Bromide is ubiquitously found in drinking water. It is introduced into source water primarily by contact with bromide-containing soils or seawater having high bromide content. Bromide is converted into carcinogenic bromate during ozonation processes employed in some drinking water and wastewater treatment plants. Therefore, monitoring of bromate in drinking water and its precursor bromide in source water is required. The purpose of this study was to survey bromide and bromate concentrations in randomly selected bottle waters of various brands and several tap water samples in the coastal Houston area using a direct-injection ion chromatography (IC) and a suppressed conductivity system. The method employs a simple isocratic IC with loop injection with calculated detection limit of 0.009 μg/L for bromate and 0.028 μg/L for bromide (250-μL sample volume). Allowing the detection of both species at the μg/L level in drinking water, this method does not require specialized instrumentation such as two-dimensional IC, expensive sample preparation, or post-column reactions. The results show that, whereas bromate remains undetected in all five tap water samples, there are significant high concentrations of bromide in the coastal Houston area (294.79 ± 56.97 μg/L). Its link to potential seawater intrusion need to be further investigated. For bottle water samples randomly collected, 18.2% (2 out of 11) showed detectable amount of both bromide and bromate. The detection of bromate coincides with those bottle water samples that underwent ozonation treatment. Further sample campaign with exclusively ozonated bottle water samples ($n = 19$) showed 100% detection rate for both bromide and bromate. The 99% confidence intervals were 14.45–37.97 μg/L and 0.32–2.58 μg/L for bromide and bromate, respectively. The highest level of bromate among all ozonated bottle water samples was 7.57 μg/L, a concentration close to the U.S. EPA prescribed limit for drinking water standard. Regression analysis indicated that although a positive correlation exists between bromide and bromate concentrations, such a correlation is not statistically significant. This finding is not unexpected since a variety of other parameters in the ozonation process (such as water quality, ozone dose, and time in addition to bromide concentration) affect the formation of bromate. Our results strongly suggest that cautions should be exercised to examine the potential formation of bromate when source water from coastal zone undergoes ozonation treatment. Another strong proof of our findings is that all the tap waters collected were treated in jurisdictions that do not use ozonation for disinfection. The fact that none of these tap water samples contained bromate (despite an abundance in bromide) proves our hypothesis even further.