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Brown trout recruitment from natural streams with residual regulated flow

Lake population dynamics in the Upper Kova River system, Telemark

Appendix 1: Supplementary figures and tables

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2 Brown trout and hydropower

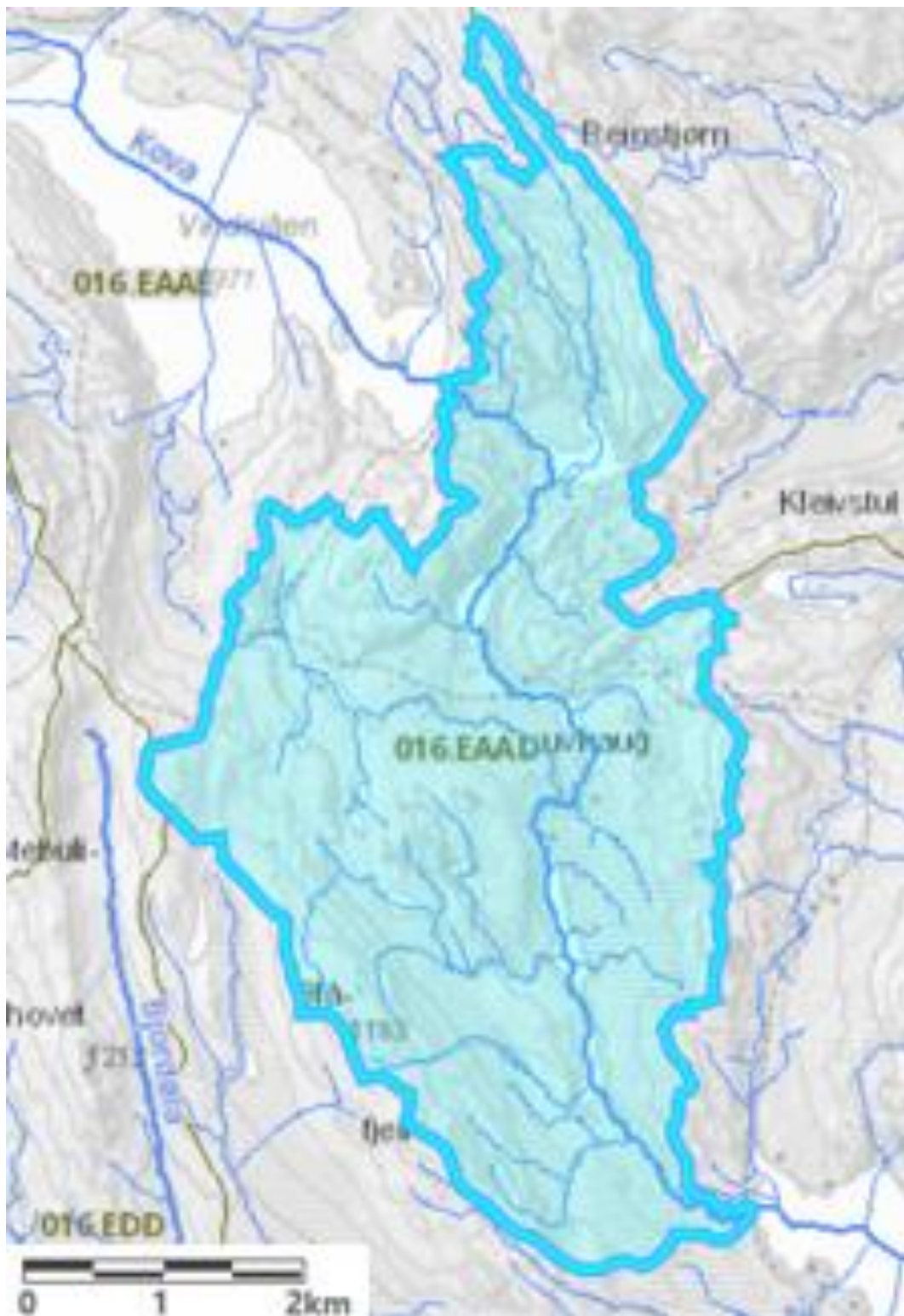


Figure A1 2.1. Upper Kova waterbody (REGINE unit 016.EAAD) catchment area (18.9 km²) (NVE Atlas, 2021).

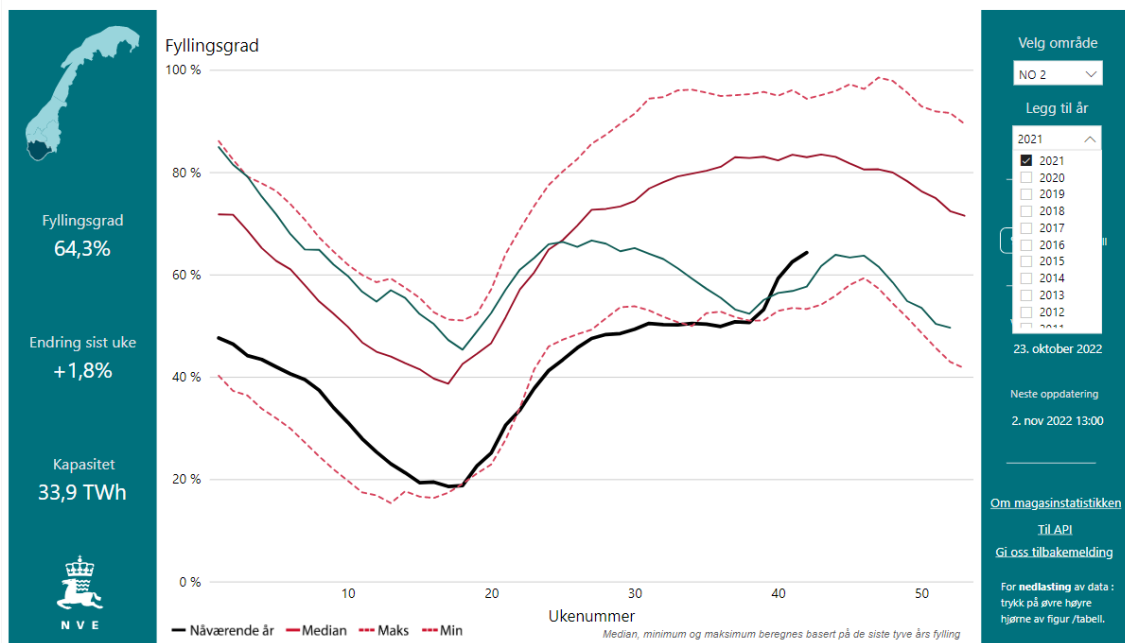


Figure A1 2.2. Filling levels of hydropower reservoirs in the part of Norway where the Kova R. is located. The black line represents 2022, and the blue line 2021. The solid red line is the median, dashed red lines the maximum and minimum, all three based on filling levels over the past 20 years. From NVE (<https://www.nve.no/energi/analyser-og-statistikk/magasinstatistikk/>), accessed October 27, 2022.



Figure A1 2.3. Heggenes' electrofishing stations in the Upper Kova R., 2017 and 2019. Map generated in QGIS (QGIS Development Team, 2021), based on coordinates in Heggenes' report (Heggenes, 2020).

3 Methods

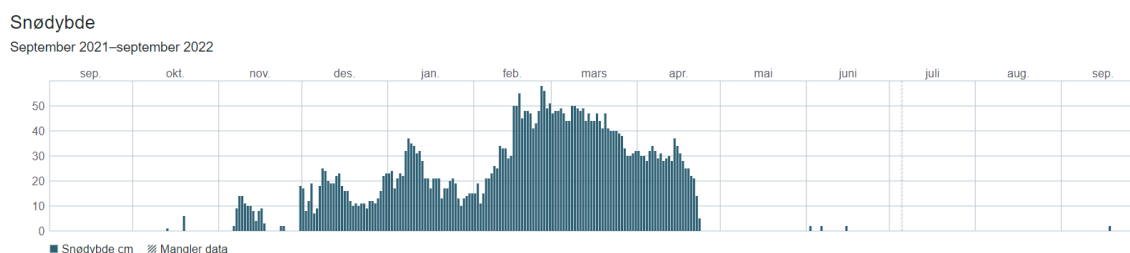


Figure A1 3.1. Snow depths in the Kova R. region September 2021-September 2022. Data from meteorological station Møsstrand II, about 20 km from L. Vindsjøen. Bars represent snow depths in cm. From (<https://www.yr.no/nb/historikk/graf/1-67464/Norge/Vestfold%20og%20Telemark/Vinje/M%C3%B8svatn>), accessed October 27, 2022.

Table A1 3.1. Three Upper Kova lakes: key gillnet information from the 2022 test fishery. Gillnet serial numbers (#), panel number at start/closest to shore, positions (UTM) and depths (m). ØU: Øvre Urdetjønn, NU: Nedre Urdetjønn, BT: Bjønntjønn. Numbers in bold/italics/red: estimated due to faulty data from GPS device.

Lake	#	Start				End		
		Panel	Northing	Easting	Depth	Northing	Easting	Depth
ØU	1	12	6625647.08	475036.24	1.5	6625660.86	475007.52	1.3
ØU	2	12	6625601.48	475043.07	0.9	6625605.97	475005.52	3.1
ØU	3	12	6625545.54	475015.56	2.5	6625552.58	474978.87	7.8
ØU	4	1	6625466.88	474970.49	2.1	6625483.76	474944.76	2.1
ØU	5	1	6625432.68	474922.51	0.7	6625450.66	474899.04	1.3
ØU	6	1	6625449.93	474842.30	0.7	6625436.60	474869.34	1.3
ØU	7	1	6625550.08	474886.62	1.6	6625526.96	474914.05	5.1
ØU	8	1	6625613.88	474938.50	2.3	6625595.04	474958.26	7.4
NU	1	12	6625225.92	474782.98	0.8	6625200.85	474769.33	4.5
NU	2	12	6625154.67	474812.89	0.8	6625156.35	474777.91	3.5
NU	3	12	6625021.43	474785.87	0.8	6625022.31	474755.59	4.2
NU	4	1	6624942.02	474754.49	0.9	6624938.55	474723.57	3.4
NU	5	1	6624883.66	474705.16	0.6	6624882.85	474676.95	1.1
NU	6	1	6624833.35	474619.59	0.5	6624859.17	474639.2	1.0
NU	7	1	6624989.30	474549.87	1.0	6624985.51	474581.64	6.9
NU	8	1	6625192.50	474653.66	1.0	6625179.26	474685.37	5.2
BT	1	12	6624367.63	475448.24	0.7	6624338.51	475439.73	5.3
BT	2	1	6624254.97	475492.90	0.9	6624242.08	475471.63	0.9
BT	3	?	6624130.11	475631.15	0.6	6624095.74	475625.14	1.0
BT	4	?	6624030.87	475735.08	0.5	6624052.28	475696.95	1.0
BT	5	12	6623914.51	475629.40	0.5	6623936.36	475610.50	1.3
BT	6	12	6624057.79	475570.21	0.5	6624084.95	475588.15	2.4
BT	7	1	6624202.67	475401.35	1.0	6624228.48	475405.06	1.3
BT	8	1	6624225.31	475345.37	0.5	6624248.62	475374.57	1.2

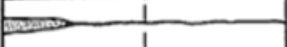
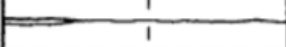
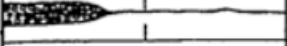
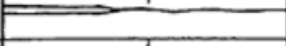

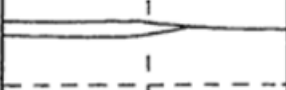
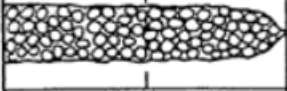
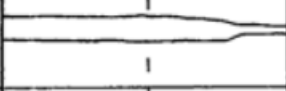
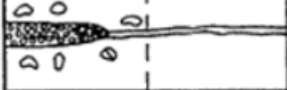
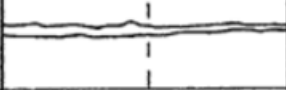
HUNN	STADIUM	HANN	
	I		GJELDFISK Skal ikke gyte kommende høst
	II		
	III		GYTEFISK Skal gyte kommende høst
	V		
	VII-II		UTGYTT FISK Tidligere gytere
← Bukhulens lengde →		← Bukhulens lengde →	

Figure A1 3.2. Scheme for staging of fish maturation levels per sex used in the 2022 test fishery. I-II (1-2): immature, III-VII (3-7): mature (set to spawn this season or previous spawners). From Miljølære.no (undated).

4 Results within and across the lakes 2022

Table A1 4.1. Øvre Urdetjønn: key individual fish data from the 2022 test fishery (all individuals). Fin-clip: indication of hatchery stock (Yes/No), Mat. stage: maturation (1-7, mature ≥ 3), Flesh color: white, light red, red (1-3), Stomach filling: quantity of food/remains (0-5), GN start/stop: depth at gillnet ends.

ID	Length (mm)	Weight (grams)	Fin-clip	Age (years)	Sex	Mat. Stage	Meat color	Stomach filling	Mesh size (mm)	Gillnet #	GN start (m)	GN stop (m)
1	187	59	No	4	M	2	1	0	19.5	1	1.5	1.3
2	267	161	No	6	F	4	1	1	24	1	1.5	1.3
3	281	172	No	8	F	4	1	2	24	1	1.5	1.3
4	261	168	No	7	F	2	1	2	24	1	1.5	1.3
5	251	134	No	5	M	7	1	2	24	1	1.5	1.3
6	278	194	No	7	F	4	1	3	24	1	1.5	1.3
7	168	42	No	3	O	NA	1	2	15.5	1	1.5	1.3
8	158	35	No	3	M	7	1	2	15.5	1	1.5	1.3
9	246	122	No	5	F	4	1	3	15.5	1	1.5	1.3
10	162	43	No	3	F	2	1	3	19.5	2	0.9	3.1
11	176	54	No	4	F	1	1	0	19.5	2	0.9	3.1
12	171	50	No	3	M	7	1	3	19.5	2	0.9	3.1
13	151	31	No	3	F	2	1	2	10	2	0.9	3.1
14	215	88	No	5	M	7	1	2	10	2	0.9	3.1
15	233	106	No	5	F	3	1	2	24	2	0.9	3.1
16	281	190	No	6	F	4	1	3	24	2	0.9	3.1
17	258	169	No	7	M	4	1	2	24	2	0.9	3.1
18	181	64	No	4	F	2	1	2	15.5	2	0.9	3.1
19	176	49	No	4	M	3	1	0	19.5	3	2.5	7.8
20	142	25	No	3	O	NA	1	4	12.5	3	2.5	7.8
21	160	35	No	3	M	3	1	4	15.5	3	2.5	7.8
22	153	35	No	3	F	2	1	2	15.5	3	2.5	7.8
23	252	141	No	7	M	7	1	3	35	3	2.5	7.8
24	288	196	Yes	8	F	4	1	3	5	4	2.1	2.1
25	161	40	No	3	M	3	1	2	15.5	4	2.1	2.1
26	164	43	No	3	M	3	1	2	15.5	4	2.1	2.1
27	135	27	No	3	M	3	1	3	15.5	4	2.1	2.1
28	122	18	No	3	F	1	1	2	10	4	2.1	2.1
29	117	16	No	3	M	1	1	3	10	4	2.1	2.1
30	299	201	No	11	M	4	1	2	10	4	2.1	2.1
31	289	205	Yes	7	M	4	2	0	29	5	0.7	1.3
32	154	35	No	3	F	2	1	2	15.5	5	0.7	1.3
33	166	37	No	4	F	2	1	2	15.5	5	0.7	1.3
34	234	133	No	6	M	4	1	3	24	5	0.7	1.3
35	274	185	No	7	F	4	2	2	12.5	5	0.7	1.3
36	182	58	No	4	F	2	1	2	43	5	0.7	1.3
37	250	117	No	7	F	4	1	0	29	6	0.7	1.3
38	288	180	No	9	F	4	1	1	29	6	0.7	1.3
39	155	29	No	3	M	1	1	0	15.5	6	0.7	1.3
40	152	28	No	3	F	2	1	2	15.5	6	0.7	1.3
41	138	22	No	3	F	2	1	0	15.5	6	0.7	1.3
42	162	38	No	3	M	2	1	2	15.5	6	0.7	1.3
43	257	151	No	5	F	4	1	3	24	6	0.7	1.3
44	278	161	No	8	F	4	1	2	24	6	0.7	1.3
45	257	136	No	8	F	4	1	1	24	6	0.7	1.3
46	119	14	No	3	F	1	1	2	12.5	6	0.7	1.3
47	150	28	No	4	M	3	1	1	10	6	0.7	1.3
48	155	32	No	3	M	3	1	2	10	6	0.7	1.3
49	192	62	No	4	F	2	1	2	19.5	6	0.7	1.3
50	161	37	No	3	F	1	1	1	15.5	7	1.6	5.1
51	218	102	No	5	F	3	1	2	24	7	1.6	5.1
52	173	52	No	4	M	3	1	3	19.5	7	1.6	5.1
53	174	50	No	4	F	2	1	3	15.5	8	2.3	7.4
54	162	44	No	3	M	3	1	1	15.5	8	2.3	7.4
55	220	97	No	5	M	3	2	2	24	8	2.3	7.4
56	199	67	No	4	M	2	1	2	19.5	8	2.3	7.4
57	242	141	No	5	F	2	2	0	43	8	2.3	7.4

Table A1 4.2. Nedre Urdetjønn: key individual fish data from the 2022 test fishery (all individuals). Fin-clip: indication of hatchery stock (Yes/No), Mat. stage: maturation (1-7, mature ≥ 3), Flesh color: white, light red, red (1-3), Stomach filling: quantity of food/remains (0-5), GN start/stop: depth at gillnet ends.

