The following supplement accompanies the article

Ontogenetic shifts and interspecies variation in tolerance to desiccation and heat at the early benthic phase of six intertidal invertebrates

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Table S1. Summary of the design of emersion temperature and desiccation tolerance experiments. Note that the size ranges for all size classes are given in Table 1.

Measure	Species	Experimental design
Emersion temperature tolerance	*Nucella ostrina* *Mytilus trossulus* *Balanus glandula* *Chthamalus dalli*	LT_{50} was separately determined for each size class, 2 size classes per species, except for *B. glandula* in which a full set of tolerance trials could only be carried out with adults. For each size class (life stage): 3-6 temperature treatments X 3-5 replicate groups per temperature X 7-15 individuals per group The numbers of treatments, replicate groups and individuals per group varied depending on the abundance of individuals in the field. Temperature treatments: each set of 3-5 replicate groups was exposed one temperature; different sets of replicates were exposed to different temperatures. The number of individuals per replicate group differed among species, but was consistent within trials of a same size class.
Desiccation tolerance	*Nucella ostrina* *Mytilus trossulus* *Balanus glandula* *Chthamalus dalli* *Petrolisthes cinctipes* *Littorina scutulata*	LTd_{50} was separately determined for each size class, 4 size classes per species. For each size class: 3 replicate desiccation trials X 4-9 durations X 4-13 individuals per duration The numbers of treatment durations and individuals per duration varied depending on the abundance of individuals in the field. Desiccation treatments: all animals exposed to the same desiccation condition; different sets of replicates exposed to desiccation for different durations. The number of individuals per replicate group differed among species, but was consistent within trials of a same size class.

Table S2. Adult size ranges of the species used in temperature experiments.

Species	Body length of adults (mm)	Reference for size at maturity
N. ostrina	18 – 25	Lamb & Hanby 2005
M. trossulus	30 – 55	Kozloff & Price 1996
C. dalli	3 – 7	Menge 2000, Lamb & Hanby 2005
B. glandula	5 – 10	Barnes & Barnes 1956

Table S3. Least squares regressions for correlation between log-transformed body length (*BL*, in mm) and body wet weight (*BW*, in g) of six intertidal invertebrates determined by collecting 40 individuals of each species from Dixon Island in September 2016. Animals were returned to the laboratory where they were placed in water for 2 h to ensure full hydration of body tissues, removed from water, blot dried and weighed measuring to the nearest 0.0001 g. Body length was measured using a vernier dial caliper, measuring to the nearest 0.25 mm. Linear regressions were generated from log transformed data.

Species	N	Equation	R^2	Residual Std. Err.
M. trossulus	40	$BW = 2.85BL - 3.72$	0.980	0.076
N. ostrina	40	$BW = 2.98BL - 3.84$	0.993	0.062
C. dalli	40	$BW = 2.94BL - 3.72$	0.933	0.110
B. glandula	40	$BW = 3.53BL - 3.97$	0.928	0.120
L. scutulata	40	$BW = 2.86BL - 3.52$	0.958	0.063

Table S4. Temperature tolerance thresholds from regressions of survival as a function of temperature (* denotes Bayesian methods were used to fit the model). The p value is for the model parameter temperature used in each GLM.

Species	Life Stage		LTt_{50} (°C)	Std. Err.	z statistic	p value	df
N. ostrina	Juvenile		32.3	0.14	-4.55	< 0.001	18
	Adult		32.9	0.17	-6.32	<0.001	18
M. trossulus	Juvenile		35.6	0.63	-6.67	<0.001	22
	Adult	*	38.3	0.18	-2.51	0.012	22
C. dalli	Juvenile		45.8	0.26	-6.23	<0.001	15
	Intermediate		46.0	0.23	-6.76	<0.001	18
	Adult		44.5	0.25	-7.66	<0.001	18
B. glandula	Adult		42.8	0.19	-6.45	<0.001	20

Table S5. Desiccation tolerance thresholds from regressions of survival as a function of time under desiccating conditions (* denotes Bayesian methods were used to fit the model). p value is for the model parameter time used in each GLM.

Species	Life Stage		LTd_{50} (h)	Std. Err.	p	df
N. ostrina	A	*	4.0	0.6	< 0.001	18
	B		11.7	0.7	< 0.001	13
	C		24.0	1.5	< 0.001	13
	D		34.2	2.0	< 0.001	13
M. trossulus	A		0.2	0.3	< 0.001	12
	B		15.3	0.9	< 0.001	13
	C		58.5	3.7	< 0.001	13
	D		52.4	3.3	< 0.001	13
C. dalli	A		23.0	1.2	< 0.001	15
	B		27.0	1.2	< 0.001	15
	C		42.1	2.5	< 0.001	15
	D		65.2	7.9	< 0.001	15
B. glandula	A		19.5	2.2	< 0.001	15
	B		32.4	2.4	< 0.001	15
	C		59.4	4.7	< 0.001	15
	D		427.5	112450.9	0.0141	15
P. cinctipes	A		2.60	0.3	< 0.001	10
	B	*	10.1	0.6	< 0.001	11
	C	*	7.8	0.5	< 0.001	11
	D		10.9	0.6	< 0.001	7
L. scutulata	A		29.0	3.7	< 0.001	13
	B		69.0	4.9	< 0.001	13
	C		142.5	10.4	< 0.001	13
	D		247.3	95.0	0.095	13

LITERATURE CITED

Barnes H, Barnes M (1956) The general biology of *Balanus glandula* Darwin. Pac. Sci. 10:415-422

Kozloff EN, Price LH (1996) Marine invertebrates of the Pacific Northwest. Seattle, WA, University of Washington Press

Lamb A, Hanby B (2005) Marine life of the Pacific Northwest (A photographic encyclopedia of invertebrates, seaweeds and selected fishes). Madeira Park, BC, Harbour Publishing

Menge B (2000) Recruitment vs. postrecruitment processes as determinants of barnacle population abundance. Ecol. Monogr. 70:265-288