

The physiological and performance consequences of land-locking in Alewives

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Multiple, independently derived **landlocked** populations exist

Anadromous



Landlocked

Photo by David Post

Reduced habitat connectivity is a threat to anadromous alewives

Increasing anthropogenic disturbance and coastal development may affect Alewife physiology

Climate change is expected to **raise temperatures** and may **lower precipitation** during the summer and fall



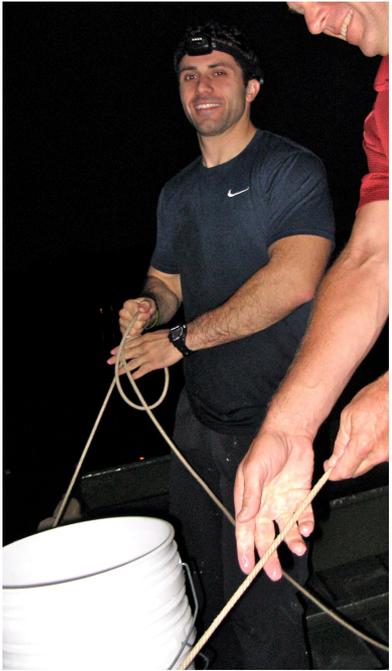
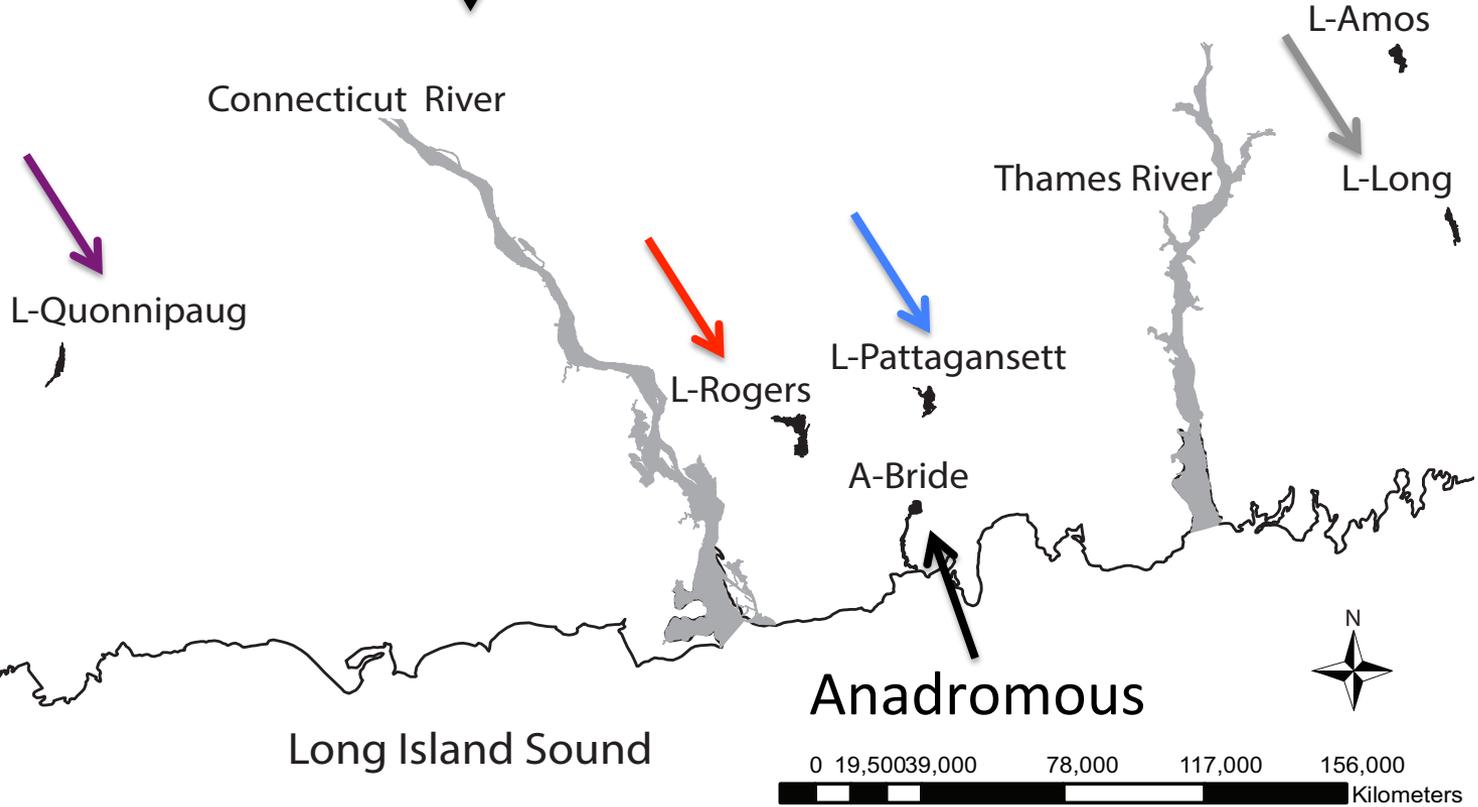
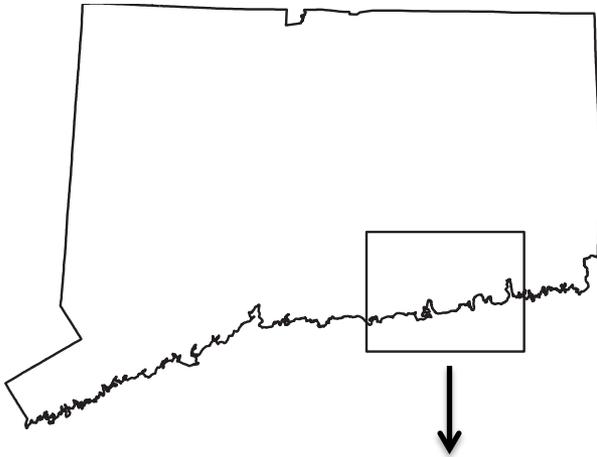
Reduction in stream flows have been predicted across the region

