

Levels of perfluoroalkyl and polyfluoroalkyl substances (PFASs) in feathers of Eurasian Eagle-Owls (*Bubo bubo*) from Norway

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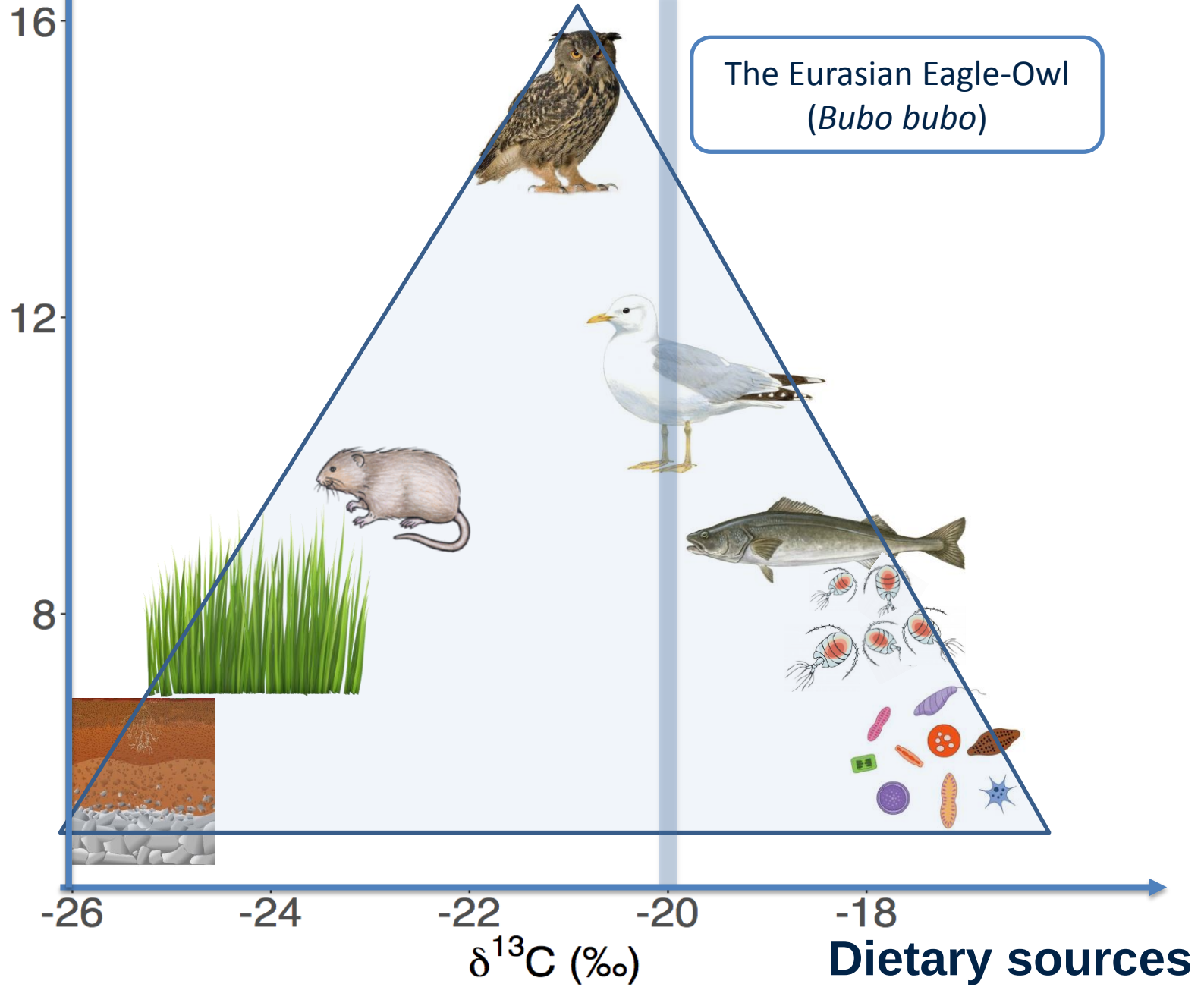
Aims

- Investigate:
 - Levels of PFASs
 - Difference between time and location
 - Difference in dietary sources ($\delta^{13}\text{C}$) and trophic position ($\delta^{15}\text{N}$)



