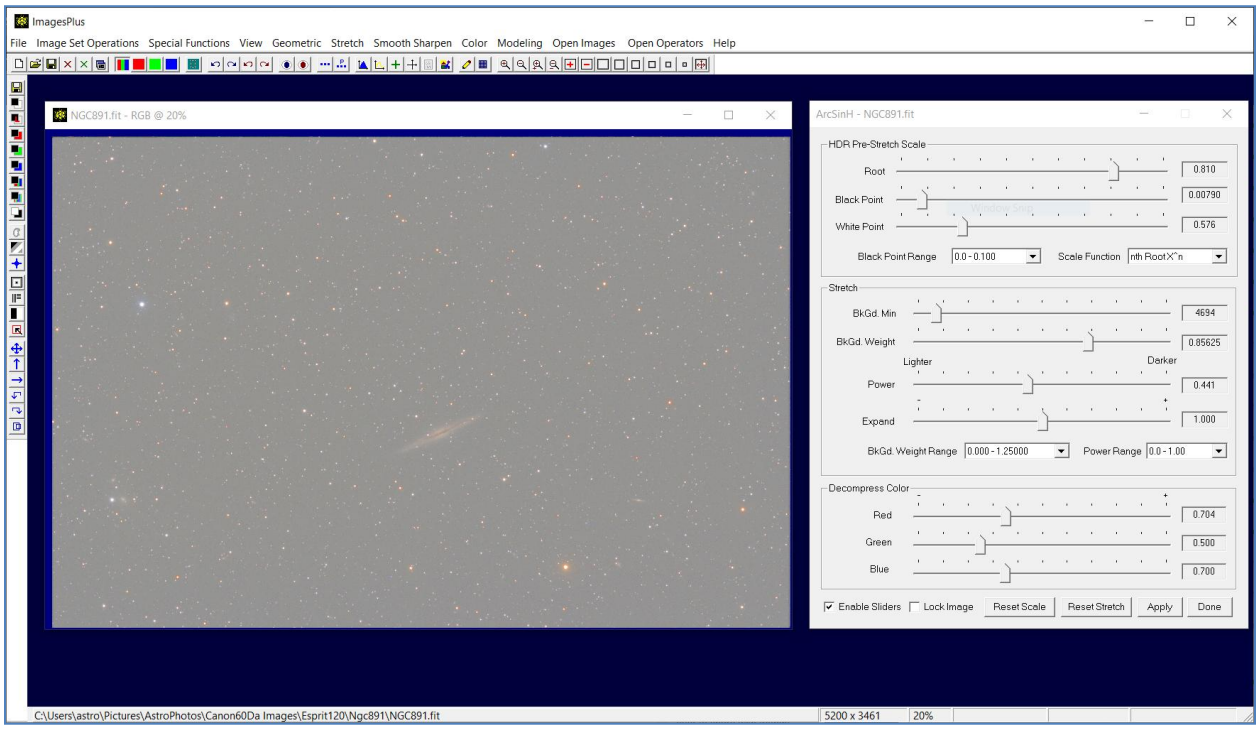
Processing NGC891 with Starless Masked Stretches & Split Star Processing

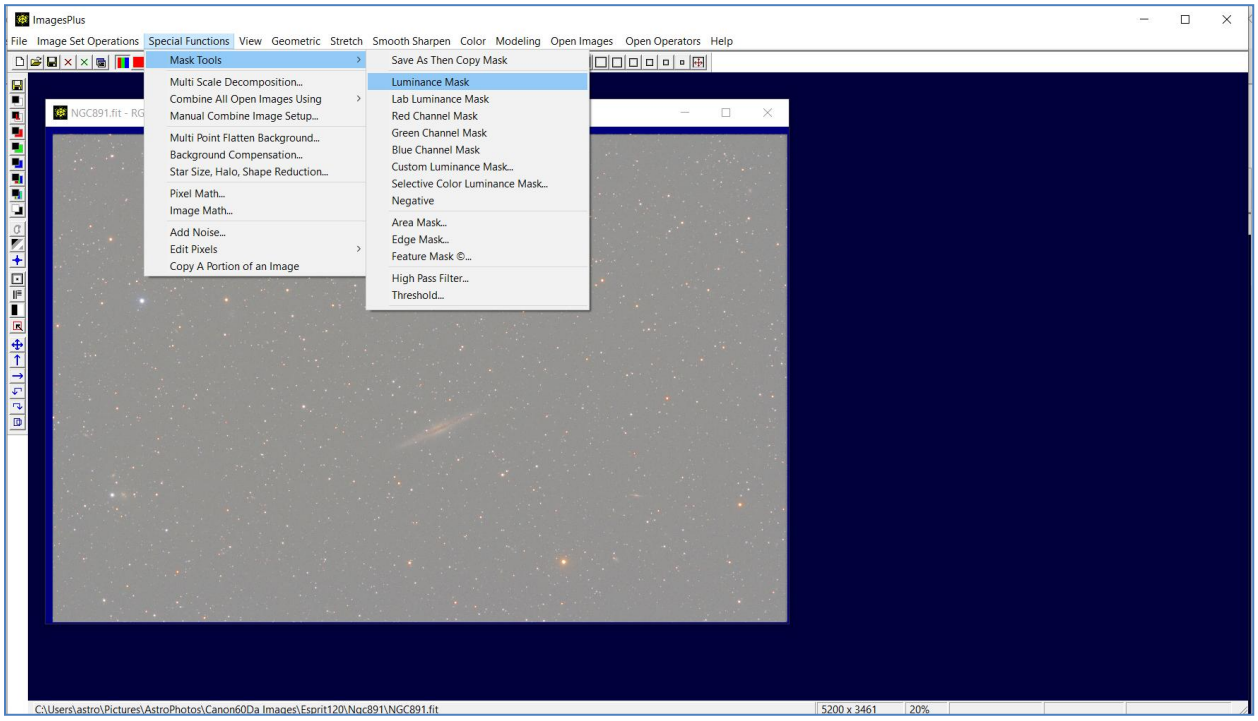
Step 1: Initial arcsinh stretch



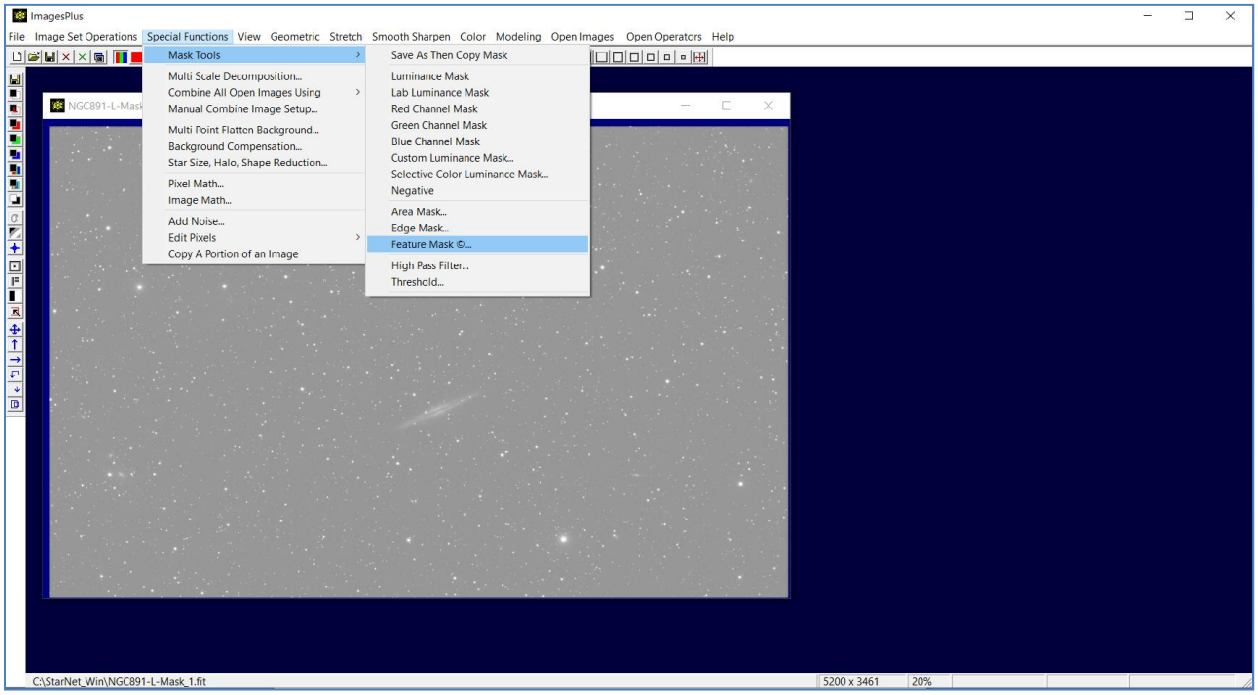
Leave the sky background bright with this stretch as it makes it easier to suppress the stars.