ID	Length (mm)	Weight (grams)	Fin-clip	Age (years)	Sex	Mat. Stage	Meat color	Stomach filling	Mesh size (mm)	Gillnet #	GN start (m)	GN stop (m)
1	220	101	No	5	M	4	1	3	19.5	1	0.8	4.5
2	170	50	No	3	F	2	1	3	12.5	1	0.8	4.5
3	148	32	No	3	F	1	1	3	12.5	1	0.8	4.5
4	255	141	No	8	F	4	1	3	24	1	0.8	4.5
5	277	195	No	8	M	3	2	3	15.5	1	0.8	4.5
6	173	50	No	3	0	NA	1	1	19.5	2	0.8	3.5
7	189	61	No	4	F	2	1	3	19.5	2	0.8	3.5
8	183	56	No	4	M	3	1	1	19.5	2	0.8	3.5
9	151	35	No	3	M	1	1	3	12.5	2	0.8	3.5
10	172	51	No	3	M	4	1	1	19.5	3	0.8	4.2
11	315	270	No	11	M	4	2	1	29	4	0.9	3.4
12	169	45	No	3	F	2	1	2	15.5	4	0.9	3.4
13	153	34	No	3	M	2	1	3	15.5	4	0.9	3.4
14	188	65	No	4	F	3	1	1	15.5	4	0.9	3.4
15	199	76	No	5	M	3	1	3	15.5	4	0.9	3.4
16	170	46	No	3	M	3	1	3	15.5	4	0.9	3.4
17	158	40	No	3	M	3	1	3	15.5	4	0.9	3.4
18	177	53	No	4	M	3	1	3	15.5	4	0.9	3.4
19	270	174	No	8	F	4	1	3	24	4	0.9	3.4
20	257	153	No	8	M	3	1	1	24	4	0.9	3.4
21	271	168	No	7	F	4	1	3	24	4	0.9	3.4
22	256	145	No	8	F	4	2	2	19.5	4	0.9	3.4
23	271	147	No	9	F	4	1	2	29	5	0.6	1.1
24	149	28	No	3	M	2	1	2	15.5	5	0.6	1.1
25	162	37	No	4	M	2	1	2	15.5	5	0.6	1.1
26	168	41	No	4	F	2	1	2	15.5	5	0.6	1.1
27	285	198	No	10	F	4	1	3	24	5	0.6	1.1
28	267	167	No	9	M	4	1	3	24	5	0.6	1.1
29	267	167	No	7	M	4	1	3	24	5	0.6	1.1
30	268	166	No	7	M	4	1	2	24	5	0.6	1.1
31	215	100	No	5	M	2	1	3	8	5	0.6	1.1
32	178	47	No	4	F	3	1	3	15.5	6	0.5	1
33	148	32	No	3	M	2	1	1	15.5	6	0.5	1
34	220	105	No	5	F	3	1	3	15.5	6	0.5	1
35	187	58	No	4	M	3	1	2	24	6	0.5	1
36	259	152	No	7	F	4	1	2	24	6	0.5	1
37	273	174	No	8	F	4	1	2	24	6	0.5	1
38	268	188	No	9	M	4	1	2	12.5	6	0.5	1
39	236	125	No	6	F	3	1	2	12.5	6	0.5	1
40	286	222	No	10	M	4	2	2	55	6	0.5	1
41	223	110	No	5	F	2	1	3	19.5	6	0.5	1
42	152	34	No	3	F	1	1	0	15.5	7	1	6.9
43	291	179	No	11	F	4	1	1	24	7	1	6.9
44	166	40	No	3	F	2	1	1	8	7	1	6.9
45	146	33	No	3	M	2	1	0	19.5	7	1	6.9
46	193	69	No	4	M	3	1	2	19.5	7	1	6.9
47	232	118	No	5	M	4	2	2	43	7	1	6.9
48	167	44	No	3	F	2	1	0	15.5	8	1	5.2
49	166	45	No	3	M	3	1	2	15.5	8	1	5.2
50	150	29	No	4	M	1	1	2	15.5	8	1	5.2
51	169	46	No	4	F	2	1	2	15.5	8	1	5.2
52	133	20	No	3	F	1	1	1	12.5	8	1	5.2
53	128	22	No	3	F	2	1	3	12.5	8	1	5.2
54	158	40	No	3	M	3	1	2	12.5	8	1	5.2
55	168	46	No	3	M	3	1	4	19.5	8	1	5.2
56	185	59	No	4	F	3	1	2	19.5	8	1	5.2
57	201	78	No	5	M	3	1	2	43	8	1	5.2
58	173	49	No	3	M	2	1	3	43	8	1	5.2

Table A1 4.3. Bjønntjønn: key individual fish data from the 2022 test fishery (all individuals). Fin-clip: indication of hatchery stock (Yes/No), Mat. stage: maturation (1-7, mature ≥ 3), Flesh color: white, light red, red (1-3), Stomach filling: quantity of food/remains (0-5), GN start/stop: depth at gillnet ends.

ID	Length (mm)	Weight (grams)	Fin-clip	Age (years)	Sex	Mat. Stage	Meat color	Stomach filling	Mesh size (mm)	Gillnet #	GN start (m)	GN stop (m)
1	182	60	No	4	M	1	1	0	19.5	1	0.7	5.3
2	171	52	No	3	M	1	1	0	19.5	1	0.7	5.3
3	109	14	No	3	0	NA	1	1	8	1	0.7	5.3
4	128	21	No	3	0	NA	1	0	12.5	1	0.7	5.3
5	151	33	No	3	M	1	1	0	15.5	1	0.7	5.3
6	160	43	Yes	3	M	1	1	2	15.5	1	0.7	5.3
7	151	35	No	3	M	1	1	0	15.5	2	0.9	0.9
8	142	24	No	3	0	NA	1	1	12.5	2	0.9	0.9
9	191	63	No	4	0	NA	1	3	19.5	2	0.9	0.9
10	159	37	No	4	0	NA	1	1	15.5	4	0.5	1.0
11	191	63	No	4	M	7	1	2	19.5	5	0.5	1.3
12	142	26	No	3	0	NA	1	1	10	5	0.5	1.3
13	211	90	No	4	M	1	1	1	24	5	0.5	1.3
14	198	75	No	4	F	2	1	2	35	5	0.5	1.3
15	216	91	No	4	M	1	1	2	19.5	6	0.5	2.4
16	221	105	No	5	0	NA	1	1	24	6	0.5	2.4
17	358	425	No	11	F	7	1	0	35	7	1	1.3
18	250	138	No	6	M	1	1	2	24	7	1	1.3
19	225	109	No	4	M	1	1	1	12.5	7	1	1.3
20	225	108	No	4	M	2	1	1	19.5	7	1	1.3
21	325	371	No	11	F	4	1	1	29	8	0.5	1.2
22	376	521	No	13	M	3	3	1	8	8	0.5	1.2
23	178	52	No	4	M	1	1	1	19.5	8	0.5	1.2

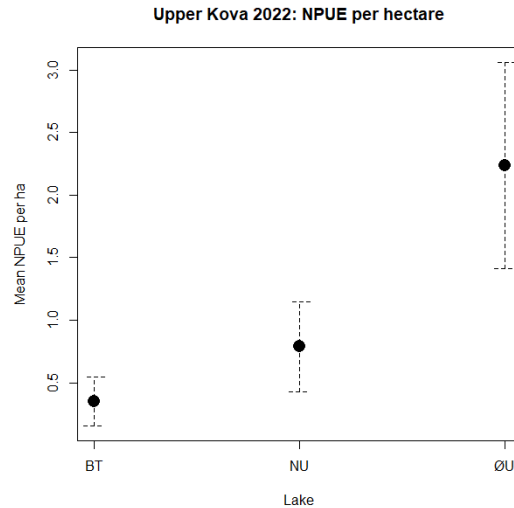


Figure A1 4.1. Three Upper Kova lakes: mean number per unit effort (NPUE) per hectare lake area based on the 2022 test fishery. BT: Bjønntjønn (n=23), NU: Nedre Urdetjønn (n=58), ØU: Øvre Urdetjønn (n=57). Error bars: 95% confidence intervals.

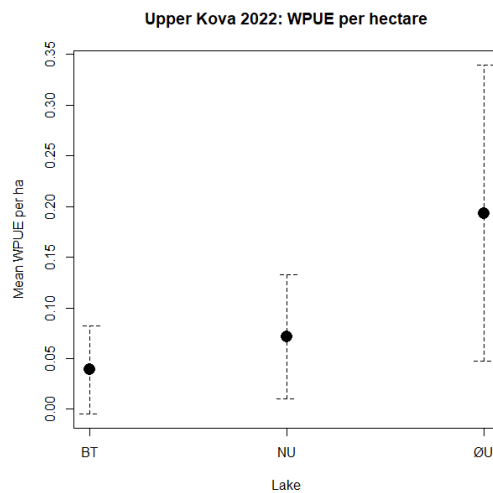


Figure A1 4.2. Three Upper Kova lakes: mean weight (kg) per unit effort (WPUE) per hectare lake area based on the 2022 test fishery. BT: Bjønntjønn (n=23), NU: Nedre Urdetjønn (n=58), ØU: Øvre Urdetjønn (n=57). Error bars: 95% confidence intervals.

Table A1 4.4. Three Upper Kova lakes: catch per unit effort (CPUE; catch per 100 m² gillnet area per gillnet night) based on the 2022 test fishery. Means with spread and confidence in estimates. SD: standard deviation, CI: confidence interval. Per ha: mean CPUE/hectare lake area.

Lake	Variable	Mean	Min	Max	SD	95 % CI	Per ha	n
Øvre Urdetjønn	CPUE	15.8	6.7	28.9	7.0	10.0 - 21.7	4.95	57
Nedre Urdetjønn	CPUE	16.8	2.4	28.6	9.0	9.3 - 24.4	1.75	58
Bjønntjønn	CPUE	6.4	0.0	13.3	4.2	2.9 - 9.9	0.78	23

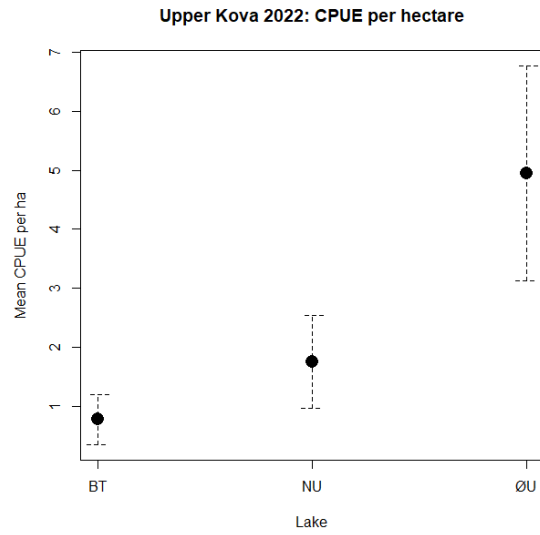


Figure A1 4.3. Three Upper Kova lakes: mean catch per unit effort (CPUE) per hectare lake area based on the 2022 test fishery. CPUE: catch per 100 m² gillnet area per gillnet night. BT: Bjønntjønn (n=23), NU: Nedre Urdetjønn (n=58), ØU: Øvre Urdetjønn (n=57). Error bars: 95% confidence intervals.

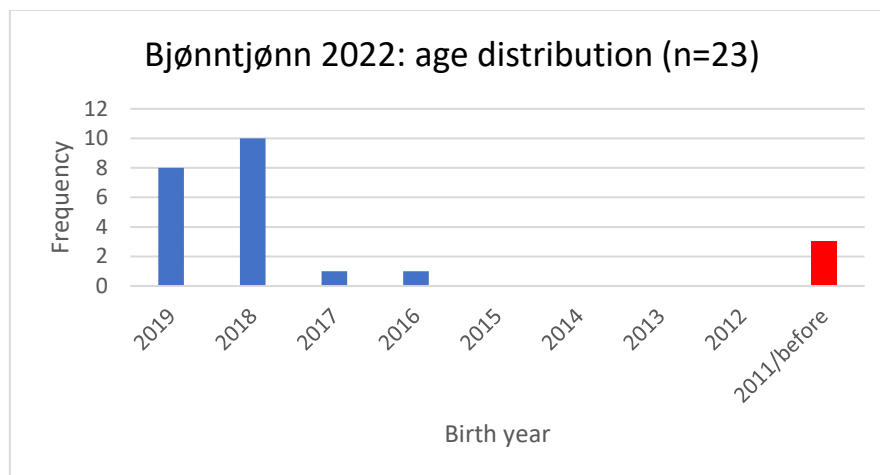
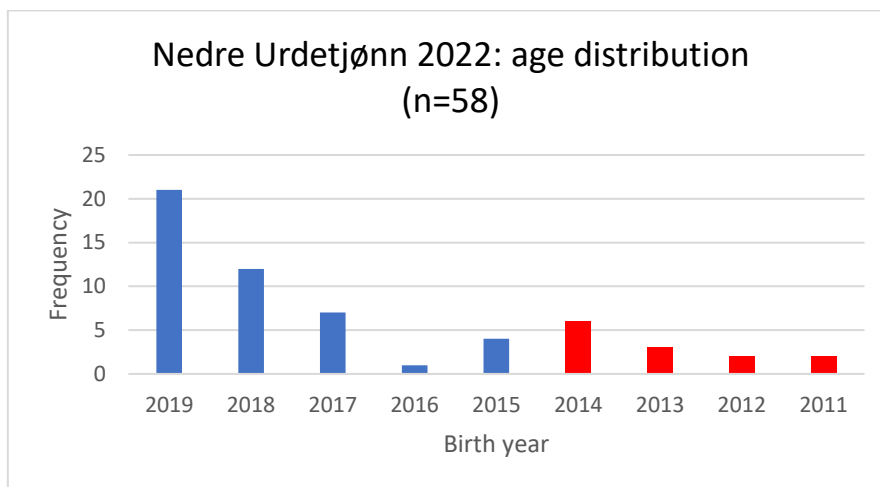
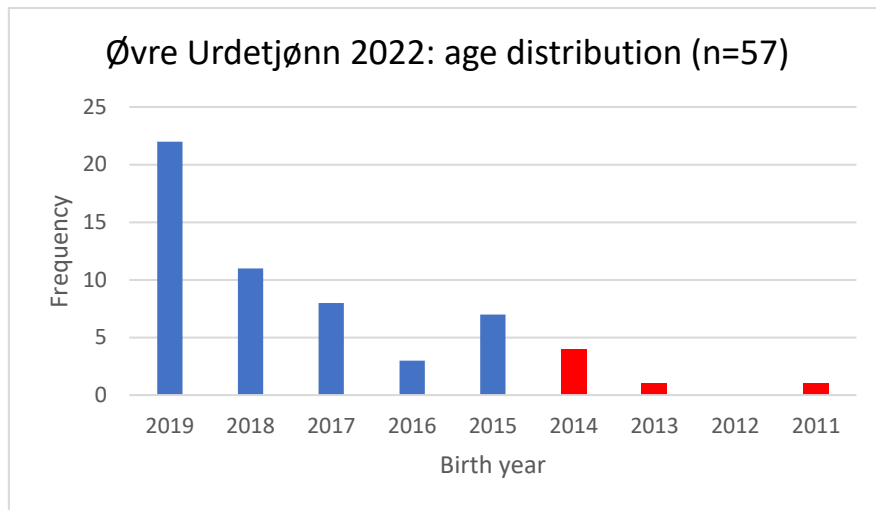


Figure A1 4.4. Three Upper Kova lakes: frequency distributions of age based on the 2022 test fishery. Age converted to birth year. Blue bars: period with presumed exclusively natural recruitment, red bars: period with supplemental stocking. 2019: unusually high summer flows from L. Vindsjøen due to dam repairs.

Table A1 4.5. Three Upper Kova lakes: age class frequencies with mean lengths based on the 2022 test fishery. SD: standard deviation, CI: confidence interval.

Lake	Age (years)	n	Mean length (mm)	SD	95% CI
Øvre Urdetjønn	3	22	151	15.6	6.9
Nedre Urdetjønn	3	21	158	13.1	6.0
Bjønntjønn	3	8	144	19.2	16.0
Øvre Urdetjønn	4	11	178	13.1	8.8
Nedre Urdetjønn	4	12	177	12.9	8.2
Bjønntjønn	4	10	198	21.7	15.5
Øvre Urdetjønn	5	8	235	16.2	13.5
Nedre Urdetjønn	5	7	216	11.9	11.0
Bjønntjønn	5	1	221		
Øvre Urdetjønn	6	3	261	24.1	59.9
Nedre Urdetjønn	6	1	236		
Bjønntjønn	6	1	250		
Øvre Urdetjønn	7	7	266	14.6	13.5
Nedre Urdetjønn	7	4	266	5.1	8.2
Øvre Urdetjønn	8	4	276	13.3	21.2
Nedre Urdetjønn	8	6	265	9.8	10.3
Øvre Urdetjønn	9	1	288		
Nedre Urdetjønn	9	3	269	2.1	5.2
Nedre Urdetjønn	10	2	286	0.7	6.4
Øvre Urdetjønn	11	1	299		
Nedre Urdetjønn	11	2	303	17.0	152.5
Bjønntjønn	11	2	342	23.3	209.7
Bjønntjønn	13	1	376		

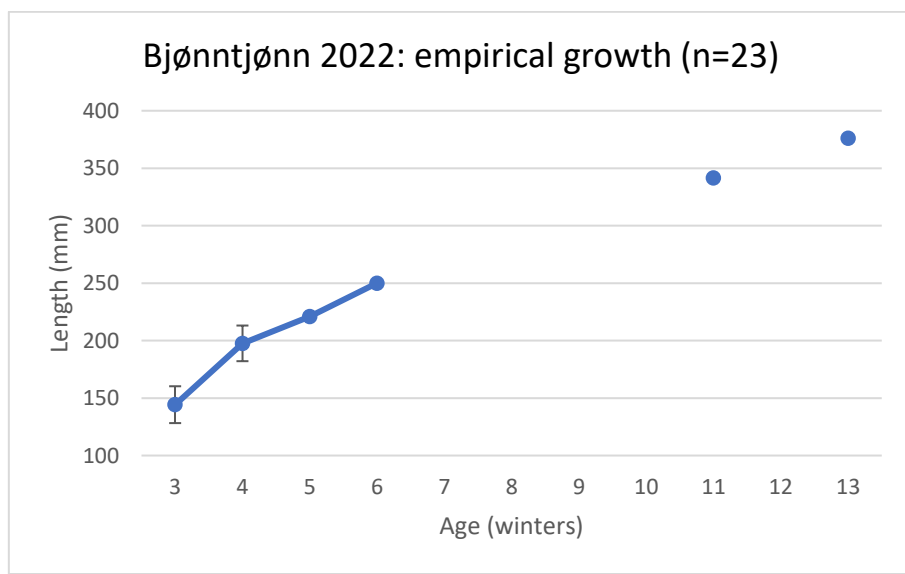
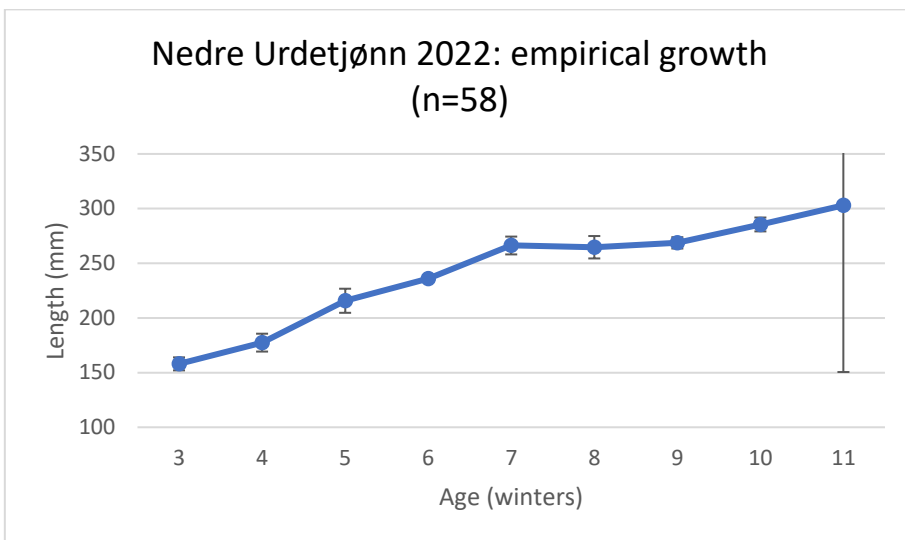
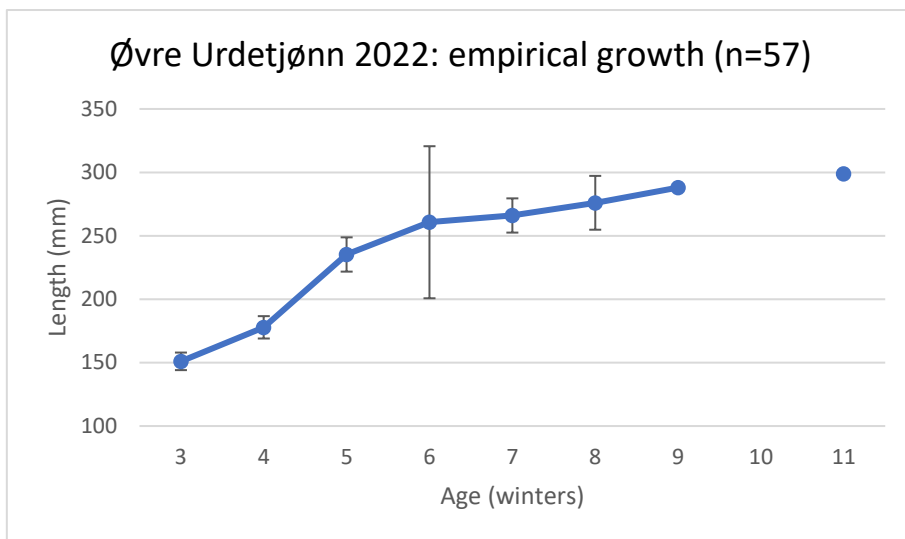


Figure A1 4.5. Three Upper Kova lakes: empirical growth (age-length) based on the 2022 test fishery. Dots represent mean length for fish in the respective age categories, error bars 95 % confidence intervals.

