The proportion of Atlantic cod (Gadus morhua) discarded in the Danish Baltic Sea cod trawl fishery has been as high as 40%. This, combined with a stock that has declined dramatically over the past 30 years, has led to numerous technical regulations being introduced to reduce the capture of juveniles and thus discards. One method that has been widely adopted in the Baltic Sea has been to improve gear selectivity, subsequently allowing young individuals to escape capture. To understand the effects that changes to gear selectivity and minimum landing size have had on discard rates, as well as the effects of a range of additional explanatory factors, generalized additive mixed models were used. Gear regulation changes enforced in the Danish demersal trawl fishery in the Baltic Sea and other factors, such as minimum landings size, juvenile abundance, catch mass, price, and their spatial and temporal distribution, were found to significantly affect discard rates. The newest and currently legislated gears were identified as having the lowest discard rates. The increase in minimum landing size from 35 to 38 cm has increased discard rates.