Route selection in a large river during the homing migration of Chinook salmon (*Oncorhynchus tshawytscha*)

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Abstract: Upstream-migrating adult salmon must make a series of correct navigation and route-selection decisions to successfully locate natal streams. In this field study, we examined factors influencing migration route selections early in the migration of 4361 radio-tagged adult Chinook salmon (*Oncorhynchus tshawytscha*) as they moved upstream past dams in the large (~1 km wide) Columbia River. Substantial behavioral differences were observed among 11 conspecific populations, despite largely concurrent migrations. At dams, Chinook salmon generally preferred ladder passage routes adjacent to the shoreline where their natal tributaries entered, and the degree of preference increased as salmon proximity to natal tributaries increased. Columbia River discharge also influenced route choices, explaining some route selection variability. We suggest that salmon detect lateral gradients in orientation cues across the Columbia River channel that are entrained within tributary plumes and that these gradients in cues can persist downstream for tens to hundreds of kilometres. Detection of tributary plumes in large river systems, using olfactory or other navigation cues, may facilitate efficient route selection and optimize energy conservation by long-distance migrants.