GMS v RIS: Long term and short term abundance trends

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Steve Roberts, Centre for Biostatistics, University of Manchester

1 Contents

> ⓘ Feedback
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> Comments and feedback welcome to steve.roberts@manchester.ac.uk or SteveRoberts@live.co.uk

2 Background

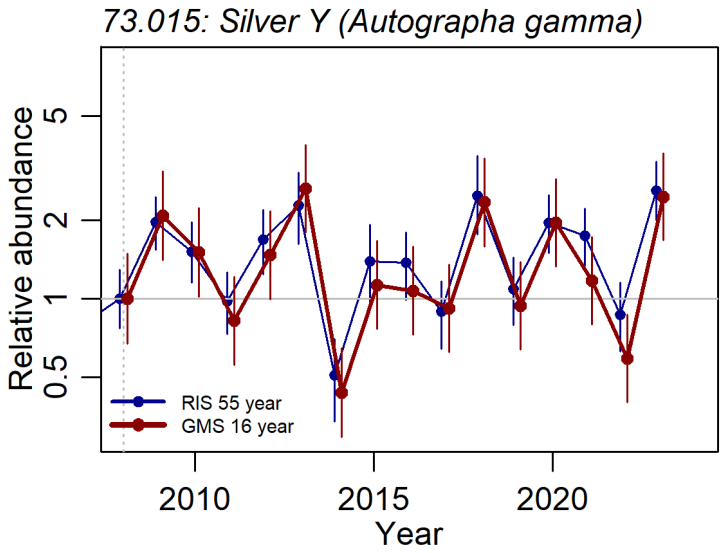
Here we compare the results of the abundance trend analyses from the GMS (2008-23) to that from the Rothamsted Insect Survey (RIS) (1968-2023). The RIS data represents the latest analyses [ref to be added when available] and was provided by Colin Harrower (CEH) as annual abundances (GAI) and fitted trend estimates over the whole period. The RIS trends update the analyses in the 2019 “Atlas of Britain & Ireland’s Larger Moths” and the 2021 “State of Britain’s Larger Moths” report. 157/184 of the GMS species analyzed to date have usable trend data from both GMS and RIS.

3 An overall comparison with Rothamsted data

3.1 Comparing GMS annual abundances to Rothamsted estimates

Figure 1 shows the annual relative abundances for the Silver-Y (*Autographa gamma*) by year for the two series. Abundances are normalised relative to 2008. This ubiquitous, non-resident migratory species is widespread both geographically and in terms of habitat and would not be expected to show much difference in (relative) abundance between locations and monitoring schemes. As such it provides a reasonable test of the equivalence between the two schemes. The two series match astonishingly well. (Note the points in *Figure 1* are offset slightly for visibility.)

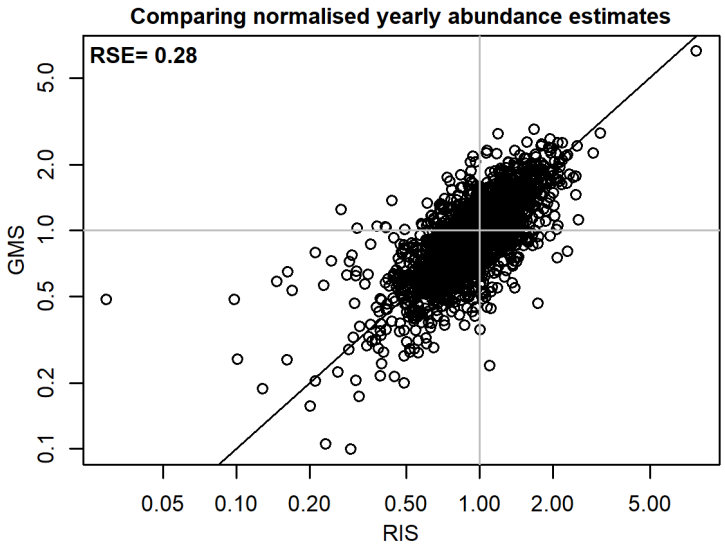
Figure 1: Abundance by year for Silver-Y



[The State report and draft paper have 4-species versions of this plot]

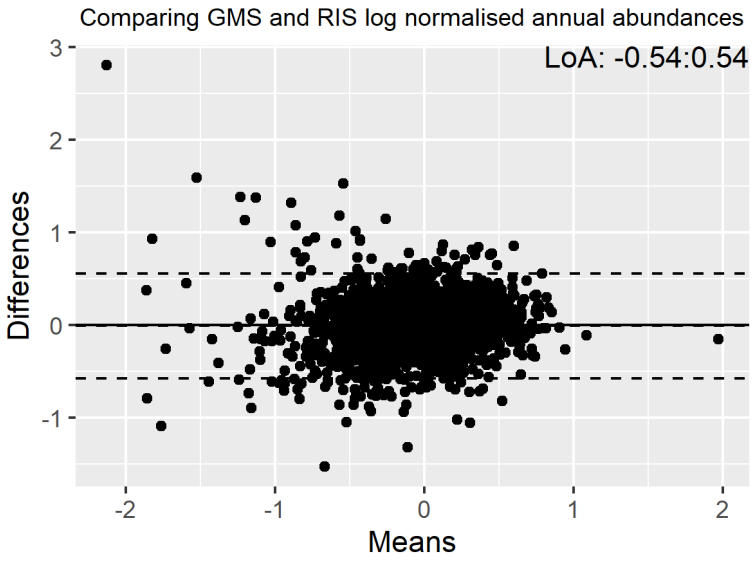
Figure 2 shows the association between the (log) annual abundances from the two series over 2008-2023 for all 157 species where we have both estimates. The abundances have been normalised by the mean abundances in each species and series so reflect relative changes between years and we analyse on the log scale. Diagonal line is equivalence.

Figure 2: Normalised Abundances : RIS 2008-23 v GMS



The residual standard error is 0.28 suggesting a ~25% variation between the two measures. A better estimate is provided by the Bland-Altman limits of agreement (LoA) - the Bland-Altman plot is shown in *Figure 3* (this plots the difference between the two measurements against the mean of the two measurements). The 95% limits of agreement are (-0.54:0.54) suggesting the two series will estimate the abundance to within ±50% 95% of the time.

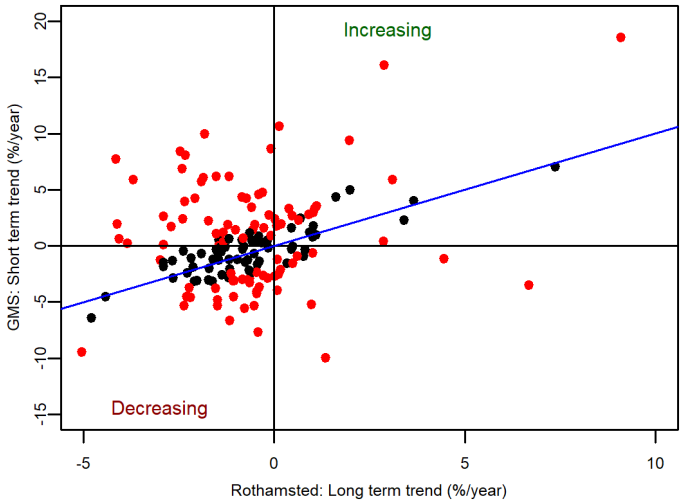
Figure 3: Bland-Altman plot: RIS recent v GMS



3.2 Comparing GMS trends to Long term Rothamsted trends

Figure 4 compares the recent (2008-23) GMS trends with the long-term trend (1968-2023) published from the Rothamsted data - expressed as a percentage change per year. The species where the two estimates are formally different (z-test based on the CI of the two estimates) are shown in red. 95%CI are shown for the GMS estimates. The diagonal blue line is numerical equality between the two trends.

Figure 4: Abundance trends: RIS long term v GMS



93/157 (59%) of species show a nominally significant difference between the two series.