Trophic position

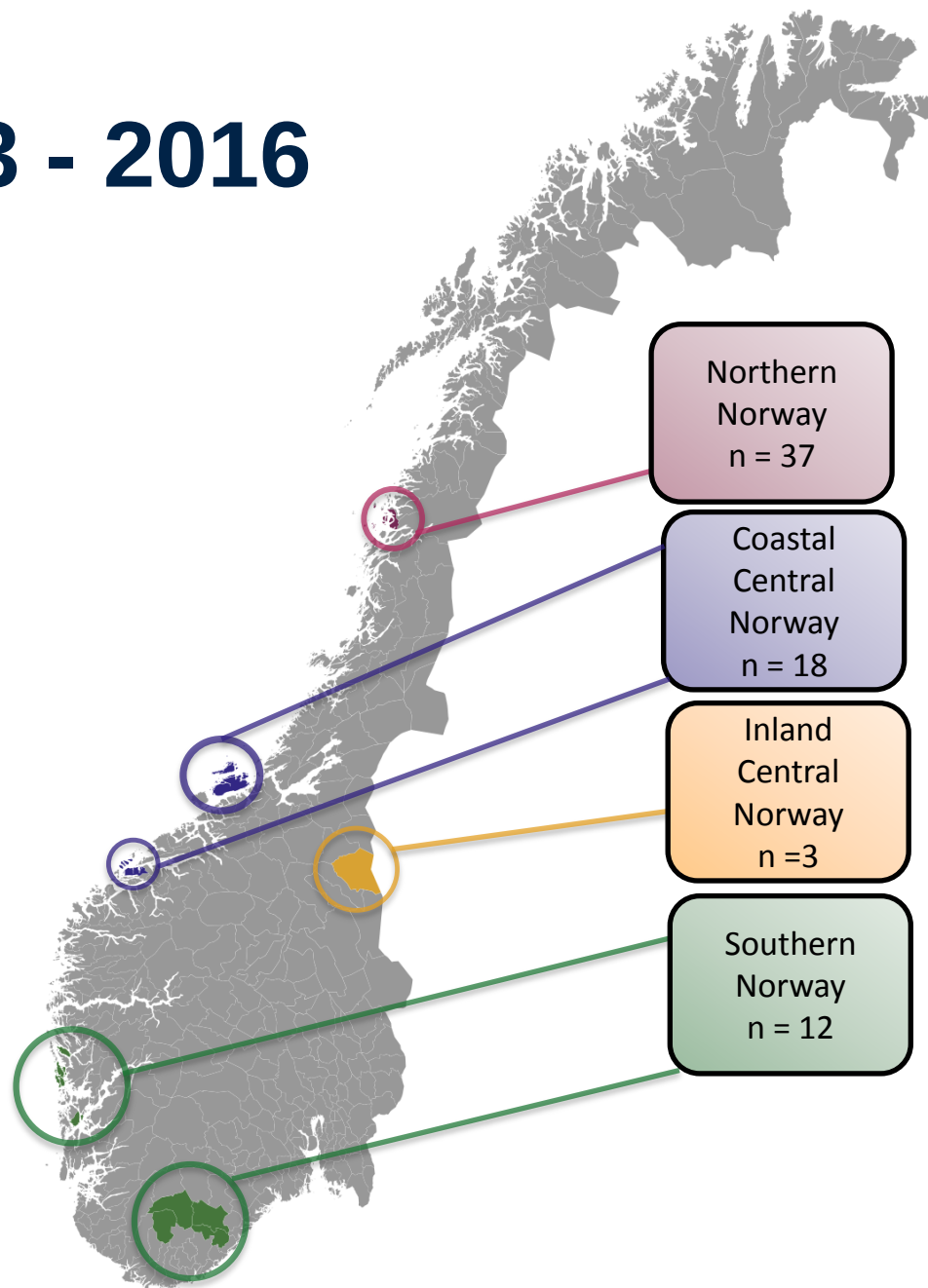
$\delta^{15}\text{N}$ (‰)



Sampling – 2013 - 2016



The Eurasian Eagle-Owl
(*Bubo bubo*)

