Fiskaaling
Aquaculture Research Station of the Faroes

Annual report 2021
The sea trout project

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and Kim S. G. Bergkvist

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Frágreiðing

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Heiti

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Høvundar

Kirstin Eliasen, Unn V. Johannesen, Símeon Petersen and Kim S. G. Bergkvist

Status	Frágreiðing nr.	Slag av verkætlan
Opin	2021-01	Uppgáva fyri Havbúnaðarfelagið

Dato	Ábyrgdarhavi
28.02.22	Kirstin Eliasen

Tal av síðum	Góðkent
22	

Samandráttur
Eftir áheitan frá Havbúnaðarfelagnum eru kanningar av sjósílum framdar við tí fyri eyga at kanna nær á árinum tey fara á sjógv á fyrsta sinni og hvussu trivnaðurin hjá teimum er á sjónum.
Úrslitini frá 2019, 2020 og 2021 vísa, at munur er millum árini viðvíkjandi nær tey fara á sjógv á fyrsta sinni, umframt at aldurin á sjósílunum tá ið tey fara á sjógv fyrstu fer, áhaldandi sæst aftur í støddini hjá teimum.
Munur er millum árini viðvíkjandi hvussu væl sílini eru fyri tá ið tey fara á sjógv og hvussu væl størru sílini á sjónum eru fyri. Sjósílini hava flest lýs frá apríl til august, meðan tey hinar mánaðarnar hava fáar ella ongar lýs. Hetta gevur ábendingar um at sílini avlúsa seg í feskum vatni.

Leitorð
Sjósíl, longd, vekt, aldur, vøkstur, magainnihald

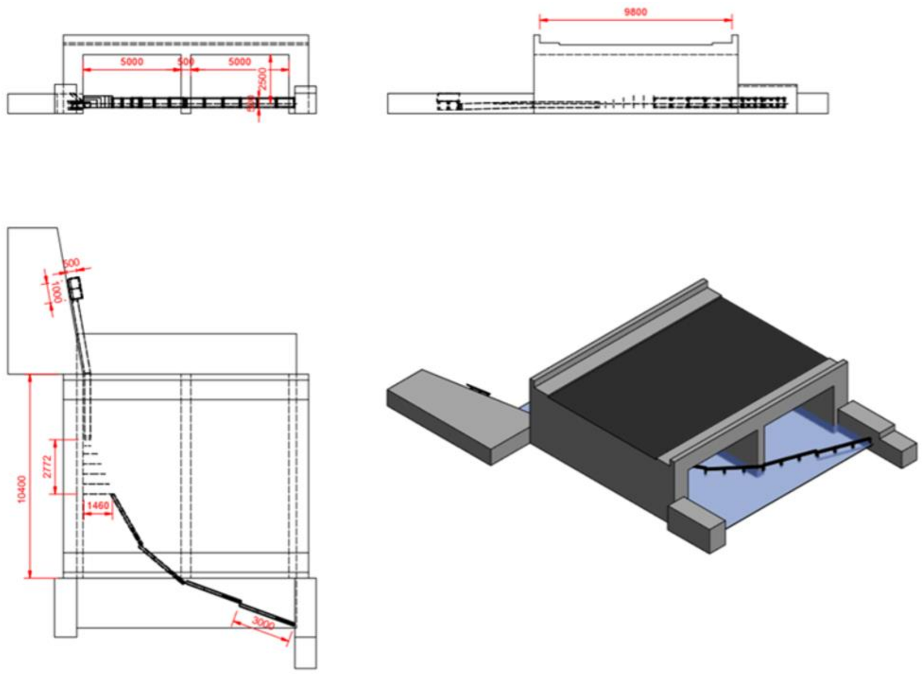
The sea trout project

The aim of the project is 1) to gain knowledge on when and under what circumstances the juvenile sea trout migrates to sea, and 2) to examine annual variations in the condition of adult sea trout at sea.

Project 1: Smolt migration to sea

Material and methods

A trap (Picture 1) was mounted in the river Sandá (61.999N, 6.781W). The trap has the height of 50 cm, covers the total width of the river and leads the seaward migrating trout into a sampling box. The trap was visited on a daily basis, where the sea trout caught were sampled, the water temperature measured, and the trap cleansed to avoid clogging. After sedation with Benzocaine (Tjaldurs Apotek, Tórshavn), the sampled sea trout were weighed to the nearest 0.1 g and length measured to the nearest 0.1 cm. Scale was sampled and stored for potential later age and growth determination, however, if the number of sea trout was high, scale was only sampled from a subsample, i.e., ~20 trout. After full recovery from the anaesthetics, the sea trout were released downstream. Sampling was terminated and the trap demounted after the first occasion of high precipitation and low numbers of sampled smolts, or when the trap was estimated to disturb the upstream migration of returning sea trout too much.



Picture 1. The sea trout trap in Sandá.

Results

The trap was mounted in the river Sandá on the 22nd of April 2021, i.e., one day earlier than in 2020 and 10 days later than in 2019, and demounted again on July 20th 2021, i.e., one day earlier than in 2020 and 12 days later than in 2019. Only 241 sea trout entered the trap in 2021, which was considerably less than in 2019 (675 specimens) and 2020 (619 specimens) (Figure 1). As in previous years, there were days in 2021 (June 9th to June 11th) when the precipitation levels led to a rise in water levels too high for the trap. Furthermore, and to prevent disturbing the upstream migration of returning sea trout, the trap only covered half of the river from July 17th and until the last sampling day (July 20th). These days sea trout probably escaped sampling.

If we, similar to previous years, make a rough estimate, based on the experience of others (www.gov.scot), and divide the sea trout sampled into categories of small (<20.1 cm, likely juvenile) and large (>20 cm, likely not juvenile), the trend in 2021 was approximately the same as previous years, i.e., the large specimens dominated the early samplings, while the small specimens dominated the late samplings (Figure 1).

Similar to 2019 and 2020, the seaward migration of sea trout was observed to occur concurrent with occasions of high precipitation (Figure 1). The window when 25% to 75% of the small sea trout (<20.1 cm) had migrated to sea ranged in 2021 from the 30th of May to 22nd of June, which was later than in 2019 and a bit earlier than in 2020 (Table 1 and Figure 1).

Table 1. Dates when 25% and 75% of the small sea trout (<20.1 cm) in Sandá had migrated to sea.

Year	Date of 25% migration	Date of 75% migration
2019	19.05	29.05
2020	10.06	28.06
2021	30.05	22.06

