Glacial headwaters can deliver an abundance of alluvial sediment to a watershed, and fluxes in soil aggradation often perpetuate flood risks to populated areas downstream. As climate change amplifies precipitation and accelerates glacial retreat, tracking shifts in sediment derived from glaciers becomes essential. We are currently exploring sources of sediment in the Puyallup River Watershed in Washington State. To understand the factors that influence the fate of glacial sediment, we developed a sediment transport model of the Watershed using LandLab, an open-source geomorphic modeling package written in Python. The Network Sediment Transport (NST) feature in LandLab tracks sediment parcels through the Watershed as they are transported, eroded, and buried over time. NST utilizes a surface-based model that is empirically calibrated using a distribution of particle sizes. Using Digital Elevation Models and USGS channel measurements, we modeled coarse, mixed sized sediment (0.1-10mm diameter) derived from Emmons Glacier. During this process, we compared model outputs to local data, finding that grain size distributions matched observed results. However, modeled changes to bed material in the Emmons proglacial basin did not align with observed values, though sections of the basin eroded similarly. Parcels from Emmons Glacier were trapped downstream over time while other glacial sources reached the outlet. This suggests Emmons Glacier may not be a primary sediment source in the watershed. Our model is available for modification on GitHub. Since glacial sediment transport in local watersheds is an emerging record, we hope to apply more relevant parameters to the model.