Step 2: Make starless mask

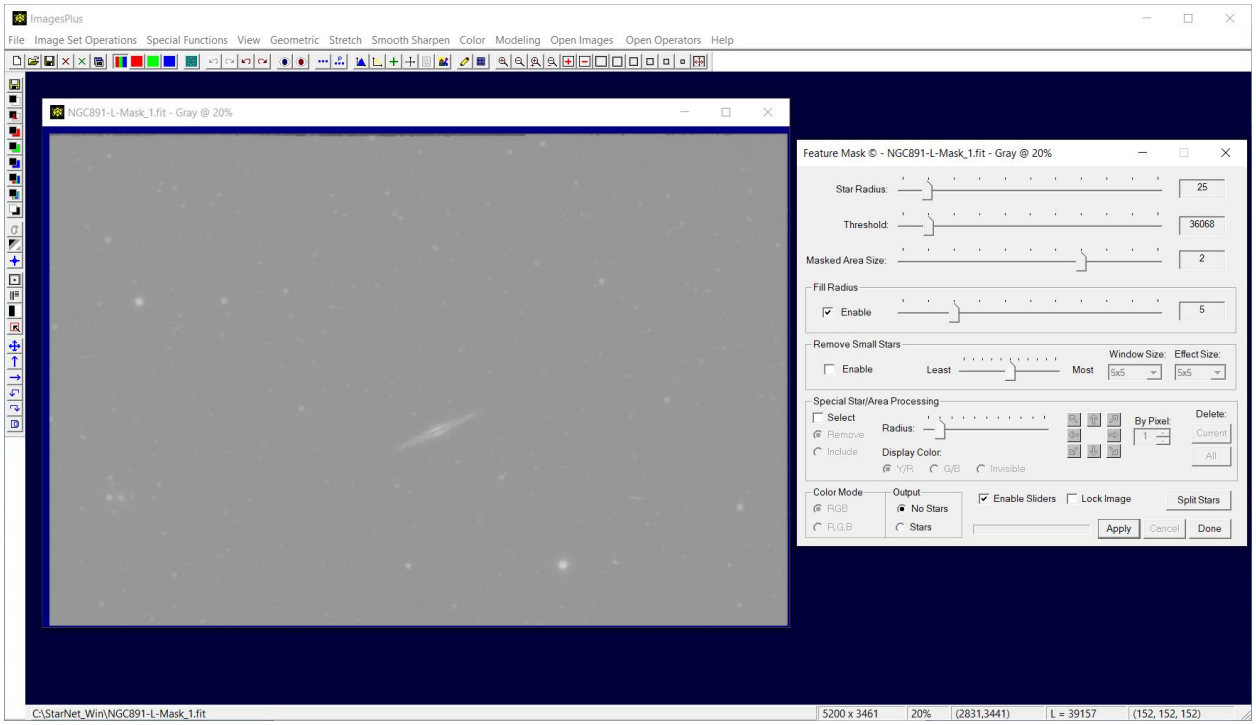
Make a luminance mask from the stretched image



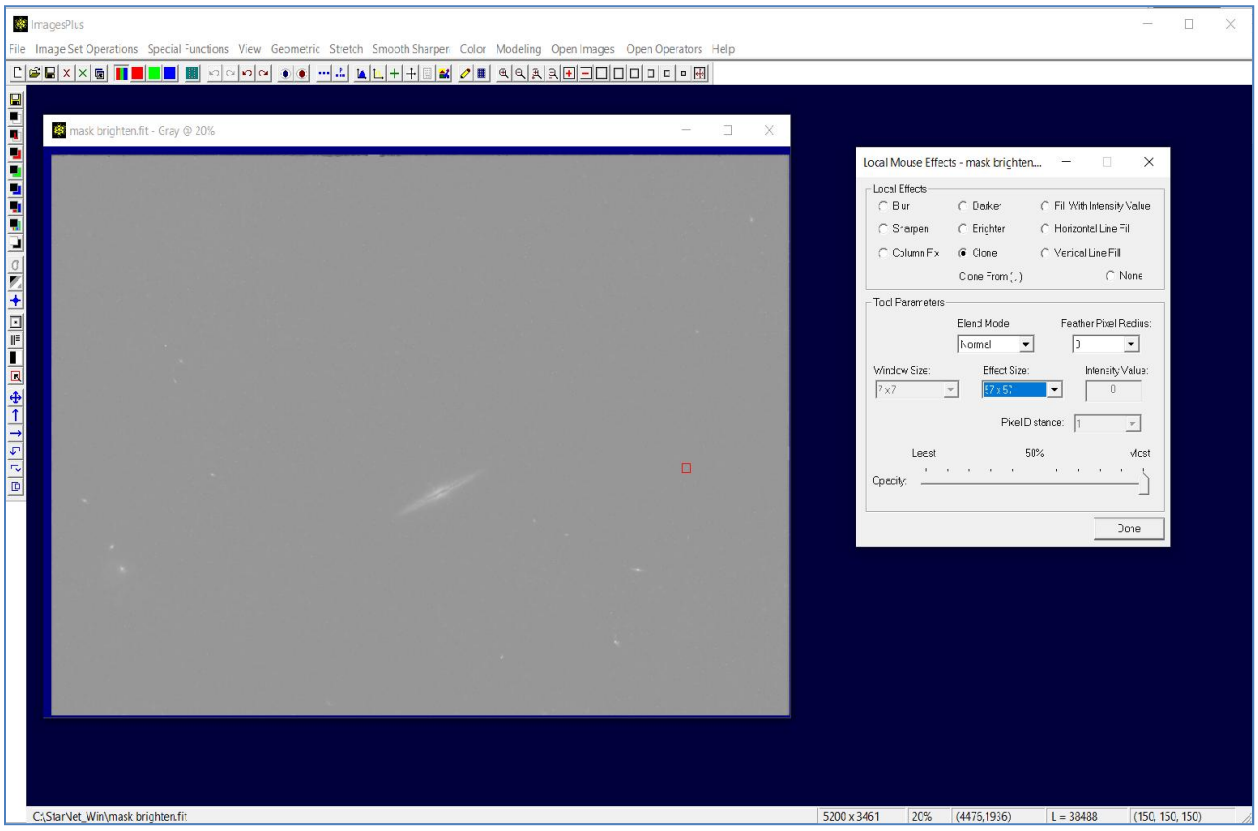
Step 3: Make a starless mask



Use the Feature Mask and a little creative cloning to remove the stars from the image.