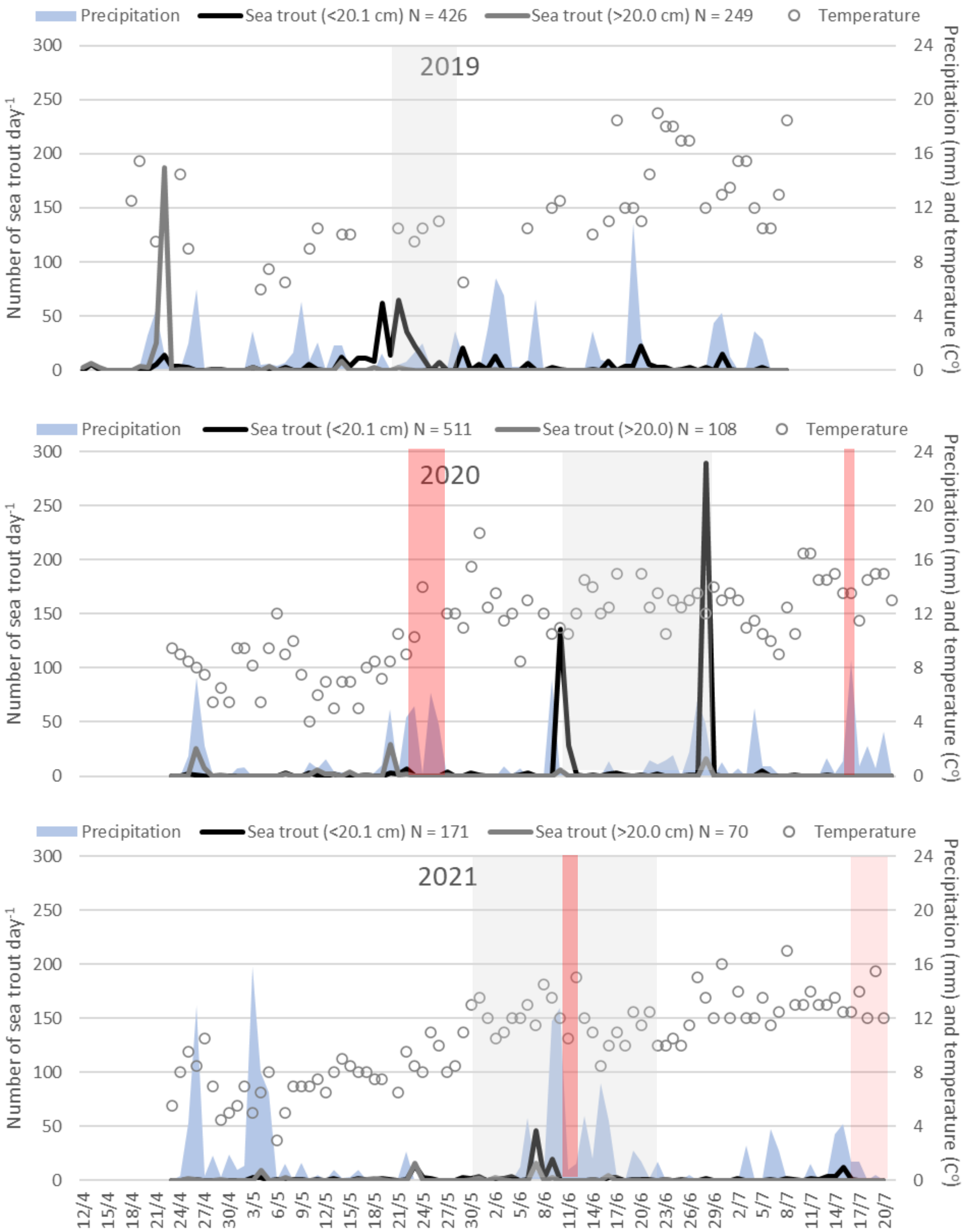


Figure 1. Number of sea trout caught, precipitation (mm) and temperature (C°) per day in 2019, 2020 and 2021. Grey areas indicate the period from 25% to 75% migration. Red areas indicate days when the trap was not adequately sampling due to high precipitation levels (dark) or upstream migrating sea trout (light). There were days in 2019 when the trap was not sampling, but unfortunately the exact dates have not been registered. Precipitation data source: www.dmi.dk.

Overall, the condition factor of the sea trout sampled in the trap was significantly lower in 2021 compared to 2019 and 2020, however, when the interannual difference was compared within the two size groups, it was most significant regarding the small specimens, i.e., the small sea trout from 2019 had a significantly better condition compared to 2020 and 2021, and the small sea trout from 2021 had a significantly poorer condition compared to 2019 and 2020. Regarding the large specimens, no significant difference was observed in the condition between 2019 and 2021, while it was significantly higher in 2020 compared to the other two sampling years (Figure 2).

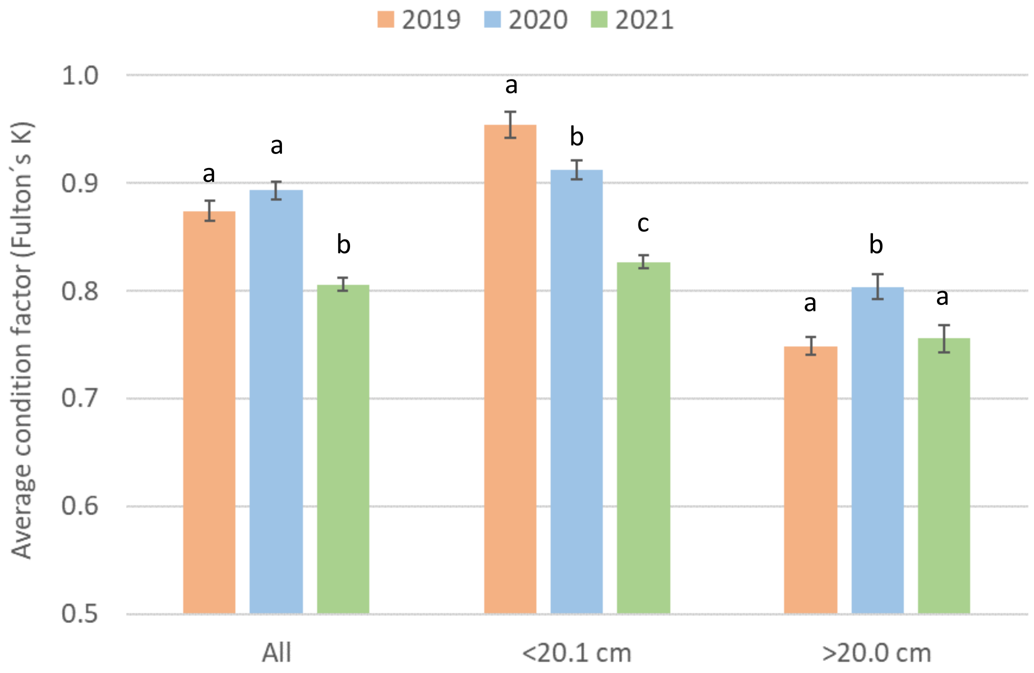


Figure 2. Average condition factor (Fulton´s *K*) of all sea trout sampled in the trap in 2019, 2020 and 2021, as well as in the small (<20.1 cm) and large (>20 cm) size groups. Vertical bars indicate standard error. Different letters indicate significant statistical difference (t-test).

Project 2: The condition of sea trout at sea

Material and methods

Scale and other information on sea trout caught at sea is sampled in two ways, i.e., 1) sampling by gillnets, and 2) by anglers donating sea trout scales and information such as length, weight and sea lice counts of the sea trout they catch by using the envelopes shown below (Picture 2), and thereby participating in a yearly drawing toss for 10,000 DKR in return.

Picture 2. The envelopes developed for the anglers to donate sea trout scale and other information (inspired by www.nina.no).

In 2021 the gillnet sampling was conducted on June 28th to 30th. Two locations on the southernmost island were selected, where one represented sea trout in the vicinity of salmon farming (Øravík) and the other represented sea trout far from salmon farming (Fámjin) (Figure 3).

The gillnets were deployed at a ~90° angle to shore, and checked at least once every 30 minutes. To minimize the influence of salinity on the sea lice numbers, the nets were set in >32‰ waters (measured using YSI Pro30). After sampling, the fish were killed in an overdose of Benzocaine (Tjaldurs Apotek, Tórshavn) and transported to shore. On land the sea lice were counted and grouped into 1) adult female *Lepeophtheirus salmonis*, 2) adult male + preadult *L. salmonis*, 3) *Caligus elongatus*, and 4) chalimus. Furthermore, the sea trout were weighed to the nearest 0.1 g and length measured to the nearest 0.1 cm. Scale was sampled from each fish and stored for later age and growth determination. Lastly, the sea trout were gutted and the stomach content analysed.

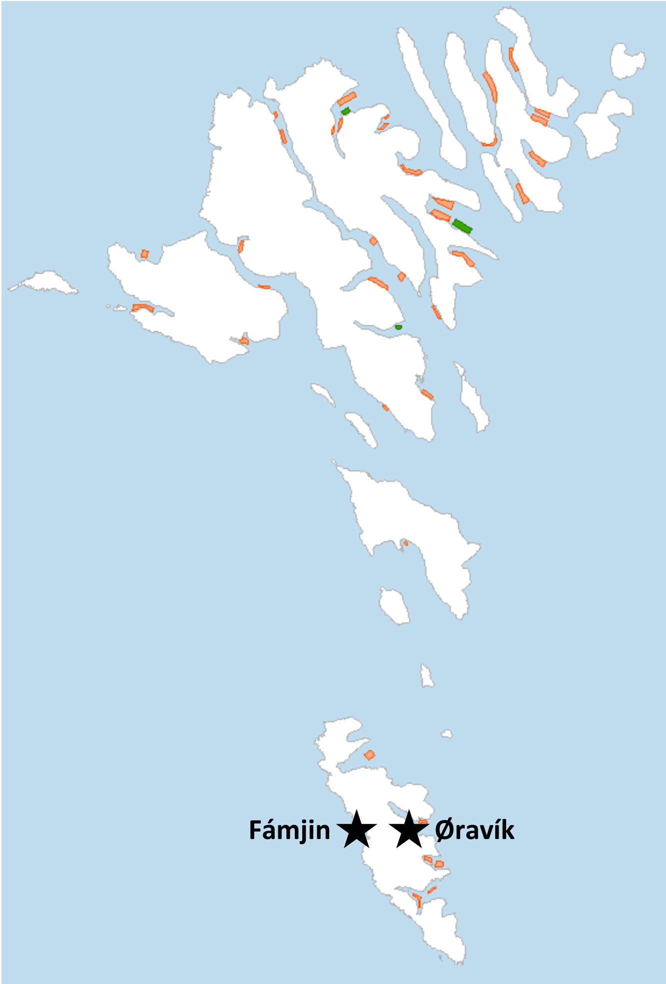


Figure 3. Gillnet sampling stations in 2021 (stars). Orange areas indicate salmon farming locations (www.kortal.fo).

