

litteR - Analysis of Litter Data

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Introduction

This tool performs the following types of data analysis on beach litter data, or any other type of litter data: data quality control, outlier analysis, descriptive statistics, and trend analysis.

This report can best be viewed with the latest versions of web browsers like Google Chrome, Mozilla Firefox, Chromium, or Safari. Its contents does not render well in some versions of Microsoft's Internet Explorer.

Settings

- period: from 2013-01-01 to 2021-12-31
- percentage of total count to analyse: 100%
- files:

- project directory: 'C:/Users/evbl/Desktop/IB2024_VH'
- settings: 'settings_VH.yaml'
- data: 'Data_file.csv'
- types: 'Category_file.csv'
- location codes: 'Edsvik SE5', 'Angklavebukten - Salto - SE6', 'Haby SE4', 'Groderhamnsvik SE9', 'Barrevik SE8', 'Gronevik Overon SE7', 'Jaravallen' and 'Sudde strand'
- region codes: 'VH'
- group codes: 'PLAST', 'TYG', 'METALL', 'PAPPER.KARTONG', 'GUMMI', 'TRA', 'GLAS.KERAMIK', 'SANITET.MEDICINSKT', 'ORGANISKT', 'KEMISKA.FORORENINGAR', 'OLIKA.MATERIAL', 'SUP' and 'FISH'
- type names: not specified
- figure quality: 'high'
- cutoff count axis in plots: 100%

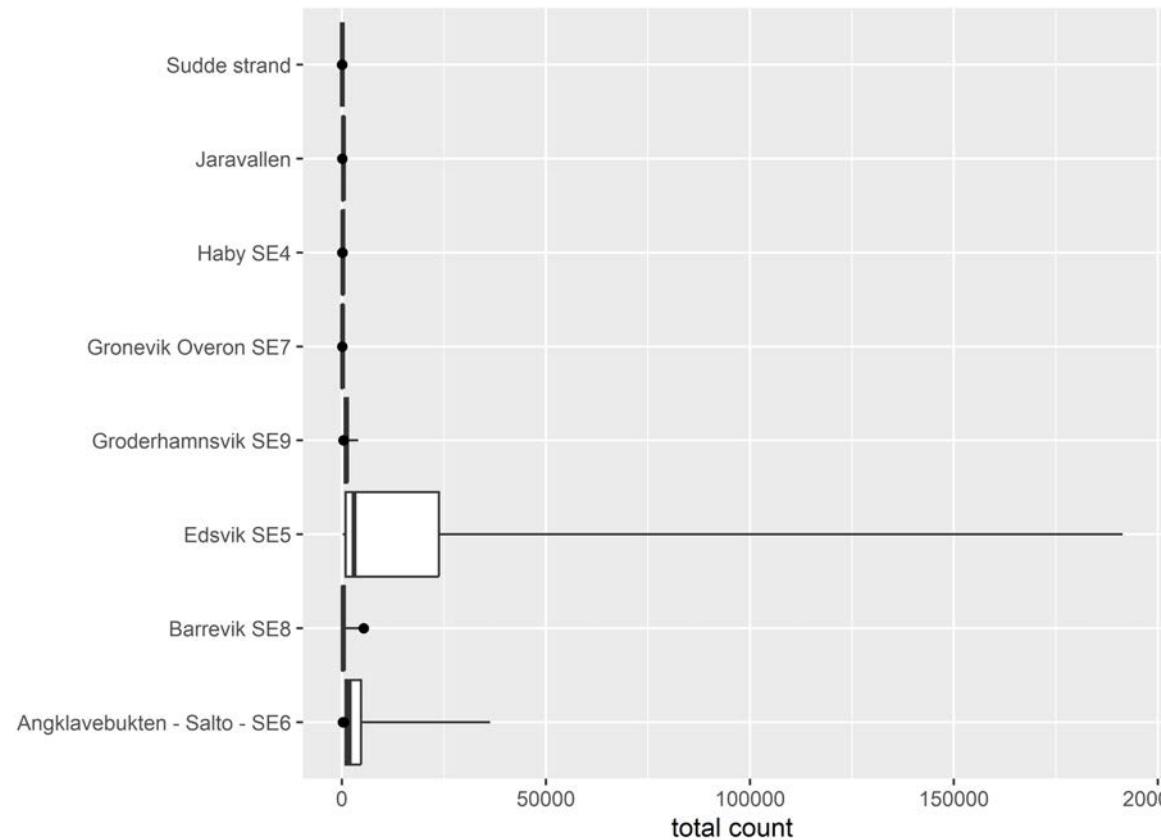
Data Quality Control

In this section, litter data will be read and validated. Warnings will be printed if they occur. See also the log-file for more details.

Warning: The following columns will be excluded from analysis:
'kat_108', 'kat_109', 'kat_110', 'kat_111', 'kat_117', 'kat_ot01', 'kat_1171' and 'kat_1172'

Outlier analysis

For each `location_code`, adjusted boxplots (<https://dx.doi.org/doi:10.1016/j.csda.2007.11.008>) are given of the total count for outliers (<https://en.wikipedia.org/wiki/Outlier>) detection in the period 2013-01-01 to 2021-12-31. Outliers are given as dots (if any) in the adjusted box-and-whisker plots below. Note that outliers are not necessarily errors.



Outliers, if available, are listed in the table below. In addition, also the number of surveys `n` is reported. Litter experts should decide if outliers are errors and need to be excluded from analysis. Note, however, that due to its non-parametric nature, `litteR` is fairly robust for outliers.

location_code	date	n	total count
Angklavebukten - Salto - SE6	2021-07-06	26	149
Angklavebukten - Salto - SE6	2014-07-01	26	307
Angklavebukten - Salto - SE6	2013-06-30	26	360
Angklavebukten - Salto - SE6	2014-10-01	26	396

location_code	date	n	total count
Angklavebukten - Salto - SE6	2021-09-30	26	456
Barrevik SE8	2020-04-22	27	5272
Groderhamnsvik SE9	2020-10-06	27	332
Groderhamnsvik SE9	2016-07-14	27	362
Groderhamnsvik SE9	2021-07-02	27	391
Gronevik Overon SE7	2021-07-01	26	24
Haby SE4	2017-07-05	27	9
Haby SE4	2019-06-25	27	40
Haby SE4	2016-07-14	27	57
Haby SE4	2017-10-09	27	74
Jaravallen	2015-10-31	20	14
Jaravallen	2015-07-25	20	35
Sudde strand	2017-05-03	23	1
Sudde strand	2016-10-30	23	2
Sudde strand	2019-10-29	23	2

Descriptive statistics

Basic statistics

The number of years and the number of surveys for each `location_code` should not be too small, otherwise the calculations in this report will be less reliable. In addition, the surveys should ideally also be evenly spread in time.

Note that **litteR** does not enforce a minimum number of years or surveys. That is the responsibility of the user. As a guideline, we advise a minimum of 5 years and 10 surveys, evenly distributed in time.

The table below gives the number of surveys and the number of years for each `location_code`.

region_code	location_code	number of years	number of surveys
VH	Angklavebukten - Salto - SE6	9	26
VH	Barrevik SE8	9	27
VH	Edsvik SE5	9	26
VH	Groderhamnsvik SE9	9	27
VH	Gronevik Overon SE7	9	26
VH	Haby SE4	9	27
VH	Jaravallen	7	20
VH	Sudde strand	8	23

For each location code and group/type name, the following statistics have been estimated for the period 2013-01-01 to 2021-12-31:

- mean count (`mean`): *i.e.*, the arithmetic mean (https://en.wikipedia.org/wiki/Arithmetic_mean) of the counts for each litter type;
- median count (`median`), *i.e.*, the median (<https://en.wikipedia.org/wiki/Median>) of the counts for each litter type;
- relative count (`%TC`): the contribution of each litter type to the total count of litter types (%);
- coefficient of variation (https://en.wikipedia.org/wiki/Coefficient_of_variation) (`cv`): the ratio of the standard deviation to the mean of the counts for each litter type (expressed as a fraction);

- ratio of mad (https://en.wikipedia.org/wiki/Median_absolute_deviation) and median (<https://en.wikipedia.org/wiki/Median>) (`rmad` , expressed as a fraction);
- number of surveys (`n`);
- Theil-Sen slope (https://en.wikipedia.org/wiki/Theil%E2%80%93Sen_estimator) (slope): a robust non-parametric estimator of slope (litter counts / year);
- p-value (<https://en.wikipedia.org/wiki/P-value>): the p-value associated with the one-tailed Mann-Kendall test (https://en.wikipedia.org/wiki/Kendall_rank_correlation_coefficient) to test the null hypothesis of
 - no monotonically *increasing* trend in case the Theil-Sen slope is greater than zero;
 - no monotonically *decreasing* trend in case the Theil-Sen slope is smaller than zero;

These statistics will be estimated for litter types with the greatest counts making up 100% of the total count for each location and for all groups specified in 'Category_file.csv'.

These statistics have been stored in file 'litteR-results-20230831T155539.csv'.

The statistics for the litter groups are given in the table below. These group statistics are based on *all* litter types and not only on those types with the highest counts.

<code>location_code</code>	<code>from</code>	<code>to</code>	<code>group_code</code>	<code>%TC</code>	<code>mean</code>	<code>median</code>	<code>cv</code>	<code>rmad</code>	<code>n</code>	<code>slope</code>	<code>p-value</code>
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	TC	100	5794	1708	1.633	1.113	26	166.9	0.1273
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	PLAST	82.96	5008	1390	1.666	1.108	26	158.9	0.1183
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	SUP	30.33	1414	473	1.709	0.9544	26	16	0.2851
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	FISH	19.45	1501	327	1.925	1.292	26	45.18	0.1097

location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	SANITET.MEDICINSKT	11.48	578.2	169.5	1.579	1.19	26	2.602	0.3957
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	GUMMI	3.212	124.4	40	1.645	0.9822	26	1.217	0.3788
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	TRA	1.009	43.08	15.5	2.172	1.387	26	3.461	0.0446
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	PAPPER.KARTONG	0.6358	20.23	5	2.032	0.8896	26	-0.3357	0.1227
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	METALL	0.3655	9.385	5.5	1.077	1.213	26	0.2106	0.2900
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	GLAS.KERAMIK	0.1933	7.923	2.5	2.153	1.483	26	0.4392	0.0150
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	TYG	0.1418	3.115	1.5	1.178	1.483	26	0	0.7279
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	OLIKA.MATERIAL	0	0	0	NA	NA	26	0	NA
Angklavebukten - Salto - SE6	2013-04-18	2021-09-30	ORGANISKT	0	0	0	NA	NA	26	0	NA
Barrevik SE8	2013-04-22	2021-10-14	TC	100	545	220	1.88	1.334	27	60.4	0.0007
Barrevik SE8	2013-04-22	2021-10-14	PLAST	96.37	531.9	207	1.908	1.311	27	56.42	0.0006
Barrevik SE8	2013-04-22	2021-10-14	FISH	37.64	339.9	49	2.49	1.331	27	27.49	0.0001
Barrevik SE8	2013-04-22	2021-10-14	SUP	15.91	36.48	25	1.185	1.127	27	4.246	0.0108

location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Barrevik SE8	2013-04-22	2021-10-14	PAPPER.KARTONG	0.8867	1.296	0	2.352	NA	27	0	0.7518
Barrevik SE8	2013-04-22	2021-10-14	GUMMI	0.7794	2	0	1.754	NA	27	0	0.9859
Barrevik SE8	2013-04-22	2021-10-14	METALL	0.7623	2.815	0	2.454	NA	27	0.1215	0.0040
Barrevik SE8	2013-04-22	2021-10-14	GLAS.KERAMIK	0.4738	2.556	0	2.356	NA	27	0	0.9759
Barrevik SE8	2013-04-22	2021-10-14	TRA	0.4556	2.556	0	1.679	NA	27	0	0.9976
Barrevik SE8	2013-04-22	2021-10-14	TYG	0.146	0.5185	0	2.354	NA	27	0	0.8701
Barrevik SE8	2013-04-22	2021-10-14	SANITET.MEDICINSKT	0.1263	1.333	0	1.918	NA	27	0	0.9903
Barrevik SE8	2013-04-22	2021-10-14	OLIKA.MATERIAL	0	0	0	NA	NA	27	0	NA
Barrevik SE8	2013-04-22	2021-10-14	ORGANISKT	0	0	0	NA	NA	27	0	NA
Edsvik SE5	2013-04-15	2021-09-29	TC	100	31445	2896	1.714	1.377	26	818.5	0.0149
Edsvik SE5	2013-04-15	2021-09-29	PLAST	90.83	30698	2800	1.727	1.408	26	820.8	0.0167
Edsvik SE5	2013-04-15	2021-09-29	FISH	48.3	23954	1410	1.877	1.476	26	668.8	0.0053
Edsvik SE5	2013-04-15	2021-09-29	SUP	17.89	1741	344	1.513	1.138	26	15.47	0.4128

location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Edsvik SE5	2013-04-15	2021-09-29	SANITET.MEDICINSKT	5.69	393.7	75.5	1.769	1.051	26	-6.882	0.1082
Edsvik SE5	2013-04-15	2021-09-29	GUMMI	1.878	280.2	54.5	1.992	1.279	26	4.058	0.2402
Edsvik SE5	2013-04-15	2021-09-29	PAPPER.KARTONG	0.704	14.23	3	2.226	0.9884	26	-0.4504	0.0449
Edsvik SE5	2013-04-15	2021-09-29	TRA	0.421	33.54	7	1.841	1.377	26	0.1425	0.3130
Edsvik SE5	2013-04-15	2021-09-29	METALL	0.2638	11.73	2	1.911	1.483	26	-0.2769	0.1411
Edsvik SE5	2013-04-15	2021-09-29	GLAS.KERAMIK	0.162	11.15	2	1.676	1.483	26	0.6665	0.0403
Edsvik SE5	2013-04-15	2021-09-29	TYG	0.05223	2.923	1	2.294	1.483	26	0	0.2963
Edsvik SE5	2013-04-15	2021-09-29	OLIKA.MATERIAL	0	0	0	NA	NA	26	0	NA
Edsvik SE5	2013-04-15	2021-09-29	ORGANISKT	0	0	0	NA	NA	26	0	NA
Groderhamnsvik SE9	2013-04-27	2021-09-21	TC	100	1248	992	0.7021	0.5709	27	-98.59	0.0026
Groderhamnsvik SE9	2013-04-27	2021-09-21	PLAST	92.78	1165	929	0.7128	0.5793	27	-93.16	0.0050
Groderhamnsvik SE9	2013-04-27	2021-09-21	FISH	35.53	481.2	310	0.9696	0.7604	27	-46.48	0.0135
Groderhamnsvik SE9	2013-04-27	2021-09-21	SUP	15.58	180.4	150	0.6244	0.5733	27	-20.73	0.0007

location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Groderhamnsvik SE9	2013-04-27	2021-09-21	GUMMI	2.052	25.56	19	0.9974	0.9364	27	-2.959	0.0082
Groderhamnsvik SE9	2013-04-27	2021-09-21	TRA	1.82	22.04	18	0.7938	0.7413	27	-2.245	0.0035
Groderhamnsvik SE9	2013-04-27	2021-09-21	GLAS.KERAMIK	1.436	14.37	5	1.13	1.483	27	-0.3649	0.2320
Groderhamnsvik SE9	2013-04-27	2021-09-21	SANITET.MEDICINSKT	1.366	14.85	13	0.8212	0.4562	27	-1.547	0.0020
Groderhamnsvik SE9	2013-04-27	2021-09-21	METALL	0.2331	2.148	2	1.07	0.7413	27	0	0.4405
Groderhamnsvik SE9	2013-04-27	2021-09-21	TYG	0.176	2.444	2	1.203	1.483	27	-0.2267	0.0215
Groderhamnsvik SE9	2013-04-27	2021-09-21	PAPPER.KARTONG	0.1407	1.926	1	1.23	1.483	27	-0.2381	0.0106
Groderhamnsvik SE9	2013-04-27	2021-09-21	OLIKA.MATERIAL	0	0	0	NA	NA	27	0	NA
Groderhamnsvik SE9	2013-04-27	2021-09-21	ORGANISKT	0	0	0	NA	NA	27	0	NA
Gronevik Overon SE7	2013-04-15	2021-10-01	TC	100	136	118.5	0.5981	0.5317	26	-7.005	0.0929
Gronevik Overon SE7	2013-04-15	2021-10-01	PLAST	86.59	117.5	102.5	0.5926	0.5713	26	-6.113	0.1168
Gronevik Overon SE7	2013-04-15	2021-10-01	SUP	48.54	66.08	55.5	0.6706	0.6946	26	-1.656	0.2906
Gronevik Overon SE7	2013-04-15	2021-10-01	FISH	12.1	16.88	16.5	0.651	0.8087	26	-1.328	0.0510

location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Gronevik Overon SE7	2013-04-15	2021-10-01	TRA	5.34	7.462	5	1.125	1.483	26	-0.7269	0.0461
Gronevik Overon SE7	2013-04-15	2021-10-01	GUMMI	1.948	3.038	1	1.264	1.483	26	0	0.8561
Gronevik Overon SE7	2013-04-15	2021-10-01	SANITET.MEDICINSKT	1.678	2.731	2	1.47	1.483	26	0	0.6852
Gronevik Overon SE7	2013-04-15	2021-10-01	PAPPER.KARTONG	1.458	1.462	1	0.9912	1.483	26	0	0.2464
Gronevik Overon SE7	2013-04-15	2021-10-01	METALL	1.138	1.231	1	1.061	1.483	26	0	0.5000
Gronevik Overon SE7	2013-04-15	2021-10-01	TYG	0.9988	1.308	1	0.9857	1.483	26	0	0.1666
Gronevik Overon SE7	2013-04-15	2021-10-01	GLAS.KERAMIK	0.8456	1.346	1	1.242	1.483	26	0	0.1459
Gronevik Overon SE7	2013-04-15	2021-10-01	OLIKA.MATERIAL	0	0	0	NA	NA	26	0	NA
Gronevik Overon SE7	2013-04-15	2021-10-01	ORGANISKT	0	0	0	NA	NA	26	0	NA
Haby SE4	2013-04-16	2021-09-20	TC	100	337.3	188	0.9336	0.899	27	19.77	0.1145
Haby SE4	2013-04-16	2021-09-20	PLAST	91.99	309.9	173	0.9448	0.9256	27	20.58	0.1055
Haby SE4	2013-04-16	2021-09-20	FISH	39.3	141.9	81	1.387	0.7871	27	14.17	0.0247
Haby SE4	2013-04-16	2021-09-20	SUP	17.07	49.41	30	1.001	0.6919	27	1.797	0.1903

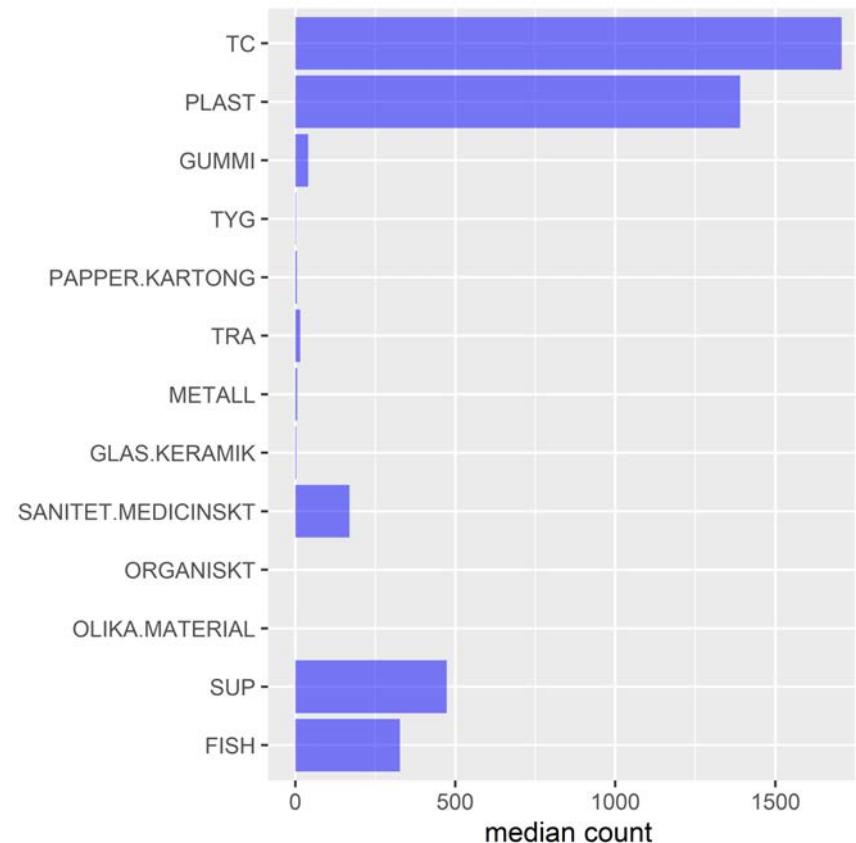
location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Haby SE4	2013-04-16	2021-09-20	GUMMI	3.454	11.15	6	1.26	0.9884	27	0.5528	0.2196
Haby SE4	2013-04-16	2021-09-20	TRA	1.622	4.815	4	1.208	1.112	27	0.4001	0.0425
Haby SE4	2013-04-16	2021-09-20	SANITET.MEDICINSKT	1.333	4.556	3	1.095	1.483	27	0.4976	0.0758
Haby SE4	2013-04-16	2021-09-20	GLAS.KERAMIK	0.7843	4.704	1	2.942	1.483	27	0.2343	0.0145
Haby SE4	2013-04-16	2021-09-20	TYG	0.3225	0.8889	0	1.441	NA	27	0	0.4452
Haby SE4	2013-04-16	2021-09-20	METALL	0.2615	0.7407	0	1.43	NA	27	0	0.4529
Haby SE4	2013-04-16	2021-09-20	PAPPER.KARTONG	0.2311	0.5556	0	2.018	NA	27	0	0.3099
Haby SE4	2013-04-16	2021-09-20	OLIKA.MATERIAL	0	0	0	NA	NA	27	0	NA
Haby SE4	2013-04-16	2021-09-20	ORGANISKT	0	0	0	NA	NA	27	0	NA
Jaravallen	2015-07-25	2021-11-12	TC	100	354.3	301.5	0.7299	0.6073	20	59.91	0.0168
Jaravallen	2015-07-25	2021-11-12	PLAST	81.29	301.7	239	0.7977	0.8188	20	52.04	0.0119
Jaravallen	2015-07-25	2021-11-12	SUP	21.34	51.8	50	0.6721	0.5634	20	6.015	0.0427
Jaravallen	2015-07-25	2021-11-12	FISH	7.101	24.3	19.5	0.8522	0.5702	20	3.68	0.0343

location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Jaravallen	2015-07-25	2021-11-12	PAPPER.KARTONG	4.669	11.75	0.5	1.71	1.483	20	0	0.3254
Jaravallen	2015-07-25	2021-11-12	TYG	3.722	9.85	6	1.195	1.359	20	1.358	0.0445
Jaravallen	2015-07-25	2021-11-12	TRA	3.141	8.05	3	1.773	1.483	20	0	0.5398
Jaravallen	2015-07-25	2021-11-12	GLAS.KERAMIK	2.837	8.2	6.5	0.7555	1.14	20	0.8069	0.0954
Jaravallen	2015-07-25	2021-11-12	METALL	2.567	9.95	6.5	1.331	0.9124	20	1.146	0.0183
Jaravallen	2015-07-25	2021-11-12	GUMMI	1.645	4.2	4	0.9698	0.9266	20	1.035	0.0110
Jaravallen	2015-07-25	2021-11-12	SANITET.MEDICINSKT	0.237	0.95	0	1.885	NA	20	0	0.9015
Jaravallen	2015-07-25	2021-11-12	ORGANISKT	0.07447	0.25	0	3.146	NA	20	0	0.8272
Jaravallen	2015-07-25	2021-11-12	OLIKA.MATERIAL	0.05797	0.35	0	3.853	NA	20	0	0.6701
Sudde strand	2014-08-03	2021-11-06	TC	100	25.04	8	1.731	0.9266	23	2.731	0.0592
Sudde strand	2014-08-03	2021-11-06	PLAST	68.9	20.78	5	1.934	1.186	23	2.048	0.0207
Sudde strand	2014-08-03	2021-11-06	SUP	35.44	7.826	4	1.429	1.112	23	0.5021	0.1682
Sudde strand	2014-08-03	2021-11-06	FISH	9.783	3.13	1	1.97	1.483	23	0.291	0.0016

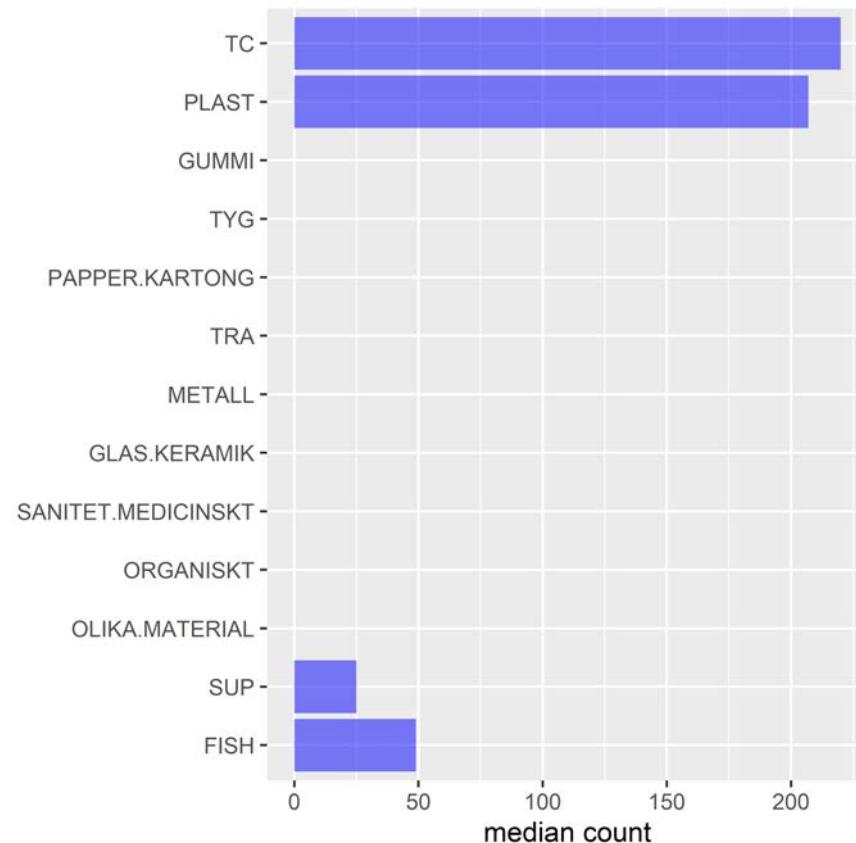
location_code	from	to	group_code	%TC	mean	median	cv	rmad	n	slope	p-value
Sudde strand	2014-08-03	2021-11-06	PAPPER.KARTONG	8.896	0.6087	0	1.623	NA	23	0	0.9256
Sudde strand	2014-08-03	2021-11-06	METALL	7.043	0.6957	0	1.528	NA	23	0	0.7633
Sudde strand	2014-08-03	2021-11-06	TYG	5.038	0.5652	0	2.122	NA	23	0	0.3344
Sudde strand	2014-08-03	2021-11-06	TRA	4.445	0.8696	0	1.909	NA	23	0	0.8520
Sudde strand	2014-08-03	2021-11-06	GUMMI	2.602	0.6522	0	2.099	NA	23	0	0.7935
Sudde strand	2014-08-03	2021-11-06	GLAS.KERAMIK	1.295	0.3478	0	2.687	NA	23	0	0.7534
Sudde strand	2014-08-03	2021-11-06	OLIKA.MATERIAL	1.053	0.4783	0	1.769	NA	23	0	0.9909
Sudde strand	2014-08-03	2021-11-06	ORGANISKT	0.7246	0.04348	0	4.796	NA	23	0	0.5599
Sudde strand	2014-08-03	2021-11-06	SANITET.MEDICINSKT	0.2479	0.2609	0	4.04	NA	23	0	0.9639

The figures below show for each location code the median count for each group.