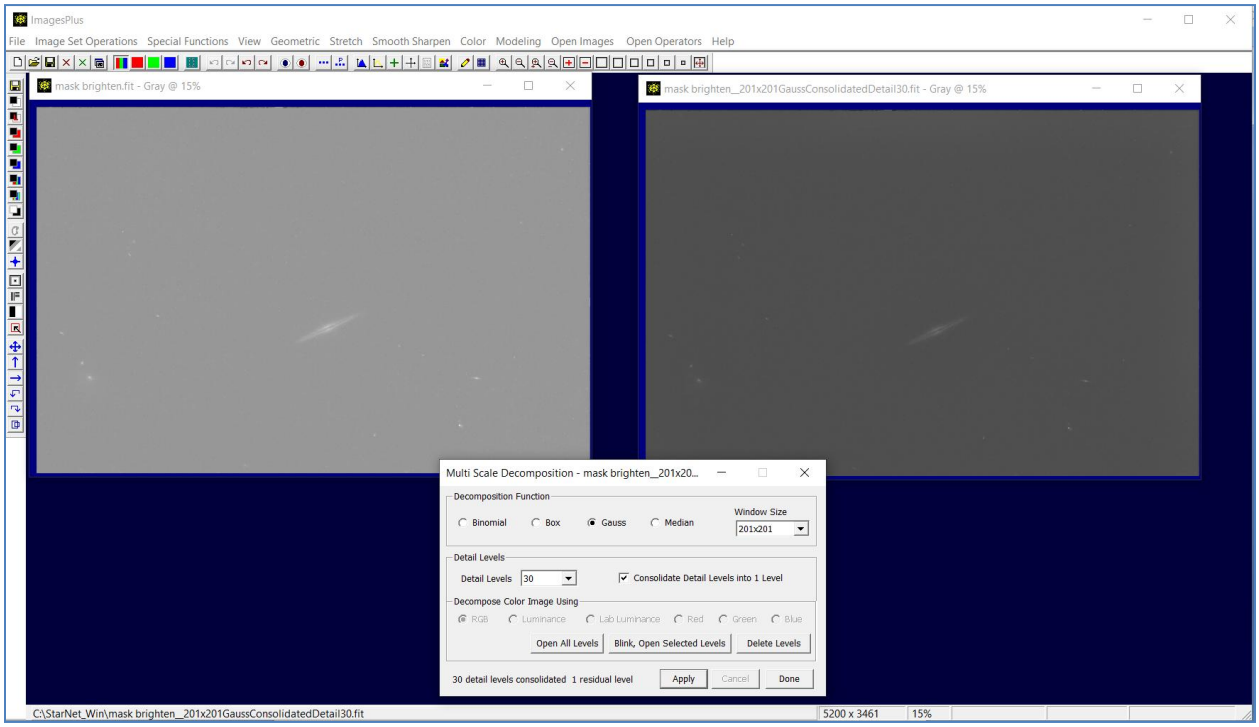
Use the clone tool to clean up the last of the bright halos producing the starless mask.



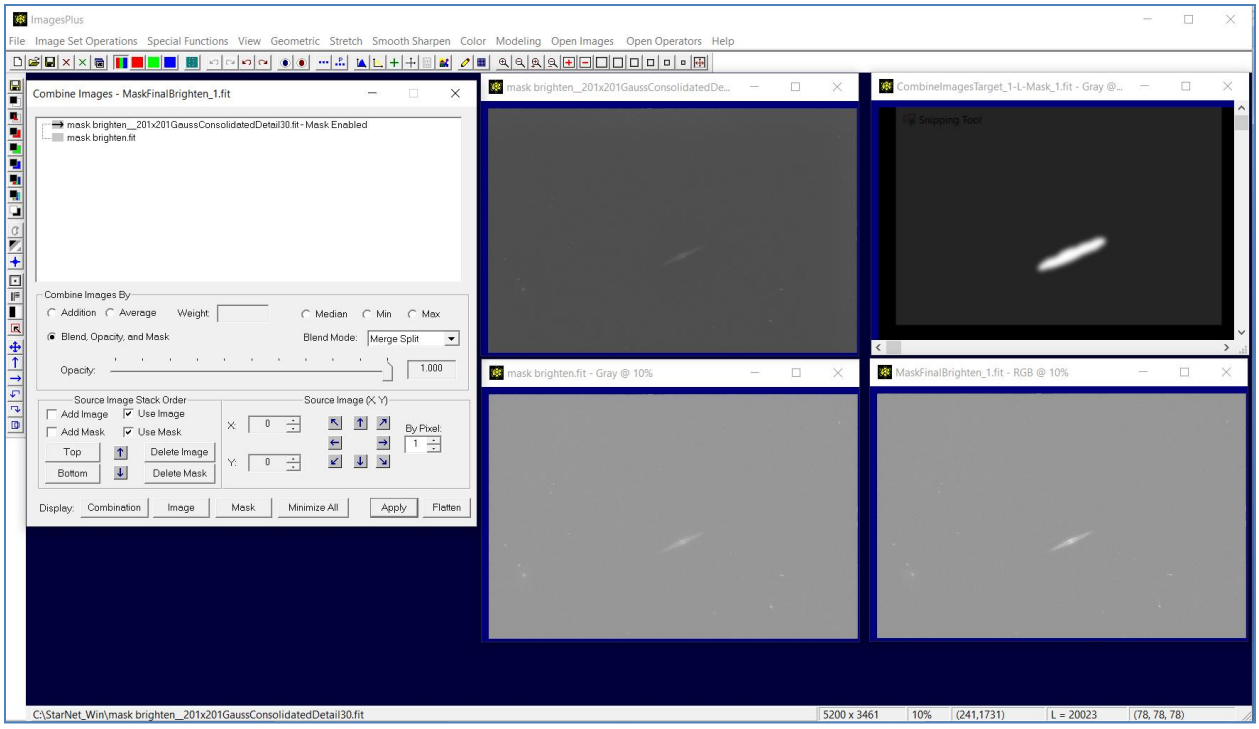
Now all that is left in the mask are NGC891 and several small faint fuzzy field galaxies. We could use the mask at this point and pick up the benefits of preventing star bloat, but with a little more work we can enhance the image sharpness at the same time.