Results

Scale and/or other information on sea trout caught with gillnets or by anglers has now been sampled from 563 specimens in total (Table 1).

Table 1. Number of sea trout caught by anglers and gillnets in 2019, 2020 and 2021.

	Anglers	Gillnet	Total
2019	147	31	178
2020	170	46	216
2021	119	50	169
Total	436	127	563

The sampling from 2019 to 2021 is seasonally unevenly distributed, i.e., the majority is from May to August, while the data from the remaining months is more sporadic (Figure 4).

When the sea trout are grouped into length categories, the smallest sea trout (<20 cm) first appeared in May and then disappeared again in September. No sea trout larger than 50 cm are reported in the months September to November (Figure 4).

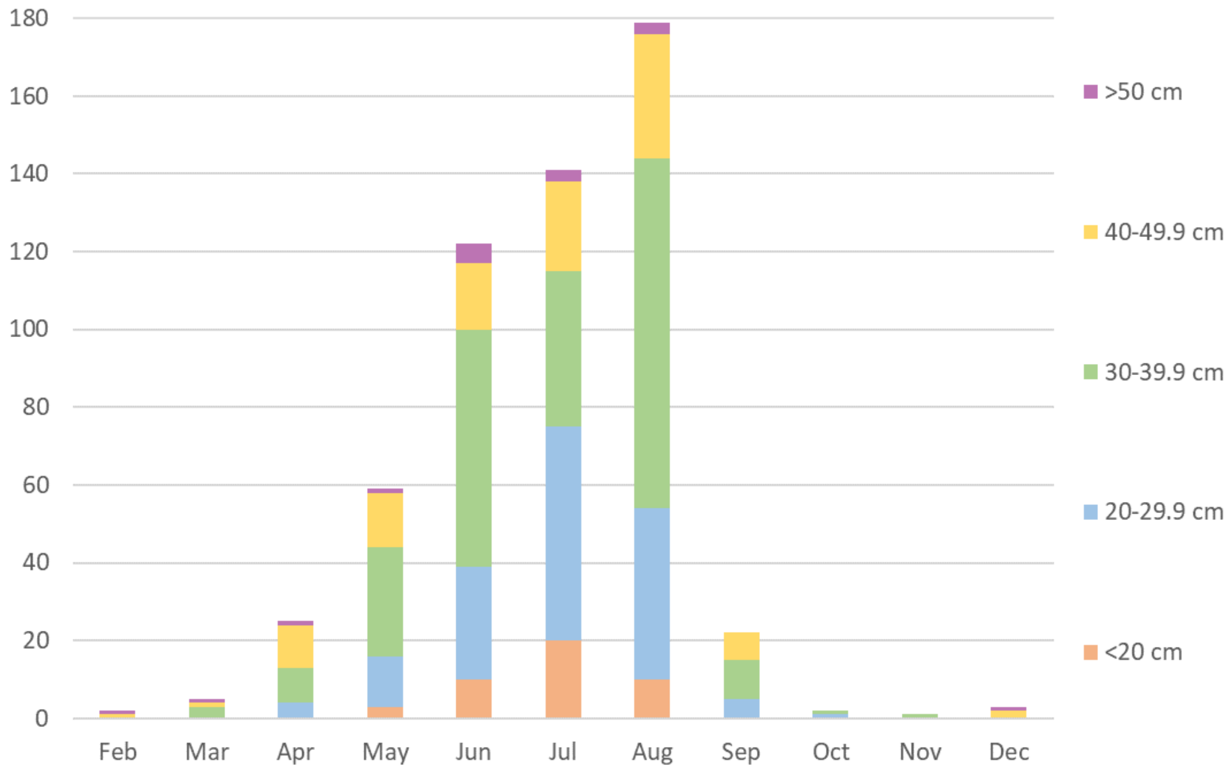


Figure 4. Number of sea trout caught at sea by anglers and gillnets in 2019-2021 divided into length groups.

On average the sea trout sampled in 2021 weighed 347 g (max 1500 g; min 36 g) and were 30.5 cm in length (max 56.0 cm; min 17.0 cm). Overall, the sea trout sampled in 2021 were somewhat smaller than in the previous two years, and had a significantly lower condition factor compared to 2020 (t-test, $p < 0.05$, Table 2).

Table 2. Length, weight and condition factor (Fulton´s *K*) of the total catch of sea trout, sea trout caught by anglers and sea trout caught with gillnets, respectively, between years. Different superscript letters indicate significant difference.

		Length (cm)			Weight (g)			Fulton´s *K*		
	Year	Average	Min	Max	Average	Min	Max	Average	Min	Max
Total	2019	32.9[a]	17.0	58.0	508[a]	55	2000	0.88[ab]	0.31	1.51
	2020	34.0[a]	17.2	57.0	396[b]	17	2300	0.93[a]	0.18	1.44
	2021	30.5[b]	17.0	56.0	347[b]	36	1500	0.83[b]	0.42	2.33
Anglers	2019	33.4[a]	17.0	56.0	578[a]	150	2000	0.87[ab]	0.39	1.51
	2020	35.1[a]	18.0	57.0	422[b]	17	2300	0.93[a]	0.18	1.44
	2021	30.6[b]	17.0	56.0	434[b]	58	1500	0.86[b]	0.45	1.25
Gillnet	2019	30.2[a]	17.1	58.0	334[a]	55	1820	0.91[a]	0.31	1.41
	2020	30.0[a]	17.2	49.4	329[a]	45	951	0.92[a]	0.65	1.17
	2021	30.4[a]	17.2	50.5	238[a]	36	943	0.79[b]	0.42	2.33

The scale of 164 sea trout sampled in 2021 were analysed, however, scale from 9 were not readable. The age distribution of the sea trout examined was 48 2-years-old, 59 3-years-old, 28 4-years-old, 14 5-years-old and six 6-years-old. Unlike 2019 and 2020 no 7-years-old specimens were found, and the large number of 4-years-old specimens caught in 2020 did apparently not result in a high occurrence of 5-years-old specimens in 2021 (Figure 5).

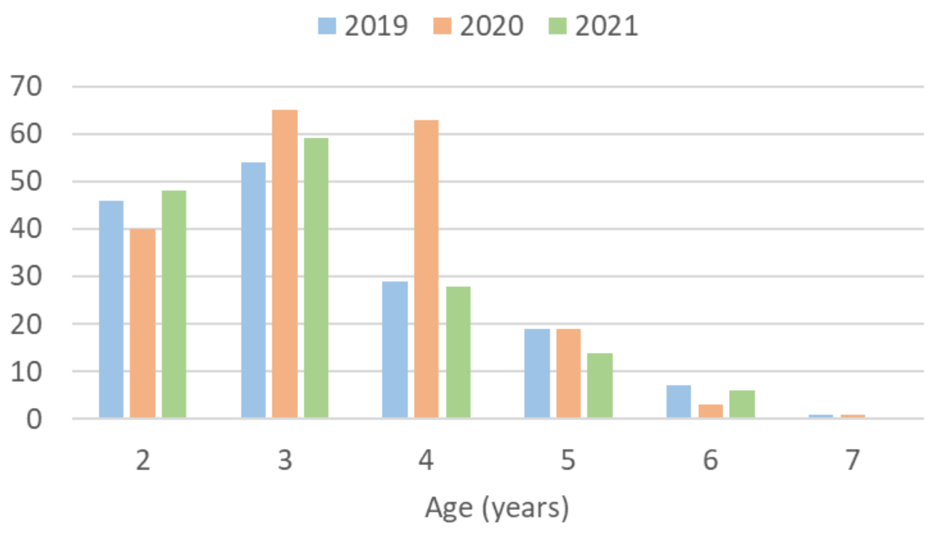


Figure 5. Age distribution of the sea trout sampled in 2019-2021.