If outlet streams dry, many YOY anadromous alewife will be trapped in natal FW ponds – increasing the likelihood of **land-locking**

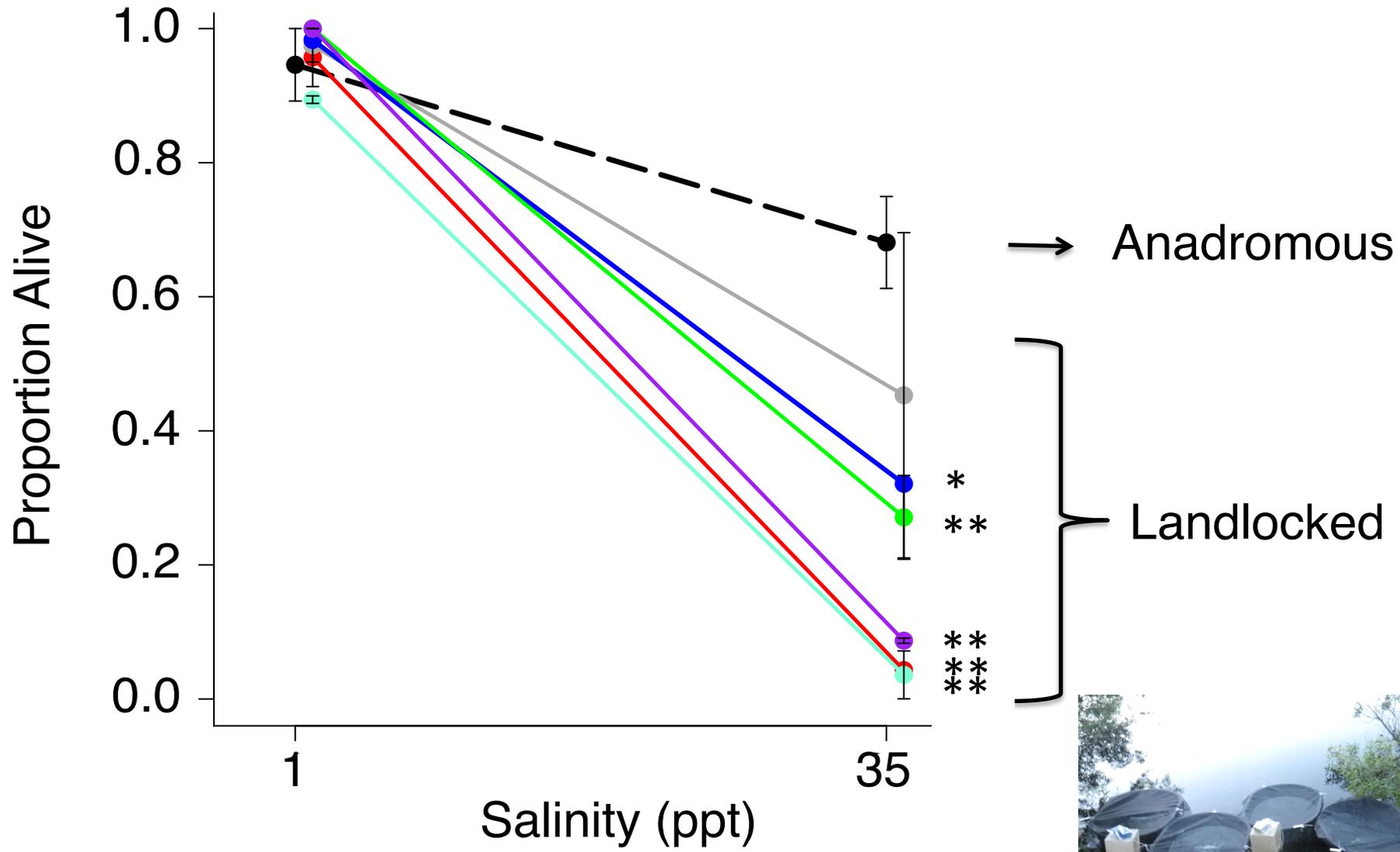
Questions

- How is performance at different salinities altered by land-locking?