The correlation here is not very strong and most species show formally significant differences in the trends. As can be seen from the individual species accounts below, in many cases this is due to the long-term trends not being representative of more recent trends, with declines in abundances from the 70s and 80s being reversed in the 2000s or increases in abundance plateauing. There is clearly an analysis to be done here comparing recent and historical trends, but that is beyond the scope of a GMS data analysis. *What we do note here is that the GMS data tells us what is happening to moths now, whilst the RIS data, as currently analysed, tells us about what has happened over 55 years*

Table 1 lists those species that are significantly increasing in the GMS (and usually also in RIS over the same period) whilst suffering a significant long-term decline over the 55 years of RIS. This will be a subset of the moths that are undergoing recovery in recent years as the RIS estimates include the recent period and we are only looking at

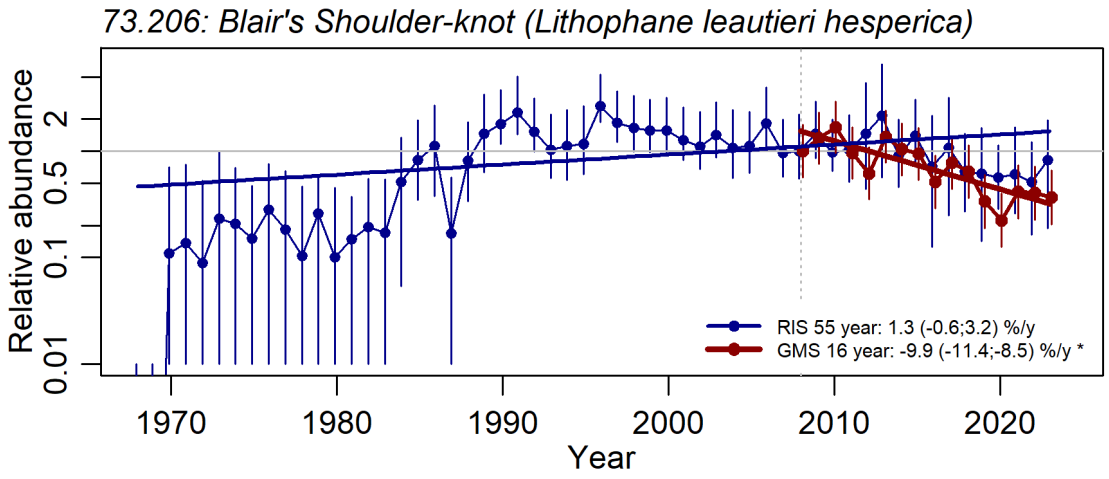
"recent" as defined by the 16 years of GMS. Interestingly we do not detect any species that are showing a decline after long-term increase: this is unsurprising as most species are declining in the long-term RIS series.

Table 1: Species where GMS shows recovery from long term decline

ABHno	Scientific.Name	Common.Name
66.001	Poecilocampa populi	December Moth
70.024	Scopula imitaria	Small Blood-vein
70.234	Ennomos alniaria	Canary-shouldered Thorn
70.256	Erannis defoliaria	Mottled Umber
71.025	Phalera bucephala	Buff-tip
73.045	Acronicta rumicis	Knot Grass
73.092	Caradrina morpheus	Mottled Rustic
73.131	Luperina testacea	Flounced Rustic
73.186	Agrochola lychnidis	Beaded Chestnut
73.291	Mythimna pallens	Common Wainscot
73.301	Leucania comma	Shoulder-striped Wainscot
73.319	Agrotis segetum	Turnip Moth
73.338	Lycophotia porphyrea	True Lover's Knot

Blair's Shoulder Knot (*Lithophane leautieri*) is the exception here but, due to the timing of the loss in abundance, the RIS trend does not now show a significant increase as it is counterbalanced out by the more recent decrease - see ***Figure 5***.

Figure 5: Abundance trends: Blair's Shouder Knot



** GMS data shows large decline - RIS data similar*
** Contrasting with large increase since very low numbers in 70s*

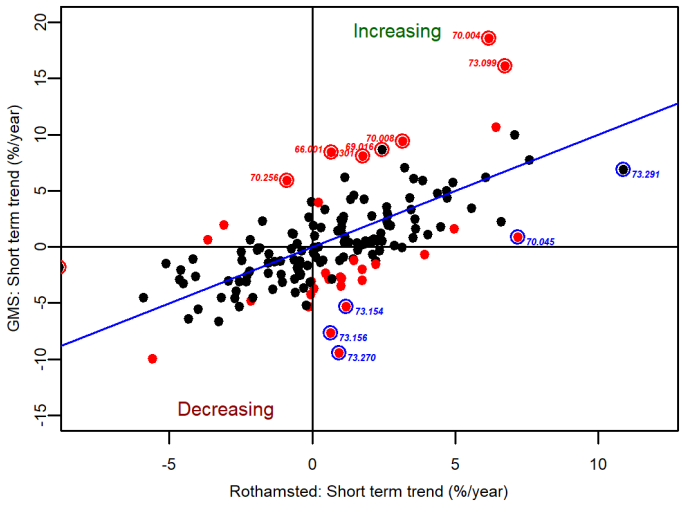
(note that in the early years of RIS there were very few of this species seen and so the error bars are very wide). A ~20-fold increase till mid-90's, then ~5-fold decrease till 2023.

3.3 Comparing GMS Trends to recent Rothamsted trends

It is to be expected that the long-term trends seen in RIS may have altered in recent times, what is more interesting is to compare the trends seen in the two sets over similar time periods. Here we compute a slope based on the supplied national GAI for the Rothamsted data from 2008-23 - comparable to the GMS data . We fit a simple linear trend in a Poisson regression model. Note that this is not a definitive trend estimate as we only have the national abundance indices, not the individual trap data, and we cannot compute reliable confidence intervals without individual trap data. However for the RIS dataset the data is largely from the same set of traps, so this should be close to the true trend. The diagonal blue line is numerical equality between the two trends.

Figure 6 shows that the recent trends are largely consistent between the two series. The most discrepant species are highlighted and listed in ***Table 2***.

Figure 6: Abundance trends: RIS recent v GMS



31/157 (20%) of species show a nominally significant difference between the two series.

Table 2: Species where GMS and RIS have differing recent trends

ABHno	Scientific Name	Common Name	GMS Slope	RIS Slope[1]	Difference[2]
70.004	Idaea rusticata	Least Carpet	18.6 (13.9:22.9)%	6.2 (2.8; 9.6)%	12.4
73.099	Hoplodrina ambigua	Vine's Rustic	16.1 (12.7:19.6)%	6.7 (0.9;12.9)%	9.3
66.001	Poecilocampa populi	December Moth	8.4 (5.1:11.6)%	0.7 (-2.9; 4.4)%	7.8
70.247	Phigalia pilosaria	Pale Brindled Beauty	-1.8 (-5.4:2.0)%	-8.9 (-18.7; 2.2)%	7.0
70.256	Erannis defoliaria	Mottled Umber	5.9 (1.2:9.8)%	-0.9 (-4.9; 3.3)%	6.8
73.301	Leucania comma	Shoulder-striped Wainscot	8.1 (5.3:10.8)%	1.8 (-2.5; 6.3)%	6.3
69.016	Deilephila elpenor	Elephant Hawk-moth	8.7 (7.4:9.9)%	2.4 (-4.2; 9.5)%	6.2
70.008	Idaea seriata	Small Dusty Wave	9.4 (7.4:11.3)%	3.2 (-0.3; 6.7)%	6.2
73.291	Mythimna pallens	Common Wainscot	6.9 (5.0:8.6)%	10.9 (3.9;18.3)%	-4.0
70.045	Scotopteryx chenopodiata	Shaded Broad-bar	0.9 (-1.1:2.9)%	7.2 (4.3;10.1)%	-6.3
73.154	Apamea remissa	Dusky Brocade	-5.3 (-7.3:-3.1)%	1.2 (-2.8; 5.3)%	-6.5
73.156	Apamea crenata	Clouded-bordered Brindle	-7.7 (-9.2:-6.2)%	0.6 (-3.1; 4.5)%	-8.3
73.270	Melanchra persicariae	Dot Moth	-9.5 (-11.2:-7.6)%	0.9 (-6.4; 8.8)%	-10.4

[1]Note RIS CI are only a conservative approximation

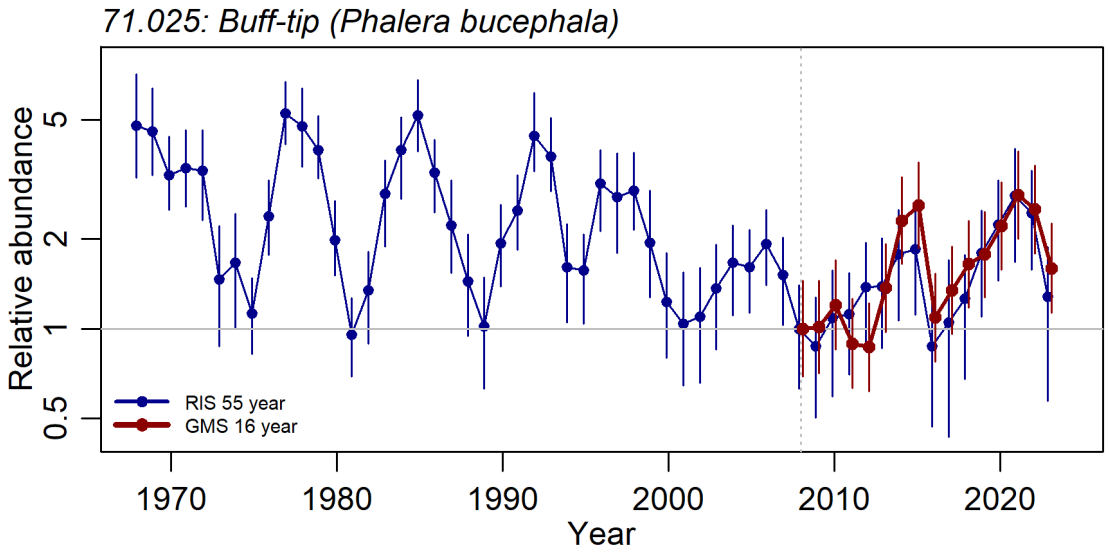
[2]GMS-RIS %/y

Given the uncertainty in the estimates it is rather likely that most of these apparent discrepancies are due to chance. See individual species plots below.