The average age of the sea trout sampled in 2021 was 3.17 years, which was somewhat lower than in 2019 (3.29 years), but not significantly (t-test, $p = 0.175$), and significantly lower than in 2020 (3.39 years) (t-test, $p < 0.05$). The sea trout sampled in 2021 had on average spent significantly more time in freshwater, i.e., 2.39 years (min 1 year and max 4 years), before migrating to sea, compared to those sampled in 2019 and 2020 (t-test, $p < 0.05$), i.e., 2.28 and

2.13 years, respectively. On the contrary, the average sea age was 0.78 years, which was significantly lower than in 2019 and 2020 (t-test, $p < 0.05$), i.e., 1.02 and 1.26, respectively. Comparison of the length-at-age of sea trout that had spent two or three years in freshwater before migrating to sea for the first time again showed that the average length-at-age was significantly different between the two. However, and unlike in the last years, with 2021 added to the data, the 6-years-old now also showed the same significant trend (Figure 6).

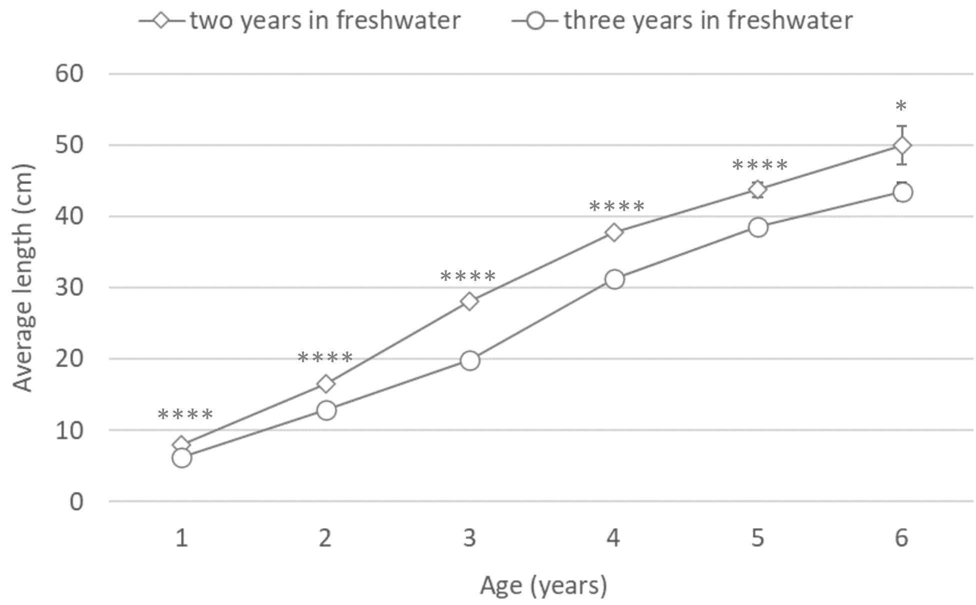


Figure 6. Length-at-age of sea trout migrating to sea after two (diamonds) and three (circles) years in freshwater. Vertical bars indicate standard error. **** and * represents significant difference of $p < 0.0001$ and $p < 0.05$, respectively (t-test).

The average growth in the third year of sea trout that had spent two years in freshwater before migrating to sea ranged between 11.7 (2016/17) to 12.5 cm $year^{-1}$ (2019/20), however, the difference was not statistically significant (One-way Anova, $p = 0.835$, Figure 7).

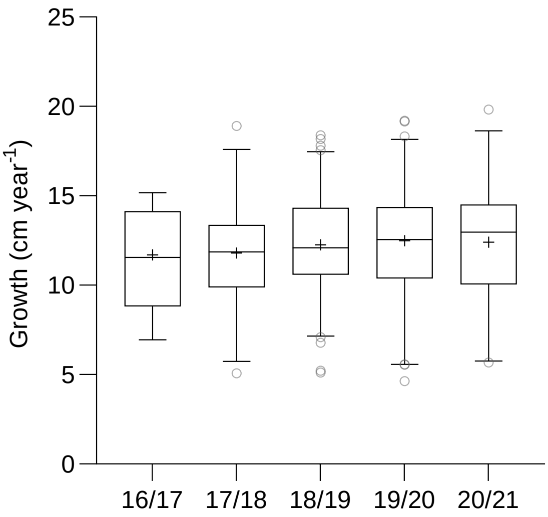


Figure 7. Annual differences in the growth in the first year at sea of 3-years-old specimens, which had spent two years in freshwater before migrating to sea. Vertical bars indicate 5 and 95 percentiles and + indicates average growth.

The stomachs of the sea trout sampled with gillnets were examined, and showed an annual significant difference in the relative distribution of prey types and empty stomachs (Chi-square, $p < 0.05$), e.g., the majority (53%) of sea trout sampled in 2019 contained larger fish, while less than 10% had ingested juvenile fish, which was in contrast to the other two sampling years, when 26-30% had consumed larger fish and 42-54% had ingested juvenile fish (Figure 8). The sea trout sampled in 2020 had the lowest frequency of empty stomachs, i.e., 9%, which is considerably lower than in 2019 and 2021, when 24% and 30% of the stomachs were empty, respectively.

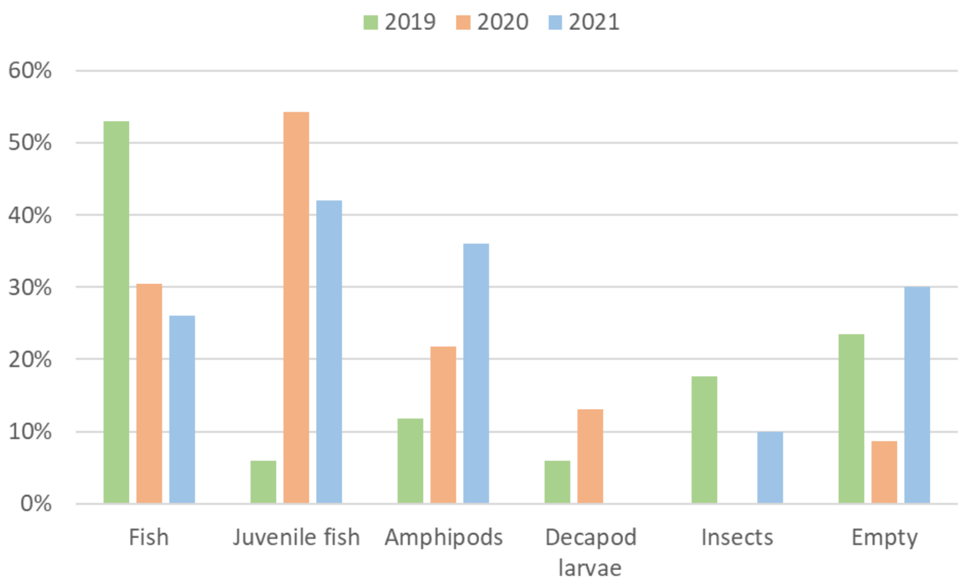


Figure 8. Relative distribution of the stomach content of the sea trout sampled with gillnets in 2019-2021.

The sea lice counts conducted by anglers and the trained gillnet staff are most likely not comparable and will thus not be compared, but presented separately. Furthermore, the sea trout caught in rivers and lakes are excluded from the analysis regarding sea lice as freshwater has a delousing effect.

The sea trout caught by anglers in 2021 had on average 4.1 sea lice and a prevalence of 42.9%. This is less than in 2019 and 2020, when the sea trout on average had 6.7 and 5.4 sea lice and a prevalence of 63.2% and 55.9%, respectively. However, it was only the difference in prevalence between 2019 and 2021 that was significant (t-test, $p = 0.003$).