 - Survival
 - Swimming capacity
 - Growth rate

Juvenile alewives were captured from their natal sites



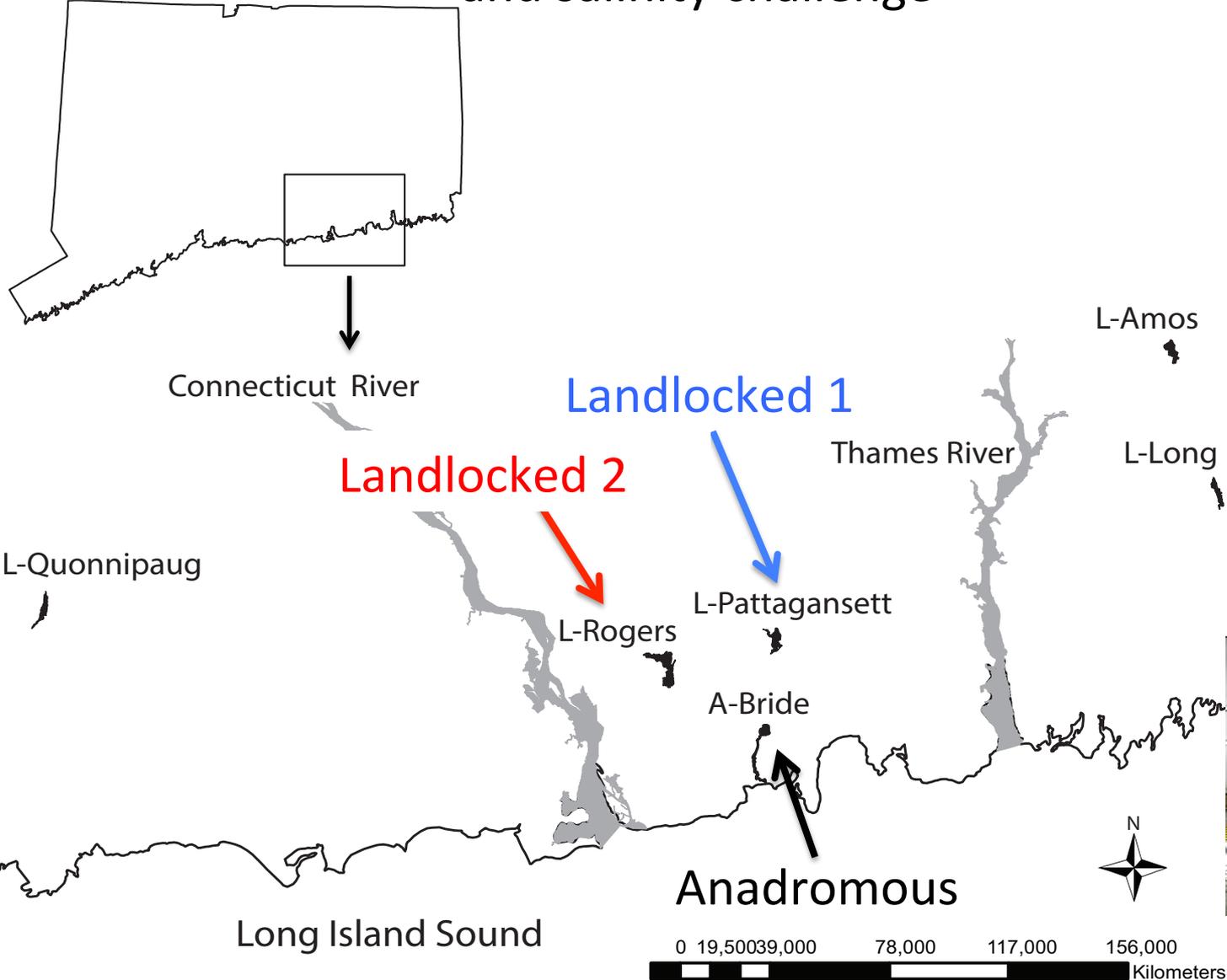
Survival in SW is lowest among landlocked populations



