CEE 6410 Project: Literature Review

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Submit a list of relevant literature you have read related to your semester course project in WORD format. Briefly describe the prior work that has been done and the gap your model/work will fill.

**Abstract**

My objective is to develop a dual optimization model for the Bear River watershed that identify instream barrier assemblages that maximize connected aquatic habitat and minimize water scarcity. Instream barriers alter natural stream conditions (O’Hanley, 2011), fragment aquatic habitat (King *et al.*, 2017), and limit the distribution, abundance, and persistence of native freshwater fishes (Bourne *et al.*, 2011). Barriers also provide human benefits such as water storage, hydropower, flood control, and transportation. Optimization models that include both human and ecological objectives can identify paths to protect and restore habitat connectivity while maintaining human water demands (Null *et al.*, 2014). Previous studies have included aquatic habitat and economic water supply objectives in optimization models, but often rely on simplistic, ecologically irrelevant habitat models and only consider large dams for removal (Kuby *et al.*, 2005; Neeson *et al.*, 2015; Null *et al.*, 2014). Kraft *et al.* (2019) developed a dual-optimization barrier-removal model that maximized connected aquatic habitat and minimized water scarcity in Utah’s Weber River, but based economic objectives on economic loss functions and water demand price elasticities on highly urbanized areas including Ogden and Salt Lake City. Alafifi and Rosenberg (2020) developed a systems optimization model for allocating water, financial resources, and revegetation efforts in the Lower Bear River watershed, but was not focused on barrier removal. Water development is slated to continue in the Bear River basin (UDWRe, 2019). My work will help to improve water resources decision making by creating a model that can quantify environmental-economic tradeoffs between suitable habitat connectivity for fish species of management concern and competing human water demands in the Bear River. The model solutions will identify promising solutions for barrier development and removal to protect and reconnect quality aquatic habitats while satisfying human water needs.

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