media, or using a transcoded media workflow.

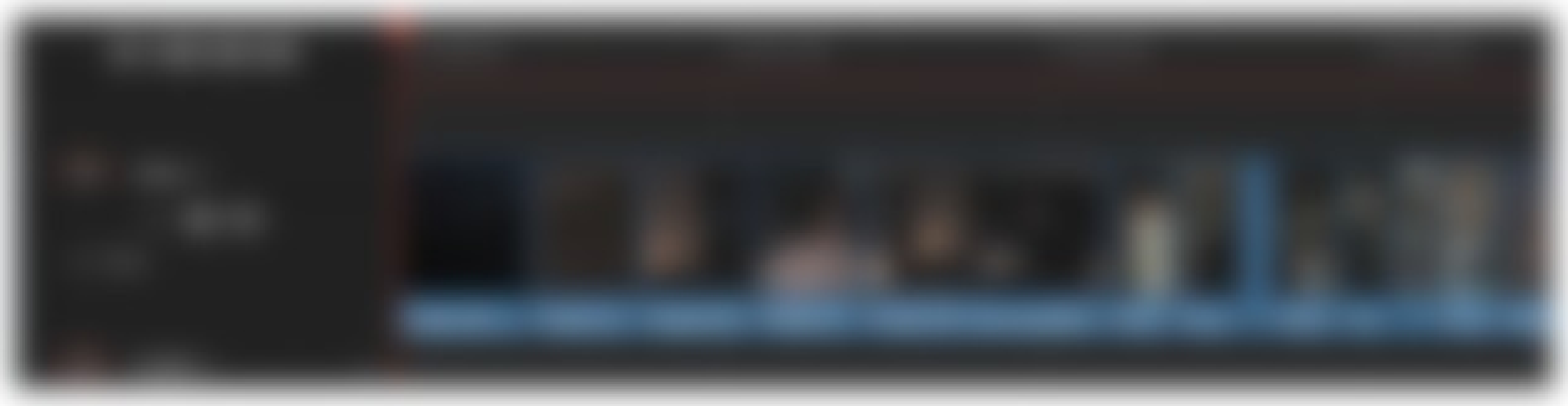
Another powerful method for increasing playback speed is allowing DaVinci Resolve to render your footage while the application is otherwise inactive. You can then play the cached media without the need to render effects-heavy clips in real time. The caching mechanism in DaVinci Resolve is made up of four independent stages that prompt a render based on various criteria. This allows DaVinci Resolve to monitor each clip and timeline and only generate renders when they meet one or more of the cache level requirements. In order, these levels are:

- Fusion Output Caching
- Node Caching
- Color Output Caching (optional)
- Sequence Caching

Enabling Smart Cache

Caching in DaVinci Resolve can occur on the timeline, clip, or even the node level. Additionally, cache rendering can occur automatically, if meeting the criteria determined by the Smart Cache feature, or manually, as determined by the user. You will experience most of these cache levels in the next few exercises.

1. Enter the edit page.
2. If you did not do so in Lesson 1, enable caching by choosing Playback > Render Cache > Smart.



A red bar appears above the edit page timeline and gradually turns blue as frames are successfully cached. Rendering is prioritized to the playhead position so that the clips you are actively working on are the first to be processed.

NOTE If you do not observe the caching process in the timeline, it's possible that the project does not have a cache location. To fix this, enter the Project Settings, and in the Master Settings, scroll down to the Working Folders. Ensure that the Cache files location is set and has write access.

The first level at which caching occurs is Fusion Output Caching (previously known as source caching). Its name refers to the position in the video signal's order of operations. After media is imported and added to a timeline, its signal flows from the edit page to the Fusion page and is then routed back to the edit page, which prompts this first cache. When in Smart Cache mode, Fusion Output Caches are generated for processor-intensive video media codecs such as H.264/HEVC and most raw camera formats, as well as for any compositing performed in the Fusion page.

The Project 03 – The Long Workday SCD timeline uses media compressed with an intermediary codec (DNxHR) already optimized for editing; therefore, the program can play it in real time without triggering the Fusion Output Cache. You'll have a chance to observe this level of caching in Lesson 9, "Setting Up Raw Projects," where you work with raw media. Fusion is also not triggering the cache because you have not done any work in the Fusion page in this lesson.

The timeline turned red when you activated Render Cache because of the work you did on the node cache level in the color page.

Generating a Node Cache

Node caching occurs in the Node Editor of the color page after grades and effects are applied. As with Fusion Output Caching, when Smart Cache is enabled, rendering occurs only when DaVinci Resolve deems the node processes to be intensive.

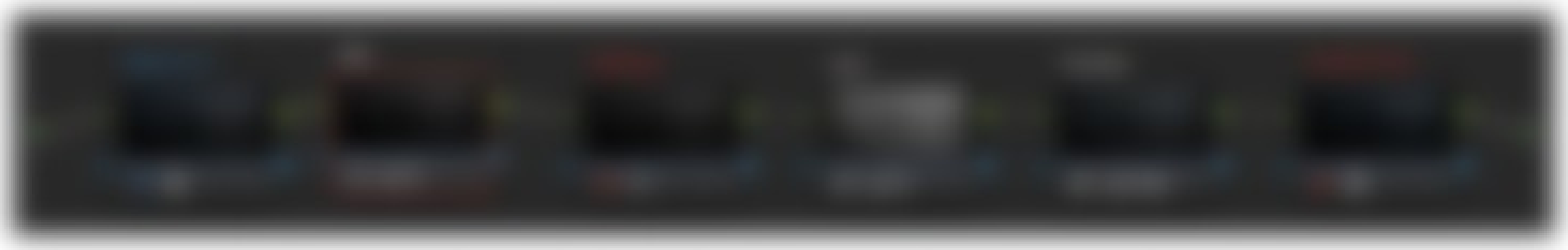
1 Enter the color page.

You will continue to work on clip 01.

2 In the interface toolbar, ensure that the Timeline button is enabled. This will display the mini-timeline, in which you can observe the video tracks and their cache processes.

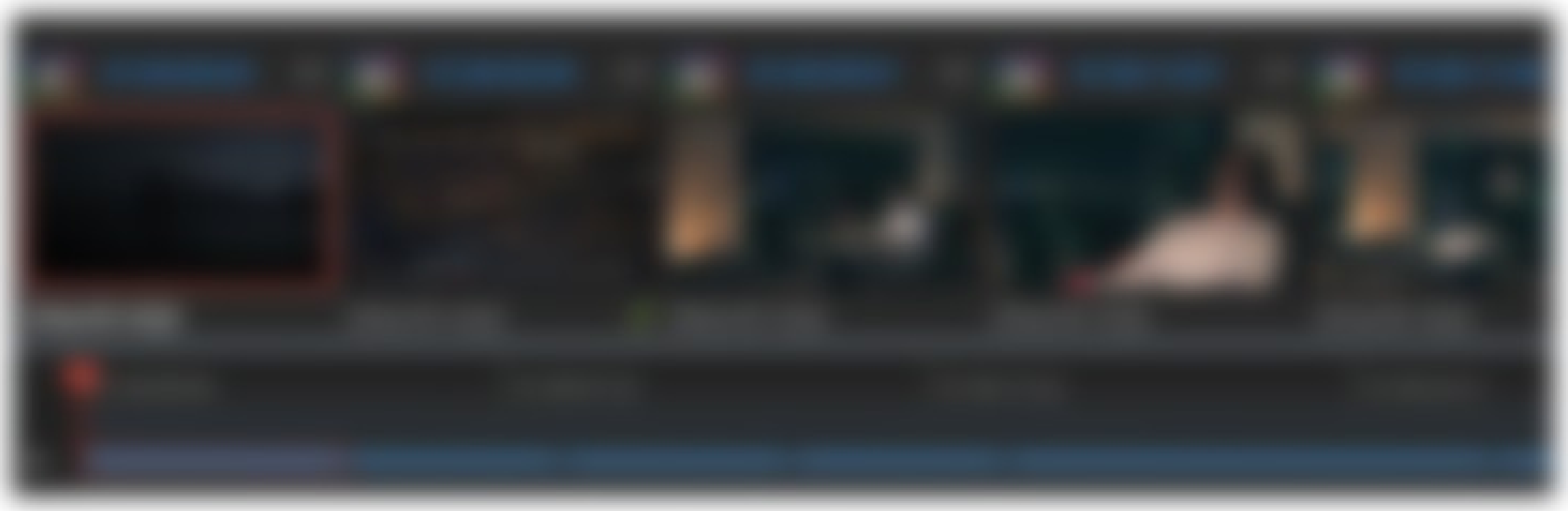
3 Create a serial node before the Denoise node and label it [illegible].

- In the adjustment controls, drag the Saturation value to 0.



The image retains its sunrise animation but now plays it in black and white. The timecode above the clip thumbnail turns red to indicate that it is being re-cached. In the Node Editor, the Denoise and OUTPUT CST node names and numbers turn red for the same reason.

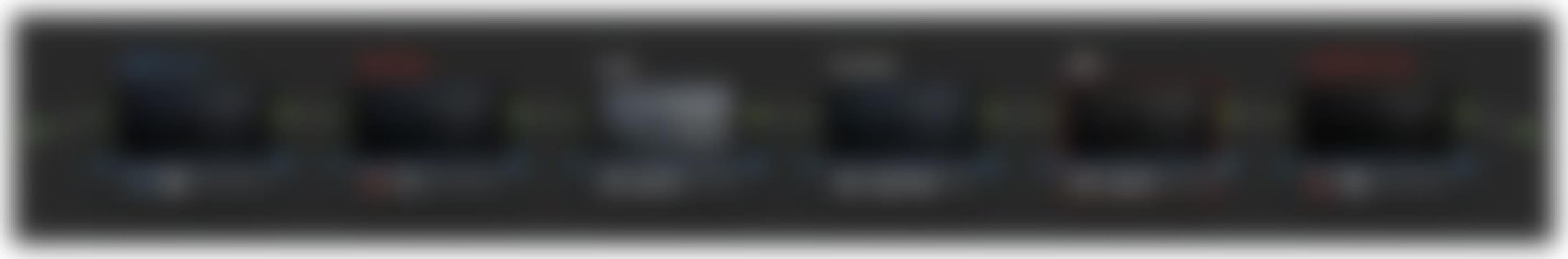
The INPUT CST remains blue because the BW addition has not affected its incoming signal. The BW node also does not turn red because the standard color grading tools in the color page are not classified as intensive enough to trigger a cache.



The cache line in the mini timeline will eventually turn blue as the render is completed.

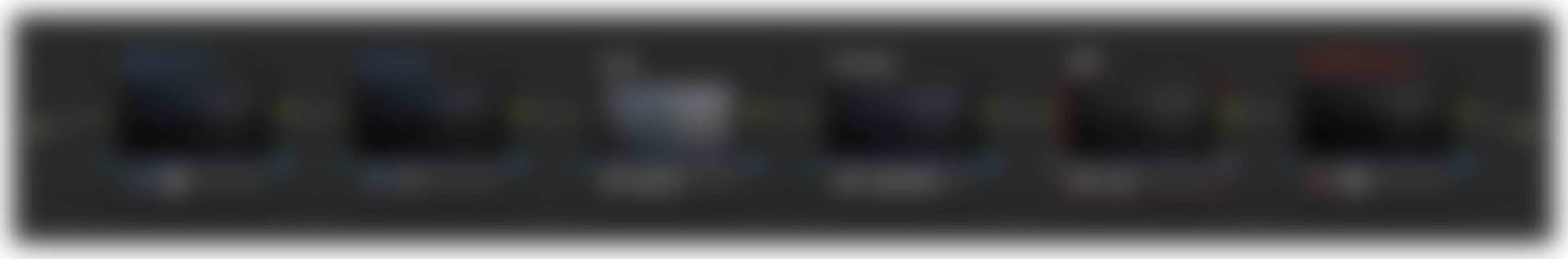
You will now observe how changes in node order impact cached nodes.

- Click the BW node and press E to extract it.
- Drag the BW node over the connection line between the Sunrise and OUTPUT CST nodes.



The Denoise and OUTPUT CST nodes turn red again as they process their respective new incoming RGB signals. The Denoise node is no longer processing a black and white signal, and the OUTPUT CST is processing the video under a different order of operations.

- After the nodes turn blue, click the BW node and raise the contrast to 1.50.



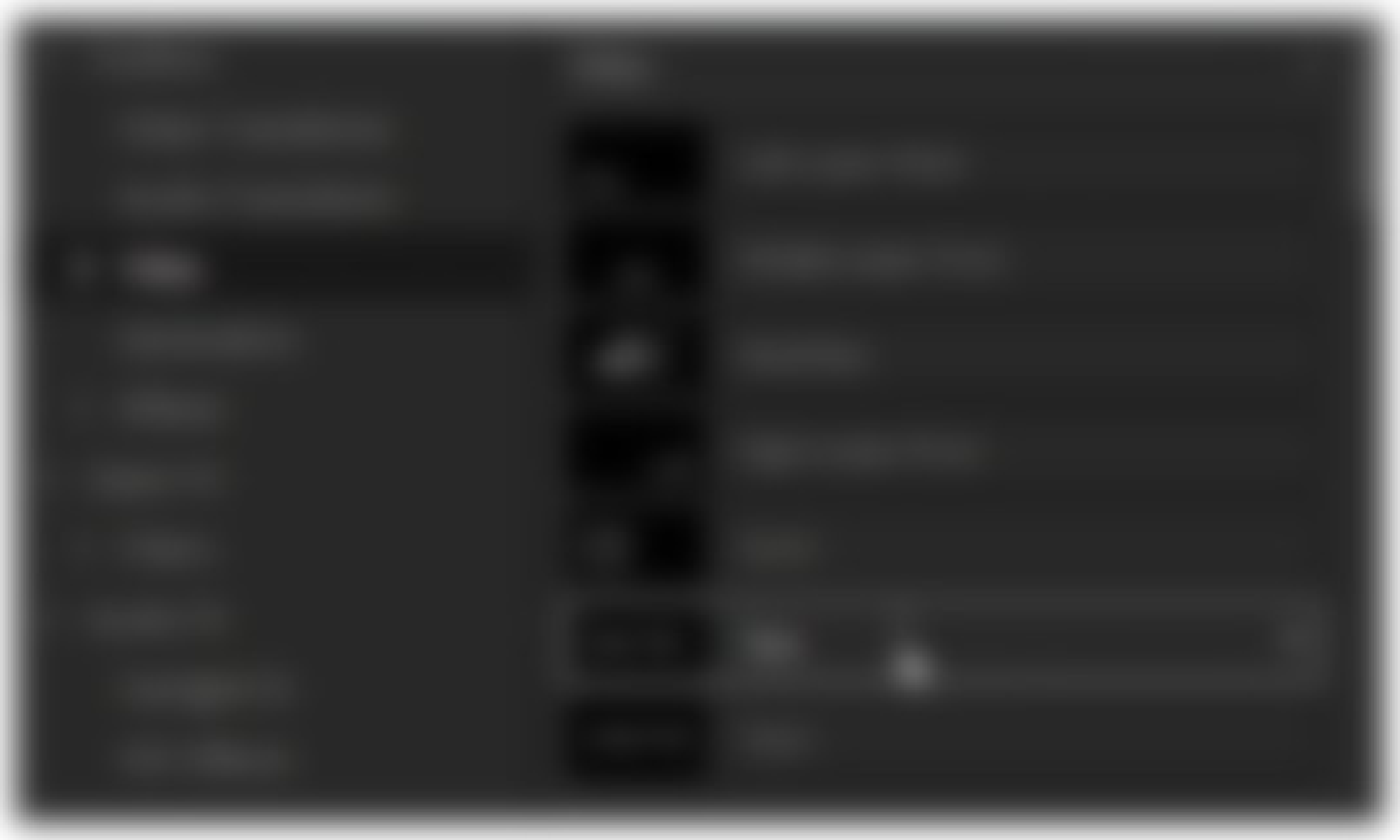
The OUTPUT CST node turns red as it forces a re-cache. The change does not impact the Denoise node this time because nodes are not affected by downstream changes in the node tree. If you follow the path of the RGB signal, it is denoised before it is desaturated, so the program continues to use the same denoised version of the cached render.

- Delete the BW node.

Observing Sequence Caching

After the Fusion Output and Node Caches, a Sequence Cache is prompted in the edit page when effects such as transitions, titles, or generators are applied to the timeline.

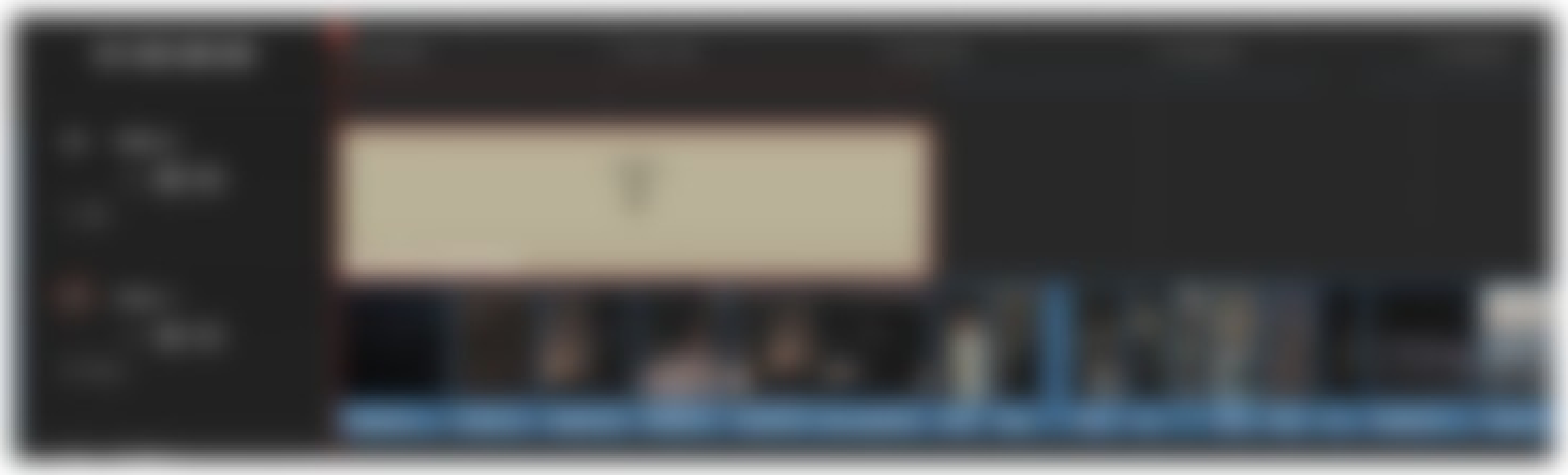
- Enter the edit page.
- Open the Effects Library panel.
- In the Toolbox > Titles folder, locate the Text title generator.



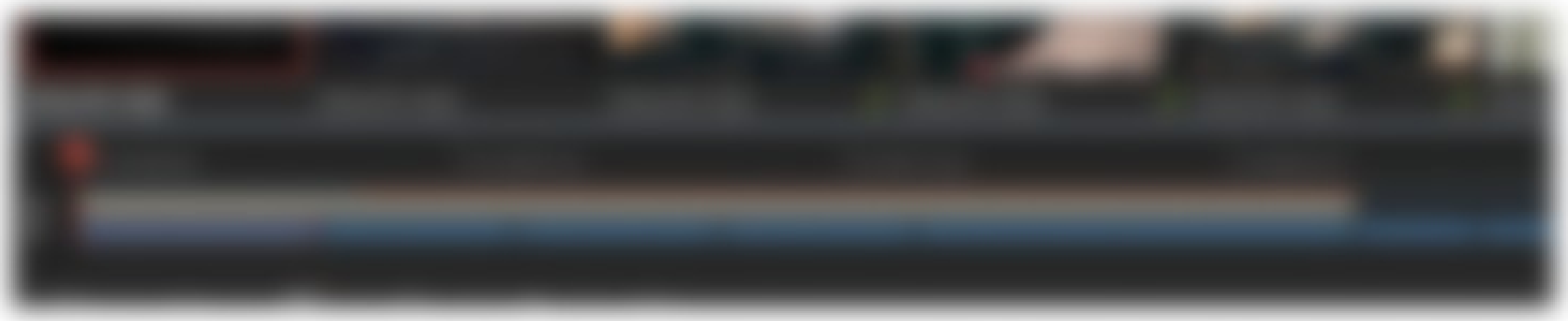
- Drag the title generator onto video track 2 and extend its length to cover the first five clips of the timeline.
- In the upper right of the edit page, open the Inspector palette.

- Under Rich Text, enter the project name **The Long Workday**.

  A red line appears over the timeline to indicate that a render cache is being generated for all the media under the title text.



- Enter the color page.



  Note that the sequence cache for the title generator is still visible in the mini-timeline. If you don't want to see or cache edit page effects or higher nodes during grading, you can opt to disable them.

- Click V2 on the mini-timeline to hide the project name text and prevent it from prompting the sequence cache render.

Utilizing User Cache Modes

As you've seen, the decision to render clips and nodes on every level of the workflow is made by DaVinci Resolve's background processes. This allows you to continue focusing on your project while Smart Cache detects if and when rendering is necessary.

However, at times, you might want to control which clips or nodes are rendered. For that, you can enable User Cache, which will not perform any media rendering until you specifically tell it to do so.

- Choose Playback > Render Cache > User.

  The blue highlights on the clip timecodes and nodes disappear. From now on, all render caching will occur only on your command.

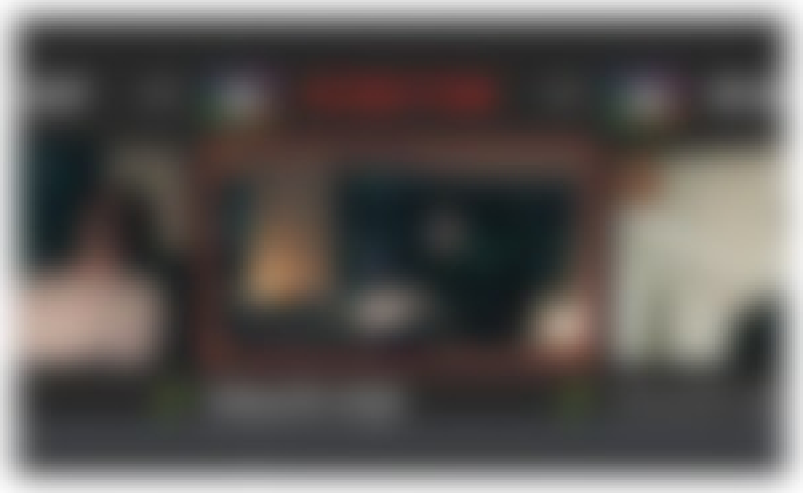
Some colorists prefer to work in this mode when they don't want an entire timeline to get cached as soon as they launch a project. One reason might be that they're using raw media and want to cache only the clips they are actively working on.

- Select clip 21.
- Right-click the Denoise node and choose Node Cache > On. Once again, caching is prompted, and the node name and clip timecode eventually turns blue.

> TIP When working on a larger project, you could use the Clips filter to isolate clips with noise reduction and manually cache them to avoid enabling Smart Cache.

In addition to selecting individual nodes, you can manually render a clip's entire node tree.

- Select clip 25.
- Right-click clip 25 and choose Render Cache Color Output.



The clip's timecode turns red in the timeline while the nodes remain white. In this scenario, the entire node tree is cached, which results in even faster processing when compared to individually rendered nodes. However, it also means that making changes to any of the nodes in the tree will require the entire clip to be re-cached.

- In the Node Editor, add a new serial node called **Magenta Look**.
- Drag the Offset color wheel toward magenta to add color to the clip.

Although simply adding color to a clip is not processor intensive, the clip's timecode immediately turns red because in User Cache mode, any change will prompt a re-cache.

- Remove the Magenta Look node.

  The clip caches again, even though you recently had this exact configuration of nodes. This is because the program does not keep a record of which specific changes triggered a cache render. Even if you return to previous settings, the clip will treat the change as new and will re-cache.

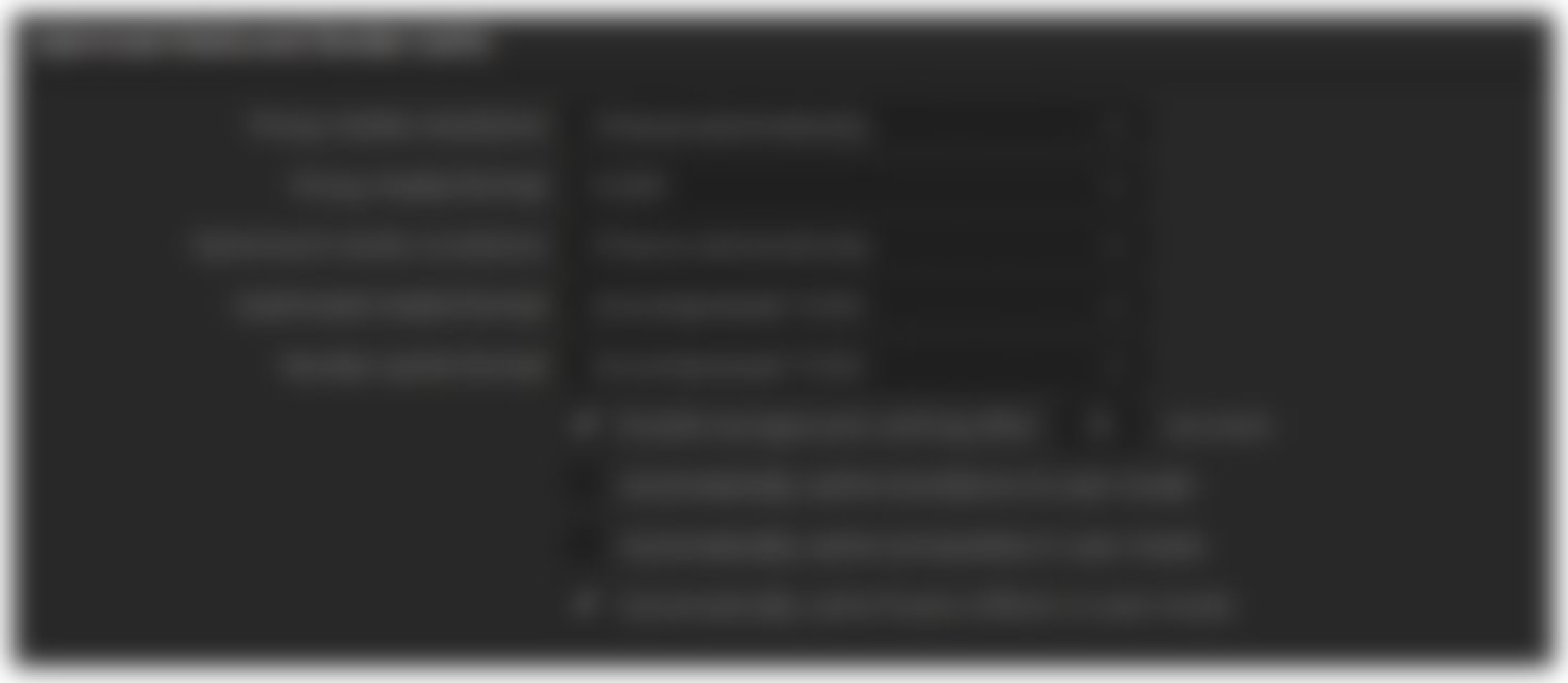
You can still manually override the cache status of nodes and clips in Smart Cache mode by right-clicking and choosing On or Off in the Cache submenu. In User Cache mode, you use these same controls to activate caching, but there will be no background "flush" processes like the ones in Smart Cache mode.

Configuring Cache Quality

When you play media in the viewers of the edit and color pages, you can see the playback frame rate in the GPU status indicator in the upper left of the viewer.

A green light indicates that the media is playing in real time. A red light indicates lag, with the numerical value displaying the actual playback frame rate. Caching should result in the GPU status indicator always displaying a green light during playback. If it does not, you should consider lowering the Timeline Proxy Resolution in the Playback menu, or reducing the quality of the cache.

- Open Project Settings and click the Master Settings tab.
- Scroll down until you see the Optimized Media and Render Cache section.



The "Render cache format" field allows you to choose the codec used to encode your cached media.

Lowering the cache quality will reduce the file size and prevent your storage from running out of space too quickly. However, this setting will also lower the visual quality of the rendered media in your viewer. You should avoid reducing cache quality if precision of color and key data is important.

Inversely, raising the cache quality will result in a faithful reproduction of your image at the expense of very large render files.

- Set the "Render cache format" to one of the full quantization formats [illegible].

  Beneath the "Render cache format" menu are a few checkbox options.

  You can specify the amount of time that must pass before background caching begins in Smart Cache mode. By default, the interval is [illegible] seconds, but you can increase the duration if you prefer to tweak your settings at a leisurely pace when grading.

  Additionally, you can enable automated transition and composite rendering when in User mode, which will mimic the behavior of Smart Cache mode.

- Click Save to exit the Project Settings.

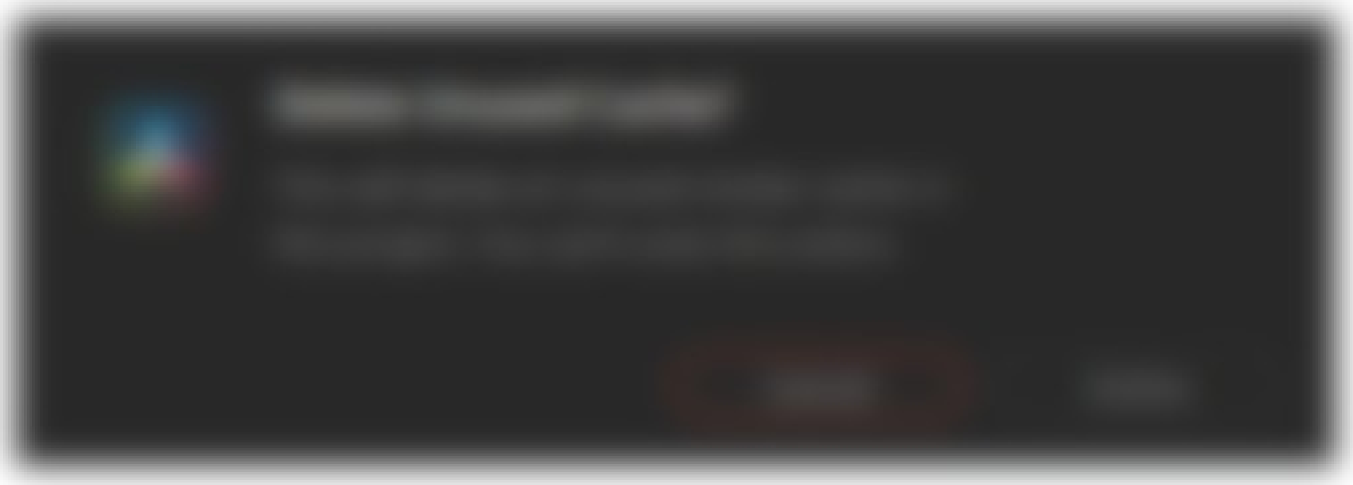
Another reason why cached media may not playback in real time is that the cache working folder location might have insufficient read/write speed. Check that the folder is not located on an old drive or a cloud account (if you have a poor internet connection).

NOTE By default, the Cache files location of the Working Folders is assigned to the topmost media storage location (Preferences > System) of your project library. To optimize playback, you might want to redirect the cache location to a drive other than the one that contains the DaVinci Resolve application and your project files.

Clearing a Cache

Although caching is triggered on multiple levels, only one cached file is ever active for each clip or transition. For example, if you apply noise reduction to a clip and then pass over it on the edit page, the active cache will be a rendered video with reduced noise and baked-in color. Any further changes will prompt a new cache, which will replace the previous iteration on the timeline. All the previous renders will be retained in your storage location until you choose to clear your cache. You'll want to clear your cache periodically to make room for more renders or to delete unnecessary materials from older projects.

1. Choose Playback > Delete Render Cache > Unused.



A prompt will ask you to confirm that you want to delete the unused cache associated with this project.

2. Click Delete. The media in the timeline remains rendered, while all previous cached versions of the clips are removed from your storage.

   Other options for deleting the render cache allow you to delete all cached media or only the renders associated with selected clips on the timeline. It's important to remember that no actual media is affected when clearing a cache, and even if you accidentally delete the renders currently being used in your project, they will be regenerated the next time caching is triggered.

> **TIP** Occasionally, you might come across a graphic anomaly in which the viewer in the color page is outputting visual data that does not match the changes you made to a clip. For example, a Media Offline placeholder might appear when you are certain the media is connected. Clearing the active render cache (All) will remove the program's memory of the clip render and force it to re-cache the clip correctly.

You can also opt to clear the render cache of specific projects in your libraries.

- Choose Playback > Manage Render Cache.

  The Manage Render Cache window allows you to filter your projects based on storage location and library. The columns underneath list all your projects and the sizes of the render cache associated with each one.

  To free up storage space, select the checkboxes of older projects and click Clear Selected Cache in the lower left corner.

- Click Close when done.

> **TIP** You can automate the deletion of cached files after a certain period of time. Go to Preferences > User > Cache Management and indicate in days how frequently you wish to clear the cache.

Proxies and offline media formats are vital for a clean editing workflow, but their use is discouraged for compositing and grading because they are often of lower visual quality than the camera originals, which impacts grade clarity and secondary selections. Using Smart Cache with a high quality render format will allow you to work faster with higher image fidelity.

Self-Guided Exercises

Complete the following exercises in the unfiltered Project 03 - The Long Monday 3.0 timeline to test your understanding of the tools and workflows covered in this lesson.

Clip 02 – Use node sizing to clean up the speed limit signs at the top of the frame.

Clips 03–06 – Apply noise reduction to each clip in the Offline group. If you use AI UltraNR, make sure you do run the Noise Profile analysis for each clip.

Clip 09 – Use dynamic and static keyframes to flicker the lights in the garage.

Clip 14 – Use Patch Replacer to remove all the clouds from the sky using the fewest nodes possible. Compound the cloud clean up nodes when finished.

