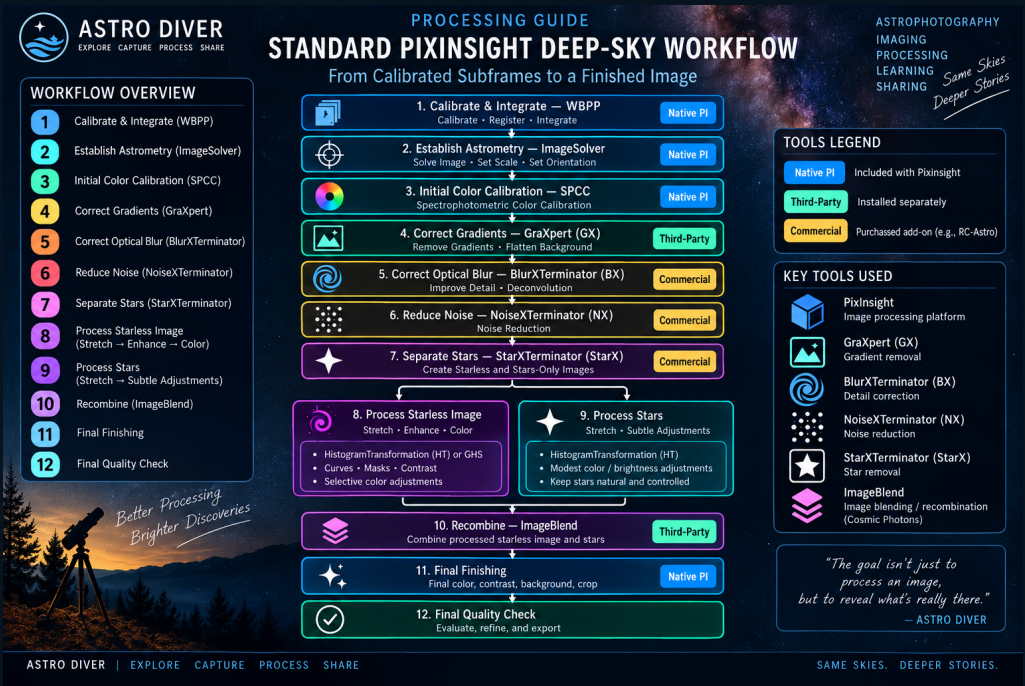


# Standard PixInsight Deep-Sky Processing Workflow

From calibrated subframes to a finished image



Version 1.0 | September 2026

A practical guide documenting the workflow I currently use on my own astrophotography data.

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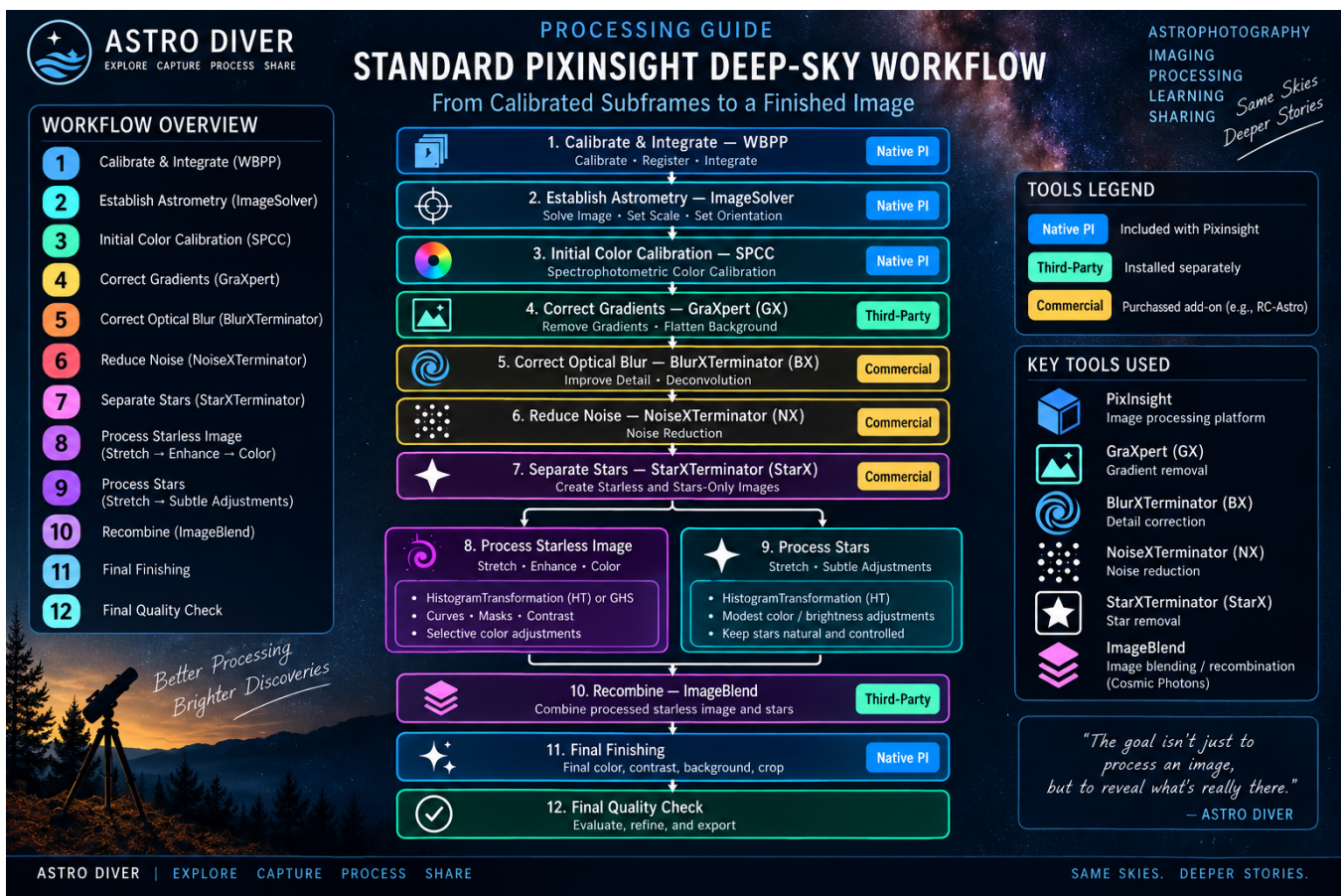
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This guide presents the processing backbone I currently use for many one-shot-color deep-sky images in PixInsight. It follows the image from calibration and integration through color and gradient correction, blur and noise correction, star separation, stretching, recombination, and final quality control. Along the way, I highlight the points where I normally stop, inspect the image, and decide what comes next.