3.4 Aside: Do some species have genuine periodic variation in abundance?

It is worth noting (see ***Figure 7*** for a very clear example) that some species show long-term fluctuations in abundance which may be cyclic with periods of 5-10 years. If there are periodic variations in abundance, for example due to predator-prey (or parasite) interactions then short-term (15 year) trends may not be representative of the long term trends if the time period of assessment does not cover a number of full cycles. In the example below (***Figure 7***) the GMS data happens to begin at the nadir in the cycle and stop just after the next peak..

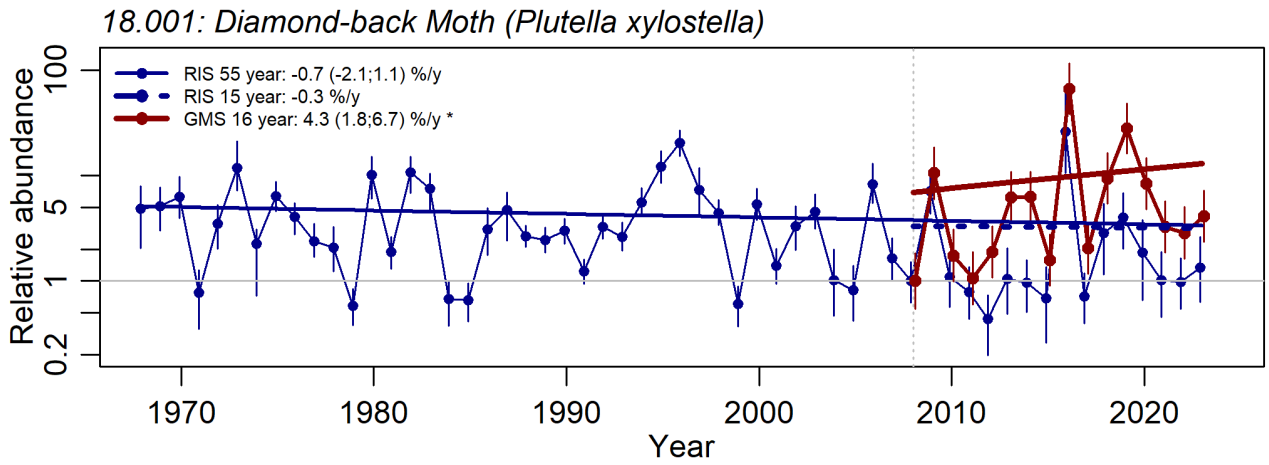
Figure 7: Abundance trends: Buff-tip: Note apparent long-term periodicity



4 Individual species comparisons

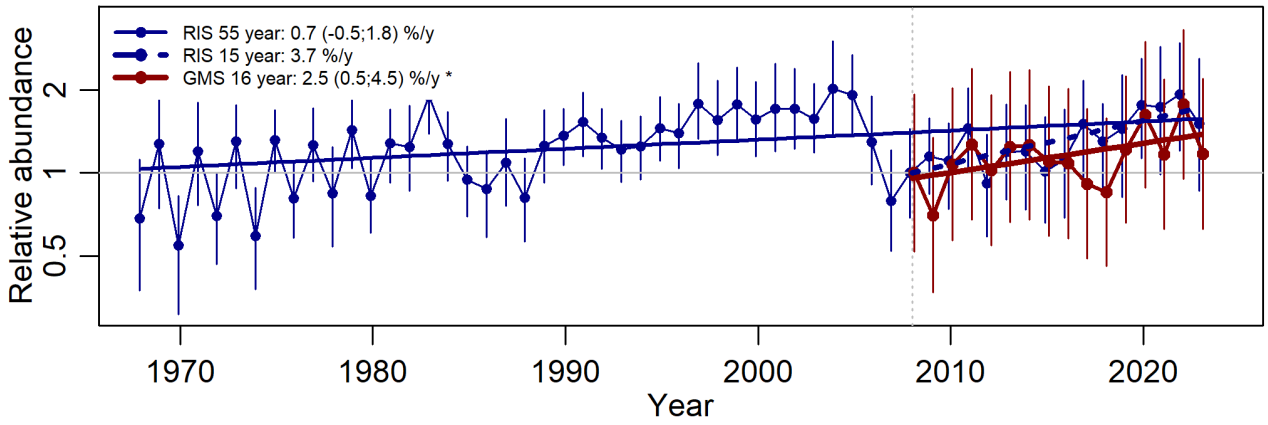
The plots below show the trends in the two series for each species where these are available.

Abundances are normalised to the 2008 values in both series. RIS trends are illustrated by simple (Poisson) regression lines through the full series and the 2008-23 subset. Published trend estimates are shown in the legend along with the slope of the 2008-23 subset (noting this is not a rigorous estimate and we cannot derive CI - see above). Significant trends highlighted with an asterisk. The GMS data shows the fitted line and the legend the trend estimate. Note that the abundance scales vary between species so can't compare slopes between species visually.



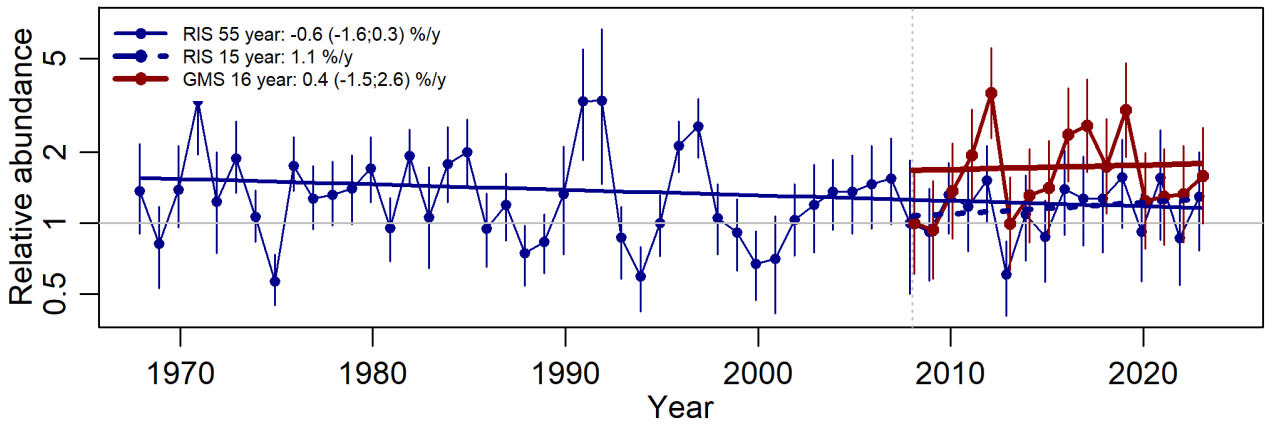
** Long-term RIS data suggests a stable population*
** GMS shows significant increase, but this is very dependent on a couple of big (migratory) influxes.*

3.001: Orange Swift (Triodia sylvina)



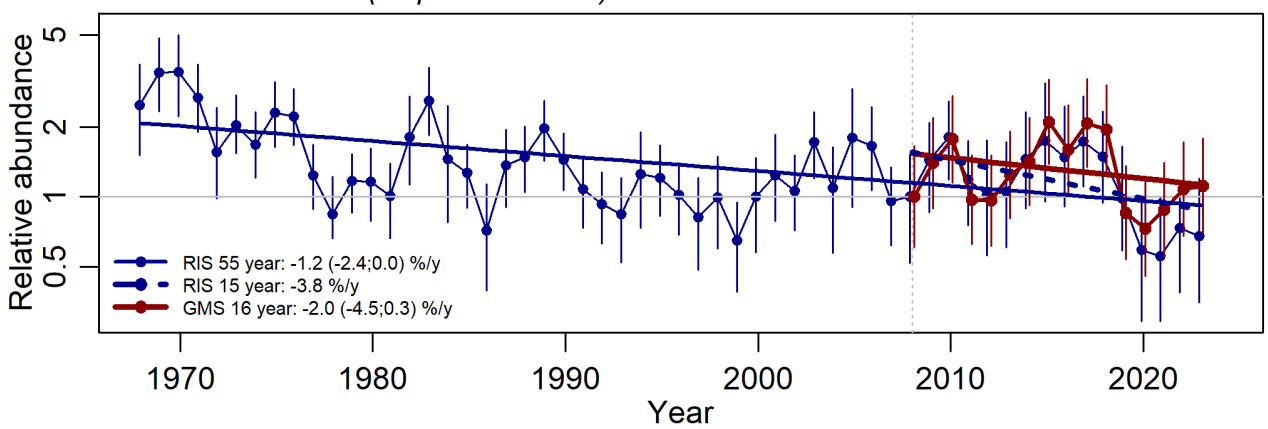
** RIS data shows recovery after big losses 2015-17*
** Recovery in both datasets after this period, with GMS showing significant increase.*