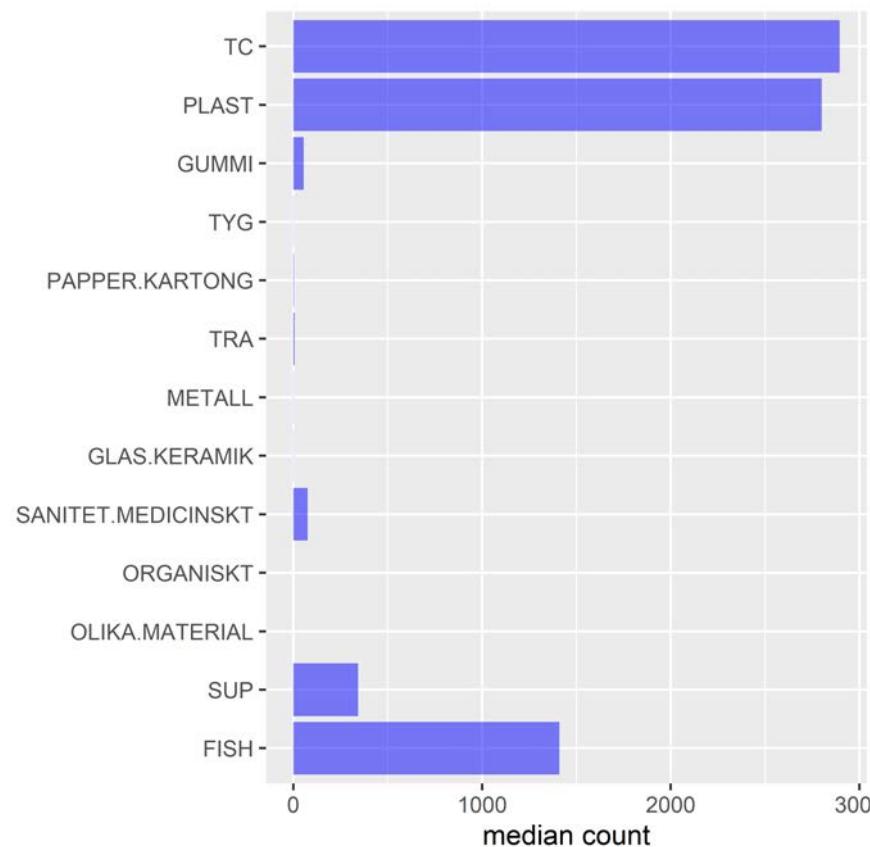
Angklavebukten - Salto - SE6



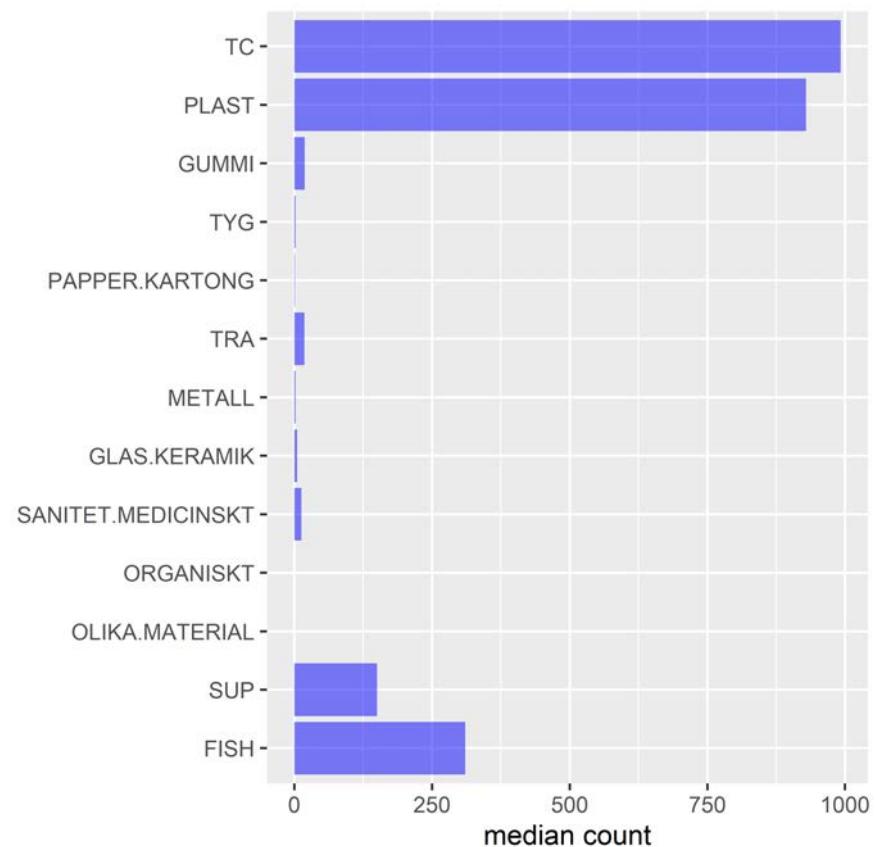
Barrevik SE8

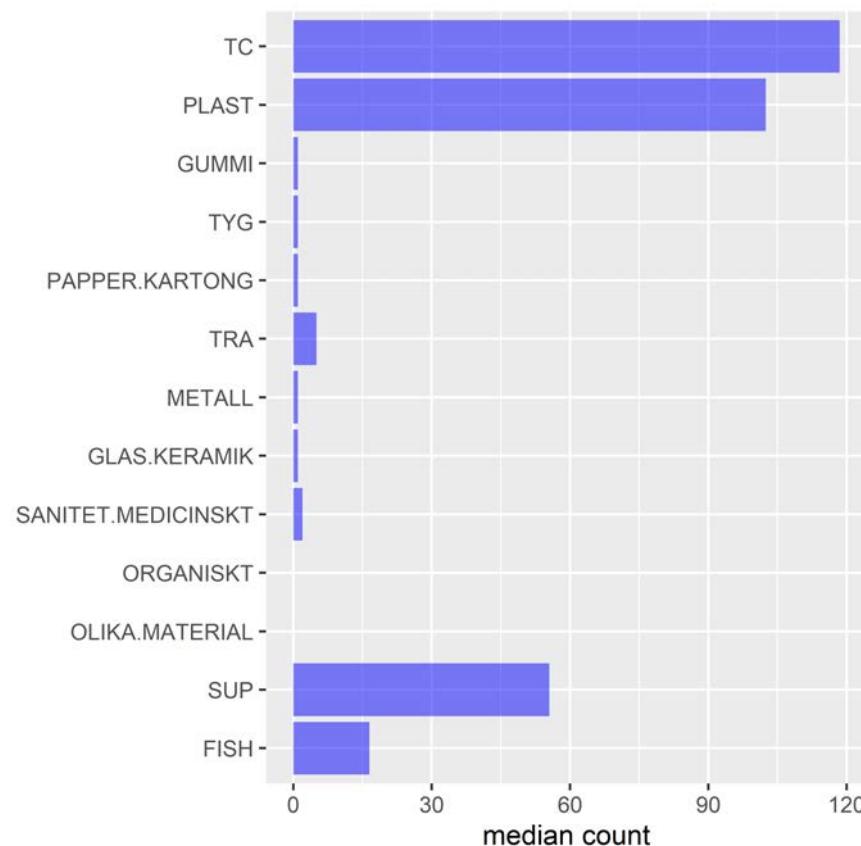
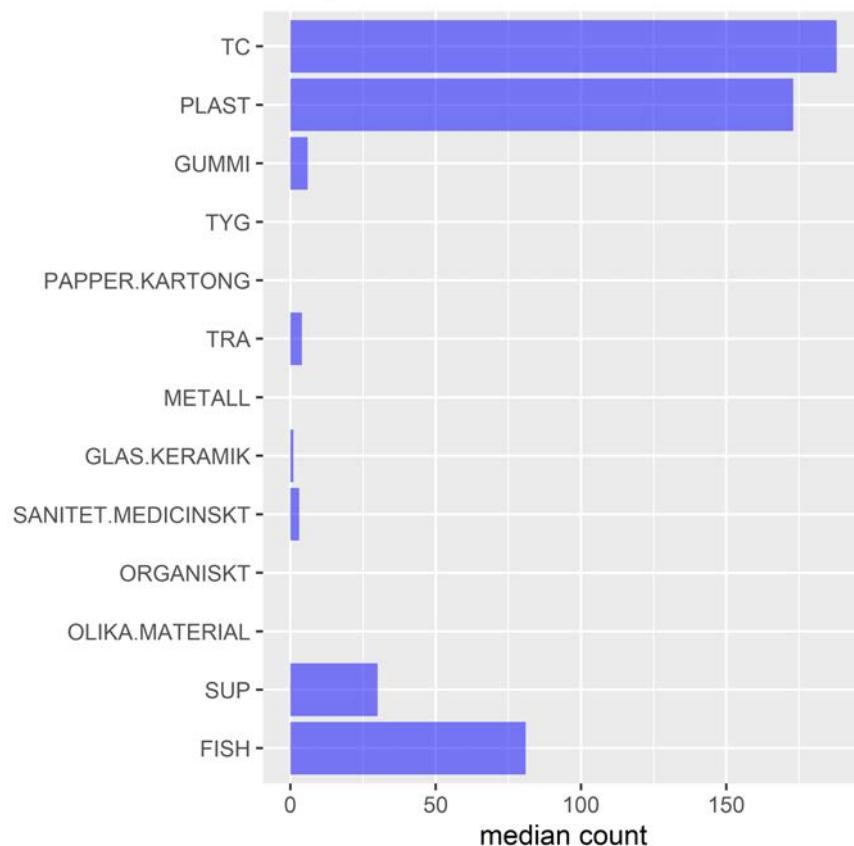


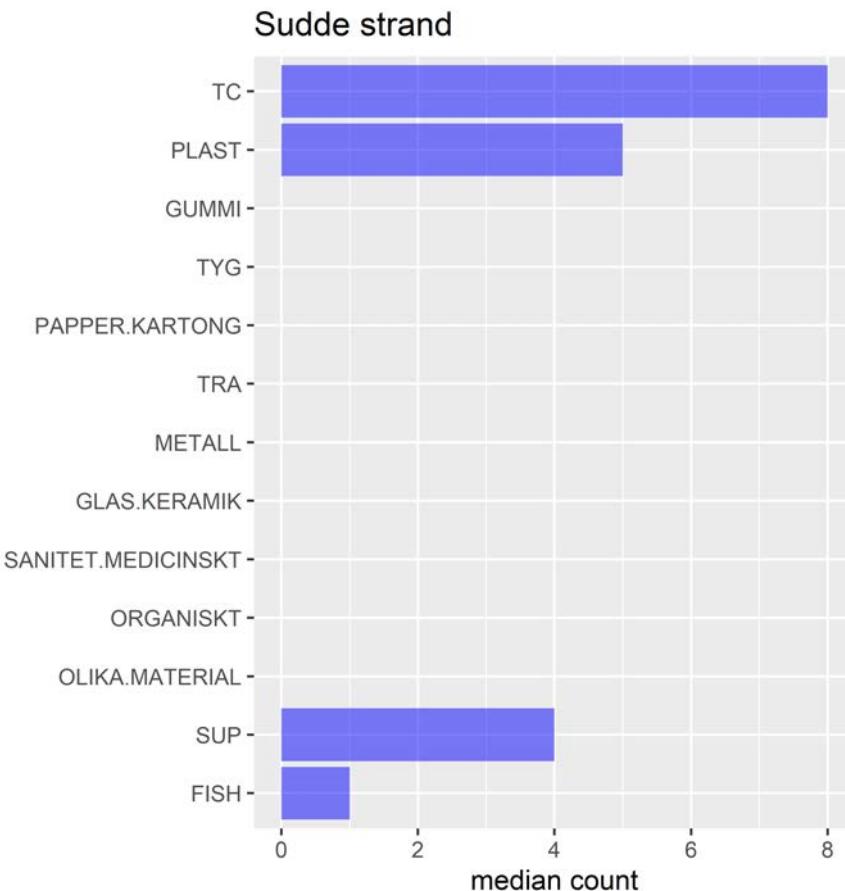
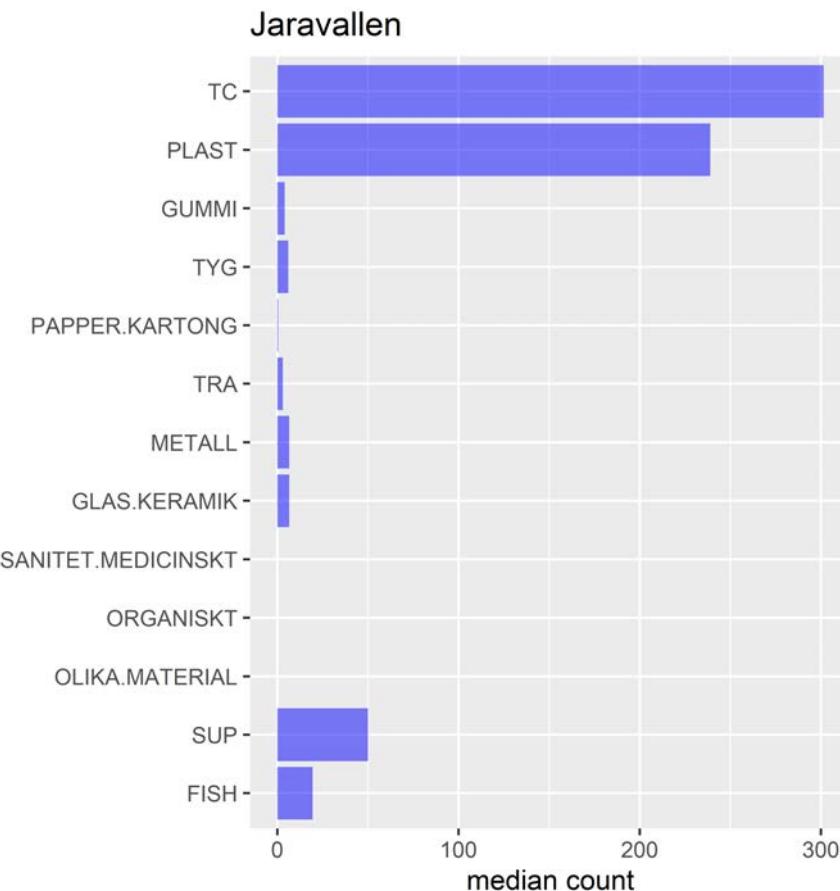
Edsvik SE5



Groderhamnsvik SE9



Gronevik Overon SE7**Haby SE4**



Top 10

The table below gives for each location the top 10 of litter types, i.e., the 10 litter types with the highest median litter counts.

location_code	rank	type_name	median count
Angklavebukten - Salto - SE6	1	kat_46	380.0
Angklavebukten - Salto - SE6	2	kat_32	275.5
Angklavebukten - Salto - SE6	3	kat_15	250.0

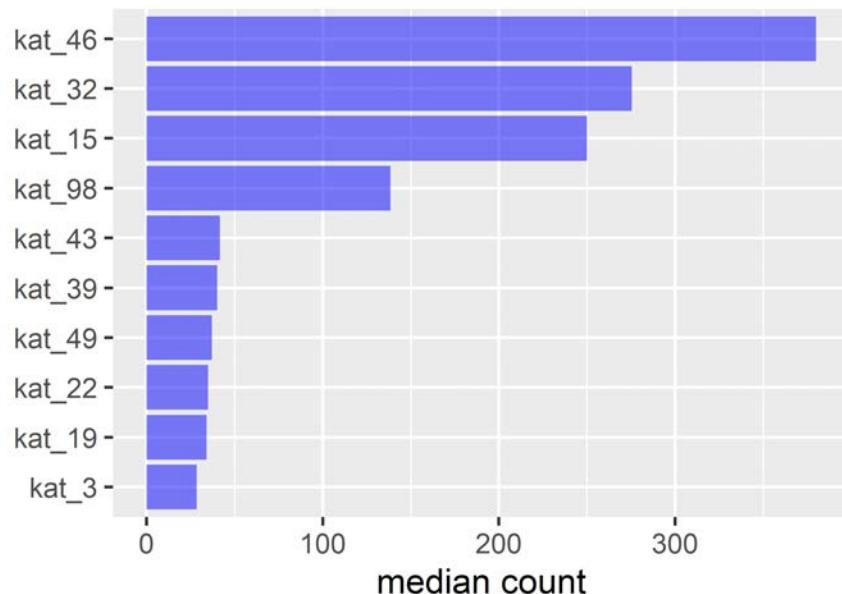
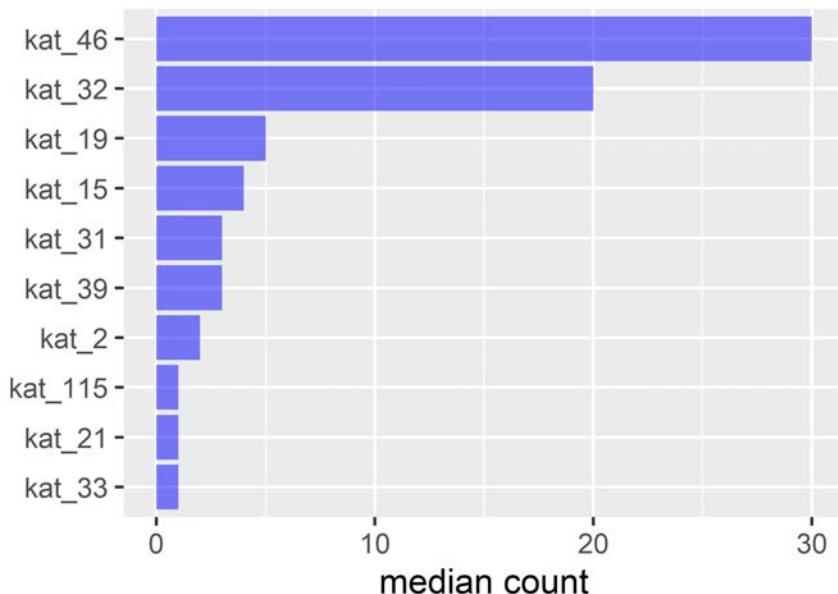
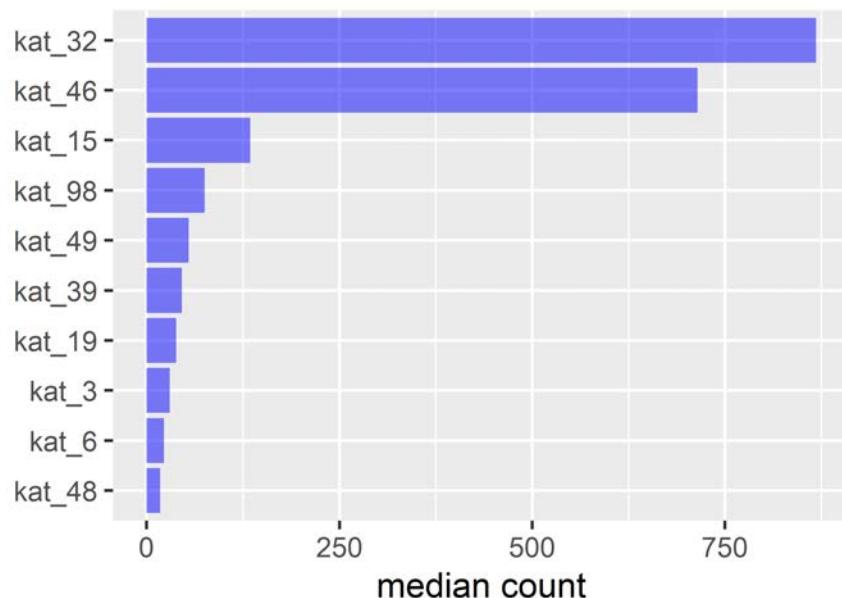
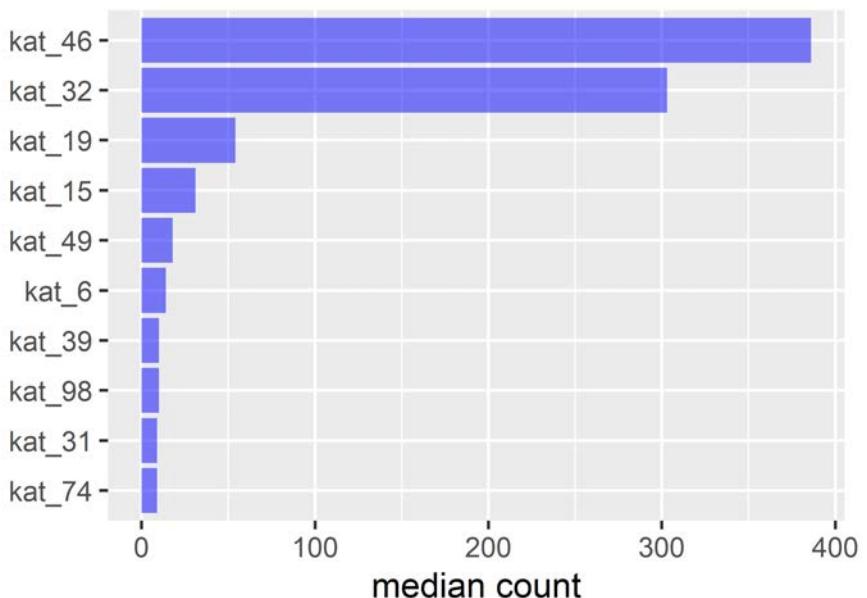
location_code	rank	type_name	median count
Angklavebukten - Salto - SE6	4	kat_98	138.5
Angklavebukten - Salto - SE6	5	kat_43	41.5
Angklavebukten - Salto - SE6	6	kat_39	40.0
Angklavebukten - Salto - SE6	7	kat_49	37.0
Angklavebukten - Salto - SE6	8	kat_22	35.0
Angklavebukten - Salto - SE6	9	kat_19	34.0
Angklavebukten - Salto - SE6	10	kat_3	28.5
Barrevik SE8	1	kat_46	30.0
Barrevik SE8	2	kat_32	20.0
Barrevik SE8	3	kat_19	5.0
Barrevik SE8	4	kat_15	4.0
Barrevik SE8	5	kat_31	3.0
Barrevik SE8	6	kat_39	3.0
Barrevik SE8	7	kat_2	2.0
Barrevik SE8	8	kat_115	1.0
Barrevik SE8	9	kat_21	1.0
Barrevik SE8	10	kat_33	1.0
Edsvik SE5	1	kat_32	868.0
Edsvik SE5	2	kat_46	714.5
Edsvik SE5	3	kat_15	134.5
Edsvik SE5	4	kat_98	75.5
Edsvik SE5	5	kat_49	54.5

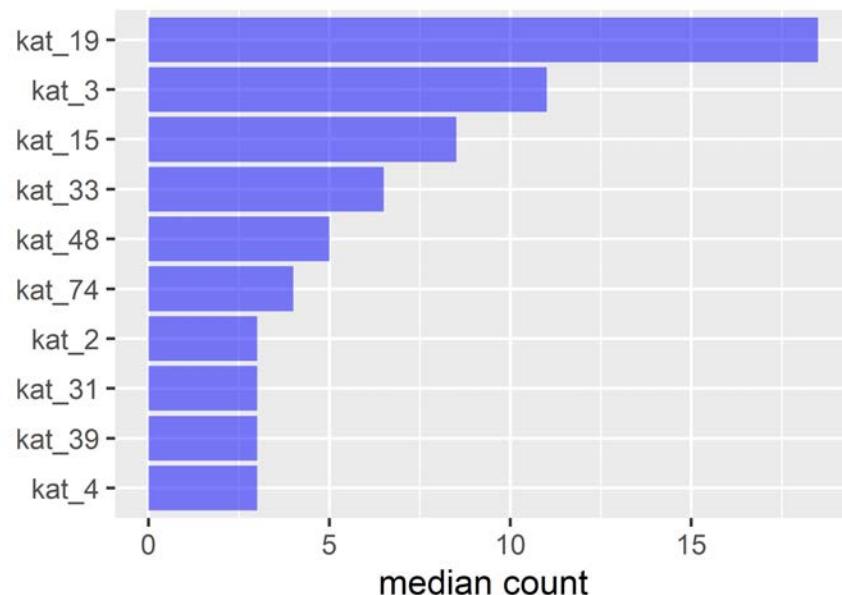
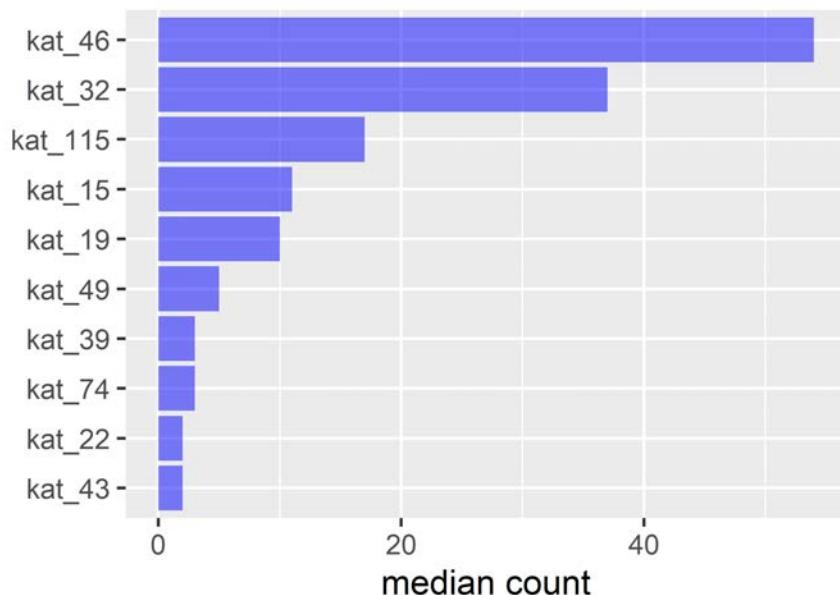
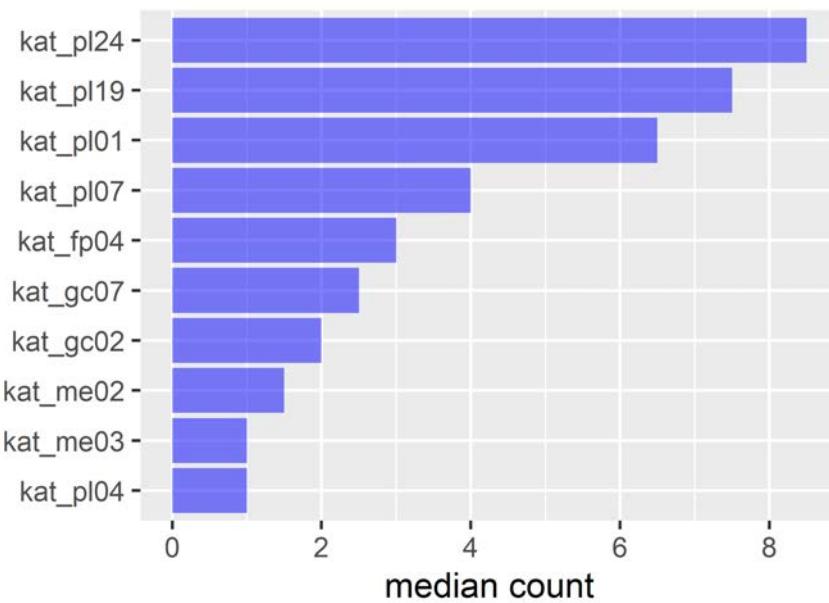
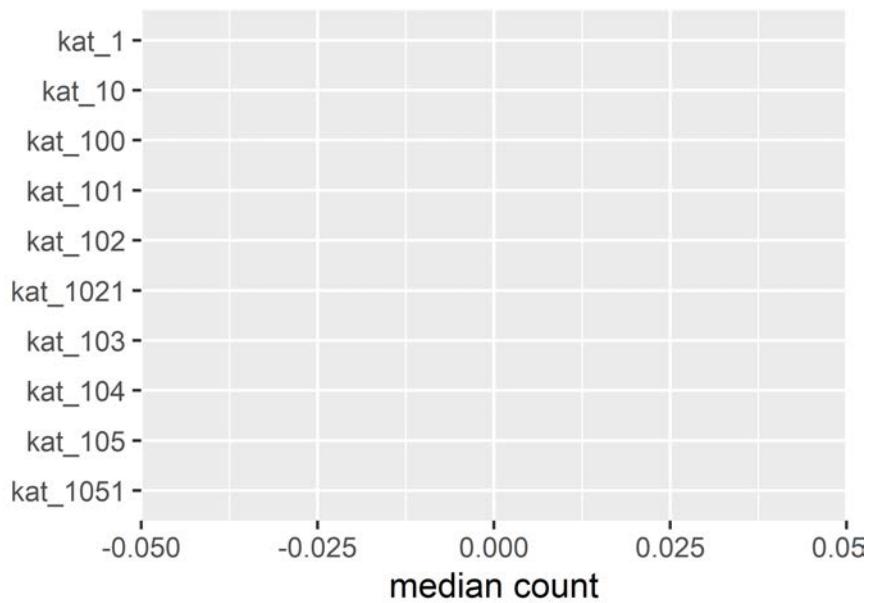
location_code	rank	type_name	median count
Edsvik SE5	6	kat_39	45.5
Edsvik SE5	7	kat_19	38.5
Edsvik SE5	8	kat_3	30.0
Edsvik SE5	9	kat_6	22.5
Edsvik SE5	10	kat_48	17.5
Groderhamnsvik SE9	1	kat_46	386.0
Groderhamnsvik SE9	2	kat_32	303.0
Groderhamnsvik SE9	3	kat_19	54.0
Groderhamnsvik SE9	4	kat_15	31.0
Groderhamnsvik SE9	5	kat_49	18.0
Groderhamnsvik SE9	6	kat_6	14.0
Groderhamnsvik SE9	7	kat_39	10.0
Groderhamnsvik SE9	8	kat_98	10.0
Groderhamnsvik SE9	9	kat_31	9.0
Groderhamnsvik SE9	10	kat_74	9.0
Gronevik Overon SE7	1	kat_19	18.5
Gronevik Overon SE7	2	kat_3	11.0
Gronevik Overon SE7	3	kat_15	8.5
Gronevik Overon SE7	4	kat_33	6.5
Gronevik Overon SE7	5	kat_48	5.0
Gronevik Overon SE7	6	kat_74	4.0
Gronevik Overon SE7	7	kat_2	3.0

location_code	rank	type_name	median count
Gronevik Overon SE7	8	kat_31	3.0
Gronevik Overon SE7	9	kat_39	3.0
Gronevik Overon SE7	10	kat_4	3.0
Haby SE4	1	kat_46	54.0
Haby SE4	2	kat_32	37.0
Haby SE4	3	kat_115	17.0
Haby SE4	4	kat_15	11.0
Haby SE4	5	kat_19	10.0
Haby SE4	6	kat_49	5.0
Haby SE4	7	kat_39	3.0
Haby SE4	8	kat_74	3.0
Haby SE4	9	kat_22	2.0
Haby SE4	10	kat_43	2.0
Jaravallen	1	kat_pl24	8.5
Jaravallen	2	kat_pl19	7.5
Jaravallen	3	kat_pl01	6.5
Jaravallen	4	kat_pl07	4.0
Jaravallen	5	kat_fp04	3.0
Jaravallen	6	kat_gc07	2.5
Jaravallen	7	kat_gc02	2.0
Jaravallen	8	kat_me02	1.5
Jaravallen	9	kat_me03	1.0

location_code	rank	type_name	median count
Jaravallen	10	kat_pl04	1.0
Sudde strand	1	kat_1	0.0
Sudde strand	2	kat_10	0.0
Sudde strand	3	kat_100	0.0
Sudde strand	4	kat_101	0.0
Sudde strand	5	kat_102	0.0
Sudde strand	6	kat_1021	0.0
Sudde strand	7	kat_103	0.0
Sudde strand	8	kat_104	0.0
Sudde strand	9	kat_105	0.0
Sudde strand	10	kat_1051	0.0

The figure(s) below show(s) for each location the top 10 of litter types.

