The aim of this study was to assess the combined effects of temperature and UVR on the photosynthesis performance of two diatoms – *Chaetoceros gracilis* and *Thalassiosira weissflogii*. In particular, we evaluated the role of UVR in inducing photoinhibition and the potential mitigation of this negative effect by an increase in temperature. Cultures were pre-acclimated at two temperatures – 18 °C and 23 °C – and exposed to different radiation treatments – UVR + PAR (280–700 nm); UV-A + PAR (315–700 nm) and PAR only (400–700 nm) under two temperatures: 18 °C (local surface summer water temperature) and 23 °C (simulating a potential increase estimated by the year 2100). Exposure to natural solar radiation resulted in UVR-induced photoinhibition that was significantly higher in *T. weissflogii* than in *C. gracilis*. Both species benefited from the higher temperature (23 °C) resulting in a lower photoinhibition as compared to samples exposed at 18 °C. Inter-specific differences were determined in regard to the heat dissipation processes (NPQ) which were higher at high temperatures, and much more evident in *C. gracilis* than in *T. weissflogii*. The analyses of inhibition and recovery rates under different irradiances indicate that the balance between negative (inhibition) and positive (repair-dissipation) effects shifted towards a more positive balance with increasing temperature. Our results highlight for a beneficial effect of temperature on photosynthesis performance during exposure to UVR, although important inter-specific differences are found, probably due to differences in cell size as well as in their distribution within the oceanic realm (i.e., coastal versus oceanic species).