

## SUPPORTING INFORMATION

Extreme event impacts on terrestrial and freshwater biota in the Arctic:

A synthesis of knowledge and opportunities

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**Table S1:** Overview of literature review showing the number of ecological impacts (n=69) of different extreme events on terrestrial and freshwater biota in the Arctic. Also provided are the methods used, the direction of the ecological impacts detected, and the references (n=48).

Extreme event	Biota	Impact type	Impact direction	Method	No. of impacts	References
Landslide	Vegetation	Growth	Negative	Modelling	1	(Verdonen et al., 2020)
Pest outbreak	Vegetation	Growth	Negative	Experiment	1	(Bokhorst et al., 2015)
Pest outbreak	Vegetation	Growth	Negative	Modelling	1	(Bjerke et al., 2014)
Rain on Snow	Arthropods	Abundance	Negative	Experiment	1	(Coulson et al., 2000)
Rain on Snow	Birds	Abundance	Negative	Observation	1	(Hansen et al., 2013)
Rain on Snow	Mammals	Abundance	Negative	Modelling	1	(Chan et al., 2005)
Rain on Snow	Mammals	Abundance	Negative	Monitoring	3	(Hansen et al., 2013)
Rain on Snow	Mammals	Abundance	Positive	Modelling	1	(Hansen et al., 2019)
Rain on Snow	Mammals	Growth	Negative	Field-study	1	(Berger et al., 2018a)
Rain on Snow	Mammals	Reproduction	Negative	Monitoring	1	(Stien et al., 2012)
Rain on Snow	Mammals	Survival	Negative	Monitoring	4	(Miller and Gunn, 2003; Miller and Barry, 2009; Stien et al., 2012; Hansen et al., 2014)
Rain on Snow	Mammals	Survival	Negative	Observation	3	(Putkonen et al., 2009; Forbes et al., 2016; Sokolov et al., 2016)
Rain on Snow	Vegetation	Reproduction	Negative	Experiment	1	(Preece et al., 2012)
Rain on Snow	Vegetation	Survival	Negative	Experiment	2	(Preece et al., 2012; Milner et al., 2016)
Storm	Arthropods	Abundance	Negative	Field-study	1	(Zawierucha et al., 2019)
Storm	Mammals	Reproduction	Negative	Field-study	1	(Williams et al., 2017)
Storm	Mammals	Survival	Negative	Monitoring	1	(Dau, 2005)
Storm	Mammals	Survival	Negative	Observation	1	(Berger et al., 2018b)

Storm	Vegetation	Growth	Negative	Modelling	1	(Bjerke et al., 2014)
Storm	Vegetation	Growth	Negative	Field-study	1	(Pisaric et al., 2011)
Storm	Vegetation	Survival	Negative	Field-study	1	(Pisaric et al., 2011)
Summer cooling	Arthropods	Survival	Negative	Experiment	1	(Coulson et al., 1995)
Summer cooling	Birds	Phenology	Negative	Field-study	1	(McGuire et al., 2020)
Summer cooling	Birds	Reproduction	Negative	Field-study	1	(Ganter and Boyd, 2000)
Summer cooling	Vegetation	Growth	Negative	Modelling	1	(Bjerke et al., 2014)
Summer rain	Birds	Survival	Negative	Field-study	1	(Anctil et al., 2014)
Summer rain	Vegetation	Growth	No effect	Experiment	1	(Keuper et al., 2012)
Summer rain	Vegetation	Growth	Positive	Experiment	1	(Keuper et al., 2012)
Summer snow	Arthropods	Phenology	Negative	Monitoring	1	(Schmidt et al., 2019)
Summer snow	Birds	Abundance	Negative	Monitoring	2	(Schmidt et al., 2019)
Summer snow	Birds	Growth	Negative	Field-study	1	(Krause et al., 2016)
Summer snow	Birds	Phenology	Negative	Field-study	1	(Boelman et al., 2017)
Summer snow	Mammals	Reproduction	Negative	Monitoring	2	(Schmidt et al., 2019)
Summer snow	Vegetation	Reproduction	Negative	Monitoring	1	(Schmidt et al., 2019)
Summer warming	Birds	Phenology	Negative	Field-study	1	(McGuire et al., 2020)
Summer warming	Fish	Survival	Negative	Observation	1	(Gunn and Snucins, 2010)
Summer warming	Vegetation	Growth	Positive	Experiment	2	(Marchand et al., 2005; Marchand, Kockelbergh, et al., 2006)
Summer warming	Vegetation	Phenology	Negative	Field-study	1	(Zona et al., 2014)
Summer warming	Vegetation	Reproduction	Negative	Field-study	1	(Graae et al., 2009)
Summer warming	Vegetation	Survival	Negative	Experiment	2	(Marchand, Kockelbergh, et al., 2006; Marchand, Verlinden, et al., 2006)
Wildfire	Fish	Abundance	No effect	Monitoring	1	(Murdoch et al., 2020)
Wildfire	Vegetation	Growth	Negative	Monitoring	1	(Bret-Harte et al., 2013)
Wildfire	Vegetation	Growth	Positive	Field-study	1	(Frost et al., 2020)
Wildfire	Vegetation	Growth	Positive	Modelling	1	(Chen et al., 2020)

