We formulated tidal decay lifetimes for hypothetical moons orbiting extrasolar planets with both lunar and stellar tides. Previous works neglected the effect of lunar tides on planet rotation, and are therefore applicable only to systems in which the moon's mass is much less than that of the planet. This work, in contrast, can be applied to the relatively large moons that might be detected around newly-discovered Neptune-mass and super-Earth planets. We conclude that moons are more stable when the planet/moon systems are further from the parent star, the planets are heavier, or the parent stars are lighter. Inclusion of lunar tides allows for significantly longer lifetimes for a massive moon relative to prior formulations. We expect that the semi-major axis of the planet hosting the first detected exomoon around a G-type star is 0.4-0.6 AU and is 0.2-0.4 AU for an M-type star.