3.002: Common Swift (Korscheltellus lupulina)



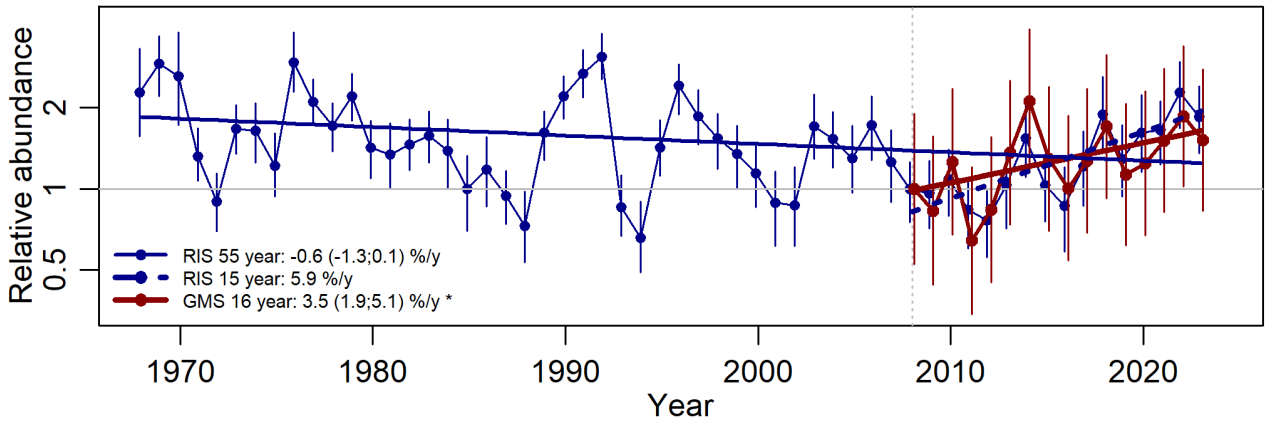
** No trends detectable*

3.005: Ghost Moth (Hepialus humuli)



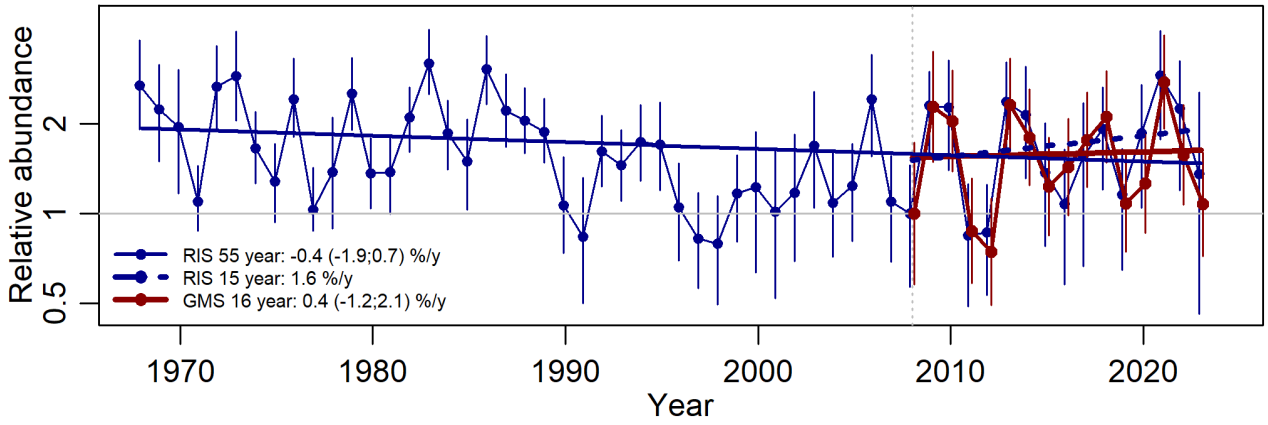
** Significant decline in RIS series continues unabated, but not detectable in GMS data alone.*

65.007: Chinese Character (Cilix glaucata)



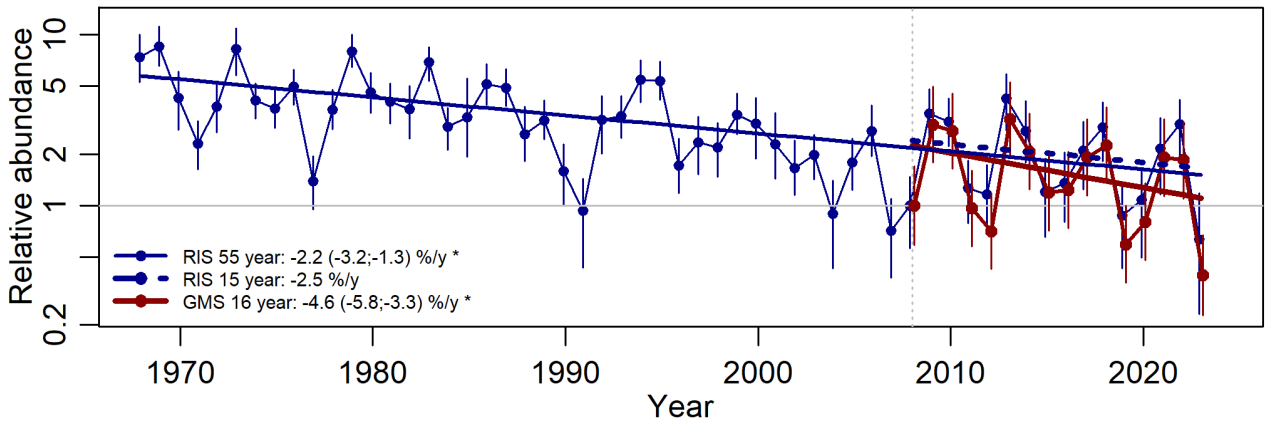
** RIS data shows long-term decline but recovery after around 2008. GMS shows significant positive trend.*

65.008: Peach Blossom (Thyatira batis)

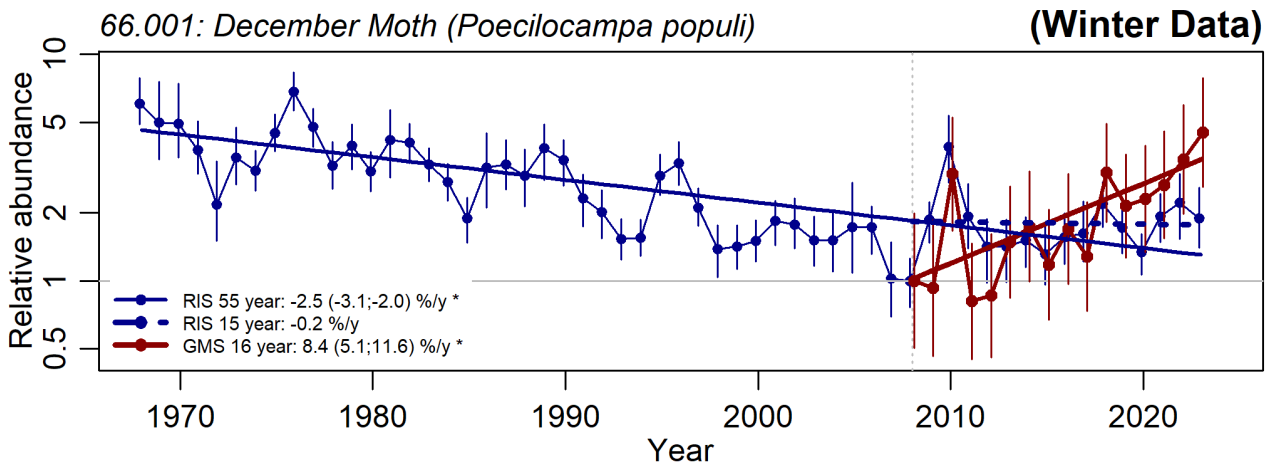


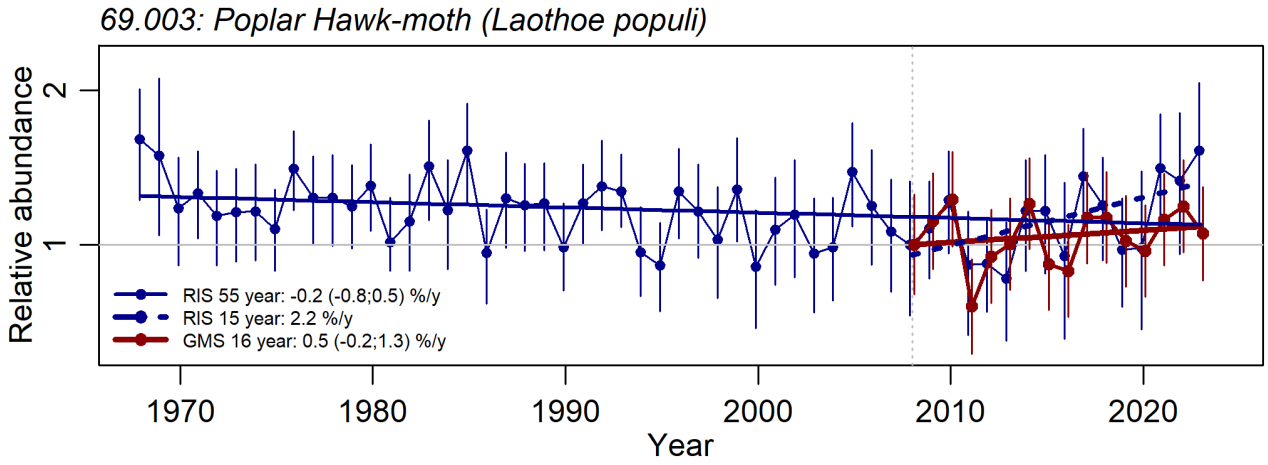
** No detectable trends*

65.009: Buff Arches (Habrosyne pyritoides)

