There is a great variety and amount of volume elements in the ocean that play the role of “obstacles” when they are intercepted by sound waves. Acoustic interaction with these volume scatterers depends on sound frequency, on their own physical properties, like size, orientation, tissue density and elasticity and on the properties of the surrounding media. This fact arises during measurements with narrow band, ultrasonic sound sources, as it is the case of most modern echosounders employed in Fisheries acoustics. Sound backscattering is a contributing remote sensing method to obtain physical information from the volume scatterers present in the ocean. Many of these acoustic targets can be geometrically described as prolate spheroids like some fish and fish swim bladders. Historically, complexity involved in the computation of volume acoustic scattering responses in prolate spheroidal coordinates leads to some references on modelling Target Strengths of this type of scatterers, each with different degree of success. In this work a robust code has been implemented to compute the radial and angular spheroidal functions involved in the analytical solution of the wave equation with boundary conditions for both, rigid and soft prolate spheroidal targets. Ensonification of several specimens of perch (*Percichthys trucha*) held at 38 kHz for different tilt angles, provided average direct Target Strengths measurements. Morphometric data gathered from the ensonified perches were used as input of the implemented model in order to test the predicted Target Strengths. Comparison between modelled and measured Target Strengths from perch led to encouraging satisfactory results.