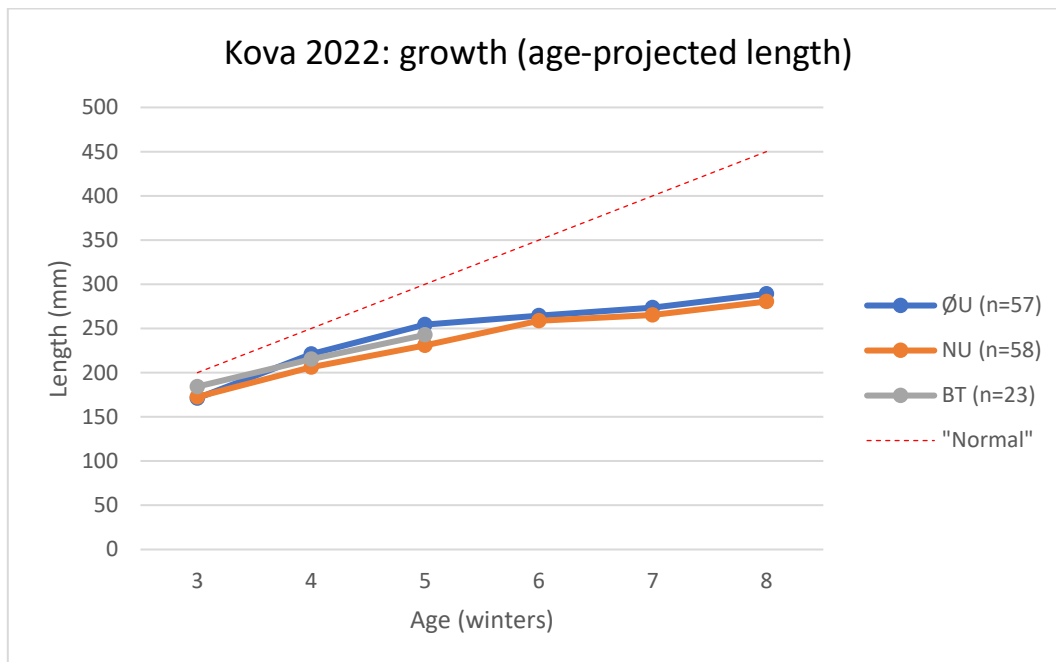
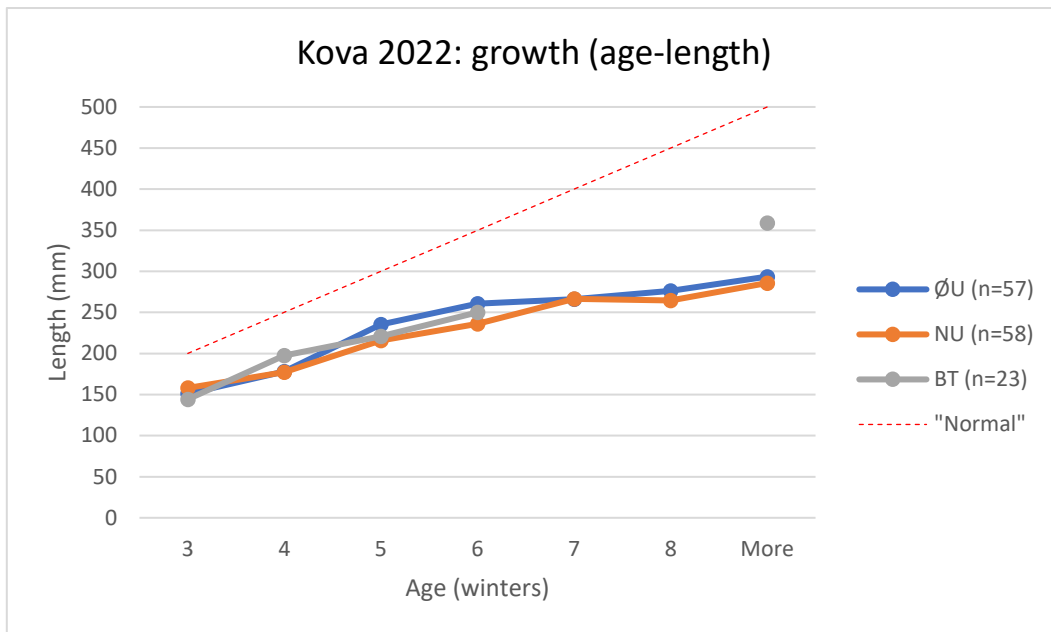


Figure A1 4.6. Three Upper Kova lakes: growth (empirical age-length) based on the 2022 test fishery. Top: based on observations, bottom: based on end-of-season length projections. Dots represent mean length for age class, joined with lines where consecutive age classes were represented in the catches. Red dashed line: stable growth rate of 50 mm/year. ØU: Øvre Urdetjønn, NU: Nedre Urdetjønn, BT: Bjørntjønn.

Upper Kova 2022: k-factor (all fish)

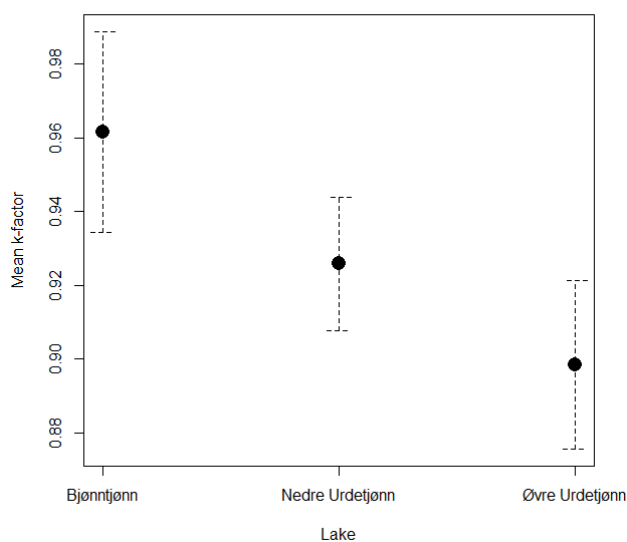


Figure A1 4.7. Three Upper Kova lakes: mean k-factor of all fish per lake based on the 2022 test fishery. Bjønntjønn: n=23, Nedre Urdetjønn: n=58, Øvre Urdetjønn: n= 57. Error bars: 95% confidence intervals.

Table A1 4.6. Three Upper Kova lakes: mean k-factor with spread for four fish length classes per lake based on the 2022 test fishery. SD: standard deviation.

Lake	≤ 160 mm			160-190 mm			> 190-250 mm			> 250 mm		
	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Øvre Urdetjønn	0.90	0.09	15	0.95	0.07	16	0.89	0.09	10	0.85	0.07	16
Nedre Urdetjønn	0.97	0.08	12	0.93	0.05	20	0.97	0.02	9	0.87	0.06	17
Bjønntjønn	0.97	0.08	8	0.99	0.06	3	0.93	0.03	9	1.00	0.08	3

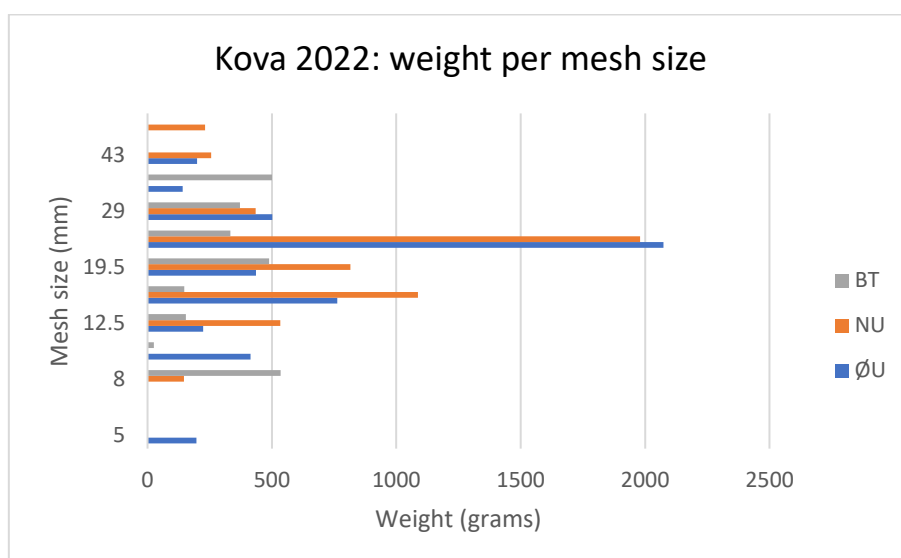
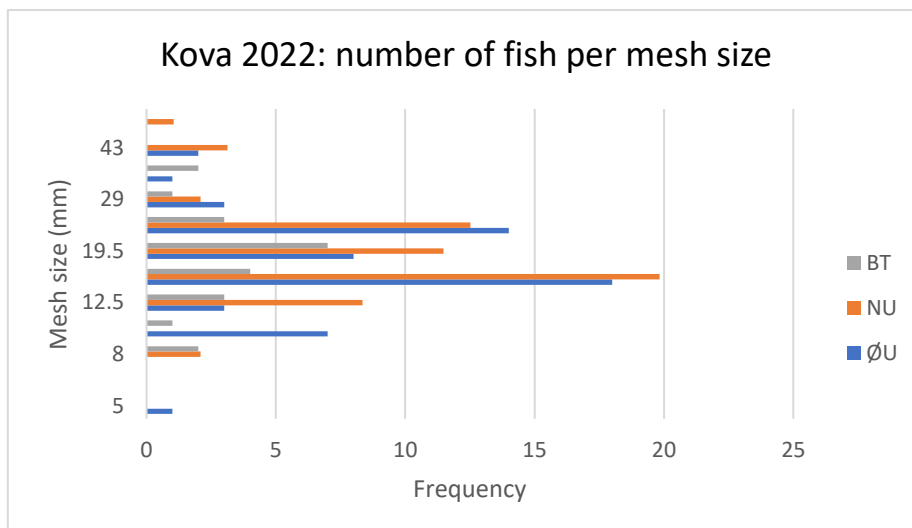


Figure A1 4.8. Three Upper Kova lakes: number and weight of fish per mesh size in the 2022 test fishery. BT: Bjønntjønn (n=23); NU: Nedre Urdetjønn (n=61; corrected for smaller gillnet area with factor 1.04); ØU: Øvre Urdetjønn (n=57).

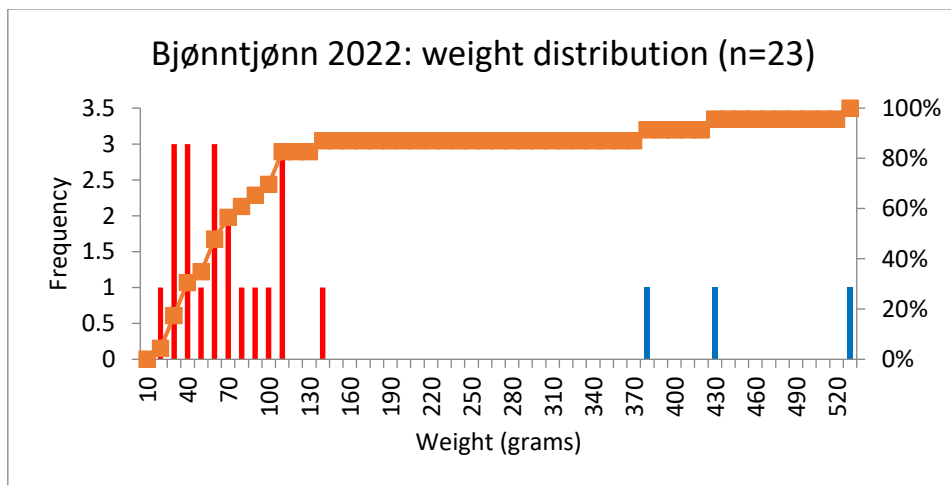
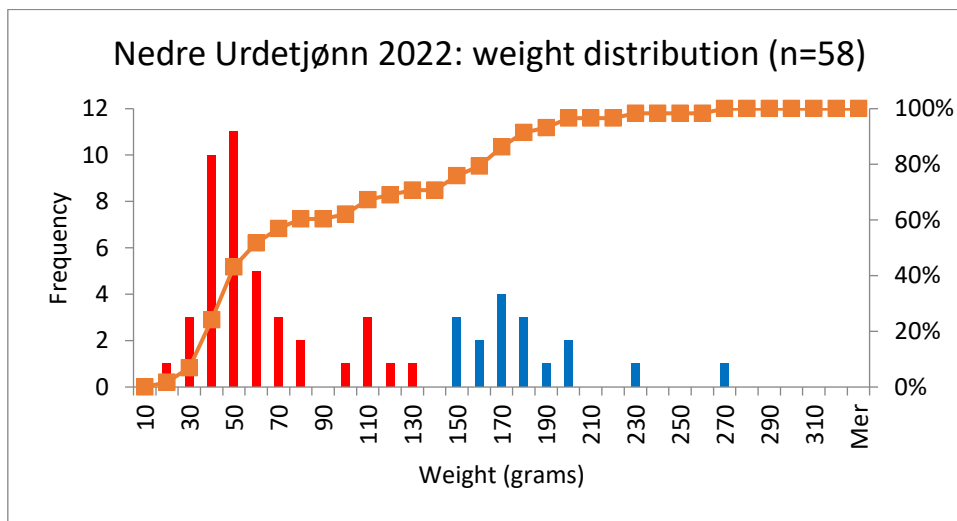
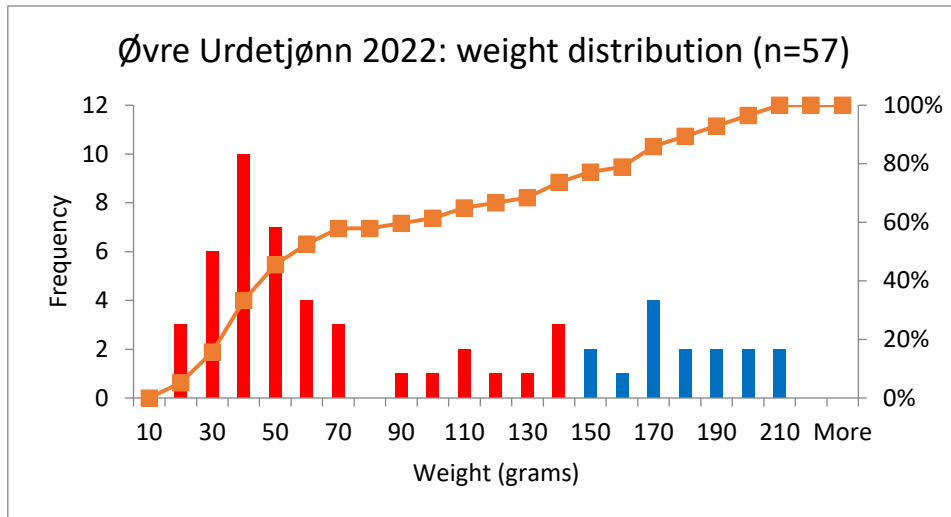


Figure A1 4.9. Three Upper Kova lakes: frequency distribution of fish weights based on the 2022 test fishery. Blue bars represent fish with weights ≥ 150 grams. The cumulative curve (in orange) indicates the proportion of fish under/over a given length, 50 % corresponding to the median.



Figure A1 4.10. Three Upper Kova lakes: macro-parasites *Eustrongylides* sp. Collection of specimens found in the abdominal cavity of fish caught in the 2022 test fishery. Photo by author.