Angklavebukten - Salto - SE6**Barrevik SE8****Edsvik SE5****Groderhamnsvik SE9**

Gronevik Overon SE7**Haby SE4****Jaravallen****Sudde strand**

Regional descriptive statistics

Basic statistics

The regional statistics for the litter groups are given in the table below. They all (except for the p-value) have been estimated in a stepwise fashion:

1. compute the statistic for each individual location within a specific region (see also previous section);
2. compute the same statistic for the results in step 1.

Note that these statistics are all so called intra-block statistics, *i.e.*, data from individual beaches are not merged. Instead, first the beach statistics are calculated and these are then aggregated as described below. Also note that these statistics, in fact, only describe the individual beaches within a region and not necessarily describe the region as a whole statistically correctly.

The statistics are:

- `n` : number of surveys;
- `mean` : *i.e.*, the regional mean (https://en.wikipedia.org/wiki/Arithmetic_mean) of the individual mean beach counts within a region for each litter group;
- `median` : *i.e.*, the regional median (<https://en.wikipedia.org/wiki/Median>) of the individual median beach counts within a region for each litter group;
- `slope` : the median of the Theil-Sen slopes of the individual beaches within a region for each litter group. Data from different beaches have not been mixed in the computation of the Theil-Sen slopes. This method is similar to the one in Gilbert (1987) except that in our procedure all beaches within a region contribute equally to the regional trend.
- `p-value` : the p-values for each regional trend (`slope`) are computed by means of the expressions given in Van Belle & Hughes, 1984 (<https://dx.doi.org/10.1029/WR020i001p00127>) (Eqs. 2 and 7) and Gilbert, 1987 (<https://www.osti.gov/biblio/7037501-statistical-methods-environmental-pollution-monitoring>) (Eqs. 17.1 - 17.5).

The trend statistics can only be computed if all `location_code`'s of a `region_code` have at least three records (surveys). If that is not the case, the table below contains `NA`.

region_code	group_code	n	mean	median	slope	p-value
VH	TC	202	4986	260.8	39.84	0.0092
VH	PLAST	202	4769	223	36.31	0.0036
VH	FISH	202	3308	65	8.926	0.0003
VH	SUP	202	443.4	52.75	3.021	0.2080
VH	GUMMI	202	56.4	5	0.2764	0.0441
VH	TRA	202	15.3	4.5	0	0.8622
VH	SANITET.MEDICINSKT	202	124.6	2.5	0	0.6983
VH	GLAS.KERAMIK	202	6.325	1.5	0.1171	0.0020
VH	METALL	202	4.837	1.5	0	0.9224
VH	TYG	202	2.702	1	0	0.3153
VH	PAPPER.KARTONG	202	6.507	0.75	0	0.0261
VH	OLIKA.MATERIAL	202	0.1035	0	0	0.9883
VH	ORGANISKT	202	0.03668	0	0	0.7801

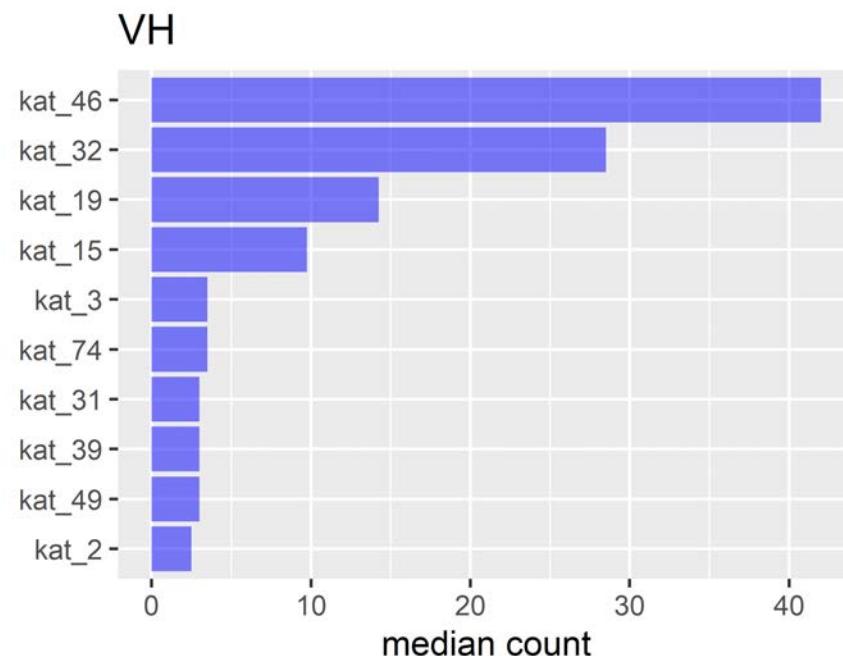
Top 10

The table below gives for each region the top 10 of litter types, *i.e.*, the 10 litter types with the highest median litter counts.

region_code	rank	type_name	median count
VH	1	kat_46	42.0
VH	2	kat_32	28.5
VH	3	kat_19	14.2

region_code	rank	type_name	median count
VH	4	kat_15	9.8
VH	5	kat_3	3.5
VH	6	kat_74	3.5
VH	7	kat_31	3.0
VH	8	kat_39	3.0
VH	9	kat_49	3.0
VH	10	kat_2	2.5

The figure(s) below show(s) for each region the top 10 of litter types.



Trend analysis

For each location code and the type names and group codes specified in the settings file, the following statistics have been estimated for the period 2013-01-01 to 2021-12-31:

- from: the first date of the time-series;
- to: the final date of the time-series;
- Theil-Sen slope (https://en.wikipedia.org/wiki/Theil%E2%80%93Sen_estimator) (slope): a robust non-parametric estimator of slope (counts / year);
- p-value (<https://en.wikipedia.org/wiki/P-value>): the p-value associated with the one-tailed Mann-Kendall test (https://en.wikipedia.org/wiki/Kendall_rank_correlation_coefficient) to test the null hypothesis of
 - no monotonically *increasing* trend in case the Theil-Sen slope is greater than zero;
 - no monotonically *decreasing* trend in case the Theil-Sen slope is smaller than zero;
- the number of surveys (N);

A p-value less than an *a priori* specified significance level (https://en.wikipedia.org/wiki/Statistical_significance) (e.g., often $\alpha = 0.05$), indicates a significant trend. If the p-value is greater than this significance level, we can't say that there is no trend. We can only conclude that our data do not show evidence for a significant trend (due to lack of data, noise, etc.).

The Mann-Kendall test is a non-parametric test and as such does not make distributional assumptions on the data.

Warning: The following specified group code(s) are not found and will be skipped:
 'KEMISKA.FORORENINGAR'

location_code	type name / group code	from	to	N	slope	p-value
Angklavebukten - Salto - SE6	TC	2013-04-18	2021-09-30	26	166.9	0.1273
Angklavebukten - Salto - SE6	PLAST	2013-04-18	2021-09-30	26	158.9	0.1183
Angklavebukten - Salto - SE6	FISH	2013-04-18	2021-09-30	26	45.18	0.1097

location_code	type name / group code	from	to	N	slope	p-value
Angklavebukten - Salto - SE6	SUP	2013-04-18	2021-09-30	26	16	0.2851
Angklavebukten - Salto - SE6	TRA	2013-04-18	2021-09-30	26	3.461	0.0446
Angklavebukten - Salto - SE6	SANITET.MEDICINSKT	2013-04-18	2021-09-30	26	2.602	0.3957
Angklavebukten - Salto - SE6	GUMMI	2013-04-18	2021-09-30	26	1.217	0.3788
Angklavebukten - Salto - SE6	GLAS.KERAMIK	2013-04-18	2021-09-30	26	0.4392	0.0150
Angklavebukten - Salto - SE6	PAPPER.KARTONG	2013-04-18	2021-09-30	26	-0.3357	0.1227
Angklavebukten - Salto - SE6	METALL	2013-04-18	2021-09-30	26	0.2106	0.2900
Angklavebukten - Salto - SE6	OLIKA.MATERIAL	2013-04-18	2021-09-30	26	0	NA
Angklavebukten - Salto - SE6	ORGANISKT	2013-04-18	2021-09-30	26	0	NA
Angklavebukten - Salto - SE6	TYG	2013-04-18	2021-09-30	26	0	0.7279
Barrevik SE8	TC	2013-04-22	2021-10-14	27	60.4	0.0007
Barrevik SE8	PLAST	2013-04-22	2021-10-14	27	56.42	0.0006
Barrevik SE8	FISH	2013-04-22	2021-10-14	27	27.49	0.0001
Barrevik SE8	SUP	2013-04-22	2021-10-14	27	4.246	0.0108
Barrevik SE8	METALL	2013-04-22	2021-10-14	27	0.1215	0.0040
Barrevik SE8	GLAS.KERAMIK	2013-04-22	2021-10-14	27	0	0.9759
Barrevik SE8	GUMMI	2013-04-22	2021-10-14	27	0	0.9859
Barrevik SE8	OLIKA.MATERIAL	2013-04-22	2021-10-14	27	0	NA
Barrevik SE8	ORGANISKT	2013-04-22	2021-10-14	27	0	NA
Barrevik SE8	PAPPER.KARTONG	2013-04-22	2021-10-14	27	0	0.7518
Barrevik SE8	SANITET.MEDICINSKT	2013-04-22	2021-10-14	27	0	0.9903
Barrevik SE8	TRA	2013-04-22	2021-10-14	27	0	0.9976

location_code	type name / group code	from	to	N	slope	p-value
Barrevik SE8	TYG	2013-04-22	2021-10-14	27	0	0.8701
Edsvik SE5	PLAST	2013-04-15	2021-09-29	26	820.8	0.0167
Edsvik SE5	TC	2013-04-15	2021-09-29	26	818.5	0.0149
Edsvik SE5	FISH	2013-04-15	2021-09-29	26	668.8	0.0053
Edsvik SE5	SUP	2013-04-15	2021-09-29	26	15.47	0.4128
Edsvik SE5	SANITET.MEDICINSKT	2013-04-15	2021-09-29	26	-6.882	0.1082
Edsvik SE5	GUMMI	2013-04-15	2021-09-29	26	4.058	0.2402
Edsvik SE5	GLAS.KERAMIK	2013-04-15	2021-09-29	26	0.6665	0.0403
Edsvik SE5	PAPPER.KARTONG	2013-04-15	2021-09-29	26	-0.4504	0.0449
Edsvik SE5	METALL	2013-04-15	2021-09-29	26	-0.2769	0.1411
Edsvik SE5	TRA	2013-04-15	2021-09-29	26	0.1425	0.3130
Edsvik SE5	OLIKA.MATERIAL	2013-04-15	2021-09-29	26	0	NA
Edsvik SE5	ORGANISKT	2013-04-15	2021-09-29	26	0	NA
Edsvik SE5	TYG	2013-04-15	2021-09-29	26	0	0.2963
Groderhamnsvik SE9	TC	2013-04-27	2021-09-21	27	-98.59	0.0026
Groderhamnsvik SE9	PLAST	2013-04-27	2021-09-21	27	-93.16	0.0050
Groderhamnsvik SE9	FISH	2013-04-27	2021-09-21	27	-46.48	0.0135
Groderhamnsvik SE9	SUP	2013-04-27	2021-09-21	27	-20.73	0.0007
Groderhamnsvik SE9	GUMMI	2013-04-27	2021-09-21	27	-2.959	0.0082
Groderhamnsvik SE9	TRA	2013-04-27	2021-09-21	27	-2.245	0.0035
Groderhamnsvik SE9	SANITET.MEDICINSKT	2013-04-27	2021-09-21	27	-1.547	0.0020
Groderhamnsvik SE9	GLAS.KERAMIK	2013-04-27	2021-09-21	27	-0.3649	0.2320

location_code	type name / group code	from	to	N	slope	p-value
Groderhamnsvik SE9	PAPPER.KARTONG	2013-04-27	2021-09-21	27	-0.2381	0.0106
Groderhamnsvik SE9	TYG	2013-04-27	2021-09-21	27	-0.2267	0.0215
Groderhamnsvik SE9	METALL	2013-04-27	2021-09-21	27	0	0.4405
Groderhamnsvik SE9	OLIKA.MATERIAL	2013-04-27	2021-09-21	27	0	NA
Groderhamnsvik SE9	ORGANISKT	2013-04-27	2021-09-21	27	0	NA
Gronevik Overon SE7	TC	2013-04-15	2021-10-01	26	-7.005	0.0929
Gronevik Overon SE7	PLAST	2013-04-15	2021-10-01	26	-6.113	0.1168
Gronevik Overon SE7	SUP	2013-04-15	2021-10-01	26	-1.656	0.2906
Gronevik Overon SE7	FISH	2013-04-15	2021-10-01	26	-1.328	0.0510
Gronevik Overon SE7	TRA	2013-04-15	2021-10-01	26	-0.7269	0.0461
Gronevik Overon SE7	GLAS.KERAMIK	2013-04-15	2021-10-01	26	0	0.1459
Gronevik Overon SE7	GUMMI	2013-04-15	2021-10-01	26	0	0.8561
Gronevik Overon SE7	METALL	2013-04-15	2021-10-01	26	0	0.5000
Gronevik Overon SE7	OLIKA.MATERIAL	2013-04-15	2021-10-01	26	0	NA
Gronevik Overon SE7	ORGANISKT	2013-04-15	2021-10-01	26	0	NA
Gronevik Overon SE7	PAPPER.KARTONG	2013-04-15	2021-10-01	26	0	0.2464
Gronevik Overon SE7	SANITET.MEDICINSKT	2013-04-15	2021-10-01	26	0	0.6852
Gronevik Overon SE7	TYG	2013-04-15	2021-10-01	26	0	0.1666
Haby SE4	PLAST	2013-04-16	2021-09-20	27	20.58	0.1055
Haby SE4	TC	2013-04-16	2021-09-20	27	19.77	0.1145
Haby SE4	FISH	2013-04-16	2021-09-20	27	14.17	0.0247
Haby SE4	SUP	2013-04-16	2021-09-20	27	1.797	0.1903

location_code	type name / group code	from	to	N	slope	p-value
Haby SE4	GUMMI	2013-04-16	2021-09-20	27	0.5528	0.2196
Haby SE4	SANITET.MEDICINSKT	2013-04-16	2021-09-20	27	0.4976	0.0758
Haby SE4	TRA	2013-04-16	2021-09-20	27	0.4001	0.0425
Haby SE4	GLAS.KERAMIK	2013-04-16	2021-09-20	27	0.2343	0.0145
Haby SE4	METALL	2013-04-16	2021-09-20	27	0	0.4529
Haby SE4	OLIKA.MATERIAL	2013-04-16	2021-09-20	27	0	NA
Haby SE4	ORGANISKT	2013-04-16	2021-09-20	27	0	NA
Haby SE4	PAPPER.KARTONG	2013-04-16	2021-09-20	27	0	0.3099
Haby SE4	TYG	2013-04-16	2021-09-20	27	0	0.4452
Jaravallen	TC	2015-07-25	2021-11-12	20	59.91	0.0168
Jaravallen	PLAST	2015-07-25	2021-11-12	20	52.04	0.0119
Jaravallen	SUP	2015-07-25	2021-11-12	20	6.015	0.0427
Jaravallen	FISH	2015-07-25	2021-11-12	20	3.68	0.0343
Jaravallen	TYG	2015-07-25	2021-11-12	20	1.358	0.0445
Jaravallen	METALL	2015-07-25	2021-11-12	20	1.146	0.0183
Jaravallen	GUMMI	2015-07-25	2021-11-12	20	1.035	0.0110
Jaravallen	GLAS.KERAMIK	2015-07-25	2021-11-12	20	0.8069	0.0954
Jaravallen	OLIKA.MATERIAL	2015-07-25	2021-11-12	20	0	0.6701
Jaravallen	ORGANISKT	2015-07-25	2021-11-12	20	0	0.8272
Jaravallen	PAPPER.KARTONG	2015-07-25	2021-11-12	20	0	0.3254
Jaravallen	SANITET.MEDICINSKT	2015-07-25	2021-11-12	20	0	0.9015
Jaravallen	TRA	2015-07-25	2021-11-12	20	0	0.5398

location_code	type name / group code	from	to	N	slope	p-value
Sudde strand	TC	2014-08-03	2021-11-06	23	2.731	0.0592
Sudde strand	PLAST	2014-08-03	2021-11-06	23	2.048	0.0207
Sudde strand	SUP	2014-08-03	2021-11-06	23	0.5021	0.1682
Sudde strand	FISH	2014-08-03	2021-11-06	23	0.291	0.0016
Sudde strand	GLAS.KERAMIK	2014-08-03	2021-11-06	23	0	0.7534
Sudde strand	GUMMI	2014-08-03	2021-11-06	23	0	0.7935
Sudde strand	METALL	2014-08-03	2021-11-06	23	0	0.7633
Sudde strand	OLIKA.MATERIAL	2014-08-03	2021-11-06	23	0	0.9909
Sudde strand	ORGANISKT	2014-08-03	2021-11-06	23	0	0.5599
Sudde strand	PAPPER.KARTONG	2014-08-03	2021-11-06	23	0	0.9256
Sudde strand	SANITET.MEDICINSKT	2014-08-03	2021-11-06	23	0	0.9639
Sudde strand	TRA	2014-08-03	2021-11-06	23	0	0.8520
Sudde strand	TYG	2014-08-03	2021-11-06	23	0	0.3344

Descriptive statistics and trend analysis results have been stored in file 'litteR-results-20230831T155539.csv'.

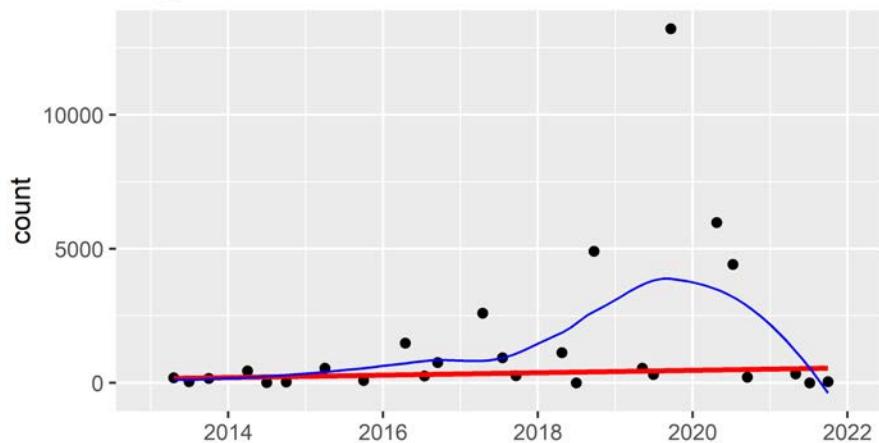
Time-series of the selected type names, group codes and spatial codes are given in the plots below, including trend line and smoother.

The lines and dots have the following meaning:

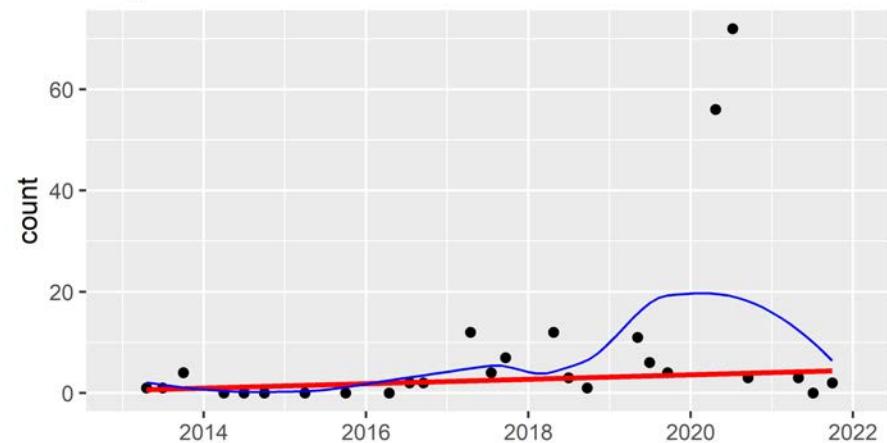
- dots: observations;
- thin gray line segments: auxiliary line segments to guide the eye (only given for 5 to 24 points);

- blue line: loess-smoother (https://en.wikipedia.org/wiki/Local_regression). It is only given for 25 or more points;
- red line: Theil-Sen trend line (its slope is given in the table above). It is only given for 5 or more points. However, it is recommended to use a minimum period of 4 to 5 years to obtain useful trend results.

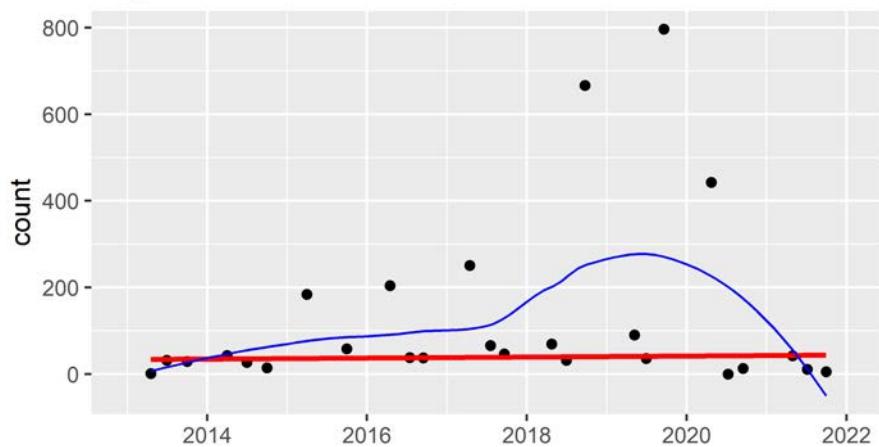
Angklavebukten - Salto - SE6 FISH



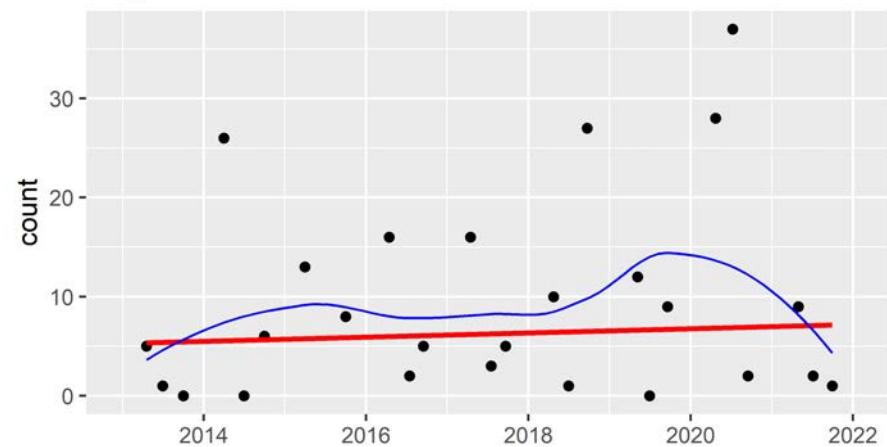
Angklavebukten - Salto - SE6 GLAS.KERAMIK

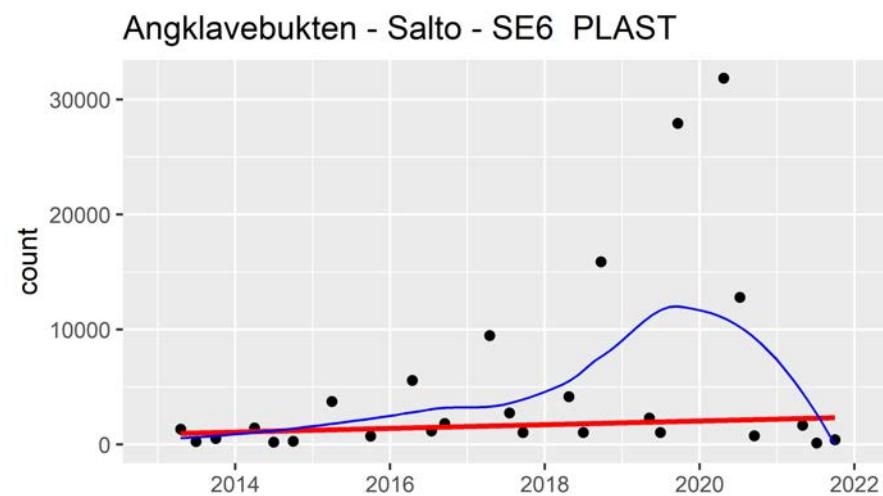
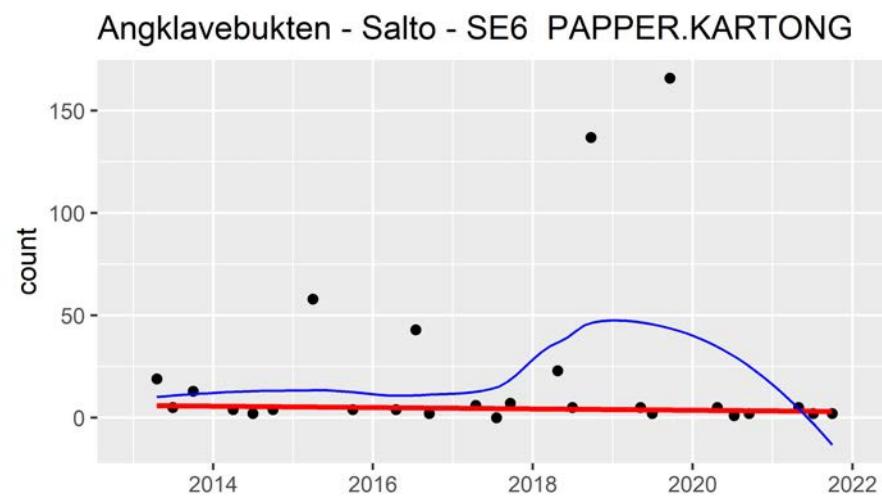
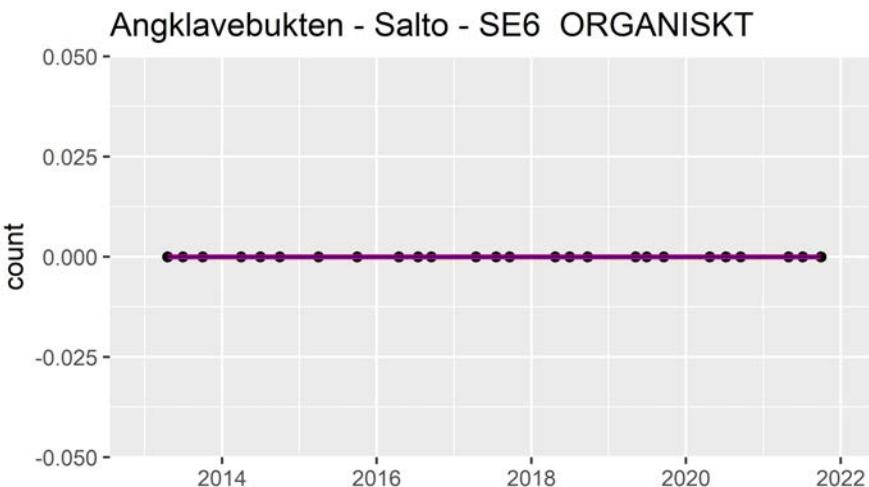
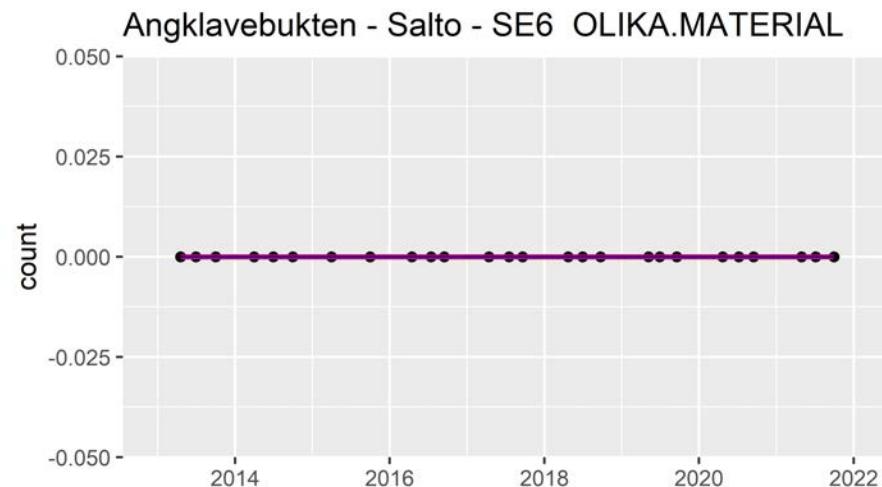


