In western Montana, phosphorus is one of the most common contaminants found in rivers and streams, threatening the health of aquatic ecosystems. In response to growing water quality concerns and new regulatory requirements, a three-stage treatment wetland was recently constructed at the Ennis National Fish Hatchery to treat wastewater generated by raceway cleaning operations. Currently only the first two stages of this system are complete and over the first two months of operation have removed over 98% of influent chemical oxygen demand, 99% of total suspended solids, 59% of total nitrogen, and 95% of total phosphorus. However, the effluent phosphorus concentration is expected to increase as organic matter accumulating in the wetland mineralizes and the phosphorus adsorption capacity of the wetland media is saturated. To maintain long-term phosphorus removal, the treatment wetland was designed with a filter unit to be filled with media capable of adsorbing large quantities of phosphorus. The purpose of this research is to choose the optimal media for this filter unit, comparing three manufactured materials (lightweight aggregate, juniper biochar, and lodgepole biochar) and four natural materials (limestone, dolomite, shale, and gravel). Batch adsorption experiments were conducted with coarse media in deionized water, coarse media in Blaine Spring Creek water, and fine media in deionized water. The difference between these batch experiments showed that water chemistry and particle size significantly affect phosphorus adsorption for a given material. Based on their high performance in batch experiments, lightweight aggregate and lodgepole biochar were tested in continuous flow columns, along with gravel to provide a baseline performance comparison. Gravel and lightweight aggregate removed more phosphorus in continuous flow columns than in batch experiments, likely due to ongoing precipitation with calcium ions in the influent. Lightweight aggregate was the top performing media in all experiments, and is recommended for use in the filter units at the Ennis National Fish Hatchery treatment wetland. Based on its phosphorus removal capacity in column experiments (1200 mg P kg⁻¹ lightweight aggregate), the filter beds will be saturated in 14 months if the current effluent phosphorus concentration of 2.3 mg L⁻¹ is maintained.