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2 3 4 5 6 7 **Antioxidative Responses of Two Marine Microalgae During Acclimation** 8 **to Static and Fluctuating Natural UV Radiation**

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17 18 19 20 **ABSTRACT**

21
22 Photoacclimation properties were investigated in two marine
23 microalgae exposed to four ambient irradiance conditions: static
24 photosynthetically active radiation (PAR: 400–700 nm), static
25 PAR + UVR (280–700 nm), dynamic PAR and dynamic
26 PAR + UVR. High light acclimated cultures of *Thalassiosira*
27 *weissflogii* and *Dunaliella tertiolecta* were exposed outdoors for
28 a maximum of 7 days. Dynamic irradiance was established by
29 computer controlled vertical movement of 2 L bottles in a water
30 filled basin. Immediate (< 24 h), short-term (1–3 days) and long-
31 term (4–7 days) photoacclimation was followed for antioxidants
32 (superoxide dismutase; ascorbate peroxidase and glutathione
33 cycling), growth and pigment pools. Changes in UVR sensitivity
34 during photoacclimation were monitored by measuring UVR-
35 induced inhibition of carbon assimilation under standardized UV
36 conditions using an indoor solar simulator. Both species showed
37 immediate antioxidant responses due to their transfer to the
38 outdoor conditions. Furthermore, upon outdoor exposure, carbon
39 assimilation and growth rates were reduced in both species
40 compared with initial conditions, however, these effects were
41 most pronounced in *D. tertiolecta*. Outdoor UV exposure did not
42 alter antioxidant levels when compared with PAR-only controls
43 in both species. In contrast, growth was significantly affected in
44 the static UVR cultures, concurrent with significantly enhanced
45 UVR resistance. We conclude that antioxidants play a minor
46 role in the reinforcement of natural UVR resistance in
47 *T. weissflogii* and *D. tertiolecta*.