When you've completed these exercises, open the Project 03 - The Long Monday Commercial COMPLETED.drp and review Lesson 09 Timeline COMPLETED to compare your work with the "solved" timeline. If the media appears offline, click the red Relink Media button in the upper left corner of the media pool and specify the location of the Project 03 media on your workstation.

Lesson Review

- True or false? If you change a project's timeline resolution, you will need to review your secondary grade nodes and manually resize all the Power Windows to fit the new resolution.
- Where can you animate the sizing properties of a clip?
- What are dynamic keyframes?
- True or false? Noise reduction should be applied only to node 01 of any clip.
- Would adding a vignette to a clip cause Smart Cache to render the clip?

Answers

1. False. DaVinci Resolve is resolution independent, meaning all secondary tools automatically resize to fit a new project resolution and aspect ratio.
2. You can animate the sizing properties of a clip in the Keyframes Editor by changing transform values in the Input Sizing mode of the Sizing palette.
3. Dynamic keyframes gradually change a value between two points in time.
4. False. Noise reduction can be applied to any position in the node tree, based on effectiveness.
5. Maybe. Primary and most secondary grading tools are not considered processor intensive enough to prompt a Smart Cache render, so adding a vignette on its own would not trigger a cache. However, if the vignette was placed upstream from a Smart Cached node, it would trigger a re-cache.

Lesson 9

Setting Up Raw Projects

Raw media refers to various still and video image formats in which visual data is captured as an unprocessed digital signal. In its initial state, raw media does not have any visual properties. It is only through a processing method called debayering that you can assign a monitoring color space to the video signal and view it on a display. Raw media has far greater grading potential due to its high dynamic range, wide gamut, and uncompressed approach to pixel data encoding.

In this lesson, you will work with Blackmagic RAW (.braw) clips. Blackmagic RAW offers the same grading latitude as other raw standards with the additional benefit of GPU acceleration and partial debayering, which results in dramatically smaller file sizes and faster playback.

Time

This lesson takes approximately 2 hours to complete.

Goals

Adjusting Raw Settings at the Project Level [illegible]

Adjusting Raw Settings at the Clip Level [illegible]

Grading High Dynamic Range Media [illegible]

Setting Up a Render Cache for Raw Media Projects [illegible]

Self-Guided Exercise [illegible]

Lesson Review [illegible]

Adjusting Raw Settings at the Project Level

The color management exercises you completed in Lessons 6 and 7 demonstrated how to configure a project's color space/gamut and gamma/transfer function to set up the starting point of a grade. Debayering raw footage works on a similar premise, although it's a far more essential part of the grading process. Without it, the raw media cannot be displayed in the viewer.

Raw format sensors are defined by their ability to record the photometric properties of light. Rather than presenting as a set of pixels with hard color data, raw formats record the light intensity of a scene within the geometry of the sensor's individual photoreceptive elements, or photo sites.

To reach a photo site, light must pass through a filter that isolates just one channel of color – red, green, or blue. Together, the filtered signals make up the Bayer mosaic that contains all the data necessary to re-create the image digitally. In the Bayer mosaic, green is replicated at double the frequency of red and blue, mimicking the standard observer's perception of color.

For this reason, raw files are sometimes called digital negatives: visual information containing a wide dynamic range of light that remains unviewable until processed. Debayering (also known as demosaicing) allows you to appoint values to the photometric signals and produce a visible image in a designated color space and resolution.

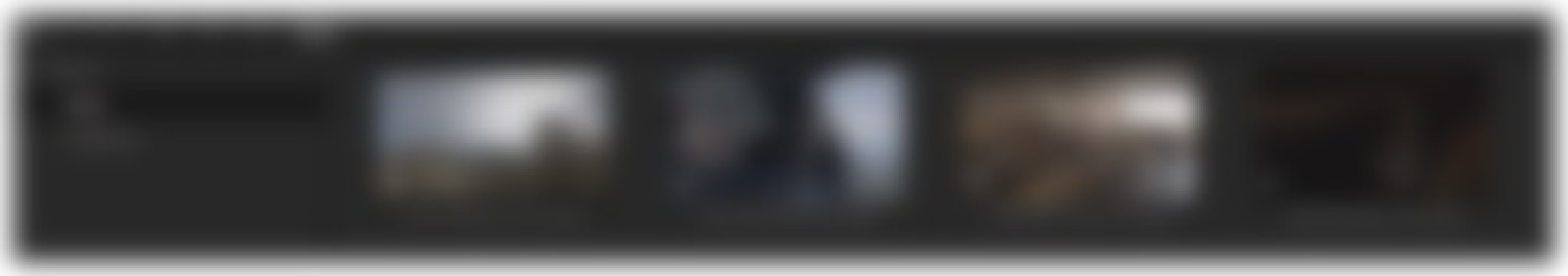
Determining Whether Clips Are Raw

You can sometimes recognize whether a video file is raw by its format name (ArriRaw, Nikon NRAW, Canon Raw, etc.) or extension (.braw), which you can see in the Metadata panel. However, many formats do not provide these clues, and you need to know that they are raw before you start working with them (like RED or Phantom CINE).

A quick way to verify whether footage is raw (and supported by DaVinci Resolve 20) is to place it on a timeline and open the Camera Raw palette in the color page. If the selected clip is in a raw format, the palette becomes active and displays options for the Decode Quality and Decode Using fields. If the clip is not raw, the Camera Raw palette will remain inactive.

In this lesson, you will work with Blackmagic RAW media. This raw format is unique in that it undergoes partial debayering in the camera hardware, which results in much smaller file sizes and storage as a single video clip as opposed to an image sequence. This format allows for much faster playback, media management, and file transfer compared to traditional raw formats.

1. Open DaVinci Resolve 15.
2. Create a new project and name it **Blackmagic RAW Project**.
3. Go to the media page.
4. In the media pool, create two bins: **Video** and **Timelines**.
5. In the media storage browser, locate the BMD 15 CC – Project 03 folder and enter the Blackmagic RAW subfolder.
6. Open the Media folder and drag the four .braw clips into the Video bin.



If a dialog appears informing you that your clips' frame rates don't match the project's frame rates, click Change to adjust the project frame rate to accommodate the media.

7. Go to the edit page.
8. Set the media pool to List view and make sure the clips are sorted alphabetically in the Clip Name column.
9. Select the four Blackmagic RAW clips. Right-click one of them and choose Create New Timeline Using Selected Clips.
10. Name the timeline **Blackmagic RAW Timeline** and place it in the Timelines bin.
11. Choose Playback > Render Cache > Smart.

The Fusion Output Caching process will begin immediately on the Blackmagic RAW clips. Unlike the media you've used in previous lessons, raw formats are not intermediates and need constant debayering and caching.

When reviewing the clips in the timeline viewer, you will see that two of them have black bars on the top and bottom of the image. This is known as letterboxing and occurs when clips have a different aspect ratio to the timeline viewer. By default, DaVinci Resolve will scale media with mismatched resolutions to preserve maximum video data. However, if you want all the clips to have the same framing, you can change your scaling options in the Project Settings.

- Open Project Settings and click the Image Scaling tab.
- In the Input Scaling category, set "Mismatched resolution files" to "Scale full frame with crop."
- Click Save to close the Project Settings.

Before

After

All imported media will now be scaled to fill the viewer frame. This happens at the expense of some cropping on the edges of the clips, but this data can still be retrieved using the Input sizing palette if needed.

Next, you will set up the project color management.

Color Managing with ACES

The Academy Color Encoding System (ACES) is a scene referred, display independent color management framework developed to standardize digital cinema and broadcast post production workflows. Its cross platform support and operational consistency have led it to be adopted as an industry standard in major post production houses and streaming services. As well as being a color management system, it defines its own set of primaries and transfer functions for various workflows.

ACES gamuts

- **AP0** primaries are photometrically linear and encompass a future proof wide color gamut. AP0 is recommended for long-term archival encoding and media storage.
- **AP1** primaries are typically encoded with logarithmic transfer characteristics (listed below). Their gamut is not as wide as AP0 but is still wider than any current deliverable standard. AP1 primaries are recommended for color grading and compositing.

ACES transfer functions

- **ACEScc** is the AP1 primaries with logarithmic transfer characteristics. It is recommended for color grading.

ACEScc

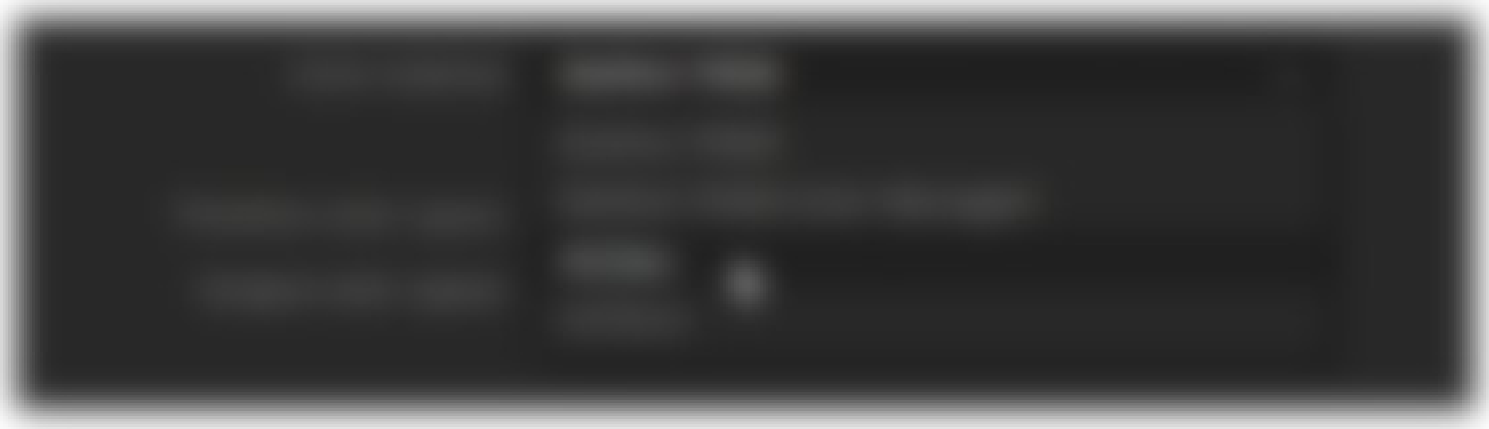
- **ACEScct** is a ACEScc variant with a higher toe that results in "milkier" shadows in lift operations. Some colorists prefer it for its film-like appearance, and it is also used for color grading.

ACEScct

- **ACEScg** has AP1 primaries with a linear transfer function. It was designed for visual effects compositing workflows.

In terms of setup, ACES operates similarly to Resolve Color Management. It requires an input and output to perform color mapping. In ACES, these are called input display transform (IDT) and output display transform (ODT). Since ACES itself is the working space, there is no timeline color space. ACES can be enabled project-wide from the Project Settings or applied to individual nodes using the ACES Transform effect.

- In the Project Settings window, click the Color Management tab.
- Set the Color Science to ACEScc.



- Leave ACES version set to the latest, ACES 1.3.
- DaVinci Resolve supports ACES AMF 1.0 sidecar files that define a clip's input and output transforms in XML. You can leave this setting set to None.

DaVinci Resolve automatically detects all supported raw formats. Thus, when color managing on a project level (via ACES or RCM), you do not need to indicate the input color space of the media. Raw formats are automatically mapped to your working color space and then transformed to the deliverable standard in the Project Settings. In such cases, the input parameters will only impact non-raw media.

- Leave ACES Input Transform set to No Input Transform.

  Unlike with Resolve Color Management, there is no Timeline color space parameter in the Project Settings. The project will operate within the fixed, log-encoded AP1 ACES color space.

- Set the ACES Output Transform to Rec.709/BT.1886 or your preferred monitoring standard.

- "Process node LUTs in" applies only to DCTL LUTs. You can use standard LUTs as usual or use the ACES Transforms to map the starting point of a LUT to an anticipated standard. You can leave this setting as it is.

- Select "Use color space aware grading tools" to ensure tools like the qualifier and curves operate consistently in the wide ACES gamut.

  Several other parameters in the Project Settings can be left in their default values. DaVinci Resolve settings are generally optimized for the average workflow, with the option to override those defaults scattered throughout the Project Settings and Preferences. You will usually know when (and why) you need to change the defaults when working with specialized workflows or formats.

- Click Save to exit the Project Settings.

  The images in the viewer shift to display the color managed raw signal.

- In the interface toolbar, open the Metadata panel.

- Change the Group Filter to Camera.

One of the benefits of working with raw media is that it retains the maximum amount of camera metadata associated with the footage. In this panel, you can see the camera type and manufacturer used to capture the footage, and even the shutter angle and lens model.

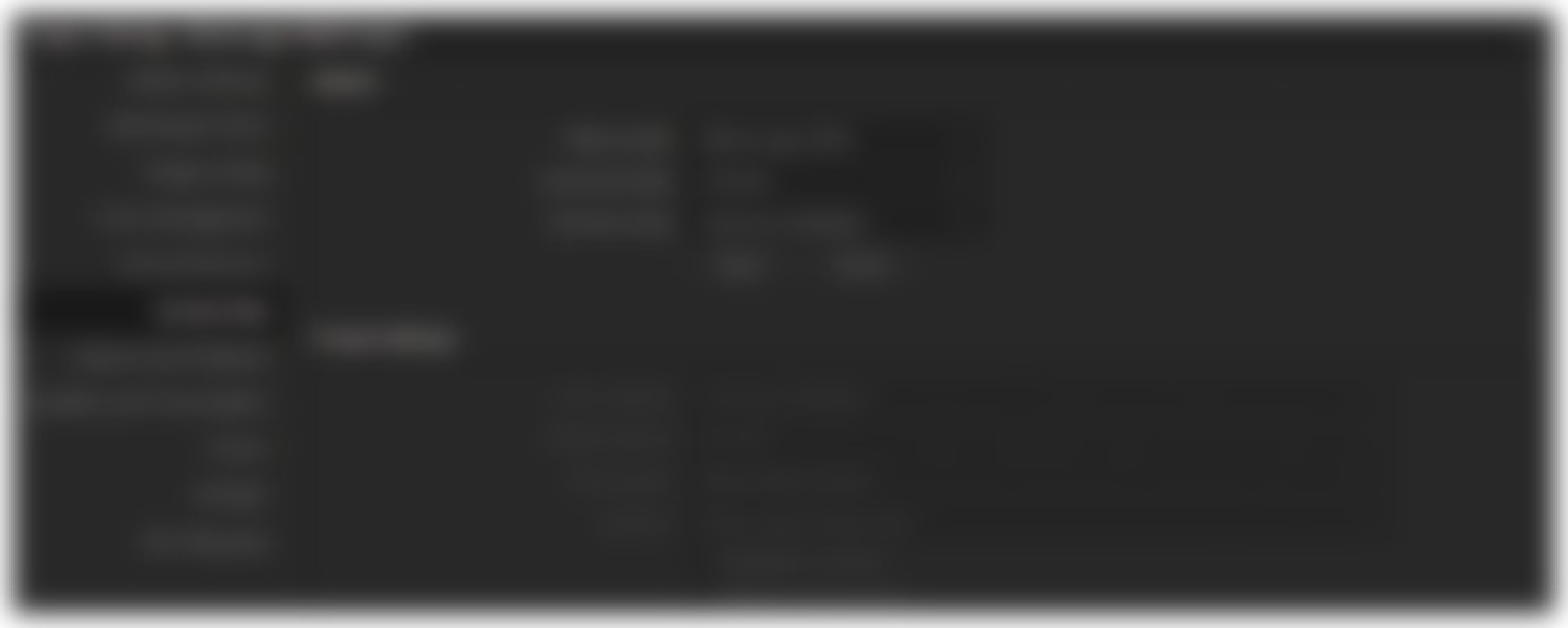
Reviewing Raw Settings on the Project Level

With the project color management set up, you can also review the raw project settings to control how the raw signal is debayered.

1. Open the Project Settings and click the Camera Raw tab.

   These settings affect how raw footage is debayered on a project-wide basis.

2. Set RAW Profile to Blackmagic RAW to access the parameters of the clips in your timeline.

   The "Decode quality" is set to the default "Full res." (full resolution), which means that raw media is debayered at its native resolution and resized to the timeline resolution set in the Master Settings. Changing the quality to Half or Quarter will substantially reduce the processing required to play the footage at the expense of the visual quality in the viewer/monitors and is a viable option for slower systems. You can opt to work at a lower debayer resolution and later select "Force debayer to highest quality" in the Advanced Render Settings of the Deliver page before rendering to ensure the image quality is optimized for export.

   NOTE No matter which "Decode quality" you choose, Fusion will always debayer raw media in its full native resolution.

3. Leave the "Decode quality" set to "Full res.," which will be 4K, 4.6K, and 6K for the clips in this project.

   The "Decode using" field allows you to specify how the raw signal is debayered relative to common in-camera settings such as color science, color space, white balance, exposure, and so on. By default, it is set to "Camera metadata," which will incorporate the settings made by the camera operator during media capture. Changing it to "Blackmagic RAW default" will reset the camera metadata and prompt it to use any associated sidecar file metadata. Setting the decode method to Project will reveal the fully customizable project and camera metadata settings in the lower half of the Camera Raw window.

> **NOTE** A sidecar file contains descriptive metadata that can be associated with raw media for look management in camera and during post-production. You can generate a sidecar file to back up or share debayer settings and to preview looks in a dedicated raw player (such as the Blackmagic RAW player). As a rule, sidecar files always take precedence over the embedded metadata. If the sidecar is deleted or moved, the decoding of the raw file will fall back on the embedded raw file metadata.

- Leave "Decode using" set to the default "Camera metadata."
- Click Save to exit the Project Settings.

In Part I of this book, you began working on media without any special color treatment in what is known as a display-referred workflow. In Part II, you enabled color management to automatically map log-encoded source clips to the Rec. 709 color space. In the final part, you took advantage of the DaVinci Wide Gamut to future-proof your deliverables using node-based CSTs, and now you will use the industry-standard ACES framework to explore other approaches to the scene-referred workflow.

There is no single "correct" choice for the treatment of media before the start of the grading process. The decision to use one color approach over another can be based on several factors: source media, delivery format, monitoring setup, LUT structure, collaboration software, and personal preference. In this lesson, you will continue to work with ACES color management, with additional consideration given to the treatment of the raw signal on the color page via the Camera Raw palette.

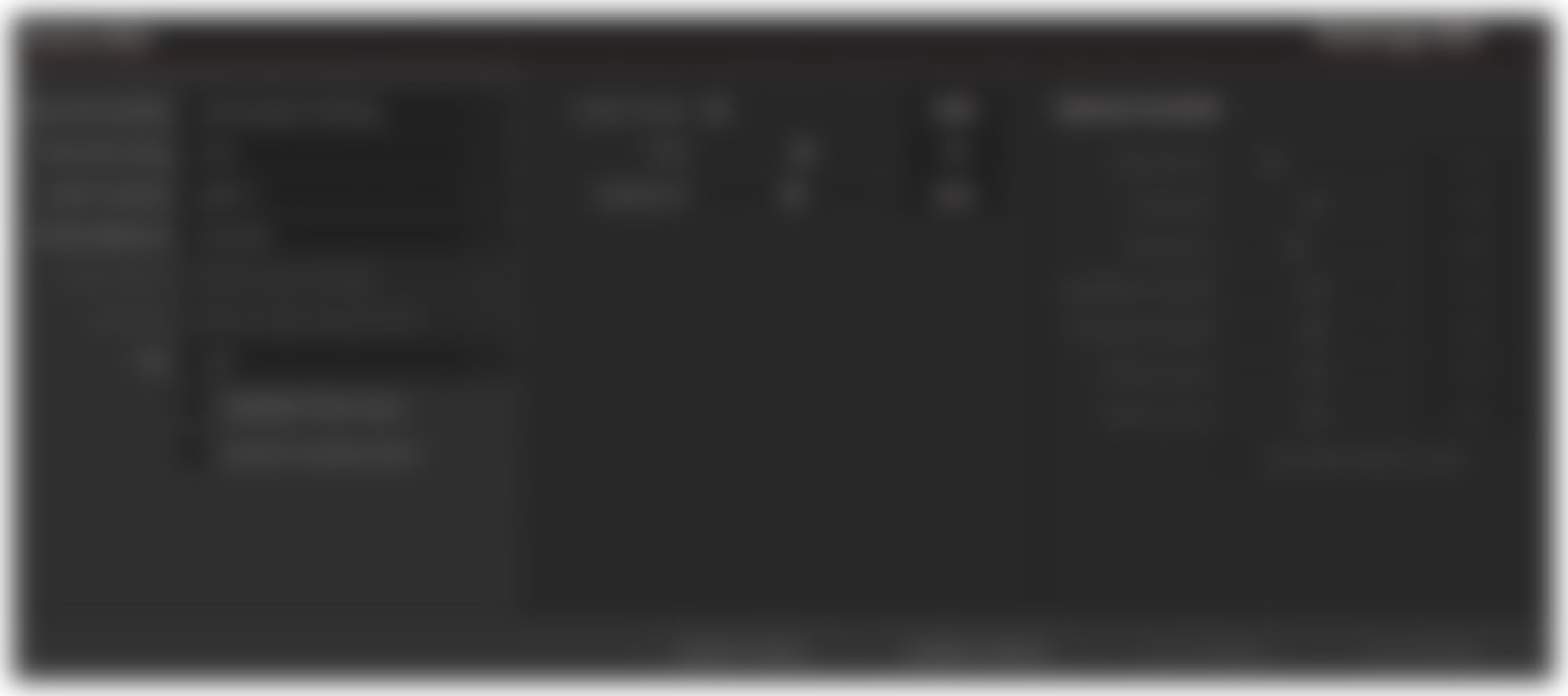
Adjusting Raw Settings at the Clip Level

When preparing raw media for grading, you will often want to address the individual debayering needs of clips. The Camera Raw palette in the color page allows you to make adjustments on a clip-by-clip basis.

1 Go to the color page.

- Select clip 01 (CR01).

- In the left palettes of the color page, open the Camera Raw palette.
- Set Decode Using to Clip. Doing so will disassociate it from the Project Settings and allow you to work on the clip independently.



The Camera Raw palette gives you access to various color, exposure, and gamma controls that will affect how the image is debayered on the timeline. In terms of the signal pipeline, debayering occurs before the video signal enters the source input of the Node Editor.

- Color Science refers to the version of the color science (or color profile) in the camera at the time the footage was captured. Leave Color Science set to Gen 4.
- Change the ISO to 200.

Although the image has already been captured, you can still adjust the sensor sensitivity to better accommodate your grade's starting point in the scene's luminance. ISO (along with most visual parameters) is ordinarily baked into digital footage after encoding, so this feature is unique to raw media workflows.

NOTE Dual Native ISO is a feature in some cameras that regulates the optimal dynamic range for a given exposure to improve image clarity and reduce noise. Depending on the ISO set during capture, you will see one of two native ISO ranges available in the Camera RAW palette.

- Change the ISO back to 400.

Another method of adjusting signal brightness is to use the Exposure parameter in the central column of the Camera Raw palette. Decimal values allow you to adjust exposure in smaller amounts than the whole values featured in the ISO dropdown.

However, looking at the waveform, it is clear that the overexposure in the sky cannot be resolved with just ISO or Exposure adjustments.

Blackmagic RAW performs partial debayering to reduce processing and speed up playback. This function is usually imperceptible in most cases, but it may result in the upper limits of the dynamic range appearing clipped in the waveform. To fully debayer the raw signal, you will activate Highlight Recovery.

- Click the Highlight Recovery checkbox under the ISO parameter.

Highlight Recovery will debayer highlight sensor data that is usually clipped in the standard decoding matrix. In raw clips with extreme waveform peaks, this option will often reveal additional information in the highlights.

Without Highlight Recovery

With Highlight Recovery

Temperature is another property of light that can be adjusted during the debayer stage.

- Drag the Color Temp slider right (6000) to warm up the image.
- To reset the Color Temp to the original setting used during filming, click the White Balance dropdown menu on the left and choose As Shot.

When working on a raw timeline, you will often want to reuse the Camera Raw controls across multiple clips. Two buttons at the bottom of the Camera Raw palette allow you to copy the palette data: Use Settings and Use Changes.

- **Use Settings** will apply all the Camera Raw settings from a selected clip to all highlighted clips on the timeline. This option is best used when working with media from the same source and with similar exposures.
- **Use Changes** will ripple only the altered parameters, preserving the selected clips' individual settings. This is ideal when working with visually diverse media that must retain its unique ISO and Color Temp settings.

[illegible] With clip 01 still selected, Shift-click clip 04 to highlight all the clips in the timeline.

[illegible] Click Use Changes in the Camera Raw palette. Because the only available parameters in clips 2–4 are the decode settings, all three clips switch from Project to Clip decoding while keeping all other clip settings unchanged.

TIP When saving and applying stills to raw clips, Camera Raw settings are included in the grade transfer. To prevent Camera Raw data from being overwritten during still application, right-click in the gallery and choose Copy Grade: Preserve Camera Raw settings.

[illegible] Select clip 02 (C006).

[illegible] To better prepare this clip for primary grading, raise the ISO (1250) so that the subject's faces land in the middle gray region of the waveform.

[illegible] Select clip 03 (C007).

Reviewing the scopes tells you that a substantial amount of highlight data is clustered at the top of the waveform graph. The overall scene exposure is satisfactory, so you will address that highlight region when grading. Leave the ISO at 400.

[illegible] To ensure that you can retrieve the visual data outside the window, select Highlight Recovery.

- Select clip 04 BRAW.

  This clip features a dark environment with unique lighting conditions. Although it might be tempting to address the shadows using the Camera Raw controls, dragging the Exposure value quickly reveals that it is not possible to do so without severely distorting the image. This clip is already at its ideal starting point, and you will further optimize it using the primary grading tools. Leave the ISO at 3200.

  With the raw clips successfully set up, you can proceed to grading in the Node Editor as usual.

NOTE The Color Space and Gamma parameters in the Camera Raw palette are disabled when working in a color managed project. This allows for consistent color output when changing deliverable formats in the Project Settings.

If you want to assign unique input color spaces to your raw clips and adjust the Gamma Controls to the right of the Camera Raw palette, you will need to disable project color management and instead perform node-based color management or work in a display-referred environment with no color management at all.

The Camera Raw palette is best used to address raw media's unique ISO and exposure needs prior to grading. It is highly advisable to avoid balancing, adjusting contrast, or creating looks at this stage because the Camera Raw palette leaves no evidence of such changes in the Node Editor. The standard grading tools in the color page impact raw media just as effectively and are far easier to keep track of in the node tree, which is important for minimizing destructive grading.

Grading High Dynamic Range Media

One of the unique challenges of grading high dynamic range (HDR) footage is targeting the wide tonal latitude of the available data. In a previous lesson, an overexposed sky was selected using secondary grading methods to make an isolated luminance adjustment. Such targeted tonal adjustments can be more frequent when grading HDR and ordinarily require extensive secondary grading to achieve a clean look.

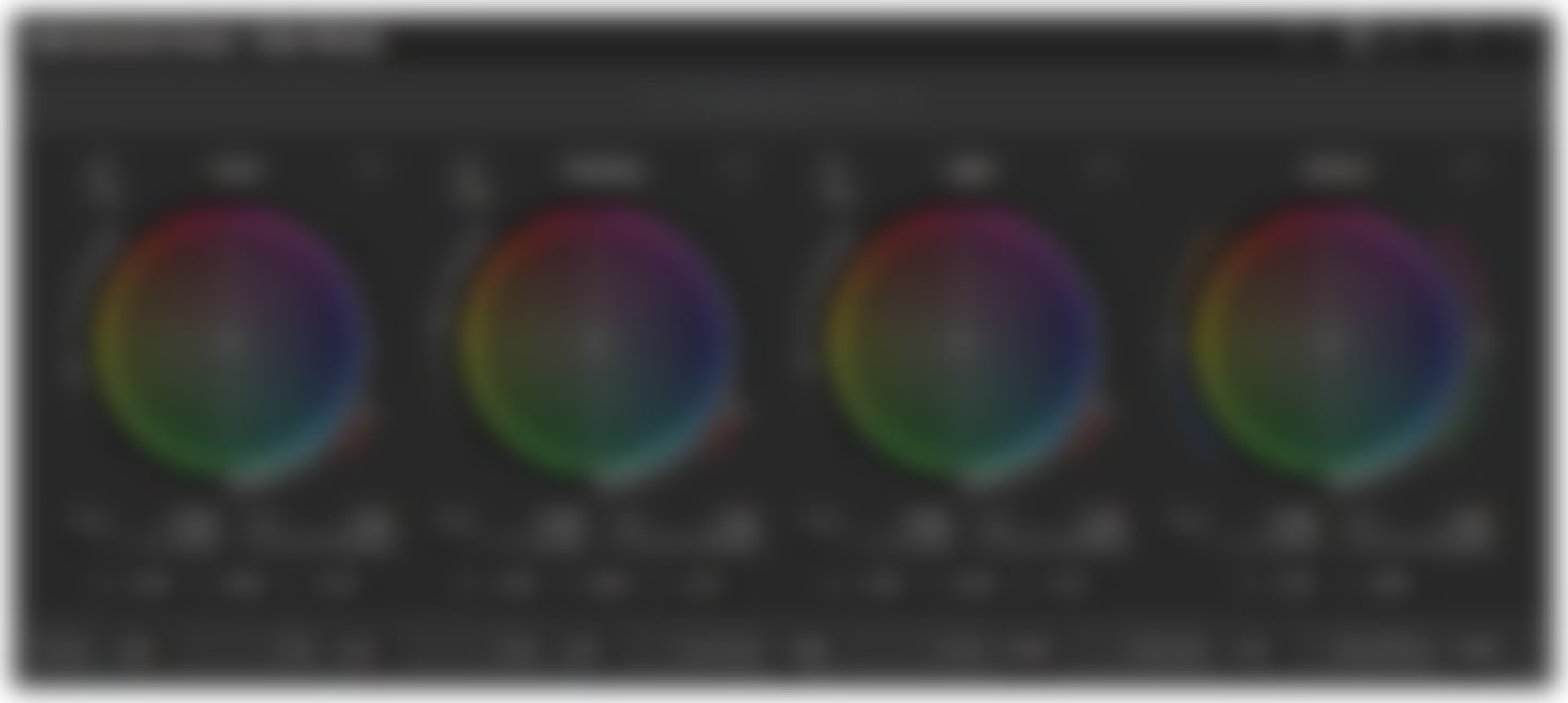
The High Dynamic Range (HDR) palette is a primary grading tool featuring color wheels mapped to customizable tonal ranges that can be used to grade the entire dynamic range of a raw image within a single interface.

Targeting Individual Tonal Ranges

As established, a major benefit of the HDR palette is its advanced tonal range control. Instead of relying on just three wheels to determine the placement of the shadows, midtones, and highlights, you can construct dynamic looks by adjusting each tonal step of the image independently. The gentle rolloff between the tonal ranges ensures that grades appear smooth and natural.

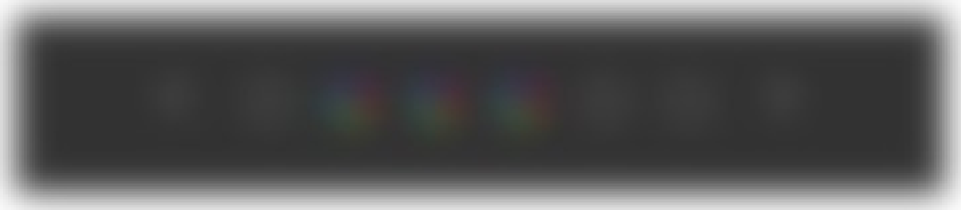
In this lesson, you will color grade a raw clip to gain an understanding of the HDR palette's unique global and tonal range parameters.

1. Select clip 01 ([illegible]).
2. Label node 01 **HDR balance**.
3. In the left palettes, open the High Dynamic Range (HDR) palette.



At first glance, the palette resembles the Primaries color wheels. In fact, much of the operation remains the same – the control point in the center of the wheels adds color to a tonal range, while controls underneath determine exposure and saturation.

One of the first major differences is the number of wheels you control. A row of buttons under the palette header allows you to navigate between the different tonal zone wheels. This action is called banking.

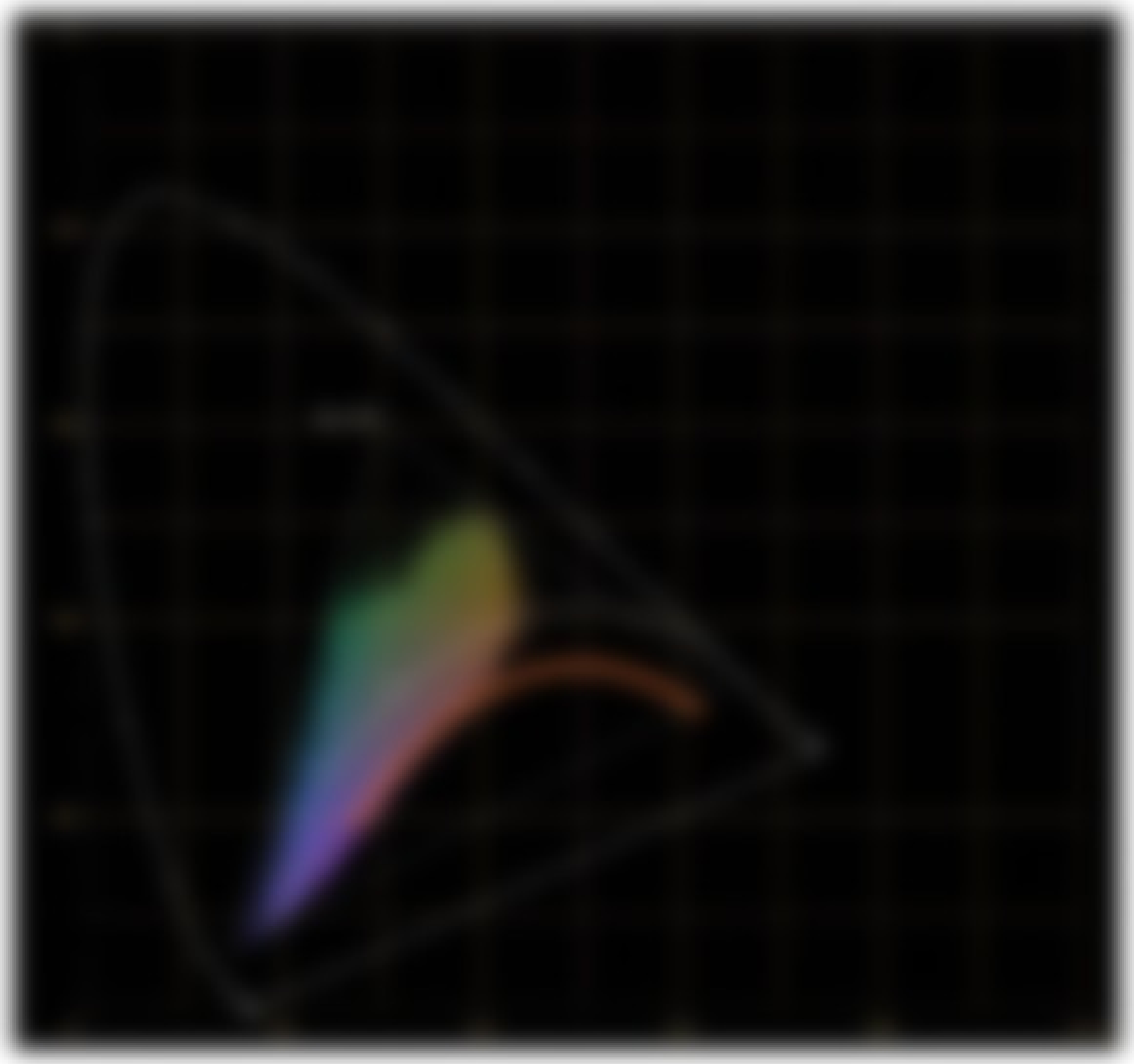


You can click the arrows on either side to bank wheels or click the wheel icons to jump one or more wheels at a time.