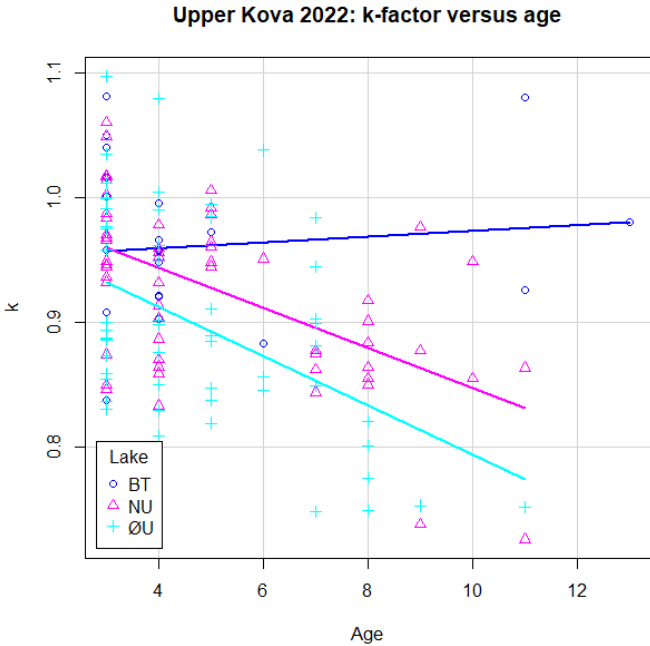


Figure A1 4.11. Three Upper Kova lakes: k-factor versus age based on the 2022 test fishery. BT: Bjønntjønn (n=23), NU: Nedre Urdetjønn (n=58), ØU: Øvre Urdetjønn (n=57).

Table A1 4.7. Øvre Urdetjønn: size at maturity (length in mm) per sex based on the 2022 test fishery. Onset defined as the point at which 50% or more of the fish in cohorts based on 30 mm length intervals had reached maturity, indicated with number in bold/italics.

Males			Females		
Immature Length (mm)	Mature Length (mm)	Mature (%)	Immature Length (mm)	Mature Length (mm)	Mature (%)
117		0	119		
	135		122		0
	150		138		
155	155	80	151		
	158		152		0
	160		153		
	161		154		
162	162		161		
	164	78	162		
	171		166		
	173		174		0
	176		176		
187			181		
199			182		
	215	50	192		
	220			218	50
	234	100		233	
	251		242		67
	252	100		246	
	258			250	
	289			257	
	299	100		257	
			261		88
				267	
				274	
				278	
				278	
				281	
				281	
				288	100
				288	

Table A1 4.8. Nedre Urdetjønn: size at maturity (length in mm) per sex based on the 2022 test fishery. Onset defined as the point at which 50% or more of the fish in cohorts based on 30 mm length intervals had reached maturity, indicated with number in bold/italics.

Males			Females		
Immature Length (mm)	Mature Length (mm)	Mature (%)	Immature Length (mm)	Mature Length (mm)	Mature (%)
146			128		0
148			133		
149			148		0
150		25	152		
151			166		
153			167		
	158		168		
	158		169		
162			169		30
	166		170		
	168			178	
	170			185	
	172	78		188	
173			189		
	177			220	
	183		223		67
	187			236	
	193			255	
	199			256	
	201	75		259	
215				270	100
	220			271	
	232	100		271	
	257			273	
	267			285	
	267			291	100
	268	100			
	268				
	277				
	286	100			
	315	100			

Table A1 4.9. Two Upper Kova lakes: age at maturity per sex based on the 2022 test fishery. Onset defined by the point at which 50% of the fish in the age class had reached maturity (indicated with bold line per lake and sex).

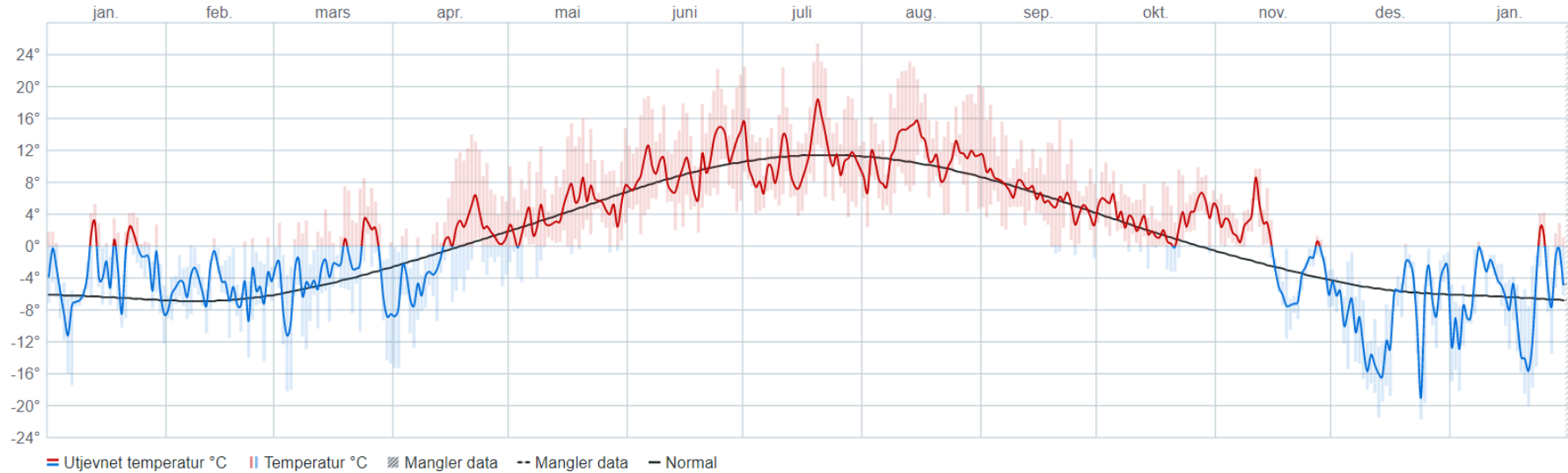
Age (years)	Øvre Urdetjønn 2022				Nedre Urdetjønn 2022			
	Males		Females		Males		Females	
	n	Mature	n	Mature	n	Mature	n	Mature
3	11	73 %	9	0 %	12	50 %	8	0 %
4	5	60 %	6	0 %	6	67 %	6	50 %
5	3	100 %	5	80 %	5	80 %	2	50 %
6	1	100 %	2	100 %	0		1	100 %
7	3	100 %	4	75 %	2	100 %	2	100 %
8	0		4	100 %	2	100 %	4	100 %
9	0		1	100 %	2	100 %	1	100 %
10	0		0		1	100 %	1	100 %
11	1	100 %	0		1	100 %	1	100 %

Table A1 4.10. Three Upper Kova lakes: flesh color based on the 2022 test fishery. Number, proportion and length (means for white and light red) of individuals with respective flesh colors. Attenuated numbers for Bjønntjønn: higher level of uncertainty due to initial classification challenges (cf. A2 2.9).

Lake	White			Light red			Red		
	n	Prop. (%)	Length (mm)	n	Prop. (%)	Length (mm)	n	Prop. (%)	Length (mm)
Øvre Urdetjønn	53	93	198	4	7	256	0	0	
Nedre Urdetjønn	53	91	197	5	9	273	0	0	
Bjønntjønn	22	96	195	0	0		1	4	376

Temperatur

Januar 2022–januar 2023



Nedbør

Januar 2022–januar 2023

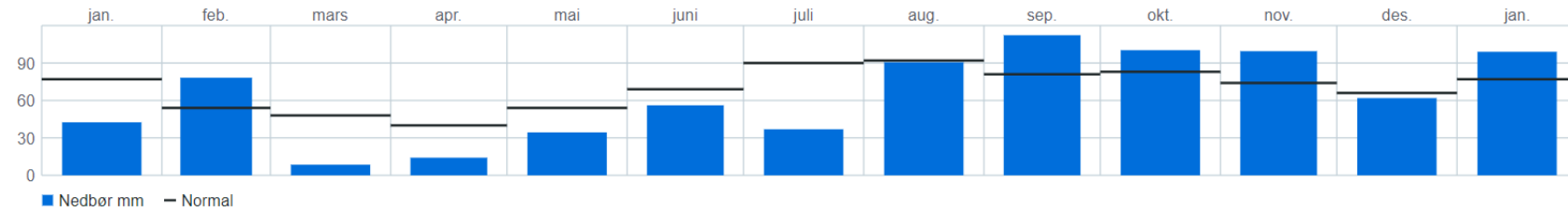


Figure A1 4.12. Temperature and precipitation for the period January 2022 – January 2023 in the Kova R. region. Data from Møsvatn/Møsstrand II meteorological station, ca. 20 km from L. Vindsjøen). Temperature: curve in blue/red represents averaged air temperature under/above 0 °C, black line is the normal. Precipitation (Nedbør): blue bars represent amount in mm, black lines the normal. From yr.no/historikk, accessed February 7, 2023.

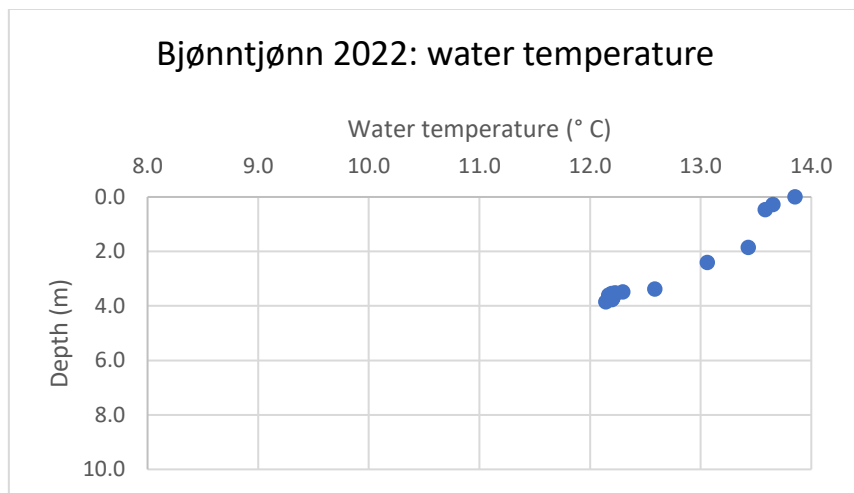
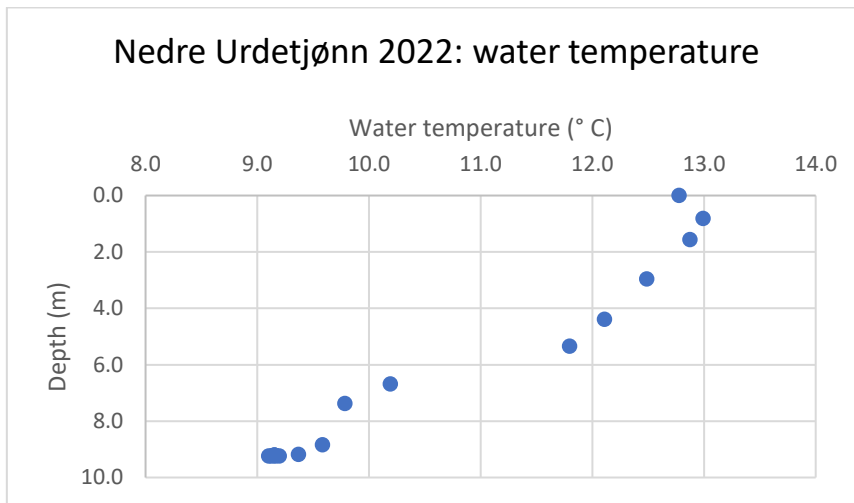
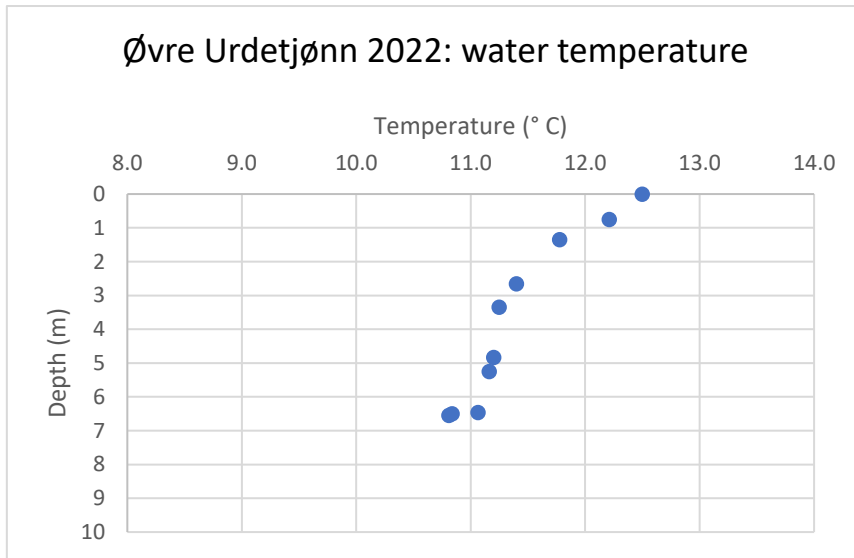


Figure A1 4.13. Three Upper Kova lakes: water temperature versus depth in the 2022 test fishery. “Best sequence” of data registered with multiparameter logger on June 22, 2022.

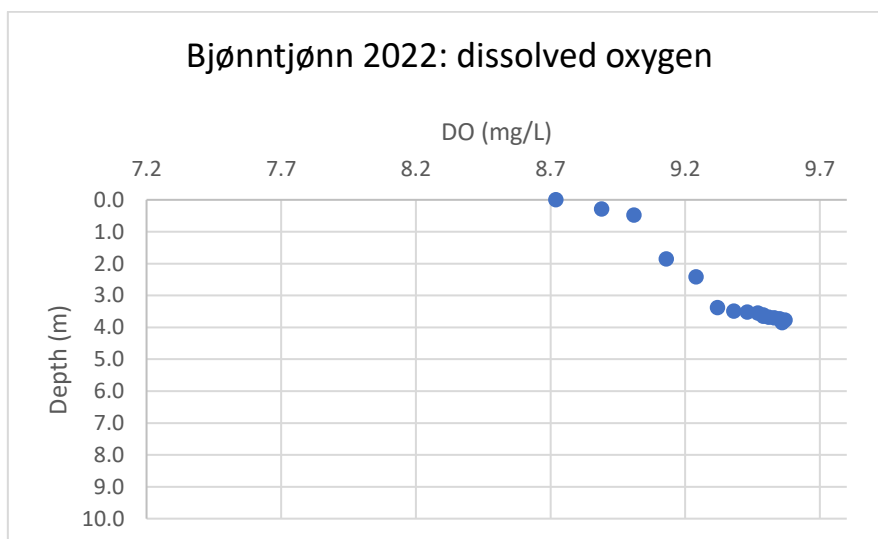
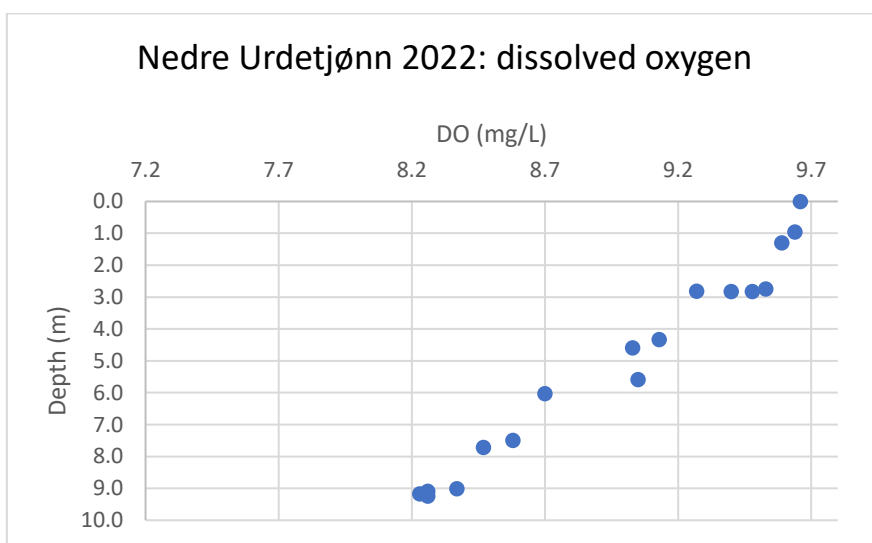
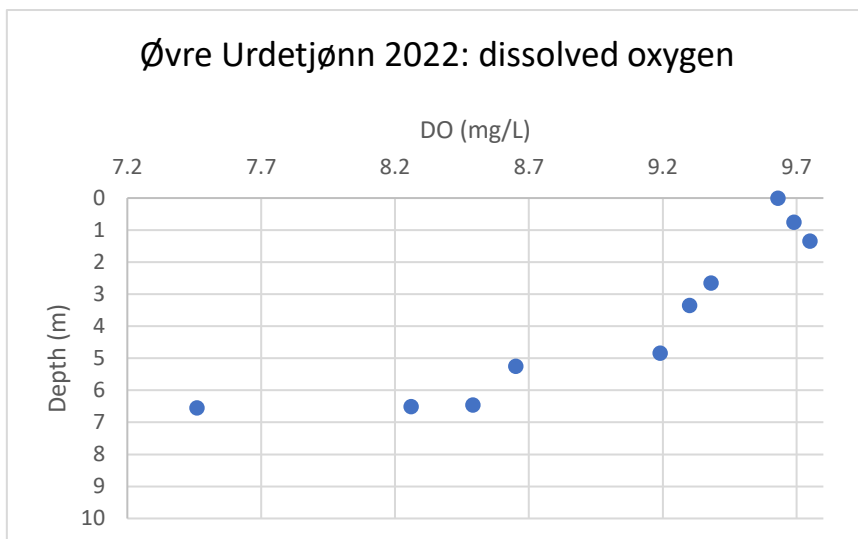


Figure A1 4.14. Three Upper Kova lakes: dissolved oxygen (mg/L) versus depth in the 2022 test fishery. Sequence with most data registered with multiparameter logger on June 22, 2022. For Bjønntjønn: note deviations from range reported for the lake in Table 4.6 and from patterns for the other two lakes.

