

## Supplemental Material

### Biological Impacts of Marine Heatwaves

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**Supplemental Table 1.** Examples of recent marine heatwaves (MHWs). Entry for each MHW event includes; “Peak Date” – date of peak MHW intensity,  $I_{\max}$  – the intensity on the Peak Date (1= Moderate, 2 = Strong, 3 = Severe and 4 = Extreme), “Duration” – total duration of event in days, “Category”, “Season”, Biological Responses - Reported impacts of MHW events as reported by Smith et al., (2021). Table adapted from Table 2 in Hobday et al. (2018).

Event	Peak Date	$I_{\max}$	Duration	Category	Season	Biological Responses	References
<b>Mediterranean Sea 1999</b>	21/09/99	1.92	8	I (Moderate)	Autumn	Mass mortalities of benthic organisms; habitat loss; reduced growth and reproduction; coral bleaching	Cerrano et al., (2000); Garrabou et al., (2019); Bianchi et al., (2019); Cupido et al., (2012)
<b>Mediterranean Sea 2003</b>	14/06/03	4.38	31	II (Strong)	Early Summer	Mortalities in mollusk fisheries (multiple life stages); mass mortalities of benthic organisms; coral bleaching; seagrass flowering and shoot mortality; reduced growth and reproduction, disease	Garrabou et al., (2019); Marba and Duarte (2010); Rodrigues et al., (2015); Cupido et al., (2012); Garrabou et al., (2009); Diaz-Almela et al., (2007)
<b>Mediterranean Sea 2006</b>	26/07/06	3.99	33	II (Strong)	Summer	Mortalities in mollusk fisheries (multiple life stages); mass mortalities of benthic organisms; shoot mortality in seagrass	Garrabou et al., (2019); Marba and Duarte (2010); Rodrigues et al., (2015)
<b>Tasman Sea 2015</b>	19/12/15	2.70	252	II (Strong)	Spring / Summer	Loss of fisheries; loss of kelp; Pacific Oyster Mortality Syndrome outbreak; mortality of abalone; fish species noted outside of their range	Doshi et al., (2012); Mathiesen (2016)

<b>Great Barrier Reef 2016</b>	11/03/16	2.15	55	II (Strong)	Summer / Autumn	Mass coral bleaching; mass coral mortalities; failed coral recruitment, species range shifts; loss of seagrass; poor reproductive effort in seagrass; increased abundance, biomass and catchability of coral trout	Brown et al., (2021); Hughes et al., (2018); Babcock et al., (2019) Eakin et al., (2019); Hughes et al., (2017); Stuart-Smith et al., (2018); McKenzie et al., (2018); Thompson et al., (2019)
<b>Northwest Atlantic 2012</b>	20/05/12	4.30	132	III (Severe)	Winter / Spring	Spring boom in lobster landings; range shift of a range of commercially valuable fisheries species (e.g., squid, cod, flounder, hake)	Mills et al., (2013); Holbrook et al., (2020); Pershing et al., (2018); Le Bris et al., (2018)
<b>Northeast Pacific Blob 2015</b>	13/07/15	2.56	711	III (Severe)	Year round -	Mass mortalities of California sea lions, seals, seabirds, and marine invertebrates; sea star wasting disease; range shifts in a variety of species; harmful algal blooms; fisheries disruptions and closures; shifts in kelp forest ecosystems; increase in orca births; coral bleaching; increased abundance of tuna; unusual sightings of warm water species; increases and decreases in fisheries recruitment; increased observations of whales; increased whale entanglement	Piatt et al., (2020); Cavole et al., (2016); Trainer et al., (2020); Harvell et al., (2019); Sanford et al., (2019); Suryan et al., (2021)
<b>Tasman Sea 2017/2018</b>	27/01/18	3.7	147	III (Severe)	Summer	Loss of native kelp; increase in invasive kelp; poor water clarity; range shift of fish and jellyfish; early spawning in snapper; salmon mortalities in fish farms; Pacific Oyster Mortality Syndrome outbreak; mortalities in wild and farmed bivalves; fish species noted outside of their range	Perkins-Kirkpatrick et al., (2019); Salinger et al., (2019); Thomsen et al., (2019); Benthuyssen et al., (2020); Salinger et al., (2020); Tait et al., (2021); Thomsen et al., (2021);
<b>Western Australia 2011</b>	20/05/11	4.89	66	IV (Extreme)	Summer	Loss of seagrass and kelp; coral bleaching; fisheries closures; reduced fisheries quotas; shifts in recruitment; range expansion of tropical fish	Wernberg et al., (2016); Lenanton et al., (2017); Caputi et al., (2016); Wernberg et al., (2013) Caputi et al., (2019); Kendrick et al., (2019); Smale and Wernberg (2013); Babcock et al., (2019)

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