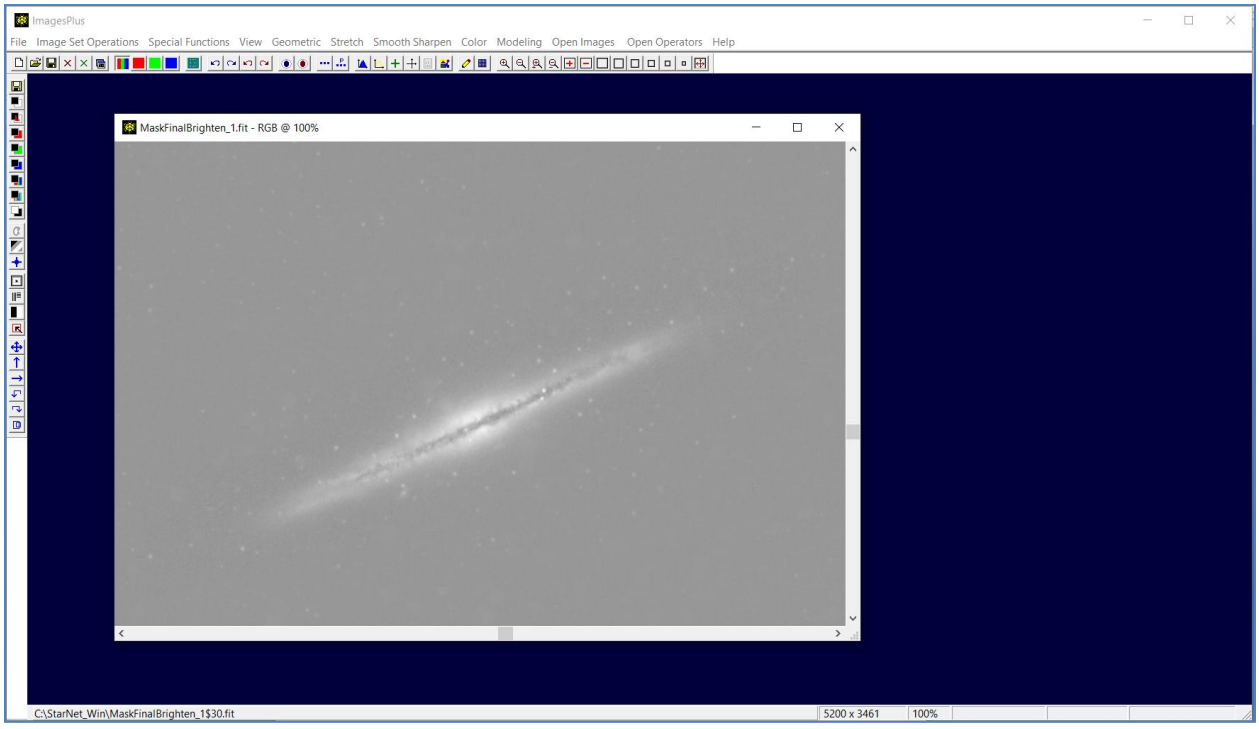
Step 4: Enhance the mask

Here we will use multiscale processing and a layer combine using the unique merge split blend mode in Images Plus. The first thing is to split the mask into detail and residual brightness layers by using the multiscale decomposition tool with a large radius and 30 iterations as shown below.



Finally we make an image stack with the detailed image from the multiscale processing on top with its blend mode set to merge split. This will increase the sharpness and contrast of the resultant stack, but it can be a little harsh on the background. To avoid this simply paint a mask to limit the effect to the main galaxy and any other fuzzies you want to enhance. It is usually a god idea to blur the mask a bit to properly blend the effect into the background at the galaxy edges. No need to be too careful in painting the mask as this technique maintains the background level while it brightens and sharpens the galaxy.

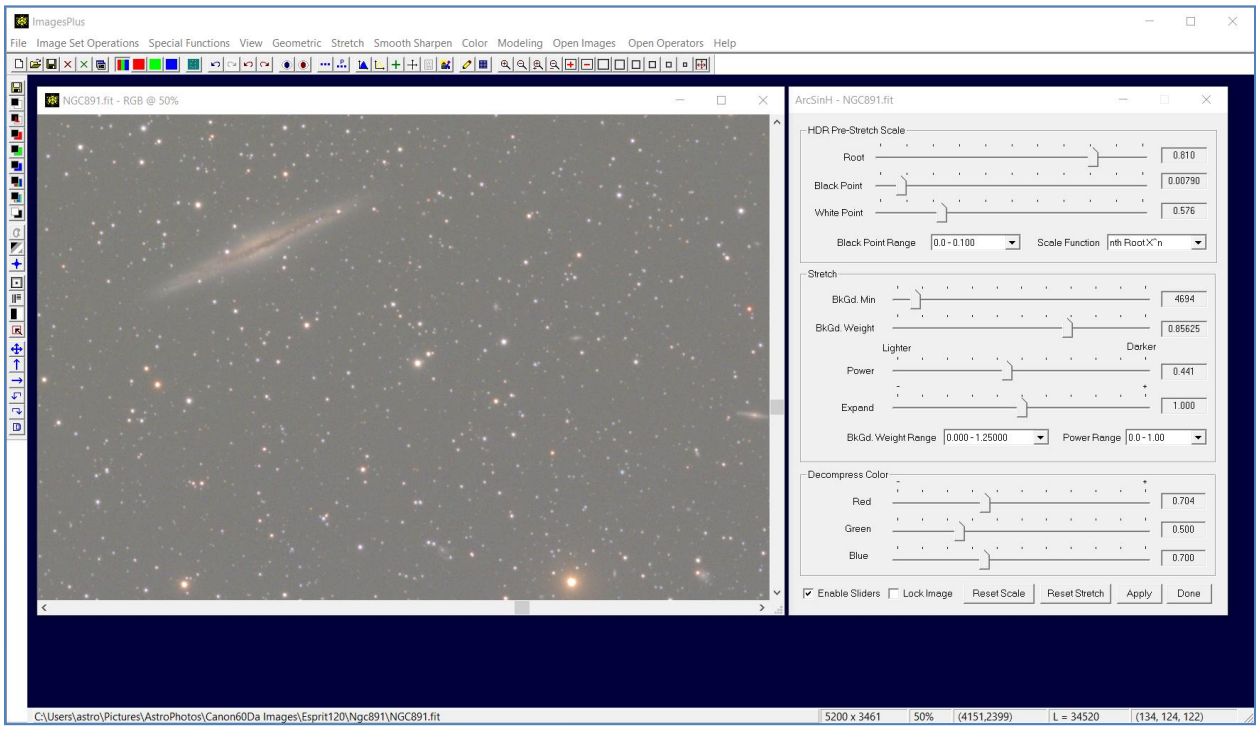




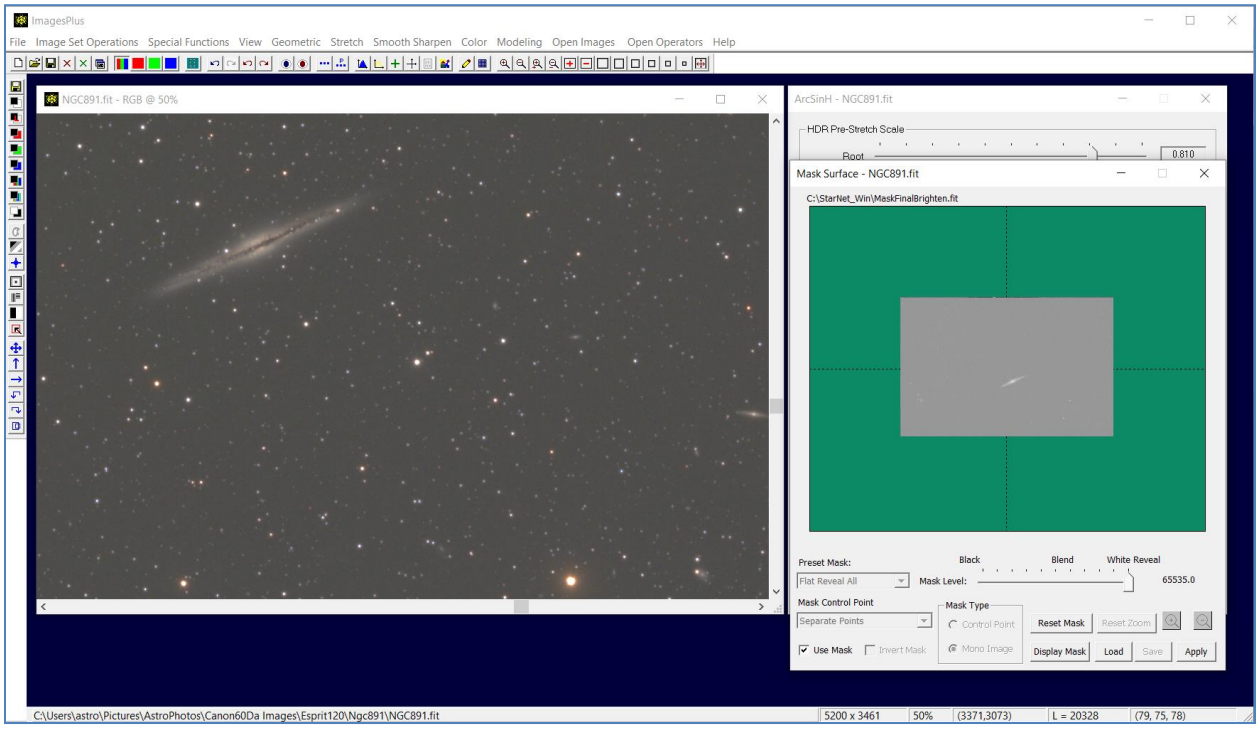
From here you can use levels to set the background level. Be careful making the background too dark as when the mask is applied it will make the stars very faint.

