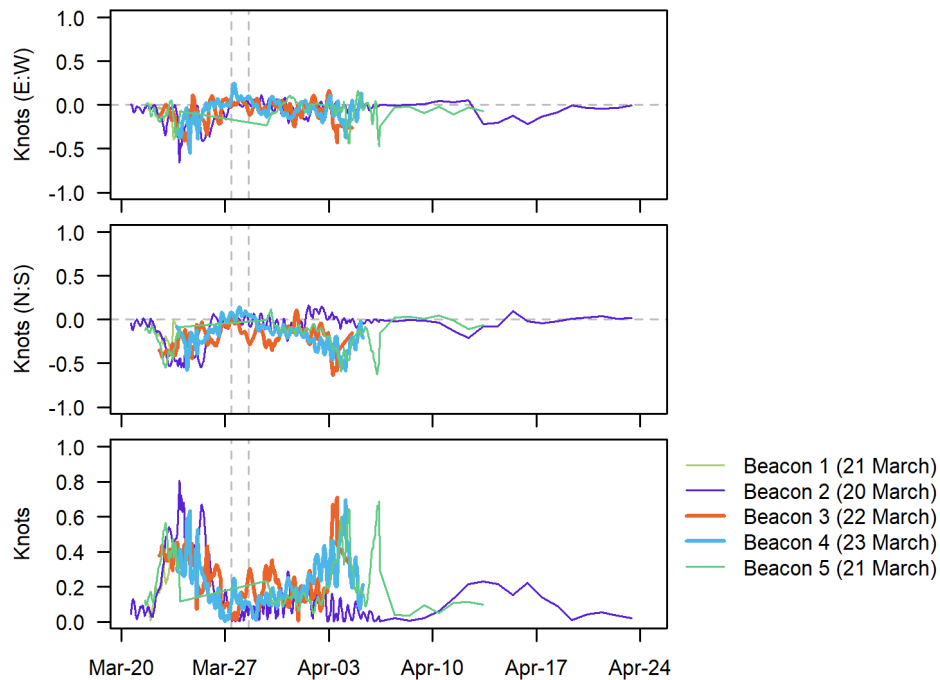


## Supplementary material:

### ESTIMATION OF PUP PRODUCTION OF HARP AND HOODED SEALS IN THE GREENLAND SEA IN 2018



*Figure S1.* Drift rates of five GPS beacons deployed in the vicinity of the whelping grounds identified during helicopter and fixed wing reconnaissance surveys. The top two panels show the East/West and North/South components of the drifts respectively, while the bottom panel shows the velocity along the drift direction. Two beacons that remained in the vicinity during the period of aerial surveys (Beacons 3 and 4) are emphasized by bold lines. Vertical dashed lines represent March 27 and 28, i.e. the period when aerial photo surveys were carried out.

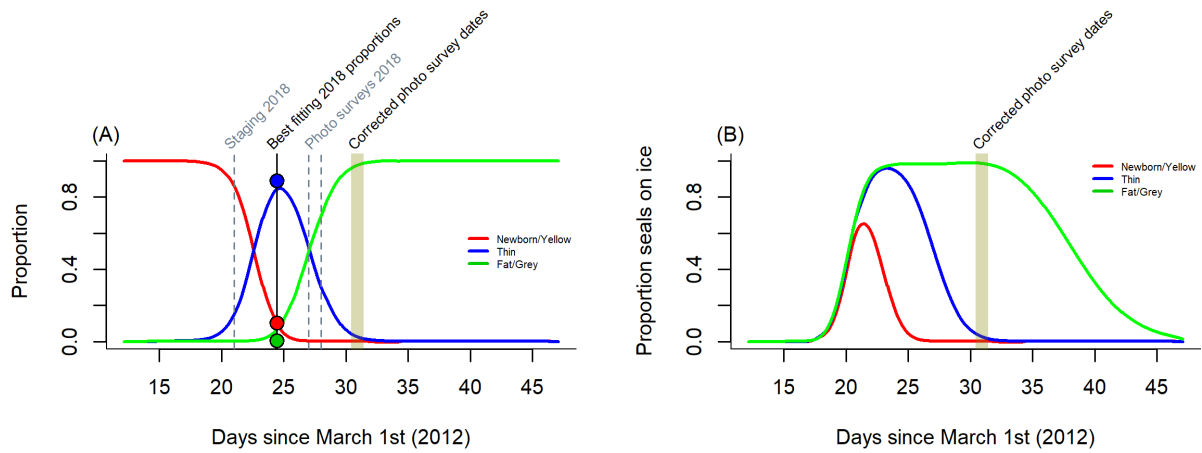


Figure S2. (A) Observed 2018 staging proportions (points) and 2012 estimates (lines) of the probability of a harp seal pup being classified as belonging to the various stages, and (B) Predicted proportion of hooded seal pups on ice as a function of time. The shaded area shows how the proportion of pups visible on ice changes during the 24 hours of 28 March when the photographic survey was carried out.