Angklavebukten - Salto - SE6 GUMMI

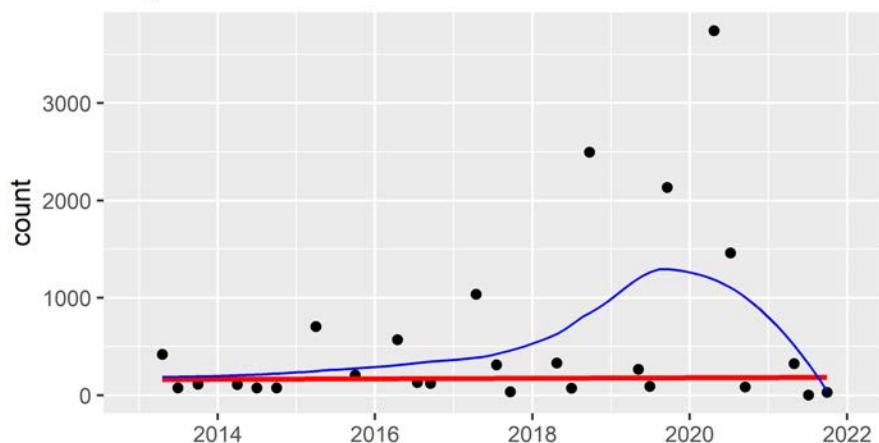


Angklavebukten - Salto - SE6 METALL

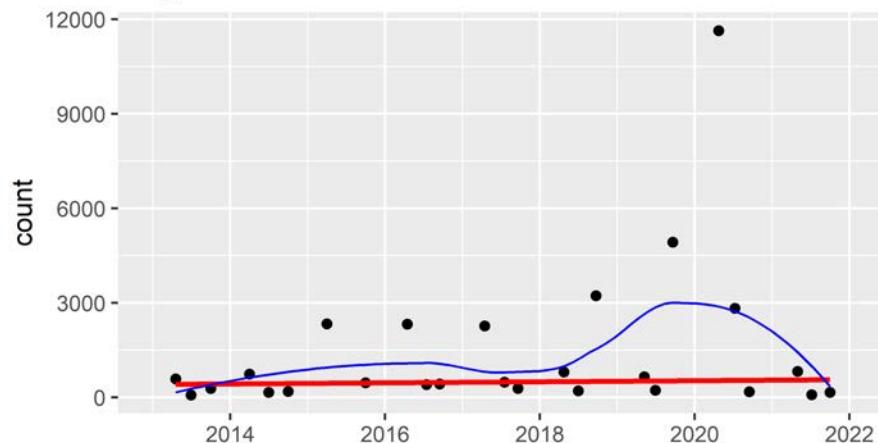




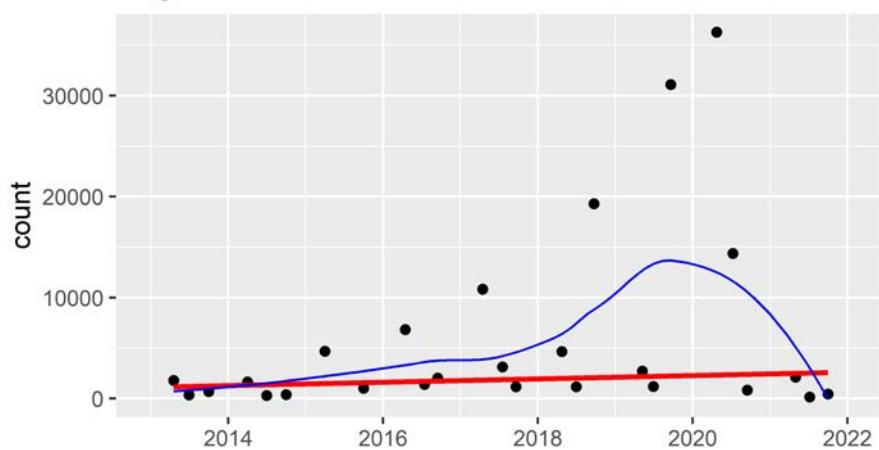
Angklavebukten - Salto - SE6 SANITET.MEDICINSKT



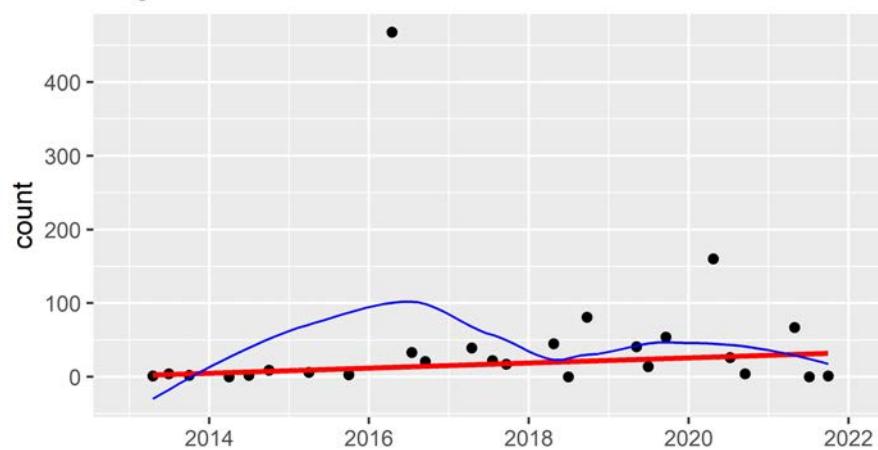
Angklavebukten - Salto - SE6 SUP

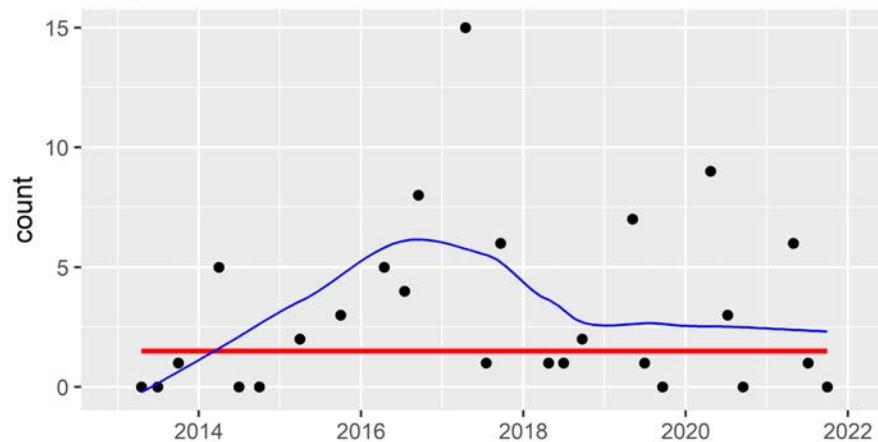
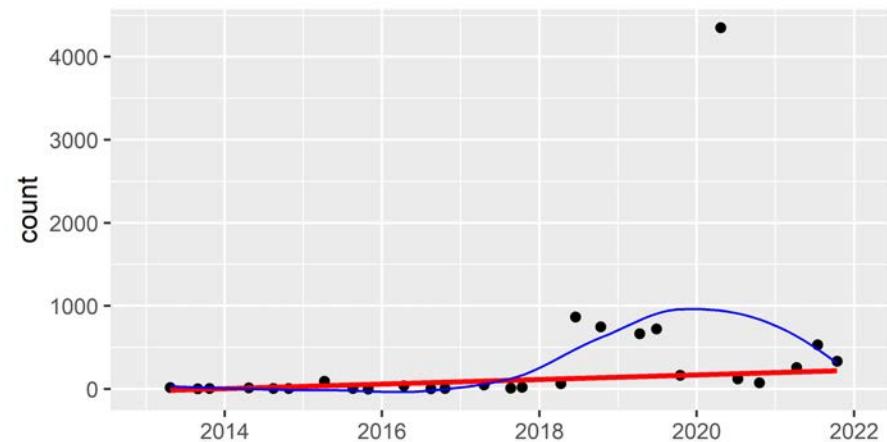
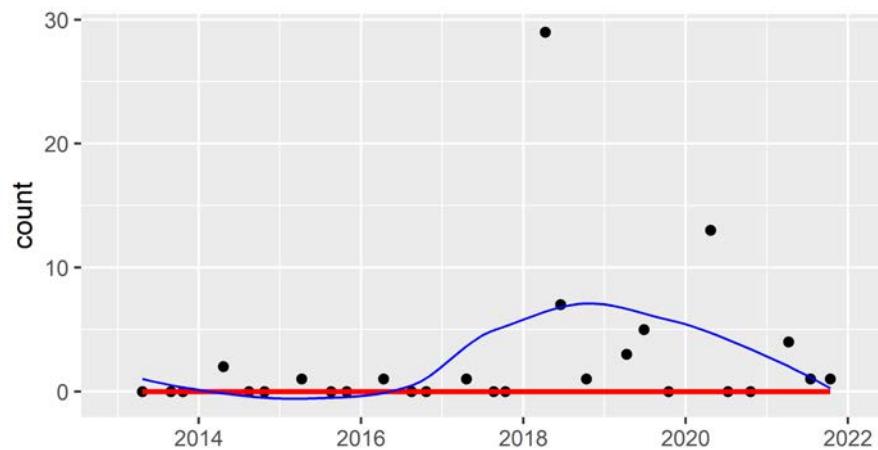
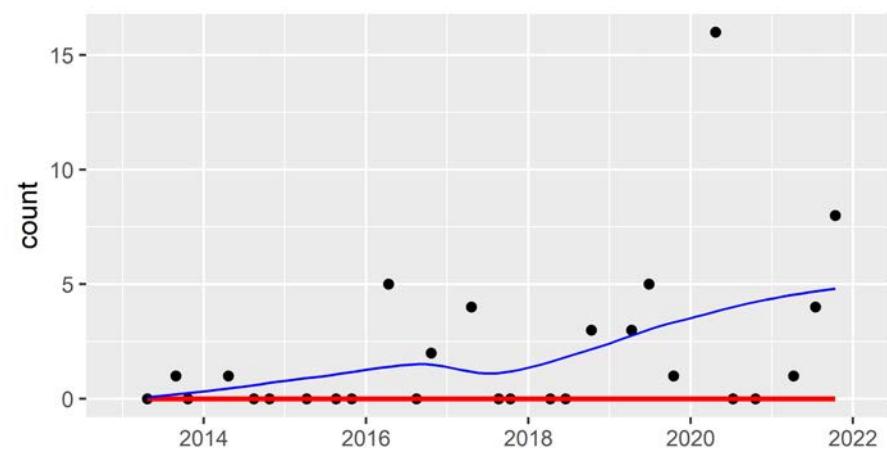


Angklavebukten - Salto - SE6 TC

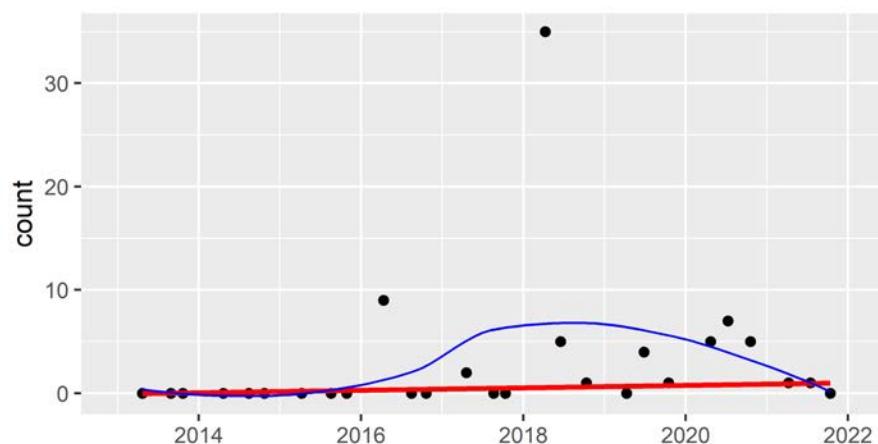


Angklavebukten - Salto - SE6 TRA

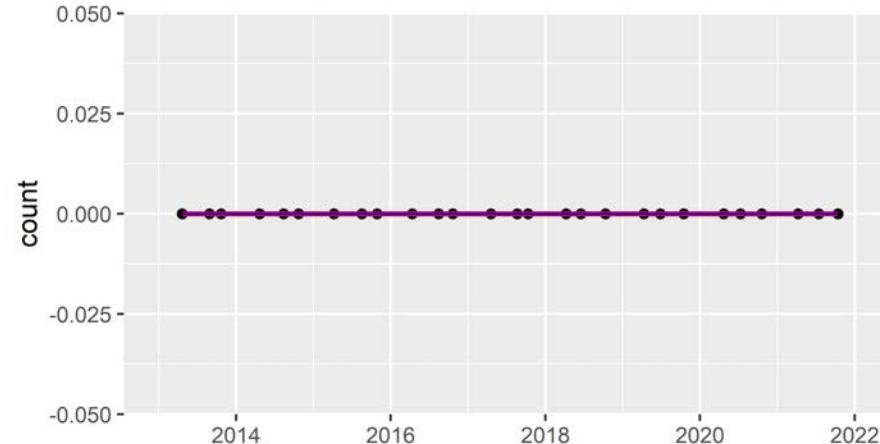


Angklavebukten - Salto - SE6 TYG**Barrevik SE8 FISH****Barrevik SE8 GLAS.KERAMIK****Barrevik SE8 GUMMI**

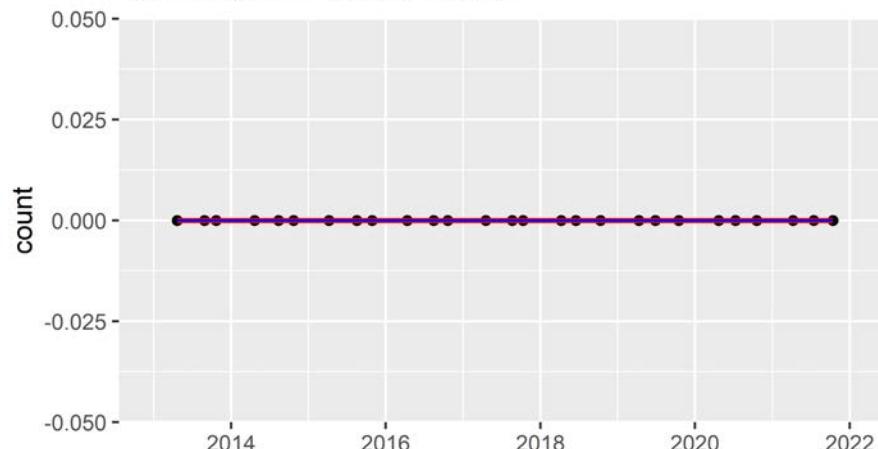
Barrevik SE8 METALL



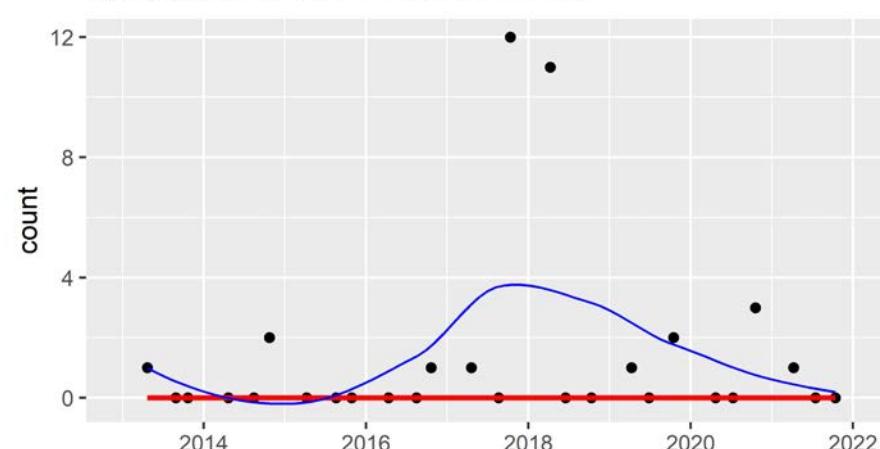
Barrevik SE8 OLIKA.MATERIAL



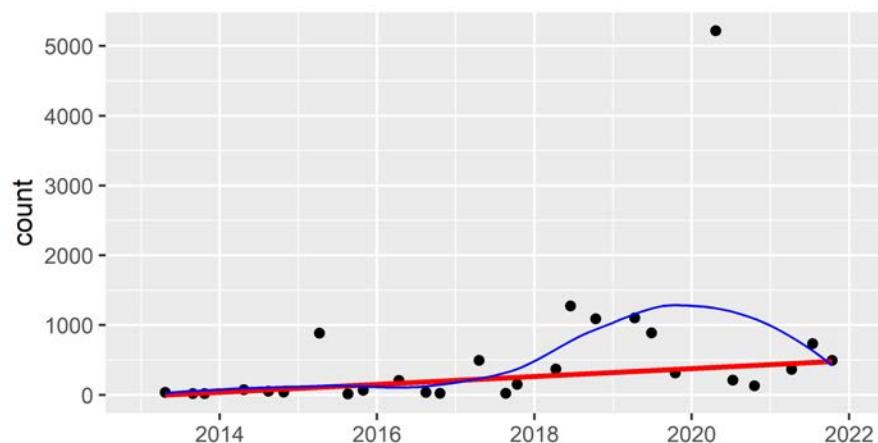
Barrevik SE8 ORGANISKT



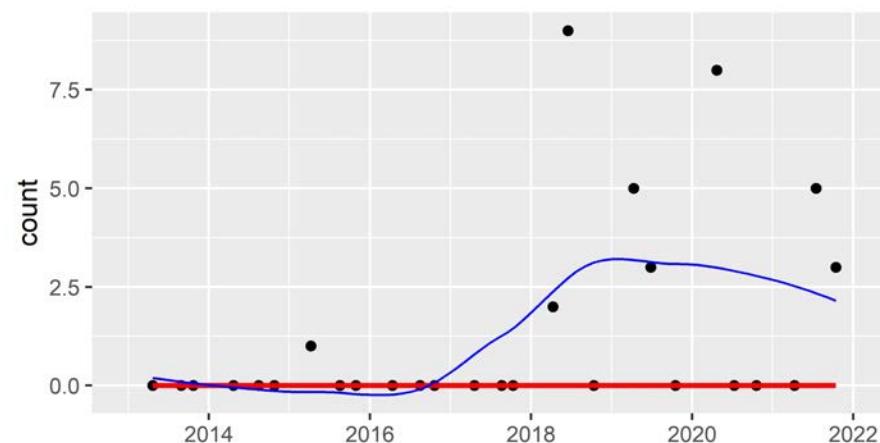
Barrevik SE8 PAPPER.KARTONG



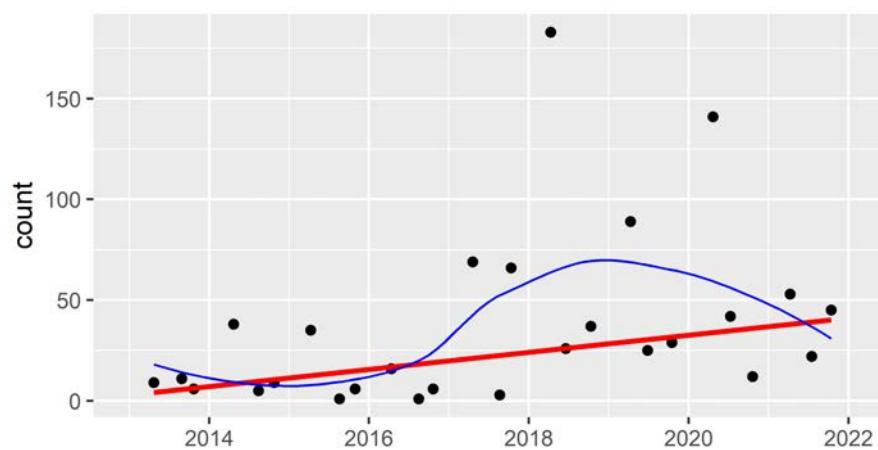
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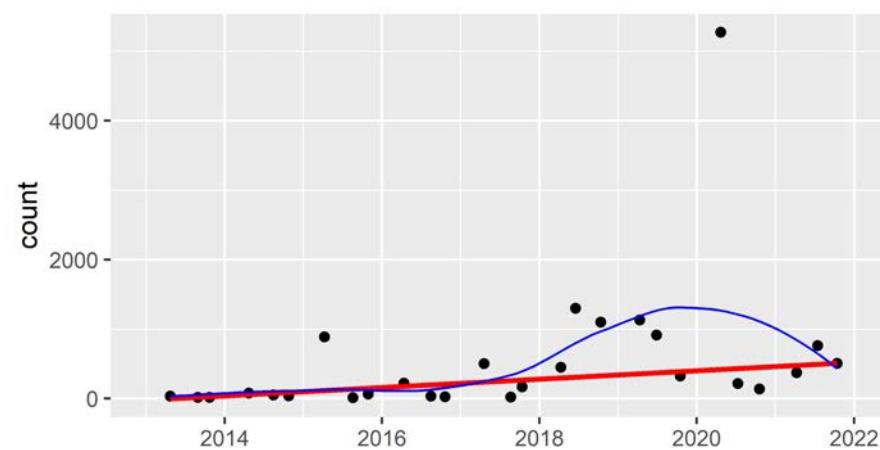
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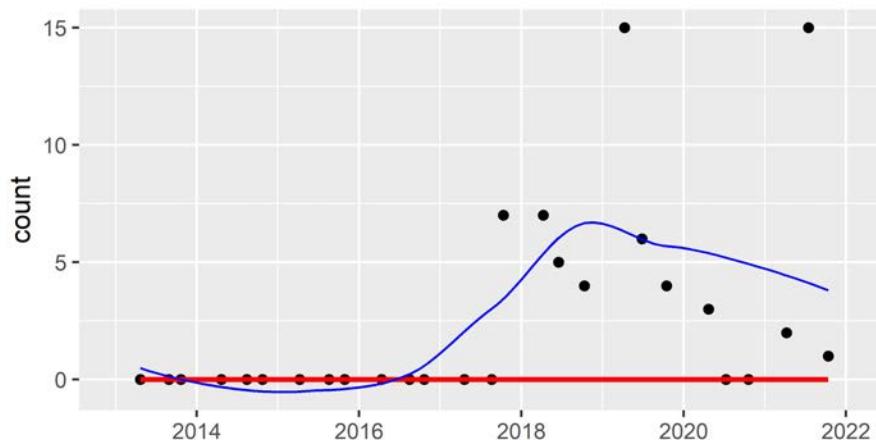
Barrevik SE8 SUP



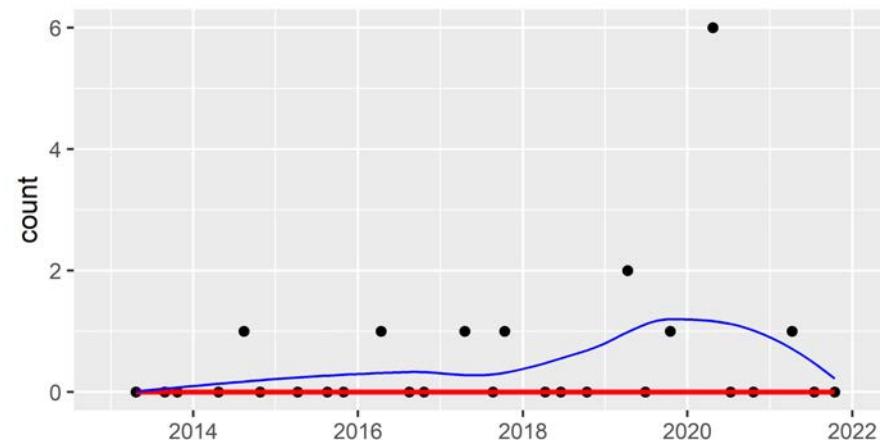
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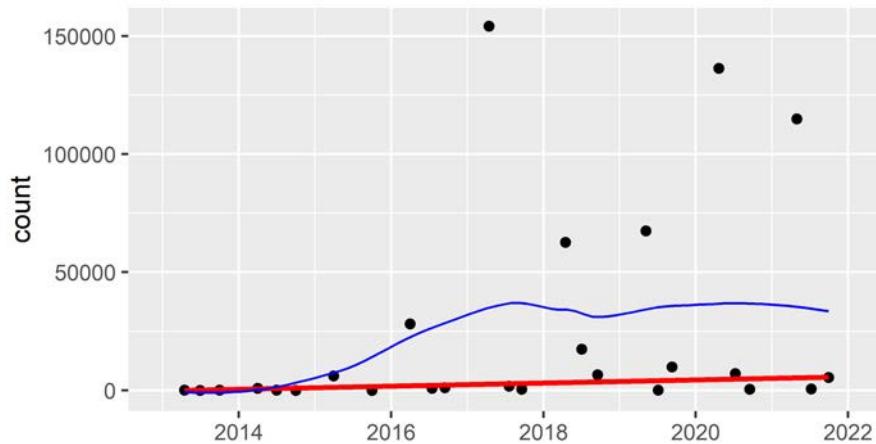
Barrevik SE8 TRA



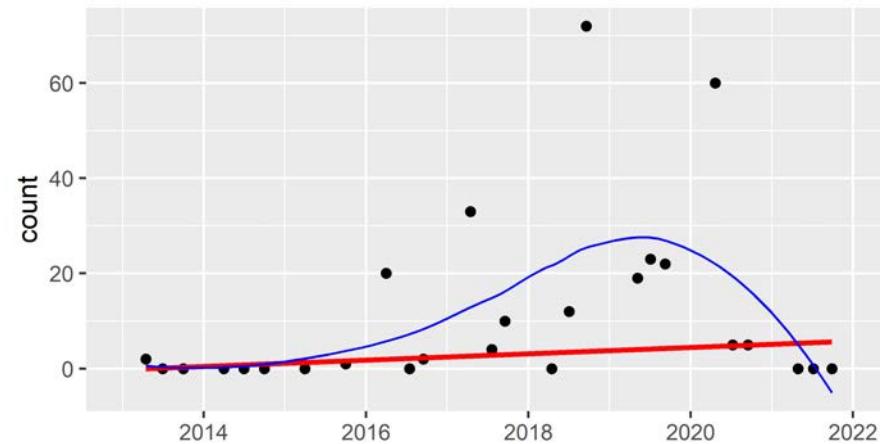
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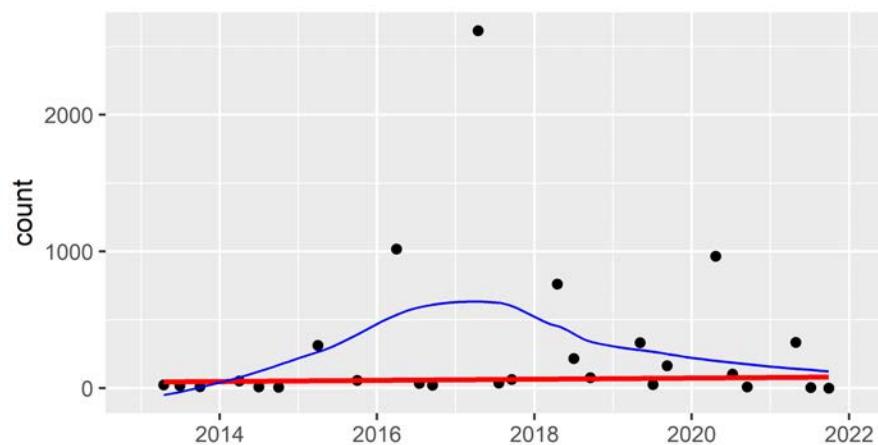
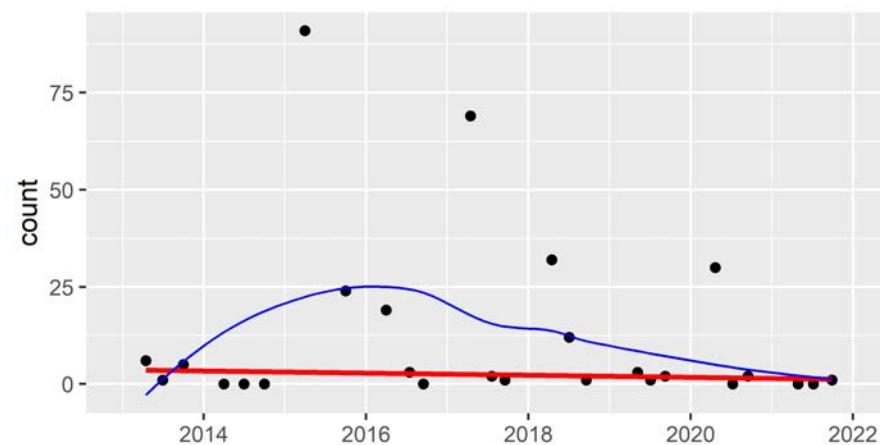
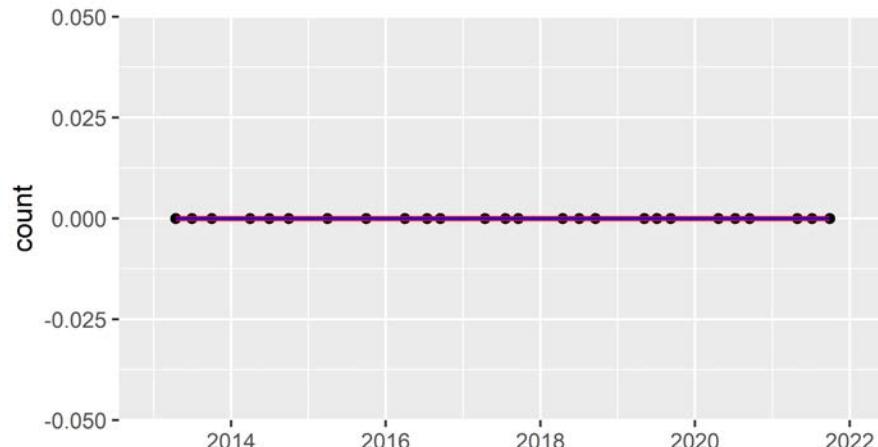
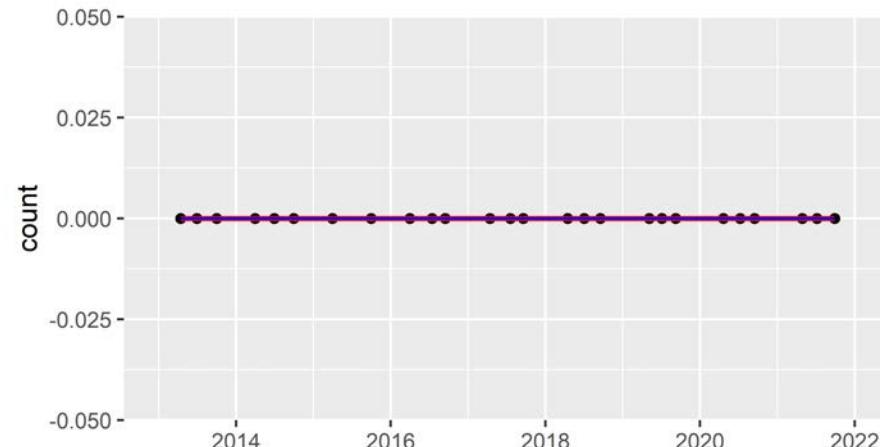