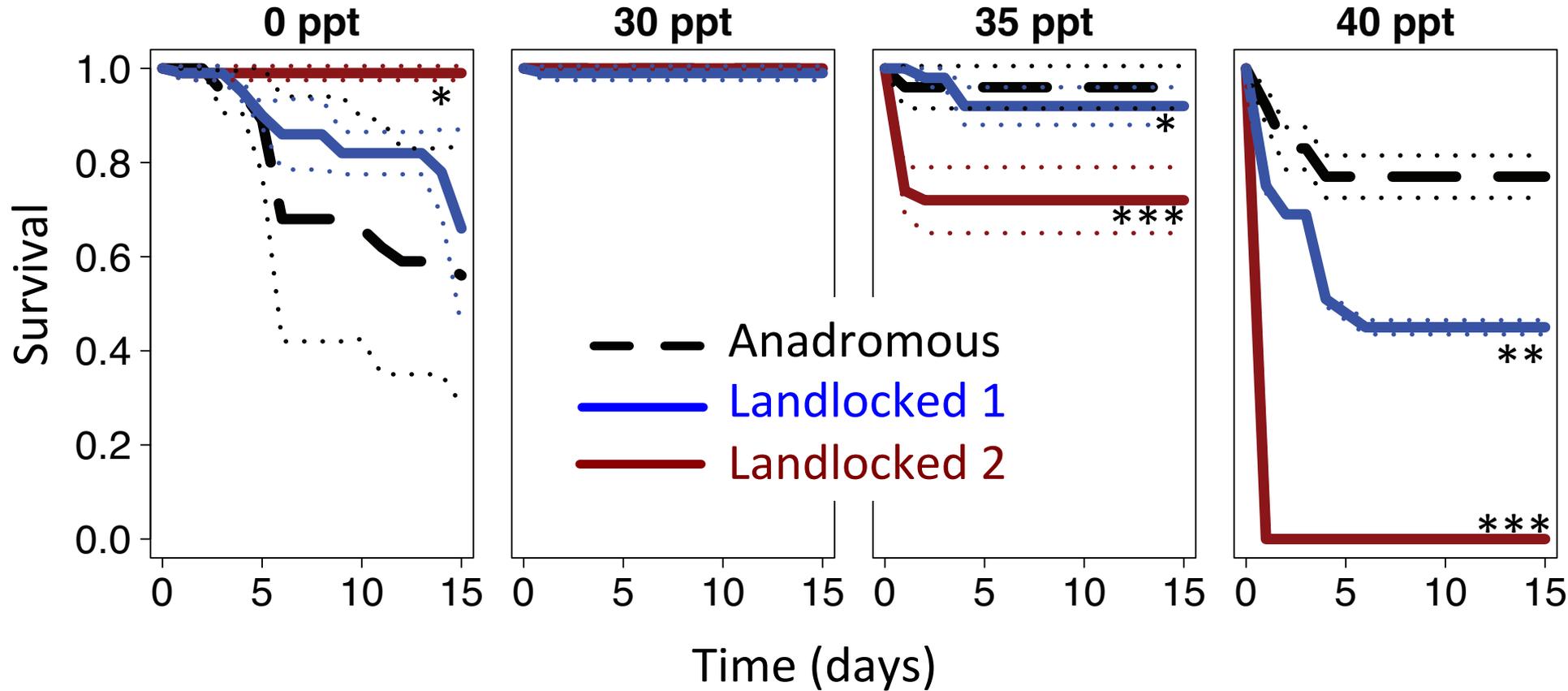
* $p < 0.001$, ** $p < 0.0001$, compared to anadromous