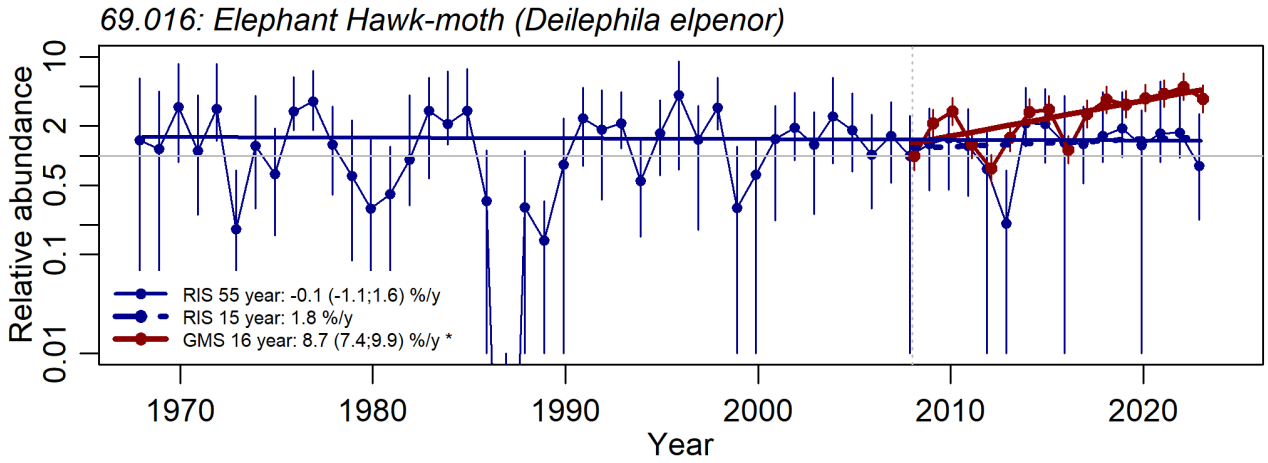


** Consistent decline in both series*



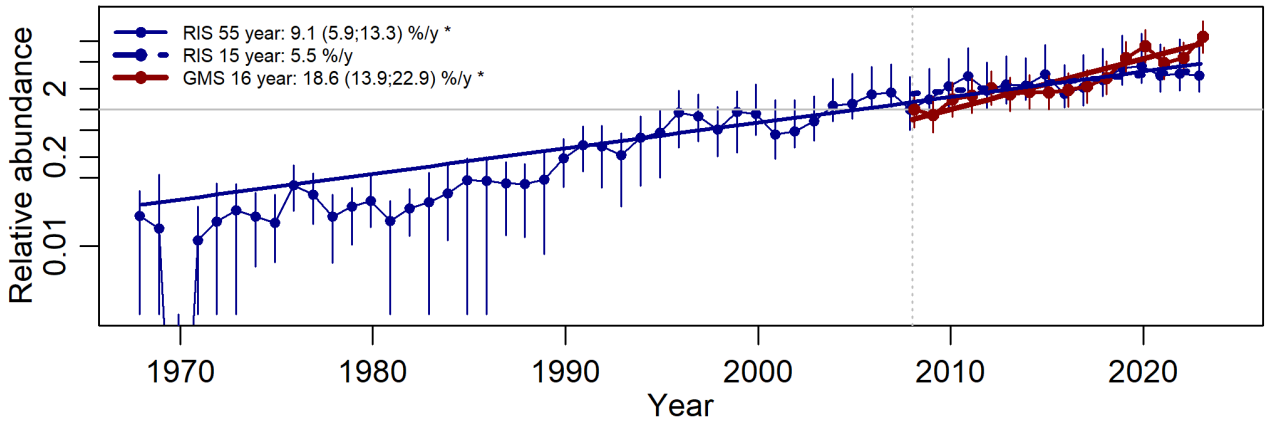


** No trends detectable*



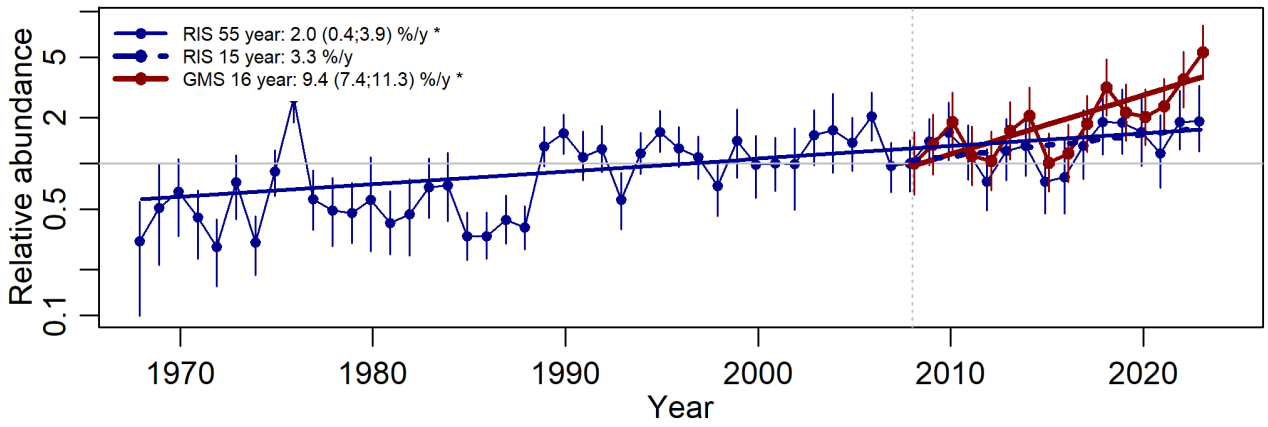
** RIS data shows no change, but GMS data shows a significant increase*
** Are we making gardens more attractive to this species?*

70.004: Least Carpet (Idaea rusticata)



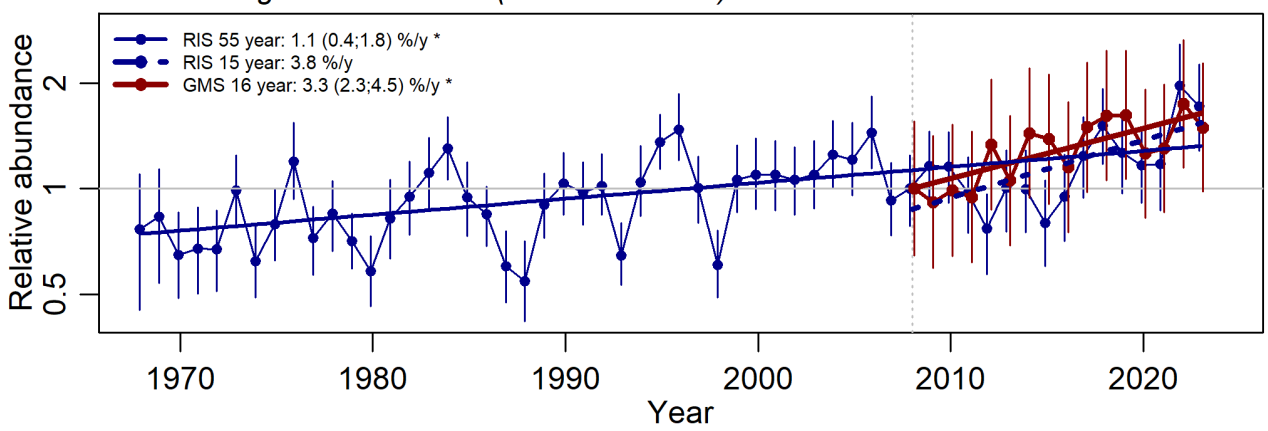
** Increasing significantly both long-term and recently*

70.008: Small Dusty Wave (Idaea seriata)