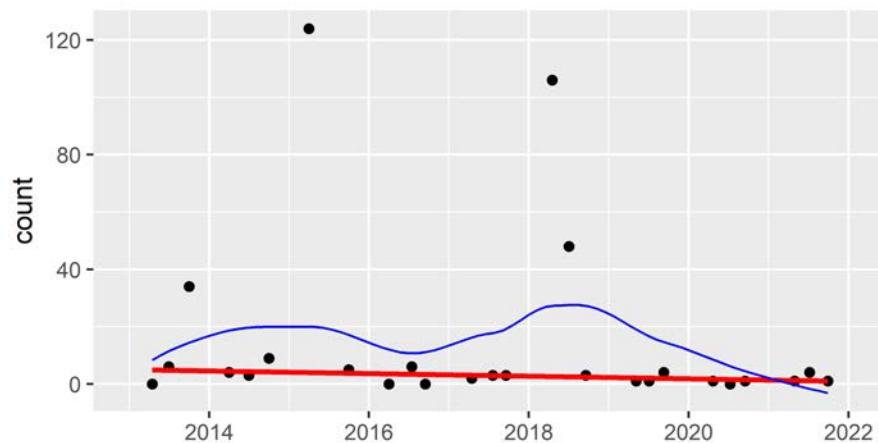
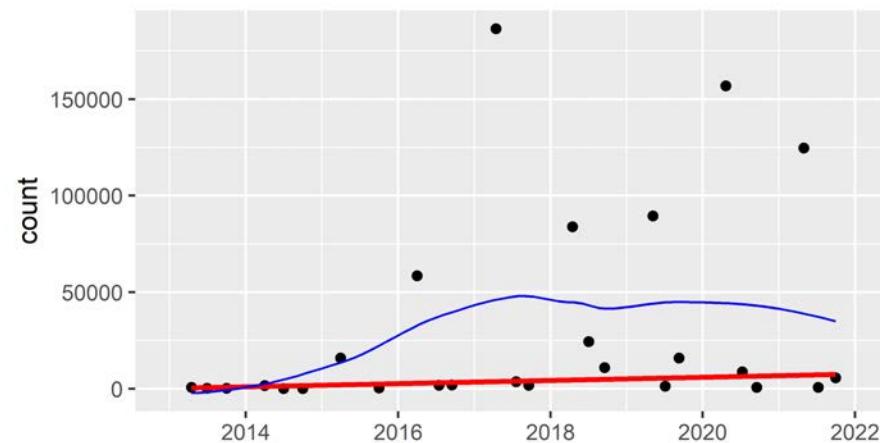
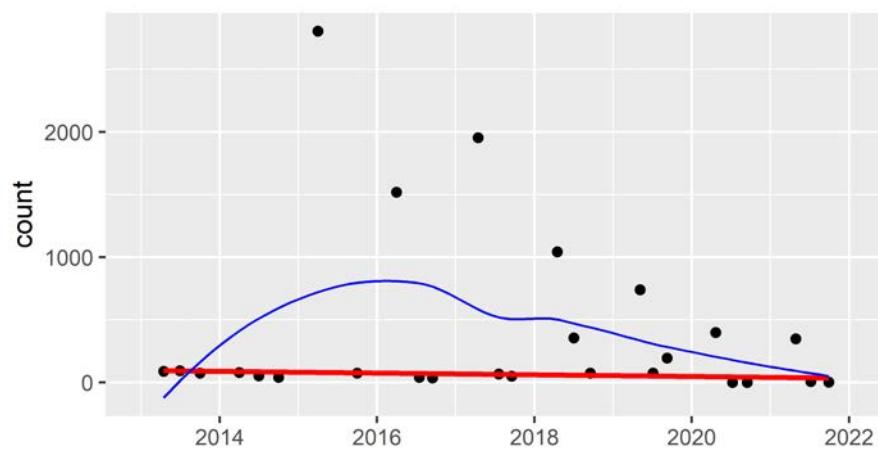
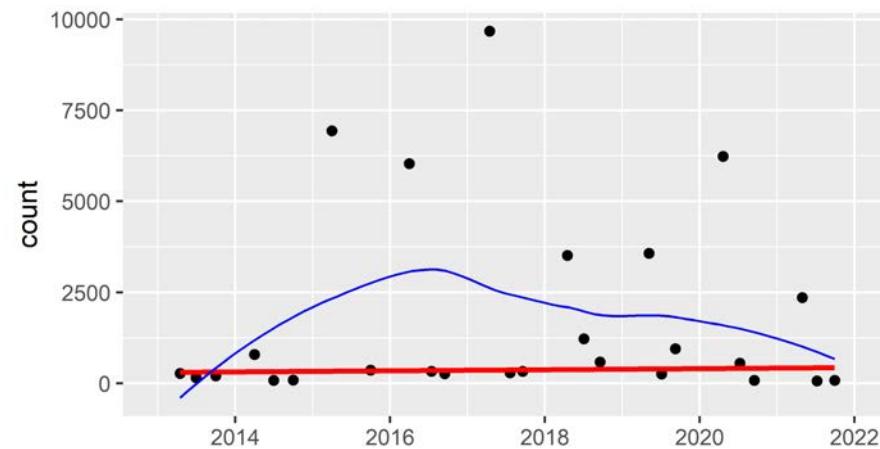
Edsvik SE5 FISH

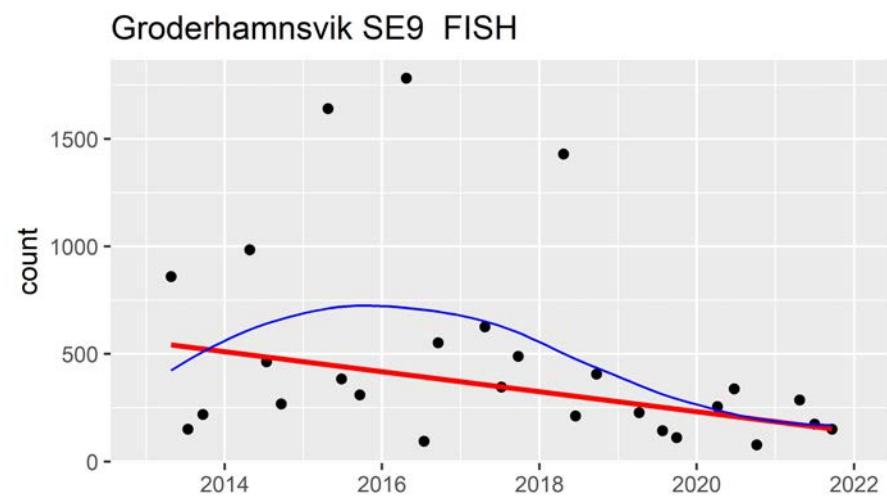
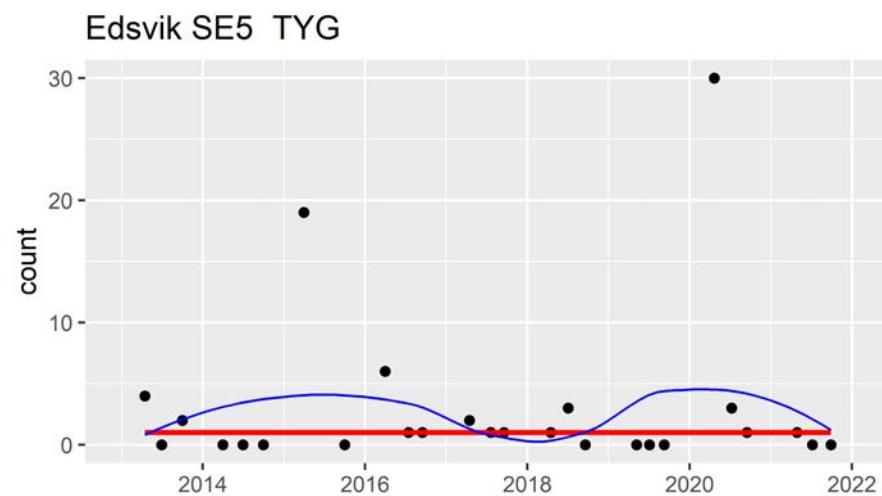
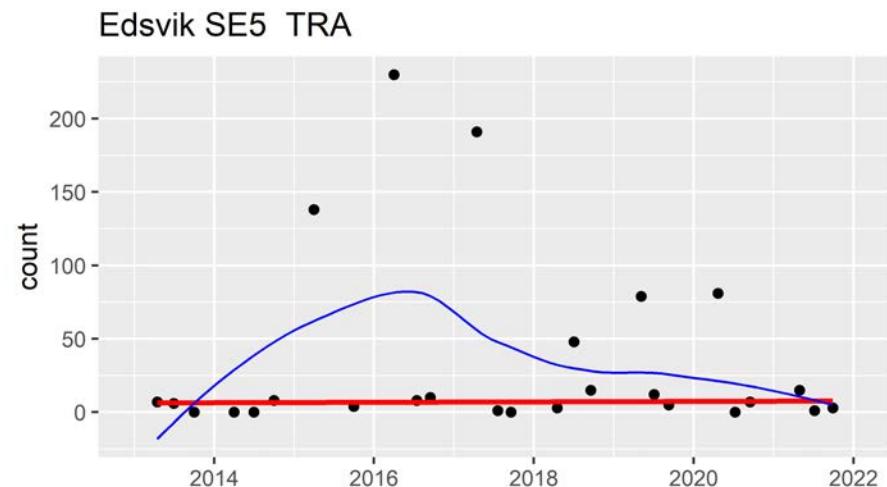
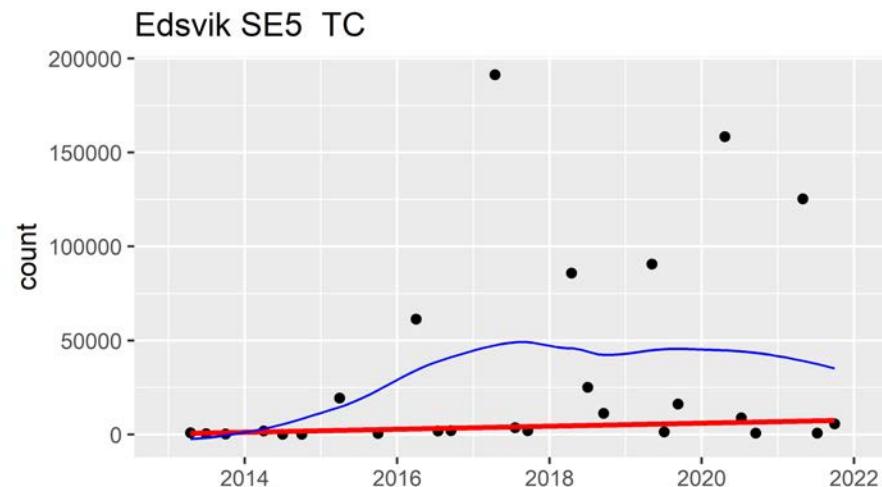


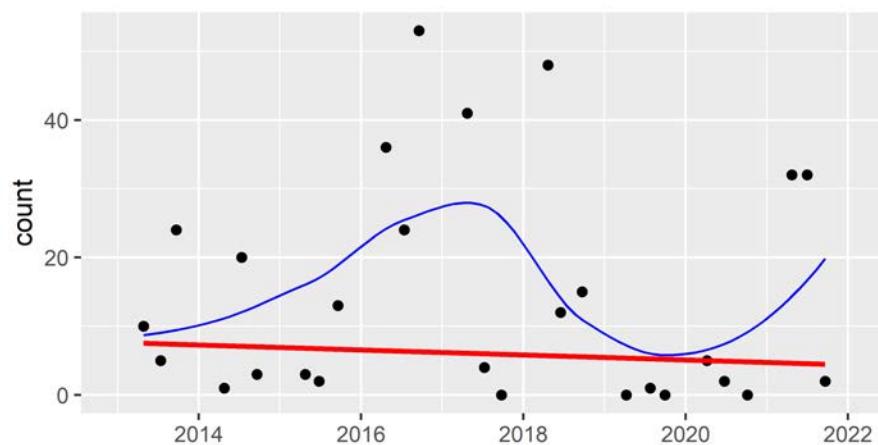
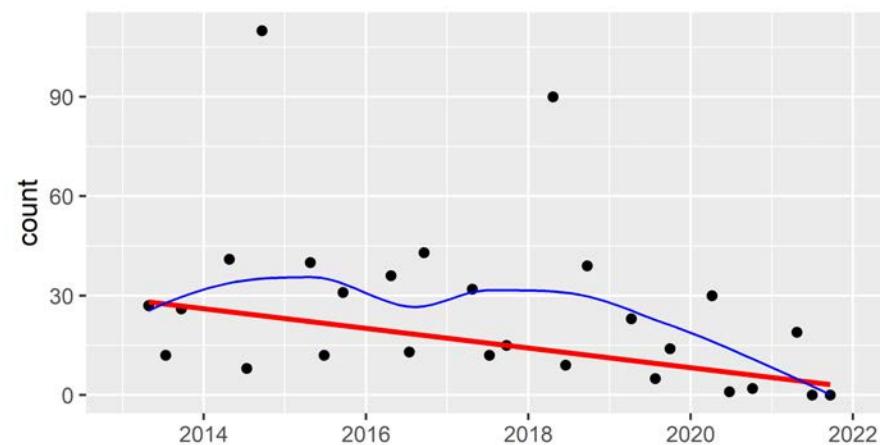
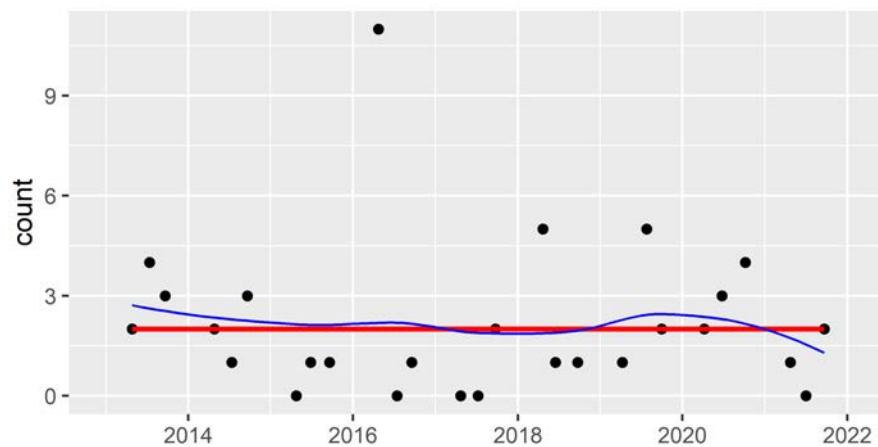
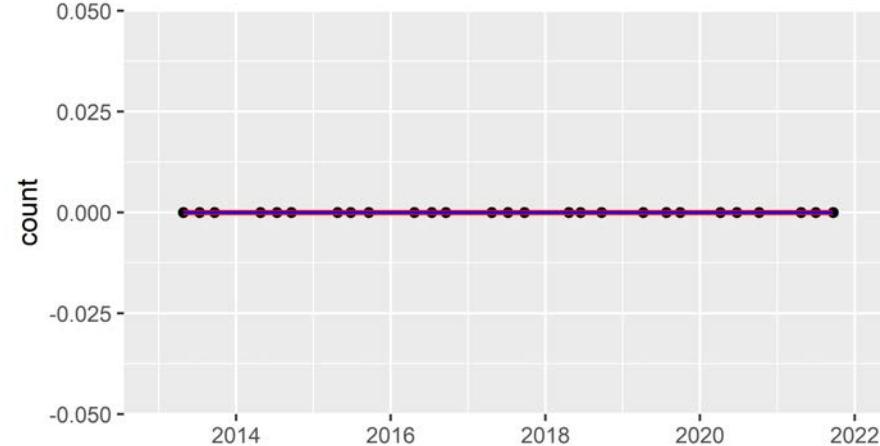
Edsvik SE5 GLAS.KERAMIK

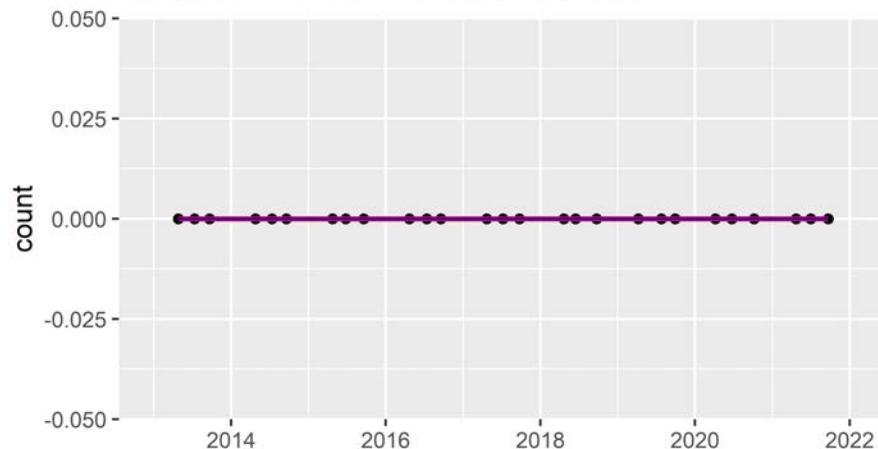
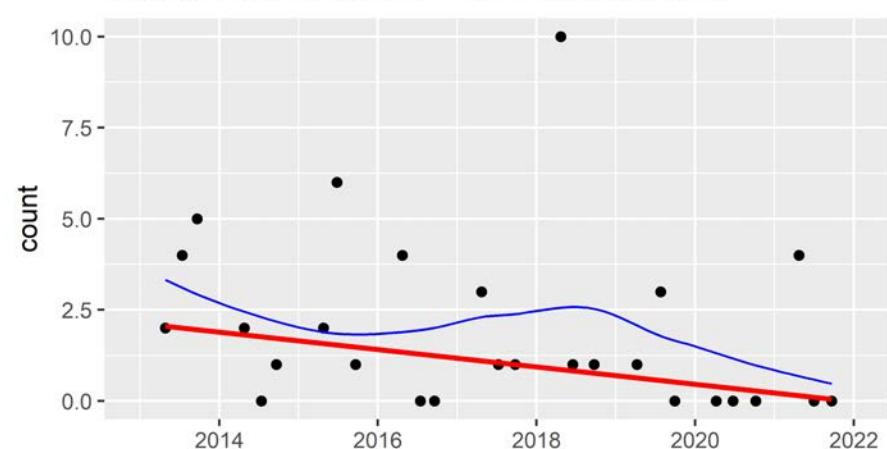
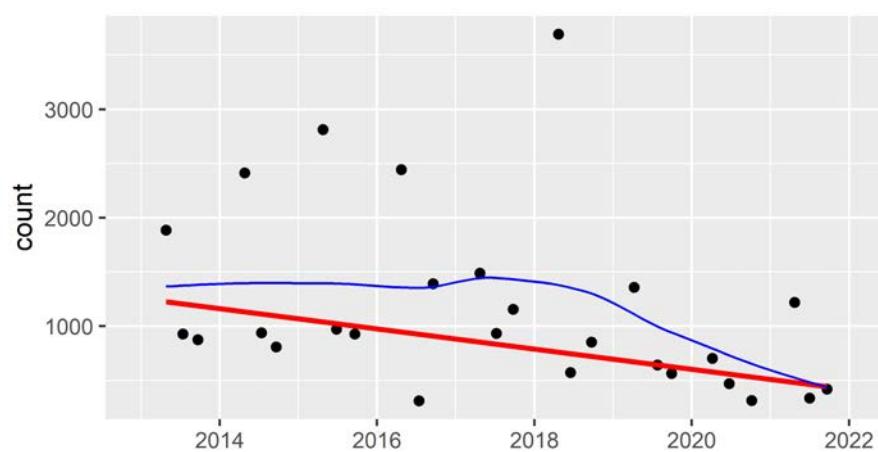
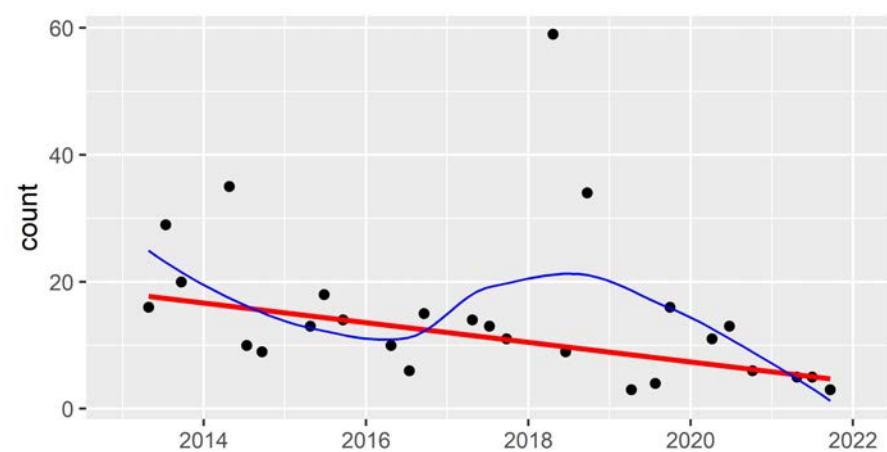


Edsvik SE5 GUMMI**Edsvik SE5 METALL****Edsvik SE5 OLIKA.MATERIAL****Edsvik SE5 ORGANISKT**

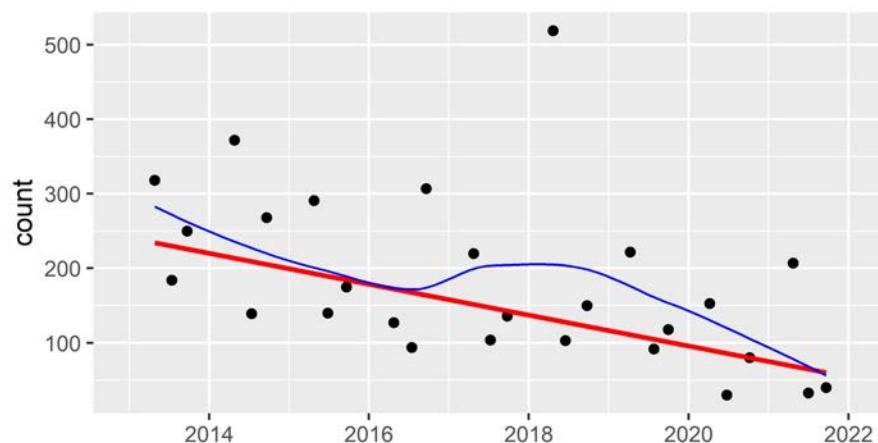
Edsvik SE5 PAPPER.KARTONG**Edsvik SE5 PLAST****Edsvik SE5 SANITET.MEDICINSKT****Edsvik SE5 SUP**



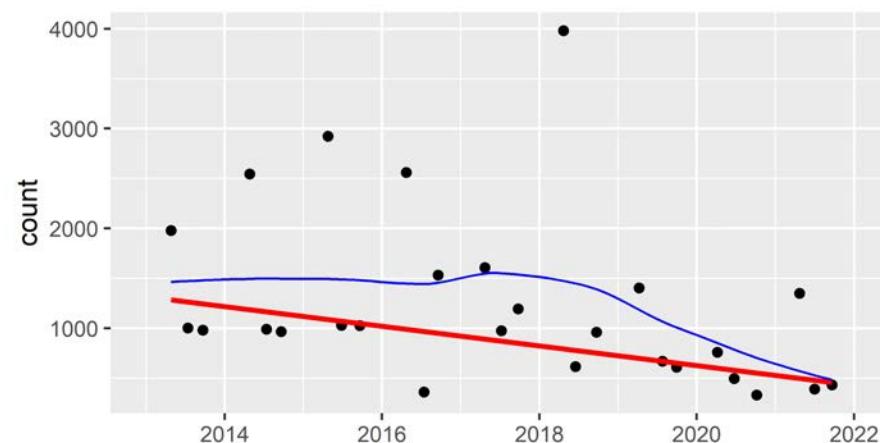
Groderhamnsvik SE9 GLAS.KERAMIK**Groderhamnsvik SE9 GUMMI****Groderhamnsvik SE9 METALL****Groderhamnsvik SE9 OLIKA.MATERIAL**

Groderhamnsvik SE9 ORGANISKT**Groderhamnsvik SE9 PAPPER.KARTONG****Groderhamnsvik SE9 PLAST****Groderhamnsvik SE9 SANITET.MEDICINSKT**