Another major difference is in the way the global wheel impacts the image. Whereas the Primaries offset wheel affects the image uniformly, the global wheel pinches the black and white points of the signal, rolling the shadows and highlights in order to compress, but never clip, either extreme of the waveform. As a result, adjustments to the exposure and saturation of a video signal have less impact in the shadows and highlights, which produces more natural-looking changes.

TIP The High Dynamic Range palette is designed for optimal performance in Resolve Color Management or ACES managed projects. When RCM or ACES is enabled, the HDR palette is permanently "color space aware," meaning it automatically maps its own operational color space to the source image, producing perceptually uniform results while maintaining careful control of image saturation. Despite the name, you can use the HDR palette with both SDR and HDR media, whether or not you enable color management.

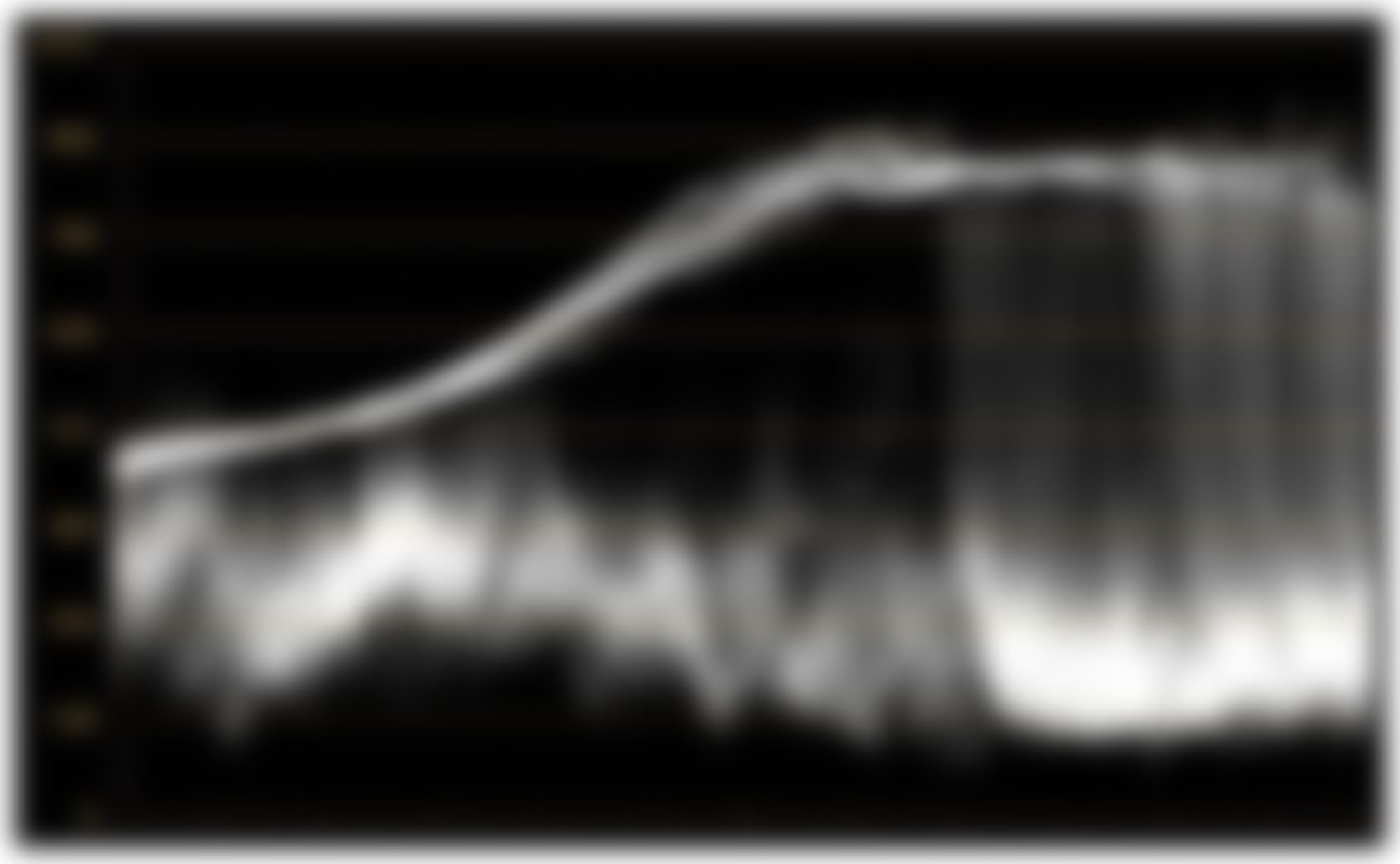
The Temp and Tint sliders on either side of the global color wheel are also uniquely mapped. They are designed to travel the image hues across the Planckian locus, which represents the natural path of light temperature in the CIE 1931 chromaticity graph. This results in more natural temperature changes in the image.



Although you will be familiar with the adjustment controls across the bottom of the palette, some controls also exhibit behaviors unique to the HDR palette:

- **Temp** and **Tint** are numeric representations of the global wheel sliders and can be used when you need more accuracy or to reset the values.
- **Contrast** and **Pivot** keep perceptually constant saturation when adjusted. This is advantageous for HDR grading, where high contrast can lead to over-saturation in the highlights.
- **Black Offset** determines the minimum value of the video signal (i.e., the black point) while gently compressing the data above it.

Begin the grading process by reviewing the waveform scope.

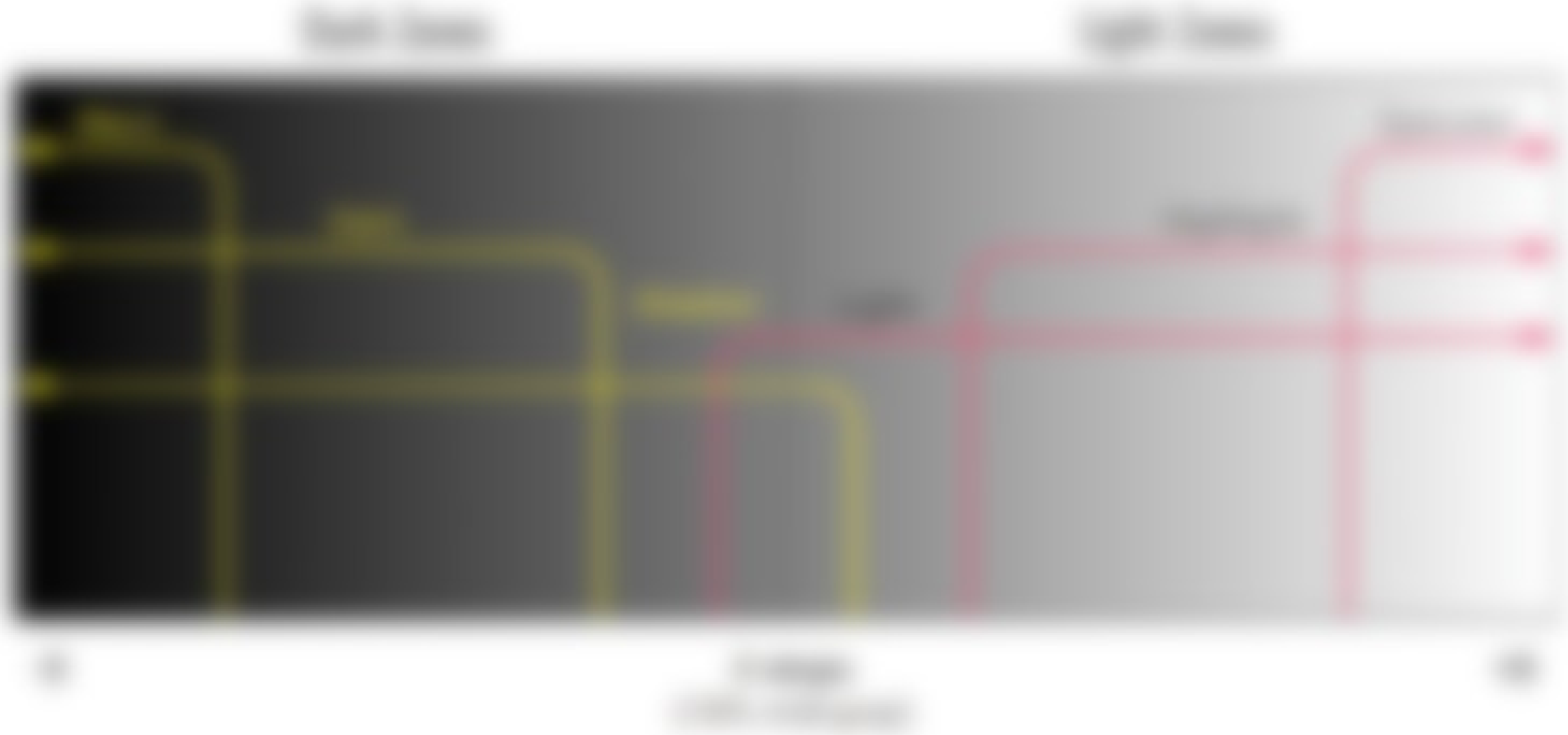


Overall, the waveform looks good; there is no obvious clipping in the highlights or shadows. However, much of the mass representing the foreground appears bunched near the bottom of the graph, resulting in flat, dark midtones. Also, the top of the mass appears compressed along a narrow range, limiting the detail you can see in the clouds. You will address both of these issues using the HDR palette.

The global wheel is a good starting point for establishing the overall exposure of a clip. Due to the even distribution of the waveform, you can leave the Global Exp (EV) parameter as is.

To establish the overall image saturation, drag Sat to 1.40 under the global wheel. Note that due to the unique global luminance mapping, saturation is not increased as aggressively in the shadows or in the clouds.

With the global values set, you can proceed to the individual tonal zones. The six default zone wheels are divided into two categories: dark zones and light zones.



The preceding graph represents the order of the default zones in the palette and their respective tonal ranges. The closer to the edges you travel, the more dedicated the tonal zones become.

The Shadow and Light wheels have the broadest impact and overlap each other by a factor of two stops. They each have narrower tonal ranges within them that allow you to create contrast in the dark and light zones.

You will address the dark zones first.

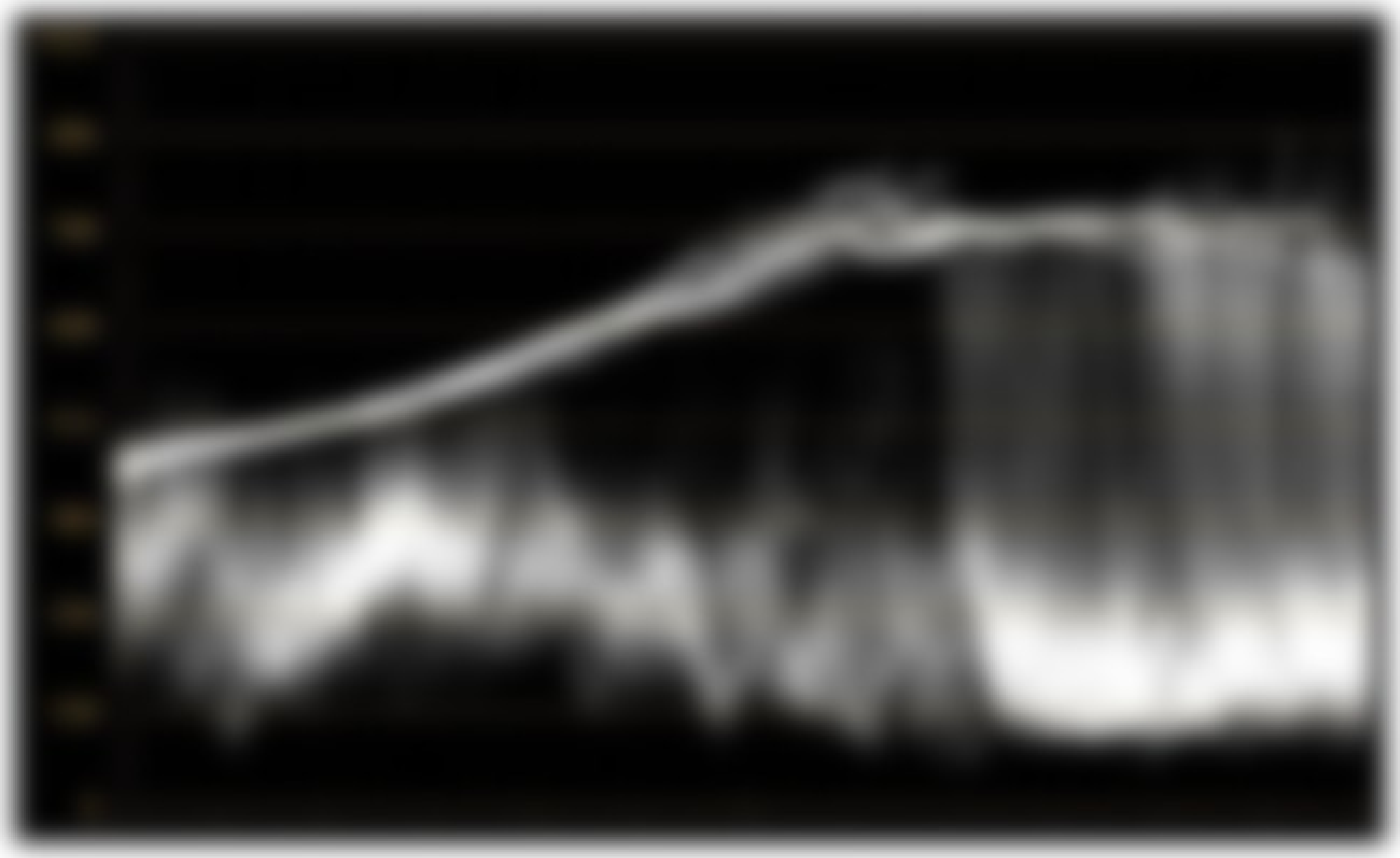
- Bank the HDR palette wheels until you see the three dark tonal range color wheels: Black, Dark, and Shadow.
- Drag the Dark wheel Exp (-0.60) to accentuate the shadows in the foreground bushes. This range is narrow enough not to impact most of the foreground midtones.
- To enhance the foreground saturation, increase Sat (1.20) in the wider Shadow zone.

Next, you will work on the light zones to reveal the cloud details in the sky.

- Bank the HDR palette wheels until you see the three light zone color wheels: Light, Highlight, and Specular.

To create room for expansion in the highlights, you must lower the top section of the waveform.

- Drag the Highlight Exp [illegible] left until the top of the waveform sits just under the third horizontal line from the top.



You now have room to expand the very top of the highlights.

- Drag the Specular Exp [illegible] right to lift the top of the waveform [illegible], revealing the cloud details in the [illegible].

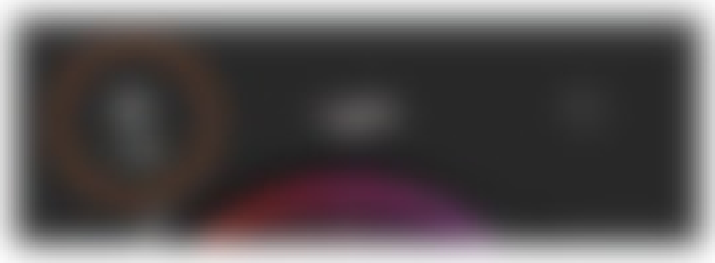
  The default tonal range graph seen in step [illegible] shows that the Highlight and Specular zones both overlap the broad Light tonal range. This means you can use the Light zone to make broader exposure changes while maintaining the established contrast in the narrower zones.

- Drag the Light Exp [illegible] right to brighten the sky while keeping the cloud detail intact.
- Drag the Light color wheel control point slightly toward blue to add more color to the sky.

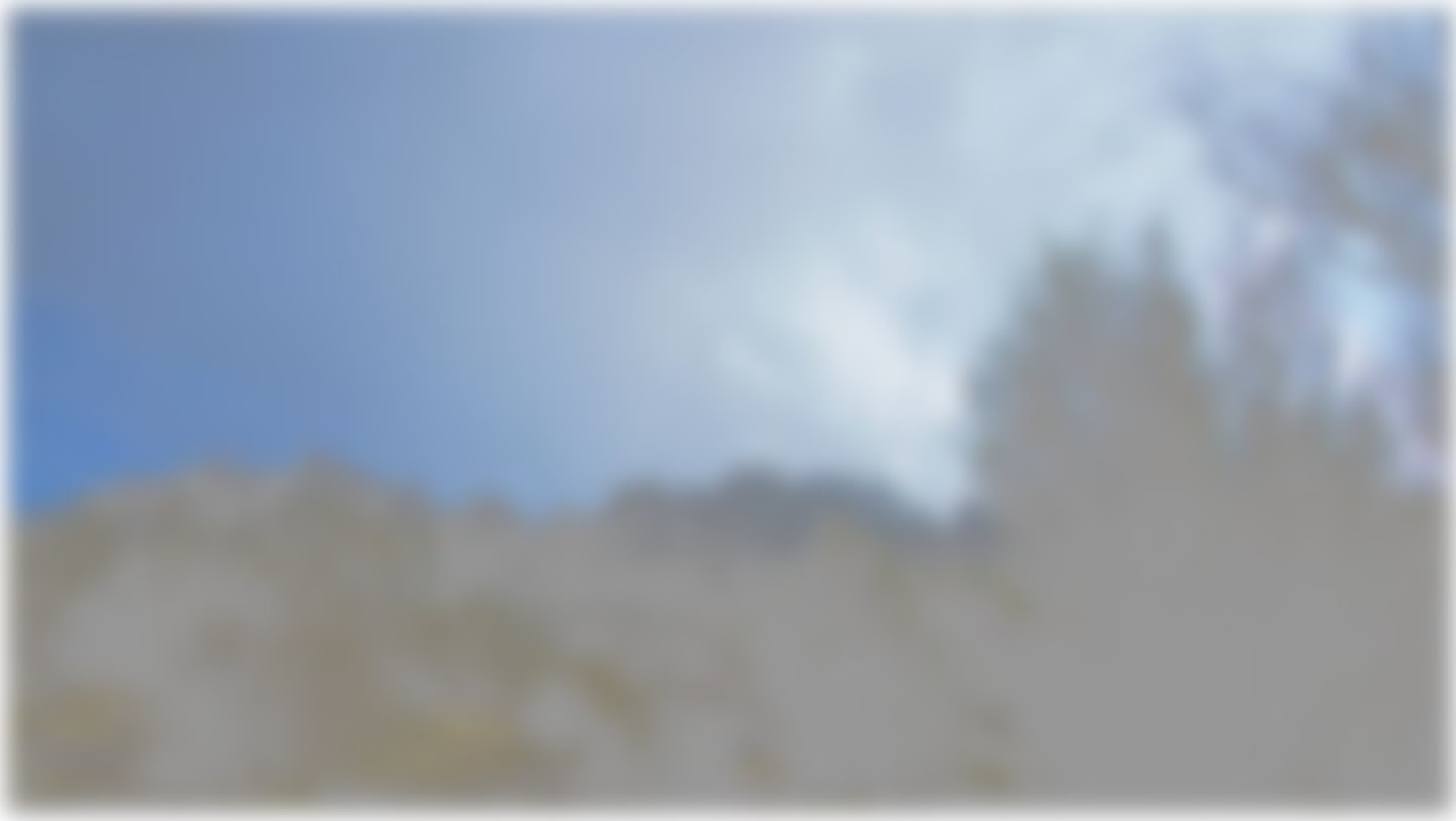
TIP In the HDR palette options menu, you can change the numeric representation of the control point position under the X/Y and Sat parameters. Display X and Y allows you to adjust the control point horizontally and vertically. Display Angle and Strength will move the control point in a circular motion to determine hue and on a radius to determine saturation. These controls can be useful when making very fine adjustments using the numeric fields instead of the color wheel control point.

Several options allow you to review and modify how the tonal zones affect the image.

- Click and hold the symbol to the left of the Light zone name.



This allows you to preview which areas of the image are impacted and determine whether the zone needs adjustment.



In this case, the Light zone affects too much of the foreground and should be reduced.

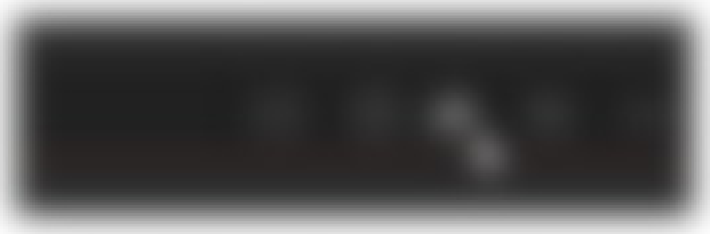
- For a permanent view of the tonal zone selection, click the Highlight button in the upper left of the viewer. Highlight mode will display the selection of the tonal zone you are working on, leaving you free to make range and falloff adjustments.

NOTE When using the viewer's Highlight mode with other tools, such as the qualifier, Power Windows, or Color Warper, ensure that the HDR palette is not active in the left palettes to avoid seeing a tonal zone selection instead.

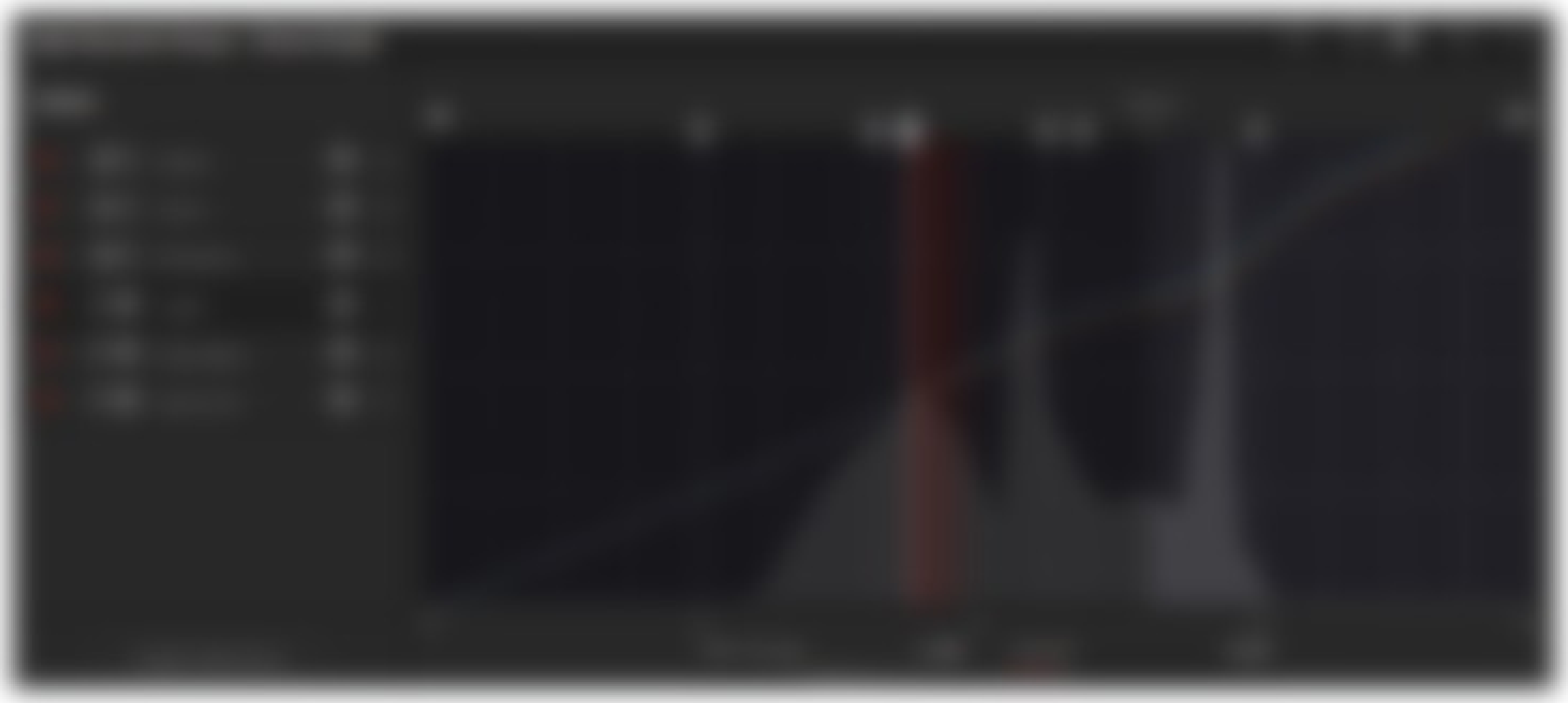
Every zone color wheel is surrounded by two sliders: Min/Max Range and Falloff. The Min/Max Range slider determines the zone limit, while the Falloff gently feathers the selection to avoid harsh edges when grading.

Let's review the HDR Zone panel to better understand how the tonal zones were distributed across this image.

- In the HDR palette header, click the Zones Graph button.



The Zones Graph is an additional panel in the HDR palette that allows you to further customize the tonal zones.

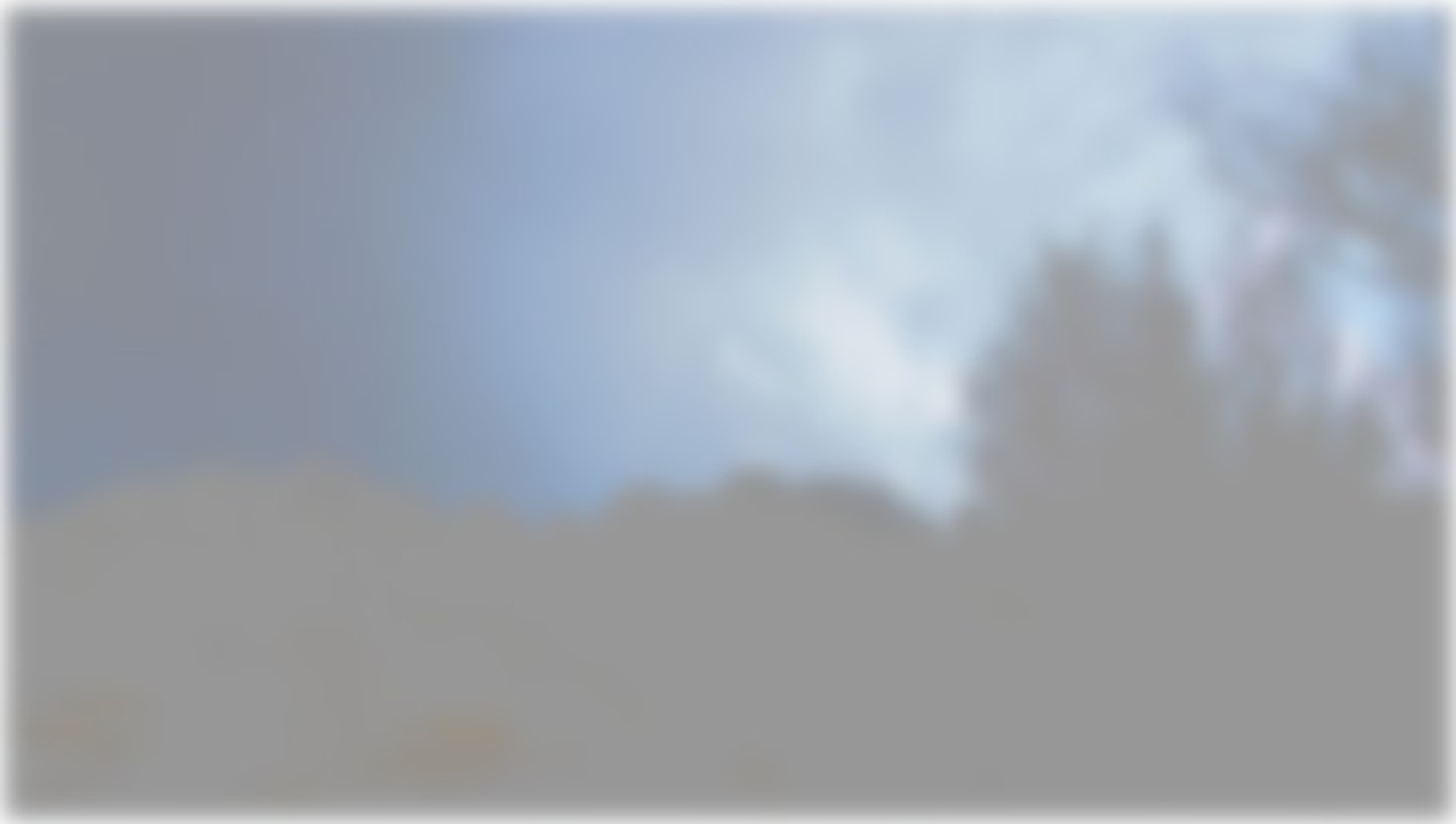


On the left is a sidebar featuring the names of the zones, which you can click to highlight their range indicator on the graph. Drag the indicator by the handle to change the minimum or maximum range of a zone. The range will impact the entire section in the direction of the handle arrow, with a falloff indicated by the soft red transition. You can also use the sliders below to adjust and reset the range and falloff values. These parameters are mapped to the sliders on either side of the zone color wheels in the Controls panel.

Projected on the graph behind the indicators is a histogram of the frame in the viewer. This histogram can help determine where range indicators should be placed and how soft the falloff should be. Note that if a histogram signal ends before the start of a range indicator, that zone will have no impact on the image when adjusted in the HDR palette. In this instance, there's nothing to the left of the Black zone, meaning that changes to the Black zone color wheel, exposure, and saturation will not impact the image.

TIP If you cannot see a histogram in the Zones Graph, adjust one of the HDR palette parameters or move the playhead slightly in the viewer. This will force the histogram data to cache.

- In the Zones Graph, drag the Light range indicator to [illegible]. The selection in the viewer contracts, resulting in better separation of the branches and mountaintops from the sky.



This adjustment may feel similar to using the Low and High Range parameters in the log wheels palette. The range slider allows you to refine the tonal range that a given wheel impacts.

- Disable highlight mode in the viewer.

Before

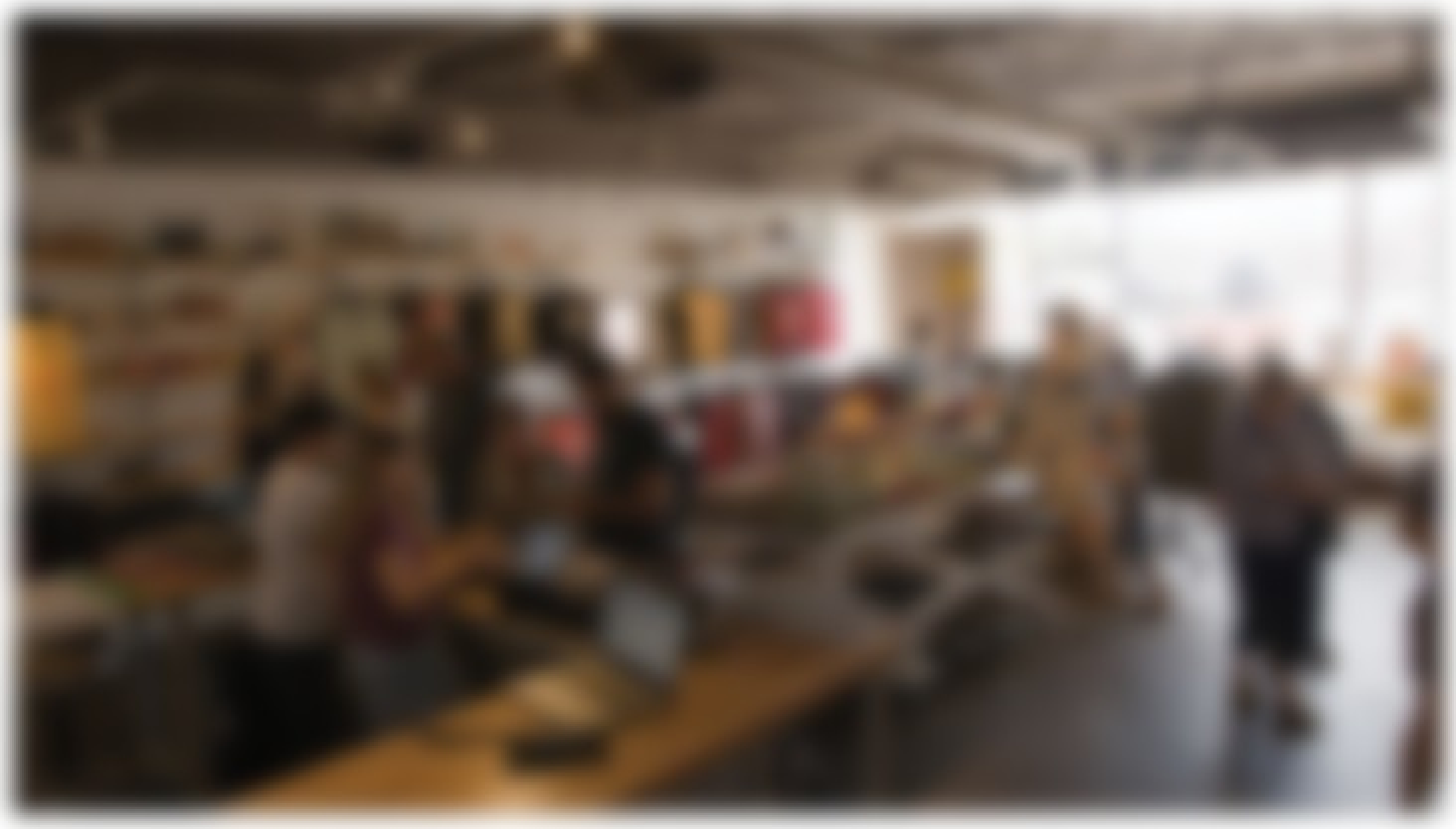
After

TIP From left to right, the HDR palette Zones Graph sidebar features controls that allow you to disable a particular zone's impact, switch zones between light and dark, hide the zone indicator in the graph, or delete a zone (for custom zones only).

