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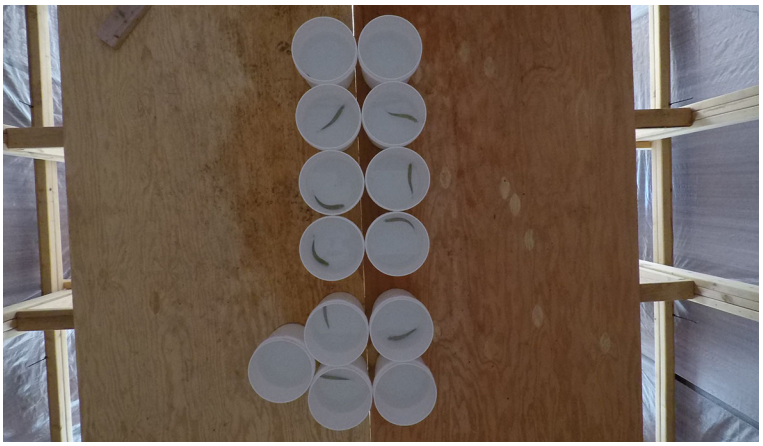
INSIDE JEB

Magnetic map guides pink salmon home



Pink salmon in buckets inside the magnetic field-generating Merritt coils before the field was switched on. Photo credit: Chase Williams.

Spawning is a high risk gamble. Success is often low and salmon leave their single shot at reproduction until just before they die. With such high odds, it is essential for the nomadic creatures to select a site that gives their offspring the best start in life. For this reason, all salmon return to their natal streams after a lifetime cruising the oceans, yet how they successfully relocate to their birthplace remains unclear. 'Earth's magnetic field varies predictably across the globe, so an animal capable of detecting the strength of the field or the angle of magnetic field lines could have an indication of where it was', says Nathan Putman from LGL Ecological Research Associates, Texas, USA. And it appears that juvenile pink salmon (*Oncorhynchus gorbuscha*) are aware of the magnetic field in their surroundings. However, it wasn't clear how the fish use to the information for guidance. With this in mind, Putman with colleagues from the University of Washington, USA, and NOAA, USA, investigated how the wanderers respond to two magnetic fields that they would encounter on their 6000 km odyssey to find out whether the fish knew where they were.

Collecting 100 newly hatched fish from the Washington Department of Fish and Wildlife Hoodsport hatchery, the team transported the youngsters to their new home at the Mikilteo Research Station, north of Seattle, ready to test the fish's responses to magnetic fields when older. 'The hardest thing to do was finding a magnetically "clean" rearing and test site', says Putman, explaining that the iron in building materials and underground pipes distorts the local magnetic field. After successfully identifying an iron-free location where he could raise the fish, Chase Williams constructed the massive wire coils that he would need to replicate the magnetic fields encountered by the adults on their 18 month migration.

Putman, Williams, Evan Gallagher and Andrew Dittman then selected two magnetic fields – located at the extreme northern and southern points of the migratory route – to test the fish's responses. Placing individual salmon in opaque buckets inside the wire coils, Williams then flicked the switch to produce one of the decoy magnetic fields while filming the fish's reactions. When he calculated their bearings, he found that the fish experiencing the northern magnetic field headed southwest, while the fish in the southern magnetic field oriented southeastwards, matching the bearings recorded by scientists tracking salmon at the same locations in the 1980s and 1990s.

'That's big!' exclaims Putman, adding, 'It seems the migratory directions adopted by pink salmon can be explained by their use of a magnetic map'. And he admits that he is impressed that the fish were able to select the correct bearing even when inside a plastic bucket. 'Being able to study the ocean navigation of salmon using buckets onshore really opens up the possibilities for understanding the mechanisms of migration', he says, hoping that the land-based technique will allow him to begin investigating how environmental change might impact the fish's abilities to locate their place of birth.

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