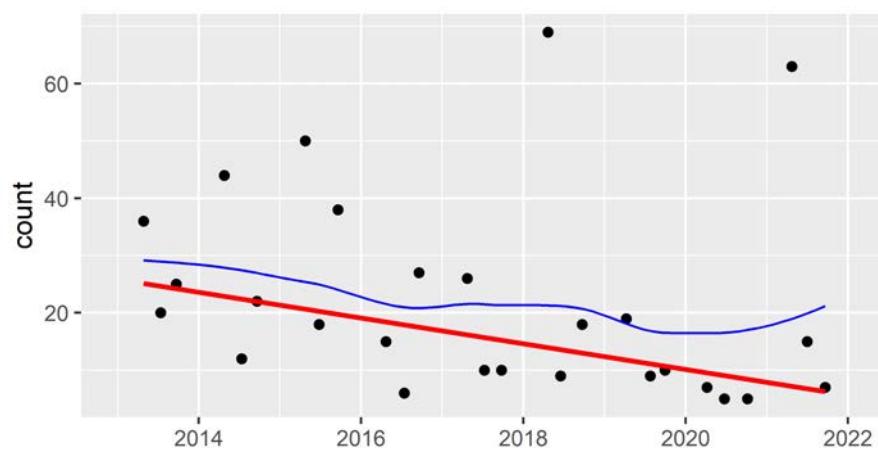
Groderhamnsvik SE9 SUP



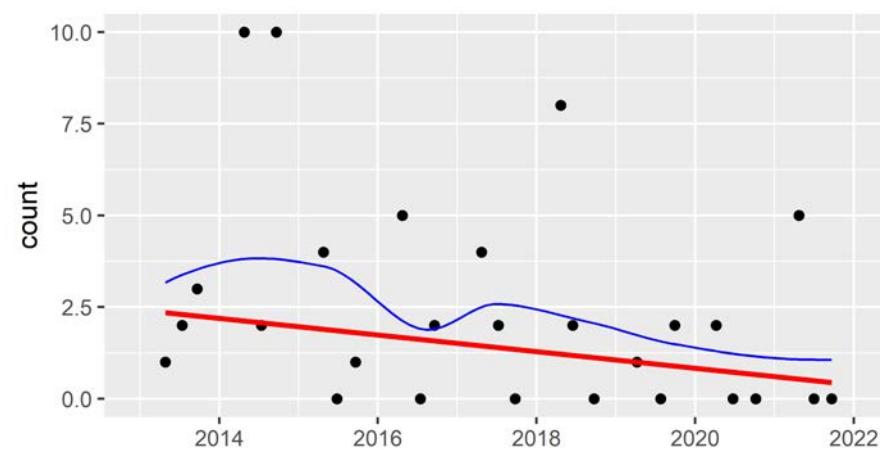
Groderhamnsvik SE9 TC



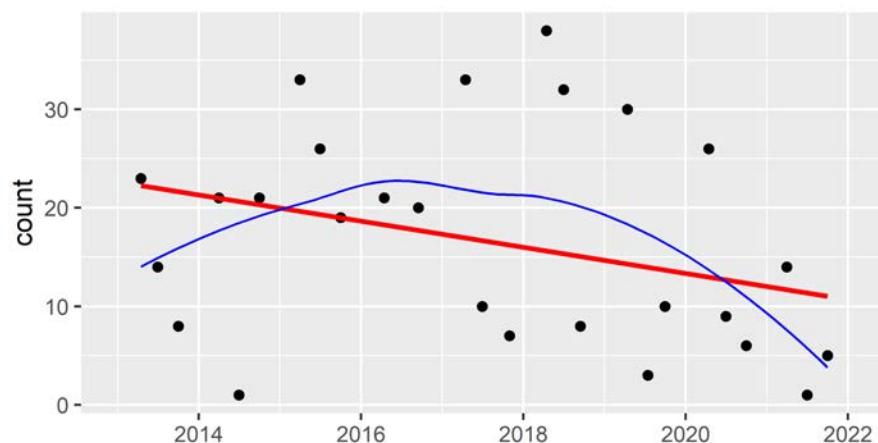
Groderhamnsvik SE9 TRA



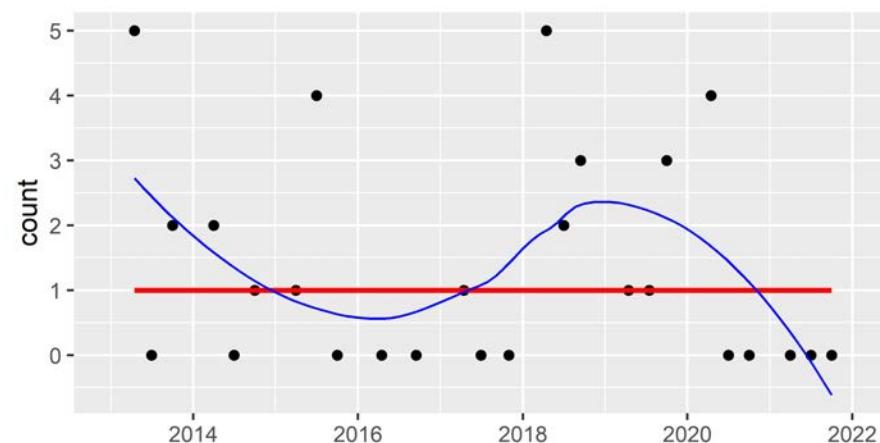
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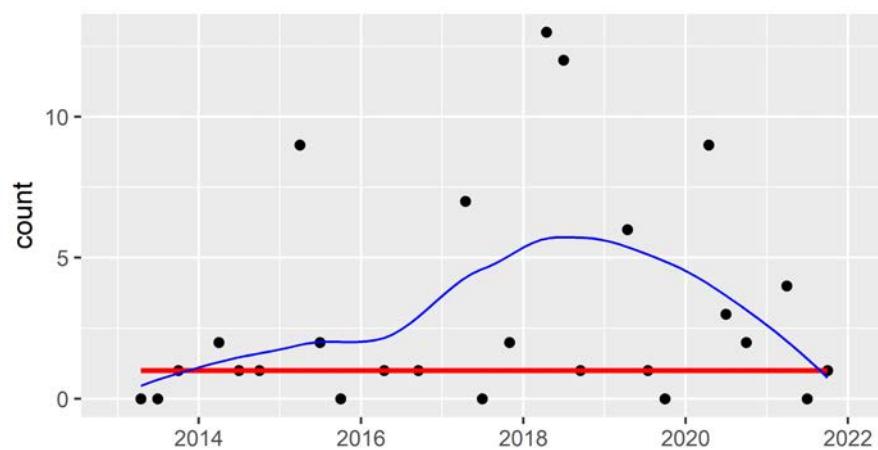
Gronevik Overon SE7 FISH



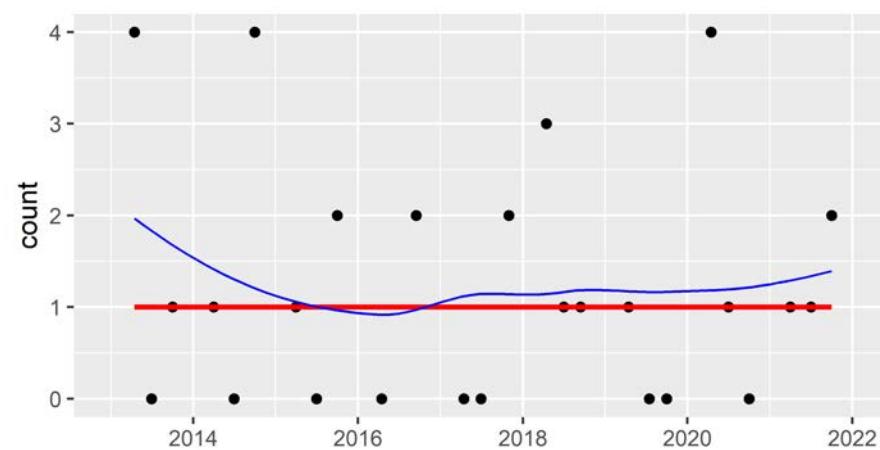
Gronevik Overon SE7 GLAS.KERAMIK

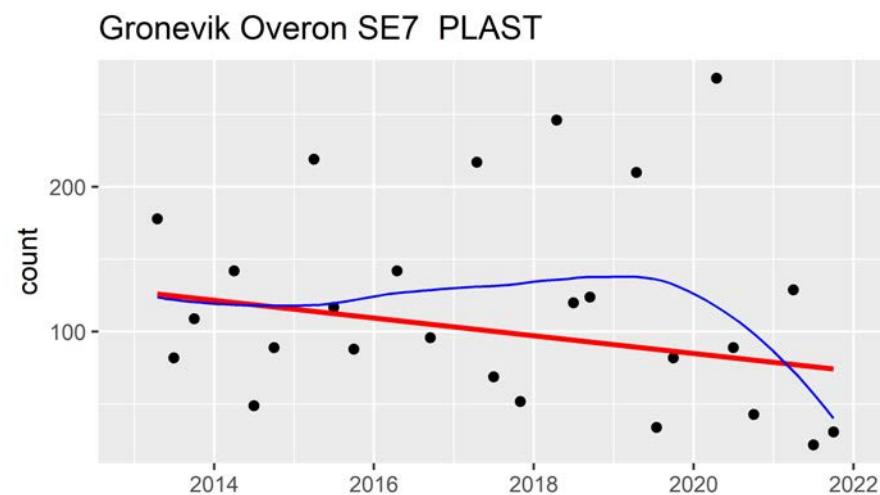
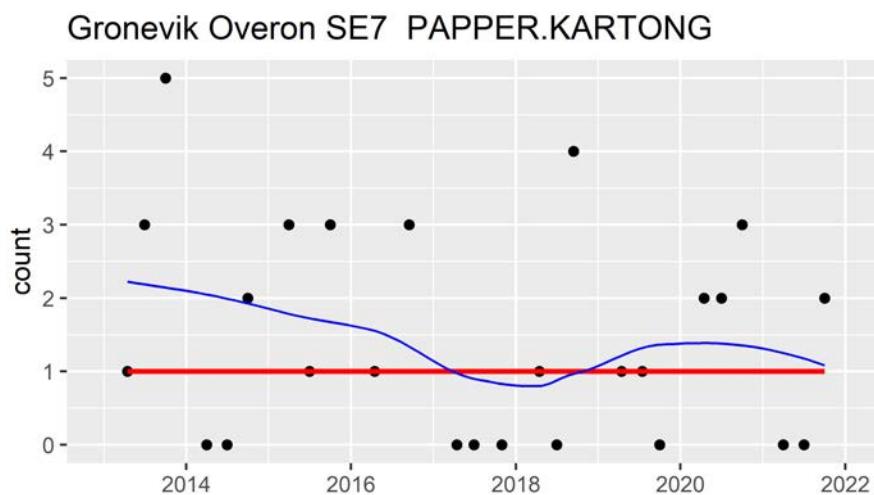
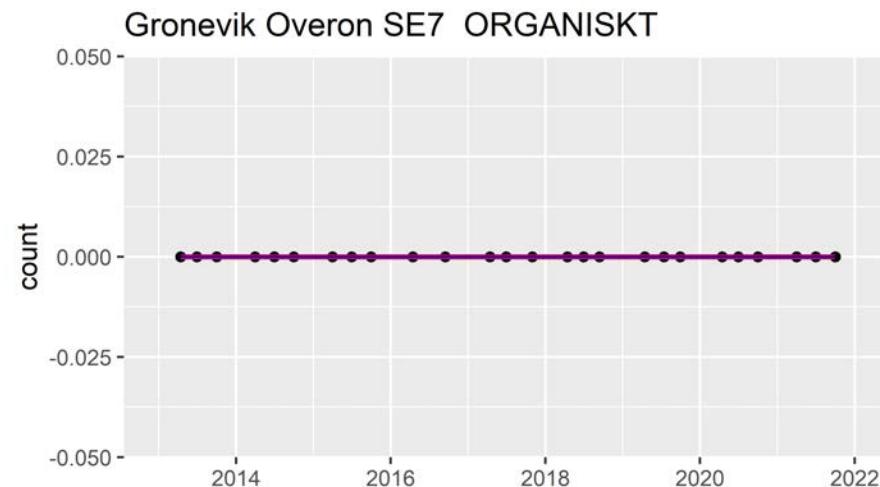
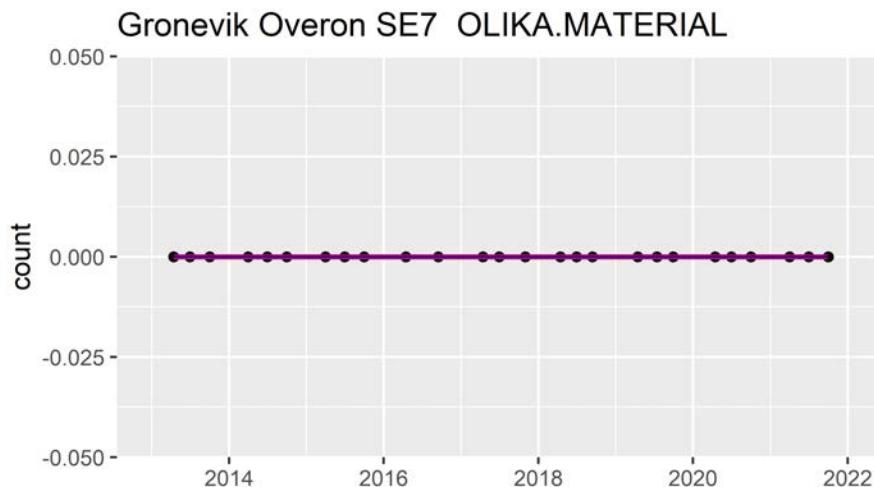


Gronevik Overon SE7 GUMMI

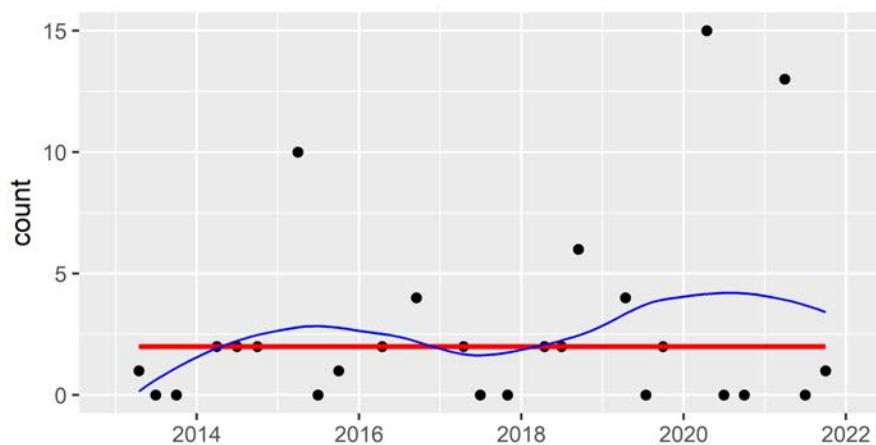


Gronevik Overon SE7 METALL

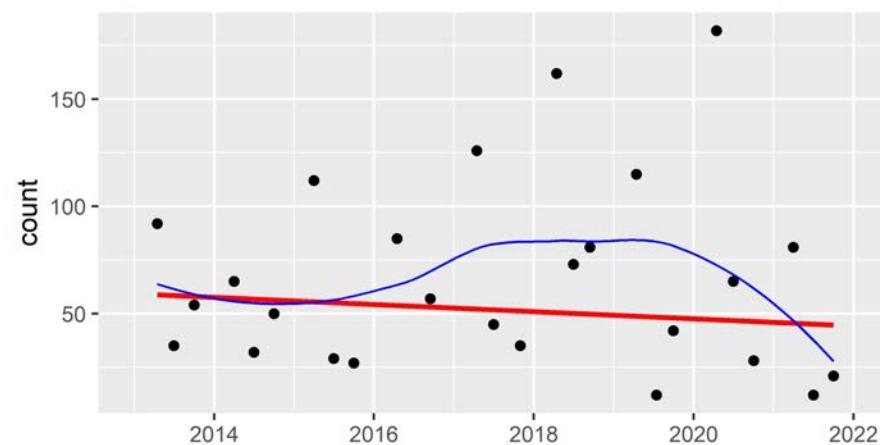




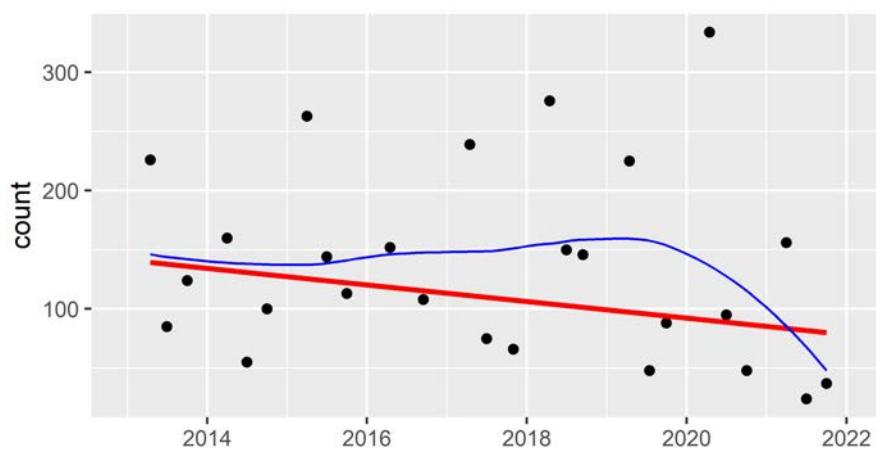
Gronevik Overon SE7 SANITET.MEDICINSKT



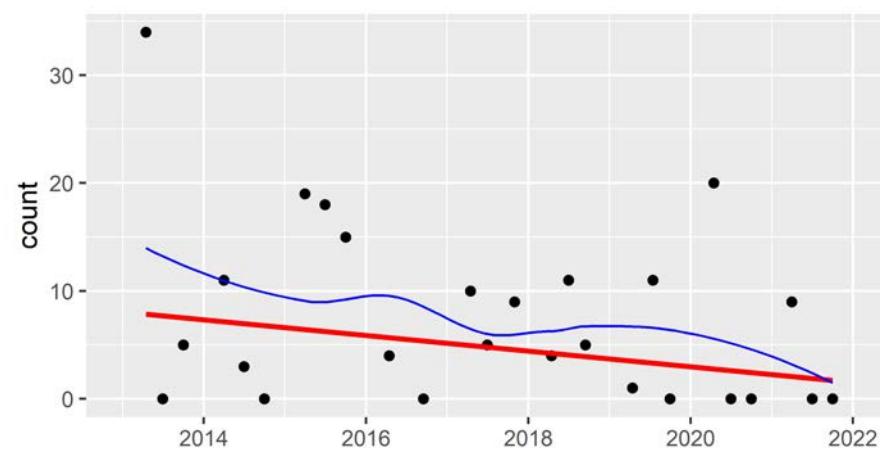
Gronevik Overon SE7 SUP



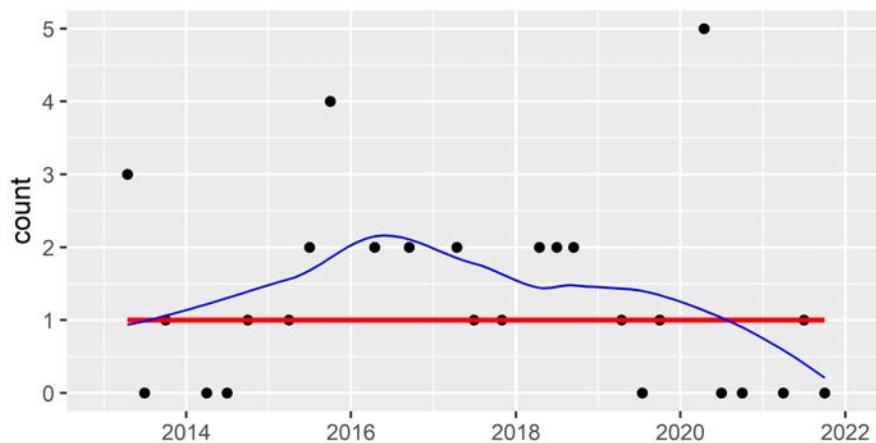
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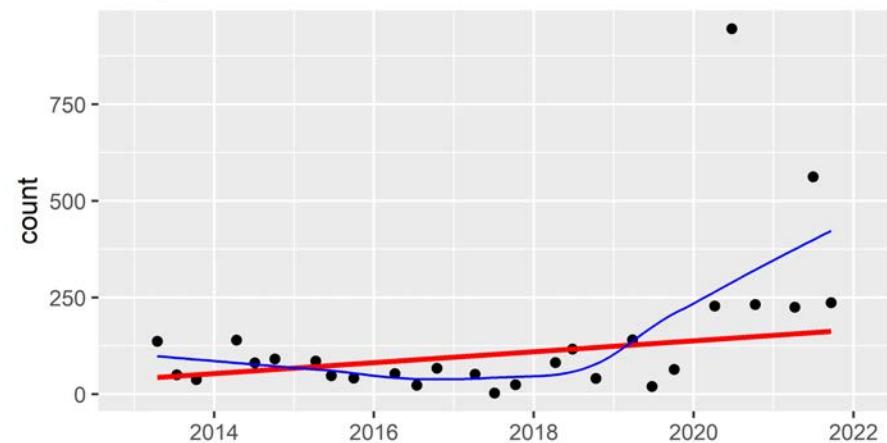
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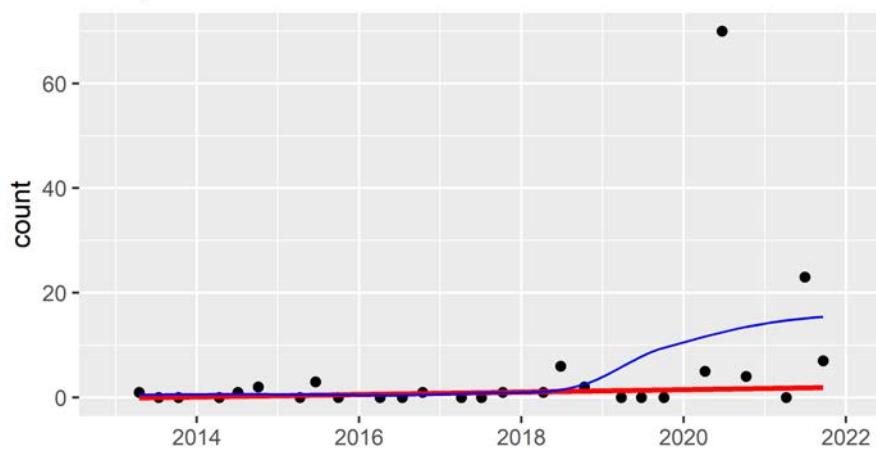
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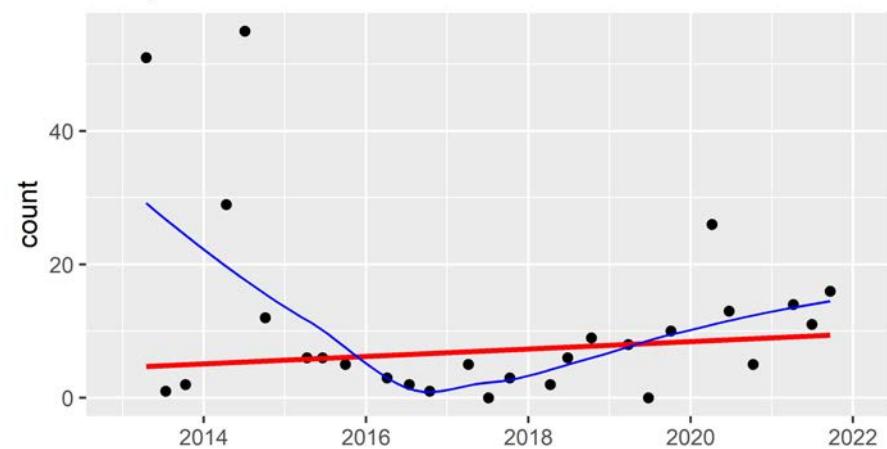
Haby SE4 FISH

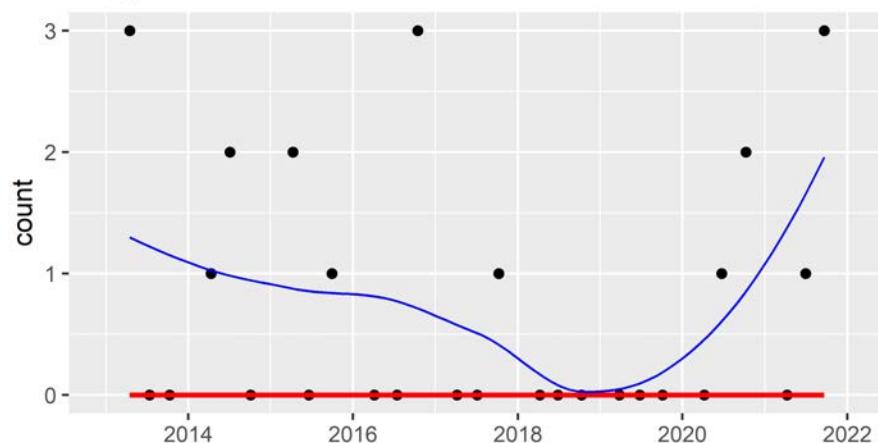
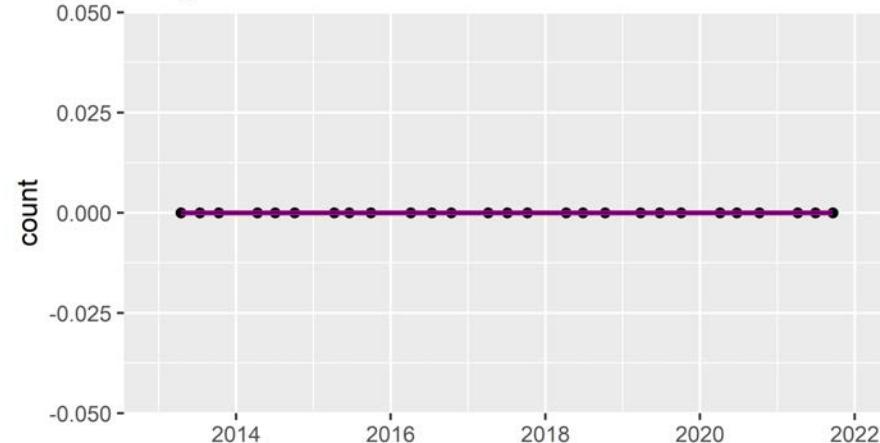
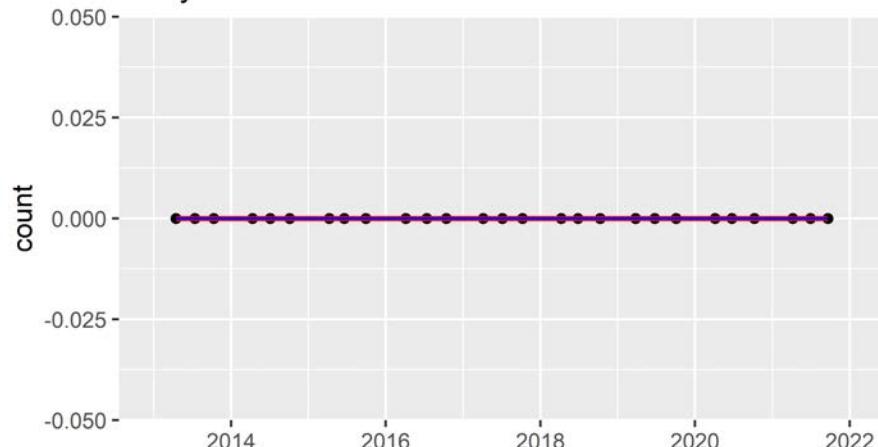
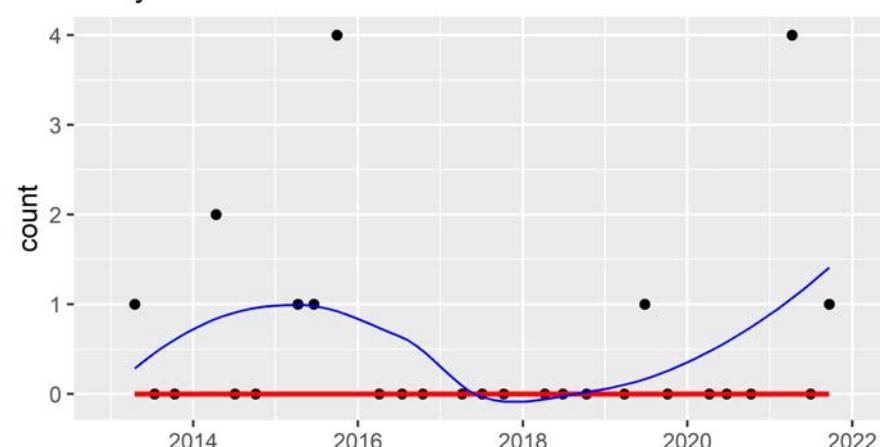