Step 5: First image masked stretch

Now return to the original unstretched image. Apply an arcsinh (or your favorite stretch routine) to the image. Leave the background a little bright as shown below.



This makes an image that has a brighter galaxy, but also has slightly bloated stars and lacks a little contrast. When the starless mask is applied to the stretch the result we get a nicely stretched image with a sharp and contrasty galaxy with little star bloat.

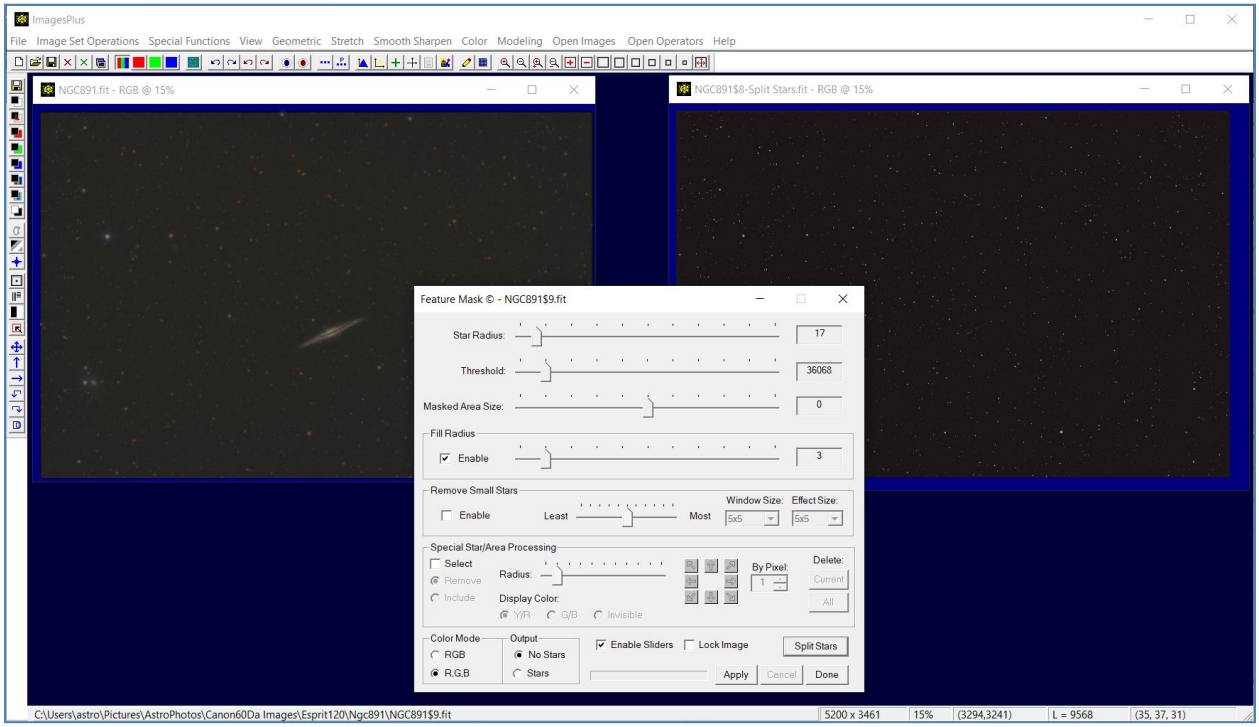


Zooming in on the main galaxy you can see the effect in full detail.

