

Ecosphere: Freshwater Ecology

Riverine fish density, predator-prey interactions, and their relationships with artificial light at night

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Appendix S1: Supplemental Methods

To produce water velocity and depth profiles across the Sacramento River at the Sundial Bridge, we developed a 2D hydraulic model using 0.5 m resolution sonar derived bathymetry from the U.S. Bureau of Reclamation (Bradley and Greimann 2020). This bathymetry domain extended from Keswick Dam (~7 km upriver of Sundial Bridge) to 0.5 km upstream from the confluence of Cow Creek (~24 km downriver of Sundial Bridge). We used the flow model HEC-RAS 5.0.7 (Hydrologic Engineering Center 2016) to create a 2D flow model of this section of the Sacramento River. The hydraulic model used a 20 m resolution grid; however, in computation, HEC-RAS 2D uses both this grid size as well as the resolution of the underlying raster (0.5 m, high resolution subgrid model (Casulli 2009)). The simulations used a computational interval of 5 seconds, and were run for sufficient times for the flows to stabilize (with higher flows requiring less time). We used values from a previously calibrated 1D HEC-RAS model of the Sacramento River as our initial Manning's N values. We then ran calibration simulations by adjusting the Manning's N values until the wetted area of the river matched satellite imagery taken at known flows (90 and 340 m³/s). For this work we looked specifically at 215 m³/s, given that this was both the median and mean (± 1.7 SE) daily flow below Keswick Dam (Department of Water Resources 2021) for the project duration.

Literature Cited

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