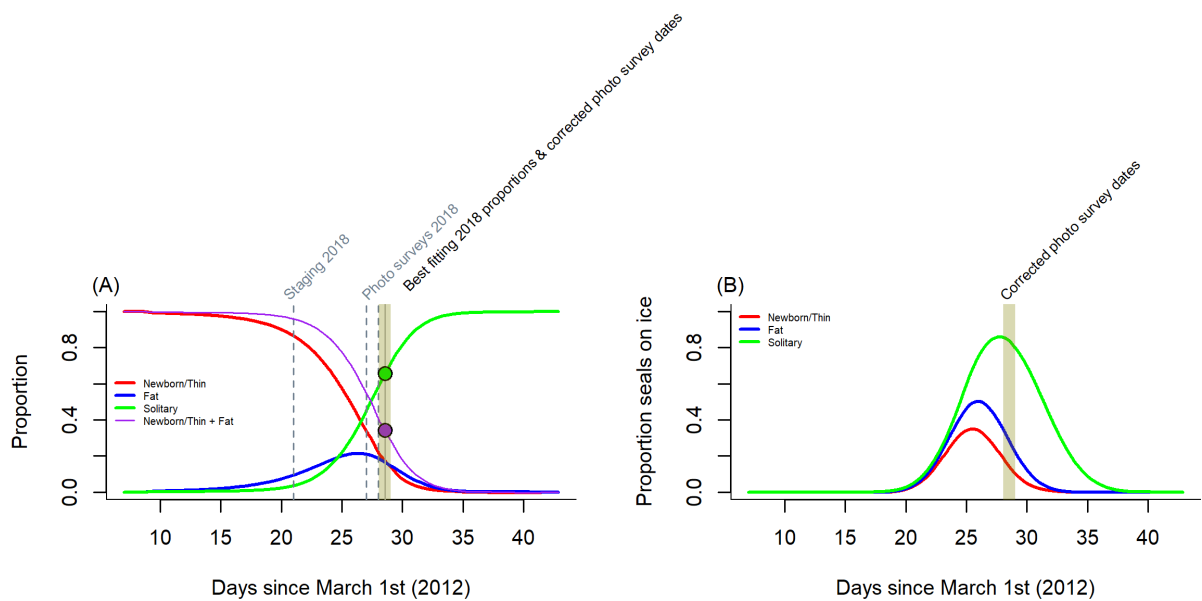


Figure S3. (A) Observed 2018 staging proportions (points) and 2012 estimates (lines) of a hooded seal pup being classified as belonging to the various stages, and (B) Predicted proportion of hooded seal pups on ice as a function of time. The shaded area shows how the proportion of pups visible on ice changes during the 24 hours of 28 March when the photographic survey was carried out.

