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Similarity of osmoregulatory capacity in coastal and inland alligator gar

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Abstract

The alligator gar *Atractosteus spatula* is a primitive fish species, occupying a wide range of temperature and salinity habitats. Long-distance movements are limited, leading to genetic differentiation between inland and coastal populations. Unknown is whether physiological capacity differs between geographically separated populations, particularly for traits important to osmoregulation in saline environments. Alligator gar from inland and coastal populations were reared in a similar environment and exposed to temperature (10, 30 °C) and salinity (0, 20 ppt) extremes to determine whether iono- and osmoregulatory ability differed between populations. There were few differences in osmoregulatory ability between populations, with similar gill, blood and gastrointestinal tract osmoregulatory parameters. Blood plasma osmolality, ion concentrations, intestinal pH and bicarbonate base concentrations, intestinal fluid osmolality, ion concentrations and gill Na⁺, K⁺-ATPase (NKA) activity were similar between populations. Notably, gar from both populations did not osmoregulate well at low temperature and high salinity, with elevated plasma osmolality and ion concentrations, low gill NKA, and little evidence of gastrointestinal tract contribution to ionic and base regulation based on a lack of

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