Table S1. Model selection procedure for FGW and SG models presenting AIC, LogLikelihood and Deviance values. The selected models are presented in bold. FWG = Freshwater growth, RG = River growth, SG = Sea growth, SST = Sea surface temperature. Rainfall and air temperatures were standardized N (0, 1). Log-transformation was used for capelin biomass (BM) and rolling averages over two years of capelin biomass (BM2y) and immature capelin biomass (Imm2y). The final models are in bold.

Model	Formula	npar	AIC	logLik	deviance
FWG models	FWG ~ 1 + river_age + RG + (1 | Smolt_year) + (1 | Birth_year) + (1 | RG_year)	10	-114816	57418	-114836
	FWG ~ 1 + river_age + RG + Population + Age_group + (1 | Smolt_year) + (1 | Birth_year) + (1 | RG_year)	13	-117532	58779	-117558
	FWG ~ 1 + river_age:RG + Population + Age_group + (1 | Smolt_year) + (1 | Birth_year) + (1 | RG_year)	13	-118118	59072	-118144
	FWG ~ 1 + river_age:RG + Population + Age_group + scale(Rainfall_May) + scale(Rainfall_June) + scale(Rainfall_July) + scale(Rainfall_August) + scale(Rainfall_September) + (1 | Smolt_year) + (1 | Birth_year) + (1 | RG_year)	18	-118110	59073	-118146
	FWG ~ 1 + river_age:RG + Population + Age_group + scale(T_May) + scale(T_June) + scale(T_July) + scale(T_August) + scale(T_September) + (1 | Smolt_year) + (1 | Birth_year) + (1 | RG_year)	18	-118128	59082	-118164
	FWG ~ 1 + river_age:RG + Population + Sea_age + Smolt_age + scale(T_May) + scale(T_June) + scale(T_July) + scale(T_August) + scale(T_September) + (1 | Smolt_year) + (1 | Birth_year) + (1 | RG_year)	**20**	**-118934**	**59487**	**-118974**
1SW fish, SG models	G1 ~ 1 + FWG * Smolt_age + Population + (1 | Smolt_year) + (1 | Birth_year)	11	36654	-18316	36632
	G1 ~ 1 + FWG * Smolt_age + Population + log(Capelin_BM) + (1 | Smolt_year) + (1 | Birth_year)	12	36656	-18316	36632
	G1 ~ 1 + FWG * Smolt_age + Population + SST_BarentsSeaE + (1 | Smolt_year) + (1 | Birth_year)	**12**	**36637**	**-18306**	**36613**
	G1 ~ 1 + FWG * Smolt_age + Population + log(Capelin_BM) + SST_BarentsSeaE + (1 | Smolt_year) + (1 | Birth_year)	13	36639	-18306	36613
	G1 ~ 1 + FWG * Smolt_age + Population + log(Capelin_ImmBM) + SST_BarentsSeaE + (1 | Smolt_year) + (1 | Birth_year)	13	36639	-18306	36613
2SW fish, SG models	TotSG ~ 1 + FWG * Smolt_age + Population + (1 | Smolt_year) + (1 | Birth_year)	11	1516.5	-747.26	1494.5
	TotSG ~ 1 + FWG * Smolt_age + Population + (1 | Smolt_year) + (1 | Birth_year)	11	1516.5	-747.26	1494.5
	TotSG ~ 1 + FWG * Smolt_age + Population + Sea_age * SG + (1 | Smolt_year) + (1 | Birth_year)	14	-1250.2	639.12	-1278.2
	TotSG ~ 1 + FWG * Smolt_age + Population + Sea_age * SG + SST_BarentsSeaE + (1 | Smolt_year) + (1 | Birth_year)	15	-1249.2	639.59	-1279.2
	TotSG ~ 1 + FWG * Smolt_age + Population + Sea_age * SG + log(BM2y) + (1 | Smolt_year) + (1 | Birth_year)	15	-1249.5	639.76	-1279.5
	TotSG ~ 1 + FWG * Smolt_age + Population + Sea_age * SG + SST_BarentsSeaE + log(BM2y) + (1 | Smolt_year) + (1 | Birth_year)	16	-1248.7	640.33	-1280.7
	TotSG ~ 1 + FWG * Smolt_age + Population + Sea_age * SG + SST_ BarentsSeaE + SST_BarentsSeaW + (1 | Smolt_year) + (1 | Birth_year)	16	-1234.8	633.42	-1266.8
	TotSG ~ 1 + FWG * Smolt_age + Population + Sea_age * SG + SST_ BarentsSeaE + SST_BarentsSeaW + log(BM2y) + (1 | Smolt_year) + (1 | Birth_year)	**17**	**-1233.4**	**633.71**	**-1267.4**
	TotSG ~ 1 + FWG * Smolt_age + Population + Sea_age * SG + SST_ BarentsSeaE + SST_BarentsSeaW + log(Imm2y) + (1 | Smolt_year) + (1 | Birth_year)	17	-1234.4	634.18	-1268.4

Table S2. Summary of Linear mixed-effects models for Freshwater growth of 1SW and 2SW fish, and sea growth of 1SW fish.