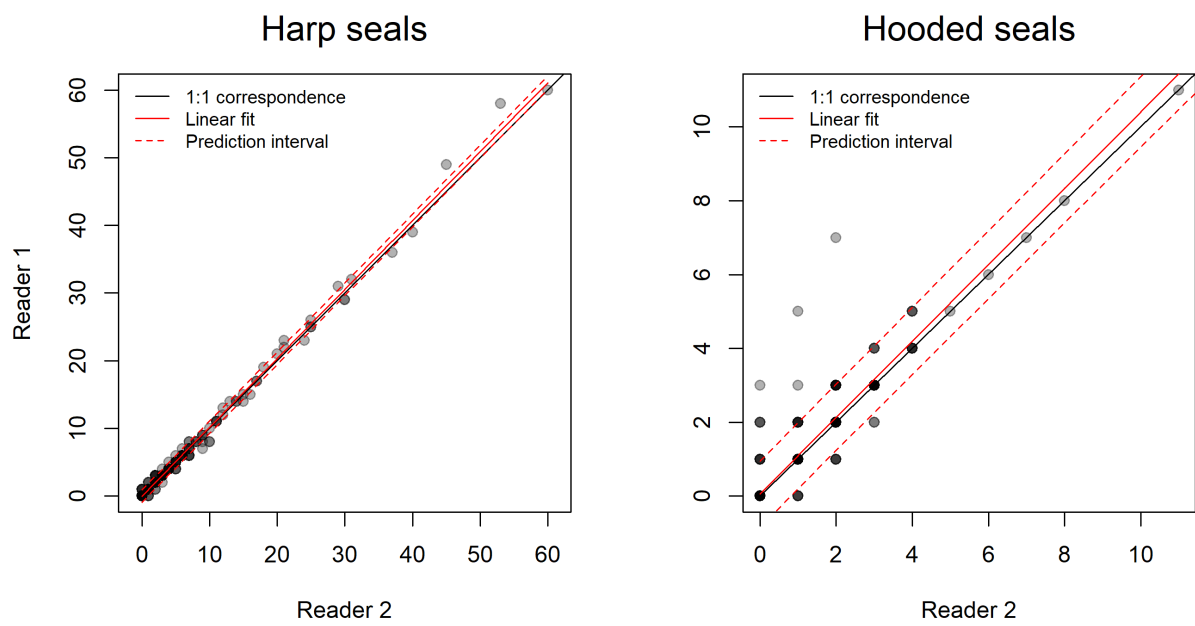


Figure S4. Inter-reader comparisons for (A) harp and (B) hooded seals, showing bias correction for Reader 1 using linear models with Reader 2 as explanatory variable.

Table S1. East-west transects (2 nm spacing) flown during fixed-wing photo surveys of harp and hooded seal whelping areas in the Greenland Sea drift ice on March 27 & 28, 2018. Positions are given in degrees & decimal minutes.

Transect	Date	Latitude	West	East	Harps	Hoods	nphotos
35002_1	March 27	71°15,0'N	20°06,0'W	19°44,0'W	1	1	42
35002_2	March 27	71°18,0'N	20°02,0'W	19°34,0'W	6	10	54
35002_3	March 27	71°20,0'N	20°02,0'W	19°23,0'W	127	33	72
35002_4	March 27	71°22,0'N	20°01,0'W	19°21,0'W	255	52	75
35002_5	March 27	71°24,0'N	20°00,0'W	19°15,0'W	88	21	83
35002_6	March 27	71°26,0'N	20°01,0'W	19°14,0'W	89	44	88
35002_7	March 27	71°28,0'N	20°01,0'W	19°09,0'W	809	105	95
35002_8	March 27	71°30,0'N	20°04,0'W	19°09,0'W	91	9	102
35002_9	March 27	71°32,0'N	20°03,0'W	19°07,0'W	14	12	102
35002_10	March 27	71°34,0'N	20°02,0'W	19°31,0'W	131	9	57
35002_11	March 27	71°36,0'N	20°01,0'W	19°29,0'W	137	9	58
35002_12	March 27	71°38,0'N	20°06,0'W	19°30,0'W	119	9	66
35002_13	March 27	71°40,0'N	19°59,0'W	19°34,0'W	32	4	46
35002_14	March 27	71°42,0'N	19°58,0'W	19°32,0'W	11	7	48
35002_15	March 27	71°44,0'N	19°54,0'W	19°29,0'W	142	14	45
35002_16	March 27	71°46,0'N	19°45,0'W	19°29,0'W	0	1	29
35002_17	March 27	71°46,0'N	19°08,0'W	18°41,0'W	22	46	49
35002_18	March 27	71°48,0'N	19°44,0'W	18°38,0'W	55	10	120
35002_19	March 27	71°50,0'N	19°47,0'W	18°50,0'W	126	17	103
35002_20	March 27	71°52,0'N	19°45,0'W	18°57,0'W	75	3	87
35002_21	March 27	71°54,0'N	19°42,0'W	18°54,0'W	38	3	87
35002_22	March 27	71°56,0'N	19°41,0'W	18°48,0'W	75	12	96
35002_23	March 27	71°58,0'N	19°36,0'W	18°48,0'W	69	15	87
35002_24	March 27	71°60,0'N	19°35,0'W	18°32,0'W	311	31	112
35002_25	March 27	72°02,0'N	19°37,0'W	18°17,0'W	310	24	146
35003_1	March 27	72°04,0'N	19°23,0'W	17°53,0'W	495	68	163
35003_2	March 27	72°06,0'N	19°13,0'W	17°40,0'W	258	39	171
35003_3	March 27	72°08,0'N	19°12,0'W	18°02,0'W	20	3	127
35003_4	March 27	72°10,0'N	19°09,0'W	18°00,0'W	9	5	127
35003_5	March 27	72°12,0'N	19°04,0'W	18°17,0'W	10	6	84
35003_6	March 27	72°14,0'N	19°02,0'W	18°24,0'W	54	12	70
35003_7	March 27	72°16,0'N	18°56,0'W	18°09,0'W	1	3	85
35003_8	March 27	72°18,0'N	18°51,0'W	18°11,0'W	0	2	73
35003_9	March 27	72°20,0'N	18°45,0'W	17°60,0'W	0	3	81
35003_10	March 27	72°22,0'N	18°40,0'W	17°59,0'W	5	3	75
35004_1	March 28	71°30,0'N	20°09,0'W	19°50,0'W	0	0	35
35004_2	March 28	71°32,0'N	20°11,0'W	19°49,0'W	0	0	39

