In view of future magnetic fusion devices like ITER and DEMO, it is mandatory to study the erosion of tungsten (W) as a first wall material to assess its impact on both plasma facing components (PFCs) lifetime and plasma performance. The WEST tokamak has unique features to investigate W erosion thanks to its all-W PFCs and a large set of edge plasma diagnostics [1]. In this contribution, the flexible WEST visible spectroscopy system [2], which monitors both lower and upper divertor with a spatial resolution of 12 mm, is fully deployed to perform an \textit{in situ} characterization of gross erosion W flux [3] at both inner and outer divertor targets. Deuterium plasma discharges were performed in WEST varying flux, energy and composition of impinging ions by acting on i) gas injection, ii) plasma current, iii) auxiliary heating power. The main plasma line integrated density \( n_{\text{core}} \) was scanned between 3 and \( 9 \times 10^{19} \text{ m}^{-2} \) in Ohmic, lower single null (LSN) discharges: the peak photon flux of the WI line (400.9 nm) at the outer divertor target drops from \( \Gamma_{\text{out WI}}^{\text{L}} = 6 \times 10^{16} \text{ ph m}^{-2} \text{ s}^{-1} \text{ sr}^{-1} \) to zero at \( n_{\text{core}} > 5.5 \times 10^{19} \text{ m}^{-2} \); at the inner target \( \Gamma_{\text{in WI}}^{\text{L}} \) can be up to one order of magnitude higher and drops to zero at lower \( n_{\text{core}} \). The in/out ratio (\( \Gamma_{\text{in WI}}^{\text{L}} / \Gamma_{\text{out WI}}^{\text{L}} \)) is found to be a strong function of the plasma current, ranging from 0.15 at \( I_p = 300 \text{ kA} \) to 1.67 at \( I_p = 700 \text{ kA} \), and a weak function of \( n_{\text{core}} \) at fixed \( I_p \). Conversely, heating the edge plasma through lower hybrid current drive increases the absolute value of \( \Gamma_{\text{WI}} \) at lower divertor targets, without impacting the in/out ratio: for example, at \( I_p = 700 \text{ kA} \), \( n_{\text{core}} = 4.5 \times 10^{19} \text{ m}^{-2} \) and \( P_{\text{LHCD}} = 2.5 \text{ MW} \), \( \Gamma_{\text{out WI}}^{\text{L}} \) and \( \Gamma_{\text{in WI}}^{\text{L}} \) both increase by a factor of 2 with respect to an Ohmic discharge in comparable conditions. Finally, upper single null (USN) discharges at \( I_p = 400 \text{ kA} \), \( n_{\text{core}} = 3-3.5 \times 10^{19} \text{ m}^{-2} \) and \( P_{\text{LHCD}} = 2.5-3 \text{ MW} \), exhibit 10 to 40 times smaller \( \Gamma_{\text{WI}} \) values and inversed inboard/outboard ratios (< 1) compared to similar LSN ones. These experimental findings are discussed in the light of local plasma parameters (density, temperature and particle flux) assessed with embedded and reciprocating Langmuir probes, as well as impurity fluxes, also estimated through spectroscopic means.