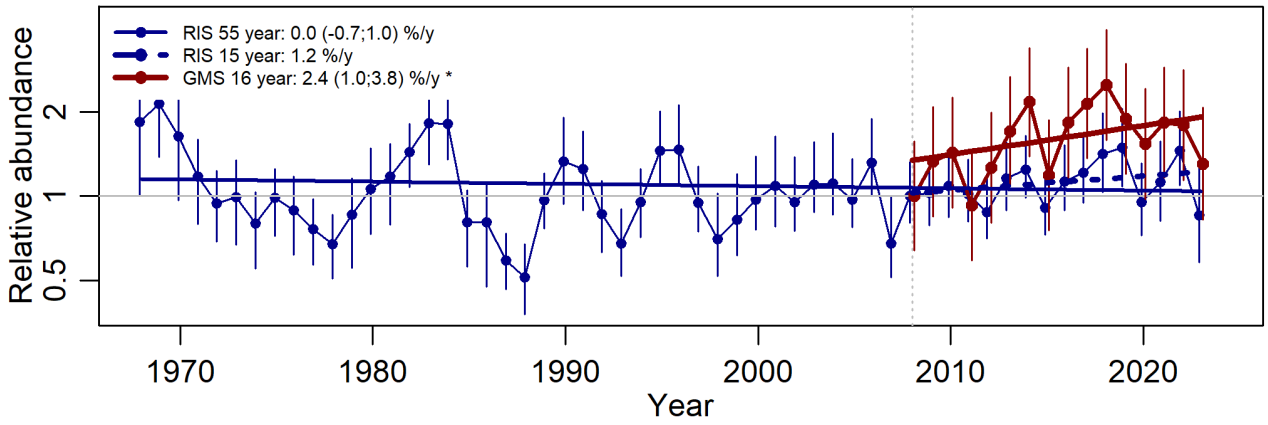
** Increasing significantly both long-term and recently*
** GMS shows rather greater recent increase than RIS*

70.011: Single-dotted Wave (Idaea dimidiata)



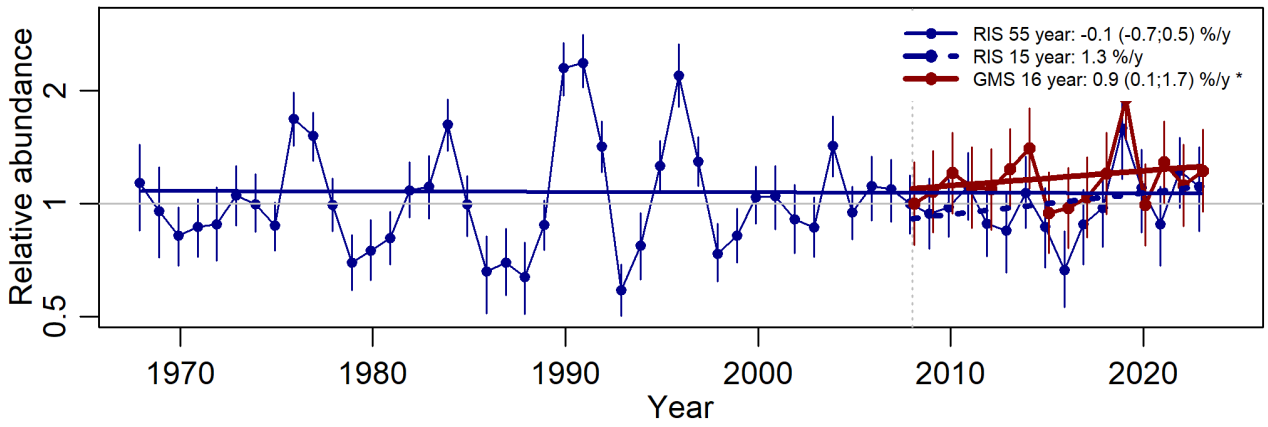
** Significant increases in RIS and GMS*
** Suggestion of incresed rate of increase in recent years - consistent between GMS and RIS*

70.013: Small Fan-footed Wave (Idaea biselata)



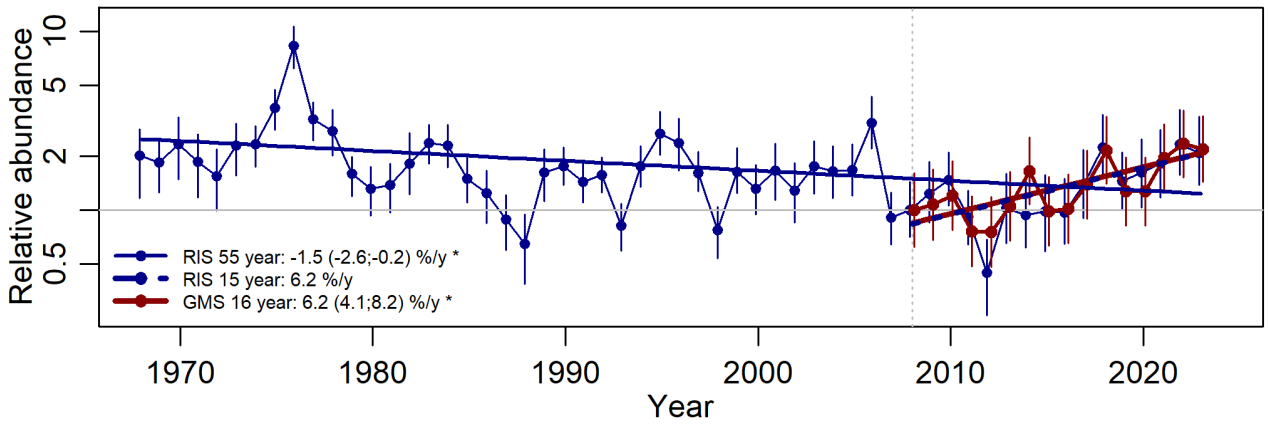
** Long-term trends stable, but incresing in recent years*
** Significant increse in GMS data consistent with RIS*

70.016: Riband Wave (Idaea aversata)



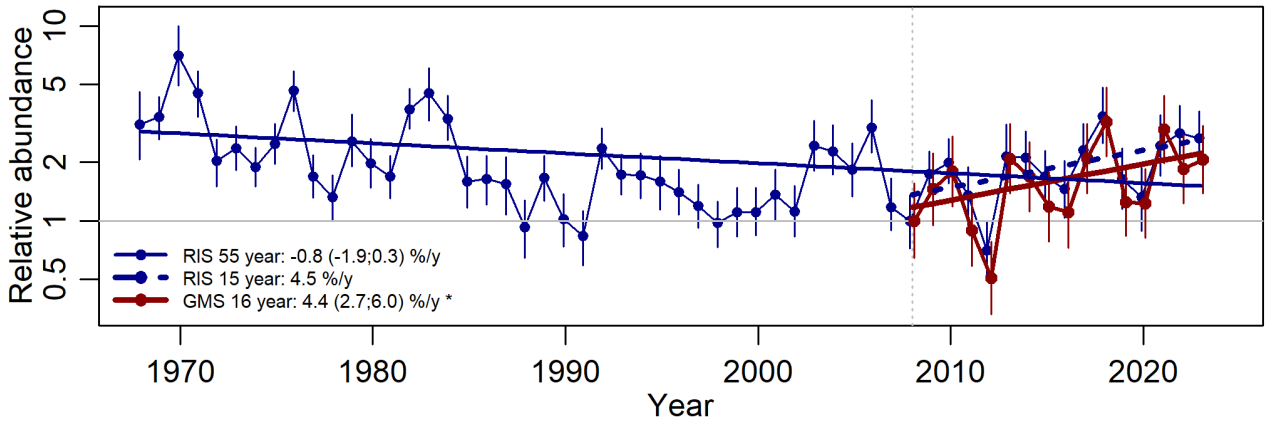
** Long-term RIS shows little change*
** But significant recent increase in GMS data consistent with RIS data*

70.024: Small Blood-vein (Scopula imitaria)



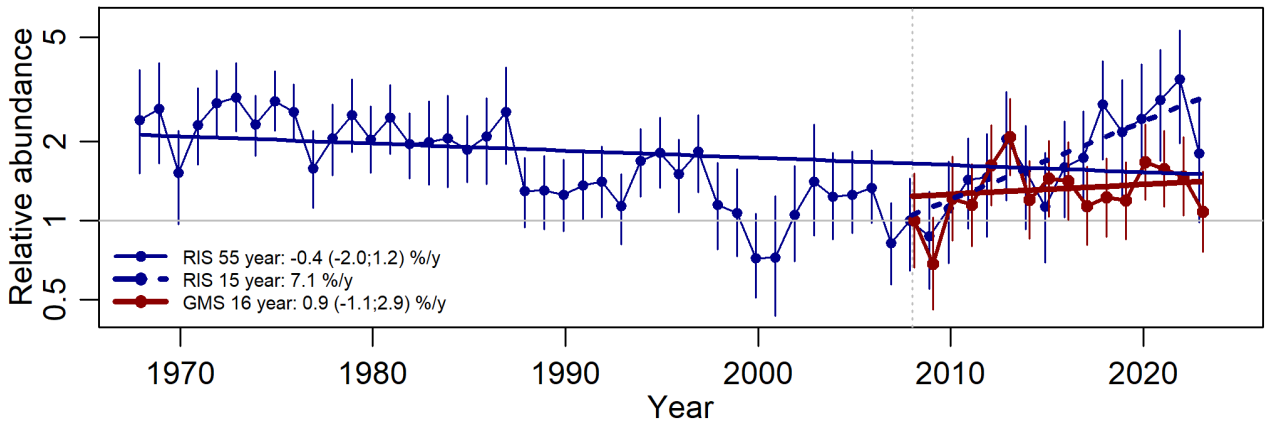
** RIS long term decline but reversing around 2007*
** GMS significant recent increase consistent with RIS*