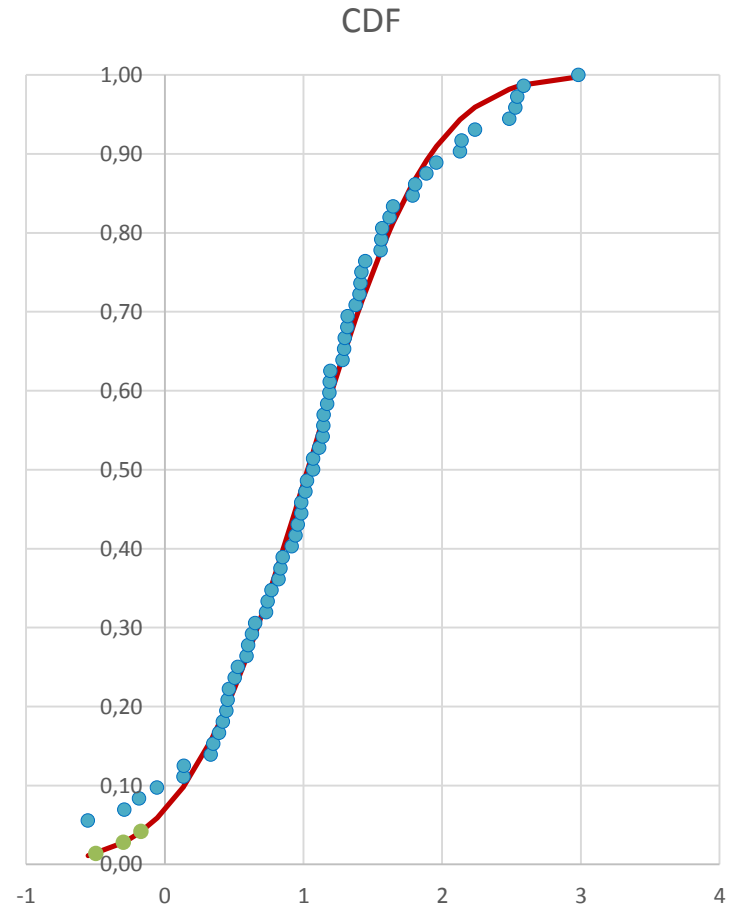


Materials



Methods

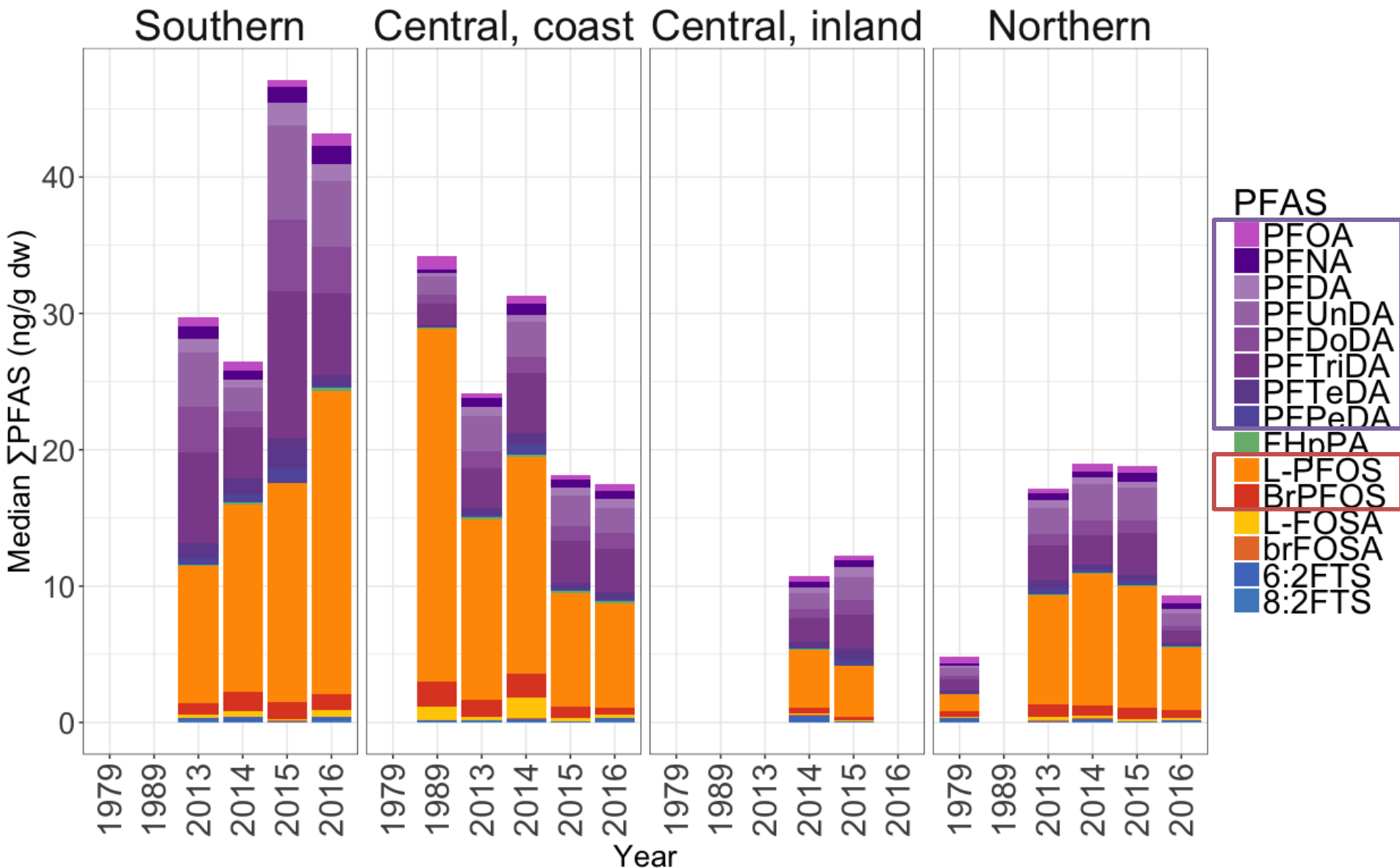
- Sex determination - DNA extraction
- PFASs – Powley method and UHPLC-MS
- Stable isotopes – Dumas combustion on an elemental analyser coupled to an isotope ratio-MS
- Statistics:
 - LOD> : Cumulative Distribution Curve
 - ANOVA and Tukey's HSD Post Hoc/Kruskal Wallis Dunn's Post Hoc Test
 - Spearman's Rank Correlations