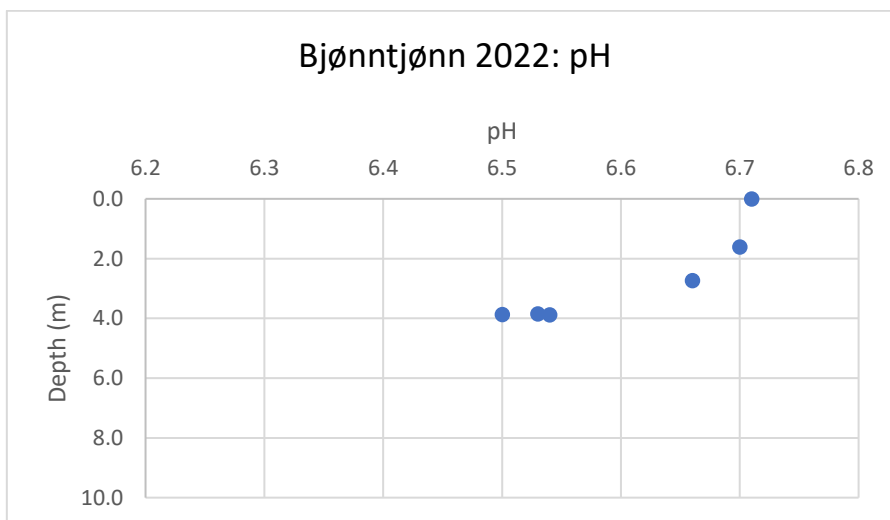
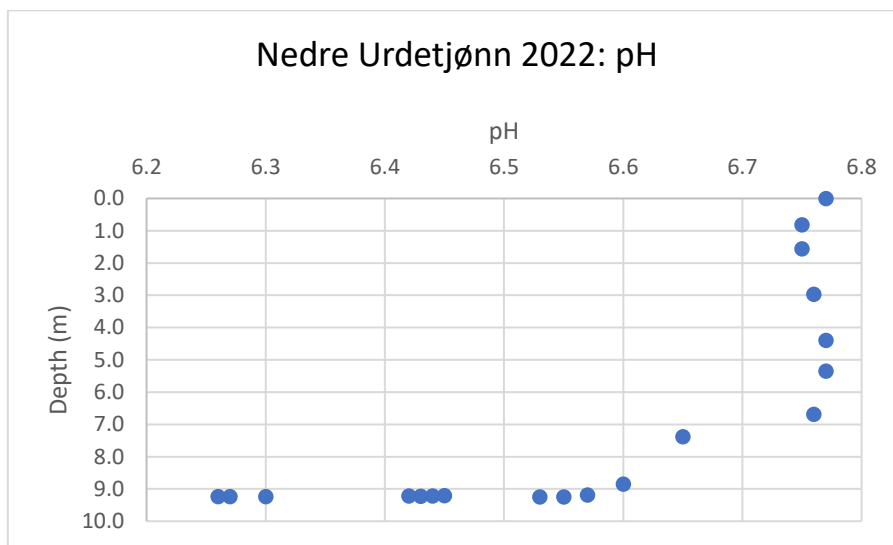
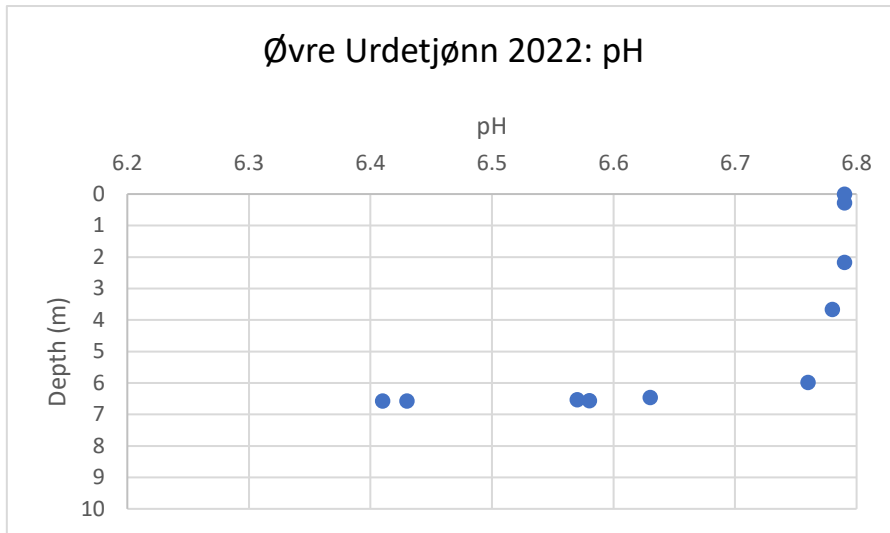


Figure A1 4.15. Three Upper Kova lakes: pH versus depth in the 2022 test fishery. “Best sequence” of data registered with multiparameter logger on June 22, 2022.

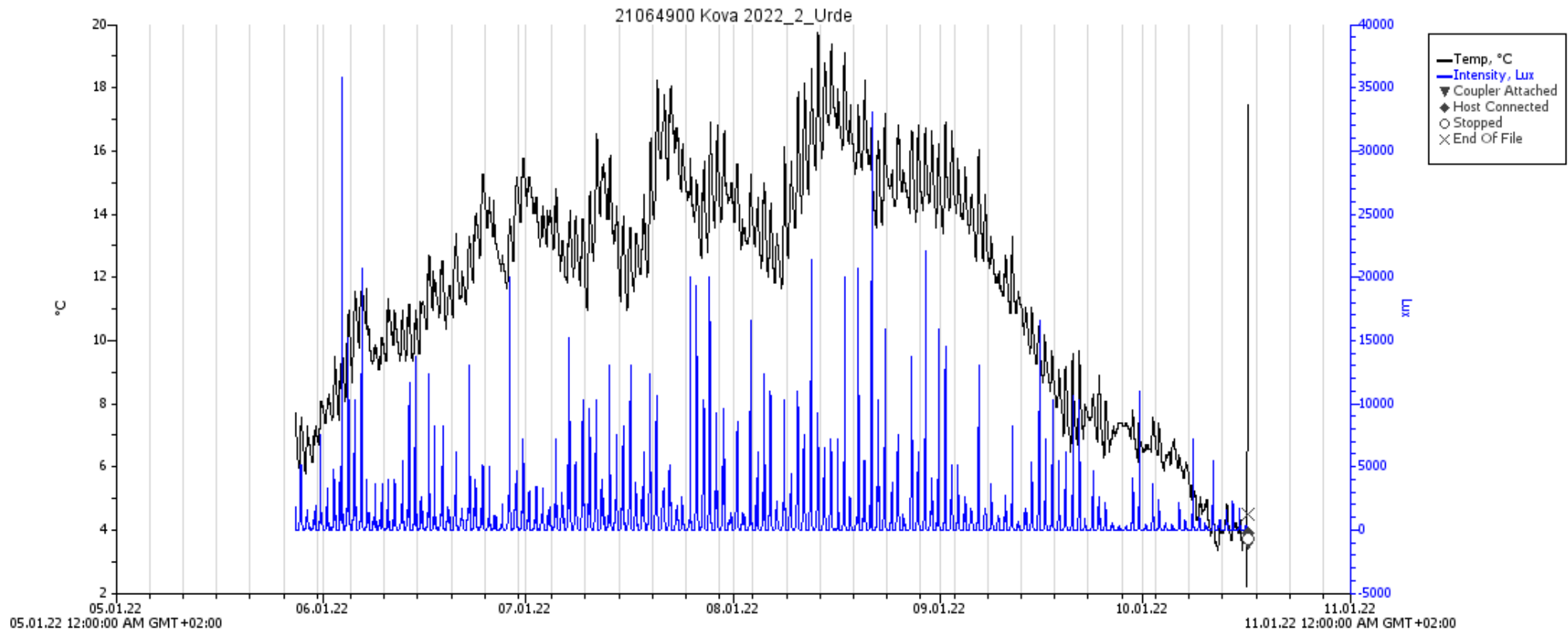


Figure A1 4.16. Øvre Urdetjønn: water temperature and solar radiation/illuminance June – October 2022. Temperature in °C, black line/left axis, solar radiation in Lux, blue line/right axis. Logger was placed in the main inlet to the lake (data/plot: J. Heggenes, personal communication, December 6, 2022).

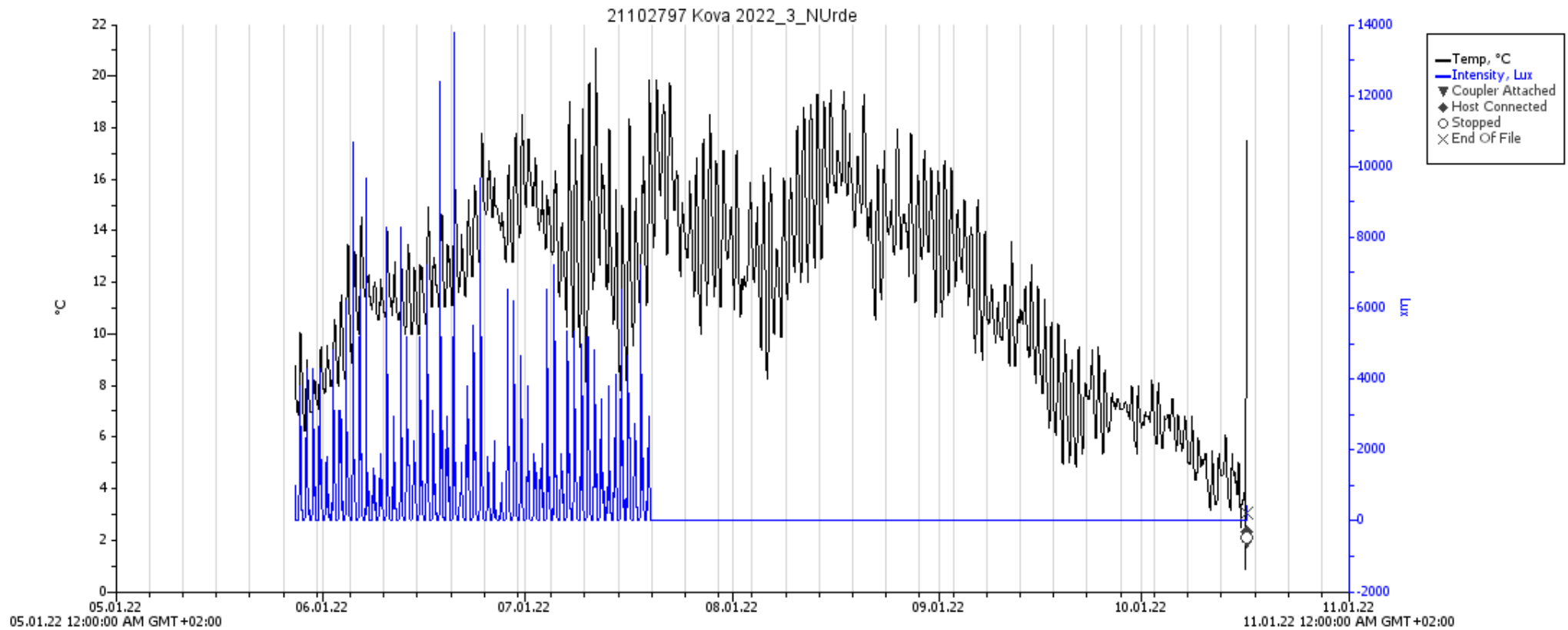


Figure A1 4.17. Nedre Urdetjønn: water temperature and solar radiation/illuminance June – October 2022. Temperature in °C, black line/left axis, solar radiation in Lux, blue line/right axis. Logger was placed in the main outlet from the lake. Solar radiation data not registered in the second half of the period, probably due to logger malfunction (data/plot: J. Heggenes, personal communication, December 6, 2022).

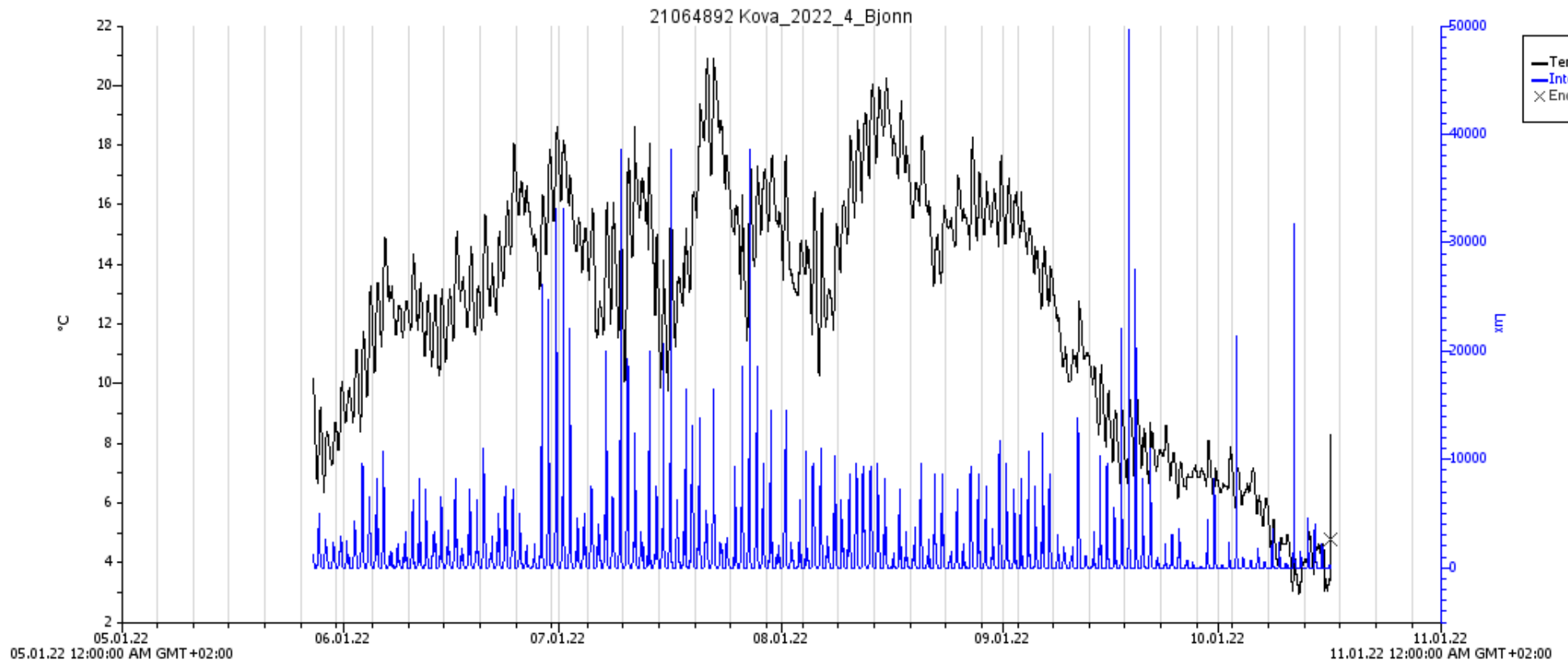


Figure A1 4.18. Bjønntjønn: water temperature and solar radiation/illuminance June – October 2022. Temperature in °C, black line/left axis, solar radiation in Lux, blue line/right axis. Logger was placed in the main outlet from the lake (data/plot: J. Heggenes, personal communication, December 6, 2022).

5 Results across time: 2022 vs 2009 and 1997

Table A1 5.1. Three Upper Kova lakes: achievable fish size classification based on three test fisheries. In the system of Ugedal et al. (2005), size class (medium: 250-350 mm) is based on mean length of at least 5 randomly selected mature females, indicating mean achievable maximum size/growth conditions. Numbers for 2009 and 1997 were combined and based on middle value in reported 30 mm intervals (2010, 1998). Bjønntjønn 2022: too few data for classification.

Lake	Year	Size class	5 rnd females (mm)	All mature females (mm)	n
Øvre Urdetjønn	2022	Medium	264	261	12
Øvre Urdetjønn	2009+1997	Medium	275	273	8
Nedre Urdetjønn	2022	Medium	257	249	12
Nedre Urdetjønn	2009+1997	Medium	271	280	14
Bjønntjønn	2022	NA	NA	306	2
Bjønntjønn	2009+1997	Medium	301	306	11

Table A1 5.2. Three Upper Kova lakes: catch per mesh size category across three test fisheries. χ^2 goodness of fit results. Expected values based on three alternatives per lake. CV: critical value for significance level.

Lake	Comparison	χ^2	df	CV 0.05	CV 0.001	P
Øvre Urdetjønn	2022 vs 1997	3.14	2	5.99		> 0.05
Øvre Urdetjønn	2022 vs 2009	16.33	2	5.99	13.82	< 0.001
Øvre Urdetjønn	2022 vs 2009/1997 combined	5.78	2	5.99		> 0.05
Nedre Urdetjønn	2022 vs 1997	4.14	2	5.99		> 0.05
Nedre Urdetjønn	2022 vs 2009	2.15	2	5.99		> 0.05
Nedre Urdetjønn	2022 vs 2009/1997 combined	3.11	2	5.99		> 0.05
Bjønntjønn	2022 vs 1997	2.28	2	5.99		> 0.05
Bjønntjønn	2022 vs 2009	3.73	2	5.99		> 0.05
Bjønntjønn	2022 vs 2009/1997 combined	3.04	2	5.99		> 0.05