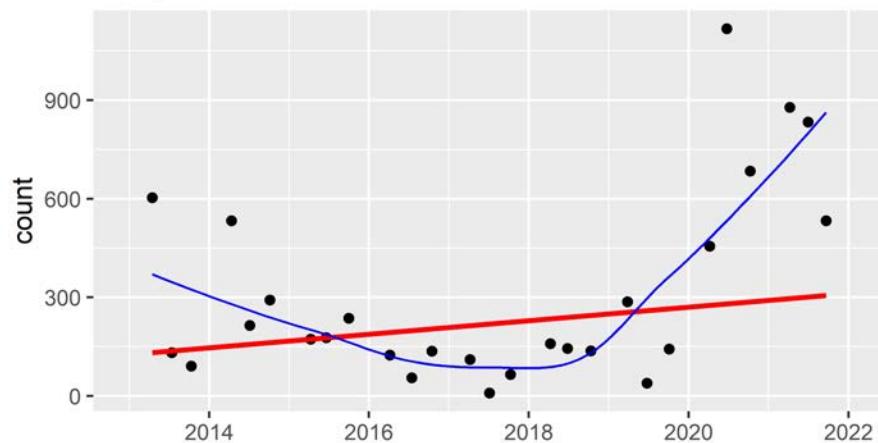
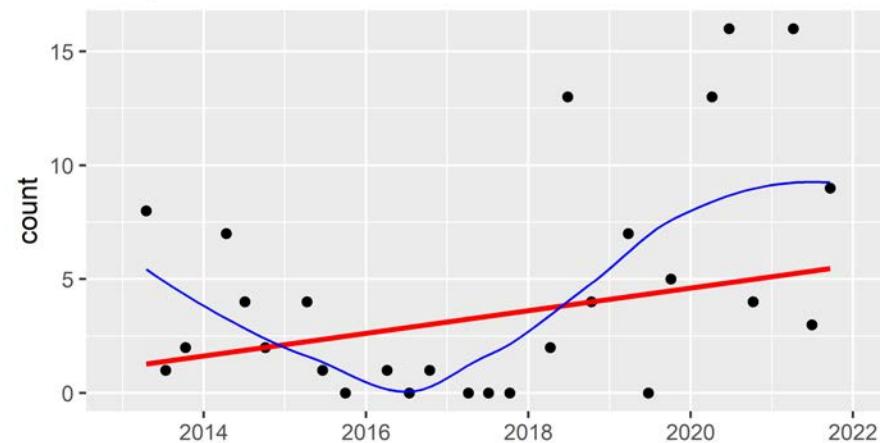
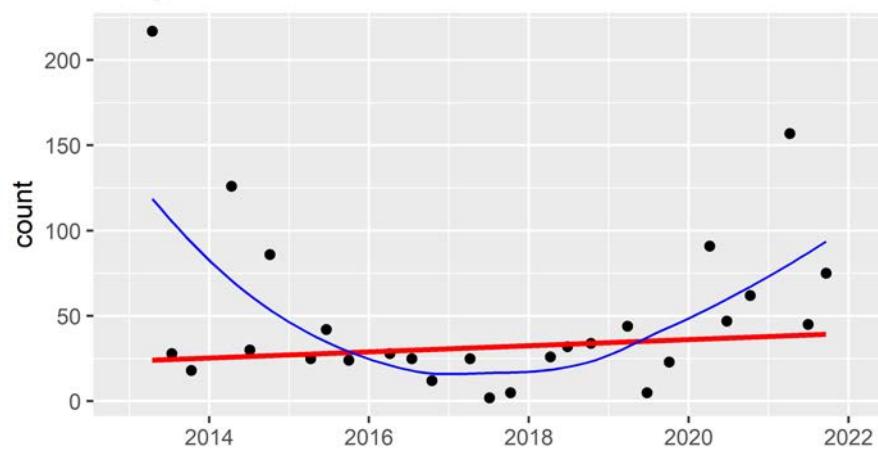
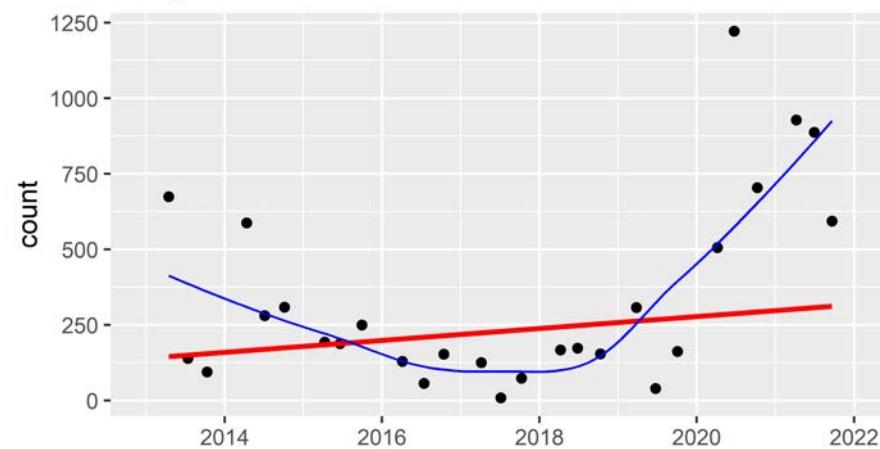
Haby SE4 GLAS.KERAMIK



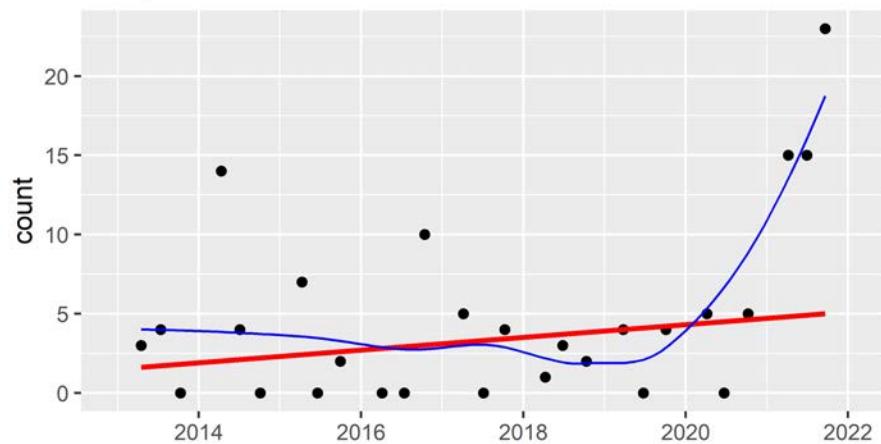
Haby SE4 GUMMI



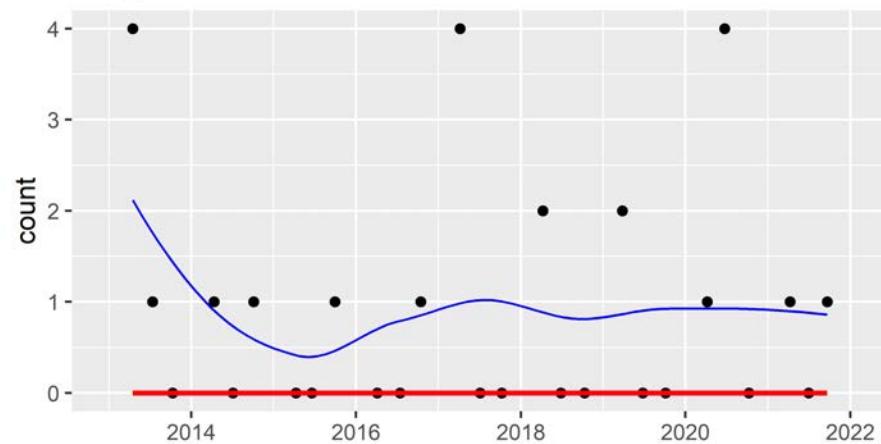
Haby SE4 METALL**Haby SE4 OLIKA.MATERIAL****Haby SE4 ORGANISKT****Haby SE4 PAPPER.KARTONG**

Haby SE4 PLAST**Haby SE4 SANITET.MEDICINSKT****Haby SE4 SUP****Haby SE4 TC**

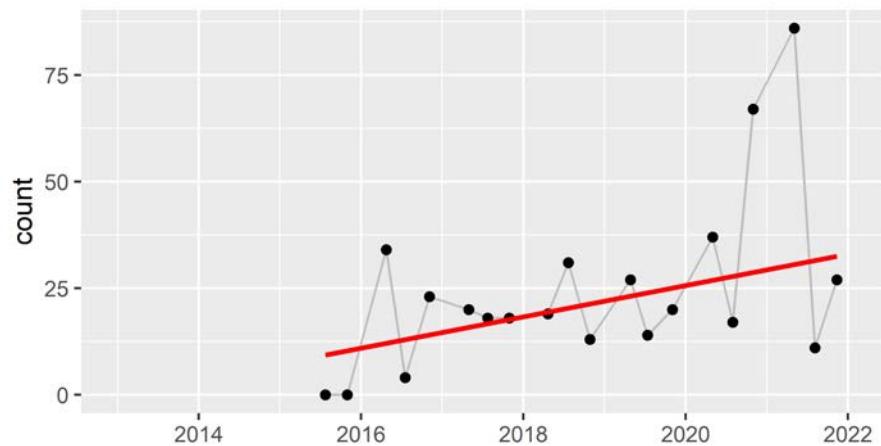
Haby SE4 TRA



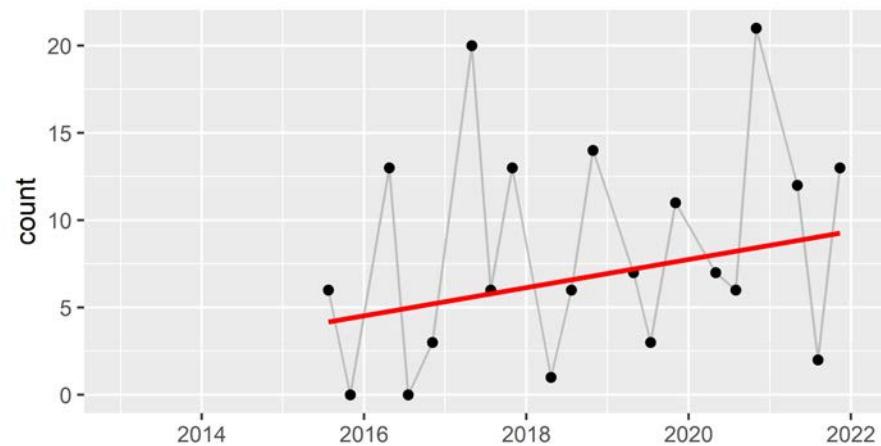
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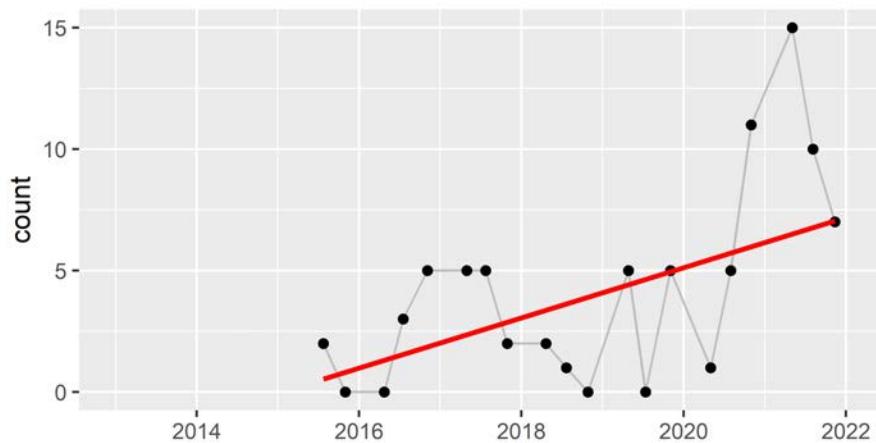
Jaravallen FISH



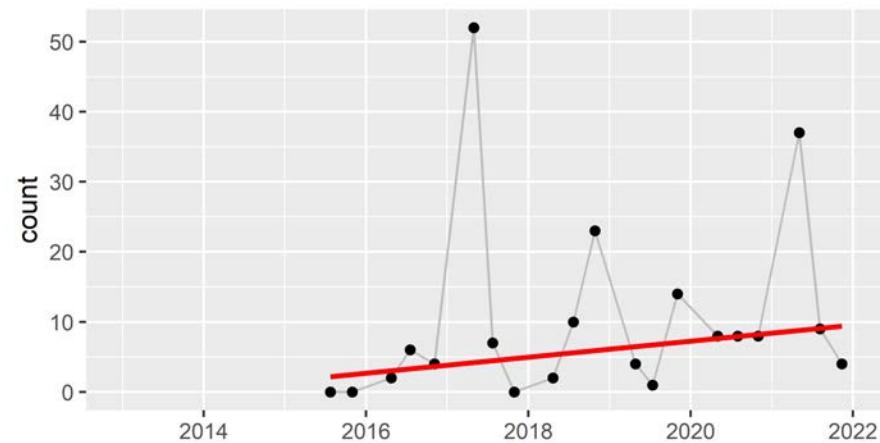
Jaravallen GLAS.KERAMIK



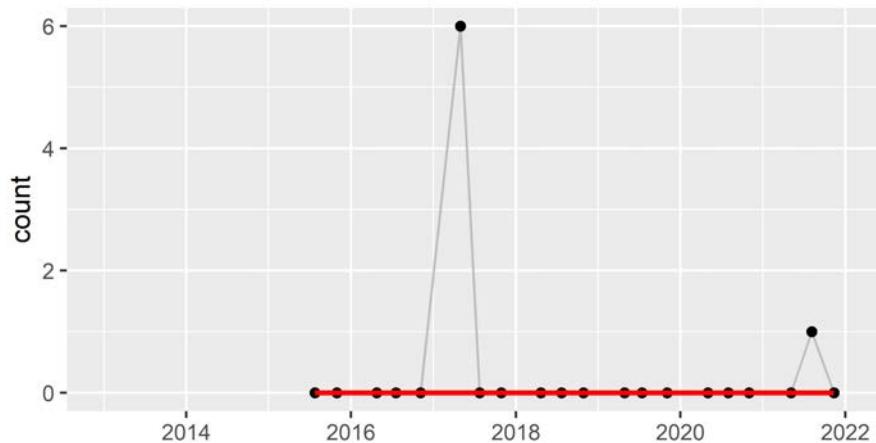
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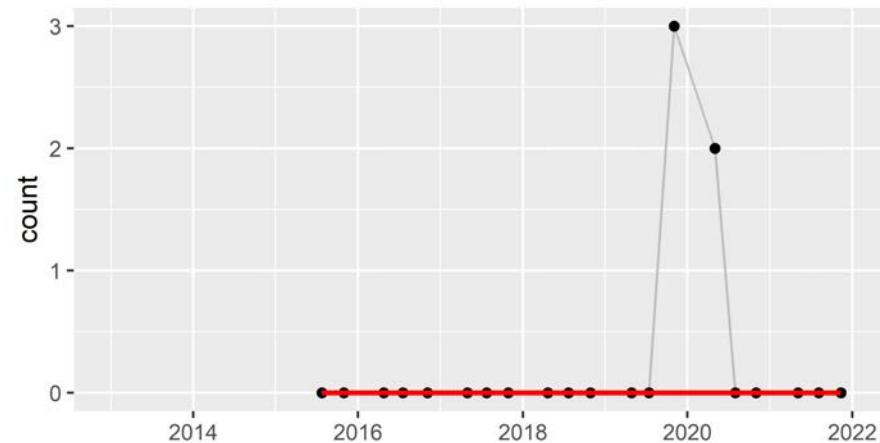
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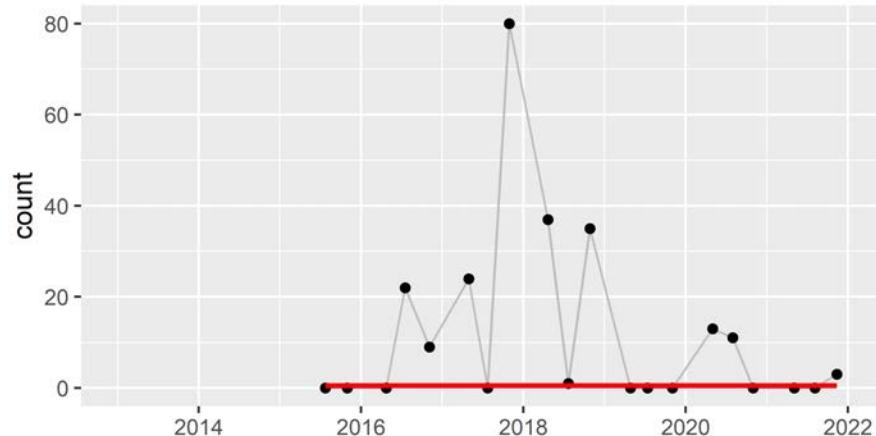
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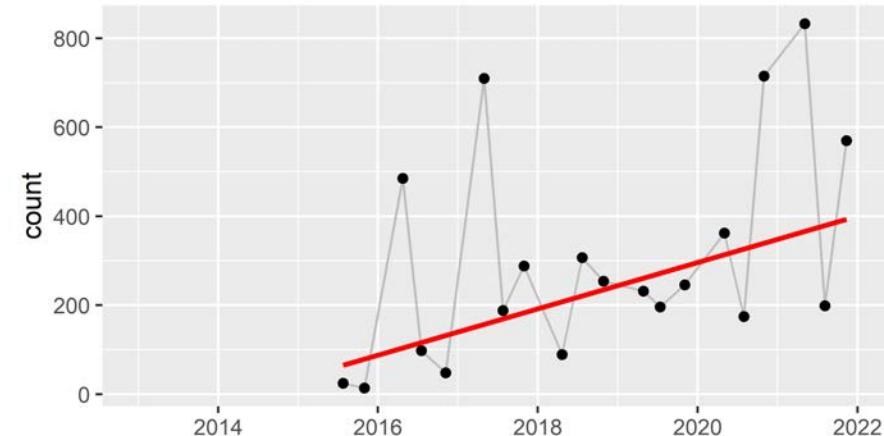
Jaravallen ORGANISKT



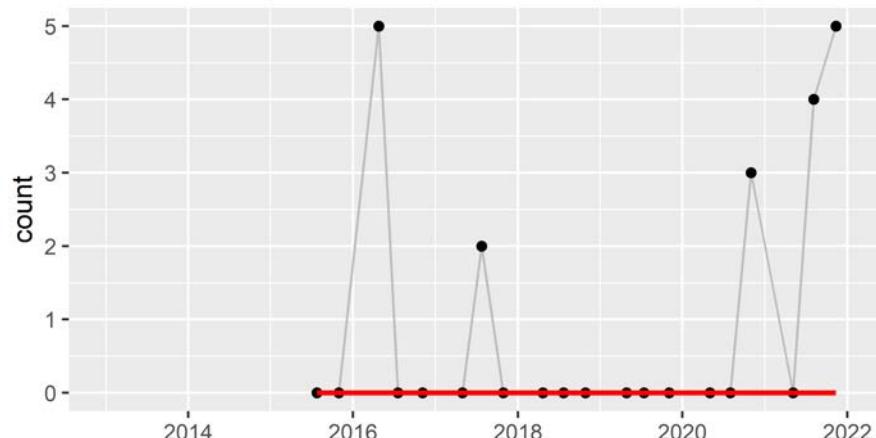
Jaravallen PAPPER.KARTONG



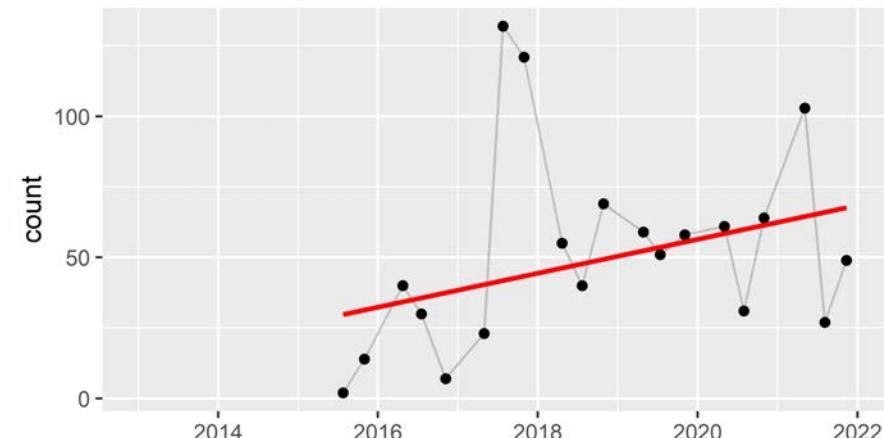
Jaravallen PLAST



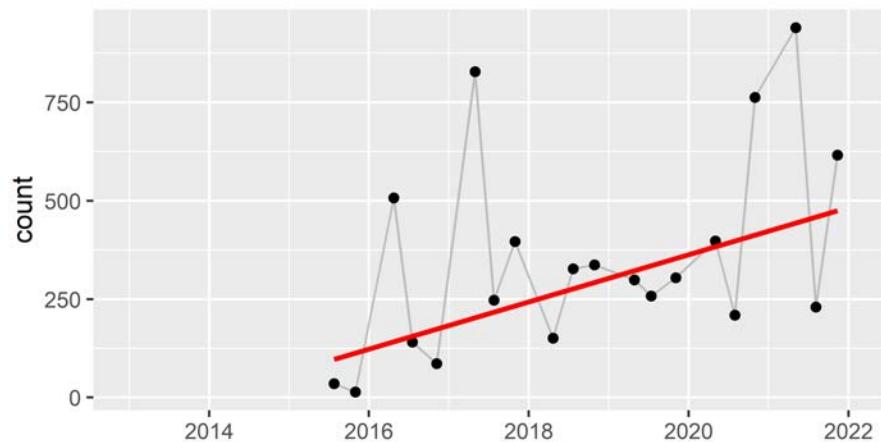
Jaravallen SANITET.MEDICINSKT



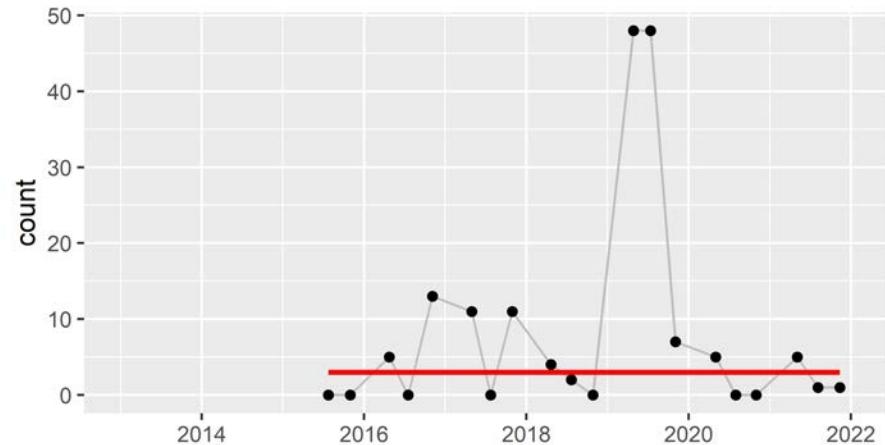
Jaravallen SUP



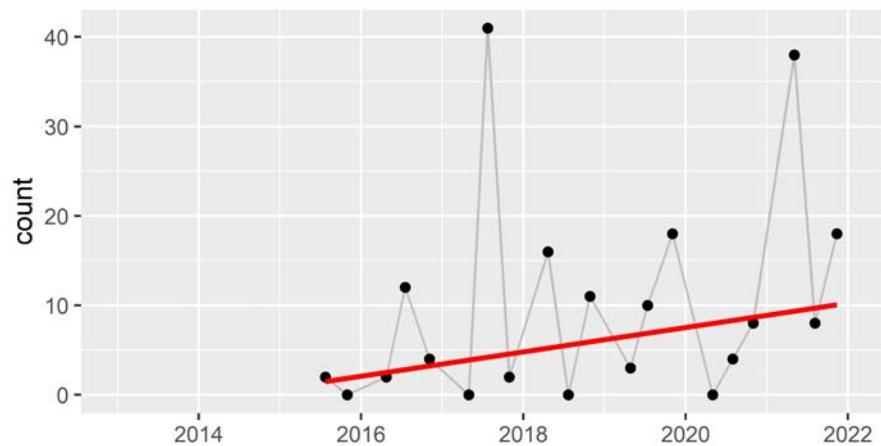
Jaravallen TC



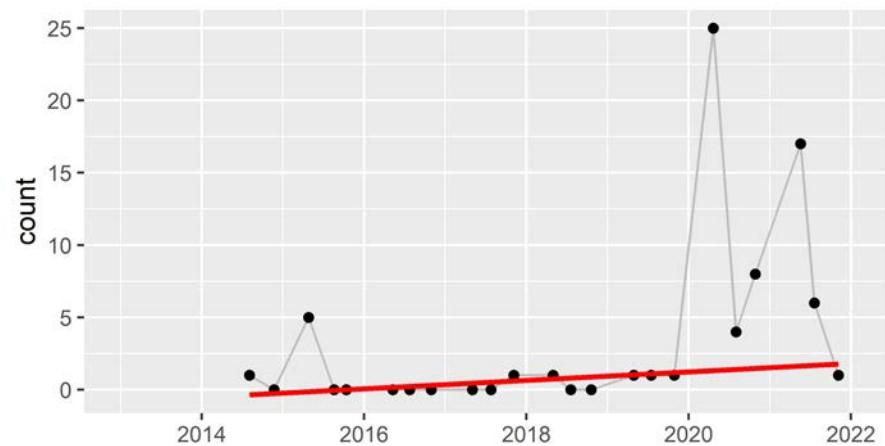
Jaravallen TRA

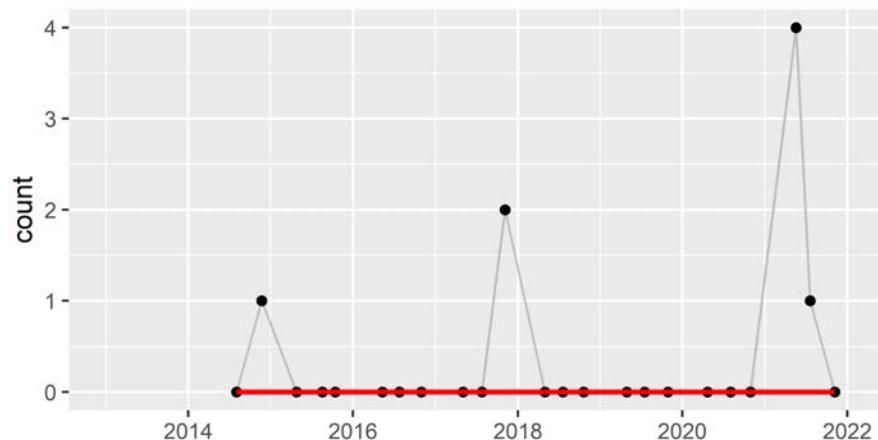
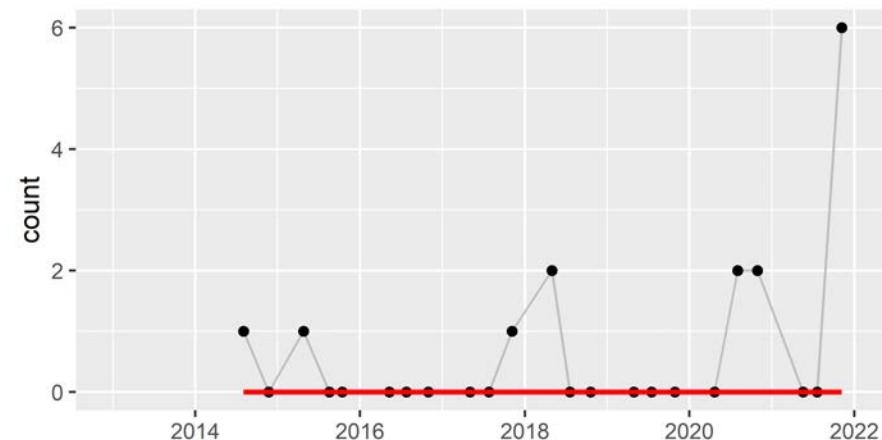
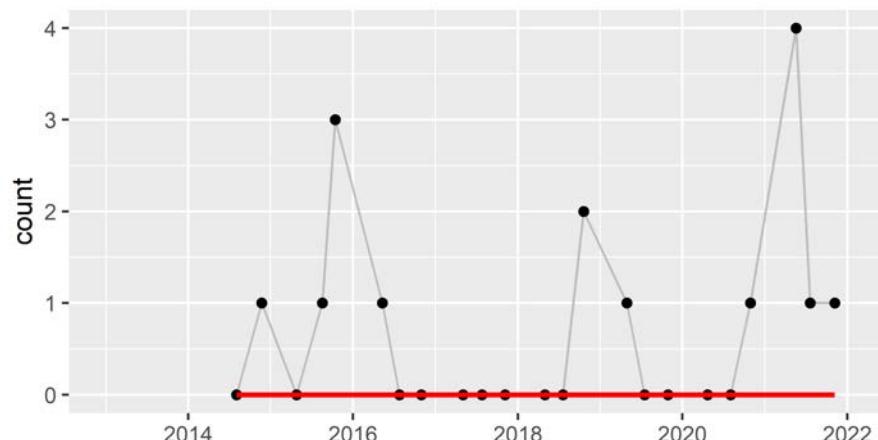
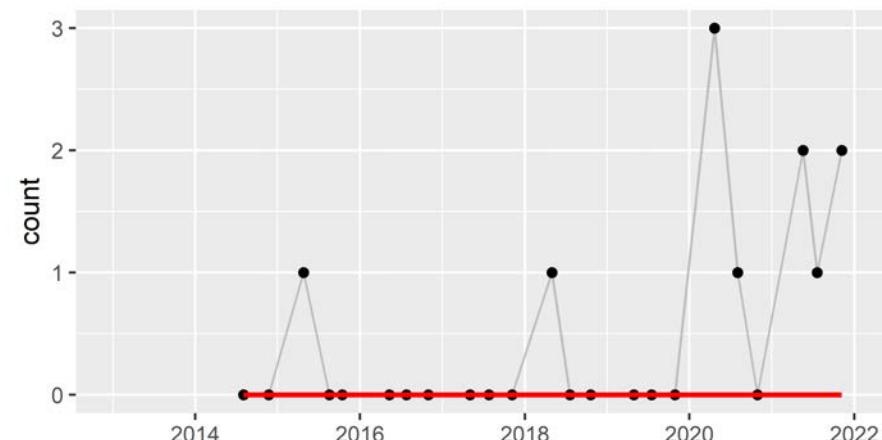