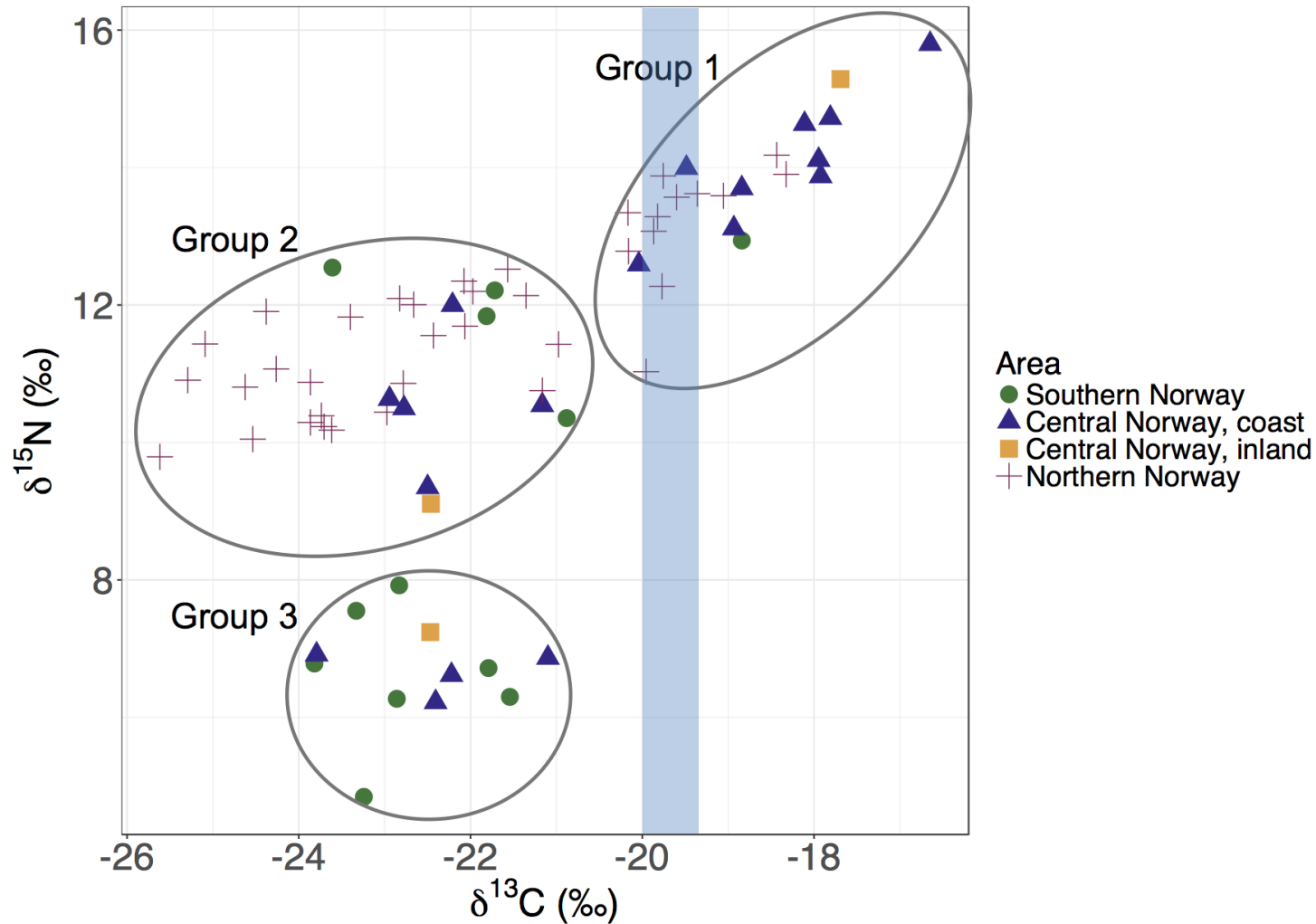
PFAS

Target Class	Target Substance	Acronym
PFCAs	Perfluoropentanoic acid	PFPeA
	Perfluorohexanoic acid	PFHxA
	Perfluoroheptanoic acid	PFHpA
	Linear Perfluorooctanoic acid	PFOA
	Perfluorononanoic acid	PFNA
	Perfluorodecanoic acid	PFDA
	Perfluoroundecanoic acid	PFUnDA
	Perfluorododecanoic acid	PFDoDA
	Perfluorotridecanoic acid	PFTriDA
	Perfluorotetradecanoic acid	PFTeDA
FTAs	Perfluoropentadecanoic acid	PFPeDA
	3-Perfluoropentyl propanoic acid (5:3)	FPePA (5:3 FTA)
	3-Perfluoroheptyl propanoic acid (7:3)	FHpPA (7:3FTA)
PFSA	Perfluorobutane sulfonic acid	PFBS
	Linear Perfluorohexane sulfonic acid	L-PFHxS
	Branched Perfluorohexane sulfonic acid	Br-PFHxS
	Linear Perfluorooctane sulfonic acid	L-PFOS
	Branched Perfluorooctane sulfonic acid	Br-PFOS
	Linear Perfluorodecane sulfonic acid	L-PFDS
	Branched Perfluorodecane sulfonic acid	Br-PFDS
FASAs	Linear Perfluorooctane sulfonamide	L-FOSA
	Branched Perfluorooctane sulfonamide	Br-FOSA
	Linear Perfluorooctane sulfonamidoacetic acid	L-FOSAA
	Branched Perfluorooctane sulfonamidoacetic acid	Br-FOSAA
	Linear N-Methyl Perfluorooctane sulfonamidoacetic acid	L-MeFOSAA
	Branched N-Methyl Perfluorooctane sulfonamidoacetic acid	Br-MeFOSAA
	Linear N-Ethyl Perfluorooctane sulfonamidoacetic acid	L-EtFOSAA
FTSs	Branched N-Ethyl Perfluorooctane sulfonamidoacetic acid	Br-EtFOSAA
	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate(4:2)	4:2 FTS
	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate(6:2)	6:2 FTS
	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate(8:2)	8:2 FTS