Juvenile alewives were captured from their **natal sites**, and transported to the lab for acclimation, and salinity challenge



For landlocked alewives, tolerance of **FW** is enhanced –
Tolerance of **SW** is reduced



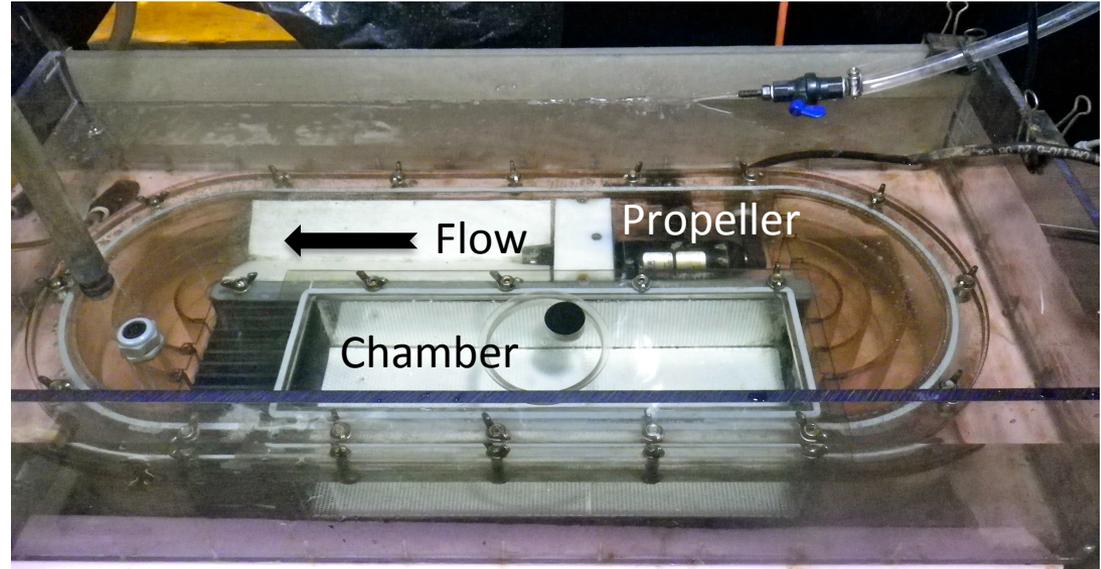
* $p < 0.05$, ** $p < 0.001$, *** $p < 0.0001$, compared to anadromous

Fish were exposed to **0 ppt FW, 35 ppt and 40 ppt SW**, and **0.5 ppt control** for 24 hours

