SOME KEY MESSAGES FROM THESSALONIKI

Which compounds

COMPOUND	G1	G2	G4	average	ave * 3 by mention
Pharmaceuticals (NSAIDs)	1	4	1	2	2.0
Agrochemicals	3	1	3	2.333333	2.3
Rodenticides	4	3	4	3.666667	3.7
metals (Pb, Hg, As, …)	5	5	1	3.666667	3.7
Perflourinated,	1		5	3	4.5
carbanates		2		2	6.0
OCs	7	7	7	7	7.0
brominated and newer FR		6	8	7	7.0
Molluscicides	6			6	18.0
antibiotics			6	6	18.0
Micro-plastics	8			8	24.0
Personal care products			9	9	27.0
PAHs			10	10	30.0

OUTPUT CAPTURE: CANDIDATE SPECIES/COMPOUND/MATRIX AND UNCERTAINTIES

GROUP 2
Metals (1.Pb, 2.Hg)

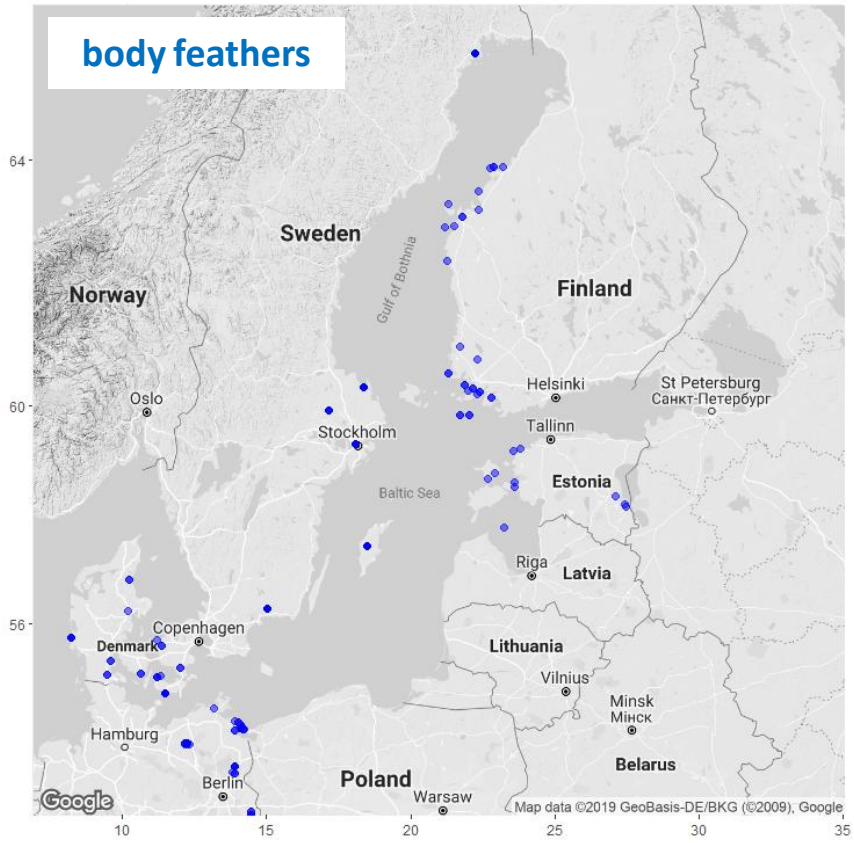
Purpose of monitoring	Trait	Suggested species	Matrix	Rationale/Comment	Key issues/uncertainties
Pb - Exposure biomonitoring	scavengers	Vultures, eagles, kites	Blood, liver, kidney, bone	Hunting ammo	Proven it is highly toxic, cross-country (European) helpful for ECHA, large scavengers available in the South and North
	Active hunters	Eagles, goshawks, eagle owls, peregrine, marsh harrier	Blood, liver, kidney bone	Waterfowl, pigeons, thrushes (mediterranean aspect) carrying embedded lead shots	
Pb - Effects biomonitoring (if different)	Same as above	Same as above	Same as above	Same as above	Carcasses should be used to monitor effects (lethal concentrations), blood from breeding birds and/or nestlings might be used to monitor health effects and also check reproductive success