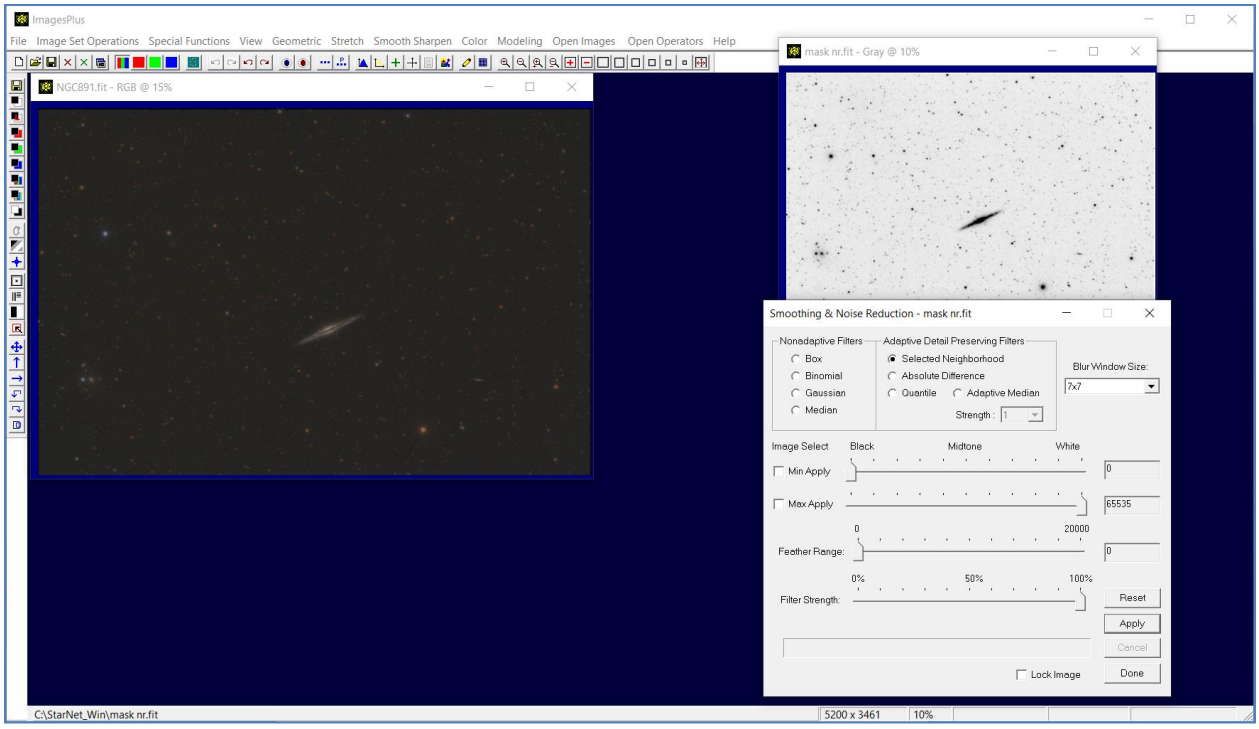


Step 6: Noise reduction

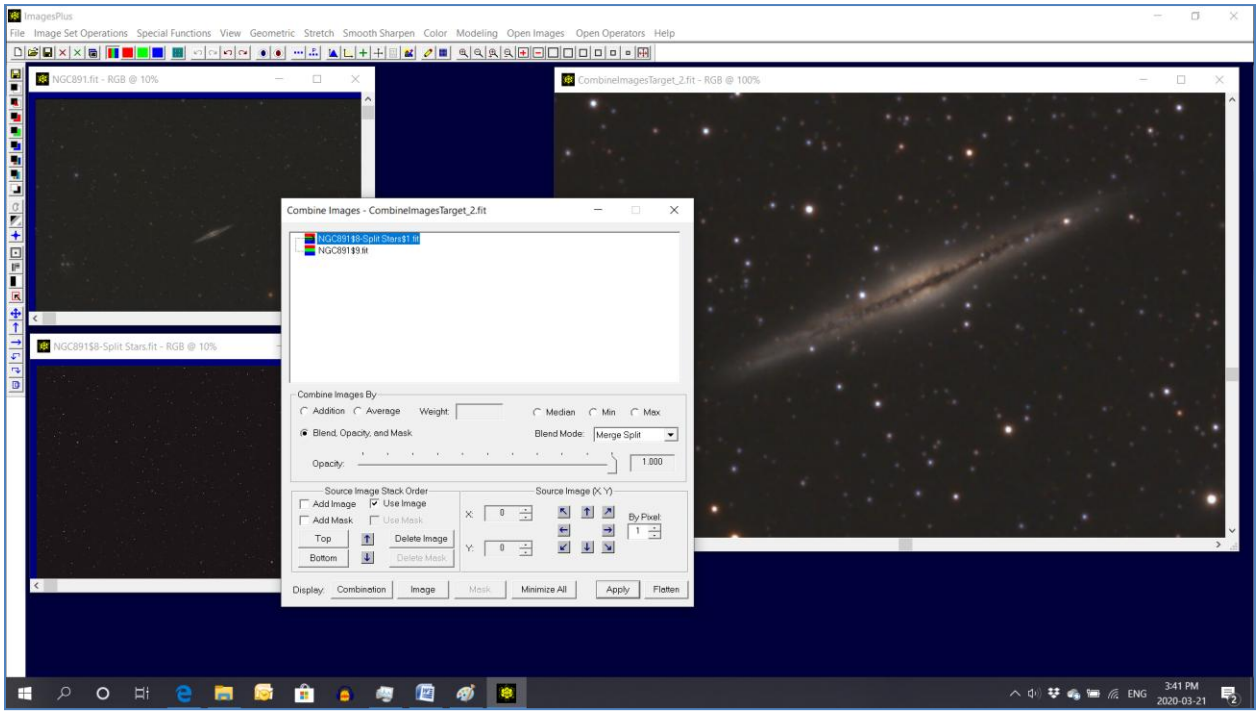
The next thing on the processing list is to take down the noise a bit. The problem here is that usually the noise reduction blurs the stars and detail a bit. To prevent this problem use the Feature Mask tool to split the stars out of the image and use an inverted luminance mask when taking down the noise in the deep sky object (DSO) layer.



Once the stars are split from the image, the blurring from the noise reduction won't affect them leaving them sharp when recombined. Even with this we only want to apply the noise reduction to the background since the masked stretching helped to keep the noise in check quite well. The inverted luminance mask made from the DSO layer with the dust lane painted black will protect all the detail we have worked to keep in the galaxy.

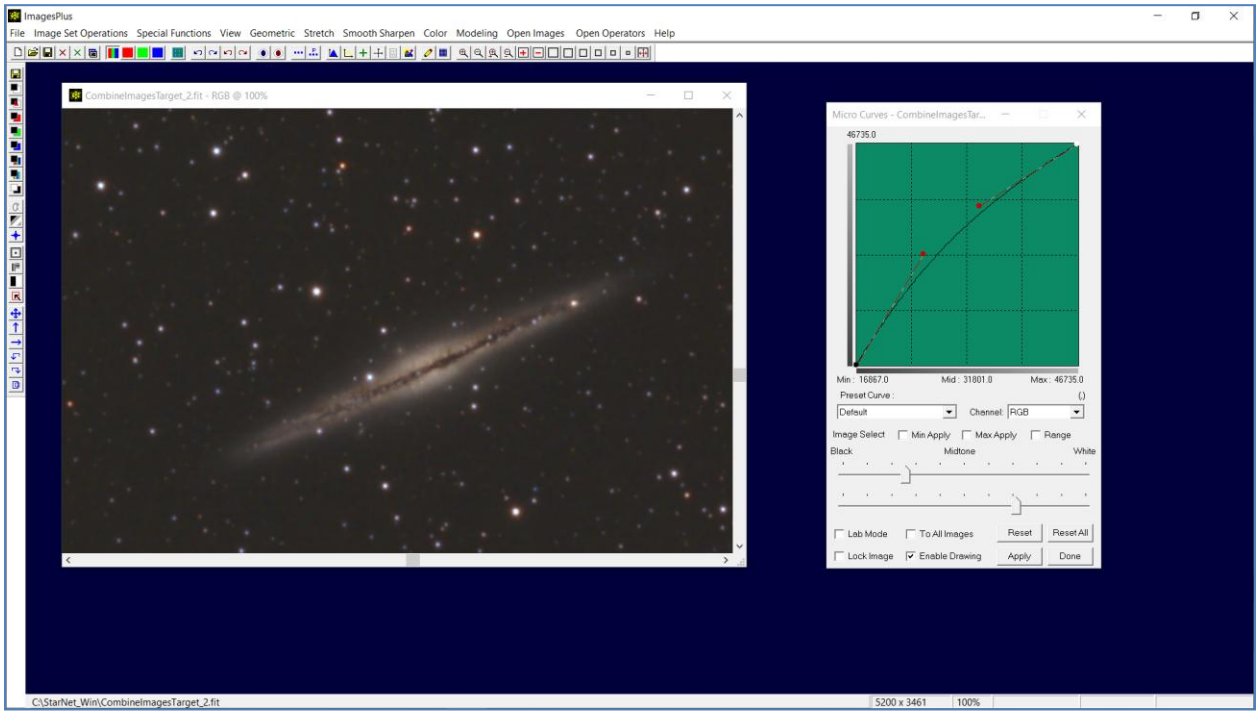


Recombining the two layers leaves us with a stretched and noise reduced image ready for the final tweaks.