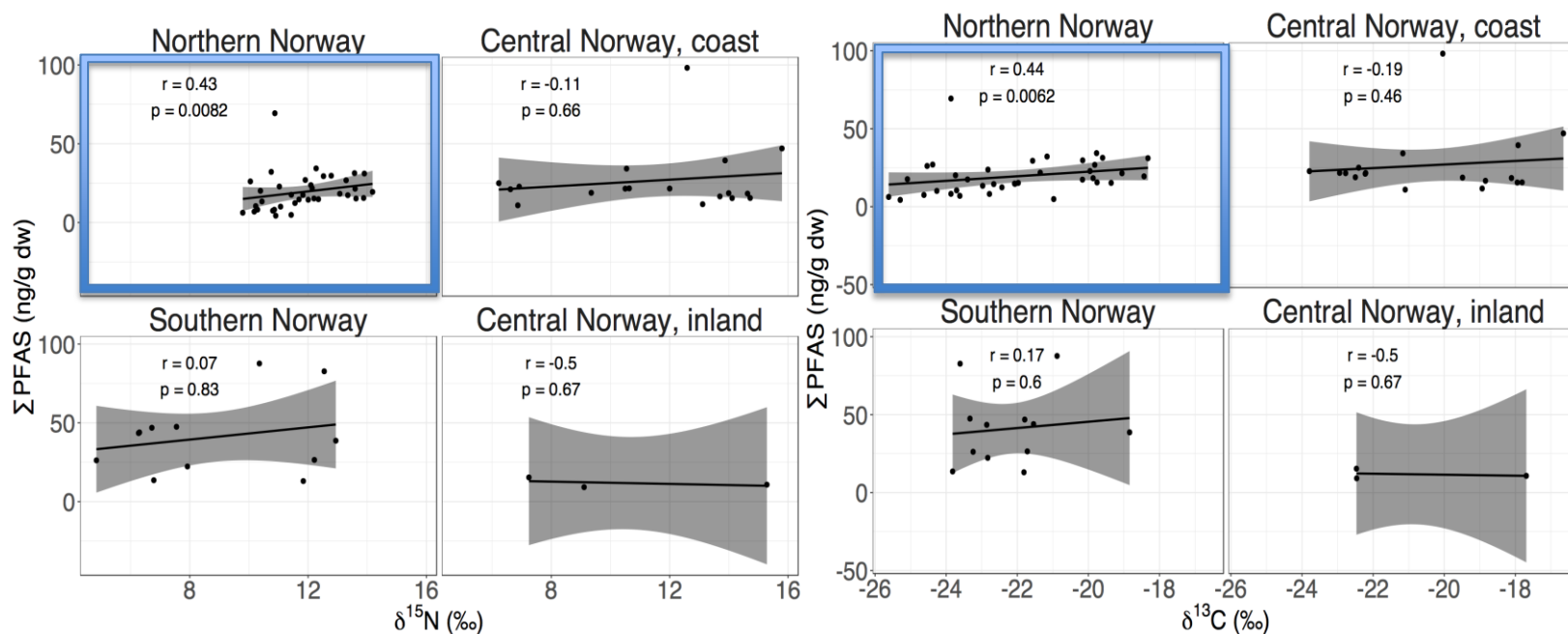
Results



Stable isotopes



Stable isotopes and PFASs



Conclusion

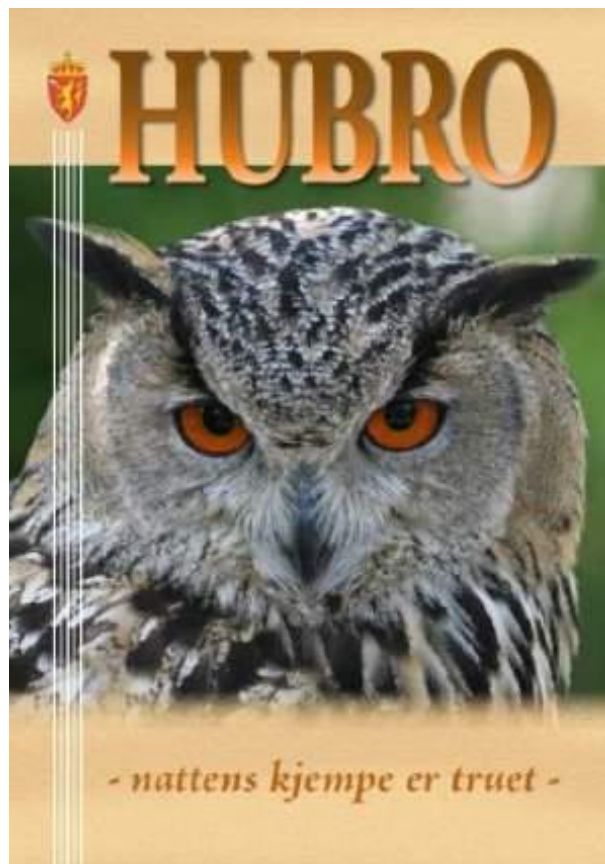
- Different contamination pattern between areas
- No difference between sampling years
- Great variation in dietary tracers and trophic positions

Thanks to

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- Igor Eulaers (UA)



Thank you for listening!



	Southern			Central, coastal			Central, inland			Northern		
<i>n</i>	12			18			3			37		
	Median	Min	Max	Median	Min	Max	Median	Min	Max	Median	Min	Max
$\delta^{13}\text{C}$	-22.32	-23.82	-18.84	-20.57	-23.79	-16.65	-22.46	-22.47	-17.69	-22.08	-25.62	-18.32
$\delta^{15}\text{N}$	7.74	4.84	12.94	12.30	6.22	15.80	9.11	7.24	15.29	11.83	9.79	14.18
PFOA	0.65	0.44	1.10	0.39	0.22	1.02	0.37	0.36	0.45	0.51	<0.20	1.08
PFNA	1.02	0.41	2.13	0.60	0.27	1.36	0.44	0.38	0.61	0.51	<0.20	1.74
PFDA	1.15	0.27	2.67	0.59	0.22	1.95	0.52	0.42	0.94	0.48	0.11	1.85
PFUnDA	4.56	1.60	10.90	2.20	0.90	4.44	1.58	1.15	1.85	1.84	<0.10	9.33