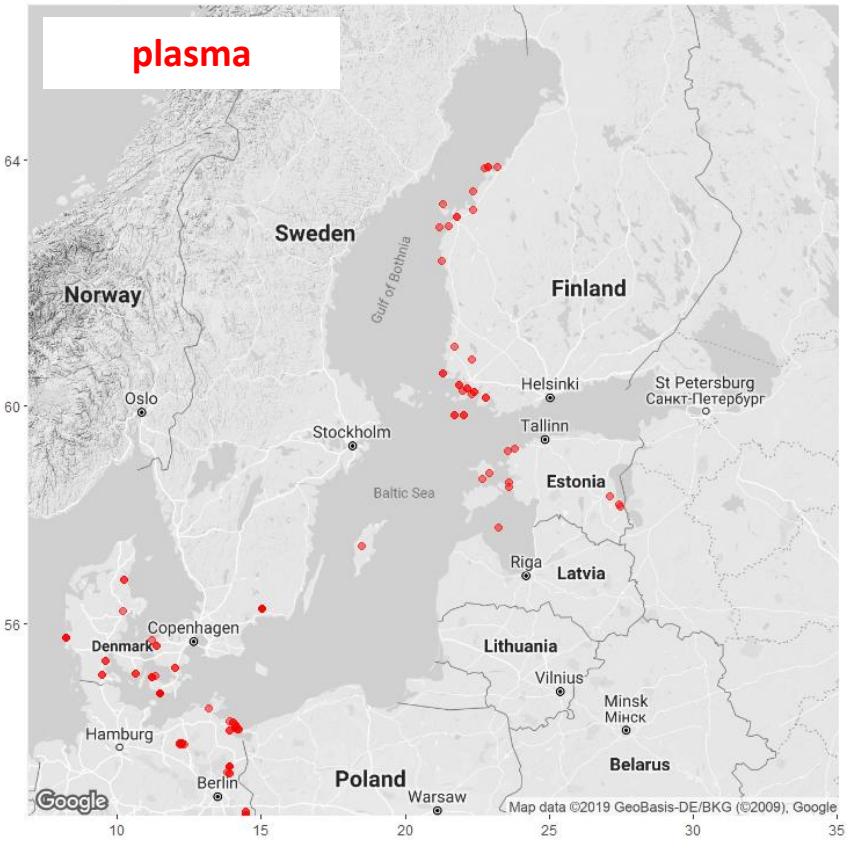
RODENTICIDES

Purpose of monitoring	Trait	Suggested species	Matrix	Rationale/Comments/uncertaintiest
Biomonitoring over time at a pan European scale	Same traits as above but European residents Widespread and abundant Carcasses easily found	Eagle owl LE owl Common kestrel Common buzzard	Livers	Are things at European scale changing in terms of exposure???? This is the question. Maybe some surrogate species if there are no buzzards
Biomonitoring for good spatial scale resolution	Same attributes as above RESIDENT	Tawny owl Barn owls Kites	Livers	Can select tawnys from urban, open farmland and forest (control). Not in Norway Tawny owls are less easy to find perhaps than buzzards in terms of carcasses. Tawny owls resident, unlike buzzards Can use owls for effects monitoring by measuring anticoagulation in blood and sampling birds fom nestboxes Influence of dumps (black kites feeding on

White-tailed eagles as multi-stressor sentinels

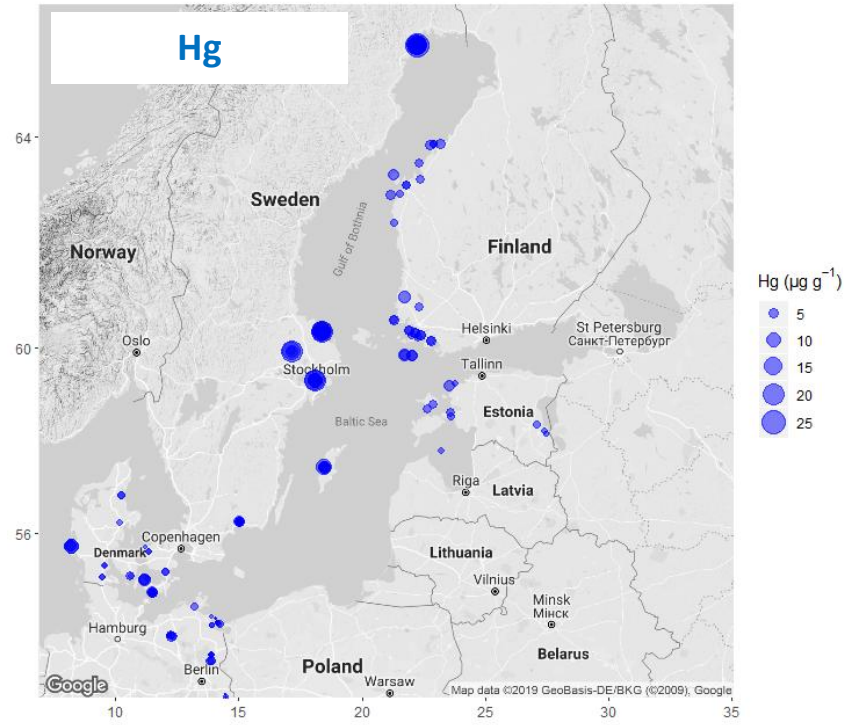
Nestlings as spatial sentinels: spatial coverage