	Total growth in the freshwater (FWG)			**1SW sea growth (SG)**		
Predictors	*Estimates*	*CI*	*p*	*Estimates*	*CI*	*p*
(Intercept)	0.54	0.50 – 0.58	**<0.001**	-1.45	-2.47 – -0.42	**0.006**
Inari vs. Pulmanki population	0.05	0.05 – 0.05	**<0.001**	-0.78	-0.82 – -0.75	**<0.001**
Inari vs. Utsjoki population	0.06	0.05 – 0.06	**<0.001**	-0.99	-1.03 – -0.96	**<0.001**
1SW vs. 2SW	-0.01	-0.02 – -0.01	**<0.001**			
Smolt age, 3 vs. 4	0.09	0.09 – 0.10	**<0.001**	-0.03	-0.06 – 0.01	0.191
Smolt age, 3 vs. 5	0.14	0.14 – 0.15	**<0.001**	-0.14	-0.18 – -0.10	**<0.001**
Mean temperature °C May	-0.02	-0.04 – 0.00	0.133			
Mean temperature °C June	0.01	-0.01 – 0.03	0.286			
Mean temperature °C July	-0.02	-0.04 – -0.00	**0.043**			
Mean temperature °C August	-0.01	-0.04 – 0.01	0.213			
Mean temperature °C September	-0.02	-0.05 – -0.00	**0.045**			
River age [1] × RG	1.62	1.59 – 1.64	**<0.001**			
River age [2] × RG	1.16	1.14 – 1.18	**<0.001**			
River age [3] × RG	0.99	0.98 – 1.01	**<0.001**			
River age [4] × RG	0.98	0.97 – 1.00	**<0.001**			
River age [5] × RG	1.02	1.00 – 1.04	**<0.001**			
FWG				0.16	0.13 – 0.20	**<0.001**
Annual mean SST, Barents Sea E				0.54	0.30 – 0.77	**<0.001**
FWG × Smolt age [4]				0.01	-0.03 – 0.04	0.772
FWG × Smolt age [5]				-0.03	-0.07 – 0.01	0.125
		Random Effects				
σ^2		0.01			0.57	
τ_{00}		0.01 $_{Growth\_year}$			0.00 $_{Birth\_year}$	
		0.01 $_{Birth\_year}$			0.24 $_{Smolt\_year}$	
		0.00 $_{Smolt\_year}$				
ICC		0.59			0.30	
N		49 $_{Smolt\_year}$			45 $_{Smolt\_year}$	
		51 $_{Birth\_year}$			47 $_{Birth\_year}$	

	53 Growth_year	
Observations	73889	15749
Marginal R^2 / Conditional R^2	0.186 / 0.669	0.215 / 0.448

Table S3. Summary for LMM of 1SW fish sea growth with monthly means as covariates. SST refers sea surface temperature (°C).

	1SW sea growth (SG)		
Predictors	*Estimates*	*CI*	*p*
(Intercept)	-5.18	-6.60 – -3.76	**<0.001**
FWG	0.17	0.13 – 0.20	**<0.001**
Smolt age, 3 vs. 4	-0.03	-0.07 – 0.01	0.152
Smolt age, 3 vs. 5	-0.14	-0.18 – -0.10	**<0.001**
Inari vs. Pulmanki population	-0.78	-0.82 – -0.75	**<0.001**
Inari vs. Utsjoki population	-0.99	-1.03 – -0.96	**<0.001**
Mean SST, June	-0.06	-0.37 – 0.25	0.720
Mean SST, July	0.06	-0.30 – 0.41	0.755
Mean SST, Aug	0.33	-0.05 – 0.71	0.085
Mean SST, Sep	0.44	0.05 – 0.83	**0.028**
Mean SST, Oct	0.06	-0.34 – 0.46	0.776
Mean SST, Nov	-0.13	-0.48 – 0.21	0.450
FWG × Smolt age [4]	0.01	-0.03 – 0.04	0.778
FWG × Smolt age [5]	-0.03	-0.07 – 0.01	0.129
Random Effects			
σ^2		0.57	
$\tau_{00\ Birth\_year}$		0.00	
$\tau_{00\ Smolt\_year}$		0.10	
ICC		0.15	
N_{Smolt_year}		44	
N_{Birth_year}		47	
Observations		15615	
Marginal R^2 / Conditional R^2		0.303 / 0.408	

Table S4. Summary of Linear mixed-effects model for sea growth of 2SW fish.

		Total SG	
Predictors	*Estimates*	*CI*	*p*
(Intercept)	1.26	1.07 – 1.44	**<0.001**
FWG (scale)	0.07	0.05 – 0.09	**<0.001**
Smolt age, 3 vs. 4	-0.02	-0.04 – -0.00	**0.017**
Smolt age, 3 vs. 5	-0.04	-0.07 – -0.02	**<0.001**
Inari vs. Pulmanki population	-0.23	-0.25 – -0.21	**<0.001**
Inari vs. Utsjoki population	-0.19	-0.21 – -0.18	**<0.001**
Sea year 1 vs. 2	0.22	0.15 – 0.30	**<0.001**
Annual SG	1.10	1.05 – 1.15	**<0.001**
Annual mean SST, Barents Sea E	-0.02	-0.07 – 0.02	0.346
Annual mean SST, Barents Sea W	0.01	-0.04 – 0.07	0.662
log(BM2y)	-0.01	-0.02 – 0.01	0.435
FWG × Smolt age [4]	-0.03	-0.05 – -0.01	**0.002**
FWG × Smolt age [5]	-0.04	-0.06 – -0.02	**0.001**
Sea year × SG	-0.10	-0.16 – -0.04	**0.001**
Random Effects			
σ^2		0.04	
$\tau_{00\ Birth\_year}$		0.00	
$\tau_{00\ Smolt\_year}$		0.00	
N_{Smolt_year}		43	
N_{Birth_year}		44	
Observations		3765	
Marginal R^2 / Conditional R^2		0.691 / NA	