Correcting Scenes with a Wide Dynamic Range

Scenes captured with HDR cameras sometimes feature dramatic shifts in exposure in different areas of the same frame. Common examples include windows in interior scenes or when shooting someone against a bright sky outdoors. With standard correction tools you would need to use a combination of secondary grading techniques for optimal results. The HDR grading palette allows you to address a range of exposure levels using just one primary tool.

- In the HDR palette header, return to the Controls panel (color wheels).
- Select clip 33 ([illegible]).

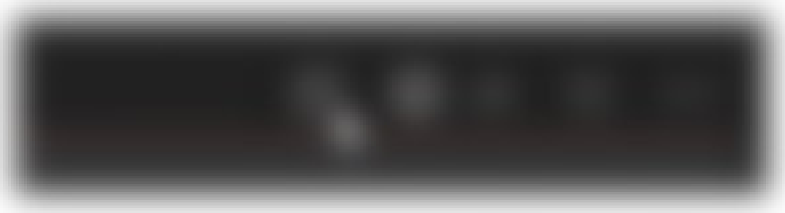


The scene is split between two different lighting environments: the underlit interior of the store and the overexposed windows.

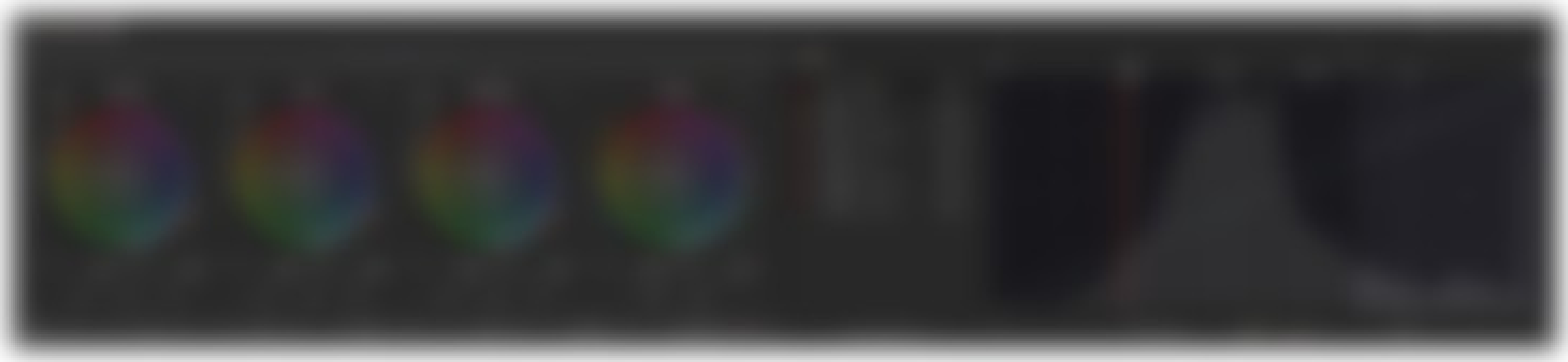
- Label node 01 **HDR balance**.

First, you will review how the HDR palette tonal ranges are distributed across the image.

- To open the Zones Graph panel without hiding the HDR color wheels, click the Expand button in the HDR palette header.



This action opens the Zones Graph in the central palettes of the color page, allowing you to grade and modify the tonal ranges simultaneously.



Overall, the tonal range layout and distribution appear appropriate for the current histogram, which is evenly spread through the graph. Because the window and the light spill in the room compose a smaller portion of the image than the interior, you will likely need to adjust the Light range at some point. However, it's too early to determine how the Light zone should be defined, so you'll return to it later.

> **TIP** You can create a custom zone in the HDR palette by clicking Create New Zone at the bottom of the Zones Graph sidebar. Like the preset zones, a custom zone can be defined as either light or dark and will appear as a color wheel with unique range and falloff parameters in the Controls panel.

Since you will not be focusing on the global wheel as much for this clip, you have the option of banking it together with the other wheels so that the HDR palette can represent four unique tonal zones at once.

- Click the options menu and select Bank Global with Color Wheels. If needed, you can still access the global wheel by banking to the rightmost wheel.

First, you will prioritize balancing the current interior, which is where the audience will predominantly be looking.

- Increase the Shadow Exp 1.00 to brighten the shop interior.

7 Increase the Shadow Sat (1.10) to make the colors in the shop more vibrant.

8 Increase the Shadow Range (+0.80) to spread the adjustment throughout the room.

9 Increase the Shadow Falloff (0.30) to soften the spread, returning shadows to the walls.

10 Increase the Dark Exp (0.10) to lighten the darker elements in the room.

Next, you will use the light zones to fix the overexposed window.

11 Decrease the Highlight Exp (-0.75) until the waveform's flat top sits just under the top of the waveform graph.

12 Raise the Light Range (+0.20) to limit the adjustment to the window area.

13 Decrease the Specular Exp (-1.00) to add contrast to the darker elements outside the window.

> **TIP** You can save a custom zone layout by opening the HDR palette options menu and selecting Save As New Preset. Zone presets can be helpful if you regularly process footage from the same camera with similar lighting compositions (such as interviews or set shoots).

Finally, you will address the scene balance.

14 Reduce the Temp (-2000) and Tint (-7.50) to balance the color cast on the walls.

Before

After

When outputting to an SDR standard, grading raw media is almost no different from grading non-raw media. The wide dynamic range demands increased attention and handling, but the creative primary and secondary workflows remain mostly the same.

When outputting to an HDR standard, special care must be given to the waveform distribution. Although there is some variety in industry approaches and individual colorist preferences, it is generally considered a good idea not to overwhelm your audience with superbright elements. Aim to place the majority of midtone environments in the 100 nit range, allowing for some fluctuation to emphasize shadows and upper midtone detail. Reserve the areas above the 100 nit line for light sources and surfaces hit by direct sunlight.

Mapping the HDR Palette to Color Panels

The HDR palette is designed to be mapped to the DaVinci Resolve Advanced and Mini Panels, even when incorporating custom zones and presets.

Advanced Panel: Press SHIFT + AUTO COLOR. All HDR palette controls will be mapped to the center panel soft buttons and knobs, while the zones will be mapped to the trackballs and rings. Press the < and > soft keys to navigate all available zones.

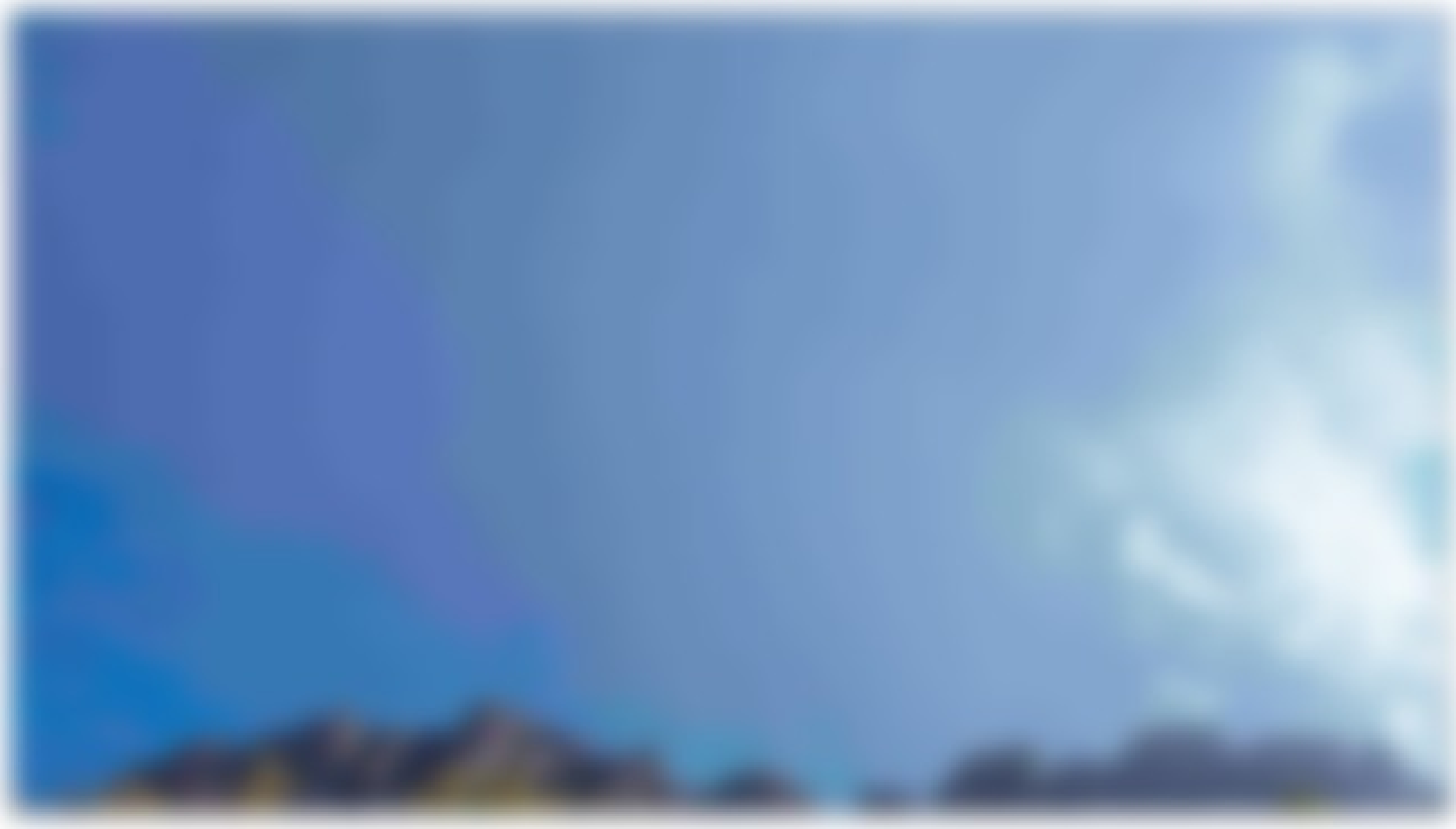
Mini Panel: Press USER and then press the HDR soft key above the left display. All HDR palette controls will be mapped to the soft keys and knobs, while the zones will be mapped to the trackballs and rings. Press the PREV ZONE and NEXT ZONE soft keys to navigate all available zones.

Setting Up a Render Cache for Raw Media Projects

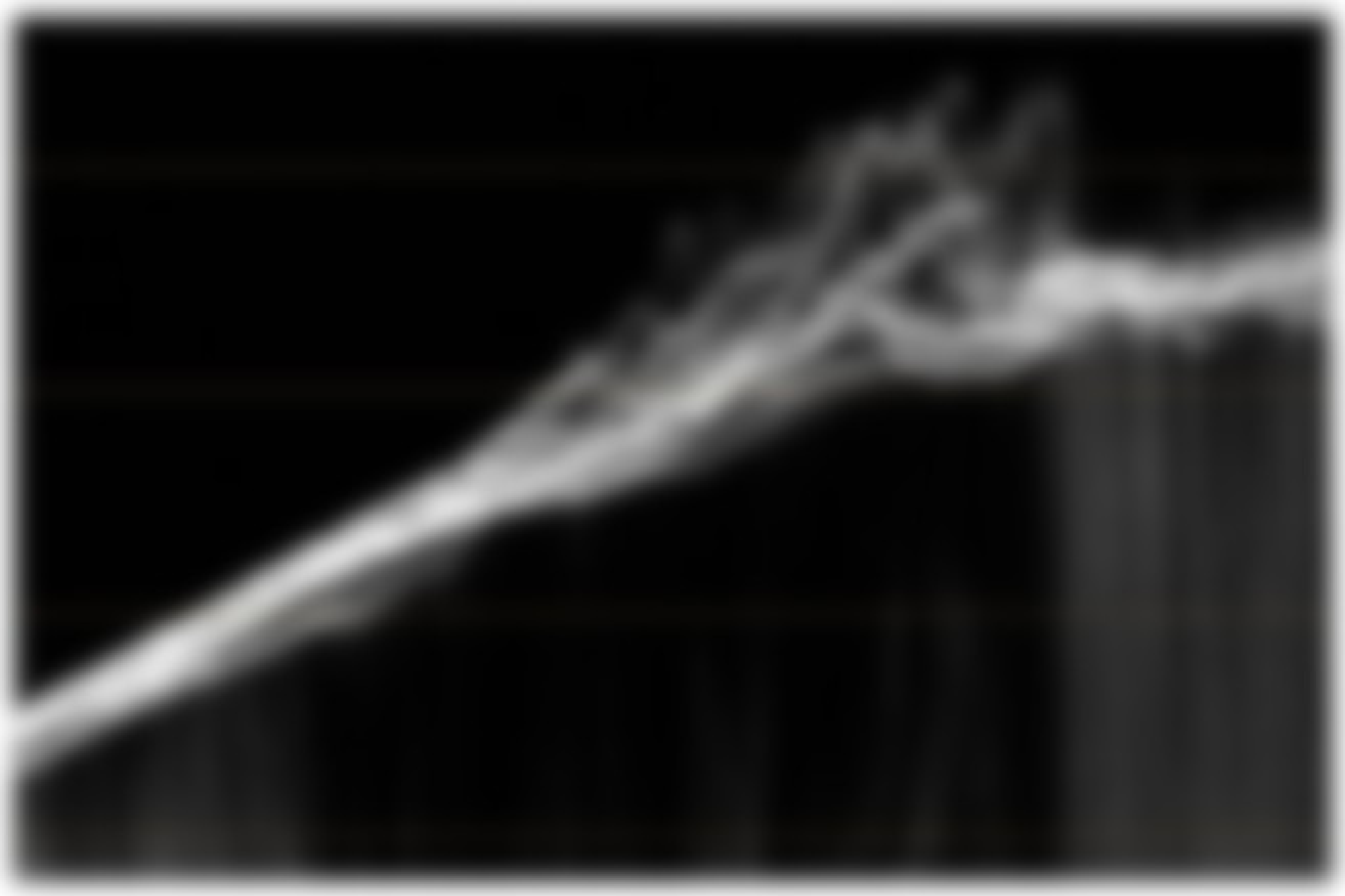
In Lesson 8, you set up your project render cache to a full quantization (444 or 4444) 12-bit depth codec, but the exercise did not detail the effect this had on the grading process. In this exercise, you will change the render cache quality to observe its impact on the image in the viewer and gain an understanding of why the render cache format matters when working with raw video.

- Select clip 01 (CDNG).
- Open Project Settings and click the Master Settings tab.
- Scroll down to the Optimized Media and Render Cache section and set the "Render cache format" to a lower quality codec such as ProRes 422 Proxy (macOS) or DNxHR LB (Windows).
- Click Save to close the Project Settings.
- If caching is not enabled in your project, choose Playback > Render Cache > Smart. Wait until clip 01 is re-cached.
- If you do not see a change in the viewer, drag the playhead slightly to refresh the active frame in the viewer.

  Caching the raw video in a lower quality format produces a posterized image with pronounced banding in the sky.



Instead of a smooth blue gradient, the sky now appears to be made up of blue, purple and gray stripes. This is the result of using a render cache format that can only represent a limited amount of luminance and color values. The impact is so severe that it is even visible in the waveform.



In addition to being a poor representation of your grade, a low quality render cache format can also interfere with your ability to accurately make qualifier selections or view the results of analytical tools, such as noise reduction or the Magic Mask. If you use a slightly higher quality render cache format, you might experience reduced artifacting in the viewer, but the image grading potential will still be compromised.

7 Open Project Settings and click the Master settings tab.

8 Set the Render cache format to one of the full quantization 444 or 4444 or HDR formats.

9 Click Save to close the Project Settings.

When setting a render cache format, remember that it affects only what you see in the viewer. If you were to render a clip from the deliver page while caching in a low quality codec, the exported image would not have banded gradients or compression artifacts. This is why it is advisable to use high quality render caching when grading HDR and high bit depth footage. If you don't, your final project could end up looking different from what you saw in the viewer.

The Render Settings of the deliver page include an option to "Use render cached images" in the final deliverable. This option saves you time when exporting a project. Since 12-bit depth codecs (such as DNxHR 444 and ProRes 4444) are HDR compliant, you can use these render cached materials to generate cinema and streaming deliverables.

Self-Guided Exercises

Complete the following self-guided exercises in the Blackmagic RAW Timeline to get more practice using the HDR palette.

Clip 02 (C002) Use the HDR palette to produce a well-lit image with warm, saturated skin tones. Increase the color separation by saturating the orange clouds against the blue sky.

Clip 04 (B004) Use the HDR palette to illuminate the cable car against the dark background. In a new node, make the car stand out by turning the interior a cool blue. Use a Power Window if necessary. Create a final node to denoise the clip and find its optimal placement in the node tree.

After completing these exercises, open Blackmagic RAW Project COMPLETED.drp and review Blackmagic RAW Timeline COMPLETED to compare your work with the "solved" timeline. If the media appears offline, click the red Relink Media button in the upper-left corner of the media pool and specify the location of the Project 03 Blackmagic RAW media on your workstation.

Lesson Review

1. When color managing raw media, where do you set the input camera format?
2. True or false? You can change the ISO and white balance of raw media at any time.
3. What does banking accomplish in the HDR palette?
4. Which tonal range is wider, Shadow or Highlight?
5. True or false? Caching should always be disabled when grading.

Answers

1. Trick question! DaVinci Resolve automatically detects the camera format of imported raw media, so there is no need to "set" it. To access the raw debayer parameters of a specific camera, open the Camera RAW project settings and select the RAW profile you wish to adjust.
2. True. Because of the unique photometric encoding of raw media, it's possible to adjust the ISO and white balance at any stage of the grading process.
3. Banking refers to navigating between the tonal zone wheels in the HDR palette.
4. In the default preset layout, the Shadow wheel has a wider tonal range than the Highlight. However, both zones can be modified as needed.
5. False. When using a lower-quality render cache format, you might want to disable it when reviewing your final grade before delivery, but enabling cache rendering during grading will help substantially with real-time playback. If using a higher-quality render cache format (10-bit depth with full quantization), it's acceptable to leave caching on at all times and even include the cached files in the final project render.

Lesson 10

Delivering Projects

When you're ready to export a project – whether at the end of a workflow, at an intermediate point, or when generating dailies – its render settings are configured in the deliver page of DaVinci Resolve.

In this lesson, you will review a project with clients, explore existing presets, output for digital cinema, and set up your own custom renders.

Time

This lesson takes approximately [illegible] hours to complete.

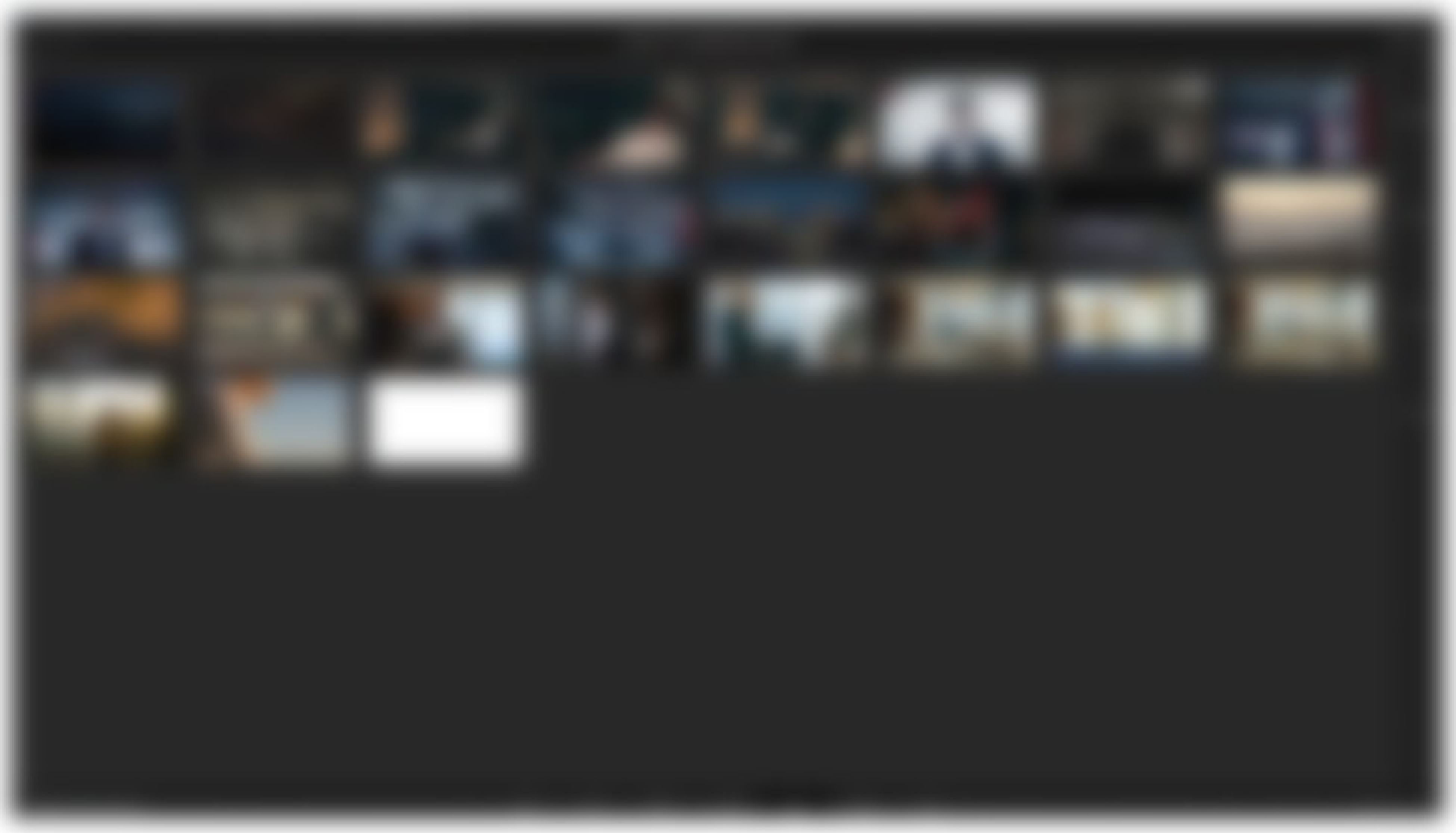
Goals

Using Lightbox to Check Timelines before Delivery [illegible]
Reviewing Projects with Clients [illegible]
Understanding the Render Workflow and Presets [illegible]
Creating Custom Renders [illegible]
Configuring a Timeline for Digital Cinema [illegible]
Exploring Advanced Render Settings [illegible]
Lesson Review [illegible]

Using Lighthouse to Check Timelines Before Delivery

The Lighthouse feature of the color page gives you an alternative, expanded representation of the timeline. It provides a general overview of clips in the edit rather than the default viewer-focused layout of the color page. It is particularly powerful when combined with filters and can be used to quickly assess the grade status of timeline clips.

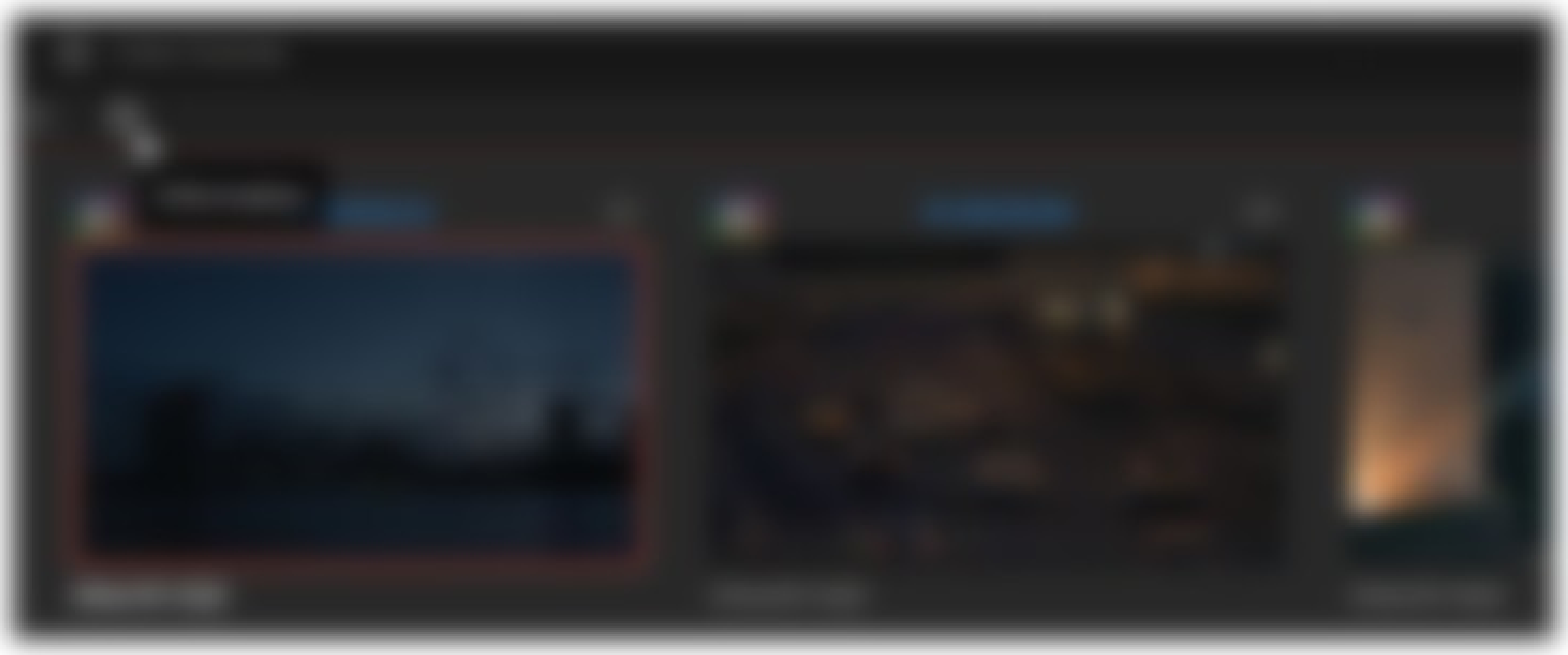
1. Launch DaVinci Resolve [illegible].
2. Import and open Project [illegible] - The Long Weekend Commercial COMPLETED.drp. If necessary, relink the media by clicking the red Relink Media button in the upper left corner of the media pool and specifying the location of the Project [illegible] media on your workstation.
3. Enable caching by choosing Playback > Render Cache > Smart.
4. In the Project Settings, set the Render cache format to one of the full quantization formats ([illegible] or [illegible]).
5. Enter the color page.
6. Use the dropdown menu at the top of the viewer to open Lesson [illegible] Timeline.
7. In the upper right of the color page, click the Lighthouse button.



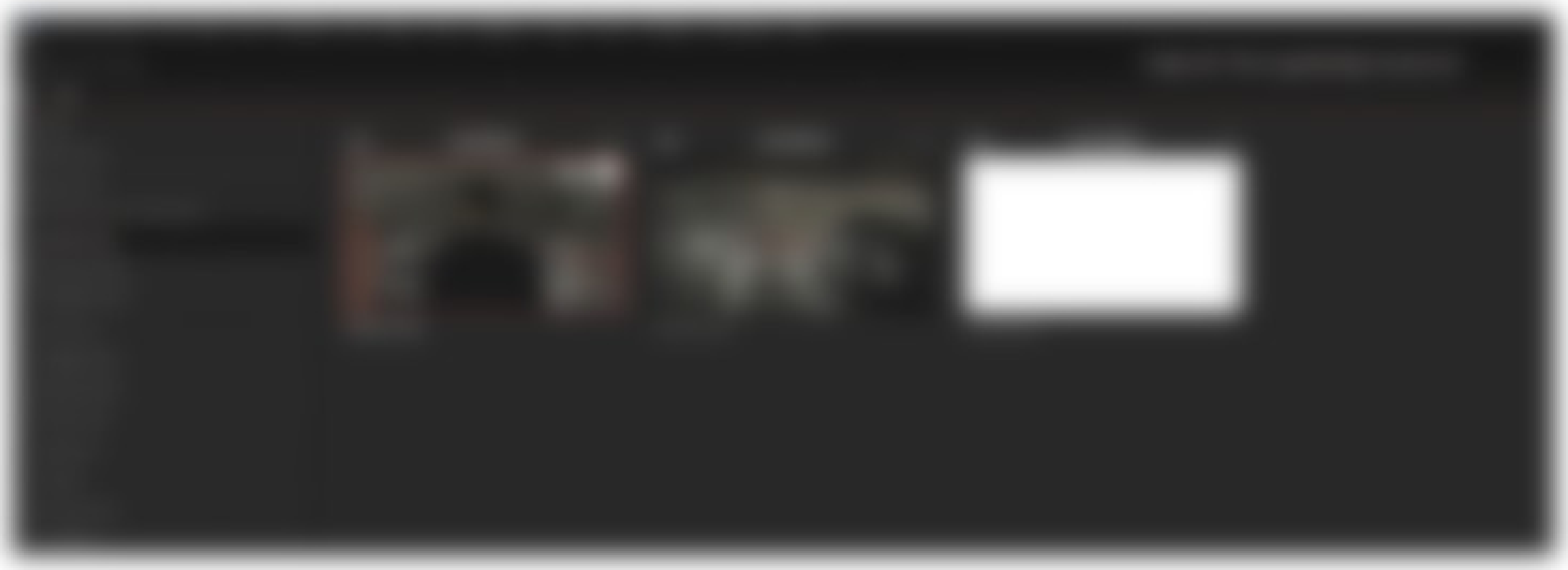
The Lightbox is a full-screen representation of your project timeline from left to right, top to bottom. A ruler to the right of the window indicates the timecode of the clips and turns into a scroll bar when a timeline has more clips than can be displayed in a single panel.

This expanded overview of the timeline's thumbnails can be helpful for colorists who find the Thumbnail timeline in the color page too restrictive. With a glance at the Lightbox, you can determine which clips are graded and which aren't.

- Click the Information button in the upper-left corner of the Lightbox panel to display clip numbers, timecodes, and video track numbers above the clip thumbnail and double-click to view a rotation of codecs, source names, and version information underneath.



- Next to the Information button, click the Clip Filter button to expand the filtering options.
- In the Clip Filter list, click Ungraded Clips.

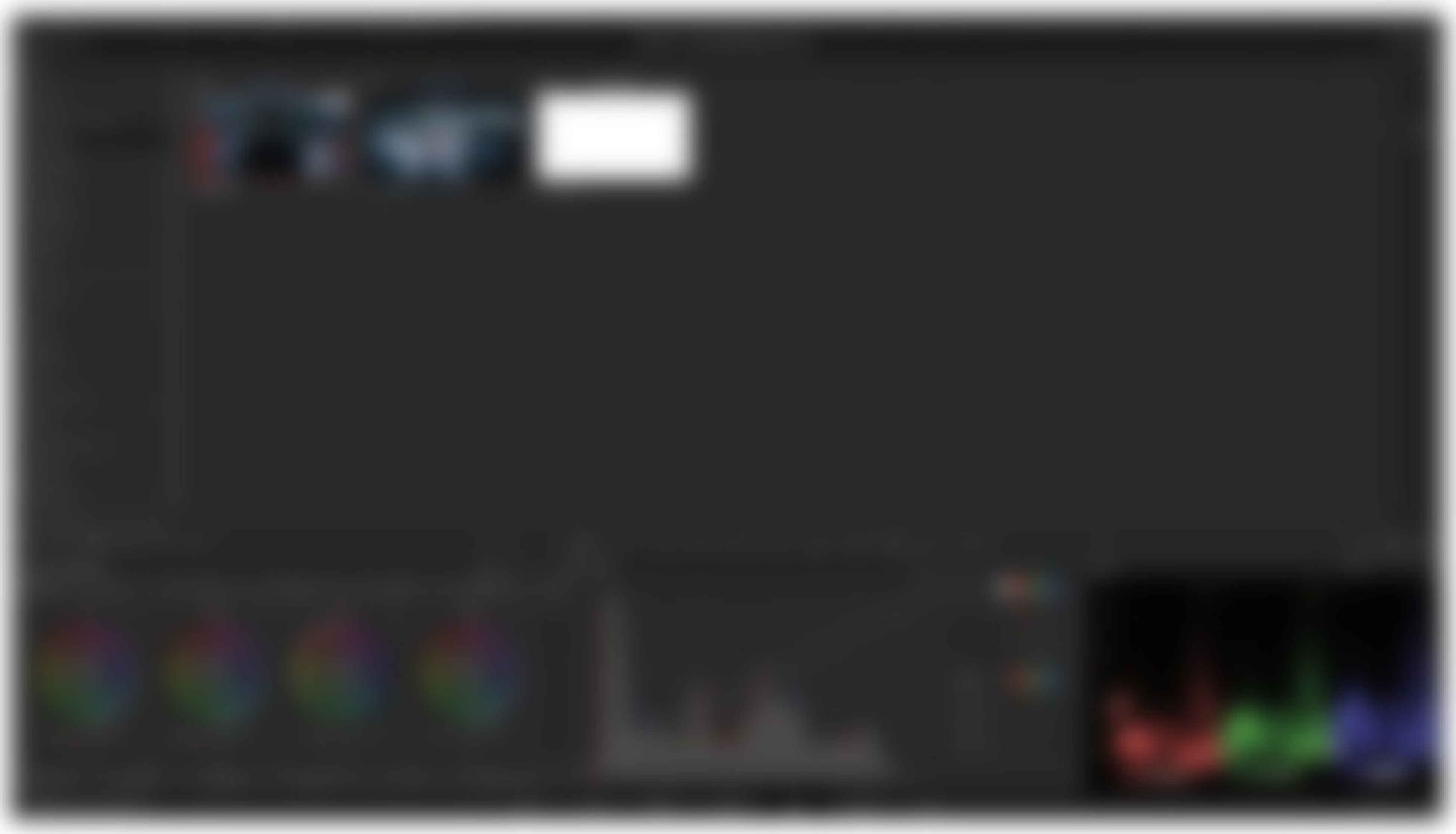


The Lightbox panel is reduced to just three clips. The first two clips clearly belong in the Garage group but must have been overlooked during grading.