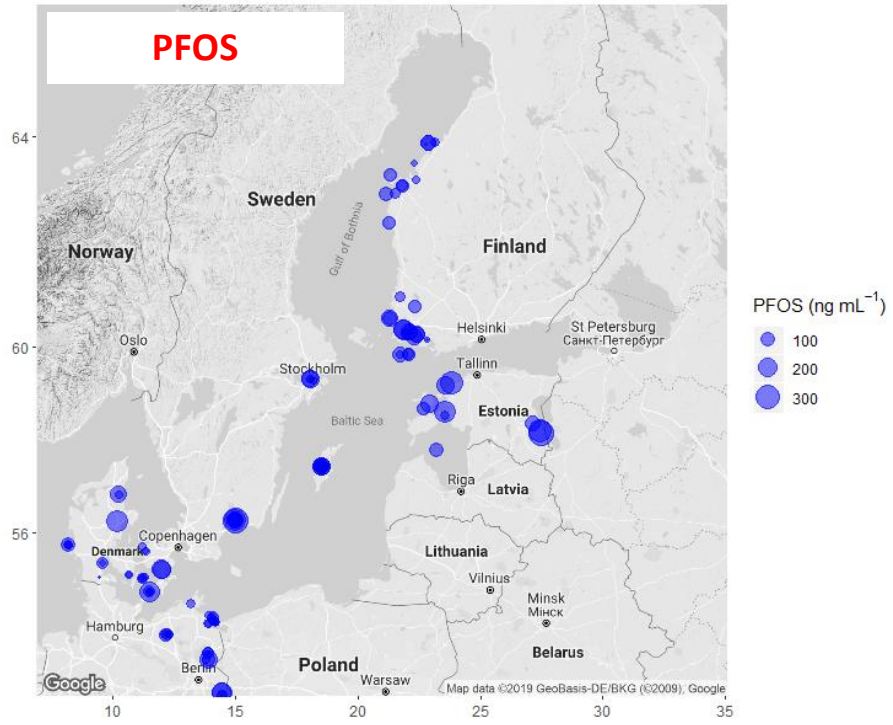




White-tailed eagles as multi-stressor sentinels

Nestlings as spatial sentinels of Hg and PFOS exposure