PFDODA	3.77	1.16	7.85	1.13	0.58	2.67	0.95	0.67	1.12	0.85	<0.10	3.25
PFTriDA	7.19	2.79	19.76	2.98	1.42	11.99	2.30	1.70	2.76	2.10	<0.20	9.37
PFTeDA	1.27	0.57	4.65	0.44	0.16	2.39	0.44	0.36	1.05	0.40	<0.10	1.89
PFPeDA	0.52	<0.10	2.83	0.17	0.01	1.55	0.21	0.12	0.80	0.25	<0.30	1.73
ΣPFCAs	20.13	8.45	51.38	8.33	4.88	24.72	7.12	5.39	9.06	7.19	2.64	29.72
FHpPA (7:3FTA)	0.08	0.03	0.75	0.17	0.02	0.84	0.03	0.01	0.06	0.07	0.01	0.23
L-PFOS	12.42	1.61	51.41	9.40	3.43	73.91	4.28	1.67	5.76	8.54	0.76	37.41
Br-PFOS	1.15	0.27	2.13	0.85	0.43	4.91	0.35	0.24	0.42	0.78	0.34	1.71
L-PFDS	0.11	0.01	0.96	0.11	0.01	0.41	0.03	0.01	0.06	0.04	0.006	0.26
ΣPFASs^2	13.94	1.90	53.05	10.13	4.05	79.23	4.71	1.93	6.17	9.38	1.46	39.34
L-FOSA	0.18	<0.02	0.82	0.22	0.09	2.92	0.08	<0.02	0.10	0.19	<0.02	1.72
Br-FOSA	0.02	<0.02	0.07	0.02	0.005	0.08	0.01	<0.02	0.03	0.02	<0.02	0.07
6:2FTS	0.07	0.004	0.58	0.05	0.002	0.45	0.04	0.01	0.44	0.05	0.003	1.33
8:2FTS	0.17	0.03	0.54	0.11	0.02	0.52	0.06	0.04	0.09	0.07	0.01	0.39