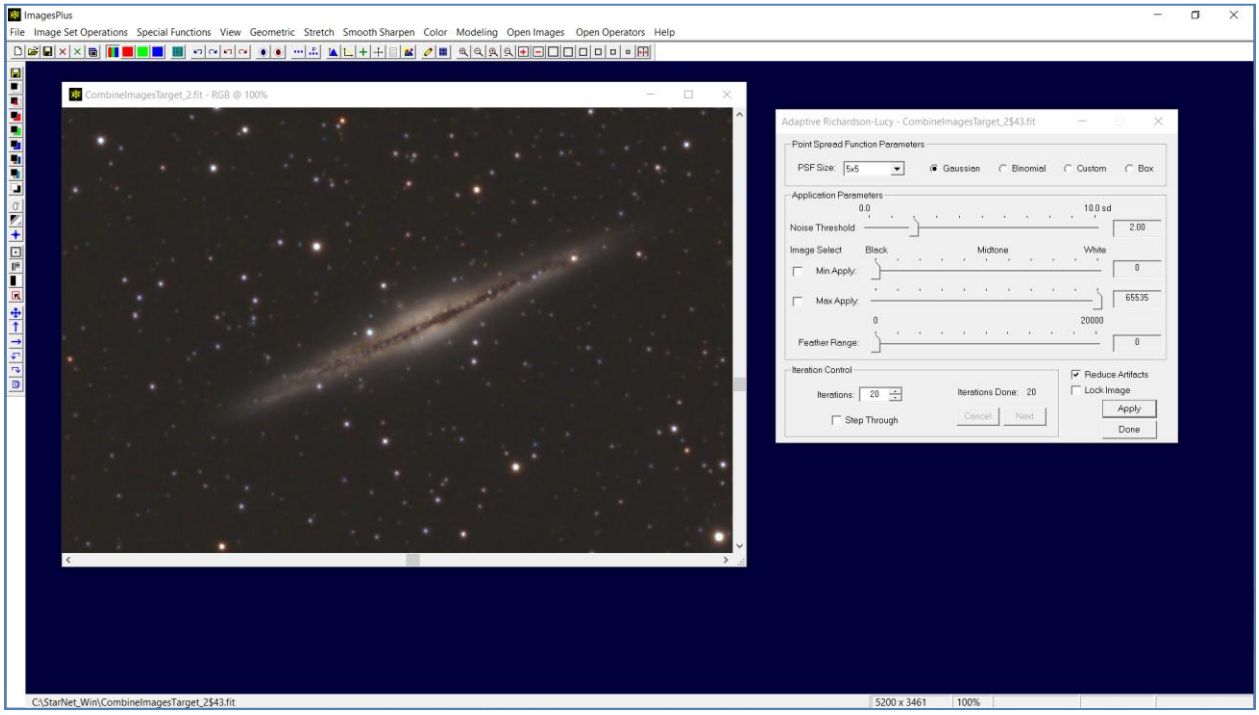
Step 7: Final curve adjustment

Finally the galaxy gets brightened up a bit using a curve adjustment.



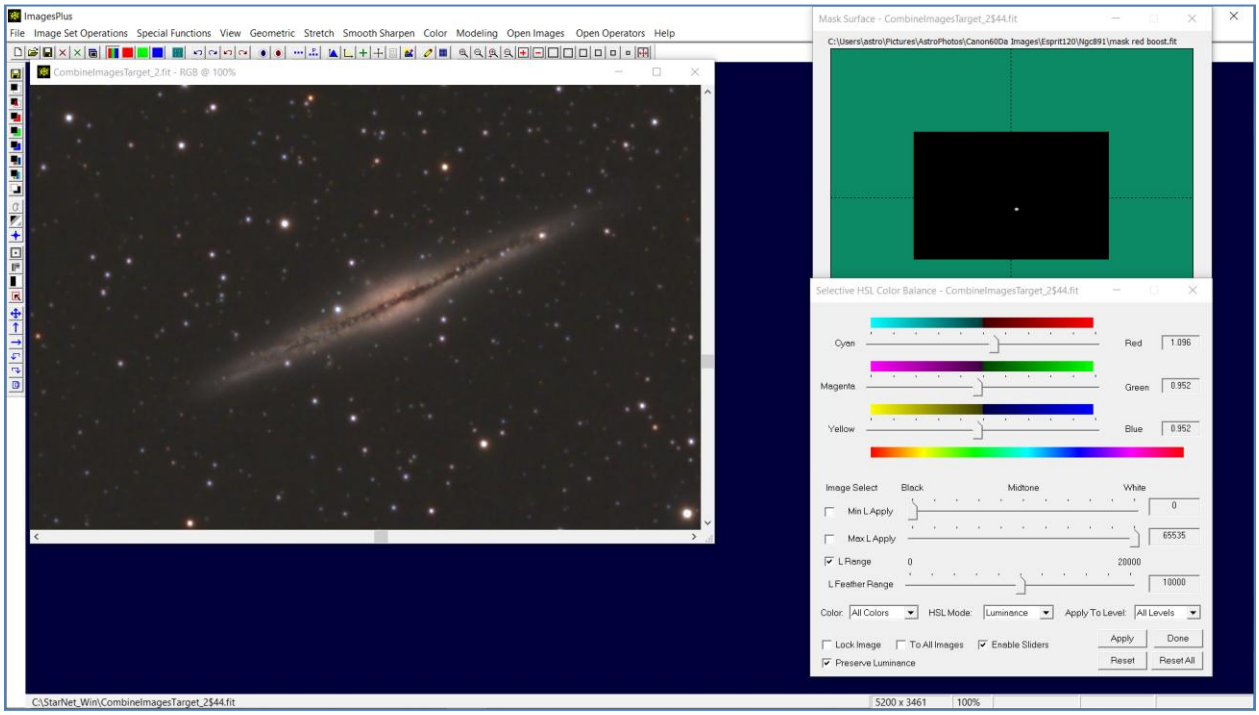
Step 8: Sharpening

Here we slightly sharpen the image using LR deconvolution. Apologies to the PI fans, but it is perfectly valid to apply deconvolution at any time in the process. While using a star as a PSF is mathematically correct before any saturation or nonlinear stretch. Deconvolution, even with a stellar PSF will still sharpen an image at any time as long as your goal is a pretty picture.



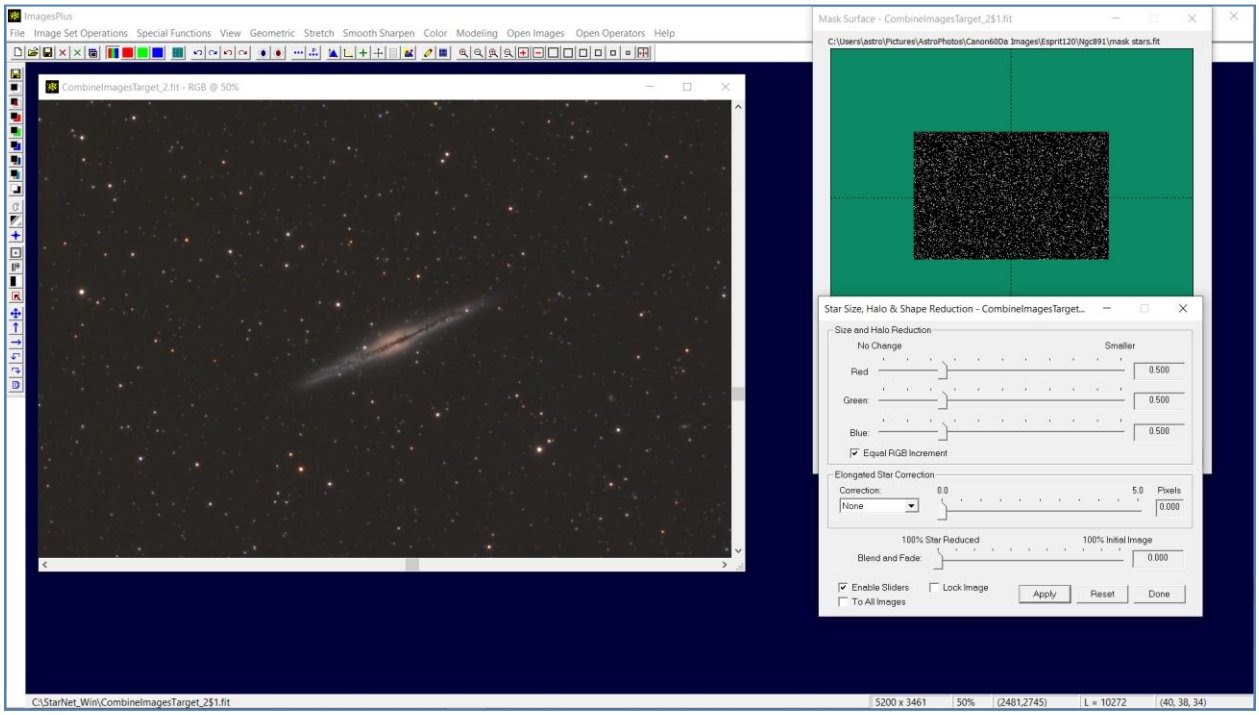
Step 9: Core saturation

My camera is a Canon 60Da, and although it has reasonable Ha sensitivity the core is a little bland for my tastes. Using a blurred painted mask to isolate the core a little red is added using the selective HSL colour balance tool.



