RECON EDITING GUIDELINES for CHILD MRI
(Note: the below is specific to a data set, but does probably contain generalizable guidelines)

First, do a quick run through of the recon from the anterior to posterior of the brain, looking both at the surfaces and at the aseg.mgz volume, to gather an idea of whether the recon requires only small or moderate and major edits. Small edits could be, for example, removing a little bit of skull that's been left in the brainmask and is affecting the pial surface, or adding control points to include a gyrus in the white and pial surfaces. Major edits are ones that are less clear cut and require either an intermediate knowledge of FreeSurfer or anatomy. Some examples of major edits are manual re-labeling of part of the aseg, editing the wm.mgz volume to include temporal lobe signal drop-off.

We always recommend making a copy of your recon before any edits are done, make edits on and re-process this new copy. That way you have your earliest recon to compare to and see if your edits helped.
When you are making edits to the white (and pial) surfaces, first try to make all edits you think can be solved with control points first. It is advisable to always make control point edits first as they more drastically change the white matter surface. Additionally, the -autorecon2–cp flag causes the recon-all stream to begin earlier in the pipeline and therefore does not take the wm.mgz edits into account or may effectively delete them. Only place control points in voxels that you believe to contain white matter, do not place control points right on top of each other (spread them out by a couple voxels in the three orthogonal directions if you can), and use them sparsely - a few control points can have a big effect!

If control points do not fully fix the surfaces, white matter edits (such as adding or deleting voxels from wm.mgz) may be needed to further refine the white surface. In particular, control points may not be able to fully re-scale wm in thin branches, such as in the temporal lobes. Adding voxels to the wm.mgz to 'bridge' these strands will be helpful. When white matter is scaled correctly (meaning its intensity is somewhere between 90 and 110), but it is still being excluded from the white surface, look for a 'hole' where white matter is not labeled as such on wm.mgz and try filling in the voxels (using voxel edit).
Make sure to make these edits second to control points, and then re-run your recon again using
-autorecon2-wm.

Common problem areas for surfaces for the age group you are working with are: the temporal poles, the posterior portions of the occipital lobe, the inferior lateral ventricles and some superior gyri (in areas of ringing). The aseg structures that most frequently contained errors were the hippocampus, amgydala, putamen and globus pallidus. Please, note that the aseg should generally only be edited if the cerebellum segmentation leaks into the superior brain gray matter or vice versa, and if this segmentation error affects the pial surface (if the surface is including part of the cerebellum or is excluding part of the cortex). In this case, you can relabel the cortex/cerebellum to have the correct values, and make sure to reach out to the FreeSurfer team for instruction. Do not manually relabel any subcortical grey matter structures unless you have been trained in anatomy and/or have previous experience manually editing the aseg.

Here is an excerpt from a previous group making edits to a pediatric data set. They experienced significant signal drop-out in the temporal lobes, and so if you run into cases where this is an issue it would be worth reading how they dealt with fixing it: "The most time-consuming and common issue with youth data sets occurs in the temporal lobes and is due to signal drop-off in these areas. Often this means the pial and white surfaces drop out a few or many slices too early in the temporal pole. Most commonly this means that there are 4-8 slices in which the temporal lobes, usually the anterior temporal poles, are visible but that the surfaces are not grabbing them adequately or completely. Equally often the pial surface will be more accurate than the white matter surfaces due to the white matter voxels in the temporal lobes not being a high enough intensity (110). In both types of cases, the most efficient approach is to use control points every other slice in the white matter as far into the temporal lobe gyrii as the white matter reaches. With the pediatric data sets we found we often had to put control points (or manually label on wm.mgz) into very thin strips of unlabeled white matter in order to adequately push the surfaces into an accurate position. With adult data we have generally been more conservative, assuring that no control point was placed on any voxel that wasn't completely surrounded by white matter. With child data, this approach did not improve the surfaces enough because the signal drop-off was often very extreme. We almost always had to use more control points closer together than would have been recommended for an adult scan. However, sometimes, putting control points on each slice can negatively affect the surfaces, so as a rule of thumb we always placed them in every other slice. On average, in cases that needed moderate edits, we used 5-15 control points every other slice to bring the voxel intensity value up to 110. Placing several control points closer together laterally and in an evenly space line along the strand of white matter was more effective then clumping them together in one spot. Placing control points on voxels that are already at a value of 110 will be largely ineffective."

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