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The Ballad of Water Entry RAFSAN RABBI, Utah State University, JOHN ALLEN, University of Hawaii, JESSE BELDEN, Naval Undersea Warfare Center, Newport, RI, TADD TRUSCOTT, Utah State University — Not all water splashes are similar, nor do they sound the same. From the pitter-pattering sound of raindrops on lakes and pools to the thunderous rumble of falls plunging into the rivers flowing below, these sounds can elucidate the mechanisms and evolution behind their origins. Particularly, solid objects can create different sounds when they impact the water surface water depending on their size, shape, speed, etc. Herein, we study these sounds by dropping hydrophobic spheres into a quiescent water-filled tank and capture the accompanying sounds with in-air microphones and sub-surface hydrophones. Spheres (diameter: 10 mm-24 mm) impacting water at low to high velocities (1- 6 m/s) were tested, revealing that the specific sealing phenomena of the cavities have distinct acoustic signatures. Synchronizing high-speed images of these impacts with audio signals captured by acoustic sensors reveal interesting and unique distinct sounds created by the unique cavity sizes, bubble shedding patterns and in some cases the rebounding Worthington jets. These observations help tie the water entry hydrodynamics and acoustics together in a definitive way.

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