## About This Guide

This guide documents the astrophotography processing workflow I currently use on my own data. It is intended as an educational reference rather than a universal recipe. Astrophotography data varies considerably with equipment, observing conditions, acquisition methods, and the astronomical target, so settings and results will vary. I encourage experimentation and adjustment based on your own data.

## Workflow at a Glance



The workflow is intentionally linear through calibration, astrometry, color calibration, gradient correction, blur correction, and initial noise reduction. StarXTerminator then separates the image while it is still linear. Stretching the starless and stars images is the transition into nonlinear processing.

# Software and Add-ons Used

| Tool                                 | Role in this workflow                                                                            | Type                         |
|--------------------------------------|--------------------------------------------------------------------------------------------------|------------------------------|
| PixInsight                           | WBPP, ImageSolver, SPCC, HistogramTransformation, CurvesTransformation and other core processing | Native                       |
| GraXpert                             | Gradient correction                                                                              | Third-party                  |
| BlurXTerminator                      | Optical blur / detail correction                                                                 | Commercial add-on            |
| NoiseXTerminator                     | Noise reduction                                                                                  | Commercial add-on            |
| StarXTerminator                      | Star separation                                                                                  | Commercial add-on            |
| Generalized Hyperbolic Stretch (GHS) | Controlled stretching / nonlinear contrast work                                                  | Third-party                  |
| ImageBlend                           | Recombination of separately processed starless and stars images                                  | Third-party (Cosmic Photons) |

Important: These are the tools I currently use, not a required shopping list. The workflow can be adapted to other tools and techniques that accomplish the same processing goals.

## The Workflow

The sequence below is the backbone I currently use for many one-shot-color deep-sky images. The individual settings change from image to image, but the overall order is intentional. I generally complete calibration, color calibration, gradient correction, blur correction, and initial noise reduction while the image is still linear. I then separate the stars and process the starless image and stars independently before recombining them for final adjustments.

### 1. Calibrate and Integrate - WBPP

I begin in PixInsight with WeightedBatchPreprocessing (WBPP), using it to calibrate, register, evaluate, and integrate the individual subframes into a master image.

This is more than a housekeeping step. Problems introduced here can follow the image through the entire processing workflow, so I inspect the resulting master before moving forward. I look for registration problems, satellite or aircraft trails that survived rejection, unusual edge artifacts, gradients, clipping, and anything else that suggests the integration should be revisited.

I don't use one universal set of WBPP parameters for every dataset. The number of imaging sessions, calibration data available, image quality, and characteristics of the target can all affect the choices I make.