70.029: Blood-vein (Timandra comae)



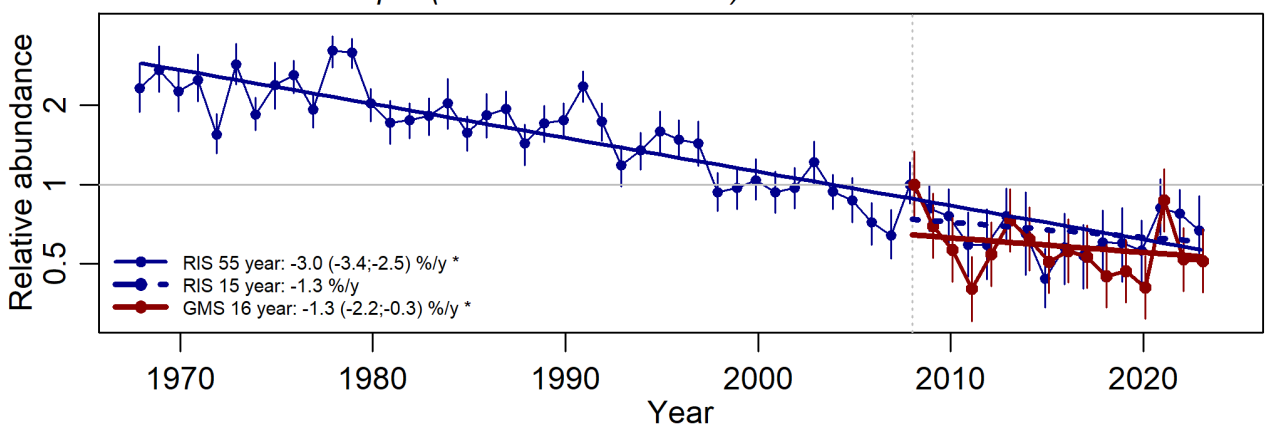
** Long-term decline reversed in recent years*
** Significant recent increase in GMS consistent with RIS*

70.045: Shaded Broad-bar (Scotopteryx chenopodiata)

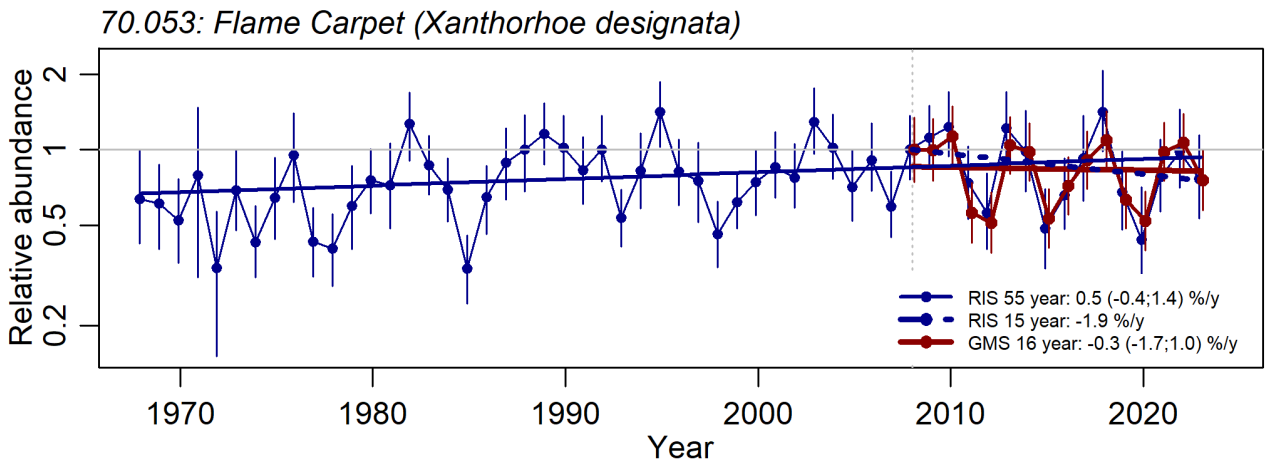


** RIS suggests recent steep increase, but not seen in GMS*
** (but small numbers)*

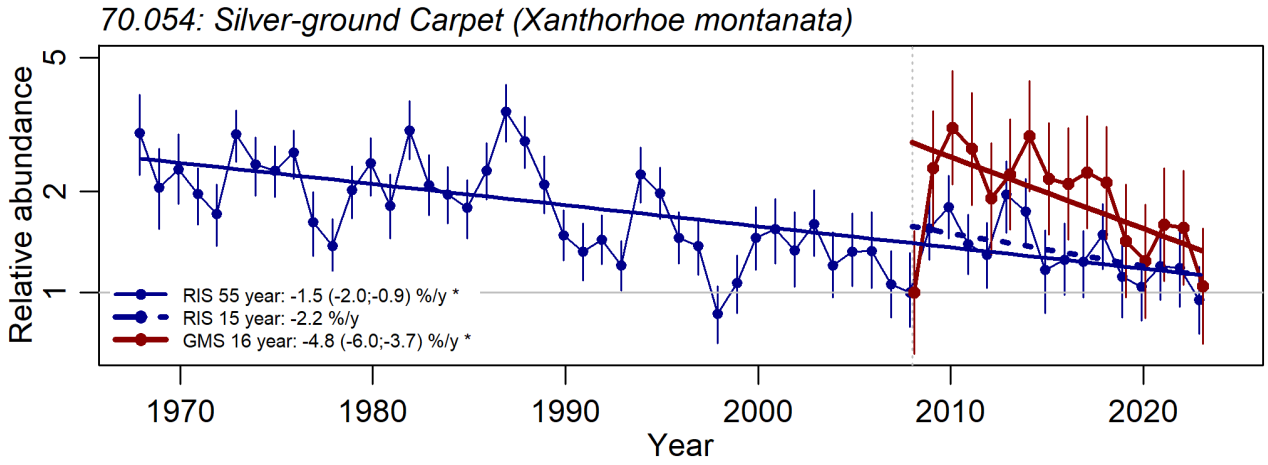
70.049: Garden Carpet (Xanthorhoe fluctuata)



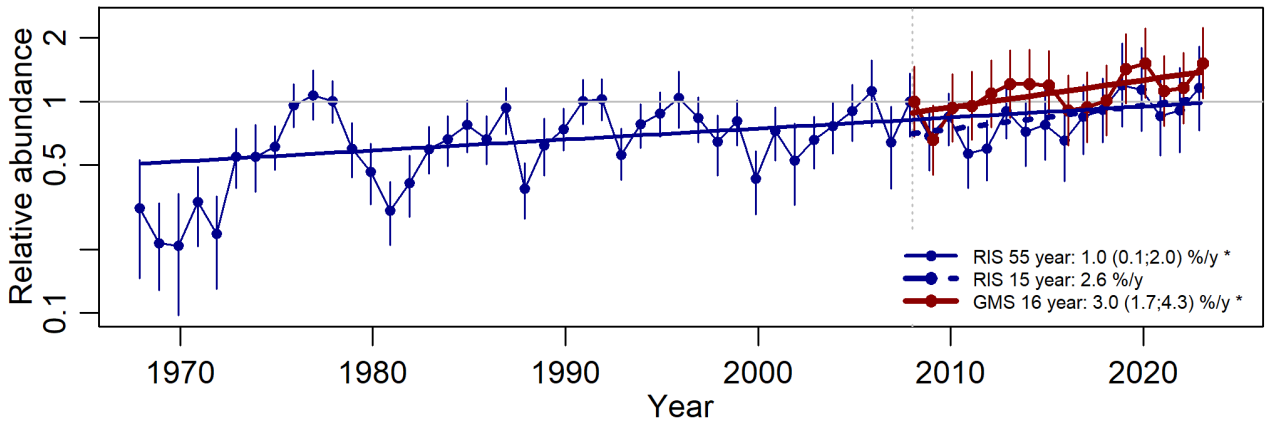
** Steady decrease in abundance in both datasets*