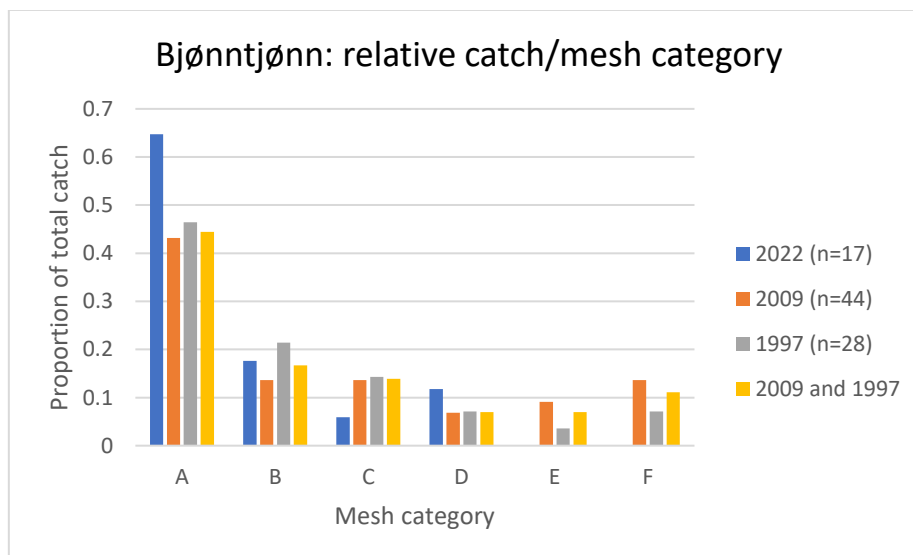
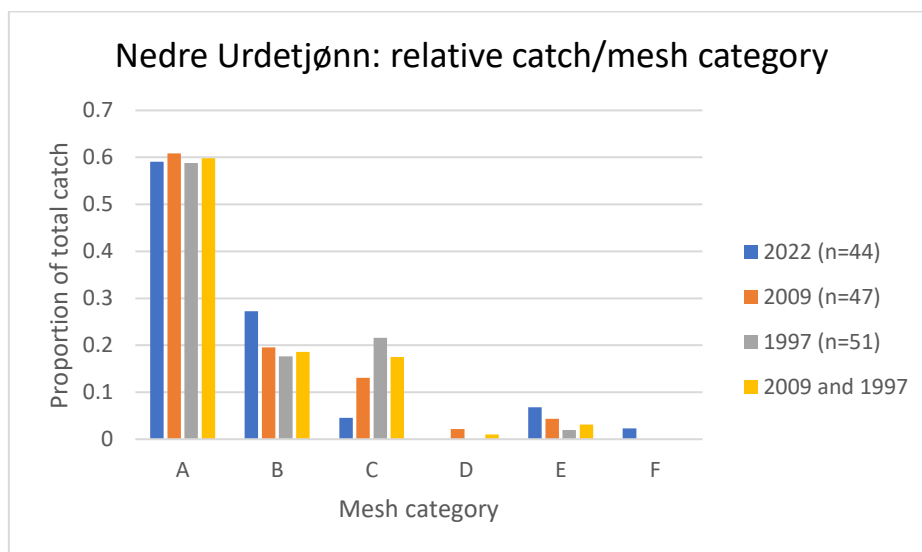
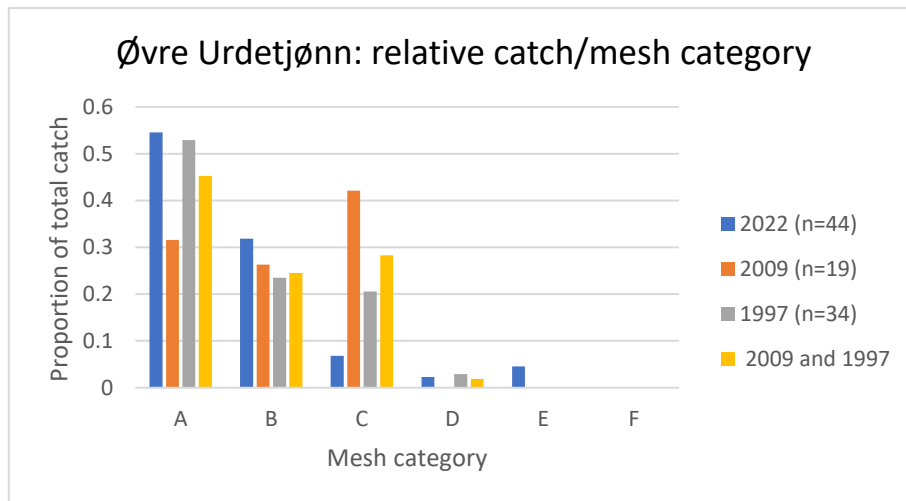


Figure A1 5.1. Three Upper Kova lakes: relative catch in numbers per mesh category in three test fisheries. The mesh sizes were categorized to allow comparison between Nordic multi-mesh gillnets and Jensen series (increasing mesh size from A – F; Table 5.2), based on Ugedal et al., 2009..

Table A1 5.3. Three Upper Kova lakes: weight (in grams) per mesh category in three test fisheries. The mesh sizes were categorized to allow comparison between Jensen series and Nordic multi-mesh gillnets (increasing mesh size from A – F; Table 5.2). *: these two mesh categories (3 mesh sizes) were not used in this survey. Values for 2009/1997 reduced by 20% to correct for larger gillnet area than in 2022.

Lake	Year	A	B	C	D	E	F	Total	n
Øvre Urdetjønn	2022	1150	2074	502	141	199	0	4066	44
Øvre Urdetjønn	2009	453	516	1280	0	0	0	2249	19
Øvre Urdetjønn	1997	1242	1136	1296	174	*	*	3847	34
Total		2844	3726	3078	315	199	0	10162	97
Nedre Urdetjønn	2022	1777	2010	447	0	245	238	4716	46
Nedre Urdetjønn	2009	1664	1556	899	249	1071	76	5515	47
Nedre Urdetjønn	1997	2125	1218	1740	0	285	0	5368	51
Total		5566	4784	3086	249	1601	314	15599	144
Bjønntjønn	2022	637	333	371	500	0	0	1841	17
Bjønntjønn	2009	1243	1056	1061	608	656	2328	6952	44
Bjønntjønn	1997	1315	712	630	426	472	262	3818	28
Total		3195	2101	2062	1534	1128	2590	12611	89
Grand total		11605	10611	8226	2098	2928	2904	38373	330

Table A1 5.4. Three Upper Kova lakes: prevalence of hatchery-stock trout based on three test fisheries. Proportion (%): of total catch per lake. Mean before 2015 was based on the sums of number and catch for the years 2009 and 1997 combined.

Lake	Year	n	Proportion (%)	Mean before 2015 (%)
Øvre Urdetjønn	2022	1	2.3	
Øvre Urdetjønn	2009	0	0.0	5.7
Øvre Urdetjønn	1997	3	8.8	
Nedre Urdetjønn	2022	0	0.0	
Nedre Urdetjønn	2009	3	6.4	3.1
Nedre Urdetjønn	1997	0	0.0	
Bjønntjønn	2022	1	5.9	
Bjønntjønn	2009	1	2.3	11.1
Bjønntjønn	1997	7	25.0	

Table A1 5.5. Three Upper Kova lakes: estimated effect on fish weight by different timing of test fisheries. Proportion (%) of the differences in mean fish weight between 2022 and 2009+1997 that might be “explained” by the early timing of the 2022 test fishery. “Explained” (%): difference between projected and “observed” mean weight for 2022 divided by the difference between “observed” mean weights in 2009+1997 and 2022.

Lake	"Explained" (%)	Differences in mean weight (grams)	
		2009/1997 vs 2022	2022 projected vs observed
Øvre Urdetjønn	53	52	27
Nedre Urdetjønn	66	37	25
Bjønntjønn	35	86	30

Table A1 5.6. Three Upper Kova lakes: fish lengths based on three test fisheries. Mean and spread for total catch, and proportions per three size classes (as in reports from 2009 and 1997). Min, Max and Proportions for 1997 were visually estimated from charts in report. SD: standard deviation. NA: data not available.

Lake	Year	Fish lengths				Proportion of catch (%)			n
		Mean (mm)	Min (mm)	Max (mm)	SD	>150-220 (mm)	≥220-250 (mm)	> 250 (mm)	
Øvre Urdetjønn	2022	209	152	289	48	59	11	30	44
Øvre Urdetjønn	2009	227	180	313	32	47	32	21	19
Øvre Urdetjønn	1997	NA	190	300	NA	51	9	40	34
Nedre Urdetjønn	2022	215	152	315	48	59	5	36	44
Nedre Urdetjønn	2009	218	157	431	60	64	19	17	47
Nedre Urdetjønn	1997	NA	180	320	NA	45	16	39	51
Bjønntjønn	2022	208	151	358	58	71	18	12	17
Bjønntjønn	2009	257	172	438	67	41	11	48	44
Bjønntjønn	1997	NA	190	380	NA	37	18	45	28

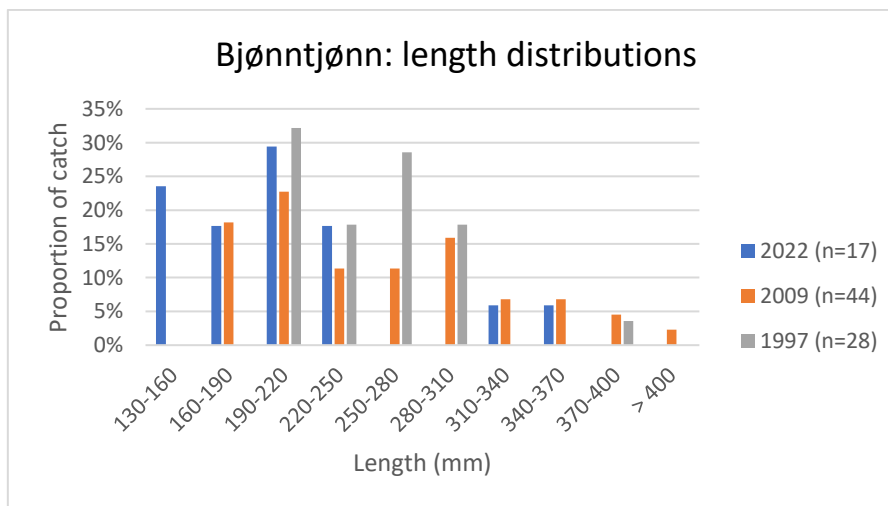
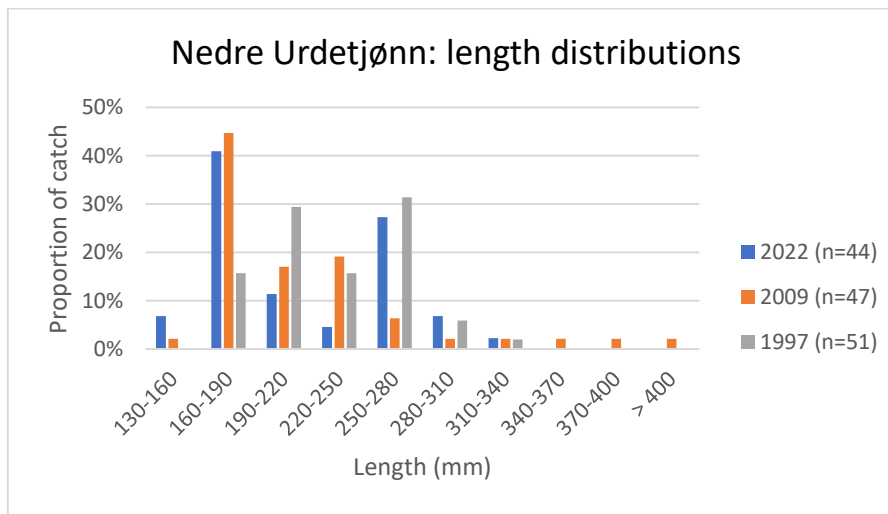
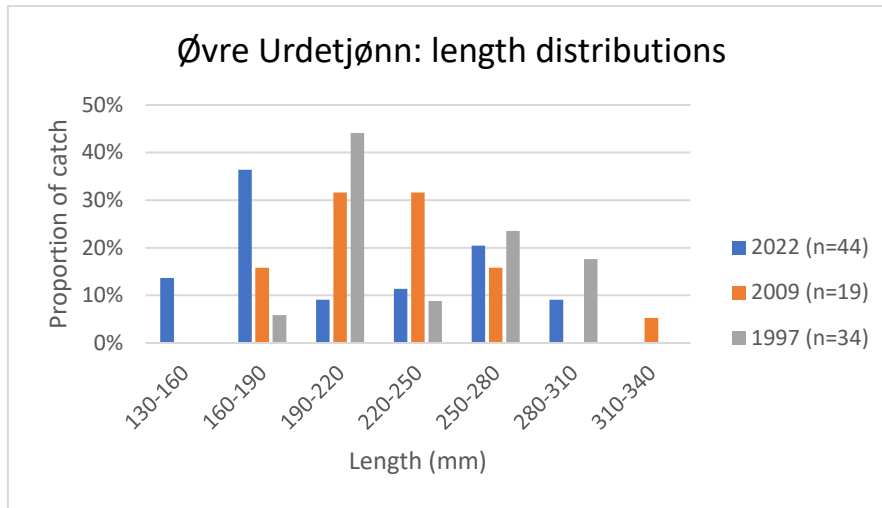


Figure A1 5.2. Three Upper Kova lakes: length distributions based on three test fisheries. Results in proportion (%) of total catch, displayed with 30 mm length intervals. Results for 2009 and 1997 were estimated from 3D bar charts in the reports (2010, 1998).

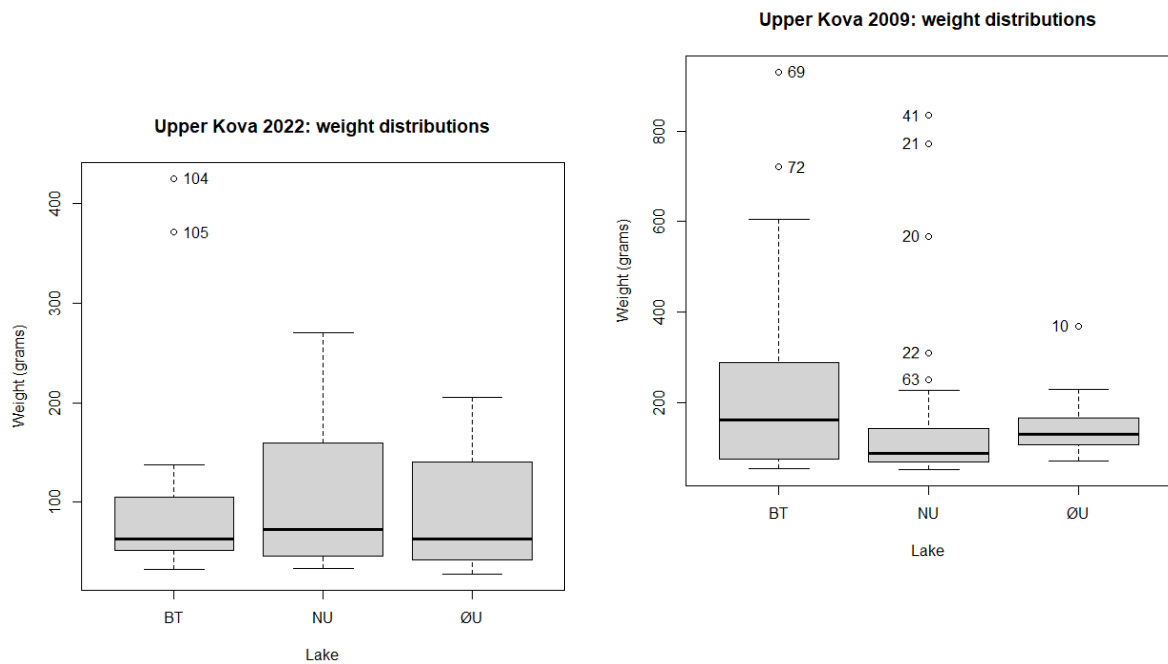


Figure A1 5.3. Three Upper Kova lakes: weight (grams) distributions based on the 2022 (left) and 2009 (right) test fisheries. Data from 2022 corrected for comparison with 2009. BT: Bjønntjønn (n=17 and 44), NU: Nedre Urdetjønn (n=44 and 47), and ØU: Øvre Urdetjønn (n=44 and 19).

Table A1 5.7. Three Upper Kova lakes: k-factor (all fish) based on three test fisheries. SD: standard deviation, CI: confidence interval. NA: relevant data not available.

Lake	Year	Mean	Range	SD	95% CI	n
Øvre Urdetjønn	2022	0.90	0.7 - 1.1	0.09	0.87-0.93	44
Øvre Urdetjønn	2009	1.20	1.0 - 1.3	0.07	1.17-1.23	19
Øvre Urdetjønn	1997	0.99	0.8 - 1.1	NA	NA	34
Nedre Urdetjønn	2022	0.91	0.7 - 1.0	0.09	0.90-0.93	44
Nedre Urdetjønn	2009	1.16	0.8 - 1.4	0.12	1.13-1.20	47
Nedre Urdetjønn	1997	0.99	0.7 - 1.2	NA	NA	51
Bjønntjønn	2022	0.96	0.9 - 1.1	0.06	0.93-0.99	17
Bjønntjønn	2009	1.06	0.9 - 1.2	0.07	1.04-1.08	44
Bjønntjønn	1997	0.99	0.8 - 1.2	NA	NA	28

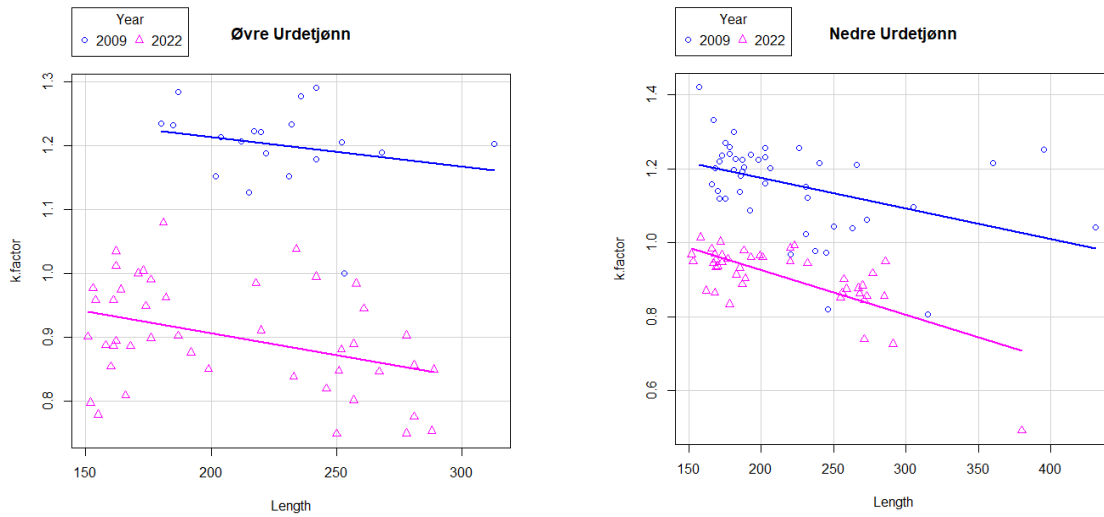


Figure A1 5.4. Two Upper Kova lakes: k-factor versus length based on the 2022 and 2009 test fisheries. Scatter plots with all individuals per survey (2022 data corrected for comparison with 2009), with regression line.

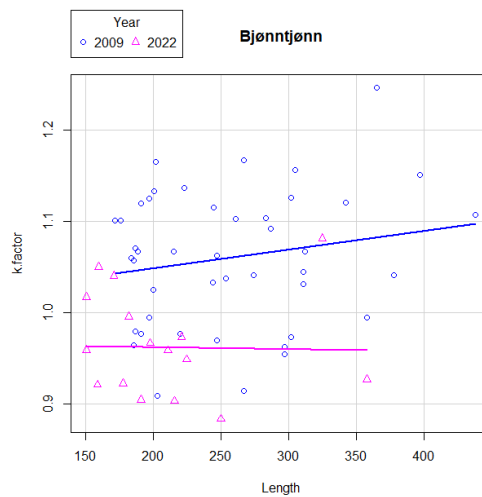


Figure A1 5.5. Bjønntjønn: k-factor versus length based on the 2022 and 2009 test fisheries. Scatter plots with all individuals per survey (2022 data corrected for comparison with 2009), with regression line.

Table A1 5.8. Three Upper Kova lakes: k-factor versus length based on the 2022 and 2009 test fisheries. Main results of linear regression analysis per lake for each survey.

