CEE 6410 Project: Brief Description

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Submit a short description (1-2 paragraphs) describing your proposed project for the course for the semester. List group members (up to 2). See further description in the [course syllabus](https://usu.instructure.com/courses/612457/files/78158988/download?wrap=1)

**Project Description**

My objective is to develop a dual optimization model for the Bear River watershed that identify instream barrier assemblages that maximize quality-weighted aquatic habitat connectivity and minimize water scarcity. The model will use the National Stream Internet, a version of the National Hyrdologic Dataset flowlines that simplify channel complexity and establish binary flow connections. Aquatic habitat will be measured using monthly average stream temperature, streamflow, and channel gradient as indicators of aquatic habitat suitability for Bonneville Cutthroat Trout (*Oncorhynchus clarki utah*)and Bluehead Sucker(*Catostomus discobolus*). Aquatic habitat measurements will be combined to calculate a quality weight, which will be applied to reach lengths to calculate quality-weighted habitat (km). Reaches will be designated as undivided stream segments between stream junctions and instream barriers including dams, diversions, and road crossings identified through the National Inventory of Dams, National Bridge Inventory, state diversion and dam datasets, and intersections between spatial stream and road networks. Quality-weighted habitat connectivity will be calculated using the Dendritic Connectivity Index (Cote *et al.*, 2009), with barrier passage ratings established from generalized type-based guidelines (Bourne *et al.*, 2011; Kemp and O’Hanley, 2010; Neeson *et al.*, 2015; Poplar-Jeffers *et al.*, 2009; Warren and Pardew, 2004). Barrier removal costs will match type-based cost estimates (Kraft *et al.*, 2019). Water scarcity costs will be calculated with seasonal or monthly economic loss functions (Kraft *et al.*, 2019), but need to be developed for the Bear River watershed. My project will build on Kraft *et al.*, (2019) to not only consider existing barriers, but also examine scenarios with future development planned for the Bear River watershed (UDWRe, 2019). The driving goal of the research is to identify development strategies that can maintain human water uses while improving aquatic habitat connectivity to benefit fish species of management concern.

**References**

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