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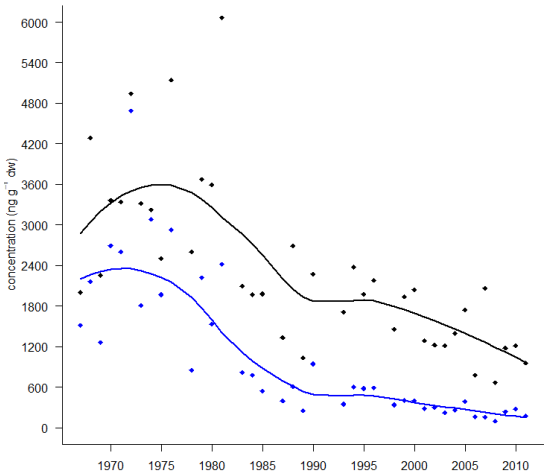
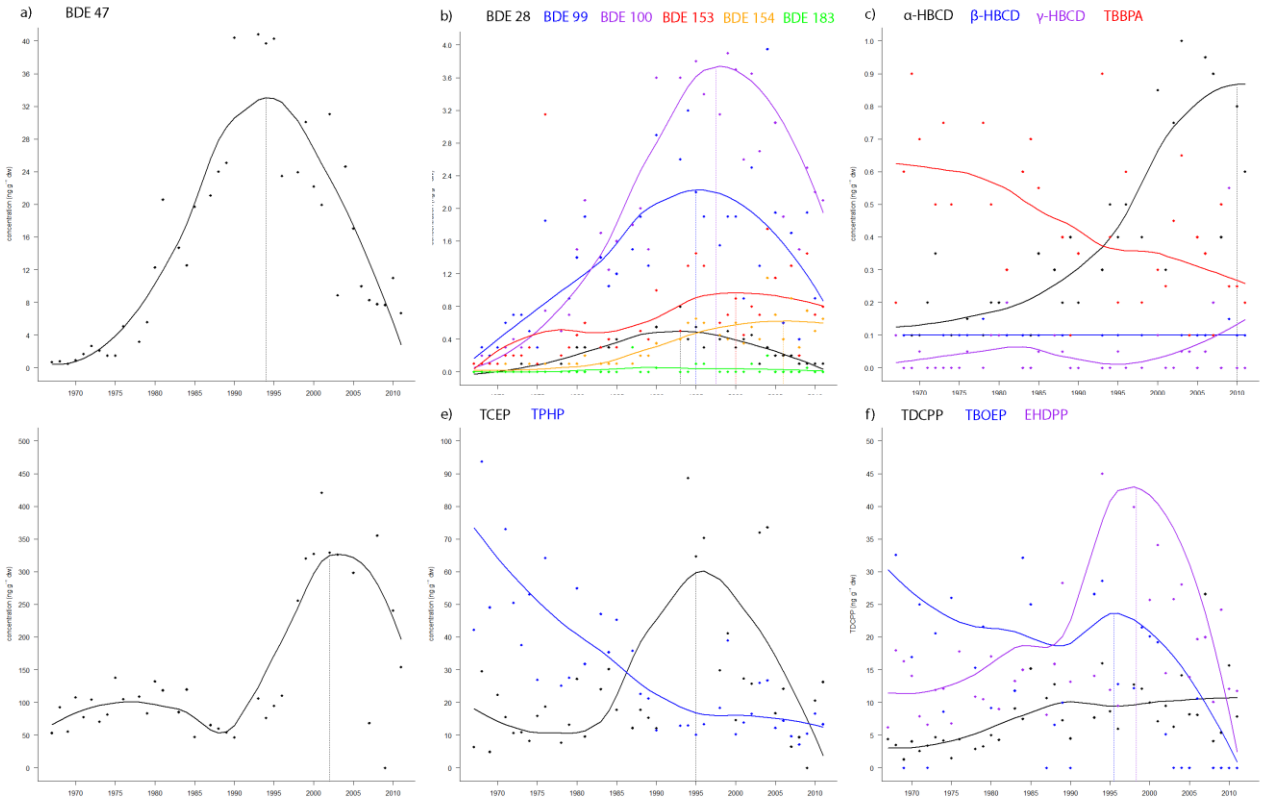
White-tailed eagles as multi-stressor sentinels