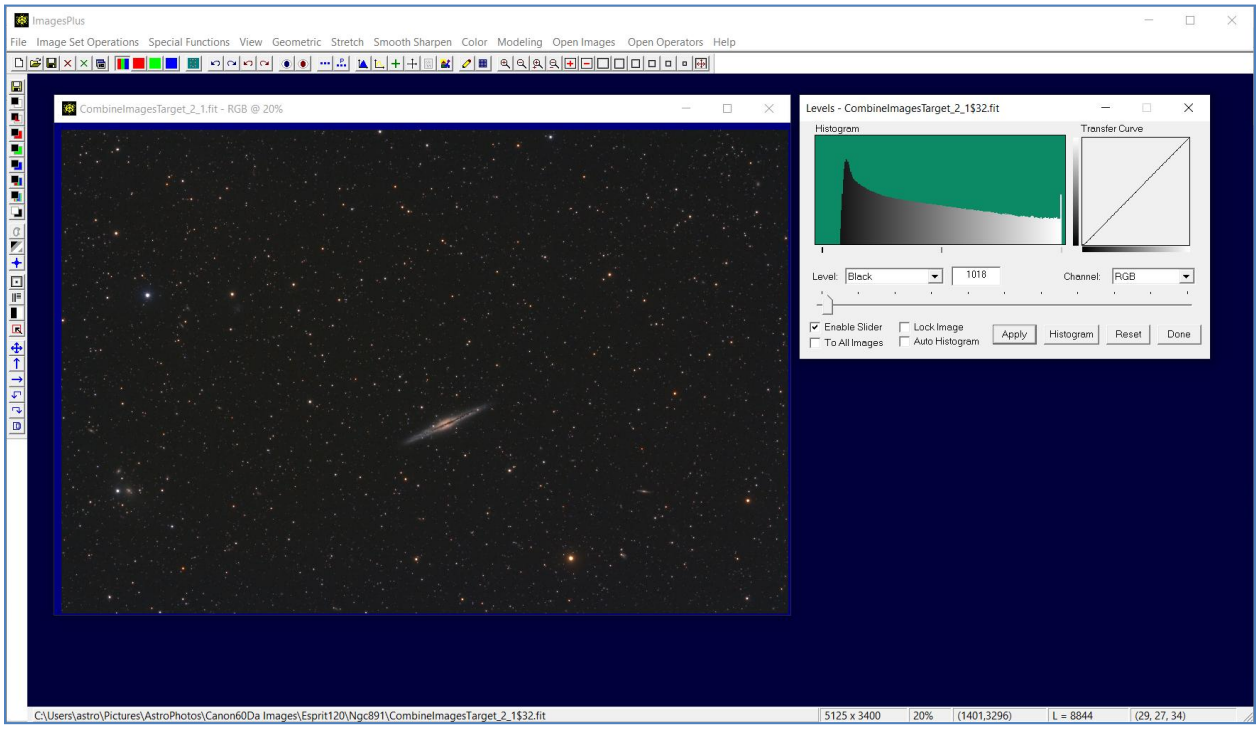
Step 10: Final star reduction

The feature mask tool is used again to split out the stars and a luminance mask made from the star layer. Using the undo button the feature mask star split is undone. The star reduction tool is used with the mask to limit the effect to the stars.

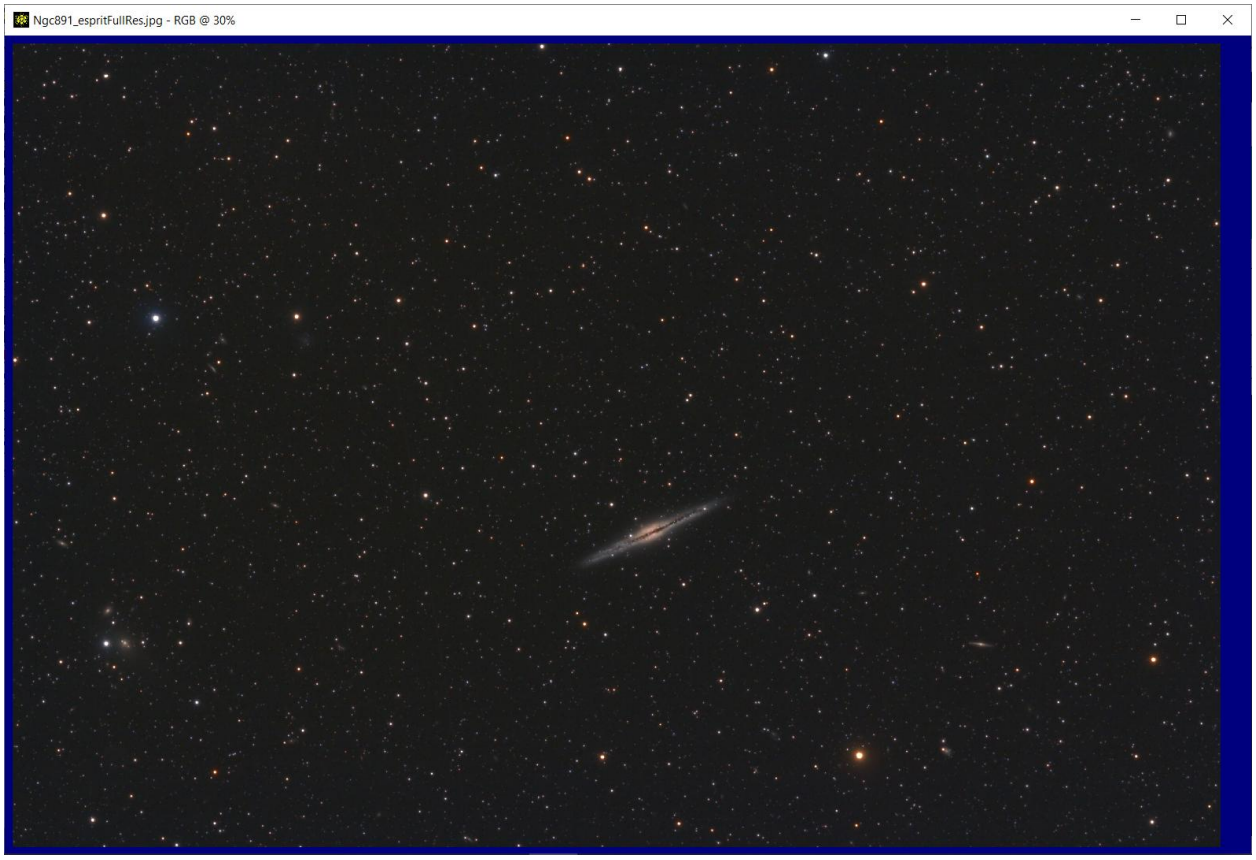


Step 11: Crop and levels adjustment

For the second last step the image was cropped to remove the stacking artifacts, the background colour neutralized and levels used to set the final image brightness. Normally the image would be cropped to center the main target, but for this paper I've only removed the stacking artifacts.



This produces the final image shown below.



Zooming in on the main target shows the full result of the processing.