- Select both clips and choose Groups > Garage > Assign to Group.

  Most of the grading in the Garage group was carried out in the post-clip stage, so the two clips will immediately adopt the look of the rest of the group. They will remain in the Lightbox panel until the next time you change the filter, after which their new status as graded clips will be acknowledged.

- In the upper left of the page, click the Color Controls button to open the grading palettes in the lower half of the screen.



  If you're working with an external monitor, you will see a full screen output of the selected clip in the Lightbox. This allows you to continue grading and balancing your media in Lightbox mode.

- With clip 01 still selected, in the Primaries log wheels, raise the Shadow master wheel to lighten the dark sun and hair.

- Select clip 23.

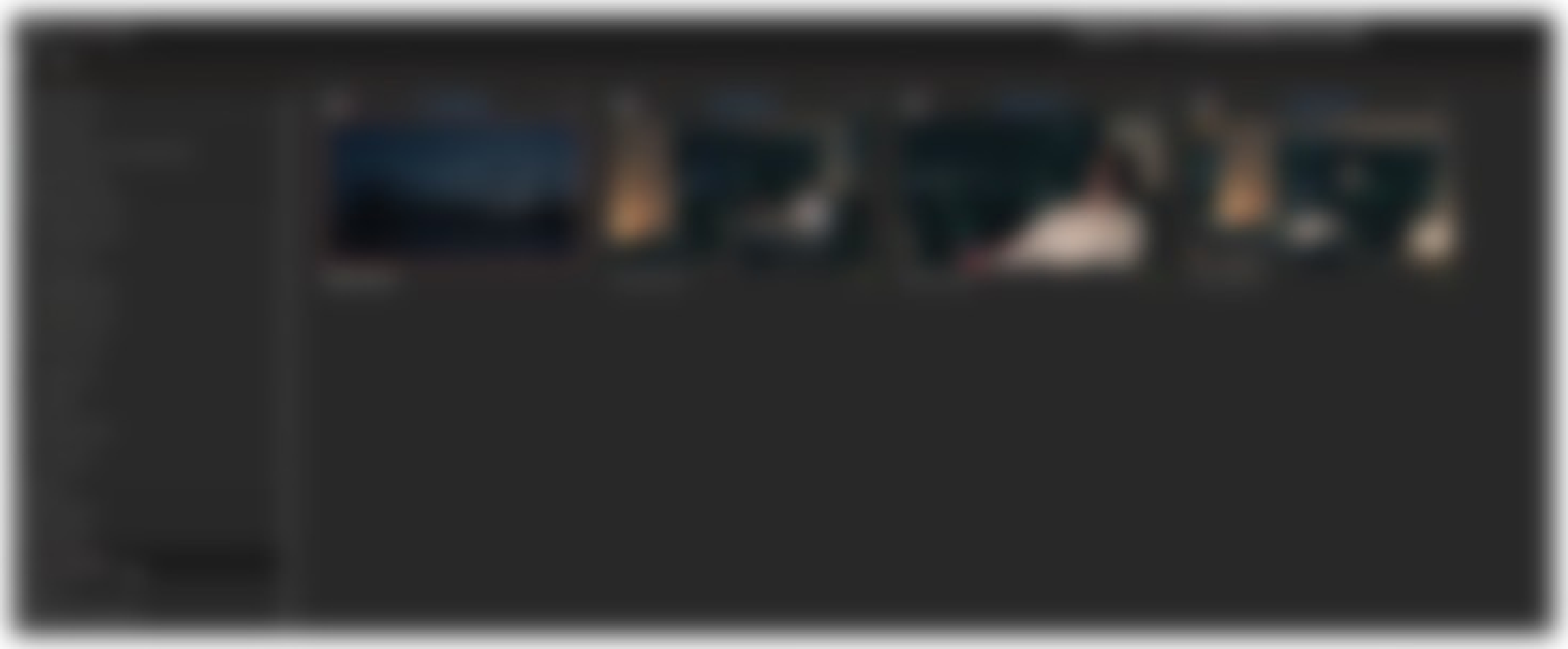
  The last filtered clip is the solid white matte at the end of the sequence, which doesn't require grading. However, due to the CST node-based color management of the timeline, if you want the luminance of the final matte to be consistent with the rest of the media (especially in high dynamic range deliverables), you will want to apply the same color management.

- In the Clip Filter list, select All Clips to return the full contents of the timeline to the Lightbox panel.

- Middle-click clip 26 to transfer the INPUT CST and OUTPUT CST nodes to the white matte clip 27.

Next, you'll review the status of the denoise nodes in the timeline.

- In the Clip Filter list, select Noise Reduction.



When performing noise reduction in Lesson 8, you learned that disabling the Denoise node would facilitate faster playback during the grading process. If you use this performance optimization method, you must remember to re-enable noise reduction nodes before exporting a project.

- Click the Lightbox button in the upper-right corner to close the Lightbox interface.

The Noise Reduction filter is still active in the timeline on the color page.

- Navigate the four clips one by one and ensure their Denoise nodes are all enabled.
- Select Clips > All Clips to remove the timeline filter.

> **TIP** Changing the timeline thumbnail mode is another great option for visually assessing the status of clips in the Lightbox panel. Choose View > Timeline Thumbnail Mode > Source C Mode to switch the order of the clips in the timeline from their edit order to the order in which the media was created. When working with original camera footage, this will display the order in which the footage was recorded. C Mode places clips captured in the same day/location next to each other, making for faster matching, grade copying, and visual assessment. When done, remember to set the Timeline Thumbnail Mode back to Record LE Mode.

The timeline has now been checked to verify that all clips are graded and all necessary nodes are active. When working on your own projects, think about the types of workflows you use and what is important to verify before delivering a project.

In addition to the default filters already present in the Clip Filter panel, you can also use the Smart Filters option at the bottom of the list to design filters based on the metadata of the clips in the timeline.

Reviewing Projects with Clients

Before rendering a finished project, you will usually also go through a review process with your clients or collaborators to ensure everyone is satisfied with the final edit. Ideally, this would occur in your editing or grading suite, but that is not always possible in remote or international productions. DaVinci Resolve offers several tools that simplify the reviewing process.

Remote Monitoring

Remote monitoring allows you to transmit the image in your viewer to a client's monitor or viewing device for real-time collaborative feedback. To use this feature, you and your client must both have:

- DaVinci Resolve Studio, which includes the DaVinci Remote Monitor app upon installation
- A Blackmagic Cloud account, available at https://www.blackmagicdesign.com
- For Linux and Windows users, an RTX series NVIDIA GPU

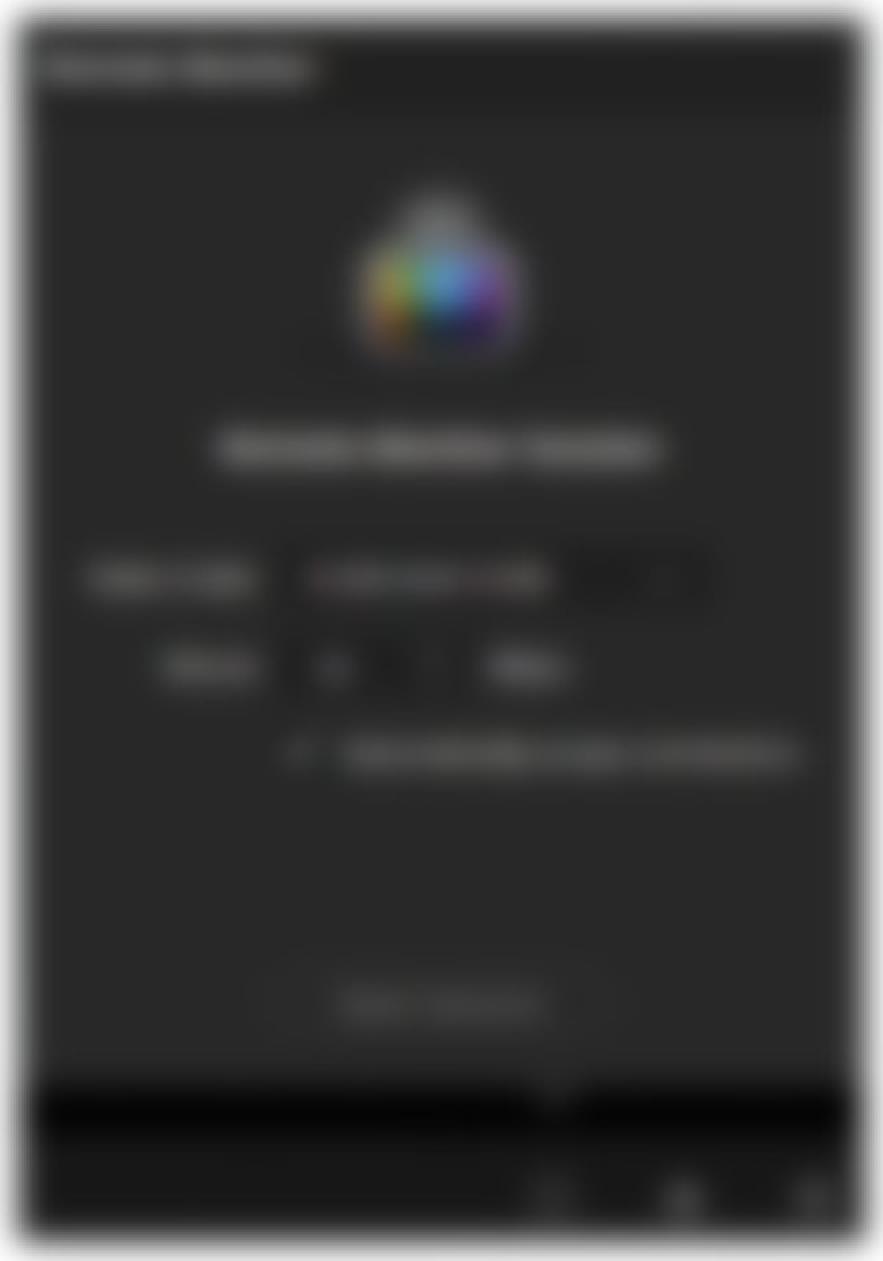
NOTE The DaVinci Remote Monitor app is available in the App Store, which means Apple iPhone and iPad devices can be used as client monitors. This setup does not require the client to have DaVinci Resolve Studio.

With these conditions met, setting up Remote Monitoring as a host takes only a few moments.

NOTE DaVinci Resolve Studio is required to complete the following exercise.

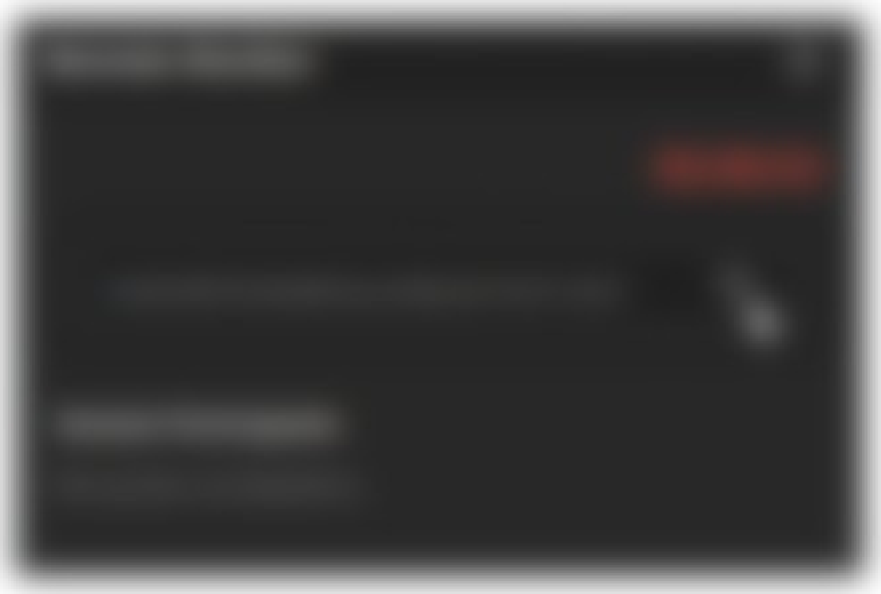
- Choose Workspace > Remote Monitoring.
- If prompted, sign in to your Blackmagic Cloud account.

- In the Remote Monitor window, select the Video Codec and Bitrate you wish to use for the session.



Ensure both you and your client support the codec and choose a transfer speed compatible with your connection bandwidth. A 10-bit depth will give greater image accuracy, but 8-bit depth is substantially less processor intensive to transmit.

- Select "Automatically accept connections" if you wish your client to connect to your viewer as soon as they input the session code. Otherwise, leave it unchecked to manually approve the link request.
- Click the Start Session button.



A session code is generated, and a red timer appears above it. Below, a list keeps track of active session participants.

- Click the Copy icon to the right of the session code field and paste the code to your client using any text-based communication method (email, text message, etc.).

Once the client has input the session code, a link will be established between their monitoring device and your video output signal. You can proceed to playback, pause and scrub the footage while communicating with the client. They will not see your DaVinci Resolve user interface.

> **TIP** If you collapse the Remote Monitor window, you can always retrieve it by clicking the Remote Monitor icon in the lower left of the DaVinci Resolve interface.

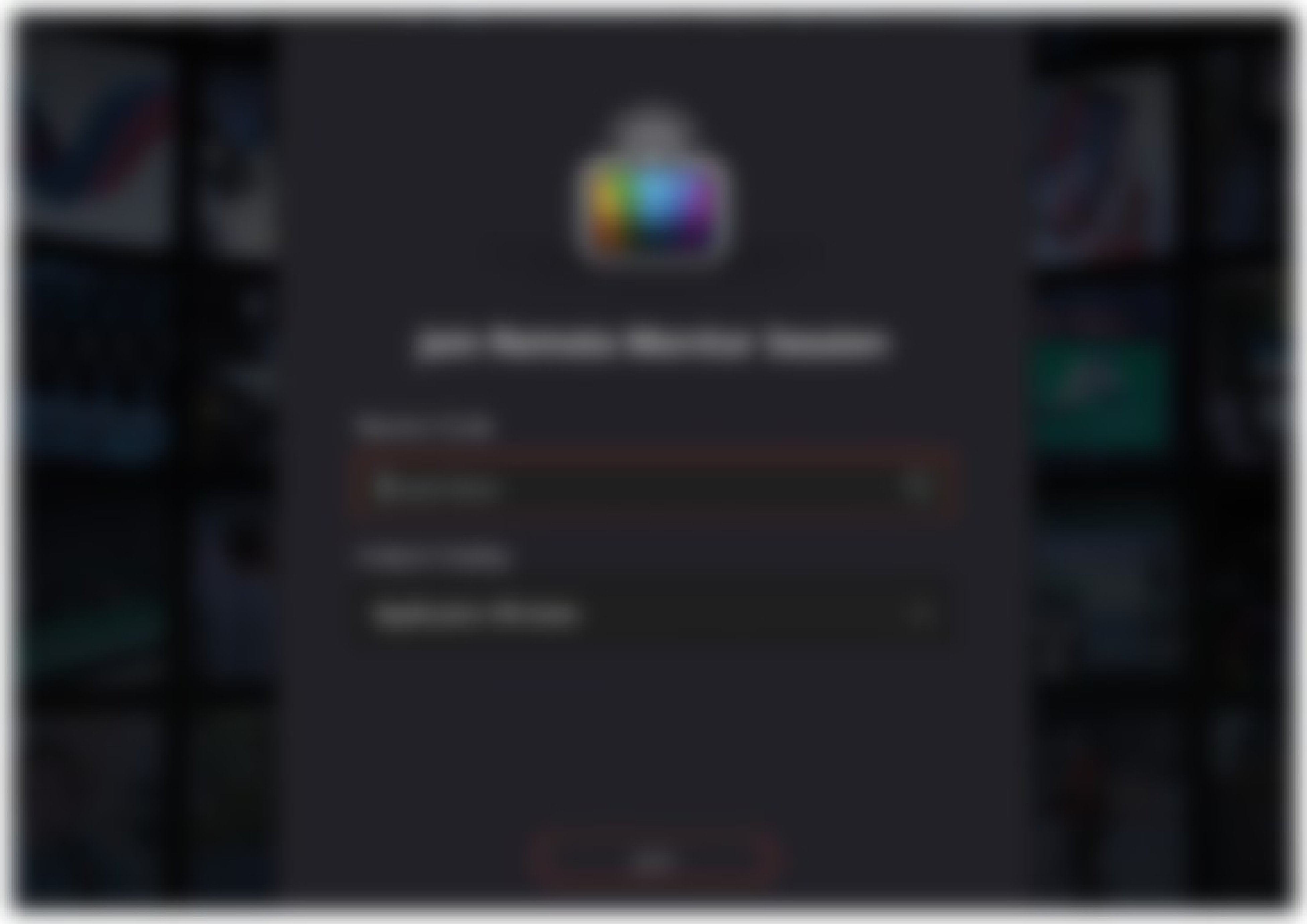
As a client, a remote monitoring connection also requires just a few steps:

1 Launch the DaVinci Remote Monitor app on your device.

2 Sign in to your Blackmagic Cloud account.

> **TIP** If you know the host's server IP address, you can access the remote monitoring session without a Blackmagic Cloud account. Click Use Remote Monitor without Blackmagic Cloud to access the IP login fields.

3 In the Session Code field, paste the code shared by the host.



- Select the Output Display you wish to use for monitoring.
- Click the Join button.

When a remote monitoring session is completed, the host must open the Remote Monitor window and choose End Session.

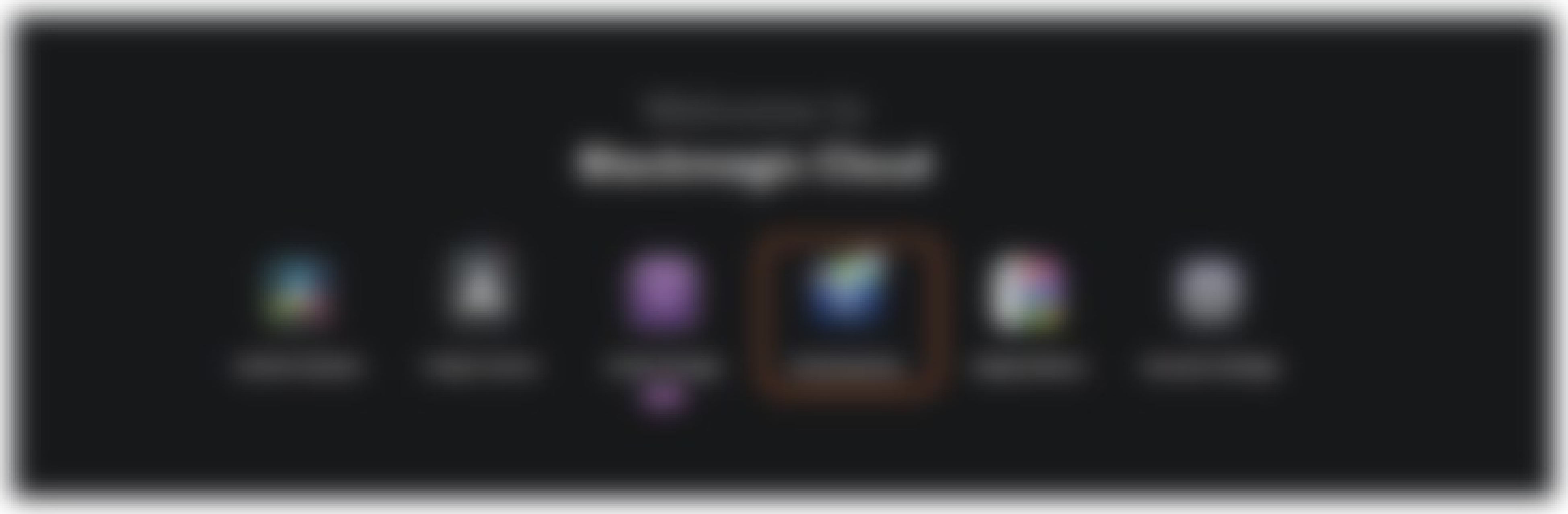
> **TIP** In DaVinci Resolve Studio, you can opt to share your viewer overlays with the client monitor. When a remote session is running, go to the viewer options menu and choose "Show Viewer Overlays on Remote Monitor." This option is popular among field colorists who might use a system in a remote location while grading on a cloud monitor.

Uploading Presentations

Blackmagic Presentations is an online service that hosts timelines in Blackmagic Cloud for more in-depth review and collaboration. The Presentations page features video conferencing tools that allow teams to remotely review and comment on edits in real time. Contributors can even add time-based notes and annotations, which will appear as markers on the host's timeline in DaVinci Resolve.

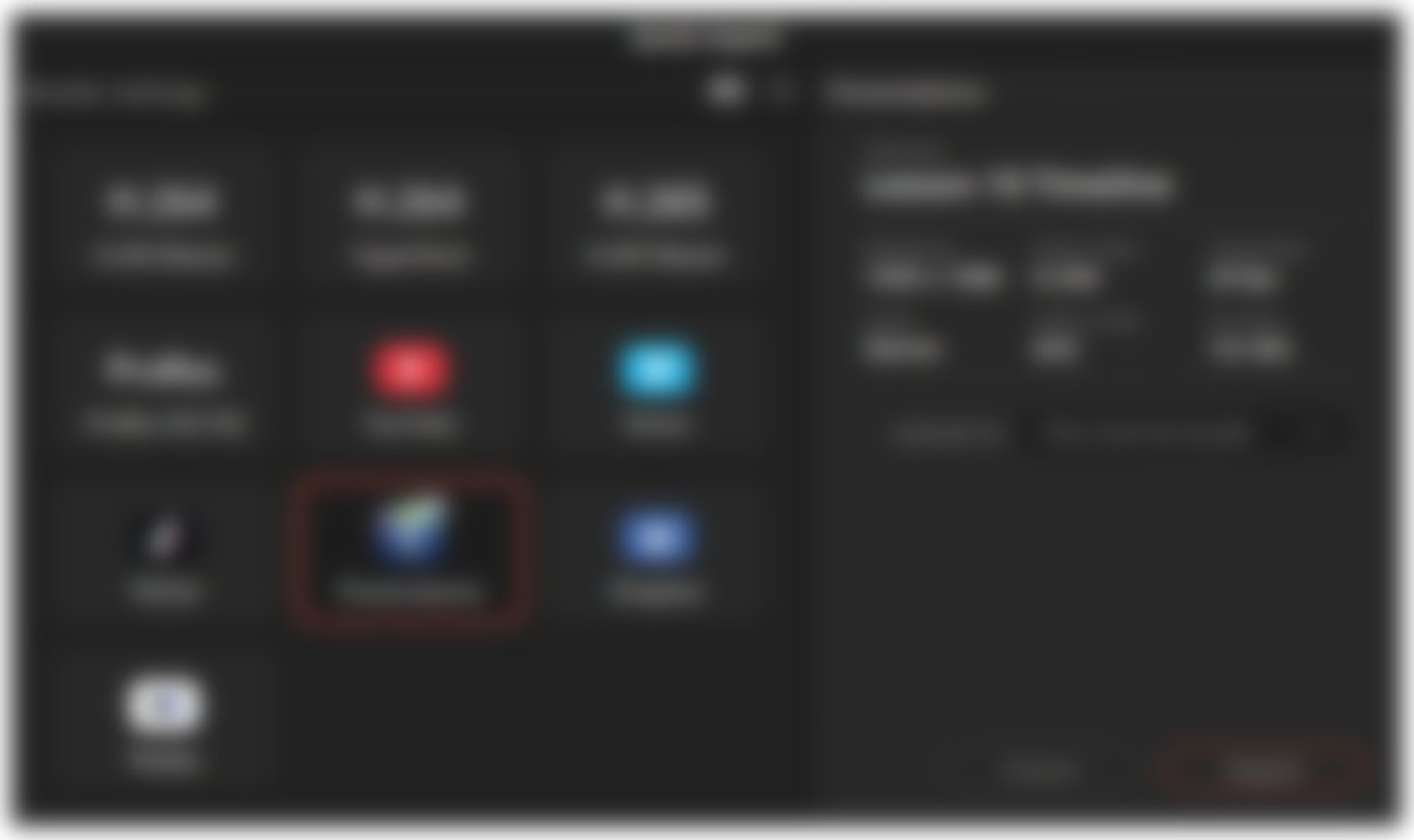
Timelines can be uploaded to Presentations via the deliver page or the Quick Export button in the cut, edit, and color pages.

1. In your web browser, go to the Blackmagic Cloud webpage (https://cloud.blackmagicdesign.com/), and log in to your account.
2. Click the Presentations icon.



Presentations can be thought of as projects or folders that can contain multiple timeline renders (called "clips" in Presentations). You must create at least one Presentation in your account before uploading a timeline.

- On the left side of the page, click Add Presentation at the bottom of the Presentations sidebar and give it a name.
- Open DaVinci Resolve 20.
- In the color page interface toolbar, click Quick Export.
- In the Quick Export window, select the Presentations preset.



> **TIP** Quick Export is one of the fastest ways to render videos for review or upload them to social media and collaboration sites. The render settings mirror those found in the default settings of the deliver page render presets.

- If necessary, sign in to your Blackmagic Cloud account.
- In the "Upload to" dropdown menu, select the Presentation to which you wish to upload the timeline.

- Click Export.

Once the render and upload are complete, the timeline will be available as a "tile" in the Presentations interface. Use the info symbol next to the presentation name to add members and/or choose "Allow Guest access to presentation" to give access to collaborators who don't have a Blackmagic Cloud account.

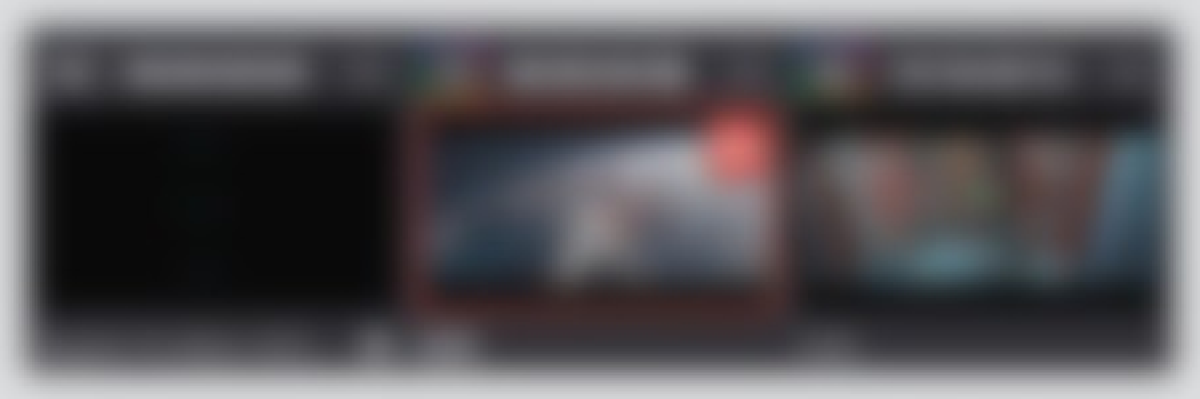
Use the panel on the right to launch clips, navigate markers, and chat with other members of the project.

Multi-User Collaboration on Blackmagic Cloud

Every project in this training manual was launched using a unique method—restoring a DaVinci Resolve archive, conforming an XML timeline, cutting a self-contained video file with scene cut detection, and importing a DaVinci Resolve project file. These projects were purposefully designed to demonstrate the variety of ways that colorists launch timelines for grading. One option we have yet to explore is using a collaborative workflow on Blackmagic Cloud.

continued

Collaborative workflows allow multiple users to log in to a DaVinci Resolve project simultaneously. With the help of clip and bin locking, collaborators can edit, composite, mix, and grade a film project simultaneously.



A key requirement for collaboration is that all user workstations have access to the same project file on a shared project library server. Blackmagic Cloud project libraries are hosted on secure online servers, allowing DaVinci Resolve users to connect and collaborate on the same project from anywhere in the world. Click the Cloud button in the header of the Project Manager to begin creating libraries and projects in Blackmagic Cloud.

If you don't want your workstation on a network with internet access, you can opt to use the provided DaVinci Resolve Project Server app to create, manage, back up, and share project libraries with any other workstation on a local area network (LAN).

Blackmagic Cloud and DaVinci Resolve Project Server grant multiple user access to DaVinci Resolve projects, but collaborators will need access to the same media to see the contents of these projects. One way to ensure that everyone can see the same media is by sharing a copy of the project assets with every collaborator on hard drives or SSDs. A more manageable and cost-effective method is hosting the media on a shared server or third-party cloud system. Blackmagic Design offers several network storage solutions – the Blackmagic Cloud Pod acts as a hub that turns any USB storage device into high-speed network storage, and the Blackmagic Cloud Store devices provide the same function, as well as internal storage options that range from 8 TB to 320 TB.

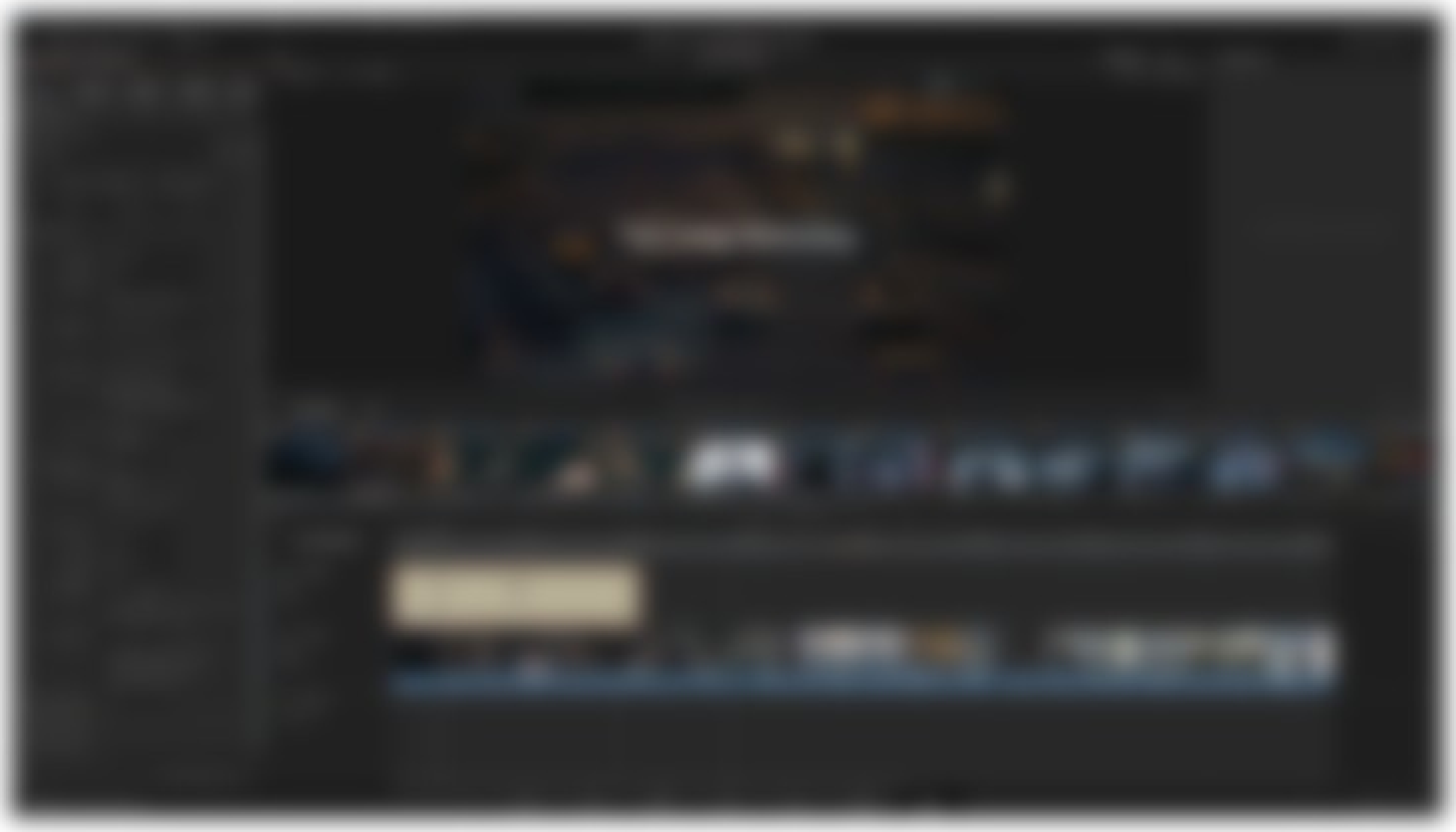
Understanding the Render Workflow and Presets

The deliver page is designed to help you quickly set up one or more render jobs. Before you dive into the minutiae of individual render parameters, it is helpful to understand that it takes only four steps to export a project from DaVinci Resolve:

- In the Render Settings panel, set up the compression parameters. These include the file type, codec, and audio specifications; the filename and location on your workstation; and various advanced controls to optimize render speed and file size.
- Define the timeline range you want to export. By default, each job is set to render the entire timeline, but you can use In and Out points to define a custom range.
- Click Add to Render Queue to list the job(s) for exporting.
- Select the job(s) in the Render Queue and click the Render button.