Museum collections to study long-term time trends: POPs and nBFRs





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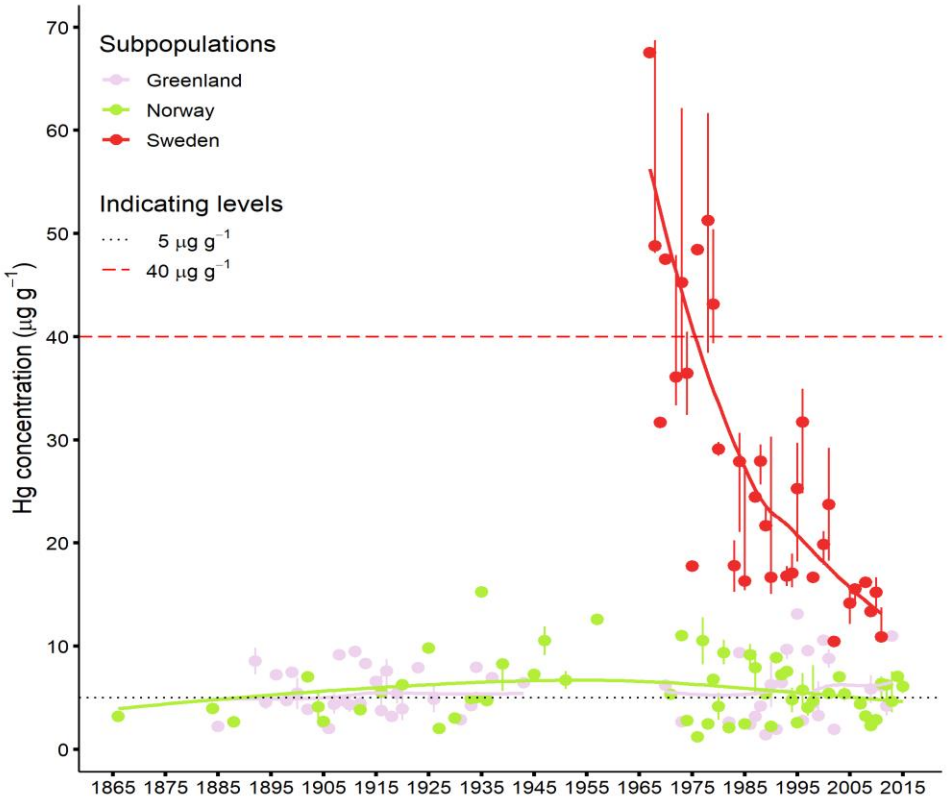
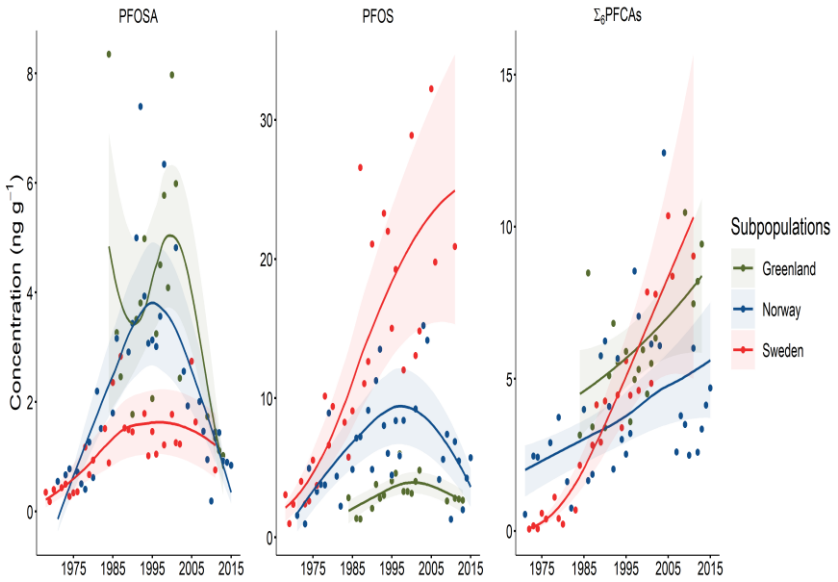
White-tailed eagles as multi-stressor sentinels

Museum collections to study long-term time trends: Hg and PFASs





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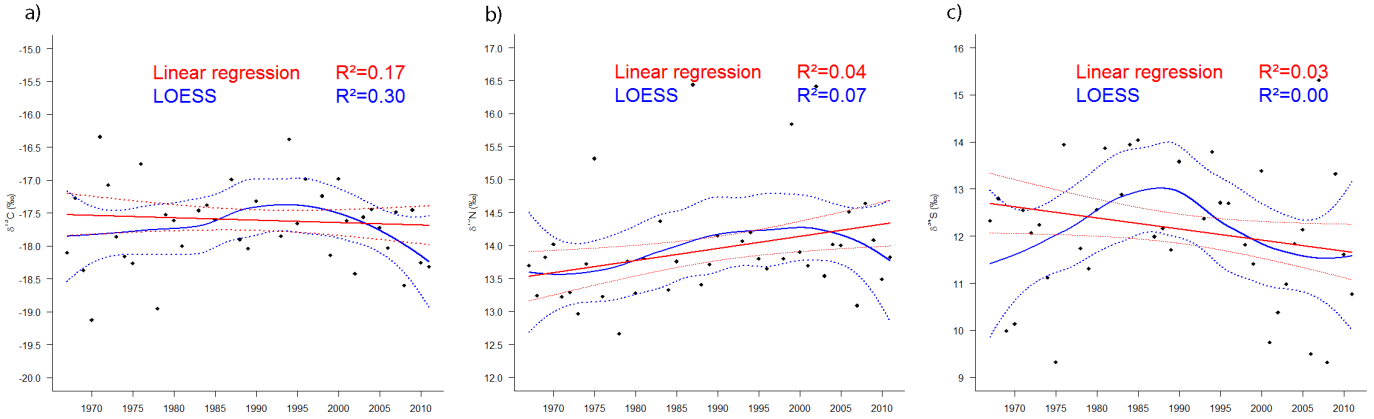
White-tailed eagles as multi-stressor sentinels