We measured the speed at failure – critical swimming speed - in bl/s

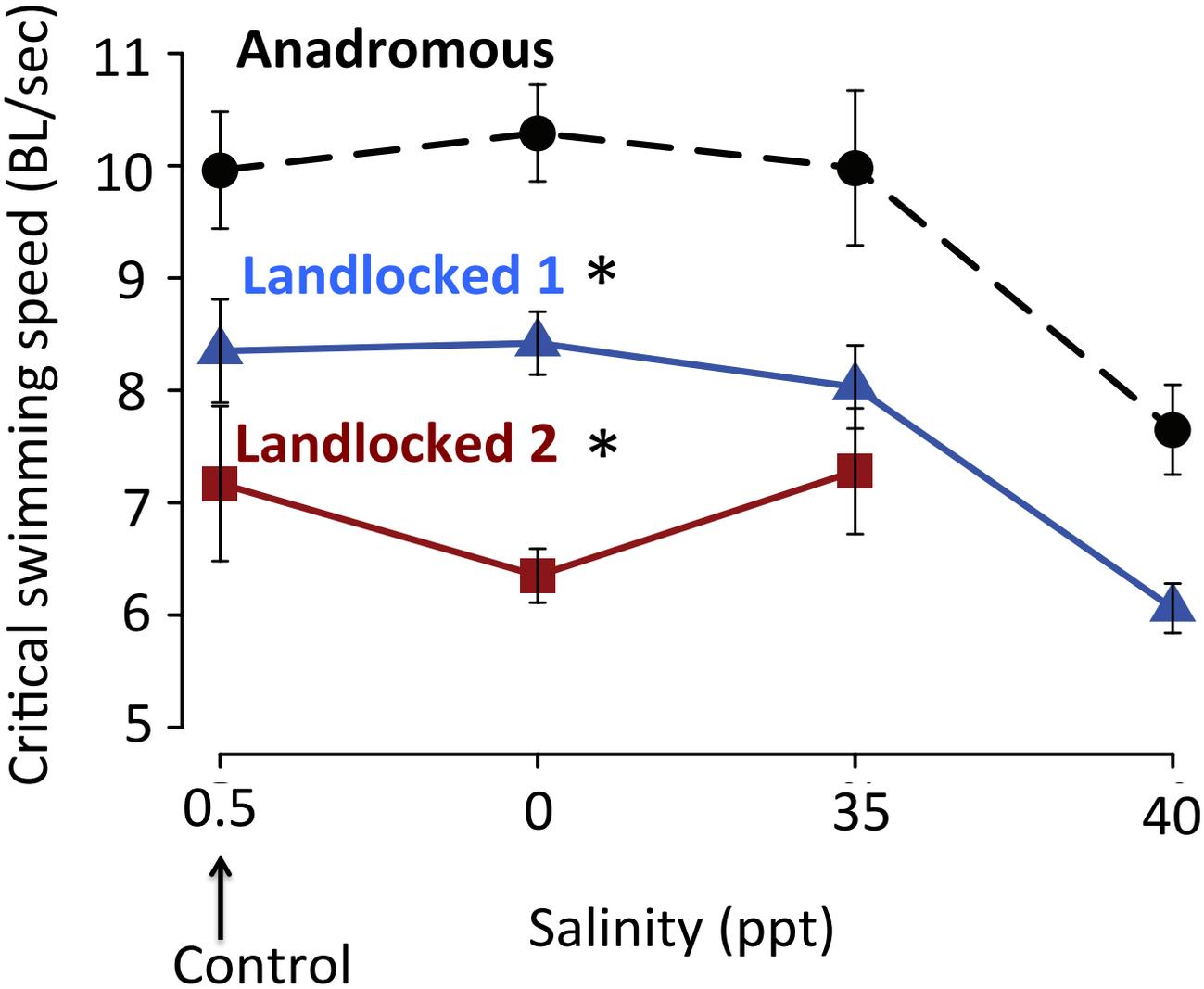


Salinity Exposure Tanks



Loligo Systems Swim Tunnel

