Deuterium retention has been shown to be affected by displacement damage in the target [1] and dynamic retention is known to be higher during plasma exposure than when the plasma exposure ceases [2]. Such effects will be present during operation of reactor scale machines i.e. progressive damage and continuous exposure to ions from the plasma. In this work, the damage-fuel retention correlation was evaluated by measuring the retention of deuterium (D) in tungsten samples (W) self-damaged to different dpa levels (1, 5, 10 dpa) and irradiated at 300, 600 and 900 K. Furthermore, we examined the synergistic character of displacement damage during plasma exposure by performing simultaneous D plasma and W ion irradiations. All the samples were irradiated to a fluence of $2.0 \times 10^{24}$ D.m$^{-2}$ using a high-flux low temperature helicon source. The deuterium retention was measured with Nuclear Reaction Analysis (NRA) and Elastic Recoil Detection Analysis (ERDA). We have observed reduction in D retention at high irradiation temperatures and higher damage levels. These results increase our understanding of the response of materials under extreme conditions as such in a divertor or first wall in fusion reactors. Such understanding informs future decisions for the best possible materials for PFC applications.