In the following exercise, you will create a render job based on a preset in the Render Settings.

1 Enter the deliver page.

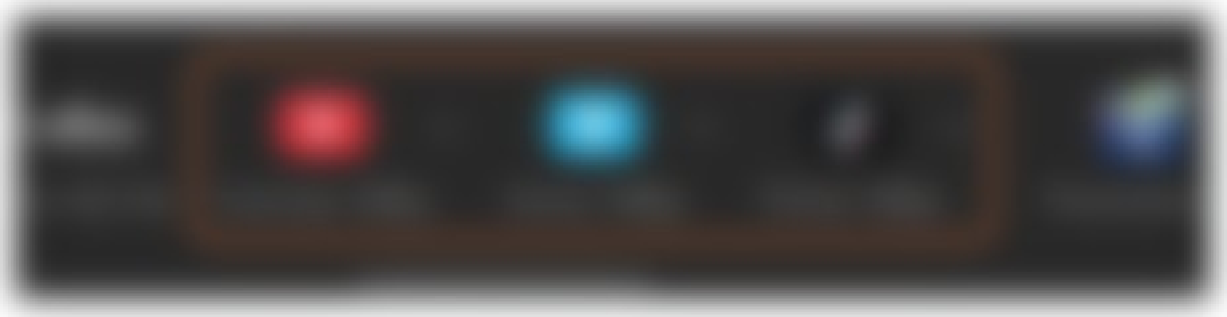


At the top of the Render Settings panel, you will find a horizontal list of render presets.

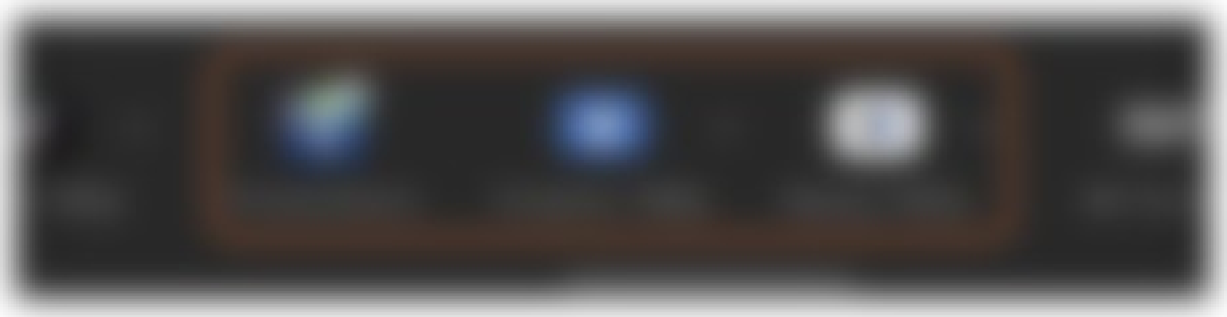
Custom Export opens the full range of render settings in the panel below.

ProRes, H.264 Master, H264, HyperDeck, and **H.265 Master** produce everything from high-end exports appropriate for broadcast (ProRes) to compressed H.264/H.265 files for client review and online upload (H.264 and H.265). Note that the ProRes Master preset is available only on macOS systems.

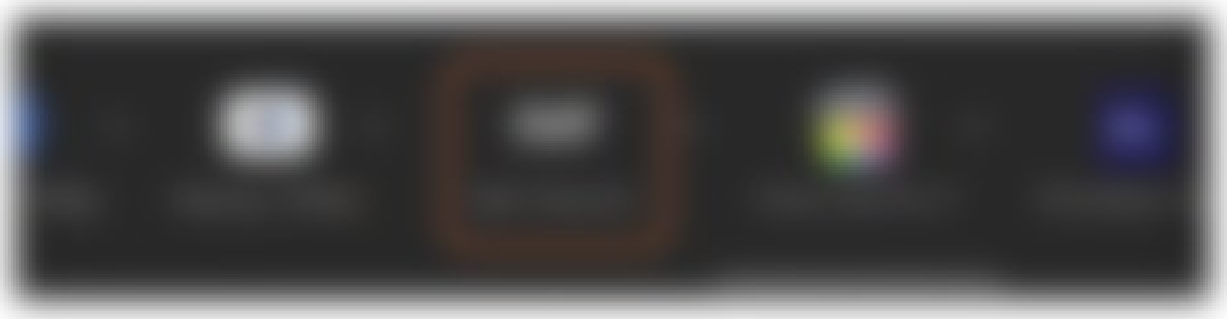
YouTube, Vimeo, and **TikTok** optimize the Render Settings panel based on video configurations recommended by user generated content and social media websites. Enter your login details in Preferences > Internet Accounts to upload videos directly to your account upon render.



Presentations, Dropbox, and **Replay** render and automatically upload rendered timelines to Presentations and Dropbox file hosting services.

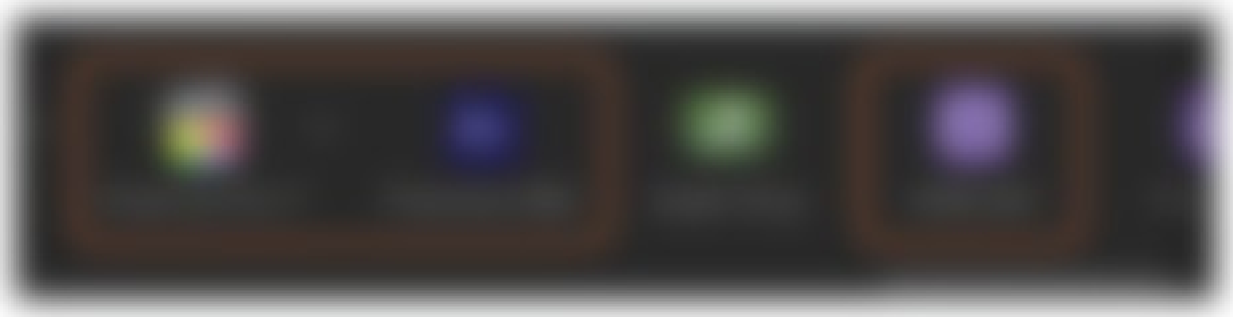


IMF Features a set of SMPTE ST 2067 compliant resolutions and codecs for tapeless network deliverables. In DaVinci Resolve Studio, this option does not require a license and supports multiple media streams for video, audio, and subtitle tracks.



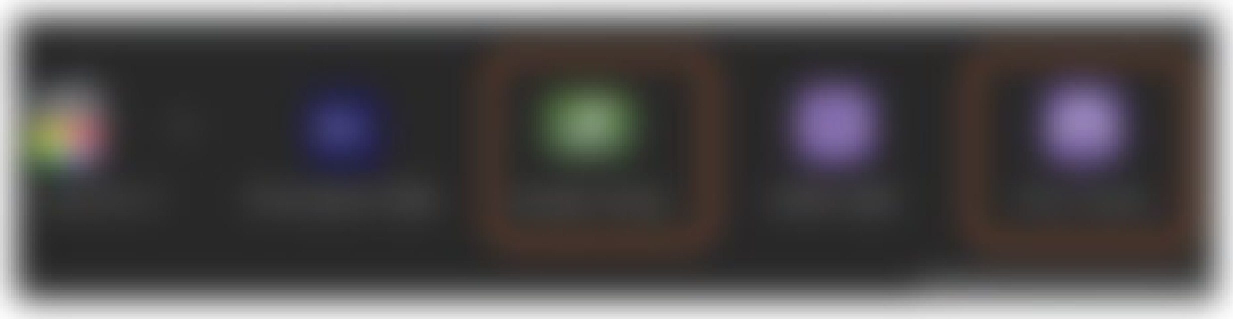
NOTE The Interoperable Mastering Format (IMF) is used for broadcast distribution and online streaming services such as Disney+, Netflix, and Sony Pictures.

Final Cut Pro 7/X, **Premiere XML**, and **AVID AAF** accommodate round trips to their respective NLE software. This assumes a workflow in which media is edited in a third-party NLE, migrated to DaVinci Resolve for grading or VFX, and then returned to the same NLE for final delivery.



Audio Only disables video output and delivers a single audio-only file. You can specify the audio file format in the Audio tab of the Render Settings.

Pro Tools renders three files: a self-contained video for reference, individual exports of all audio clips and their channels, and an AAF file for Avid Pro Tools migration. The preset accommodates workflows in which the final audio mix is mastered by an external audio engineer in Pro Tools.



- Click the dropdown arrow next to the YouTube preset and choose 2160p to load the 4K UHD version of the preset.

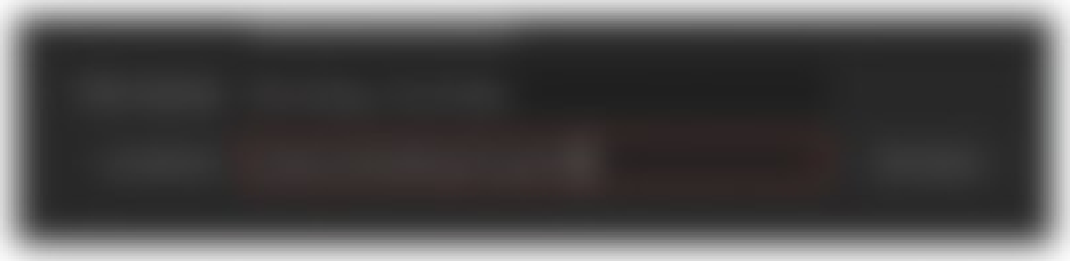
The Render Settings panel displays a limited set of parameters for the selected YouTube preset.

To name the video file, you will use the File Name and Location fields under the horizontal preset list.

- Click the empty text field next to File Name and enter **Working_YouTube**.

  The Location field identifies where the video file will be rendered. A job cannot be sent to the Render Queue without an assigned location.

- Click the Browse button next to the Location text field.
- In the File Destination window, navigate to your Desktop, create a new folder called **Exports**, and assign it as the render destination.



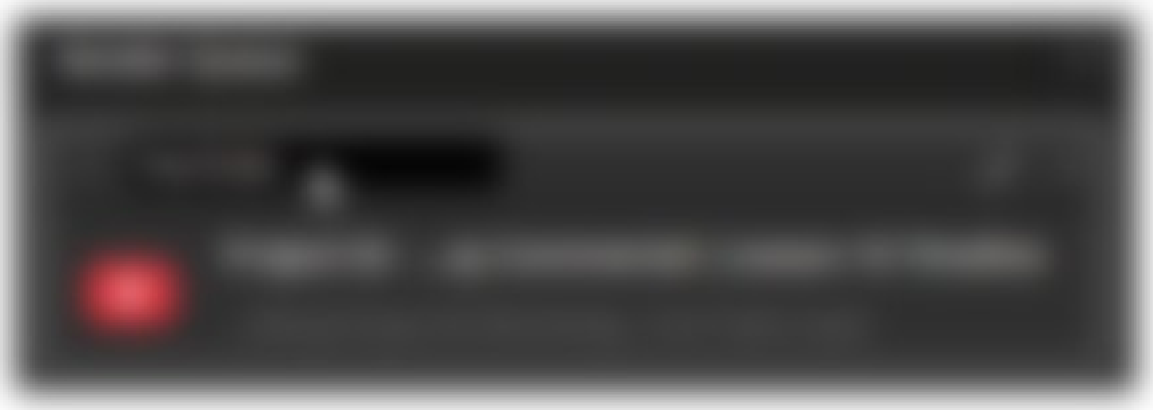
- In the Timeline panel, ensure that the render range is set to Entire Timeline.

- With the render settings configured and the timeline range defined, click Add to Render Queue at the bottom of the Render Settings panel.

A pop-up dialog asks whether you want to export the project at a higher resolution than your timeline. For the purposes of this exercise, you will confirm that this is intentional.

TIP If you're rendering a video project at a higher resolution than the original footage, it is best practice to upscale the timeline in the Timeline or Project Settings. This method will improve the rendered result, give you a more faithful representation of the final image in the viewer, and allow you to apply your grades and effects directly to the upscaled clip.

- Click Add to close the dialog.
- In the Render Queue panel, click the Job 1 title and rename it **YouTube**.



Supporting Multiple Resolution Options for User-Generated Content Websites

Video players on user-generated content (UGC) websites such as YouTube or Vimeo often offer the option to choose a playback video resolution. A lower resolution video allows for smoother playback on a low-bandwidth internet connection, whereas a higher resolution results in a better quality image.

This change in resolution does not occur in real time within the UGC player. Instead, every resolution of every video is generated at the time of the video's upload, which is why there is usually a wait period before an uploaded video goes live. When switching between resolution options, the user is actually switching between separate renders of the video as pre-generated by the host website.

For this reason, it is advisable to render and upload your video in the highest possible quality and leave it up to the UGC website and the end user to determine which resolution is best suited for playback.

Creating Custom Renders

Presets are an efficient method of exporting projects quickly with the confidence that the settings are appropriate for the intended destination. However, it's valuable to understand how and why certain settings are used and to be able to configure them to meet specific needs, especially when your project deliverables extend beyond the destinations featured in the presets list.

Most post production professionals, from editors and compositors to audio engineers and colorists, will configure render settings based on a wide range of factors. For deliverables, it will be the industry or technical standards of a broadcaster, transmission, or display format. For collaborative workflows, it may be the software and hardware specifications of the receiving department.

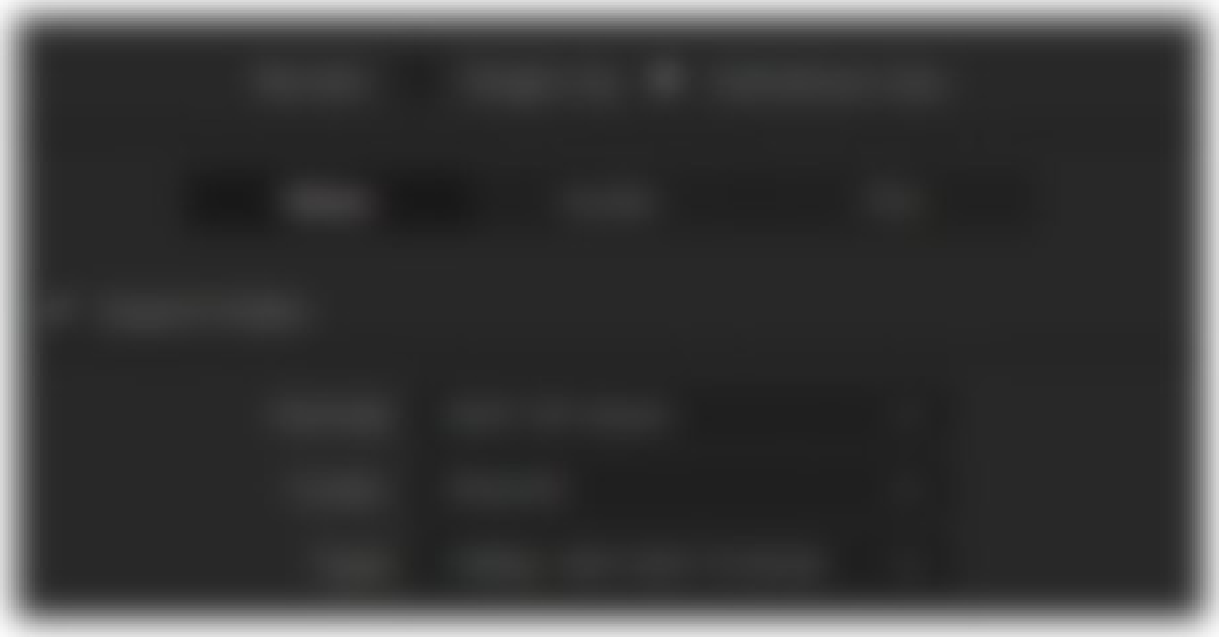
In this exercise, you will set up a render job to deliver dailies to an editor working on a PC.

1 At the top of the Render Settings, click the Custom Export button.

2 Under the File Name and Location fields, choose to render Individual Clips. Doing so will export every clip in the timeline as its own video file. In the case of dailies, you'll want to place untrimmed clips on the timeline to ensure that the editor receives all the media for every take.

3 In the Video tab, set the Format to MXF OP-Atom.

4 Set the Codec to DNxHD and the Type to 1080p 145/120/115 8-bit.



TIP Click the Expand button to the left of the Render Settings button in the interface toolbar to expand the panel to the height of the deliver page. Click the button again to collapse the Render Settings panel, extending the timeline across the full width of the deliver page.

5. The lessons throughout this training manual did not focus on audio syncing or editing. However, in a dailies workflow, it is assumed that the audio from an external recorder would have been sync'd to the video files before being assembled in a master timeline. For this export, under the Audio tab, leave the Codec set to the high quality Linear PCM codec.

> **TIP** Under Audio Normalization, the Normalize Audio checkbox allows you to adjust the gain of your audio tracks to the loudness or peak without exceeding thresholds from upon render. This ensures that the audio volume is optimized for the listener. When choosing "Optimize to standard," you can customize the normalization standard, target level, and loudness values.

6. Click the File tab to the right of the Audio tab to configure the dailies naming convention.

   By default, "Filename uses" is set to "Custom name." When working with dailies, it's advisable to preserve the original filenames ("Source name" in the Render Settings). Doing so will enable you to quickly switch between offline and online media and maintain consistency between post-production departments.

7. In this case, you don't want to use the source name because all the clips came from the same video file (Project 3 - The Long Workday 1080.mov) and will overwrite one another. Leave "Custom name" selected.
8. Enter the Custom name underneath as **Workday Dailies**.
9. To prevent them from overwriting each other upon export, select "Use unique filenames."
10. Choose Suffix as the method for distinguishing the files. This will append a string of numbers to the render filenames.
11. Uncheck "Add source frame count to filename" to simplify the naming convention.

    The default filename suffix will be eight digits long, which is excessive for a timeline with only 27 clips.

12. Choose to "Use [illegible] digits in the filename."
13. At the top of this panel, click Browse to change the Location file path.
14. In the Exports folder on the Desktop, create a subfolder called **Dailies** and select it as the location.

- In the Timeline panel, ensure that the render range is set to Entire Timeline.
- Click Add to Render Queue.
- In the Render Queue panel, change the job 2 title to **Workday_Dailies**.

Configuring a Timeline for Digital Cinema

A digital cinema package (DCP) is a collection of media and metadata files used to project digital movie files in a theatrical venue. DaVinci Resolve makes it possible to create a digital cinema package with its integration of the DCP plug-in. The next few exercises contains some practical information about DCPs with the configuration steps necessary to generate a DCP in the deliver page.

When creating a DCP, the timeline must be set to one of three 2K resolutions:

- 2K Native (1.90:1) 2048 × 1080 @ 24, 25, 30, 48, 50, or 60 fps
- 2K Flat (1.85:1) 1998 × 1080 @ 24, 25, 30, 48, 50, or 60 fps
- 2K CinemaScope (2.39:1) 2048 × 858 @ 24, 25, 30, 48, 50, or 60 fps

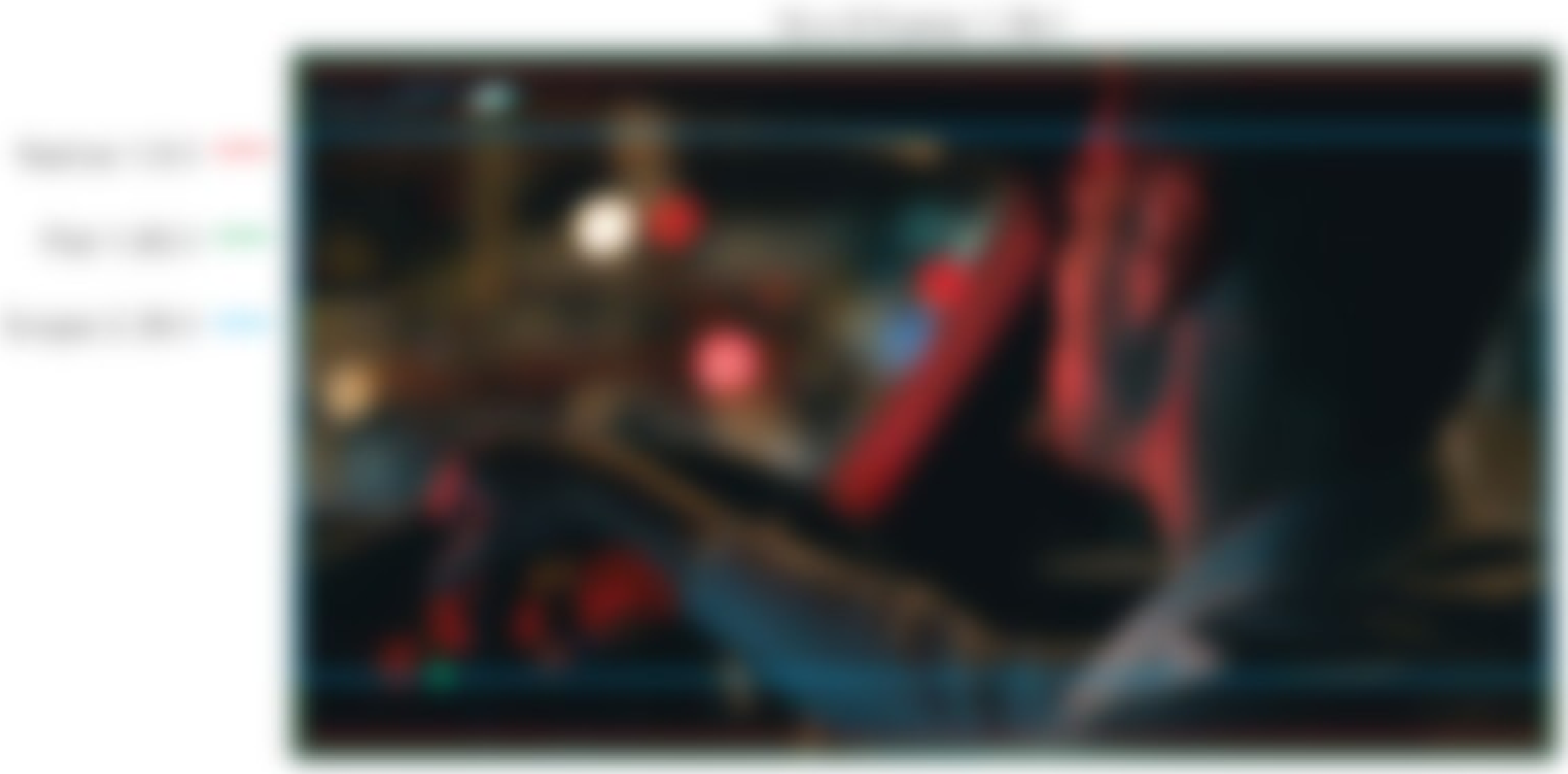
Or one of three 4K resolutions:

- 4K Native (1.90:1) 4096 × 2160 @ 24, 25, 30, 48, 50, or 60 fps
- 4K Flat (1.85:1) 3996 × 2160 @ 24, 25, 30, 48, 50, or 60 fps
- 4K CinemaScope (2.39:1) 4096 × 1716 @ 24, 25, 30, 48, 50, or 60 fps

To avoid making major changes to the original timeline, you will make a duplicate and set it up for DCP delivery.

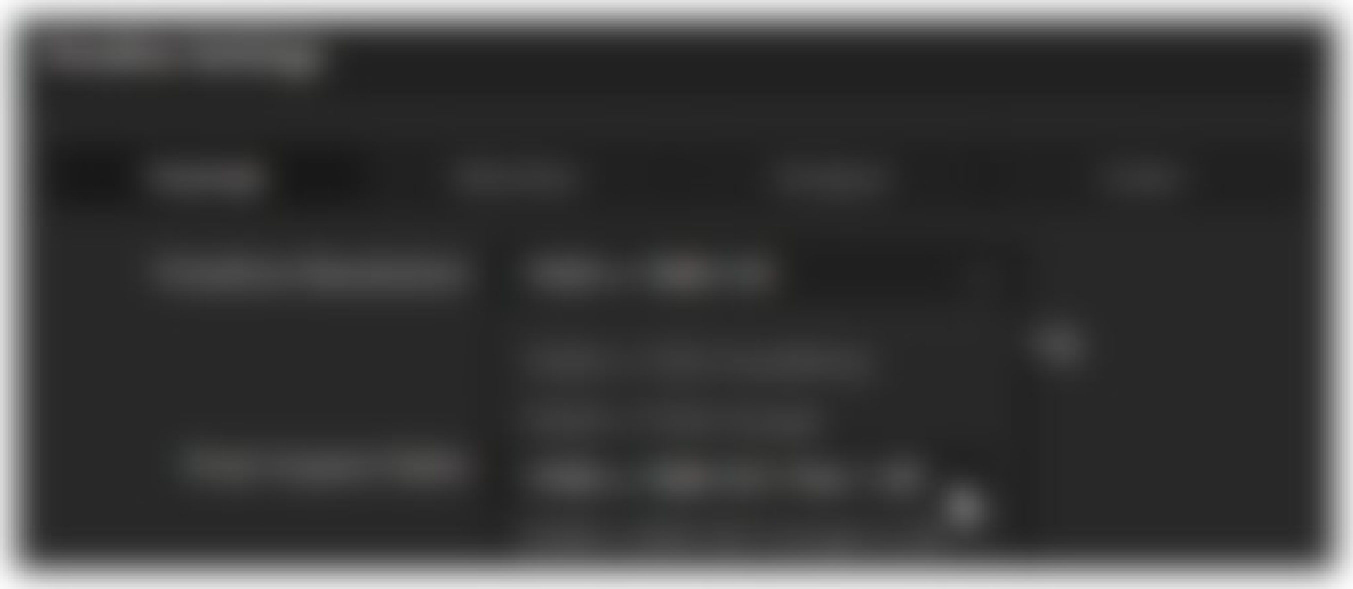
1. Go to the edit page.
2. Right-click Lesson 10 Timeline and choose Duplicate Timeline.
3. Change the new timeline name to **Lesson 10 Timeline DCP**.
4. Right-click the new timeline and choose Timelines > Timeline Settings.
5. Deselect Use Project Settings in the lower left corner.

The resolution for your DCP will be 2K Flat because it's the closest resolution option when starting from full HD. You'll need to scale up the project slightly and crop the top and bottom of the frame.



TIP 4K DCPs use a lower bit rate than 2K DCPs when played on 2K projectors. For that reason, when your target projector is 2K, always make a 2K DCP, even when working with higher resolution content.

- Set the Timeline Resolution to 1998 x 1080 DCI Flat 1.85.



- Set Mismatched Resolution to "Scale full frame with crop."
- At the top of the Timeline Settings window, select the Color tab.
- Change the Output color space to P3-D65.

NOTE You will not be able to see the correct colors for this deliverable if you do not output the video signal to a P3-DCI display.

14 Click OK to close the Timeline Settings.

The project resolution and aspect ratio are now DCP compliant. The timeline frame rate is 24 fps, which is also appropriate for DCP delivery. If you were working on a 23.976 fps project, during DCP creation, it would be interpreted as 24 fps and audio playback would be pulled up to match. Still, to ensure playback quality, it is advisable to record video and audio for a standardized frame rate (24, 25, 30, 48, 50, or 60 fps) if you know you will be delivering a DCP.

What About the Output CSTs?

When working with node-based color management, you must always be aware of the two factors that affect the appearance and color space of your final project file. The node CSTs map the pixel values of the image from one standard to another (affecting appearance). The project (or timeline) color management settings are responsible for the metadata embedded in the rendered file (designating the color space). In this scenario, the Output CSTs would still need to be updated to output to P3-DCI Gamma 2.6 instead of Rec.709. This is easy to do when working with template node trees (and using the ripple function) or by placing the Output CST onto the Timeline Node Editor.

Setting Up a DCP Render

With the resolution and frame rate appropriately set up, all further output parameters can be configured in the Render Settings panel.

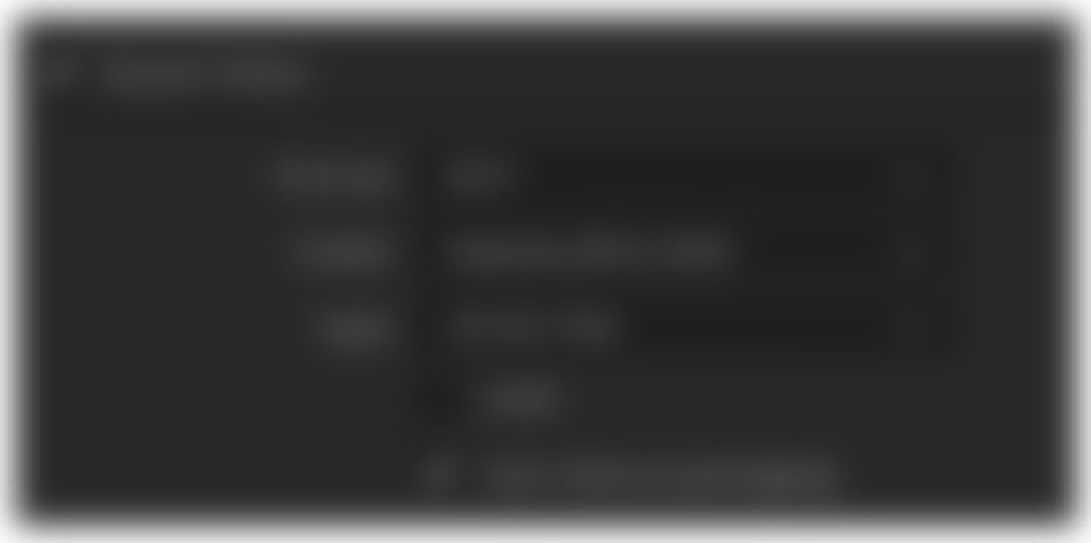
The DCP format in DaVinci Resolve 18 Studio features two codec options. The Kakadu-based JPEG 2000 standard needs no license and delivers unencrypted digital cinema packages. The easyDCP format encrypts digital media but requires the purchase of a licensing package.

1 Go to the deliver page.

2 In the Render Settings panel, click Custom Export.

3 Near the top of the panel, select Single Clip. Unlike the dailies, you want this timeline to be rendered as a single self-contained video file.

- In the Video tab, set the Format to DCP.
- Set the Codec to Kakadu JPEG 2000.
- Set the Type to 2K DCI Flat.



TIP DCP uses the XYZ color space. The output color space set in the Project Settings > Color Management menu is automatically converted to XYZ during the creation of the DCP file, even when project-wide color management (RCM or ACES) is not enabled.

The "Use Interop packaging" checkbox determines whether you are generating the DCP based on the older but more widely supported Interop standard or the more current and feature-rich SMPTE standard. One of the benefits of using the SMPTE standard is that it supports a wider range of frame rates. The major benefit of using the older Interop standard is that it is compatible with more theater projection systems, though it is limited to either 24 fps or 48 fps.

- Ensure that "Use Interop packaging" is selected.

"Clean" versions of deliverables are often required for localization. This is a version of the edit without onscreen titles, lower thirds, or baked-in subtitles for the benefit of international distributors who will want to place translated text in the edit. The same is often done for audio—dialogue is removed while music and sound effects are retained for a clean deliverable that allows for international dubbing.

An easy way to prepare edits for clean video renders is to keep text elements on separate tracks and disable them prior to rendering.

- Click the disclosure arrow to expand the Advanced Settings.
- Near the bottom, deselect Render All Video Tracks.

10 Leave the default Disable set to Video 2 to remove "The Long Weekday" text from the final export.

If you had more video tracks in the timeline, you could use the + (plus) and – (minus) signs to the right of the dropdown menu to disable as many tracks as needed.

11 Leave all other settings as they are.

TIP Unencrypted DCPs can be played back on any DCP player/encoder without restriction. The alternative DCP codec option, easyDCP, features an "Encrypt package" checkbox for additional file security. This option will set the encoder to generate a Digest containing the keys used during file encryption. With the Digest, you can play the resulting DCP on your system and generate Key Delivery Messages (KDMs) to allow the DCP to be played on other servers.

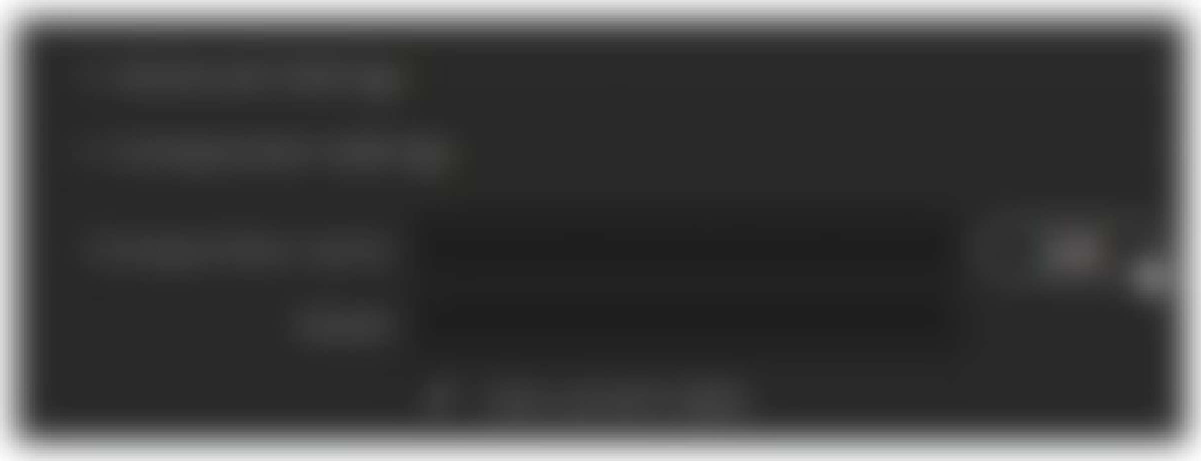
Naming and Outputting a DCP

DCPs follow a somewhat specific, yet voluntary, Digital Cinema Naming Convention for the content title. For each version of a movie you create (such as the English 5.1 version, the Spanish stereo version, the in-flight version, and so on), a composition playlist (CPL) is created containing the appropriate content name. DaVinci Resolve's DCP preset creates the CPL for you and includes a straightforward way of generating a name that follows the naming convention.