Landlocked alewives are poor swimmers compared to anadromous alewives



* P < 0.05

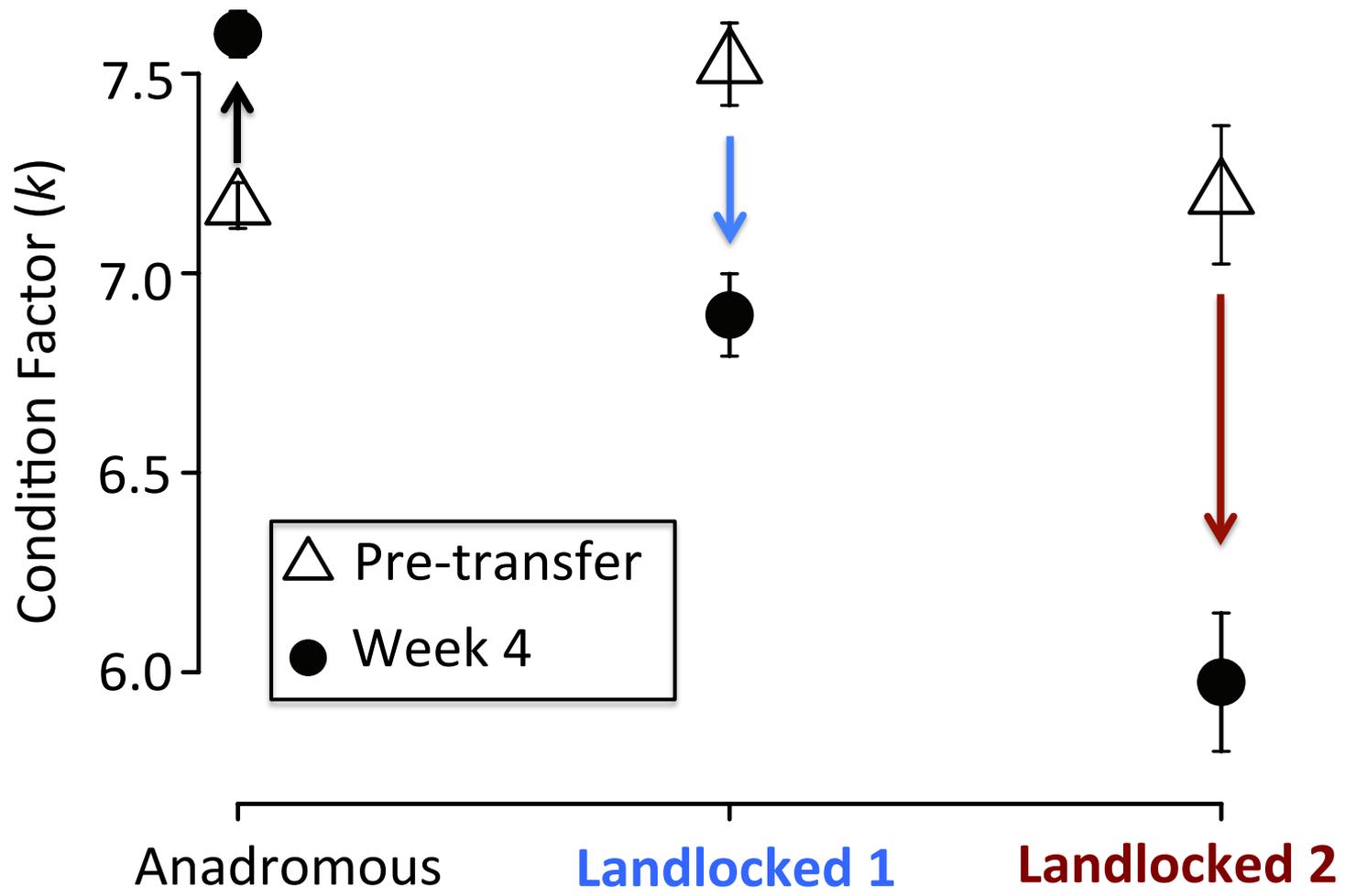
We measured alewife growth rates in FW and SW for 1 month