Opposite 2019 and 2020, the average number of lice per sea trout caught by anglers in 2021 did not show an apparent summer peak, and no sea lice were reported on the sea trout caught in June, however, this observation is based on only eight specimens. No sea lice were reported prior to April or later than August, but again this is based on very low catch data (Table 3, Figure 4).

Table 3. Monthly variations in the number and prevalence of sea lice on sea trout caught by anglers in 2019-2021 and combined.

	2019				2020				2021				Combined			
	Average	Max	Prevalence (%)	N	Average	Max	Prevalence (%)	N	Average	Max	Prevalence (%)	N	Average	Max	Prevalence (%)	N
Mar									0.0	0	0.0	5	0.0	0	0.0	5
Apr	7.7	39	33.3	6									7.7	39	33.3	6
May	5.4	18	100.0	5	3.0	8	40.0	5	4.9	25	57.1	28	4.7	25	60.5	38
Jun	11.4	30	75.0	20	3.6	16	30.8	13	0.0	0	0.0	5	7.2	30	50.0	38
Jul	5.8	30	69.2	39	9.4	82	68.8	16	4.5	37	46.2	26	6.1	82	61.7	81
Aug	8.5	26	77.8	27	5.4	43	60.6	71	4.4	44	42.5	40	5.7	44	58.7	138
Sep	0.2	2	14.3	14	1.0	3	50.0	4					0.4	3	22.2	18
Oct					0.0	0	0.0	1	0.0	0	0.0	1	0.0	0	0.0	2
Nov					0.0	0	0.0	1					0.0	0	0.0	1
Dec	0.0	0.0	0.0	3									0.0	0	0.0	3

The sea lice community on the sea trout caught with gillnets seems to vary annually, i.e., 2020 had a significantly higher average number of adult female *L. salmonis* compared to 2019 and 2021 (t-test, $p < 0.05$) and 2021 had a significantly higher average number of the chalimus stages compared to 2019 and 2020 (t-test, $p < 0.01$, Figure 9). Although there appeared to be annual difference in the *C. elongatus* load, no statistical difference was found (One-way Anova, $p = 0.210$).

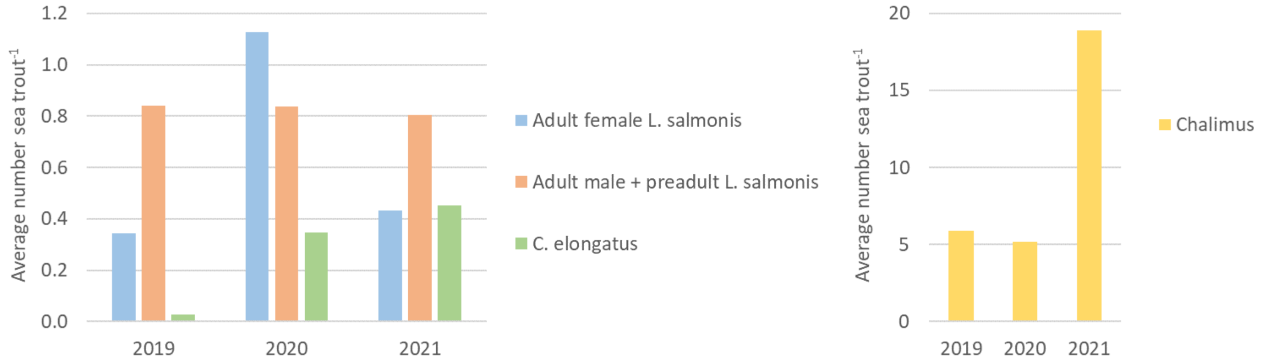


Figure 9. Annual differences in the average number of sea lice on sea trout caught with gillnets in 2019-2021.

Based on the salmon lice index presented by Taranger *et al*. 2012 to estimate the influence of salmon farming on wild salmonid stocks, we grouped the lice load of sea trout larger than 150 g into five categories, i.e., <0.025, 0.025-0.05, 0.05-0.10, 0.10-0.15 and >0.15 lice gram sea trout^{-1}, which represents 0%, 20%, 50%, 75% and 100% expected mortality, respectively. Since the sea lice data probably is not comparable, we have presented the results as the total lice load (*L. salmonis* + chalimus, left panel) on the sea trout caught with gillnets, the salmon lice (*L. salmonis*) load on the sea trout caught with gillnets (mid panel) and the total sea lice load on the sea trout caught by anglers (right panel) (Figure 10). In general, the sea lice load categories representing 0% and 20% expected mortality were dominating, however, in 2021, when the average number of chalimus sea trout^{-1} was significantly higher than in previous years, ~35% of the sea trout had sea lice loads estimated to result in at least 50% expected mortality, of which almost 9% were grouped in the 100% estimated mortality category (Figure 10).

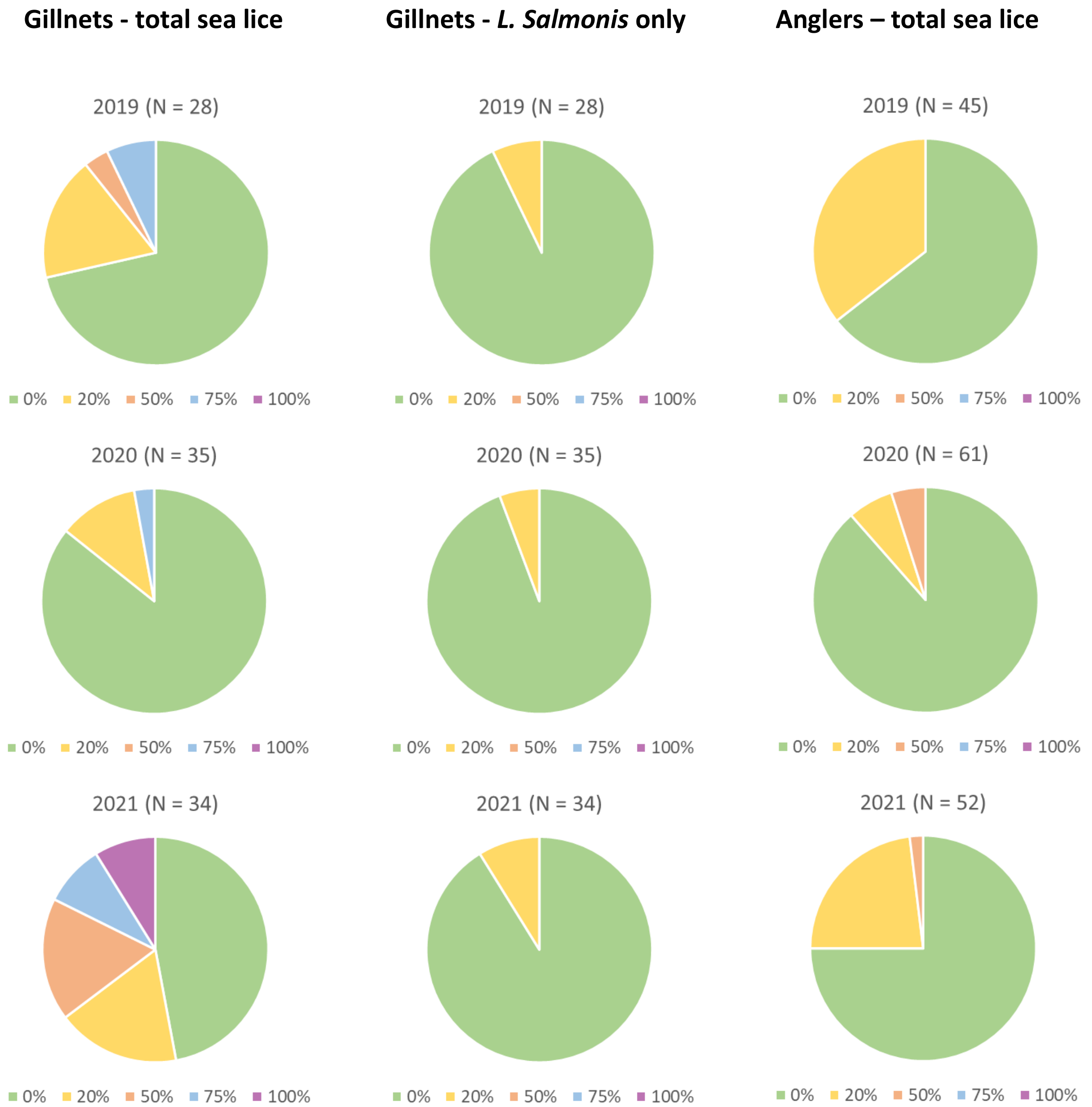


Figure 10. Proportion of sea trout (>150 g) with salmon lice loads estimated to result in 0%, 20%, 50%, 75% and 100% expected mortalities.

