**Hadal Trenches Conference 2026 - DeepZoo Abstract**

**Title:** Capturing connectivity with a low-cost, modular, and all-depth larval sampler (DeepZoo)

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**ABSTRACT**: Ecosystem resilience in the deep ocean depends on connectivity. Currents transport larvae and early life stages across a fragmented seafloor, sustaining biodiversity and recovery potential. As human pressures expand into the abyss, conserving connectivity is central to management—but collecting the data required remains a challenge. Existing larval sampling methods are constrained by size, cost, and depth limits, leaving critical questions unanswered in the deepest 45% of the ocean and in complex habitats like hydrothermal vents. Here, we present DeepZoo, a novel, cost-effective sampler designed to overcome these barriers. DeepZoo uses a Blue Robotics thruster (fully flooded and depth-unlimited) to drive water across a horizontally oriented net, operating autonomously on a rechargeable lithium polymer battery for up to 24 hours. Compact and lightweight (14 lbs. in water), it can be deployed on multiple vehicle types, including landers, remotely operated vehicles, and human-occupied submersibles. As proof of concept, DeepZoo was validated at the 9 deg 50'N hydrothermal vent field of the East Pacific Rise and Argentina's Mar del Plata Submarine Canyon, with 12 deployments spanning depths of 880–3780 m. Collected specimens included veliger gastropods, cold-water coral planulae, bivalves, and cyprid barnacles, all preserved in high-quality condition suitable for integrative taxonomy, including DNA barcoding. Together, these results demonstrate DeepZoo as a validated, accessible tool that expands the frontiers of larval and early life-stage collection. By enabling sampling across any ocean depth, DeepZoo accelerates the pace of data collection required to resolve ecological connectivity and to inform deep-ocean conservation strategies.