What I'm looking for: A clean, properly registered master with good rejection and no obvious integration problems before beginning image processing.

### 2. Establish Astrometry - ImageSolver

Before performing color calibration, I use ImageSolver to establish an accurate astrometric solution for the integrated image. This identifies exactly where the image is located in the sky and provides the coordinate and scale information needed by processes such as SpectrophotometricColorCalibration

(SPCC).

If the image has already been successfully plate solved during acquisition or integration and contains a valid astrometric solution, this step may not need to be repeated. I verify that the solution is present and correct before moving on.

What I'm looking for: A successful astrometric solution with the correct image coordinates, orientation, and scale.

### 3. Establish Initial Color - SPCC

With a valid astrometric solution in place, I use SpectrophotometricColorCalibration (SPCC) to establish a physically based starting point for color. SPCC uses the stars in the image, along with catalog data and the characteristics of the imaging system, to calibrate the relationship between the red, green, and blue channels.

I treat SPCC as a starting point rather than the final artistic color treatment. At this stage, my goal is to establish a reliable color balance while the image is still linear. More subjective color adjustments can come much later in the workflow.

What I'm looking for: A believable, neutral starting color balance with natural-looking star colors and no obvious color cast introduced by the calibration.

### 4. Correct Gradients - GraXpert

After color calibration, I evaluate the image for gradients and uneven background illumination. I typically use GraXpert for gradient correction, particularly with data captured from my light-polluted home skies.

I don't treat gradient removal as an automatic cleanup step. I inspect the correction carefully to make sure real astronomical signal - especially faint nebulosity - isn't being mistaken for background. The appropriate correction strength depends heavily on the target and the character of the gradient, so I generally favor the least aggressive correction that produces a clean, natural-looking background.

This is also a point where I may decide that the image doesn't need additional gradient correction at all. The goal is to remove unwanted background structure, not to make the background artificially uniform.

What I'm looking for: A more even background without removing faint target signal, creating artifacts, or flattening legitimate large-scale structure.

### 5. Correct Optical Blur - BlurXTerminator

While the image is still linear, I use BlurXTerminator (BX) to correct optical blur and improve the definition of both stars and deep-sky structure. Applied at this stage, BX can recover detail affected by atmospheric seeing, tracking, and the optical system before the image is stretched.

I approach BlurXTerminator primarily as a correction tool rather than simply as a way to make the image look sharper. I inspect stars closely for changes in size and shape and examine fine structures within the target to make sure the correction remains natural.

The appropriate settings vary with the quality and image scale of the data. I would rather leave a little softness in the image than push the correction far enough to create hard edges, unnatural small-scale

structure, or artifacts around stars.

What I'm looking for: Better-defined stars and improved structural detail without halos, ringing, distorted stars, or an artificially sharpened appearance.

## 6. Reduce Noise - NoiseXTerminator

Before stretching, I use NoiseXTerminator (NX) for an initial reduction of noise while the image is still linear. At this stage, the goal is not to eliminate every trace of noise, but to give the image a cleaner foundation before stretching makes the remaining noise more visible.

I generally favor a controlled application rather than aggressive smoothing. I compare the preview carefully, paying particular attention to faint nebulosity and small-scale detail that can be softened along with the noise.

Additional noise reduction may be appropriate later in processing, particularly after stretching, but I prefer to preserve real structure rather than chase a perfectly smooth background.

What I'm looking for: Noticeably cleaner data with faint structure and fine detail preserved, rather than a completely smooth or artificial-looking image.

## 7. Separate Stars - StarXTerminator

Before stretching, I use StarXTerminator (StarX) to separate the linear image into a starless image and a stars-only image. From this point forward, I can process the nebula, galaxy, or other deep-sky structure independently from the stars.

This separation gives me much greater control during stretching and color adjustment. The starless image can be stretched aggressively enough to reveal faint structure without simultaneously enlarging or overwhelming the stars, while the stars can receive a more restrained treatment of their own.

I inspect the starless image carefully after separation, particularly around bright stars and dense star fields, for residual stars, holes, halos, or other artifacts that may need attention before continuing.

What I'm looking for: A clean separation with the target structure preserved, minimal star remnants or artifacts, and a stars-only image suitable for independent processing.

## 8. Process the Starless Image

With the stars removed, I begin the main nonlinear processing of the deep-sky target. I typically use HistogramTransformation (HT) and/or Generalized Hyperbolic Stretch (GHS) to move the image from linear to nonlinear while controlling the balance between faint structure, brighter regions, and the background.

From this point, the workflow becomes much less prescriptive. Depending on the target, I may use CurvesTransformation, GHS, masks, contrast adjustments, and selective color work to develop structure and color while protecting highlights and the background.