Taranger *et al*. 2012 also presented a salmon lice index for sea trout smolts (<150 g), however, since only data from four sea trout less than 150 g have been received from anglers, the results presented from this size group are only from the gillnet sampling. Similar to the larger sea trout, 2021 was the year with sea trout having the heaviest sea lice loads compared to the other years (Figure 11), but when the same categorisation was performed only regarding *L. salmonis*, i.e., the chalimus stages were excluded, all the sea trout smolt were in the 0% mortality category.

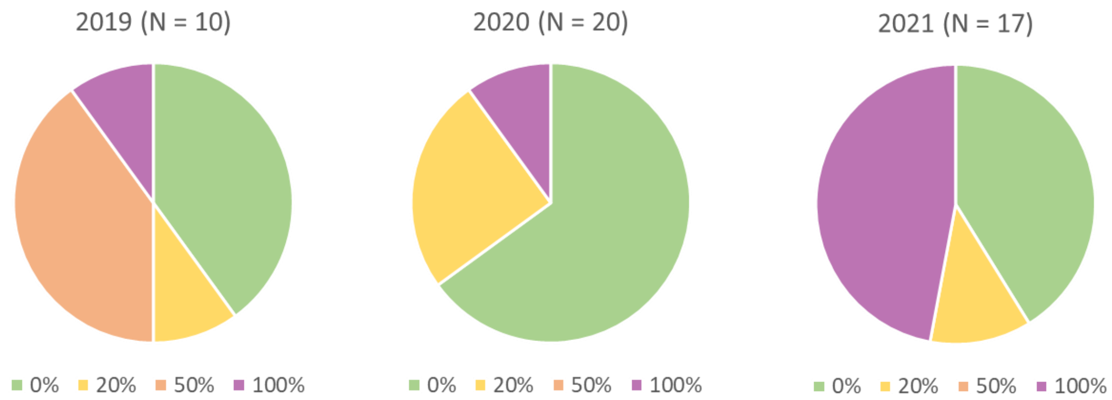


Figure 11. Proportion of sea trout smolt (<150 g) with salmon lice loads estimated to result in 0%, 20%, 50% and 100% expected mortalities.

Unfortunately, the fishing efficacy was so high in Øravík (38 sea trout), that only 12 fish could be sampled in Fámjin (the total allowance is 50 sea trout year^{-1}). The sea trout sampled at the sites representing sea trout in the vicinity of salmon farming (Øravík) and those far from salmon farming (Fámjin) had approximately the same average age, i.e., ~3.4 years, with the same minimum and maximum age, i.e., two and six years, respectively. However, a significant difference was observed in the average condition factor (Fulton´s *K*) and average number of salmon lice (*L. salmonis*) + chalimus fish^{-1}, i.e., Fámjin had a significantly higher condition factor (t-test, p = 0.0005) and Øravík had a significantly higher number of salmon lice + chalimus fish^{-1} (t-test, p = 0.003). However, no significant difference could be found when only the salmon lice load was compared between the two sites (t-test, p = 0.231, Figure 12).

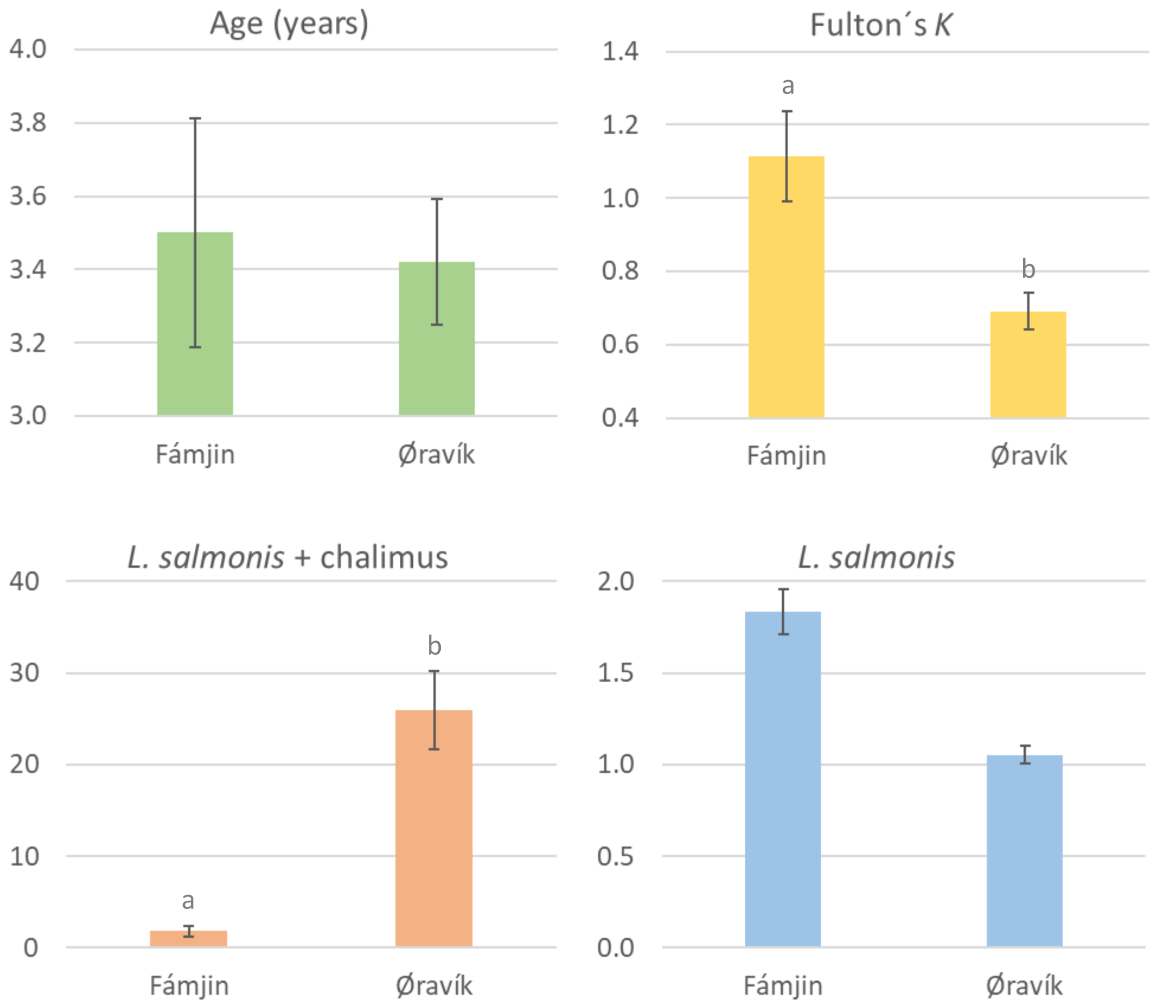


Figure 12. Average age (years), condition factor (Fulton´s K), *L. salmonis* + chalimus number and number of *L. salmonis* of the sea trout sampled in Fámjin and Øravík in 2021. Vertical bars indicate standard error. Different letters indicate significant difference (t-test).

The stomach content of the sea trout sampled at the two sites was significantly different regarding prevalence of prey types and empty stomachs (Chi-square, $p < 0.001$), i.e., less than 10% of the sea trout sampled in Fámjin had empty stomachs, while 37% of the stomachs sampled in Øravík were empty. The prevalence of juvenile fish, amphipods and insects were higher regarding the stomachs sampled in Fámjin, while the prevalence of larger fish was higher regarding the stomachs sampled in Øravík (Figure 13).