Table S1. East-west transects (2 nm spacing) flown during fixed-wing photo surveys of harp and hooded seal whelping areas in the Greenland Sea drift ice on March 27 & 28, 2018. Positions are given in degrees & decimal minutes.

Transect	Date	Latitude	West	East	Harps	Hoods	nphotos
35004_3	March 28	71°34,0'N	20°04,0'W	19°50,0'W	0	0	26
35004_4	March 28	71°36,0'N	20°05,0'W	19°49,0'W	2	5	30
35004_5	March 28	71°38,0'N	20°02,0'W	19°50,0'W	12	8	22
35004_6	March 28	71°40,0'N	20°04,0'W	19°39,0'W	16	6	44
35004_7	March 28	71°42,0'N	20°05,0'W	19°40,0'W	78	5	46
35004_8	March 28	71°44,0'N	20°05,0'W	19°40,0'W	160	7	47
35004_9	March 28	71°46,0'N	20°03,0'W	19°40,0'W	72	17	42
35004_10	March 28	71°48,0'N	20°03,0'W	19°20,0'W	1	5	80
35004_11	March 28	71°50,0'N	19°52,0'W	19°21,0'W	6	4	56
35004_12	March 28	71°52,0'N	19°53,0'W	19°18,0'W	22	14	65
35004_13	March 28	71°54,0'N	19°50,0'W	19°21,0'W	0	11	53
35004_14	March 28	71°56,0'N	19°52,0'W	18°60,0'W	7	6	95
35004_15	March 28	71°58,0'N	19°40,0'W	19°01,0'W	188	27	72
35004_16	March 28	72°00,0'N	19°32,0'W	18°60,0'W	204	30	60
35004_17	March 28	72°02,0'N	19°26,0'W	19°00,0'W	4	0	47
35004_18	March 28	72°04,0'N	19°20,0'W	18°48,0'W	66	14	59
35004_19	March 28	72°06,0'N	19°05,0'W	18°47,0'W	69	9	32
35004_20	March 28	72°08,0'N	19°01,0'W	18°33,0'W	199	21	51
35004_21	March 28	72°10,0'N	18°56,0'W	18°28,0'W	90	22	50
35004_22	March 28	72°11,0'N	18°56,0'W	18°27,0'W	85	24	54
35004_23	March 28	72°12,0'N	18°48,0'W	18°27,0'W	0	9	41
35004_24	March 28	72°09,0'N	18°51,0'W	18°25,0'W	109	17	49
35004_25	March 28	72°07,0'N	18°55,0'W	18°22,0'W	284	20	61
35004_26	March 28	72°06,0'N	18°53,0'W	18°22,0'W	286	32	57
35004_27	March 28	72°05,0'N	18°56,0'W	18°20,0'W	191	16	65
35004_28	March 28	72°03,0'N	18°59,0'W	18°25,0'W	233	23	62
35004_29	March 28	72°01,0'N	19°20,0'W	18°23,0'W	364	43	103
35004_30	March 28	72°00,0'N	19°01,0'W	18°27,0'W	240	43	62
35004_31	March 28	71°59,0'N	19°21,0'W	18°24,0'W	462	81	102
35004_32	March 28	71°58,0'N	19°23,0'W	18°39,0'W	128	115	80
35004_33	March 28	71°57,0'N	19°26,0'W	18°37,0'W	1	21	88
35004_34	March 28	71°55,0'N	19°27,0'W	18°37,0'W	10	4	91
35004_35	March 28	71°53,0'N	19°43,0'W	18°36,0'W	31	11	122