Fish were fed *ad libitum* for 4 weeks

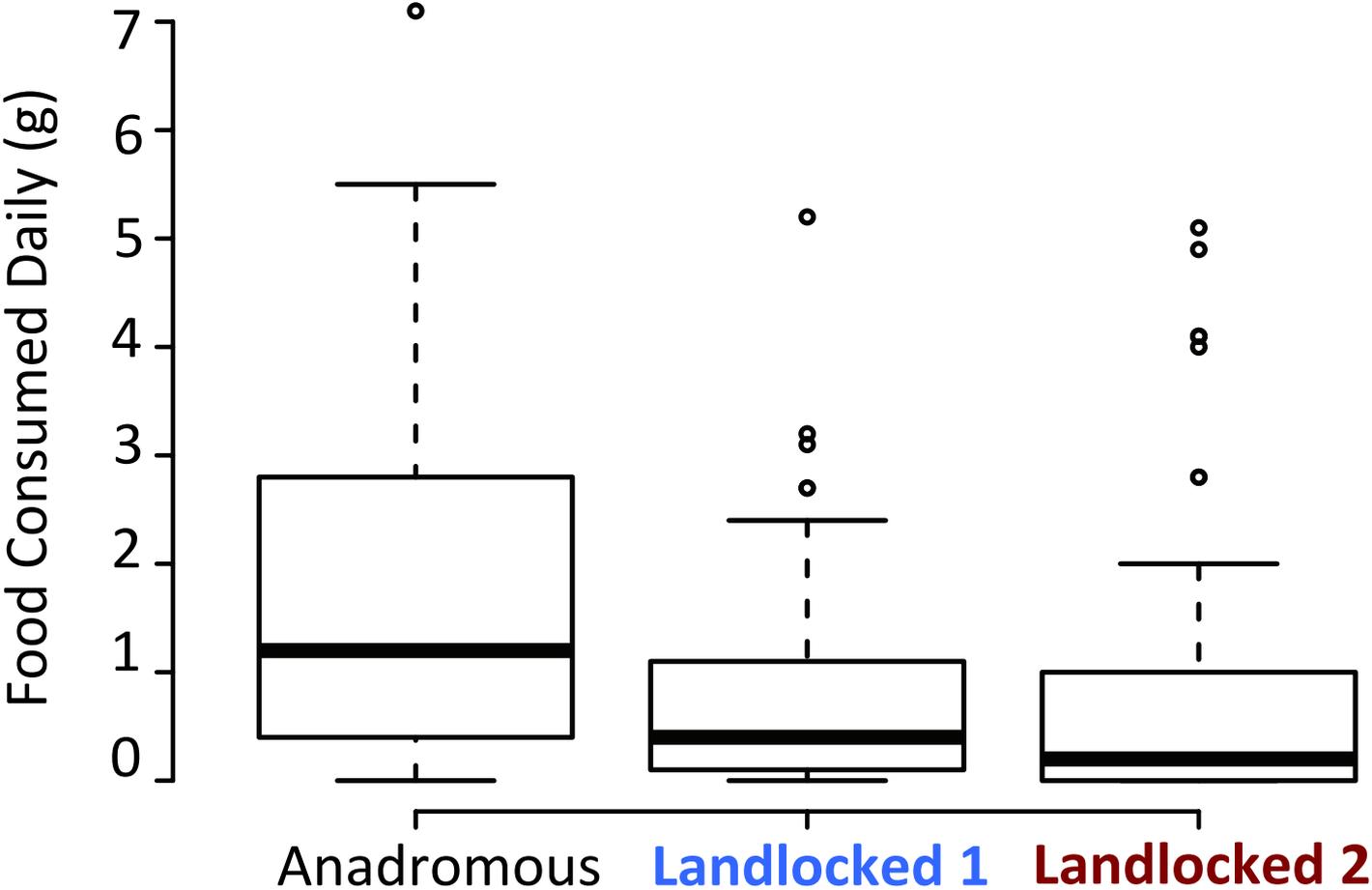
Growth tanks



Growth of landlocked alewives is *stunted* in seawater



Feeding in seawater is reduced among landlocked alewives



Conclusions

Represents a reduction of anadromous traits and capabilities



May contribute to the decline of this species