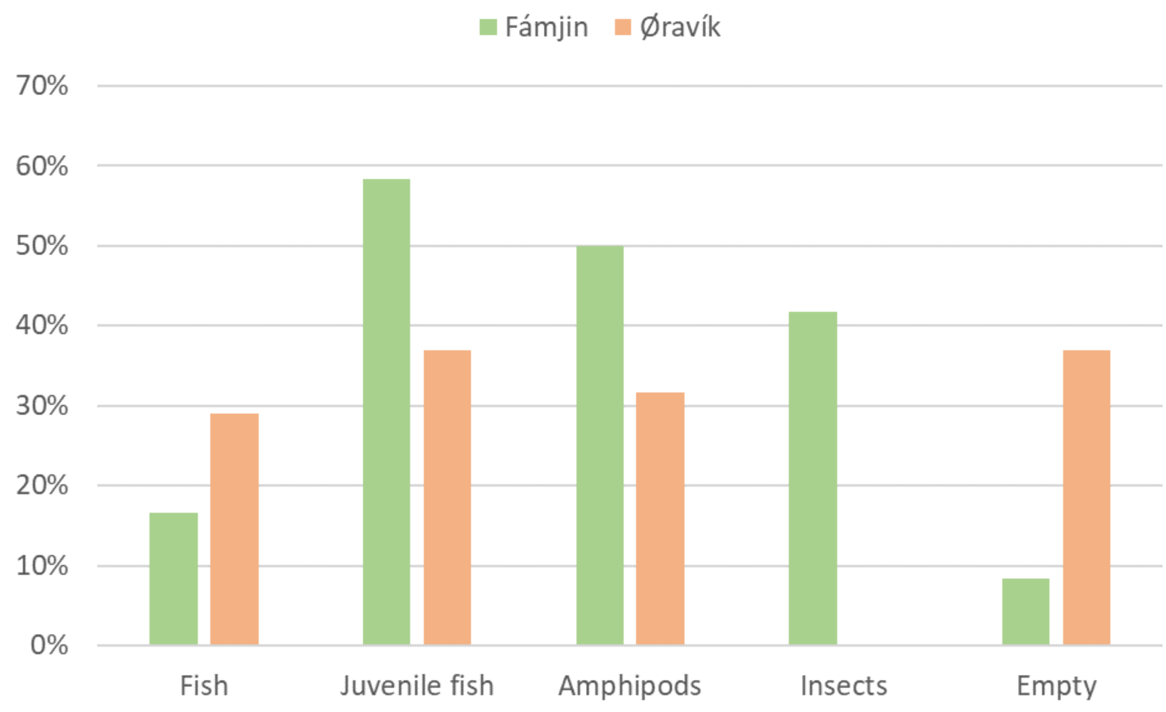


Figure 13. Prevalence of stomach content and empty stomachs of the sea trout sampled with gillnets in 2019-2021.

When the salmon lice load in Øravík and Fámjin were grouped according to Taranger *et al*. 2012 (<150 g and >150 g combined), almost one third of the sea trout living in the vicinity of salmon farming categorised as 100% expected mortality, which was in large contrast to the sea trout sampled in Fámjin, where only one of the 12 fish (9%) categorised outside the 0% expected mortality category, i.e., as 20% expected mortality (Figure 14). However, if the chalimus stages where excluded, Øravík had relatively fewer specimens categorising outside the 0% expected mortality category compared to Fámjin, i.e., 5.5% (Figure 14).

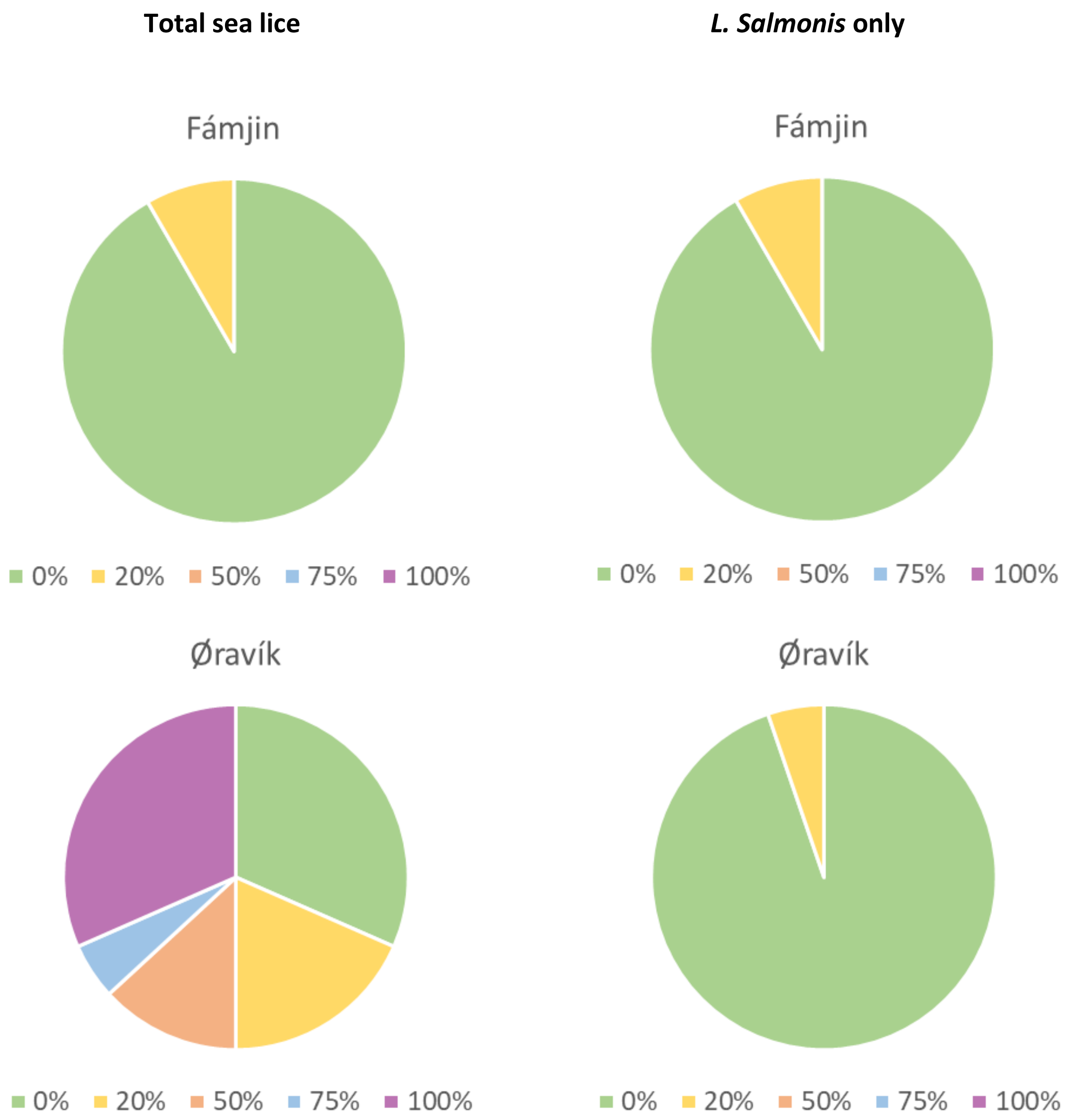


Figure 14. Proportion of sea trout sampled in Fámjin and Øravík with salmon lice loads estimated to result in 0%, 20%, 50%, 75% and 100% expected mortalities.

Discussion

Project 1

As in 2019 and 2020, the seaward migration was in 2021 concurrent with much precipitation and the subsequent increase in water discharge, and indications were again of temperature dependent migration, i.e., the bulks in migration of likely first-time migrants (<20.1 cm) occurred when the water temperature had passed $8\ C^{o}$ (Figure 1). Temperature is known to regulate the rate and duration of the smoltification process (Høgåsen 1998, Byrne *et al*. 2004), however, the relative importance of water discharge and temperature as initiators of smolt migration has been shown to vary among years and areas (Hembre *et al*. 2001; Winter *et al*. 2016). Albeit starting two weeks earlier, the 25%-75% migration period in 2021 partially overlapped with the corresponding period in 2020, while it started at approximately the same time as it ended in 2019 (Figure 1). Overall, the 25%-75% migration window has ranged from mid-May to late June in the three-year period the project has lasted (Table 1), which is in the late category compared to other European rivers (Thorstad *et al*. 2016).