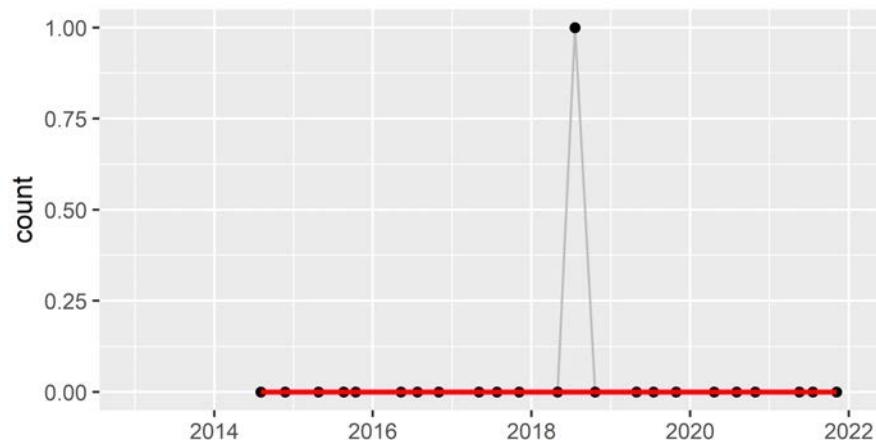
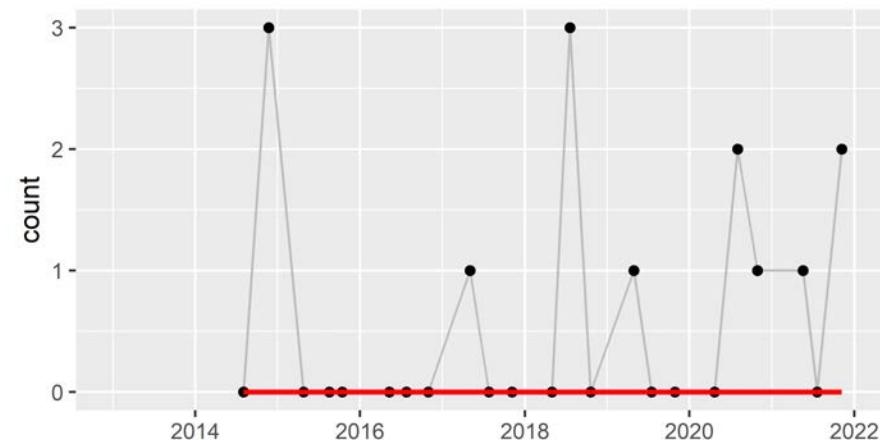
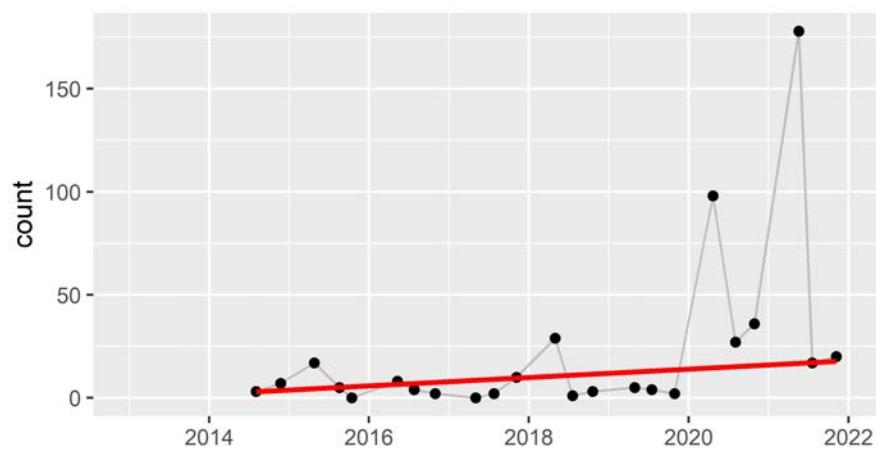
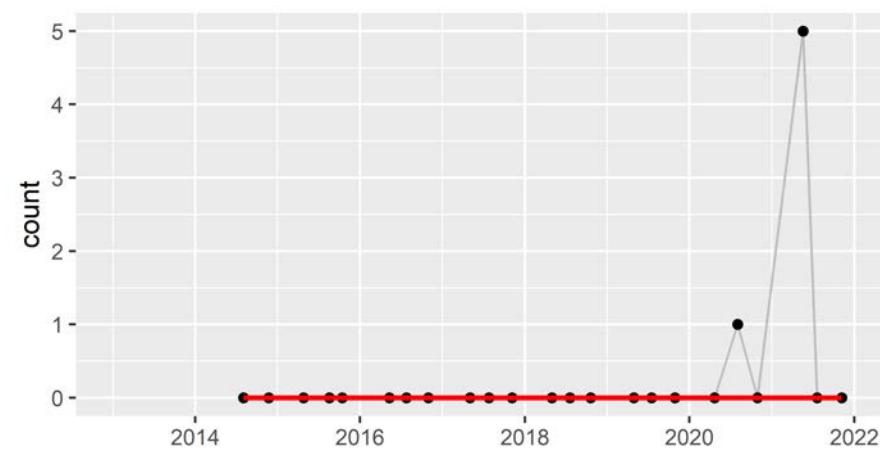
Jaravallen TYG

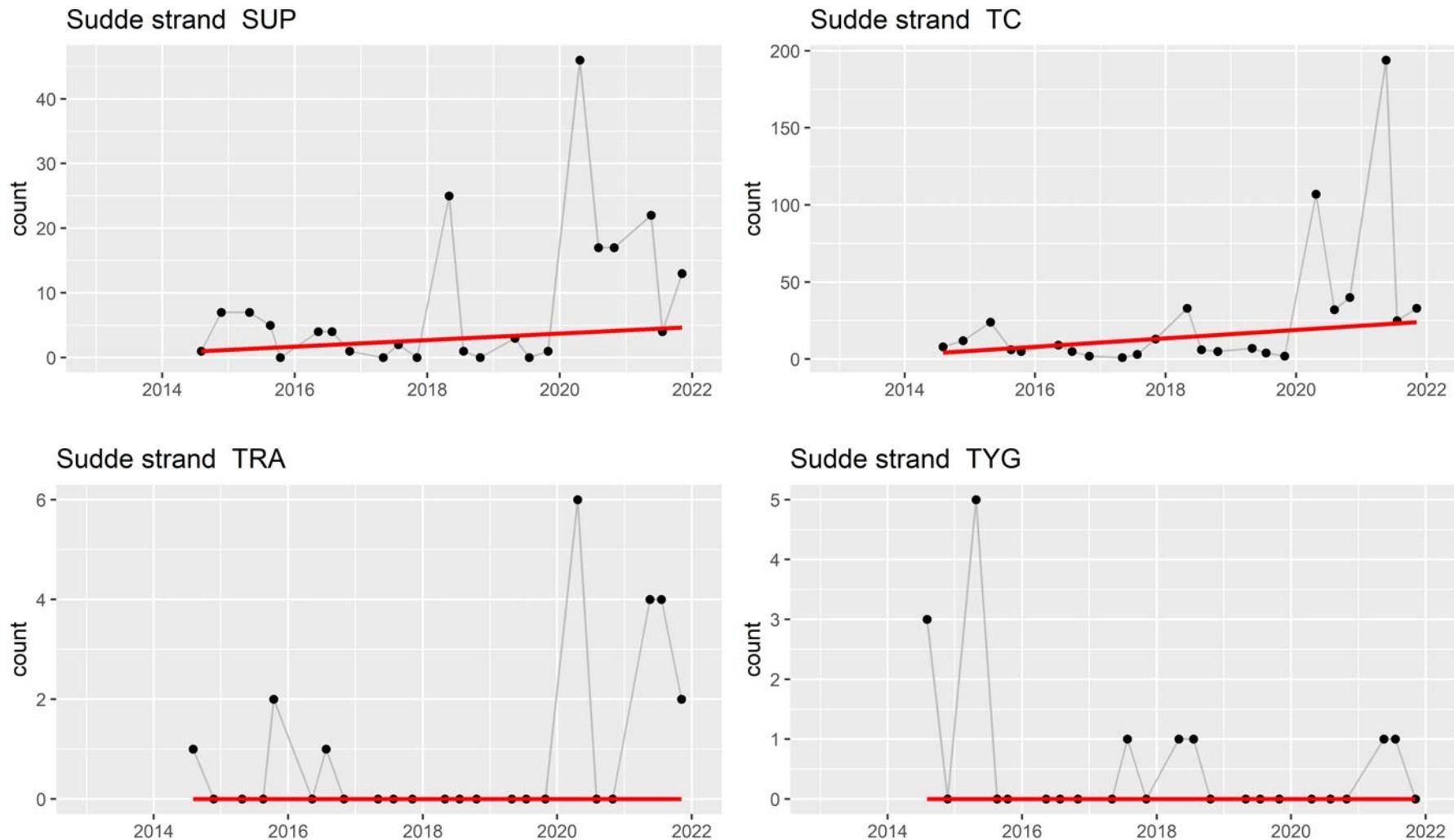


Sudde strand FISH



Sudde strand GLAS.KERAMIK**Sudde strand GUMMI****Sudde strand METALL****Sudde strand OLIKA.MATERIAL**

Sudde strand ORGANISKT**Sudde strand PAPPER.KARTONG****Sudde strand PLAST****Sudde strand SANITET.MEDICINSKT**



Regional trend analysis

For each region_code and the type names and group codes specified in the settings file, the following statistics have been estimated for the period 2013-01-01 to 2021-12-31:

- the number of surveys (N);
- Theil-Sen slope: the median of all Theil-Sen slopes (https://en.wikipedia.org/wiki/Theil%E2%80%93Sen_estimator) within a region;
- p-value (<https://en.wikipedia.org/wiki/P-value>): the p-value associated with the one-tailed Regional Kendall test (Van Belle & Hughes, 1984 (<https://dx.doi.org/10.1029/WR020i001p00127>); Gilbert, 1987 (<https://www.osti.gov/biblio/7037501-statistical-methods-environmental-pollution-monitoring>)) to test the null hypothesis of
 - no monotonically *increasing* trend in case the regional Theil-Sen slope is greater than zero;
 - no monotonically *decreasing* trend in case the regional Theil-Sen slope is smaller than zero;

A p-value less than an *a priori* specified significance level (https://en.wikipedia.org/wiki/Statistical_significance) (e.g., often $\alpha = 0.05$), indicates a significant trend. If the p-value is greater than this significance level, we can't say that there is no trend. We can only conclude that our data do not show evidence for a significant trend (due to lack of data, noise, etc.).

The Regional Kendall test is a non-parametric test and as such does not make distributional assumptions on the data.

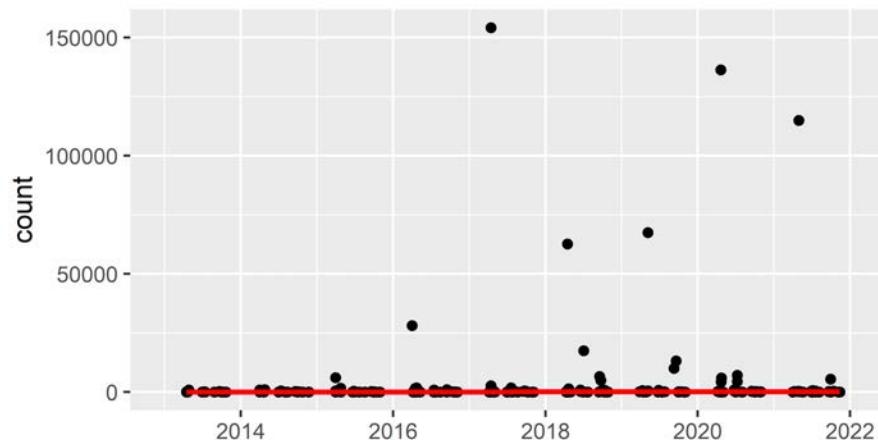
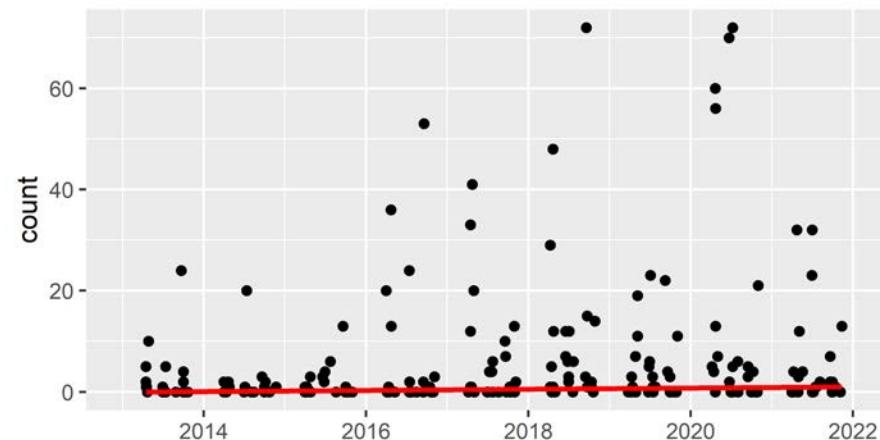
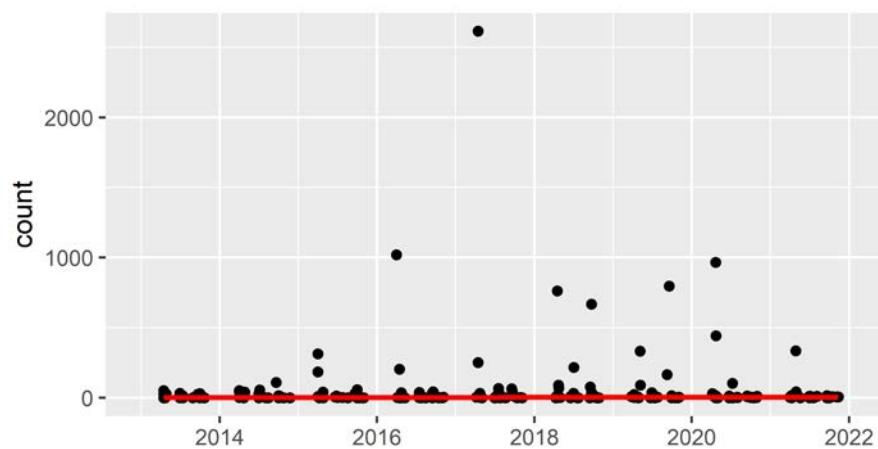
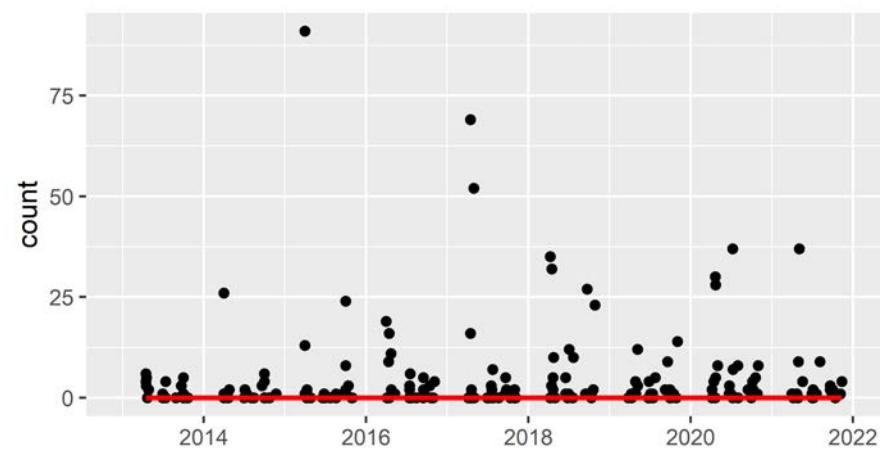
Note that the trend statistics can only be computed if all `location_code`s of a `region_code` have at least three records (surveys). If that is not the case, the table below contains `NA`.

<code>region_code</code>	<code>type name / group code</code>	<code>N</code>	<code>slope</code>	<code>p-value</code>
VH	TC	202	39.84	0.0092
VH	PLAST	202	36.31	0.0036
VH	FISH	202	8.926	0.0003
VH	SUP	202	3.021	0.2080
VH	GUMMI	202	0.2764	0.0441
VH	GLAS.KERAMIK	202	0.1171	0.0020
VH	METALL	202	0	0.9224
VH	OLIKA.MATERIAL	202	0	0.9883
VH	ORGANISKT	202	0	0.7801
VH	PAPPER.KARTONG	202	0	0.0261

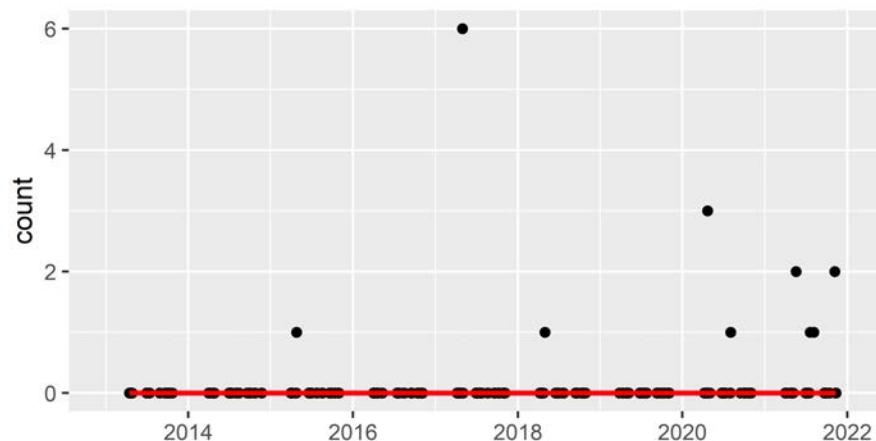
region_code	type name / group code	N	slope	p-value
VH	SANITET.MEDICINSKT	202	0	0.6983
VH	TRA	202	0	0.8622
VH	TYG	202	0	0.3153

Time-series of the selected type names and group codes are given for the selected regions in the plots below (see also Settings). The lines and dots have the following meaning:

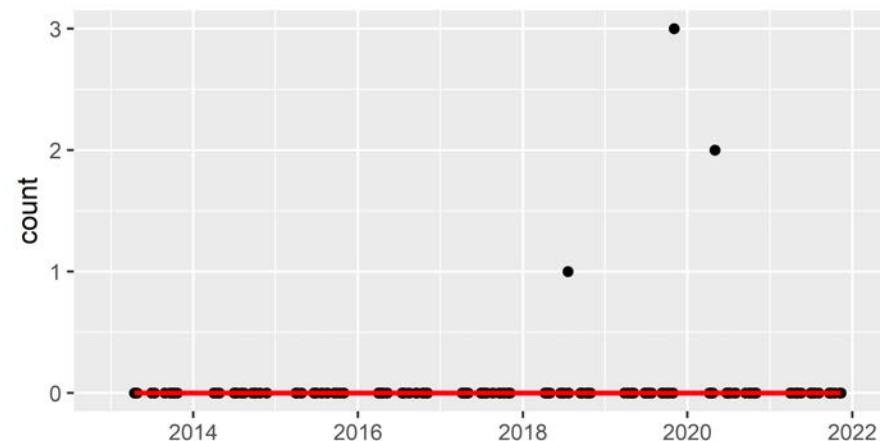
- coloured dots: observations;
- red line: Regional Theil-Sen trend line (its slope is given in the table above). Note that the trend line (red line) is only given in case there are at least three records (surveys) in each `location_code` to estimate the trend parameters.

VH FISH**VH GLAS.KERAMIK****VH GUMMI****VH METALL**

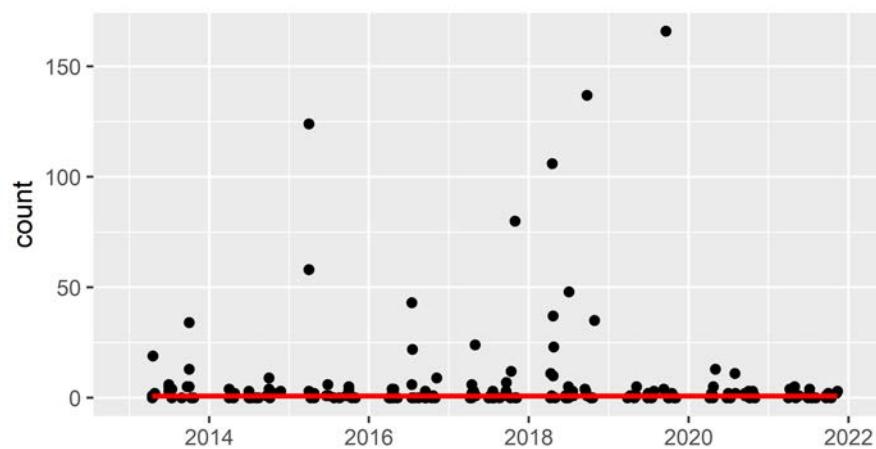
VH OLIKA MATERIAL



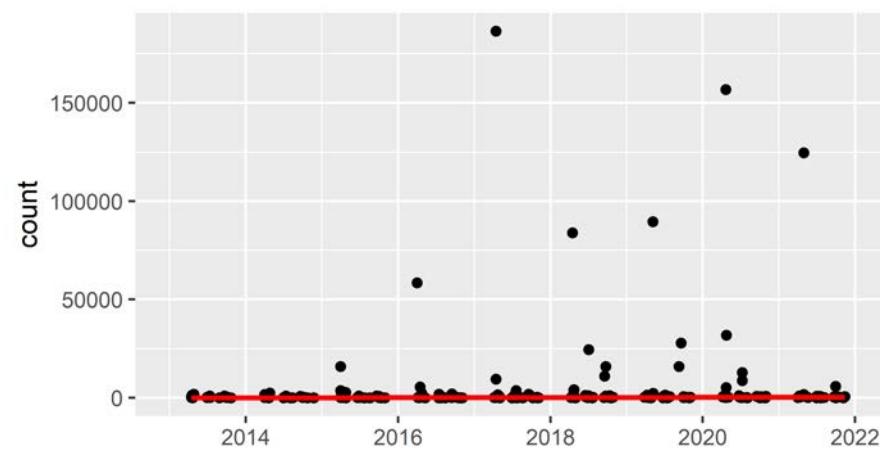
VH ORGANISKT

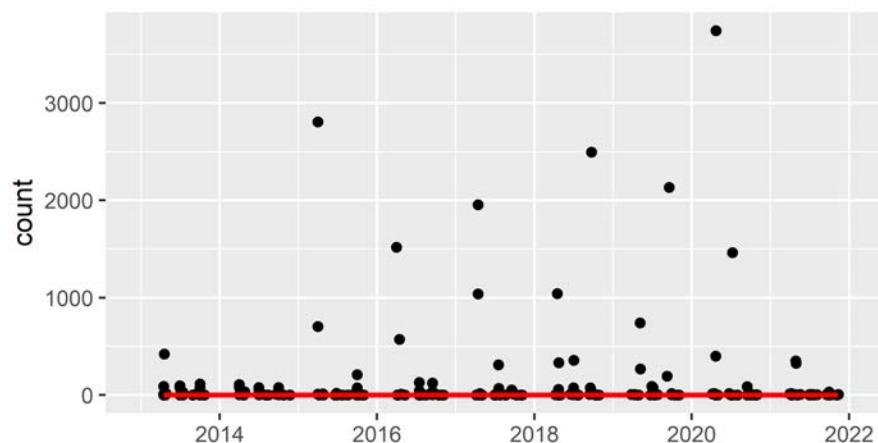
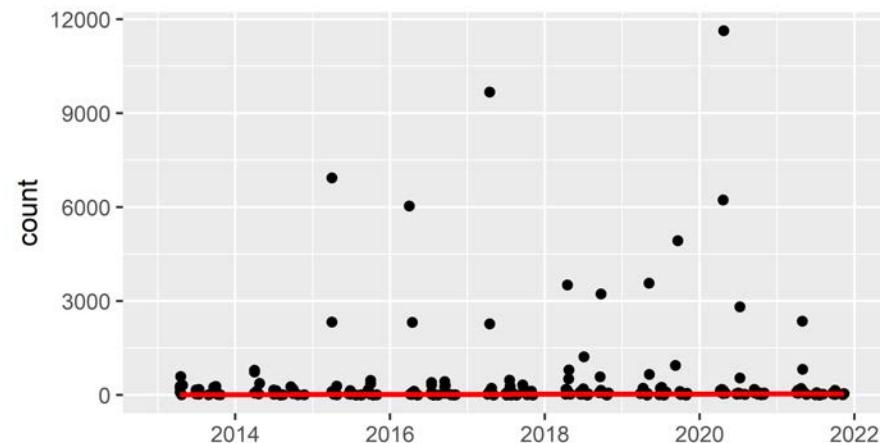
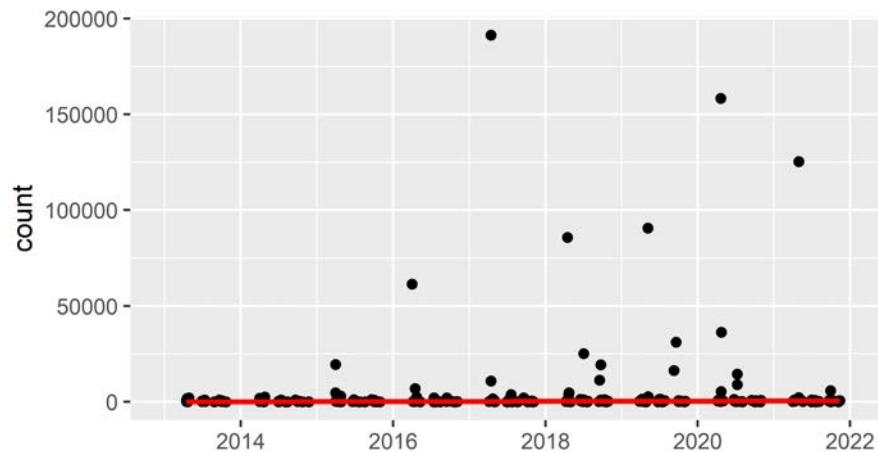
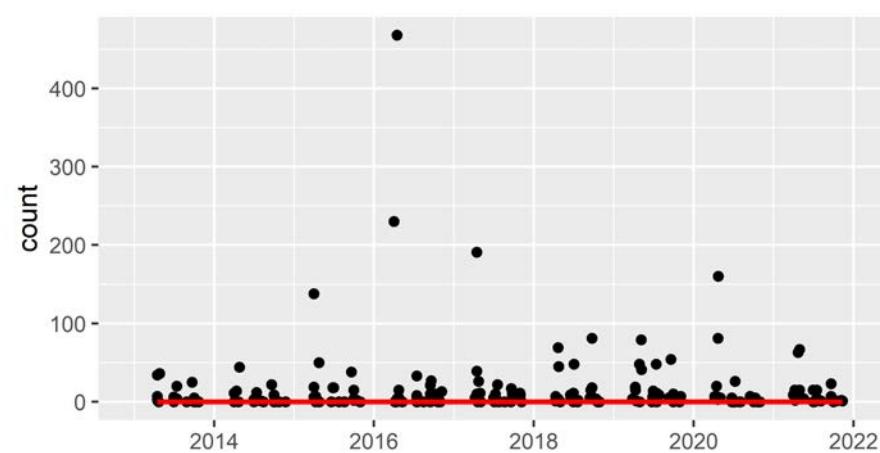


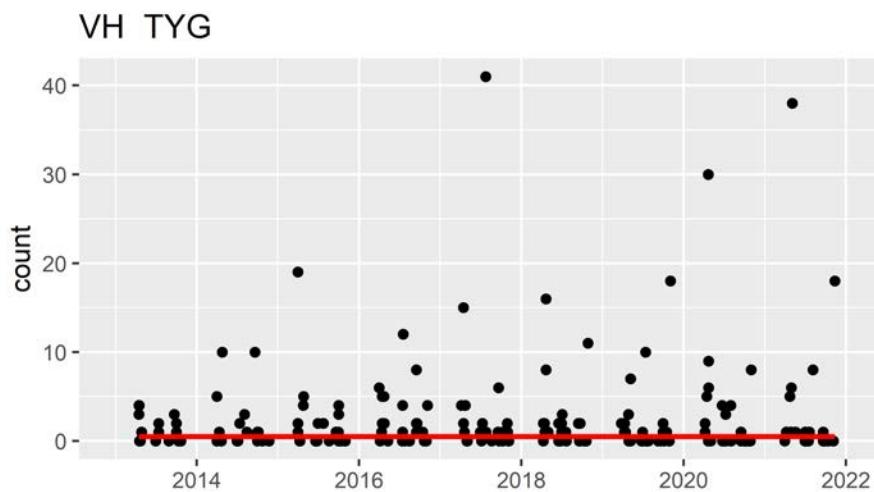
VH PAPPER.KARTONG



VH PLAST



VH SANITET.MEDICINSKT**VH SUP****VH TC****VH TRA**



Session Information

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R version 4.2.2 (2022-10-31 ucrt)
Platform: x86_64-w64-mingw32/x64 (64-bit)
Running under: Windows 10 x64 (build 22621)

Matrix products: default

locale:
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[3] LC_MONETARY=Swedish_Sweden.utf8 LC_NUMERIC=C
[5] LC_TIME=Swedish_Sweden.utf8

attached base packages:
[1] stats      graphics   grDevices utils      datasets   methods    base

other attached packages:
[1] stringr_1.4.1    readr_2.1.3     knitr_1.40      fs_1.5.2       ggplot2_3.4.0
[6] tidyverse_1.2.1   purrr_0.3.5    dplyr_1.0.10    rlang_1.0.6    litterR_1.0.0
[11] openxlsx_4.2.5.1

loaded via a namespace (and not attached):
[1] tidyselect_1.2.0 xfun_0.34        bslib_0.4.1     lattice_0.20-45  splines_4.2.2
[6] tcltk_4.2.2      colorspace_2.0-3 vctrs_0.5.0    generics_0.1.3   htmltools_0.5.3
[11] mgcv_1.8-41      yaml_2.3.6       utf8_1.2.2      pillar_1.8.1    jquerylib_0.1.4
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