Lake	Year	F	P	df	R ² (adjusted)
Øvre Urdetjønn	2022	7.7	0.008	1 on 42	0.1
Øvre Urdetjønn	2009	0.9	0.351	1 on 17	0.0
Nedre Urdetjønn	2022	23.7	0.00002	1 on 42	0.3
Nedre Urdetjønn	2009	9.1	0.004	1 on 45	0.2
Bjønntjønn	2022	0.0	0.94	1 on 15	-0.1
Bjønntjønn	2009	1.5	0.23	1 on 42	0.0

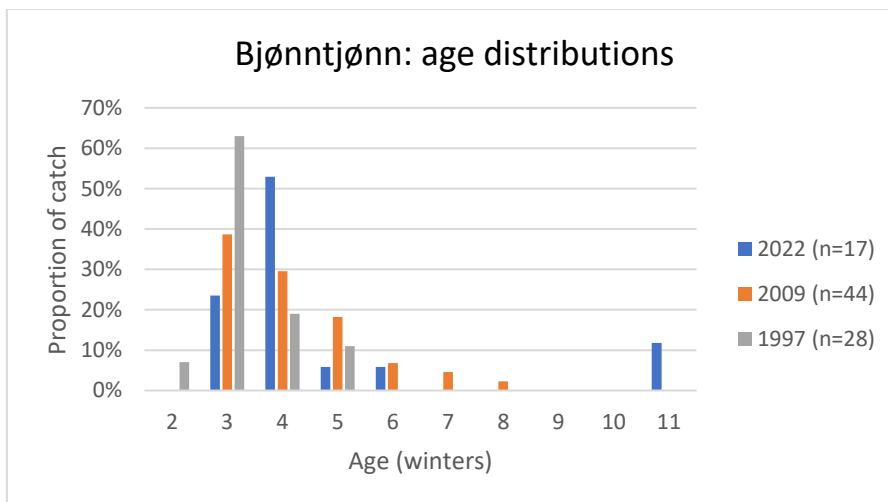
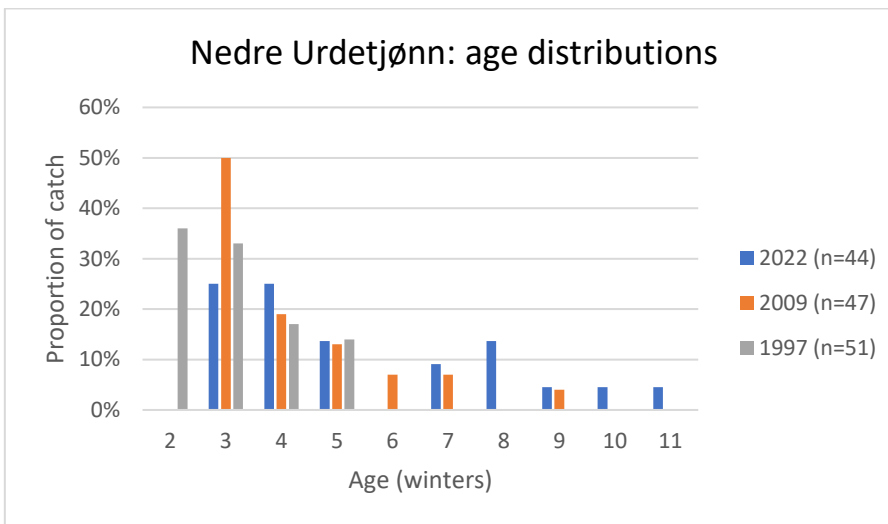
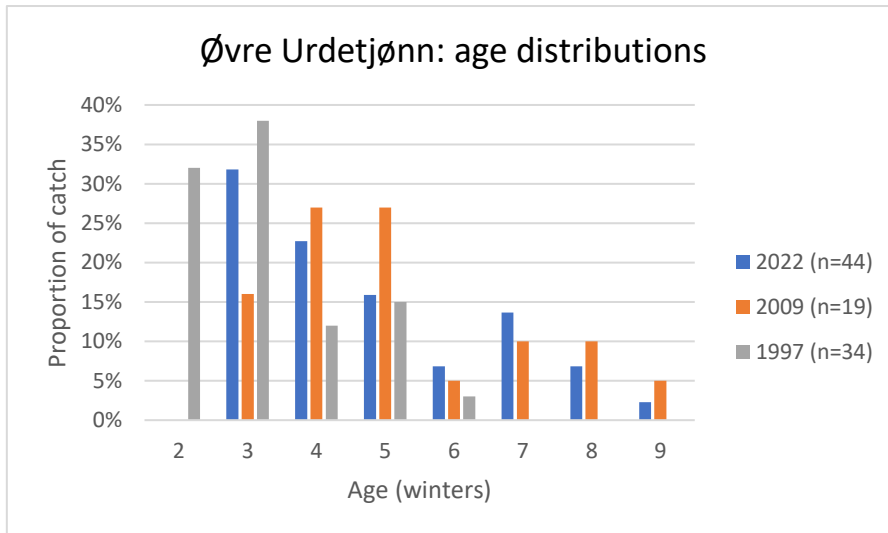


Figure A1 5.6. Three Upper Kova lakes: distribution of age classes (proportions) based on three test fisheries. Numbers for 2009 and 1997 were estimated from 3D bar charts in reports from test fisheries (2010, 1998) and age units transformed to winters.

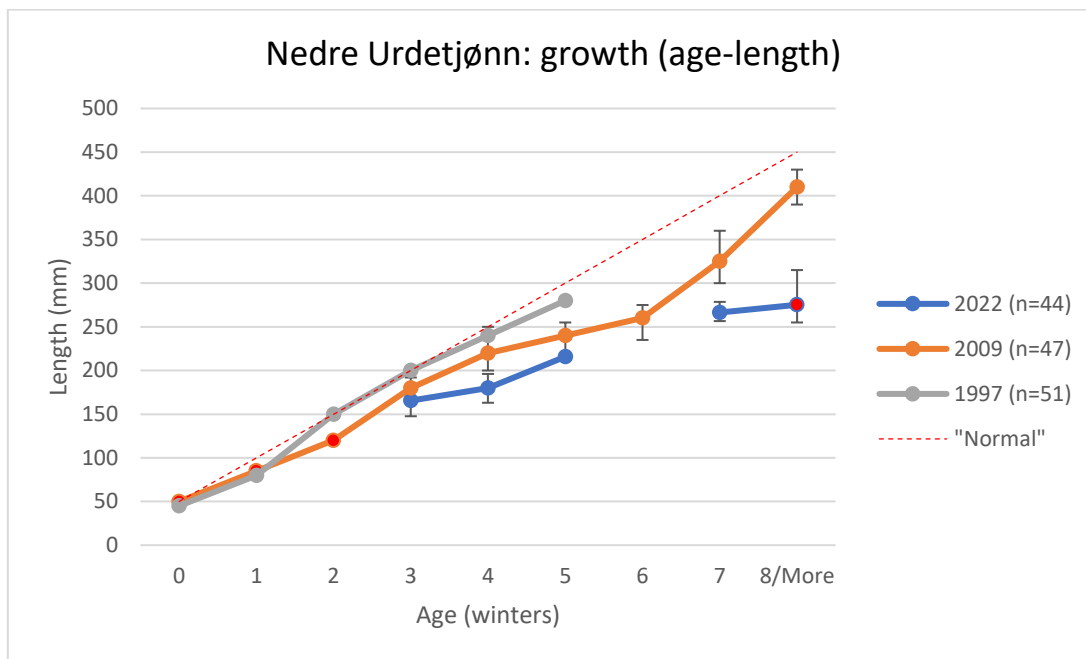
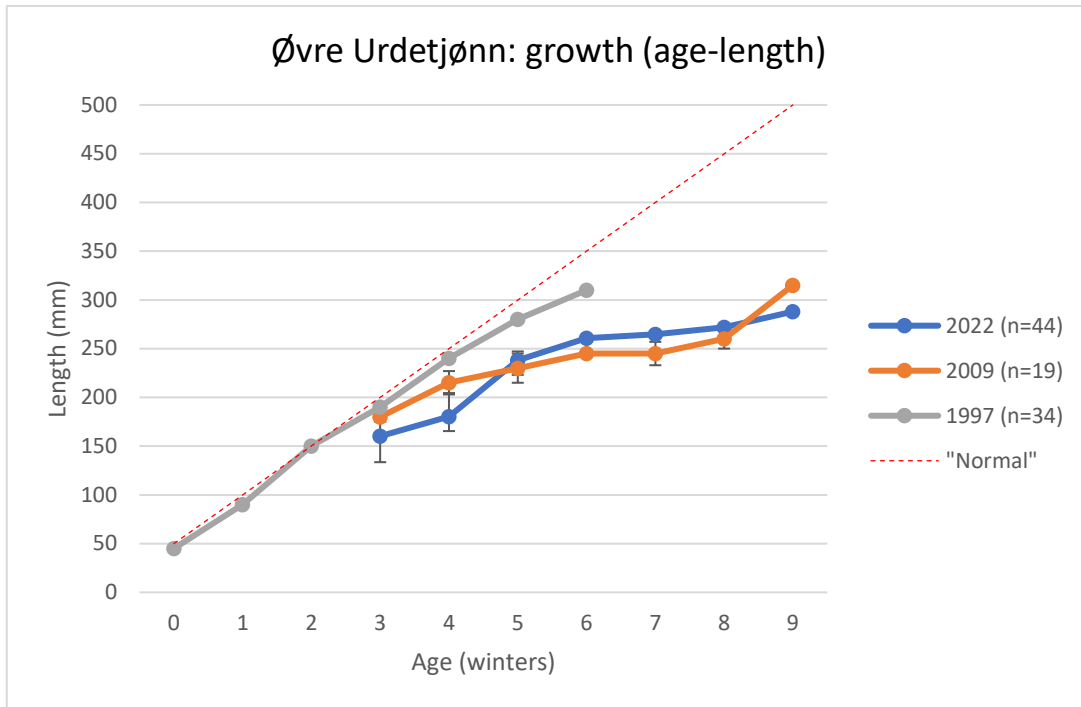


Figure A1 5.7. Two Upper Kova lakes: growth (age-length) based on three test fisheries. For 2009 (Nedre Urdetjønn: red dots/age 0-2 = catches in recruitment streams) and 2022, dots represent mean length at age, error bars minimum and maximum lengths. For 1997, the method was "back-calculation" of growth (tilbakeberegnet vekst). Values for 2009 and 1997 were estimated from line graphs in the test fishery reports (2010, 1998). The dashed red line represents a steady growth rate of 50 mm per year. Bottom plot 2022, red dot at right end: mean length of fish aged 8-11 years/winters.

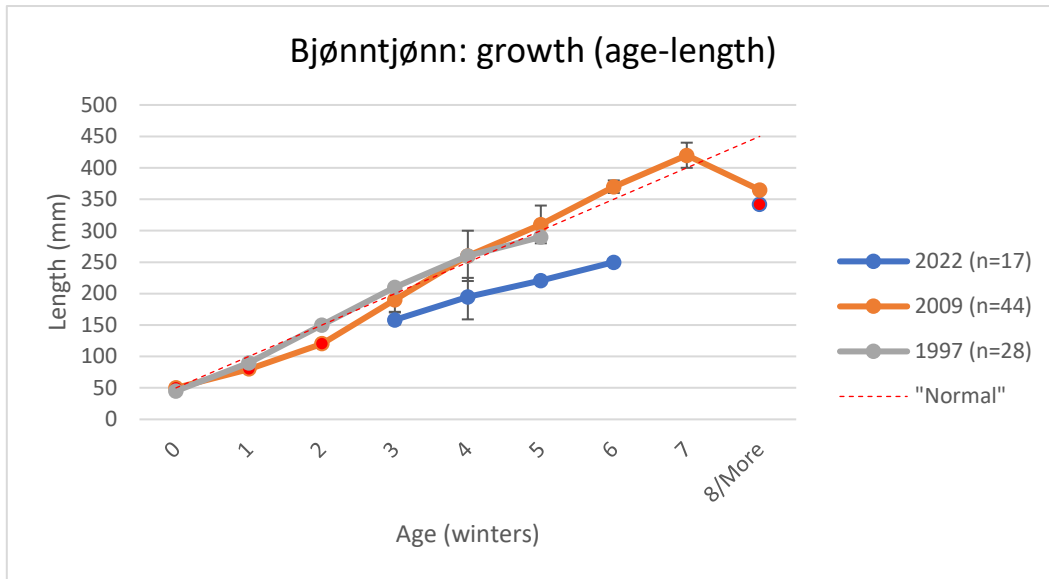


Figure A1 5.8. Bjørntjønn: growth (age-length) based on three test fisheries. For 2009 (red dots/age 0-2 = catches in recruitment streams) and 2022, dots represent mean length at age, error bars minimum and maximum lengths. For 1997, the method was "back-calculation" of growth (tilbakeberegnet vekst). Values for 2009 and 1997 were estimated from line graphs in the test fishery reports (2010, 1998). The dashed red line represents a steady growth rate of 50 mm per year. 2022, red dot at far right: estimated age = 11.

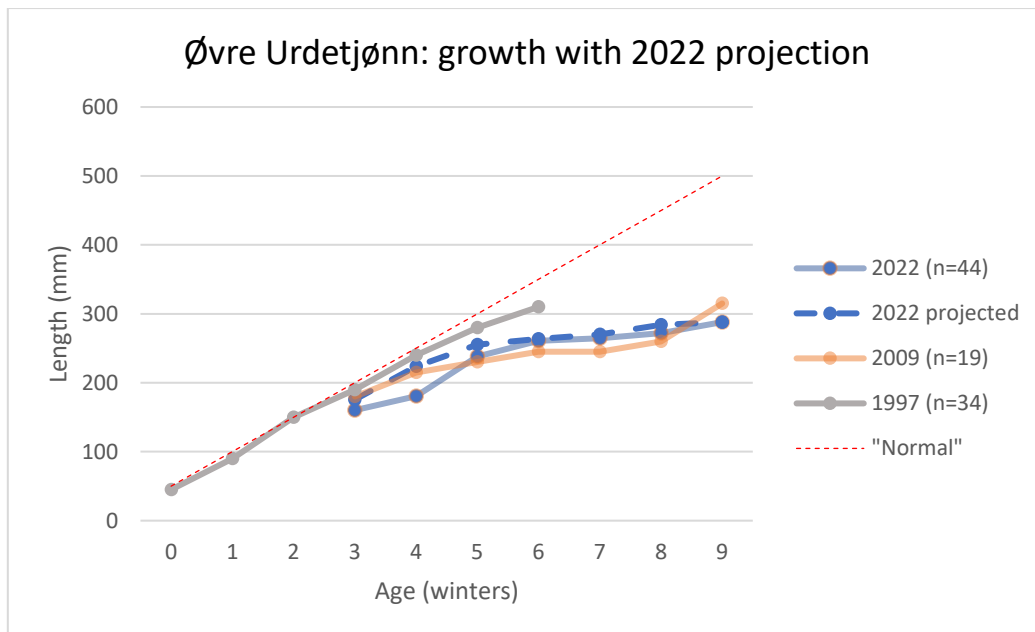


Figure A1 5.9. Øvre Urdetjønn: growth (age-length) based on three test fisheries, 2022 w. and w.out projection. 2022 projected: based on my model to predict lengths at end of growth season (A2 3.4). For 2009 (empirical growth) and 1997 (back-calculation), the values were estimated from line graphs in the test fishery reports (2010, 1998). The dashed red line represents a steady growth rate of 50 mm per year.

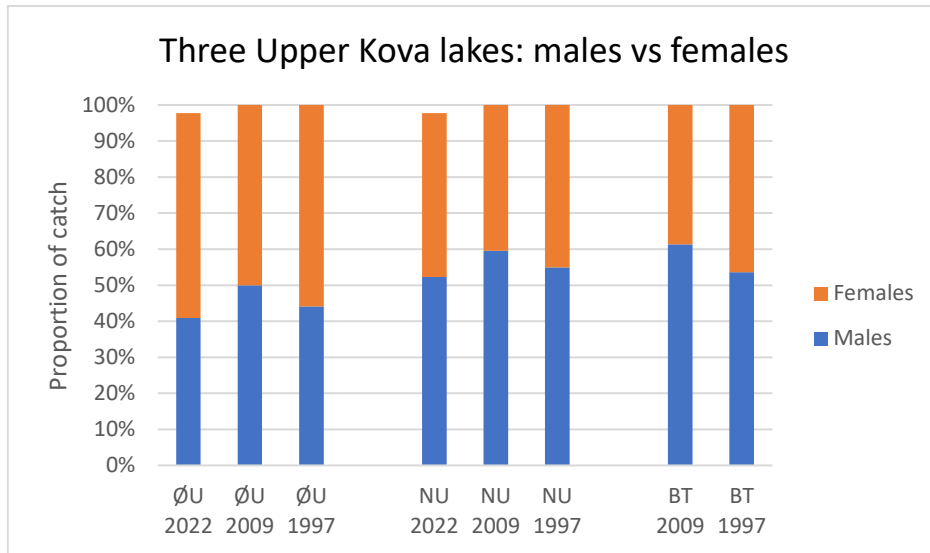


Figure A1 5.10. Three Upper Kova lakes: proportion (%) of male and female fish based on three test fisheries. ØU: Øvre Urdetjønn, NU: Nedre Urdetjønn, BT: Bjønntjønn. In ØU and NU, the proportions do not add up to 100% in 2022 because sex was undetermined in a few individuals. The results for Bjønntjønn in 2022 are not presented due to high uncertainty in the data on sex.

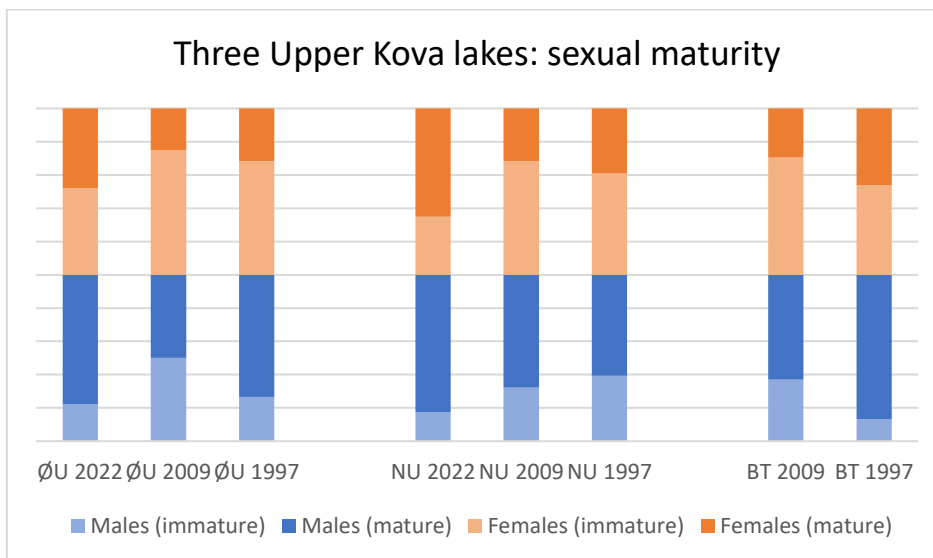


Figure A1 5.11. Three Upper Kova lakes: proportion (%) of mature fish per sex and lake based on three test fisheries. ØU: Øvre Urdetjønn, NU: Nedre Urdetjønn, BT: Bjønntjønn. The results for Bjønntjønn in 2022 are not presented due to high uncertainty in the data on sex.