Wildfire	Vegetation	Survival	Negative	Modelling	2	(Tchebakova et al., 2009; Tchebakova et al., 2016)
Wildfire	Vegetation	Survival	Negative	Field-study	1	(Whitman et al., 2019)
Winter warming	Arthropods	Abundance	Negative	Experiment	2	(Bokhorst et al., 2012; Bokhorst et al., 2015)
Winter warming	Vegetation	Growth	Negative	Experiment	2	(Bjerke et al., 2011; Bokhorst et al., 2015)
Winter warming	Vegetation	Growth	Negative	Monitoring	1	(Treharne et al., 2019)
Winter warming	Vegetation	Phenology	Negative	Experiment	1	(Bokhorst et al., 2011)
Winter warming	Vegetation	Reproduction	Negative	Experiment	2	(Bokhorst et al., 2011; Semenchuk et al., 2013)
Winter warming	Vegetation	Survival	Negative	Experiment	1	(Bokhorst et al., 2011)
Winter warming	Vegetation	Survival	Negative	Modelling	1	(Bokhorst et al., 2009)

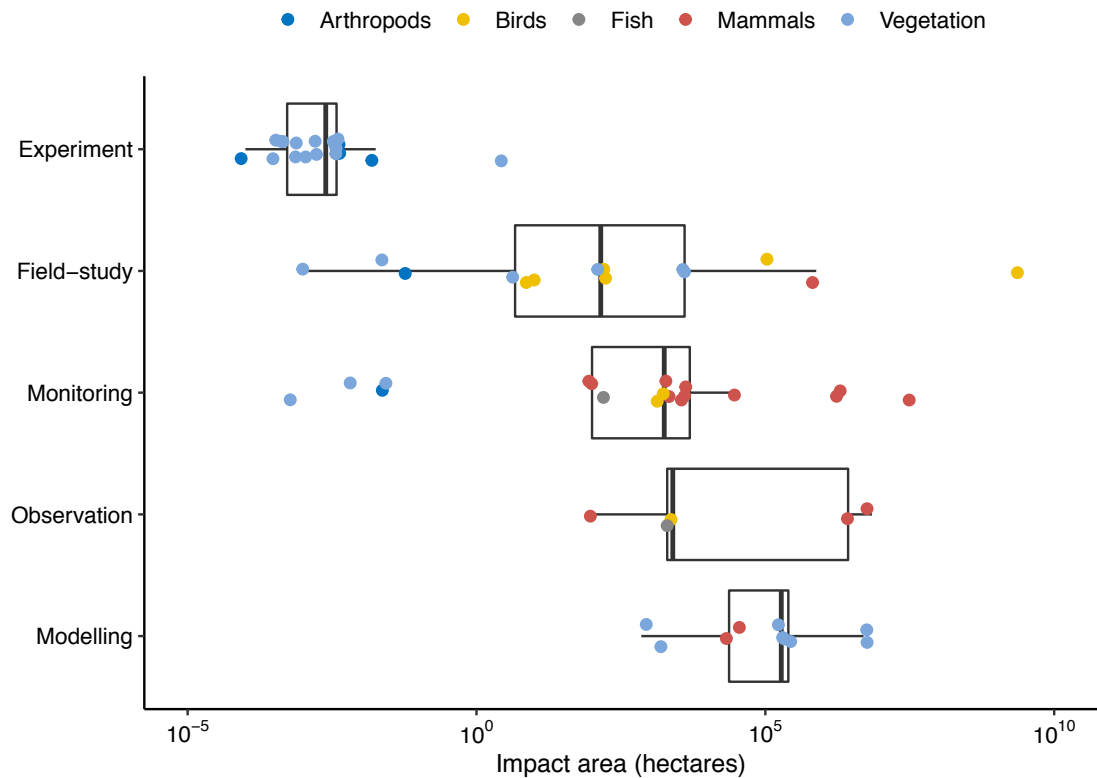
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**Figure S1:** Variation in impact area size (log10[hectares]) as considered by the different methods used to assess ecological impacts of extreme events on biota in terrestrial and freshwater Arctic ecosystems. Colours of the data points indicate the taxonomic groups used in the ecological impact assessment.