1 Continue in the Video tab of the Render Settings.

2 Scroll down and expand the Composition Settings.

3 Click the Edit button next to the "Composition name" field.



This launches the Composition Name Generator window. Here, you can enter the metadata that will be used to create a content title compatible with DCP servers and theater management systems.

- Enter the Film Title as **[illegible]**, leave the Content Type as ADV (Advertisement), and set the Audio Language to EN-English.

TIP Separate the words in your project title using initial capitals – not spaces, hyphens, or underscores.

The selected metadata is added to the composition name at the top. The [illegible] in the title refers to the projector aspect ratio based on the DCI Flat resolution you set in the timeline settings.

5. Click OK to close the window.

   The composition name should not be confused with the package name that contains the DCP. The package name is managed in the File tab of the Render Settings panel.

6. Click the File tab and enter the Custom name as **Long Birthday DCP test**.

   Lastly, you need to select a destination for the DCP.

7. Click the Browse button and select the Exports folder on your Desktop as the render location.

   When delivering a real film project, you can output the DCP to a hard drive in a CRU Dataport DX-115 enclosure that will load directly onto many digital cinema servers and is often required by film festivals. More conveniently, you can output to a USB 2 or USB 3 hard drive or even a USB stick if it accommodates the film's file size. Whatever storage device you choose must be formatted as a Linux Ext2 or Ext3 drive. You can use online resources to find various ways of accomplishing this on macOS and Windows workstations.

   > **TIP** Some projection servers don't provide enough power to mount USB-powered drives. To guarantee playback, use USB drives with an external power source.

8. In the Timeline panel, ensure that the render range is set to Entire Timeline.

9. Click Add to Render Queue.

10. A pop-up dialog will inform you of an Invalid Audio Track Count. This is due to the DCP job anticipating a 5.1 audio mix, which is common with digital cinema deliverables. Your project has a stereo output and will play without issue on most projection systems. Click Add Anyway.

11. In the Render Queue, change the job 3 title to **DCP**.

When rendering a real film project, you will want to test it after generating the DCP file. The only definite way to test your DCP is to rent a theater and run the projection just as you would for an audience. That is the only way you can absolutely verify that the color conversion (from your output color space to XYZ) worked correctly. DCPs can also be tested by importing them back into a new DaVinci Resolve project file and managing the color space from DCI-XYZ to your monitoring standard. It's a quick way to verify that the colors have not been corrupted due to incorrect color conversion, but a computer screen will never be able to truly represent how a film will appear when projected.

Exploring Advanced Render Settings

In addition to choosing how your footage is compressed, you have additional control over more nuanced aspects of the rendering process. This exercise is designed to familiarize you with these settings and empower you to set up your future custom renders more purposefully.

- Return to Lesson 10 Timeline.

- In the Render Settings panel, select the Vimeo preset at the default 1080p resolution.

  Presets are convenient as a quick starting point for renders, but they can be further customized if expanded in the Custom Export controls. In this exercise, you'll produce a video with a lower data rate than the default.

- At the top of the panel, scroll to the left of the presets list and click the Custom Export button.

  The panel reverts to its expanded custom layout but has adopted the Vimeo preset settings.

- Ensure that the Video Format is QuickTime and the Codec is H.264.

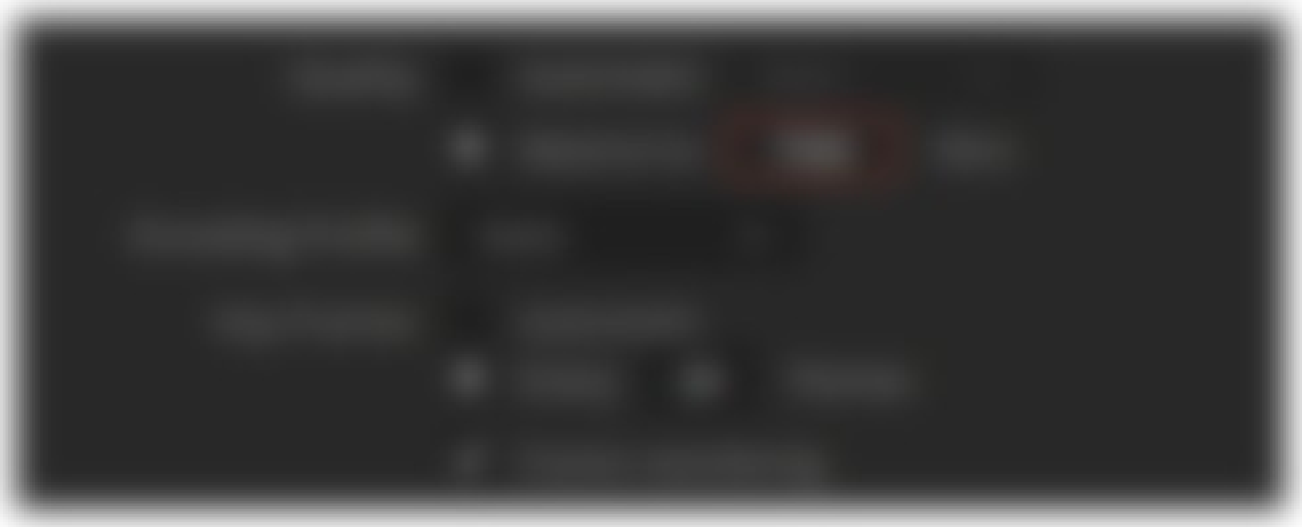
  For certain codecs, encoder acceleration options will appear under the Codec parameter. If you're using a workstation with an Nvidia NVENC GPU, you will see a dropdown menu with options to accelerate your Native and GPU encoders. Workstations offering QuickSync hardware encoding will display an option to use hardware acceleration.

- Select Auto from the Encoder dropdown menu or select "Use hardware acceleration if available" if you see either of these encoder options.

- Leave the Resolution at 1920 x 1080 HD and Frame Rate at Timeline Frame Rate (24 frames per second).

  The Quality parameter in the Render Settings panel specifically refers to the data rate – the amount of data per second required to transmit the audiovisual stream. A higher data rate contains more visual information, which results in better motion representation and detail quality, whereas a lower data rate selectively discards some data to generate a smaller file size.

- Restrict the Quality setting to 7500 Kb/s. This will reduce the file's data rate significantly, lowering the file size while still maintaining a good level of visual quality.



TIP As counterintuitive as it seems, the resolution of a video has no impact on its file size. Only the data rate determines the file size of a rendered video. If you export 720p and 1080p versions of the same video at 8000 Kb/s, they will have the same file size, although the 720p will likely look a little crisper, while the 1080p video will have more macroblock artifacting as a result of using the same amount of data to reproduce the image in a larger frame.

This is not true when using an Automatic Quality setting (such as Best), which configures the data rate based on the timeline's resolution.

The Encoding Profile determines the level of complexity involved with encoding an H.264/H.265 file. They are listed from lowest (Base) to highest quality (High 4:4:4), with Auto determining the optimal profile based on the timeline's resolution and bit depth.

- Leave the Encoding Profile set to Auto.

Key Frames are full data, intra-coded frames (also known as i-frames) inserted into a long-GOP video stream at regular intervals, such as every 30 frames. These i-frames are reference points for re-creating the temporally compressed p- (predicted) and b- (bi-directionally predicted) frames that make up the majority of the moving image in a distribution codec (such as H.264). The default Key Frames setting is ideal for most project types. If you have very fast-moving imagery and see glitch effects in your rendered video, increase the Key Frames frequency.

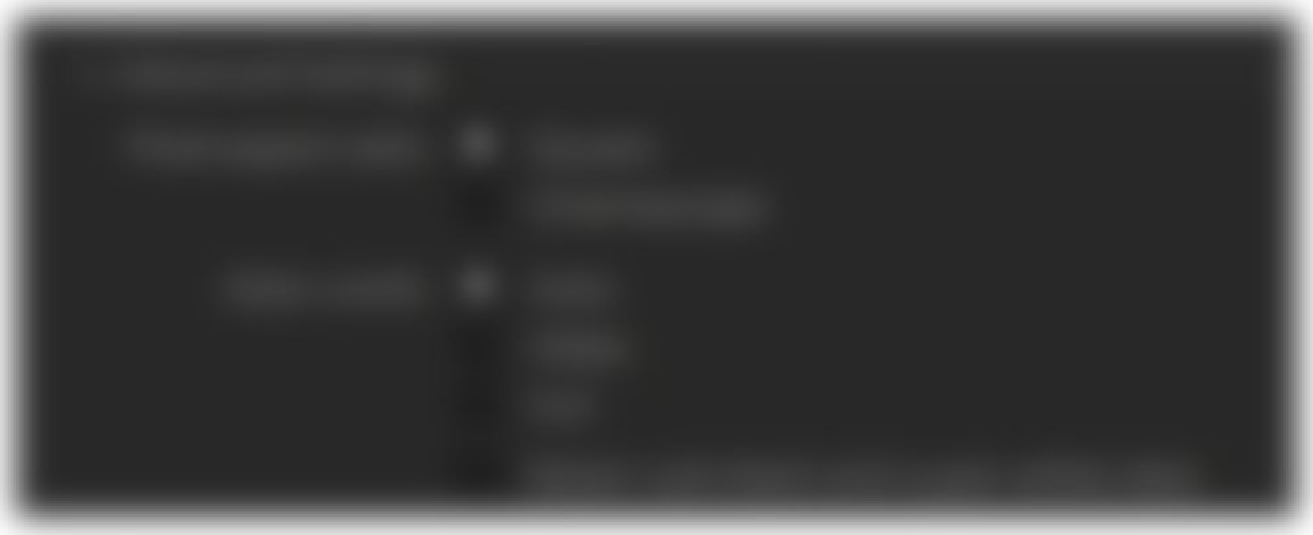
- Set the Key Frames to be enabled every 24 frames to ensure slightly less distortion during the video's temporal compression and playback.

Frame reordering allows for the encoding of b-frames to improve the quality of the resulting video file. It can be disabled for faster encoding at the expense of visual quality.

- Leave "Frame reordering" enabled.

  Many of the more specific parameters found under the Quality and Key Frames controls are tailored to finishing artists with very specific deliverable needs. As a rule, these controls are optimized to produce the best temporal compression results in your operating system and do not need adjustment.

- Scroll down and click the disclosure arrow to see the Advanced Settings.



Advanced Settings

Pixel aspect ratio ● Square ○ Cinemascope

Data Levels ● Auto ○ Video ○ Full

  The "Pixel aspect ratio" allows you to indicate whether the video pixels are Square or Cinemascope (rectangular). This option pertains to older workflows in which digital footage recorded for analog television as a rectangular 1.33:1 aspect ratio was converted for computer displays (with a square 1:1 aspect ratio). If your video looks horizontally distorted (also squashed or stretched out), change the pixel aspect ratio.

- Leave the "Pixel aspect ratio" set to Square.

  Data Levels specify the video signal range of the luminance (luma Y) component. The default Auto setting renders the media at the data level appropriate for the selected codec. Video refers to YCbCr formats that constrain the pixel data values between 64-940 in a 10-bit system in formats using a Rec. 709 video standard. Full expands the range to the film standard of 4-1023 values utilized in high-end digital film formats.

NOTE Data levels are automatically assigned based on the source footage codec (upon import) and the codec you are rendering to (upon export). The majority of codecs use video levels (also known as legal levels), while some higher-end formats (like scanned DPX image sequences) use data levels (also known as full levels).

If your final video looks substantially darker or lighter than it appears in the viewer of the color page, the data levels may be incorrectly assigned. This can sometimes happen when offline media is transcoded with a different codec from the original media. To fix this, make test exports with the Data Levels set to Video and/or Full until you find the correct data level.

- Leave the Data Levels set to Auto.

  Color Space and Gamma tags allow you to embed colorimetry metadata into the video file to be read and interpreted by operating systems and applications. These tags allow you to overcome the color shift that can occur between the DaVinci Resolve viewer and video players/browsers with an internal color profile.

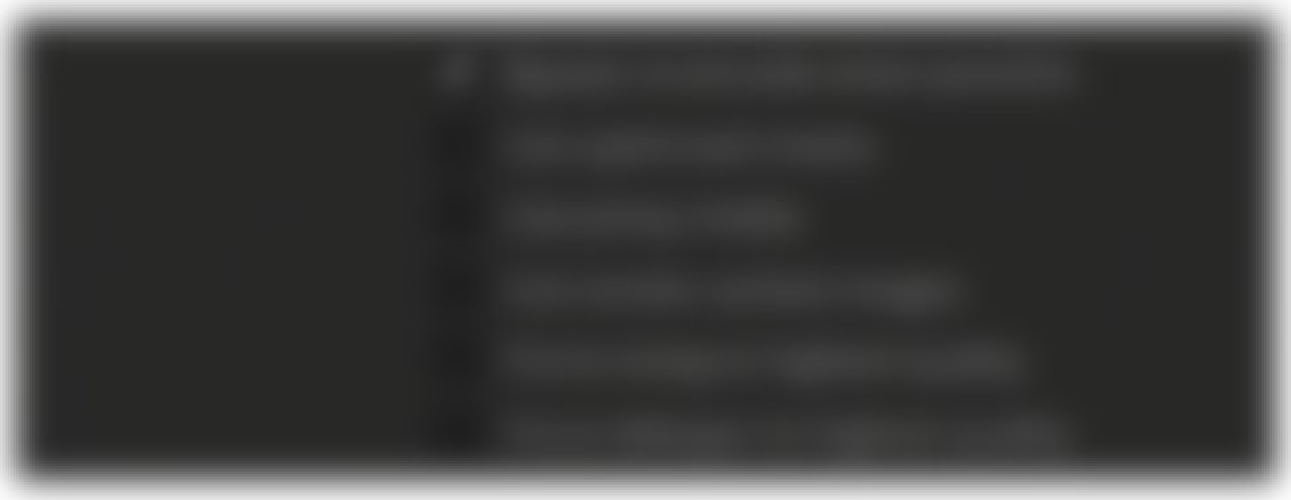
- Leave the tags set to "Same as Project." The resulting video file will be tagged with the project's output color space, regardless of whether project-wide color management (RCM or ACES) is enabled.

NOTE When exporting from a Mac, you can change the Gamma Tag to Rec.709-A to leave the transfer function metadata in the video file unspecified. Apple's applications will correctly identify and map the gamma based on Apple's internal color management system, while external devices will map the signal to the universal BT.709 transfer function.

For a solution that transcends operating systems and browsers, you can opt to bake in the Rec.709-A gamma into your video. This is not recommended for professional broadcast and projection deliverables, but if you are uploading videos to the web and want your audience to see the video the same way it appeared to you in DaVinci Resolve's viewers, make a duplicate of your timeline and change the output color space to Rec.709-A. This will embed the gamma into the video signal, meaning the contrast will appear consistent even if uploaded to a [illegible] website that does not read/interpret gamma tags.

- Set the "Data burn-in" to None to ensure that the viewer's data burn-ins will not appear in the rendered video.

  Selecting "Bypass re-encode when possible" will render a direct copy of the original media file when possible. This option will have no effect if you have graded or composited your media or if you're exporting to a format different from the source. For example, this setting could be beneficial if you were editing a project using ProRes 422 media, with the intention of delivering in ProRes 422. Bypassing re-encode will deliver such a project at the highest possible quality.

  
  ✓ Bypass re-encode when possible
  Use optimized media
  Use proxy media
  Use render cached images
  Force sizing to highest quality
  Force debayer to highest quality

- Leave "Bypass re-encode when possible" selected.

  The next set of options, "Use optimized media," "Use proxy media," and "Use render cached images," allows you to include previously generated renders of the footage in the final export. It makes sense to select these options when your optimized or proxy media and render cache are set to a high or lossless quality codec.

  The current project is set to cache renders as a high quality 12-bit depth codec with full quantization, so it makes sense to use the cached files in the final render to save time.

- Select "Use render cached images."

  The "Force sizing to highest quality" and "Force debayer to highest quality" options bypass the quality settings for resizing and debayering in the Project Settings. Selecting these is convenient when working on a processor-intensive timeline with raw footage. You can initially adjust the Project Settings for lower quality visual output during editing but bypass these settings for the highest possible quality output upon final render.

- Select "Force sizing to highest quality" to ensure that the optimal resize filter is used during rendering.

- Selecting the debayer option is unnecessary because this project does not contain any raw media.

  "Enable Flat Pass" allows you to bypass grades as indicated in the version settings of clips in the Thumbnail timeline. The default choice is Off, which means all grades will remain intact. Choosing "With clip settings" means the render will consider the bypass status of each version (as set in the Versions contextual submenu in the color page). Choosing Always On will disable all the clip grades in the timeline, providing a quick way to export an edited timeline or a set of dailies without clip grades.

- Leave Enable Flat Pass set to Off.
- Selecting "Disable sizing and blanking output" removes any transform changes and blanking that were applied to the clips in the edit or color pages. Leave it unselected.
- In the File tab, at the top of the panel, set "Filename uses" to "Timeline name." The File Name field at the top will adopt "Lesson 10 Timeline" as the filename.
- In the Timeline panel, navigate to the last frame of clip 05 and press O to place an out point (01:00:20:05). The dropdown menu at the top of the panel will show that you will be rendering a custom In/Out Range.

- Click Add to Render Queue.
- In the Render Queue, change the job 3 title to **Workday_HD_Preview**.
- In the options menu of the Render Queue, choose Show All Projects.

You should now see all the jobs that were added to the Render Queue in any project associated with the project library you're currently using. If you split longer projects into reels, or if you're working on timelines with different frame rates, you might want to create all your render jobs first and then access and render them from a single project Render Queue. That way, you won't have to wait for a project to finish rendering before launching the next render.

[illegible] In the options menu, deselect Show All Projects to return to the current project's Render Queue.

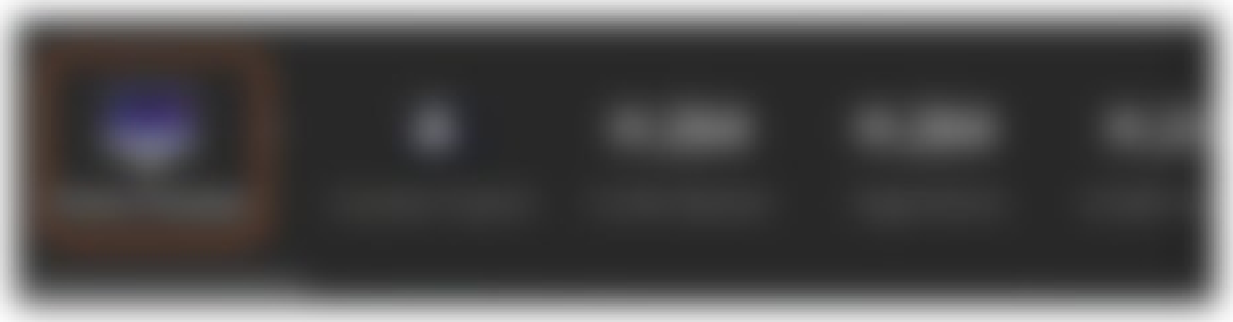
Remote Rendering

DaVinci Resolve Studio allows you to offload job rendering to a different workstation. This feature requires that all workstations have a copy of DaVinci Resolve 17 Studio installed, a shared PostgreSQL project library, and access to all necessary media files using the same filename paths. With one computer acting as a render station, all other DaVinci Resolve workstations can continue editing, grading, compositing, and mixing.

Saving Presets

When frequently outputting to the same standard, or working consistently with the same collaborators, you may want to generate a preset of your settings so you can set up future renders more quickly.

1. In the options menu of the Render Settings panel, choose Save As New Preset.
2. Name the preset **Client Preview** and choose a preset icon.



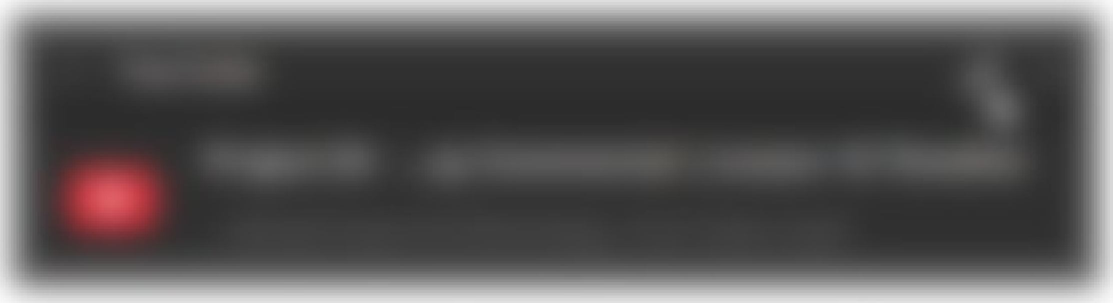
The custom preset appears on the left of the horizontal menu, at the top of the Render Settings panel.

3. In the Render Settings options menu, choose Client Preview > Add to Quick Export.
4. Go to the edit page to verify that your new custom preset has appeared in the Quick Export panel.
5. Return to the deliver page.

Editing Render Jobs

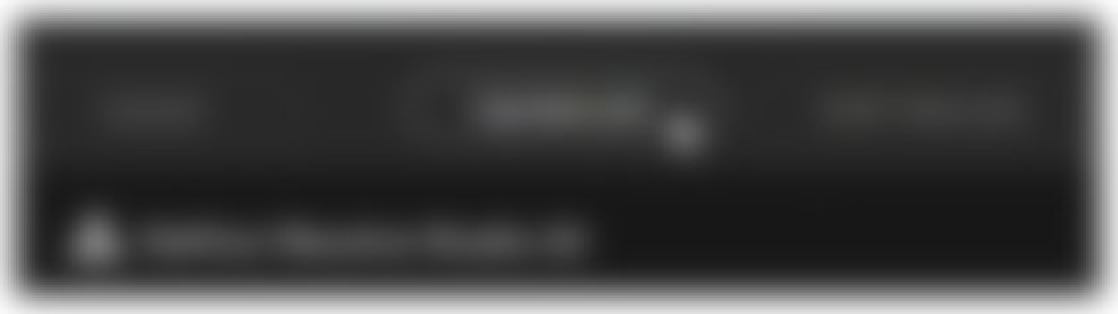
A job can be removed or modified even after it has already been added to the Render Queue.

1. Find the DCP job in the Render Queue and click the X in the upper right corner of the job to delete it from the queue.
2. Find the YouTube job and click the pencil icon at the top right corner to edit it.



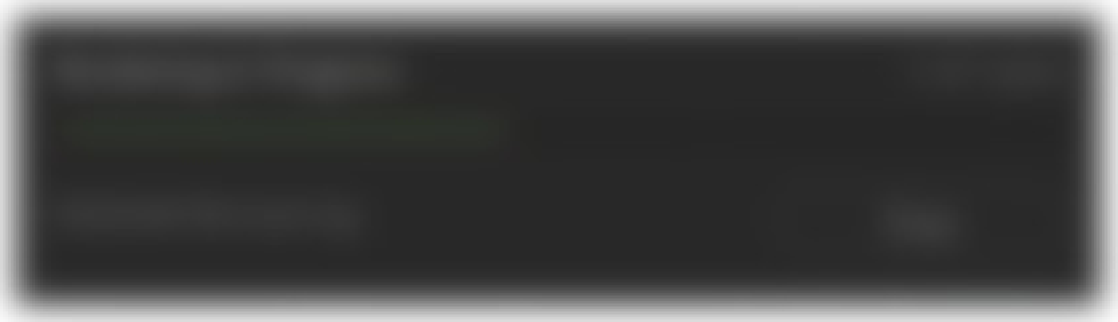
The Render Settings panel changes to reflect the YouTube job settings. Additional buttons (Cancel, Update Job, and Add New Job) at the bottom of the panel indicate that a job is currently being edited.

3. Change the Resolution to 1920 x 1080 HD.
4. Change the Format to QuickTime.
5. Click Update Job at the bottom of the panel to exit the Edit mode.



This change overwrites the original YouTube job settings.

6. Click the YouTube job in the Render Queue panel.
7. At the bottom of the panel, click Render 1.



Note that the remaining unselected jobs are not rendered. When delivering multiple timelines or formats, ensure that you select all necessary jobs in the queue before clicking the Render button. When no jobs are selected, the Render button is set to Render All.

Using the correct render settings is vital for delivering technically correct, visually optimized video project files. Understanding these settings has even greater benefits; it elevates your skillset as a colorist and imbues confidence that your projects are delivered at optimal quality while adhering to industry standards.

Why Does My Deliverable Look Different?

When you render a video, it may sometimes not look the same as it did in DaVinci Resolve. Perhaps the saturation decreases, the hues shift, or there is a change in contrast. There are many reasons why these things may happen:

- Your operating system's internal color management may display your video differently in native applications than how it appears in DaVinci Resolve. Ensure DaVinci Resolve is set up to use the display color management in the General System Preferences.
- Your main display may have a color profile that affects how the image looks during grading. When viewed on an external device without the same color profile, the final video will appear different. This can also be caused by an uncalibrated monitor. In both cases, having a dedicated grading monitor should help keep output consistent.
- A third-party application (such as an NLE or a compositing software) may incorrectly map the footage based on an assumed color space. Check the input color space settings in the application and correct them to match that of the footage.
- The video file's color space metadata might be incorrectly read by a video player or online video host. Check whether tagging or embedding the color space helps address the issue.
- The wrong Data Level setting may result in a luminance shift. Try exporting at a different data level.

Developing a workflow that produces consistent visual results is a necessary step for every colorist, although it can be a frustrating one because there are so many variables that can cause a color or gamma shift. Continue to experiment with your project and output settings until you reach the consistency you need to deliver your projects with confidence.

Lesson Review

1. True or false? You cannot grade media while using the Lightbox panel.
2. Which Blackmagic Cloud monitoring option allows your clients to leave comments on your timeline?
3. True or false? The deliver page supports roundtrip workflows with other NLE programs.
4. How would you ensure that the highest quality debayer settings are used for the final render of a raw project?
5. How do you save a custom render preset?

Answers

- False. You can view and grade media in the Lightbox if you enable color controls and have an external monitor.
- Clients can review and comment on timelines in Presentations.
- True. The presets at the top of the Render Settings panel allow you to select an NLE program for a roundtrip delivery of individual video clips and an XML timeline.
- Select "Force debayer to highest quality" in the Advanced settings when exporting a raw project.
- In the Render Settings options menu, choose Save As New Preset.

Congratulations!

You have completed **The Colorist Guide to DaVinci Resolve [illegible]** and are now ready to explore more editing, visual effects, and audio mixing workflows using the additional certified books in this series.

Completing all the lessons in this book will have prepared you to become a certified DaVinci Resolve color page end user. You can take the free online exam by following the link [illegible] or by visiting the DaVinci Resolve training page (link below) and clicking the Complete Online Exam button under the Colorist Guide lesson files. When registering please select the Blackmagic Design Training Partner Country as ONLINE and the Training Partner Name as BMD Training Page.

[illegible]

The exam is made up of [illegible] multiple choice questions that must be answered within a 1 hour limit. A passing score requires [illegible] accuracy or better. Every user has three attempts at the exam, with a 24 hour wait period between attempts. If you are unsuccessful after the third attempt, please wait 6 months before contacting training@blackmagicdesign.com to request that three more attempts be added to your account. The exam is open book and open software to encourage you to research the questions as you answer them. Upon passing, your certificate will be emailed to you automatically.

We also invite you to become part of the DaVinci Resolve community by joining the web forum on the Blackmagic Design website ([illegible]). There, you can ask questions about the creative aspects of filmmaking and connect with industry editors, colorists, compositors, and audio engineers.

We hope that you have found DaVinci Resolve [illegible] professional nonlinear editing and world class color correction tools to be intuitive to learn and a perfect fit for your creative workflow.

Appendix A

Using the DaVinci Resolve Panels

Blackmagic Design manufactures a variety of control surfaces for use with DaVinci Resolve 20. The DaVinci Resolve panels allow you to make faster, more nuanced changes to your images without taking your eyes off the grading monitor. Instead of being limited to color grading one click or drag at a time, you can use the panels to adjust multiple controls simultaneously. This intuitive approach can be the difference between taking 5 minutes to complete a shot and taking just 30 seconds. Three control panels are available for DaVinci Resolve's color page: Micro, Mini, and Advanced.

DaVinci Resolve
Micro Color Panel

DaVinci Resolve Micro Color Panel

The DaVinci Resolve Micro Color Panel is a high quality, portable wireless panel that features three high resolution trackballs and 12 precision machined control knobs for accessing essential primary correction tools. Soft keys throughout the panel reset grades, grab and play stills, navigate the timeline and nodes, and feature many commonly used grading actions and playback controls. Two shift keys triple the functionality of most of the available controls, turning the trackballs into transform and Power Window controls when needed. A horizontal slot across the top of the panel allows for the mounting of tablets, such as the Apple iPad, for truly remote workflows. The DaVinci Resolve Micro Color Panel is perfect for use on set to quickly evaluate colors and create looks for broadcast trucks, for education, and for anyone who grades while traveling.

DaVinci Resolve Mini Panel

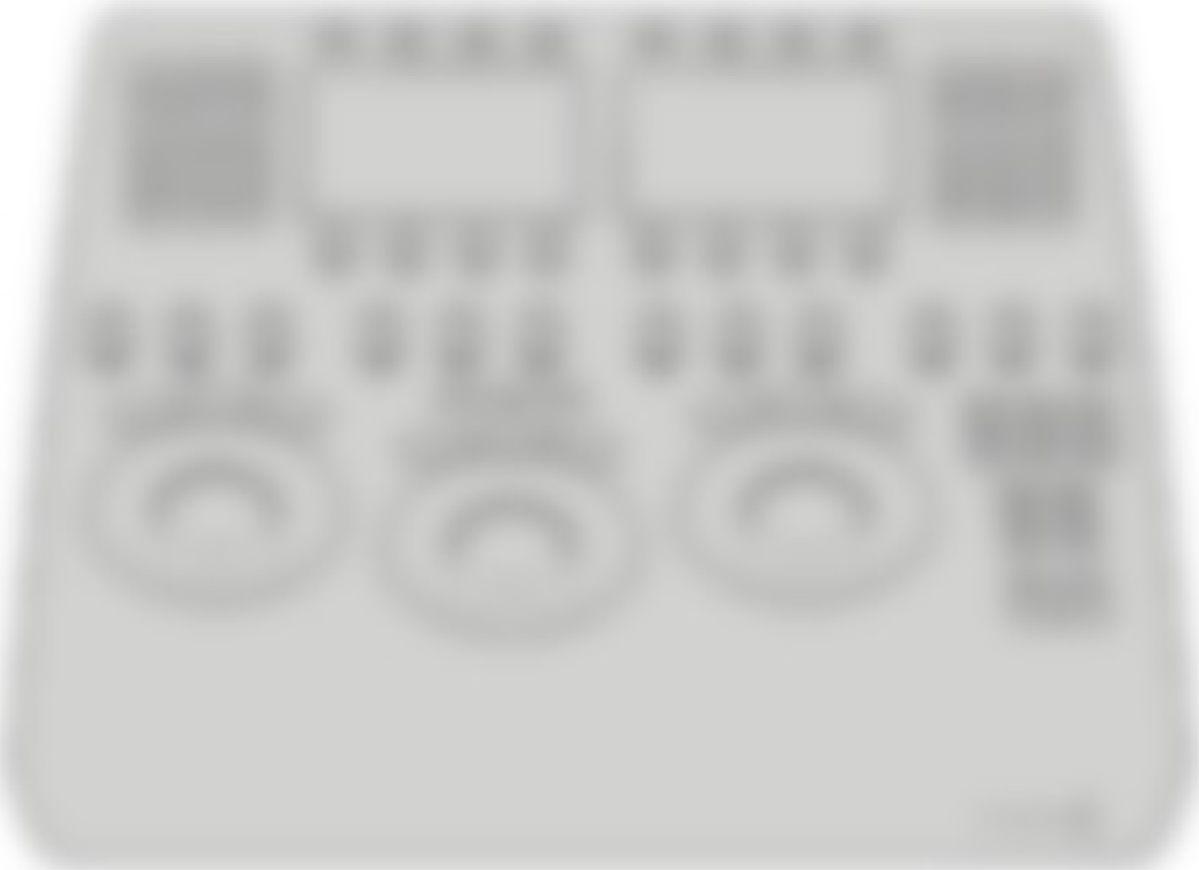
The DaVinci Resolve Mini Panel is a compact device packed with a massive number of features and controls. You get three professional trackballs along with various buttons for switching tools, adding color corrections, and navigating your node tree. The Mini Panel also includes two 5-inch color LCD screens that display menus, controls, and parameter settings for the active tool. Eight soft buttons and eight soft knobs give you direct access to the menus of most of the palettes in the color page. The Mini Panel is ideal for users who balance editing and color grading, users who wish to access both primary and secondary color correction tools from their panel, and freelance colorists who need to carry a panel with them when moving between facilities. It's also great for colorists working on location shoots, for corporate and event videographers, for houses of worship, and many more.