Both the number of large sea trout (>20.0 cm), as well as the number of likely first-time migrators (<20.1 cm) was lower in 2021 compared to the two previous years. It is not possible to make any final conclusion on why the number has dropped, however, several circumstances might have had an influence, e.g., 1) the days when the trap was not functioning properly due to too high water levels, might have had a relatively larger influence on the number of sea trout samplings in 2021 compared to 2019 and 2020, 2) unlike the two previous sampling years, the trap was in 2021 disturbed by youngsters catching trout hesitating to enter the trap, 3) a unusually long cold period in spring, resulting in the river being more or less frozen hard, might have taken its toll on the local trout stock, 4) the condition factor of the sea trout sampled in the trap in 2021 was significantly lower compared to the two previous sampling years, especially regarding the likely first-time migrators (<20.1 cm, Figure 2), which might indicate that the conditions in the river have not been favourable, possibly influencing both survival and/or migration, and 5) the Faroese fishing association "Føroya Sílaveiðufelag" released reared trout smolt into Sandá in 2019, which might have led to unnaturally high sample numbers in 2019 and 2020. However, these smolts are marked by cutting the adipose fin, and the results from our recordings on marked sea trout were in 2019 four, in 2020 10 and in 2021 three, not indicating a large influence.

Project 2

The results of the length distribution of sea trout sampled at sea was in concert with the findings in the trap, i.e., the smallest sea trout (<20.1 cm, likely first-time migrators) initially appeared in May and disappeared in August, probably due to growing out of the smallest category. Furthermore, no large specimens (>50 cm) have so far been sampled from September to November, indicating a spawning period similar to that in northern Norway (Jensen and Rikardsen 2008).

Similar to the results from the trap (project 1), the overall condition of the sea trout caught at sea indicated that the specimens in 2021 were in a somewhat poorer state compared to the two previous sampling years, especially 2020 (Table 2). One might speculate that this could be due to the poorer condition of the 2021 smolt, however, the same trend was observed in all age classes. On the other hand, 2020 had significantly fewer empty stomachs compared to 2019 and 2021, and the sea trout sampled in 2020 might thus have been in a better condition due to more favourable feeding conditions (Figure 8).

With the exception of the large 4-year-old cohort in 2020, the age distribution in 2021 resembled those in 2020 and 2019 (Figure 5). However, despite of having spent on average more time in freshwater prior to migrating to sea, the average age was lower in 2021 compared to 2020 due to a lower average sea age.

Comparison of the length-at-age of sea trout that has spent two or three years in freshwater before migrating to sea has previously shown that the average length-at-age is significantly higher for the two-years-in-freshwater cohort, emphasising the enhanced growth rate at sea, as well as indicating that size might be an initiator of seaward smolt migration. With the addition of the 2021 data, the previously not significant difference between the two six-years-old cohorts has now become significant (Figure 6). On the other hand, when only data from 2019 and 2020 were available a significantly different and higher growth rate was observed in the first year at sea

between years, however, with the inclusion of the 2021 data, this trend was no longer significant (Figure 7).
The sea lice load and prevalence were on average lower in 2021 compared to 2019 and 2020, however, it was only statistically significant regarding the difference in prevalence between 2019 and 2021. Opposite the two previous sampling years, no obvious summer peak was observed in 2021 (Table 3), but similar to 2019 and 2020, no sea lice were reported prior to April or after September in 2021. Since the abundance of salmon lice in the Faroese aquaculture typically is at its highest in the winter months (Kragesteen et al. 2021, www.hfs.fo, Figure 15), the absence of sea lice in this period might indicate delousing in freshwater.

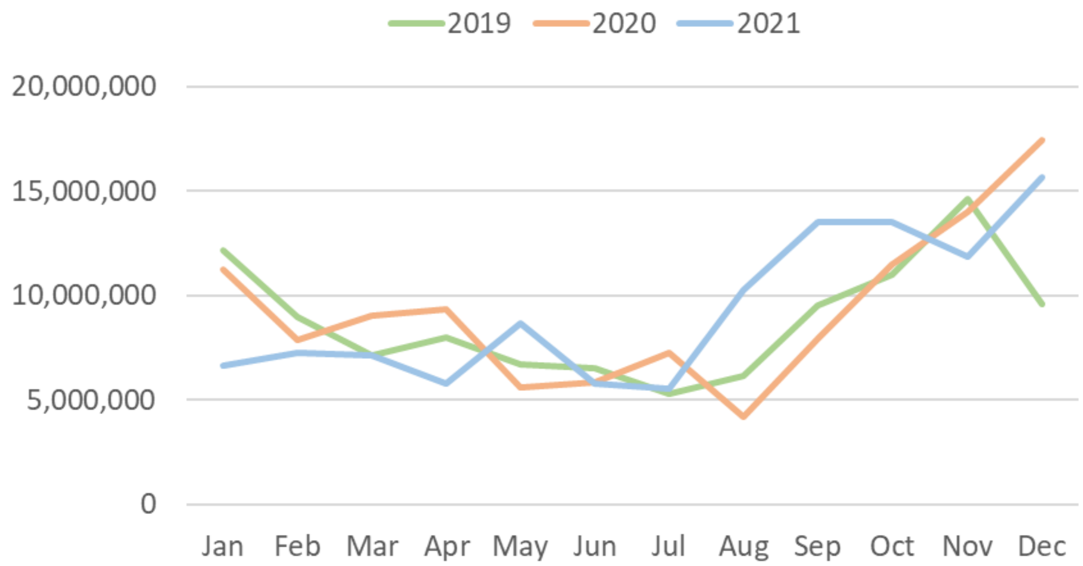


Figure 15. The total number of adult female *L. salmonis* per month (average number per salmon*total number farmed salmon) in the Faroe Islands in the period 2019-2021. Data source www.hfs.fo.

Based on the sea lice counts of the sea trout caught with gillnets, the sea lice community appears to differ between years, however, the locations of the gillnet sampling have also differed, and this might have had an influence. Nevertheless, the results did indicate that the sea trout sampled in 2020 had a heavier load of adult female *L. salmonis* compared to the other two sampling years, while the sea trout sampled in 2021 had a heavier load of chalimus (Figure 9).
C. elongatus has been found to be living on numerous different fish species and it has been proven difficult to determine the causal mechanism or species in the seasonal infestation pattern that is often observed on farmed fish, as correlations between species are likely to be due to derived rather than causal reasons (á Norði et al. 2015). Distinguishing between the two most common sea lice species on sea trout, i.e., *L. salmonis* and *C. elongatus*, in the Faroe Islands might thus be of great relevance when grouping the salmon lice load according to Taranger *et al*. 2012, who recommends that the chalimus stages are included (Figure 10, 11 and 14). Taranger *et al*. 2012 furthermore propose an objective method for estimating the sustainability of a stock by summing up the proportions of sea trout in each expected mortality category (Table 4), and again, it must be acknowledged that the information on which species the chalimus stages belong to is of great importance when estimating the influence of salmon lice on the Faroese sea trout stock, i.e., when the chalimus stages are excluded from the salmon lice data, the final results change drastically, e.g.,

from 49% to 0% expected mortality for the sea trout smaller than 150 g sampled with gillnets (Table 4).

Table 4. The estimated spawning stock reduction (%), where red, yellow and green represents large (>30%), moderate (10-30%) and small (<10%) reductions, respectively.

Sea trout size	<150 g	<150 g	>150 g	>150 g	>150 g
Method	Gillnets	Gillnets	Gillnets	Gillnets	Anglers
Sea lice	Total	Chalimus stages excluded	Total	Chalimus stages excluded	Total
2019	32%	0%	11%	1%	7%
2020	15%	0%	4%	1%	4%
2021	49%	0%	28%	2%	6%

The results from the gillnet sampling in 2021, where the locations were selected based on their distance to farmed salmon, showed that the sea trout in the vicinity of salmon farming had a significantly higher sea lice load compared to the sea trout sampled far away from salmon farming, but again it was the chalimus stages that made the difference significant (Figure 12 and 13). The sea trout from the two locations also had a significantly different condition (Fulton´s *K*), but similar to the differences in condition between years, it again was the sea trout with the fewest empty stomachs that were in better condition (Figure 13).
Current project will continue in 2022, and since it is not possible to distinguish between *L. salmonis* and *C. elongatus* at the chalimus stages in the field, the main improvement of the methods used is to sample the chalimus stages for later species identification.

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