Table A1 5.9. Three Upper Kova lakes: length (3 classes) at maturity per sex based on three test fisheries. Proportion (%) of individuals (n) that were mature. Bjønntjønn 2022 not reported due to few and uncertain data.

Øvre Urdetjønn		Males		Females		Total
Year	Length (mm)	n	Mature (%)	n	Mature (%)	n
2022	≤ 220	13	69	12	8	26
2009	≤ 220	7	57	7	0	14
1997	≤ 220	8	50	9	0	17
2022	220-250	1	100	4	75	5
2009	220-250	3	33	3	66	6
1997	220-250	2	100	1	0	3
2022	> 250	4	100	9	89	13
2009	> 250	2	50	2	50	4
1997	> 250	5	100	9	67	14
Nedre Urdetjønn		Males		Females		Total
Year	Length (mm)	n	Mature (%)	n	Mature (%)	n
2022	≤ 220	15	73	10	40	26
2009	≤ 220	18	56	12	0	30
1997	≤ 220	19	42	4	0	23
2022	220-250	1	100	1	0	2
2009	220-250	6	100	3	66	9
1997	220-250	3	100	5	20	8
2022	> 250	7	100	9	100	16
2009	> 250	4	75	4	100	8
1997	> 250	6	100	14	57	20
Bjønntjønn		Males		Females		Total
Year	Length (mm)	n	Mature (%)	n	Mature (%)	n
2009	≤ 220	10	40	8	0	18
1997	≤ 220	6	83	3	0	9
2009	220-250	4	50	1	0	5
1997	220-250	2	50	3	0	5
2009	> 250	13	85	8	63	21
1997	> 250	7	100	7	86	14

Table A1 5.10. Three Upper Kova lakes: stomach filling in the test fisheries in 2022 and 1997. Filling judged by food quantity in the esophagus and ventricle, with scores from 0 (empty) to 5 (distended/bursting). Mean of remaining: mean value for the fish that were not classified as empty (values 1-5).

Lake	Year	Empty (%)	Mean of remaining	n
Øvre Urdetjønn	2022	16	2.2	44
Øvre Urdetjønn	1997	47	1.4	34
Nedre Urdetjønn	2022	5	2.3	44
Nedre Urdetjønn	1997	43	2.0	51
Bjønntjønn	2022	29	1.6	17
Bjønntjønn	1997	36	2.4	28

Table A1 5.11. Three Upper Kova lakes: proportion (%) of flesh colors based on three test fisheries. Results for Bjønntjønn in 2022 attenuated due to uncertain data quality.

Lake	Year	White	Light red	Red	n
Øvre Urdetjønn	2022	93	7	0	44
Øvre Urdetjønn	2009	74	26	0	19
Øvre Urdetjønn	1997	79	12	9	34
Nedre Urdetjønn	2022	91	9	0	44
Nedre Urdetjønn	2009	70	23	6	47
Nedre Urdetjønn	1997	76	22	2	51
Bjønntjønn	2022	100	0	0	17
Bjønntjønn	2009	57	39	5	44
Bjønntjønn	1997	82	18	0	28

Table A1 5.12. Øvre Urdetjønn: flesh color in % per length group (30 mm intervals) in three test fisheries.

Year	Length (mm)	White (%)	Light red (%)	Red (%)
2022	130-160	100	0	0
2009	130-160			
1997	130-160			
2022	160-190	100	0	0
2009	160-190	100	0	0
1997	160-190	100	0	0
2022	190-220	75	25	0
2009	190-220	100	0	0
1997	190-220	100	0	0
2022	220-250	80	20	0
2009	220-250	50	50	0
1997	220-250	100	0	0
2022	250-280	100	0	0
2009	250-280	34	66	0
1997	250-280	50	25	25
2022	280-310	75	25	0
2009	280-310			

1997	280-310	50	33	17
2022	310-340			
2009	310-340	100	0	0
1997	310-340			

Table A1 5.13. Nedre Urdetjønn: flesh color in % per length group (30 mm intervals) in three test fisheries.

Year	Length (mm)	White (%)	Light red (%)	Red (%)
2022	130-160	100	0	0
2009	130-160	100	0	0
1997	130-160			
2022	160-190	100	0	0
2009	160-190	95	5	0
1997	160-190	100	0	0
2022	190-220	100	80	20
2009	190-220	75	25	0
1997	190-220	100	0	0
2022	220-250	100	0	0
2009	220-250	55	45	0
1997	220-250	100	0	0
2022	250-280	100	75	25
2009	250-280	0	66	34
1997	250-280	47	53	0
2022	280-310	100	0	0
2009	280-310	0	0	0
1997	280-310	33	67	0
2022	310-340	100	0	0
2009	310-340	0	0	100
1997	310-340	0	0	100
2022	340-370	0	0	0
2009	340-370	0	100	0
1997	340-370	0	0	0
2022	370-400	0	0	0
2009	370-400	0	0	100
1997	370-400	0	0	0
2022	430-460	0	0	0
2009	430-460	0	100	0
1997	430-460	0	0	0

Table A1 5.14. Bjønntjønn: flesh color in % per length group (30 mm intervals) in three test fisheries.

Year	Length (mm)	White (%)	Light red (%)	Red (%)
2022	130-160	100	0	0
2009	130-160	0	0	0
1997	130-160	0	0	0
2022	160-190	100	0	0
2009	160-190	100	0	0
1997	160-190	0	0	0
2022	190-220	100	0	0
2009	190-220	100	0	0
1997	190-220	100	0	0
2022	220-250	100	0	0
2009	220-250	60	40	0
1997	220-250	80	20	0
2022	250-280	0	0	0
2009	250-280	40	20	40
1997	250-280	88	12	0
2022	280-310	0	0	0
2009	280-310	29	71	0
1997	280-310	40	60	0
2022	310-340	100	0	0
2009	310-340	0	100	0
1997	310-340	0	0	0
2022	340-370	100	0	0
2009	340-370	0	100	0
1997	340-370	0	0	0
2022	370-400	0	0	0
2009	370-400	0	100	0
1997	370-400	100	0	0
2022	400-430	0	0	0
2009	400-430	0	100	0
1997	400-430	0	0	0

Table A1 5.15. Three Upper Kova lakes: comparable water quality data from the test fisheries in 2022 and 2009. Temperature 2022: with handheld device, right below surface. Conductivity 2022: mean of measurements with handheld device. pH 2022: first measurement below zero meters in best sequence from multiparameter logger.

Lake	Year	Max depth (m)	Temperature (°C)	Conductivity (µS/cm)	pH
Øvre Urdetjønn	2022	6.6	11.9	7.2	6.8
Øvre Urdetjønn	2009	7.5	NA	10.6	6.4
Nedre Urdetjønn	2022	9.2	11.4	6.5	6.8
Nedre Urdetjønn	2009	9.5	NA	10.6	6.4
Bjønntjønn	2022	4.4	12.4	6.9	6.7
Bjønntjønn	2009	8.0	NA	12.4	6.5

6 Discussion

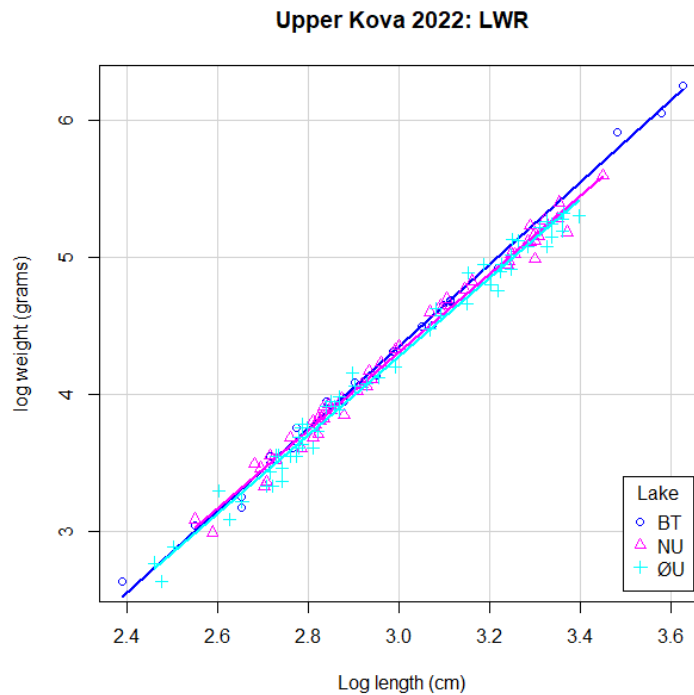


Figure A1 6.1. Three Upper Kova lakes: length versus weight (log-transformed) based on the 2022 test fishery. With regression lines. BT: Bjønntjønn ($n=23$), NU: Nedre Urdetjønn ($n=58$), ØU: Øvre Urdetjønn ($n=57$).

Table A1 6.1. Three Upper Kova lakes: measure of recruitment based on the 2022 test fishery and Jensen, 1979. Mean catch per gillnet-night in mesh sizes reflecting potential recruits (A; number of fish) and “attractively sized fish” (B-D; weight in grams). Jensen’s mesh sizes adapted to the 2022 test fishery. A: mesh size 15.5 and 19.5 mm in 2022 (vs. Jensen’s 19.5 and 22.5 mm) B-D: range 24-35 mm in 2022 (vs. Jensen’s 26-35 mm).

Lake	Year	A: #/GN-night	B-D: grams/GN-night	Ratio B-D/A
Øvre Urdetjønn	2022	12	906	76
Nedre Urdetjønn	2022	13	771	59
Bjønntjønn	2022	5.5	401	73

Table A1 6.2. Three Upper Kova lakes: frequency distributions per gillnet in the 2022 test fishery. Used in test of the results versus a random (Poisson) distribution as an estimate of spatial distribution of fish in the lakes.

Fish per gillnet	Frequencies		
	Øvre Urdetjønn	Nedre Urdetjønn	Bjønntjønn
0	0	0	1
1	0	1	1
2	0	0	1
3	1	0	2
4	0	1	2
5	2	1	0

6	1	1	1
7	1	0	0
8	0	0	0
9	2	1	0
10	0	1	0
11	0	1	0
12	0	1	0
13	1	0	0
Total	8	8	8

Table A1 6.3. Three Upper Kova lakes: correlations for key individual fish data based on the 2022 test fishery. Numbers are r-values. Mat. stage: maturation stage.

Øvre Urdetjønn	Length	Weight	Age	Mat. stage	Flesh color	Stomach filling
Length	1					
Weight	0.983713	1				
Age	0.917028	0.913548	1			
Mat. stage	0.506439	0.471721	0.417087	1		
Flesh color	0.281409	0.316735	0.181790	0.018699	1	
Stomach filling	-0.042443	-0.005368	-0.066210	0.234361	-0.247259	1
Nedre Urdetjønn	Length	Weight	Age	Mat. stage	Flesh color	Stomach filling
Length	1					
Weight	0.983063	1				
Age	0.953428	0.956651	1			
Mat. stage	0.795661	0.753010	0.715386	1		
Flesh color	0.424053	0.490512	0.416826	0.300201	1	
Stomach filling	0.129016	0.107082	0.070078	0.146218	-0.047990	1
Bjønntjønn	Length	Weight	Age	Mat. stage	Flesh color	Stomach filling
Length	1					
Weight	0.955800	1				
Age	0.940376	0.988039	1			
Mat. stage	0.547717	0.541842	0.553105	1		
Flesh color	0.544363	0.657999	0.629916	0.104537	1	
Stomach filling	0.042390	-0.081656	-0.053943	0.039394	-0.011495	1

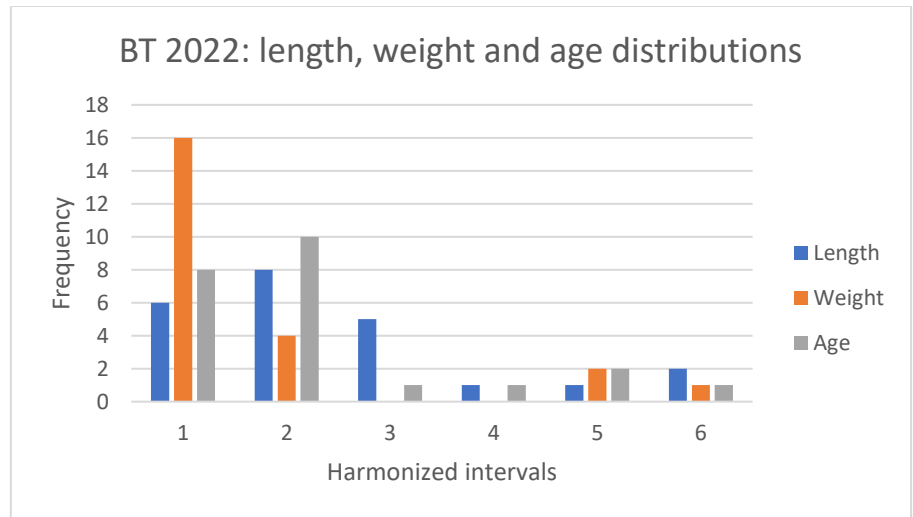
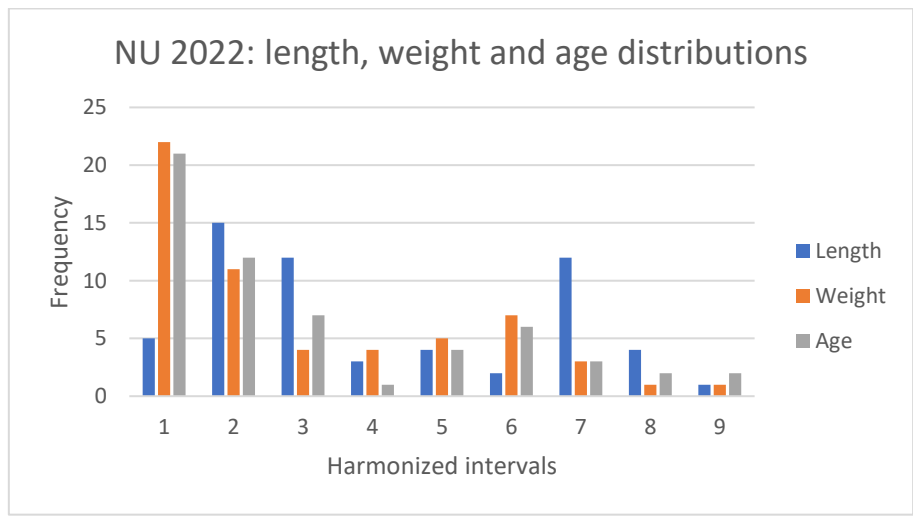
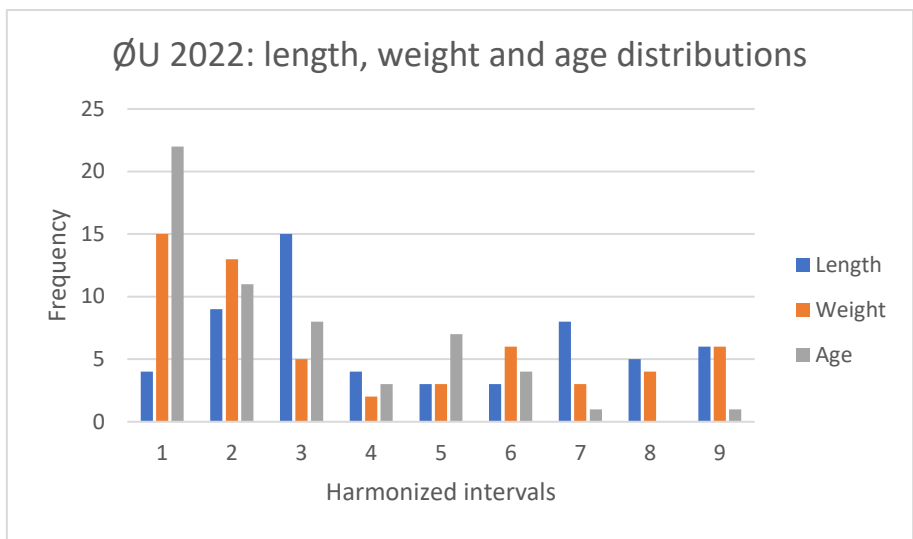


Figure A1 6.2. Three Upper Kova lakes: distributions of length, weight and age (synoptic) in the 2022 test fishery. ØU: Øvre Urdetjønn, NU: Nedre Urdetjønn, BT: Bjønntjønn. The intervals for the three variables were defined on the basis of the number of age classes represented to allow direct comparison in the plot (Table A1 6.4).

Table A1 6.4. Three Upper Kova lakes: interval values used in Fig. A2 6.2. Numbers in bold/italics: limit values around most pronounced dips in the histograms.

Intervals	Øvre Urdetjønn			Nedre Urdetjønn			Bjønntjønn		
	Length	Weight	Age	Length	Weight	Age	Length	Weight	Age
1	137	35	3	149	48	3	154	99	3
2	157	56	4	170	76	4	198	183	4
3	178	78	5	190	103	5	243	268	5
4	198	99	6	211	131	6	287	352	6
5	218	120	7	232	159	7	332	437	11
6	238	141	8	253	187	8	376	521	13
7	259	163	9	273	214	9			
8	279	184	10	294	242	10			
9	299	205	11	315	270	11			

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Figure A1 3.2. Scheme for staging of fish maturation levels per sex used in the 2022 test fishery.

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Figure A1 4.14. Three Upper Kova lakes: dissolved oxygen versus depth in the 2022 test fishery.

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Figure A1 4.17. Nedre Urdetjønn: water temperature and solar radiation June – October 2022.

Figure A1 4.18. Bjønntjønn: water temperature and solar radiation June – October 2022.

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Figure A1 5.2. Three Upper Kova lakes: length distributions based on three test fisheries.

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