Museum collections to study long-term time trends: dietary and climate effects



increasing

		θ_x	P_x	R^2
BDE 28	year+δ^{13}C	0.05; 0.07	<0.01; 0.02	0.65
BDE 47	year+δ^{13}C	0.07; 0.07	<0.01; 0.02	0.84
BDE 99	year+δ^{34}S	0.04; 0.04	<0.01; <0.01	0.63
BDE 100	year+δ^{34}S	0.05; 0.06	<0.01; <0.01	0.78
BDE 153	year+NAO+δ^{34}S	0.03; 0.03; 0.04	<0.01; 0.07; <0.01	0.47
BDE 154	year+NAO+δ^{13}C	0.03; 0.03; 0.07	<0.01; 0.05; <0.01	0.55
BDE 183	year	0.02	0.38	0.06
α-HBCD	year+NAO+δ^{34}S	0.02; -0.03; 0.03	<0.01; 0.04; <0.01	0.57
TBBPA	year+δ^{34}S	0.21; -0.10	0.07; 0.03	0.56
EHDPP	year+NAO	0.01; 0.05	0.63; 0.02	0.10
TBOEP	year	0.13	0.12	0.21
TCEP	year+NAO:δ^{15}N+NAO:δ^{34}S+δ^{13}C	0.05; 0.07; −0.04; 0.27	<0.01; <0.01; 0.06; 0.02	0.28
TCIPP	year+NAO	0.08; 0.03	<0.01; 0.04	0.80
TDCIPP	year+NAO$_{-1}$+δ^{34}S	0.01; 0.02; 0.03	<0.01; 0.06; <0.01	0.29
TPHP		NA		

decreasing

		θ_x	P_x	R^2
BDE 28	year+δ^{15}N+δ^{34}S	−0.04; 0.06; −0.02	<0.01; <0.01; 0.13	0.63
BDE 47	year+δ^{15}N	−0.04; 0.08	<0.01; <0.01	0.69
BDE 99	year+δ^{15}N+δ^{34}S	−0.01; 0.05; 0.07	<0.01; 0.14; <0.01	0.39
BDE 100	year+δ^{34}S	−0.02; 0.03	<0.01; <0.01	0.38
BDE 153	year+NAO$_{-1}$:δ^{34}S+δ^{13}C	0.00; 0.02; 0.15	0.50; 0.01; 0.05	0.36
BDE 154	year	0.00	0.88	0.00
BDE 183	year	−0.01	0.60	0.03
α-HBCD		NA		
TBBPA	year	-0.01	<0.01	0.17
EHDPP	year+NAO:δ^{15}N	−0.04; 0.05	<0.01; <0.01	0.27
TBOEP	year	0.01	0.70	0.01
TCEP	year+NAO:δ^{15}N	0.01; 0.08	0.68; <0.01	0.26
TCIPP	year+NAO:δ^{15}N+δ^{34}S	−0.04; 0.03; −0.06	0.03; 0.02; 0.04	0.34
TDCIPP		NA		
TPHP	year+NAO:δ^{34}S+δ^{15}N	−0.02; −0.02; 0.04	<0.01; <0.01; 0.06	0.46

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THINGS TO CONSIDER

- Numbers, species, compound, matrix and sampling effort (new samples/banked samples) covered in Rafa presentation
- What are we trying to demonstrate—spatial coverage/temporal coverage/both/something else?
- Contaminants and isotopes?
- Make timeframe realistic for sample collection
- Don’t make life overly difficult or overthink, it is a proof of concept.
- Once there are some data, it will throw up lots of questions, logistical, analytical and interpretative issues
- Will need to consider how to logistically interpret the output (in the agenda)