Mitigating Supersonic Underwater Noise

Narrator: Wherever Puget Sound interfaces with people, the sound of infrastructure development is often the sound of a pile driver. This constant pounding can get to people. But what are the affects on marine life below?

Peter Dahl: It's fairly intuitive that when you're hitting a pile, it's like hitting a nail with a hammer and there's a big noise. And one can imagine there's a big noise underwater.

Narrator: Peter Dahl of the Applied Physics Laboratory and Per Rinehall of the UW Department of Mechanical Engineering measured the underwater noise from inpact pile driving at the Vashon Island ferry terminal. The levels of sound they detected raise concern about marine life.

Researchers have found that underwater noise from pile driving can result in variable levels of impacts to marine organisms. These impacts range from behavioral disturbances to actual physical injury.

Dara Farrell is investigating the rate of sound decay underwater to better understand the affects of noise on marine life.

Dara Farrell: The affects of noise can range from behavioral tics or avoidance… it can mask communication. And in extreme cases, it can kill.

Narrator: So, what can be done? Dahl and Per Reinhall found a way to turn down the pile driving sound underwater. They encapsulated the pile with a double-walled steel tube called a T-NAP.

Dahl: It's called a T-NAP, which is a **T**emporary **N**oise **A**ttenuation **P**ile that basically went over the original pile. We were able to successfully mitigate the original source of sound as it travels down the pile at speeds of roughly Mach 3 — in other words, three times the speed of sound underwater. We were able to roughly reduce the noise intensity by about a factor of ten — or about 10 dB.

Narrator: So the Vashon Island project answered some questions, but also now presents a new mystery.

Dahl: As that Mach wave continues down to the bottom of the pile, it reflects, turns around and goes right back up — also at very fast speed. Unfortunately, the Mach wave created by that reflected disturbance now escapes out under the sediment and we were not able to effectively capture that with our noise mitigation strategy.

So it's a discovery and a problem at the same time. And it's presented a new challenge and we are working on that challenge to address the entire problem.

This is APL The Applied Physics Laboratory at the University of Washington in Seattle.