FUNDULUS NUMBERS IN NORTHEAST CREEK VARY WITH TIDE AND SALINITY

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The behavioral osmoregulation hypothesis suggests that estuarian fish such as *Fundulus heteroclitus* minimize their osmotic work by choosing to inhabit water with an average salinity matching that of their plasma. Under laboratory conditions this seems to be true (Kidder, Bull MDIBL 36:69, 1997), but observations in the wild, while supporting this hypothesis, have hitherto lacked quantitation.

We used an underwater camera with a 50' cable to monitor the presence of fish in a defined volume of water. A 20 x 20 cm black square was painted on a square piece of wood, and ring stand components were used to support an underwater camera 20 cm from the center of the square. When submerged in the stream with the board vertical and parallel to the flow direction, fish could be identified and counted as they swam through the field of view on the monitor. Any fish seen against the black square was therefore present in the 2.6 liter volume thus defined. The majority of fish seen were *Fundulus*; the few sticklebacks observed were not counted. Salinity and temperature were measured with an Orion 105 salinity meter, with the probe near the camera location.

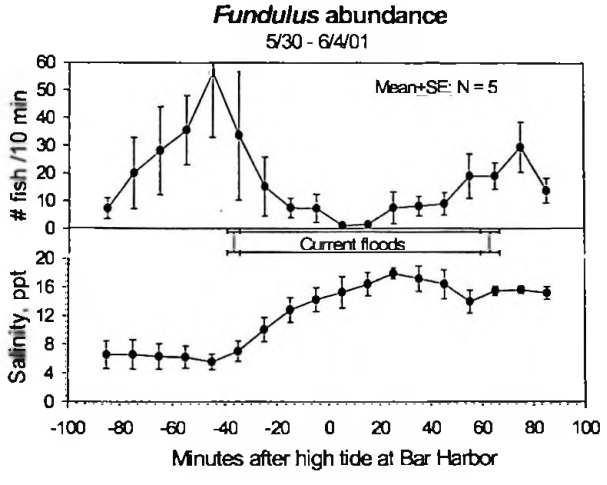

Figure 1. *Fundulus* abundance measured as described in the text, with simultaneous salinity and current observations. All data are mean ± SE for 5 three-hour observation periods.

Our site was south of the Route 3 bridge over Northeast (King's) Creek on Mount Desert Island. This is the site of a broken dam, with current reversing and salinity changing dramatically during spring tides, but only a small change in water level. *Fundulus* were counted for 10 minute periods ±90 min around high tide at Bar Harbor, as determined from published tide tables.

Figure 1 shows killifish moving upstream before current reversal and returning both with and against the current. Few fish were observed at the time of maximum flood. These data suggest that similar observations farther up and down the stream would show corresponding patterns as fish approach and leave the present site. Future work will use automated fish recording techniques to minimize the effort involved in these experiments.

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