Auditory evoked potentials (AEPs) reflect neural activity evoked by sound. Measurements of AEPs in dolphins and porpoises — both to self-generated and external sounds — are providing an increasingly detailed picture of the neural physiology underlying toothed whale biosonar. I will briefly review the history of AEP measurements in toothed whales, and focus on our lab’s recent measurements of AEPs during active biosonar tasks with bottlenose dolphins. Special emphasis will be placed on the application of techniques developed for human auditory electrophysiology to studying biosonar.