I usually work in several restrained passes rather than trying to achieve the final appearance with one aggressive adjustment. I stop frequently to evaluate the image at different scales and watch for clipped blacks, blown highlights, excessive saturation, harsh contrast, or processing artifacts.

What I'm looking for: Faint structure becoming visible while brighter regions remain controlled, with natural transitions, a believable background, and enough processing headroom for further refinement.

## 9. Process the Stars

I process the stars separately from the starless image, generally using a more restrained stretch than I use for the deep-sky target. HistogramTransformation (HT) is usually sufficient to bring the stars into the nonlinear state while maintaining control over their size, brightness, and color.

My goal is usually to preserve natural-looking star color without allowing the stars to dominate the finished image. Depending on the dataset, I may make modest adjustments to saturation, brightness, or contrast before recombination, but I try to keep this processing minimal.

Processing the stars independently also gives me the flexibility to balance their prominence against the target rather than accepting whatever star intensity results from stretching the entire image together.

What I'm looking for: Natural star color, controlled brightness and size, and enough presence to complement the target without overwhelming it.

## 10. Recombine Stars and Starless Image

Once the starless image and stars have been processed independently, I recombine them to create the finished composite. I currently use ImageBlend for this step, which allows the separately processed components to be brought back together while retaining the advantages of the starless workflow.

Recombination is another decision point rather than simply a mechanical step. I evaluate whether the stars feel appropriately balanced with the target and may adjust their intensity before settling on the final blend. Stars that looked appropriate in isolation can sometimes appear too prominent once they are returned to the processed nebula or galaxy.

I also inspect the recombined image closely for halos, unusual transitions around bright stars, color shifts, or artifacts that may have been introduced during star separation or independent processing.

What I'm looking for: A seamless recombination in which the stars look like a natural part of the image, complement the deep-sky target, and show no obvious signs of having been processed separately.

## 11. Final Finishing

After recombination, I evaluate the image as a whole and make any final adjustments needed to bring the processing together. These may include modest changes to color, saturation, contrast, brightness, or the background using tools such as CurvesTransformation, GHS, or carefully constructed masks.

I try to keep this stage restrained. By this point, most of the important processing decisions have already been made, so final finishing should refine the image rather than fundamentally change it. I pay particular attention to the relationship between the target, stars, and background and to whether the image still looks natural at both full-frame and closer viewing scales.

I may also make the final crop or framing decision at this stage, particularly if registration or stacking has left edge artifacts or if a tighter composition improves the presentation of the target.

What I'm looking for: A balanced final image with controlled color and contrast, a clean background, natural stars, and a composition that directs attention toward the target without looking overprocessed.

## 12. Final Quality Check

Before considering an image finished, I step away from individual processes and evaluate the result as a complete image. I inspect it both at full-frame scale and at higher magnification, looking for problems that may have been easy to miss while concentrating on individual processing steps.

I check the background for clipping, gradients, excessive smoothing, or color casts; examine bright and faint stars for halos, distortion, or unnatural color; and look through the target for oversharpening, excessive saturation, blown highlights, or processing artifacts. I also reconsider the crop and overall composition.

Most importantly, I compare the final image with the data I started with. The objective isn't to extract every possible bit of contrast or color, but to produce an image that reveals the available structure while still looking balanced and believable. If something draws attention because of the processing rather than the astronomical subject, I usually go back and reconsider that adjustment.

What I'm looking for: A finished image that holds up at both normal viewing size and closer inspection, with no obvious technical distractions and a balance of detail, color, stars, and background that serves the astronomical target.

# Decision Points and Exceptions

This workflow is a backbone, not a rule set. I may skip gradient correction when the background is already clean, revisit calibration or integration if the master shows problems, use different stretching strategies depending on target dynamic range, or perform additional targeted noise, color, and contrast work when the data warrants it. The important part is to understand why a process is being used and to inspect the image before moving on.

## Final Quality-Control Checklist

- Background is not clipped and does not show obvious residual gradients or color casts.
- Bright and faint stars remain natural, without distracting halos, distortion, or unnatural color.
- Fine structure is present without an oversharpened or artificial appearance.
- Noise reduction has not erased faint nebulosity or small-scale detail.
- Color and saturation support the target rather than becoming the subject of the image.
- Starless and stars components recombine naturally.
- Crop and framing improve the presentation and remove any integration-edge artifacts.
- The final image holds up both at normal viewing size and under closer inspection.

## Closing Note

Astrophotography processing is iterative. I expect this workflow to continue changing as I learn, test new tools, and work with different targets and datasets. This document records the process I use now so that the reasoning behind each step is as useful as the sequence itself.

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