DaVinci Resolve Advanced Panel

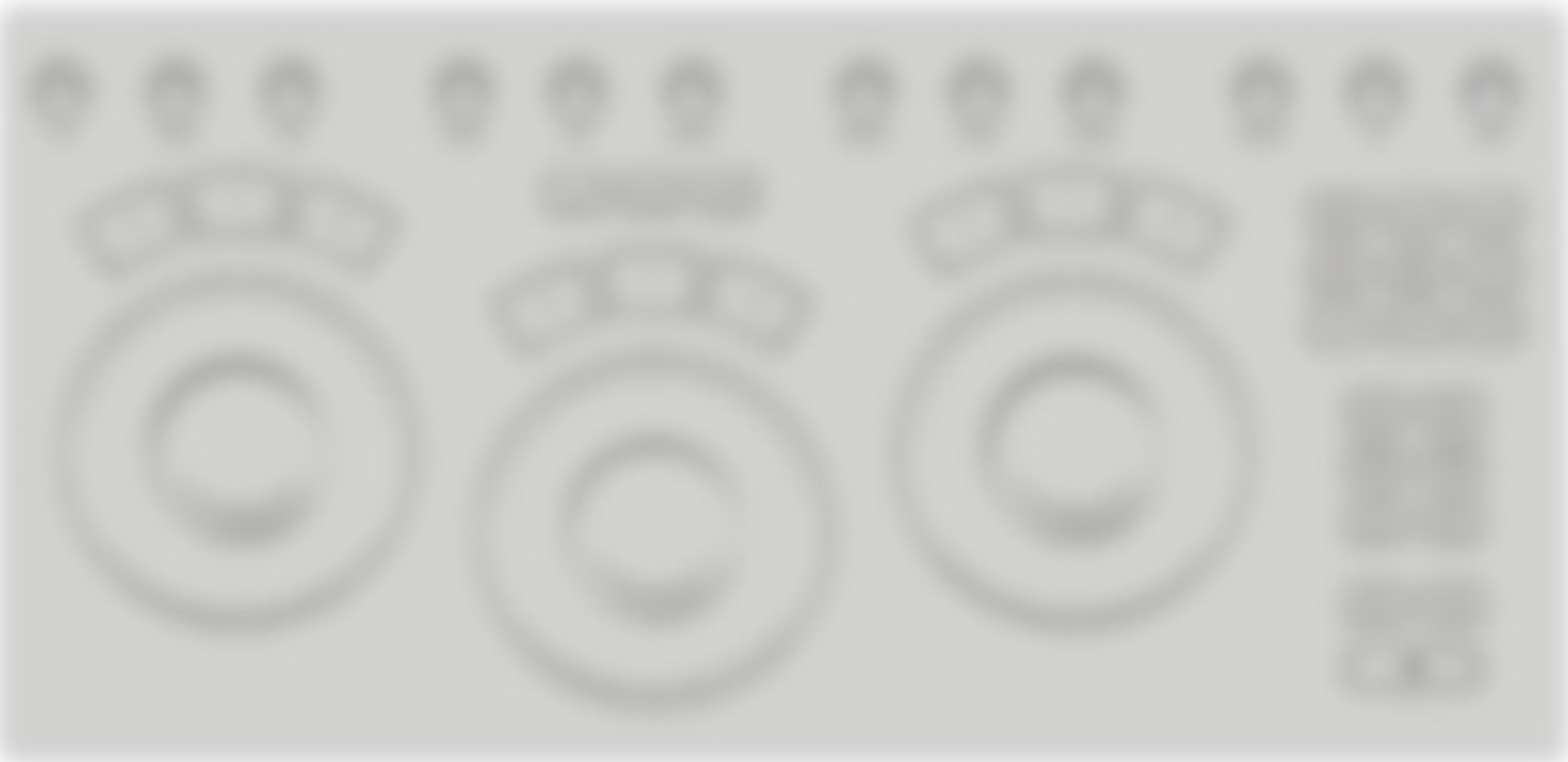
For the ultimate in speed, power, and control, Blackmagic Design offers the DaVinci Resolve Advanced Panel. The Advanced Panel has been designed in collaboration with professional colorists to work in total harmony with the software. The large panel consists of left, center and right consoles that give you quick, one touch access to virtually every parameter and control in the color page. The DaVinci Resolve Advanced Panel lets colorists instinctively reach out and touch every part of the image, adjusting multiple parameters simultaneously with complete responsiveness for a smooth grading experience. While the Mini Panel gives you access to nearly all the color correction tools in DaVinci Resolve, the Advanced Panel gives you even more flexibility with physical buttons and knobs to control Memories, Open FX tools, Dolby Vision, and many other speed- and workflow-based tools that further increase your efficiency. The Advanced Panel also features a unique T-bar for playing back gallery stills, shuttle controls for cycling through frames and speeding through your timeline and a slide out keyboard. Used in many of the top color grading facilities around the world, the DaVinci Resolve Advanced Panel is the ultimate control surface for DaVinci Resolve.

DaVinci Resolve Mini Panel Overview

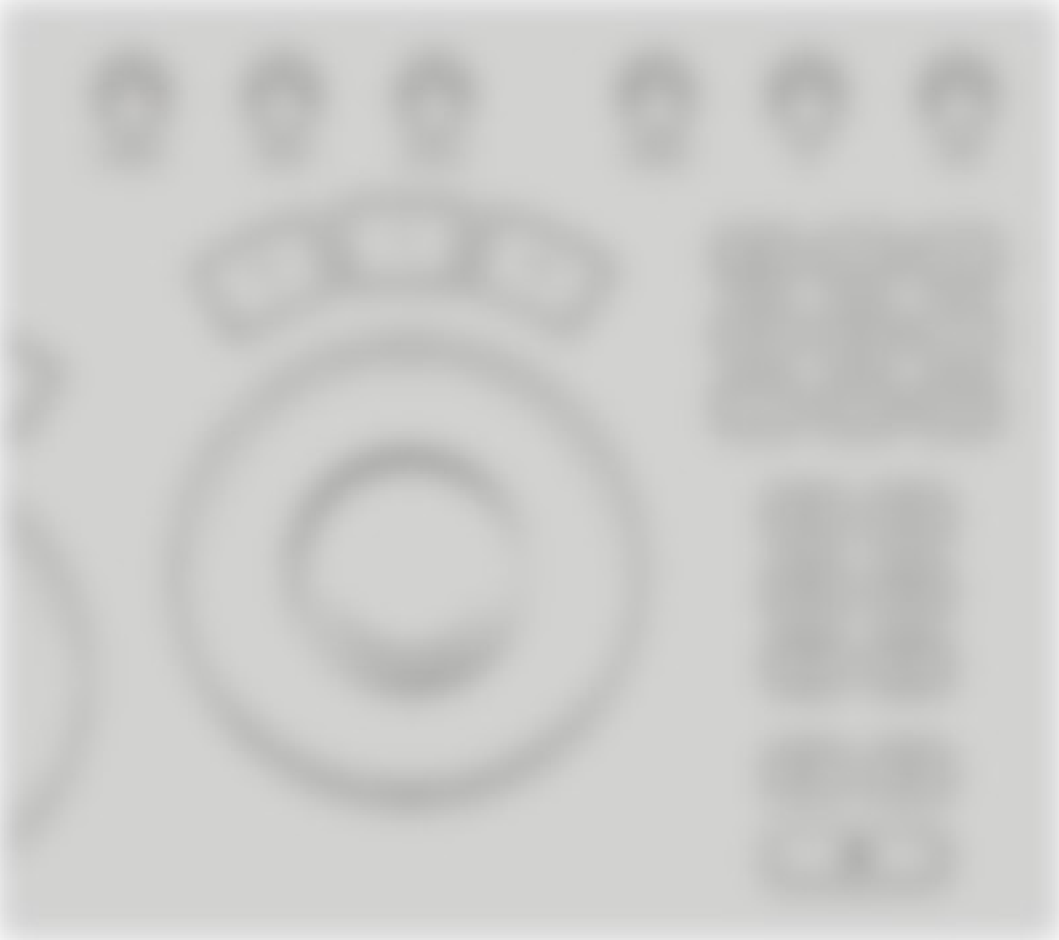
The Mini Panel is mapped to virtually every tool and parameter in the color page while sporting a compact design and an accessible price point. This makes it incredibly popular among both professional colorists and industry newcomers. The following overview will introduce you to its layout and key functions.



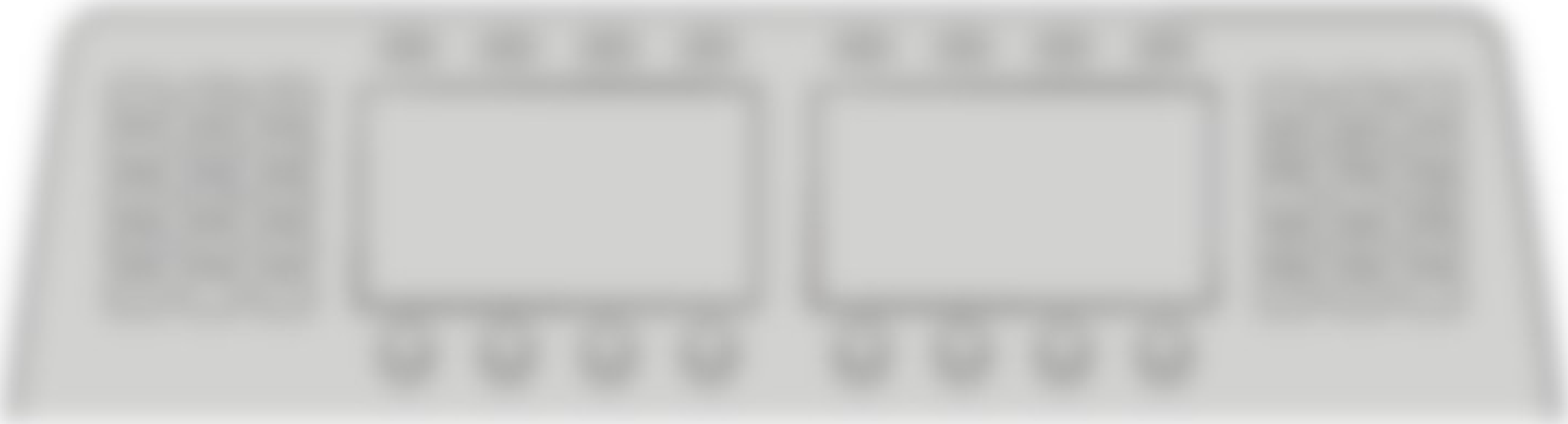
The upper half of the Mini Panel contains the primary control tools. The most prominent are the three trackballs and rings that control Lift, Gamma, and Gain. Their behavior and layout mirror the color wheels in the Primaries palette, with the trackballs controlling hue, while the rings control brightness. When the Lift ring is rotated counterclockwise, the image shadows darken. When the Gain trackball is moved toward the upper left, the lighter areas of the image become warmer. The Offset soft key maps the right trackball to the Offset wheel and the two left trackballs to the Temp and Tint adjustments.



Above the Lift, Gamma, and Gain wheels are the Primary knobs, which are mapped to the adjustment controls in the Primaries palette. They control frequently used parameters such as Contrast, Pivot, Saturation, Color Boost, and Hue. All panel knobs have 4,096 points per turn to allow for smooth operation and can be pushed to reset their parameters.



To the right of the Gain trackball are useful playback and shuttle controls to help you quickly navigate between clips, nodes, and frames. Some additional playback options include Loop, which will repeat the playback of the currently selected clip; Bypass, which will temporarily bypass all the node/color corrections on the timeline; and Disable, which will temporarily disable the selected node of a clip.



The lip, or top angled portion, of the Mini Panel consists of palette soft keys, two 5-inch high-resolution color displays, and even more node, keyframing, and selection controls. All palettes in the color page toolbar are mapped to their own buttons on the Mini Panel. The two displays, as well as the eight soft buttons and eight soft knobs above and below the displays, offer advanced control over the active color page palette.

Appendix B

Setup and Delivery on Macs

This guide featured multiple tips for best practices when working on Mac workstations. All these suggestions are consolidated in this sidebar for easy reference when setting up and delivering projects on Macs.

Setting the Output Color Space

If you're using a Mac display, you'll need to choose an output color space based on your ICC display profile. To find the display profile in your macOS, go to System Preferences > Displays > Color tab. On newer displays, the profile will usually be Display P3. To set the correct output color space for Display P3 in the Project Settings, select "Use separate color space and gamma" under "Color processing mode," and in the "Output color space" field, set the left parameter as P3-D65 and the right parameter as sRGB.

Using DaVinci Resolve with Mac Displays

The macOS internal color management utility, ColorSync, uses metadata to match colors between its applications. As a third-party software, DaVinci Resolve is not impacted by ColorSync, which is why the videos rendered out of DaVinci Resolve might look different when viewed in Safari or QuickTime. To avoid this, you can include DaVinci Resolve in ColorSync's internal mapping. Go to DaVinci Resolve > Preferences > System, and in the General category, select Use Mac Display Color Profile for Viewers. This will enable DaVinci Resolve to use whichever color profile you have selected in the macOS Color preferences, including custom color profiles and calibration software profiles. Please note that this will only affect the appearance of the footage in the viewers.

Gamma Tags

When exporting from a Mac, you can change the Gamma Tag to Rec.709-A to leave the transfer function metadata in the video file unspecified. Apple's applications will correctly identify and map the gamma based on Apple's internal color management system, while external devices will map the signal to the universal BT.709 transfer function.

Rec.709-A as an Output Color Space

For a solution that transcends operating systems and browsers, you can opt to bake the Rec.709-A gamma into your video. This is not recommended for professional broadcast and projection deliverables, but if you are uploading videos to the web and want your audience to see the video the same way it appeared to you in DaVinci Resolve's viewers, make a duplicate of your timeline and change the output color space to Rec.709-A. This will embed the gamma into the video signal, meaning the contrast will appear consistent even if uploaded to a UGC website that does not read/interpret gamma tags.

Index

NUMBERS

[illegible]

A

[illegible]

B

[illegible]

color space, finding middle gray of, [illegible]
See also output color space
color values, changing over time, [illegible]
Color Warper versus HSL curves, [illegible]
color wheels, primary grading with, [illegible]
Colorist Guide subfolder, creating, [illegible]
See also project housekeeping
Colorize option, [illegible]
colors. See also memory colors
- balancing with master wheels, [illegible]
- neutralizing, [illegible]

ColorSlice palette, [illegible]
ColorTrace, using to migrate timeline grades, [illegible]
Command key. See keyboard shortcuts
comparing. See also matching shots; Split Wipe
- clips using split screen views, [illegible]
- and matching shots manually, [illegible]
- parades side by side, [illegible]
- results, [illegible]
- work to source footage, [illegible]

complementary hue, adding, [illegible] See also hue
content, delivering in multiple standards, [illegible]
contrast, setting, [illegible]
contrast balance, redefining, [illegible]
Contrast node
- labeling, [illegible]
- selecting, [illegible]

Contrast serial node, labeling, [illegible]
control menu, [illegible]
control panels, [illegible]
control points
- creating, [illegible]
- moving with precision, [illegible]

copying
- grades in stills, [illegible]
- grades using Timelines album, [illegible]
- nodes, [illegible]

Corrector header, [illegible]
corrector nodes
- blend modes, [illegible]
- disabling and re-enabling, [illegible]
- operations within, [illegible]

Cleanup node, labeling, [illegible]
Cleanup serial node, creating, [illegible]
cover-ups, creating with Patch Replacer effect, [illegible]
CSTs (Color Space Transforms), [illegible]
See also transforms (CST)
- node-based color management, [illegible]
- using in groups, [illegible]

Ctrl key. See keyboard shortcuts
Curve palette, HSL curves, [illegible]
curves
- color correcting with, [illegible]
- in mini page layout, [illegible]
- isolating, [illegible]
- setting contrast, [illegible]

Curves palette
- black point, [illegible]
- Lum Sat video, [illegible]
- opening, [illegible]

Curves palette histogram, setting, [illegible]
custom renders, creating, [illegible]
See also Render Cache
custom windows, creating, [illegible]
See also windows
cuts
- checking confidence, [illegible]
- nudging one frame at a time, [illegible]

D

Dark Blue serial node, labeling, [illegible]
data burn-in, adding to viewer and final video, [illegible]
Data Levels, setting, [illegible]
DaVinci Remote Monitor app, [illegible]
DaVinci Resolve 18 quick setup, [illegible]
DaVinci Resolve archive, opening, [illegible]
DaVinci Resolve, downloading, [illegible]
DaVinci Resolve panels, [illegible]

DaVinci Wide Gamut, 280. See also gamut (color)
DaVinci YRGB color management, 172–176
DCP (digital cinema package)
  defined, 437
  naming and outputting, 435–437
  unencrypted, 435
DCP render, setting up, 433–435
"Decode quality," choosing with raw settings, 284
Defocus/ED node, labeling, 300
deletion of cached files, automating, 378
deliverables, appearance of, 446
delivering content, 7
delivering projects
  uploading presentations, 416–422
  using Lightbox to check uniformity, 412–416
delivery and setup on Macs, 412–416
Denoise serial node, labeling, 303
depth of field, mimicking, 75–80
depth plane, isolating grades to, 38–42
Design Training and Certification Program, 2
destructive grades, potential for, 193. See also grades
difficult tracks, fixing, 309–312. See also tracks
display profile, finding for macOS, 172
Display Qualifier Focus, 81
display-referred color management, 180. See also color management
DNxHD 175 10Bits codec, 444
downloading
  DaVinci Resolve, xi
  and installing DaVinci Resolve lesson files, xiii
downstream nodes, 182
.dra folder, creating, 4
.dra format, 444
Dropbox setting, 424
.drp files, 7, 194
.drt format, 444
Dual Native ISO feature, 290
dynamic attributes, modifying, 358–360
dynamic keyframes, animating position values with, 358–359. See also keyframes
dynamic range, 164–170. See also wide dynamic range

E

EBU Color Bar, locating, 187
editing, offline and online, 360
Editing Comp mode, 400
EDLs, importing, 271–273
Effects and Definitions panel, 253
emulation LUT, applying, 233–235. See also LUTs (lookup tables)
exporting. See also Quick Export
  and importing stills, 248–251
  from tiles, 445
  project archive, 362
external mattes, using, 216–222
Eyes category, 117
Eyeshadow category, 126

F

Face node, labeling, 303
face refinement
  combining windows with, 122–126
  enhancing skin tones with, 116–126
Face Window circle window, creating, 117
files, organizing into bins, 346–351. See also project files
Film Look Creator
  designing grades with, 231–234
  generating looks in, 237
filters and flags, organizing shots with, 48–51. See also Fast Filter; Pre-Filter parameter
Final Cut Pro 7/X setting, 437
fixing
  difficult tracks, 309–312
  translation errors, 151–160

flags and filters, organizing shots
with, 46–47
footage. See balancing footage
foreground, labeling, 160–161
Foreground Appearance, 167
Frame mode, switching from Tracker
to, 46–47
frame rates, matching, 388
full levels, 444
Fusion Output Caching process, 383.
See also caching process

G

Gain color wheel, xxiv, 17, 19, 28, 30
Gain master wheel, 15, 28, 30
Gain Y bar, 16
gallery, xxi–xxii
Gallery View button, 297
gamma, remapping, 152
Gamma color wheel, xxiv, 28
Gamma master wheel, 15
gamma tags, 456
Gamma Y, 16
gamut scale. See also monitor display, gamma
considering for delivering content, 176
mapping between, 173
Generators, accessing, 187
Global Blend parameter, 167
Global wheel, 127
grade compositing. See node-based grade
compositing
grades. See also base grades; destructive
grades; post-clip grades; timeline grades
animating, 351–352
copying, 398
copying using Timeline album, 236–238
designing with Film Look
Creator, 231–234
isolating in depth planes, 38–42
toggling on and off, 10
grades and nodes, appending, 233–234
gradients and color bar graphics, 28
grading versus broadcast monitor, 173

grading workflow
balancing and shot matching, 8, 10
creating looks, 9
primary and secondary, 10
secondary grading, 9
visualizing in Node Editor, 10
graphic anomaly, encountering, 217
Gray Scale component clip, naming, 352
grid interfaces, using, 113–118
groups. See also clip group finish; post-clip
group finish; pre-clip group finish;
timeline grade finish
adapting to color grading
workflow, 270–271
creating, 270–277
reviewing contents of, 280
using color charts to balance, 285–287
using CSTs in, 282–286

H

H.264 Master setting, 429
H264 Hyperdeck setting, 429
H.265 Master setting, 429
harsh appearance under modest
window, 30
HDR (high dynamic range) media,
grading, 393–403
HDR balance node, labeling, 402
HDR palette
control point position, 398
custom zones, 403–404
highlight mode, 399–401
mapping to color panels, 403
saving custom zones, 404
Zones graph, 400–402
Headlights node, labeling, 172
hero shot, choosing, 97
High Dynamic Range palette, 393
highlight, xxiv
Highlight button, 16, 17, 38, 39
Highlight HDR button, 36
highlight master wheel, 17

Highlight Recovery, using with raw projects, [illegible]
Highlights and Shadows parameters, [illegible]
Highway Group self-guided exercise, [illegible]
Home Group self-guided exercise, [illegible]
Hotspot Brightness, [illegible]
HSL curves
  versus Color Warper, [illegible]
  using with skin tones, [illegible]
  working with, [illegible]
HSL Qualifier palette, [illegible]
HSL selection, refining, [illegible]
Hue, disabling, [illegible]
    See also complementary hue
Hue curves, naming convention, [illegible]
Hue Rotate field, [illegible], [illegible]
Hue Vs Hue palette, [illegible]
Hue Vs Sat, [illegible]

I

Image Scaling tab, Project Settings, [illegible]
Image sequence media, [illegible]
Image uniformity. See Offset color wheel
Image watermark, applying over video, [illegible]
Image wipe, [illegible]
Images, brightening, [illegible]
IMF setting, [illegible]
Importing
  and exporting stills, [illegible]
  pre-conformed EDLs, [illegible]
  XML timelines, [illegible]
Input and Output DRT parameters, [illegible]
Input Hue field, [illegible]
Input Sizing mode, [illegible]
Installing DaVinci Resolve lesson files, [illegible]
Interface
  Color page layout, [illegible]
  palette panel, [illegible]
  Primaries color wheels, [illegible]
  viewer, [illegible]
ISO, changing for raw projects, [illegible]

J

joiner node, deleting, [illegible]

K

key elements, sharpening, [illegible]
Key Frame Editor, in color page layout, [illegible]
Key mixer, seeing results of, [illegible]
keyboard shortcuts
  bypassing node trees, [illegible], [illegible]
  bypassing nodes, [illegible]
  Cinema Viewer mode, [illegible]
  collapsing viewer, [illegible]
  comparing results, [illegible]
  comparing work to source footage, [illegible]
  Contrast node, [illegible]
  cycling through versions, [illegible]
  disabling color adjustments, [illegible]
  entering color pages, [illegible]
  inverting wipes, [illegible]
  Keyframes palette, [illegible]
  layer mixers, [illegible]
  moving in viewer, [illegible]
  ripple commands, [illegible]
  Select All clips, [illegible]
  serial nodes, [illegible]
  Shot Match, [illegible]
  toggling grades, [illegible]
  toggling Primaries color [illegible] wheels, [illegible]
  toggling wipes, [illegible]
  Undo, [illegible]
  versions, [illegible]
Keyframe Editor, [illegible]
Keyframe Timeline Mode, [illegible]
Keyframeable categories, expanding list of, [illegible]
keyframes, using to animate grades, [illegible], [illegible]. See also dynamic keyframes; static keyframes

Keyframes palette
- increasing interface size, [illegible]
- navigating, [illegible]

Key between nodes, reusing and refining, [illegible]

KODAK LUT compound node, creating, [illegible]

L

LAB color space, setting, [illegible]

layer mixer node, compositing color effects with, [illegible]. See also nodes

layers, naming, [illegible]

LUT login curve window, labeling, [illegible]

legal levels, [illegible]

lesson files, getting, [illegible]

Lift color wheel, [illegible]. See also shadows

Lift master wheel, [illegible]

Lightbox, using to check timelines, [illegible]

linked A/V clips, [illegible]. See also A/V clips

Live Preview behavior, changing, [illegible]

Live Save, [illegible]. See also saving

local versions, creating, [illegible]

log adjustment controls, [illegible]

log wheels and color, comparing, [illegible]

log wheels and Primaries color, toggling between, [illegible]

The Long Weekday project, naming, [illegible]

looks, creating, [illegible]

LOOK layer, naming, [illegible]

LOOK serial node, labeling, [illegible]

Look serial node, labeling, [illegible]

looks, generating in Film Look Creator, [illegible]

Loop button, [illegible]

LUT files, adding, [illegible]

LUT node, labeling, [illegible]

LUT to Set Fit curve, [illegible]

Luma waveform, [illegible]

luminance
- altering, [illegible]
- displaying, [illegible]
- impact of Offset wheel on, [illegible]

Luminance selection, [illegible]

LUTs (Lookup tables). See also conversion LUT
- 3D LUT Compatible option, [illegible]
- applying to clips in media pool, [illegible]
- working with, [illegible]

M

Mac displays, using DaVinci Resolve with, [illegible]

macOS
- finding display profile in, [illegible]
- quick setup, [illegible]

Macs, setup and delivery on, [illegible]

Magenta Look serial node, adding, [illegible]

Magic Mask. See also AI Magic Mask 2 palette
- fixing difficult masks with, [illegible]
- matte selection, [illegible]

Magic Mask overlay, [illegible]

Magic Mask palette, [illegible]

markers, using for filtering purposes, [illegible]

Mask Overlay, toggling, [illegible]

masking
- physical features, [illegible]
- secondary grading, [illegible]

Master node, labeling, [illegible]

master wheels. See also RGB color management
- balancing colors with, [illegible]
- identifying, [illegible]
- setting tonal range with, [illegible]

Match node, labeling, [illegible]

matching clips. See also clips
- finding, [illegible]
- using waveforms, [illegible]

matching frame rates, [illegible]

matching shots. See also comparing shot match
- at the group level, [illegible]
- using LUTs, [illegible]

matte data, reusing, [illegible]

Matte Finesse tools, [illegible]

matte preview, disabling, [illegible]

Offline Group self-guided exercise, [illegible]
offline and online workflows, 164
offline reference, syncing, 161–163
Offset color wheel, xxiv, 134
Offset wheel
  accessing, 41
  impact on luminance, 35
onscreen control menu, [illegible]
onscreen window controls, toggling, 71. See also windows
Option key. See keyboard shortcuts
OTIO (Open Timeline IO), 162
output color space. See also color space
  changing for dynamic range, 135–136
  setting, 403
OUTPUT LUT, 229
Output LUTs, 403
Output sizing, 448–449
Outside node, deleting, 71, 88
oversaturation, fixing, 92–100

P
pages, resetting, 11
Palette panel, xiv
panels, 449–452
Parade scope, 30, 36, 37–42
parades, comparing side by side, 44
parallel mixer node, creating processing branches with, 196–207. See also nodes
Patch Replacer effect, creating clean ups with, 352–355
people and objects, tracking automatically, 290–312
performance, optimizing with Render Cache, 366–378
photo color, matching, 182
physical features, masking, 330–333
Pink-toned circular window, deleting, [illegible]
Pivot parameter, 28
Playhead icon, [illegible]
plug-ins, removing from nodes, 138
Point Tracker, 317
position values, animating with dynamic keyframes, 354–358
Post-Filter, increasing, 302
  See also filters, settings
post-clip grade, applying with external reference, 272–273
  See also clips, grades
post-clip group level, using to create unifying look, 272–287. See also groups
Power Windows, 75, 81. See also windows
PowerGrade unit, appending, 246
pre-clip group level, 277–282
  See also groups
pre-conformed EDLs, importing, 271–275
Pre-Filter parameter, 86
  See also filters, settings
Premiere XML, setting, 427
presentations, uploading, 419–427
Presentations setting, 424
presets, saving, 444
presets and render workflow, understanding, 423–428
Primaries color and log wheels, toggling between, 37
Primaries color bars, adjusting, 34–35
primaries color wheels, xiv–xvii, xxiv, 29
primary grading with color wheels, setting tonal range, 17–34
PRIMARY layer, naming, 202
Pro Tools setting, 421
processing branches, creating, 196–205
project backups, setting up, 6–7
project files, locating, 7. See also files
project housekeeping, 166–171. See also [illegible]
Project Server, 462
Project Settings, opening, 110, 111
projects
  checking timelines before delivery, 412–426
  remote rendering, 434–435
  reviewing with clients, 419–422
ProRes setting, 424
proxy workflows, exploring, 164–167

Q

Qualifier (Hue/Sat) controls, [illegible]
Qualifier palette, [illegible]
qualifier selection, removing, [illegible]
Qualifier tool, [illegible]
qualifier values, refining, [illegible]
qualifiers
  as "color space aware" tools, [illegible]
  limiting, [illegible]
Quick Export, [illegible]. See also exporting

R

Radius control, Sharpen palette, [illegible]
[illegible] node, labeling, [illegible]
raw clips, determining, [illegible]. See also clips
raw media projects
  setting up Render Cache for, [illegible]
  sidecar file, [illegible]
raw settings. See also Camera Raw palette; [illegible]
  adjusting at clip level, [illegible]
  adjusting at project level, [illegible]
  reviewing on project level, [illegible]
RCM (Resolve Color Management). See color management
Rec. 709-A, using as output color space, [illegible]
Rec. 709-A Gamma 2.4 output color space, [illegible]
RED IPP2 tone mapping option, [illegible]
[illegible] corrector node, labeling, [illegible]
[illegible] layer node, creating, [illegible]
Reference Sizing mode, [illegible]
Reference Sizing tool, [illegible]
refreshing clips, [illegible]
refreshing individual clips, [illegible]
Remote Monitor app, [illegible]
remote rendering, [illegible]
Remove OFX Plugin option, [illegible]
Render Cache. See also custom render
  clearing, [illegible]
  optimizing performance with, [illegible]
  setting up for Raw media projects, [illegible]
render jobs, editing, [illegible]
Render settings, exploring, [illegible]
Render Settings (Advanced), [illegible]
Render Settings panel, [illegible]
render workflow and presets, understanding, [illegible]
renders, customizing, [illegible]
Replay setting, [illegible]
Reset UI Layout, [illegible]
resolution. See also 4K resolution
  and aspect ratio, [illegible]
  rescaling media to, [illegible]
  standards, [illegible]
resolution options, supporting, [illegible]
Resolve FX plug-ins, removing from nodes, [illegible]
Restore node, labeling, [illegible]
reviewing projects with clients, [illegible]
Revival category, Resolve FX, [illegible]
RGB channel button, [illegible]
RGB channels, [illegible]
RGB output, connecting to RGB input, [illegible]
RGB selection, fine-tuning, [illegible]
[illegible] curve window, labeling, [illegible]
ripple commands, assigning shortcuts to, [illegible]

S

Sat Vs Lum, [illegible]
saturation and windows, using to draw attention, [illegible]
Saturation range, [illegible]
saving. See also Live Save
  advanced Render settings, [illegible]
  and applying LUTs to raw clips, [illegible]
  custom [illegible] layout for HDR, [illegible]
  node tree templates, [illegible]
  presets, [illegible]
  stills for other projects, [illegible]
Scene Cut Detection, using to prepare media, [illegible]

viewer's eye, controlling, [illegible]
Vignette node, creating, [illegible]
vignettes, focusing attention with, [illegible]
Vivid setting, [illegible]
visual data, sampling with node sizing, [illegible]

W

warping color ranges, [illegible]
watermark, applying over video, [illegible]
waveform, raising top of, [illegible]
Waveform brightness slider, [illegible]
waveform scope, [illegible]
waveforms, using to match clips, [illegible]
wide dynamic range, correcting scenes with, [illegible]. See also dynamic range
Widescreen filters, [illegible]
window outline, hiding, [illegible]
Window palette, [illegible]
windows. See also custom windows; onscreen window controls; Power Windows
  combining with face refinements, [illegible]
  tracking data, [illegible]
  using to limit qualifiers, [illegible]
windows and saturation, using to shape attention, [illegible]
Windows quick setup, [illegible]
Wipe Timeline Clip, [illegible]

wipes
  inverting, [illegible]
  toggling on and off, [illegible]
Workday Dailies, Custom name, [illegible]
Workday_HD_Preview, creating in Render Queue, [illegible]
workflows. See grading workflow; offline and online workflows; proxy workflows; render workflow; [illegible]

X

XML (eXtensible Markup Language), [illegible]
XML export, preparing timelines for, [illegible]
XMLs
  timeline, exporting, [illegible]
  See also timelines
XYZ color space, [illegible]

Y

Y (luma) channel, [illegible]
Y (luminance) bar, Primaries color bars, [illegible]
YouTube setting, [illegible]
YRGB color management, [illegible]. See also [illegible]

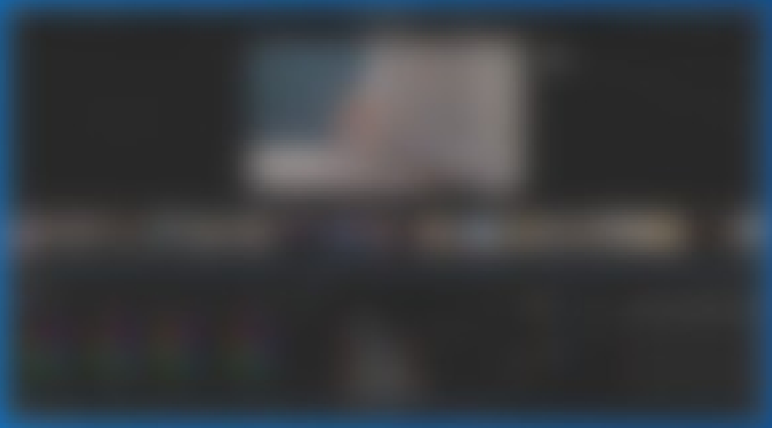
Z

zone layouts, saving for HDR, [illegible]
zooming
  in and out of viewer, [illegible]
  into reference image, [illegible]

The Colorist Guide to

DAVINCI RESOLVE 20

[illegible]



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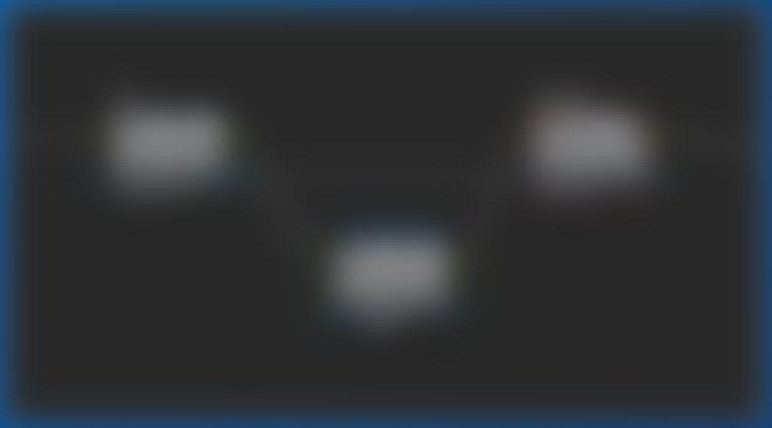

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What You'll Learn

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Who This Book is For

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