*Abstract.* – Summer steelhead *Oncorhynchus mykiss* may enter freshwater almost a year before spawning and potentially make long migrations (>1,000 km) to interior headwater habitats. However, in response to sub-optimal tributary habitat conditions, adult summer steelhead may exhibit complex behaviors during upstream migration in the Columbia River Basin. Steelhead may migrate upstream of their natal tributary, or overshoot, and spend days to several months before subsequently migrating downstream, or fallback, to their natal tributary to spawn. An existing Bayesian patch occupancy model, derived from observations of adult steelhead tagged with passive integrated transponder (PIT) tags to estimate population-specific abundance upstream of the tagging location, was modified to estimate the abundance of overshoot fallbacks. Overshoot steelhead abundance at the tagging location was estimated based on the relationship the number of known overshoot fallbacks and their model-estimated abundance. The annual mean (SD) proportion of overshoot steelhead that successfully migrated downstream of the tagging location (i.e., Priest Rapids Dam) was 0.57 (0.12). The spatial distribution of overshoot steelhead suggested the number of dams negatively affected downstream migration success probability. Improved downstream passage survival for adult steelhead will increase the abundance of those affected populations, while reducing potential genetic introgression of upstream populations (i.e., overshoot steelhead that spawn in non-natal rivers). This is the first study to estimate the abundance of overshoot and fallback steelhead providing the data necessary for scientists to estimate potential conservation benefits of improved downstream survival. The proportion of overshoot steelhead for those affect populations will likely increase in response to climate change related effects (i.e., increasing water temperatures). Studies have consistently shown that surface flow passage routes (e.g., sluiceways and temporary spillway weirs) are very effective in guiding and passing adult steelhead downstream of Columbia River hydroelectric projects, but changes in dam operations must occur throughout the basin to maximize conservation benefits.