** No discernable trends*

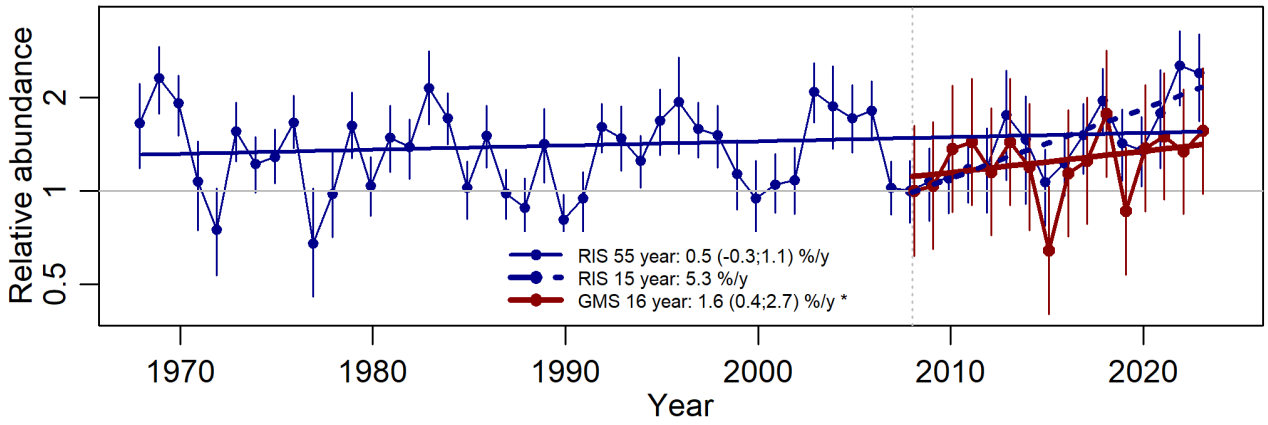


** Steady decline - more marked in GMS*
** Note very poor year in GMS in 2008*



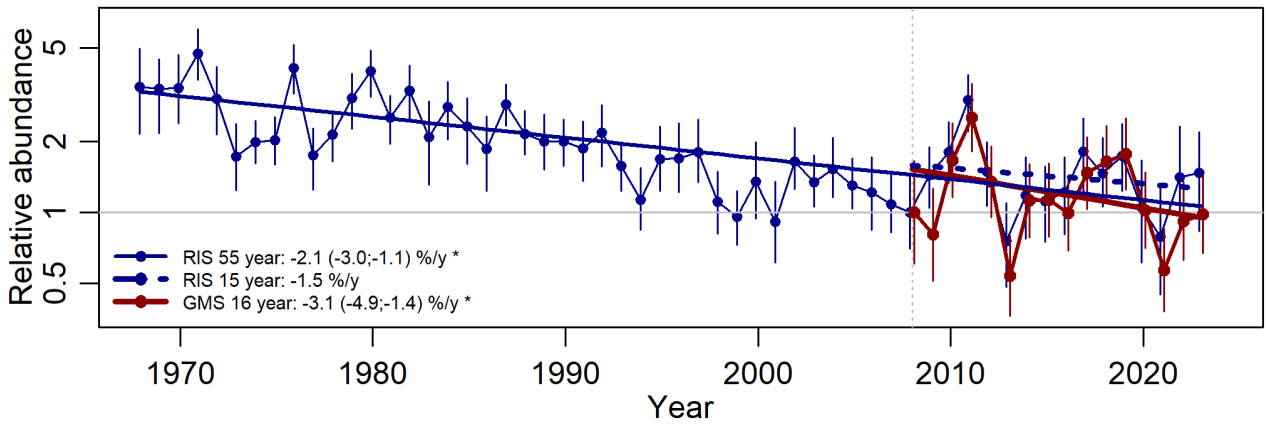
** Steady increase - significant in GMS*

70.061: Common Carpet (Epirrhoe alternata)



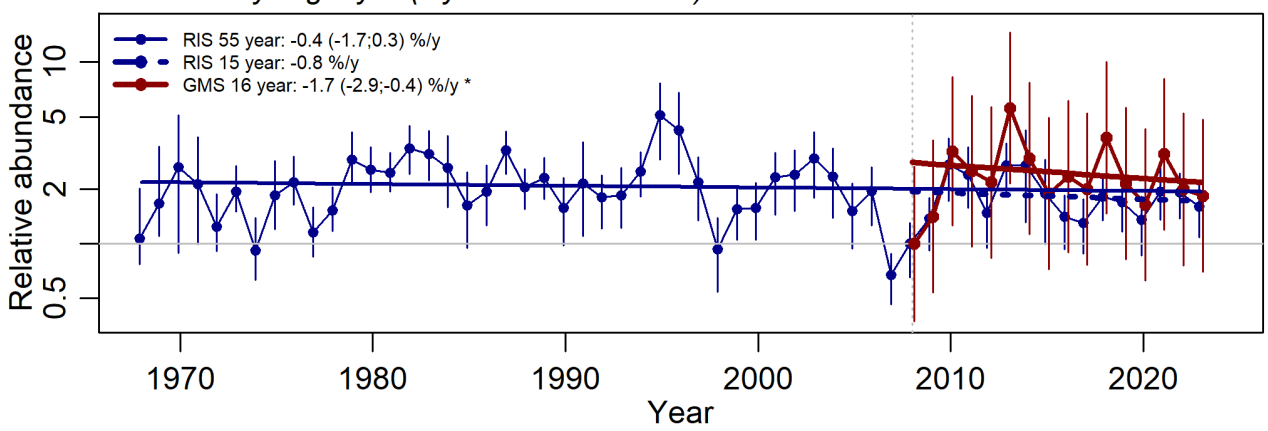
** GMS shows increase - consistent with RIS*
** But overall no trend in RIS*

70.066: Shoulder Stripe (Earophila badiata)



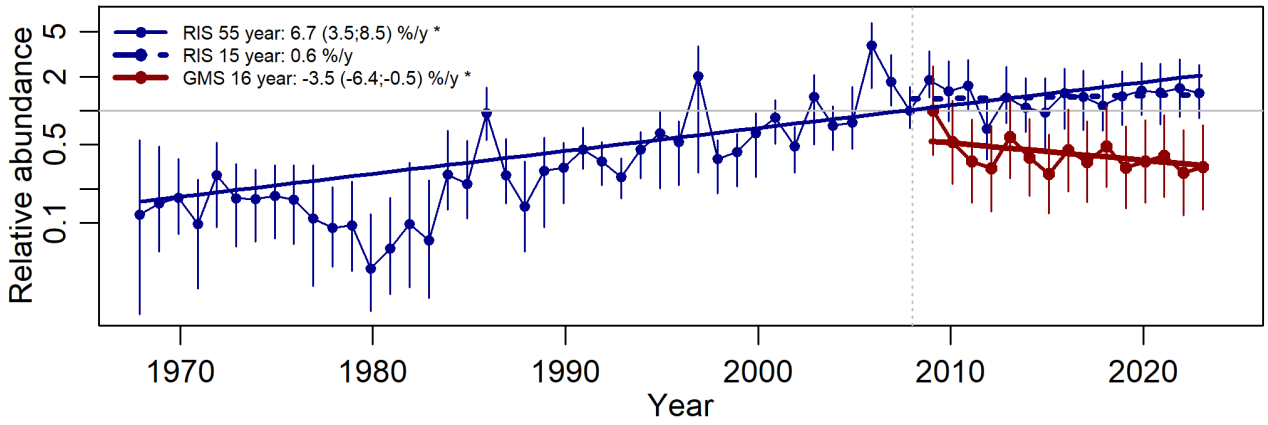
** Steady decline in both datasets*

70.074: July Highflyer (Hydriomena furcata)



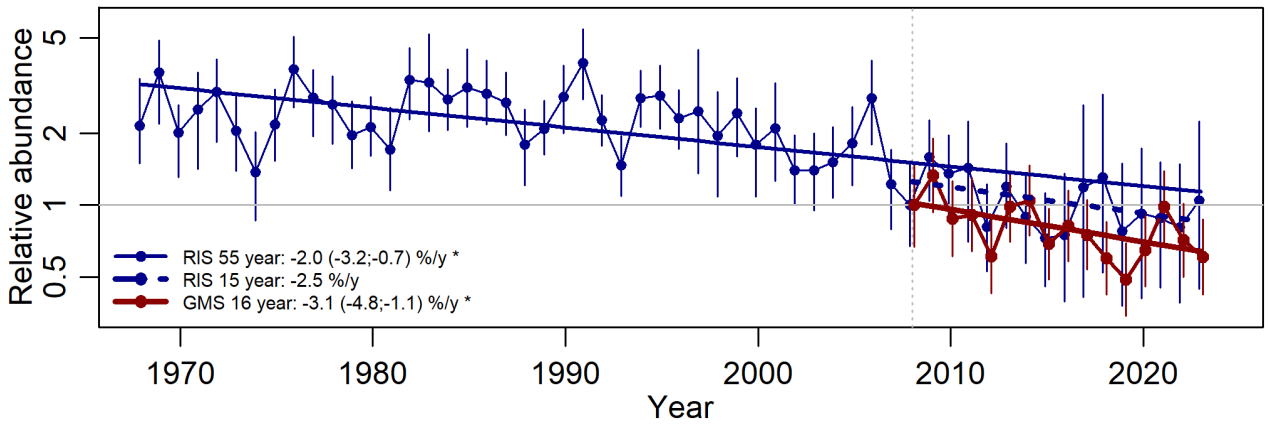
** GMS shows a recent decrease - consistent with RIS*

70.079: Spruce Carpet (Thera britannica) **(Winter Data)**



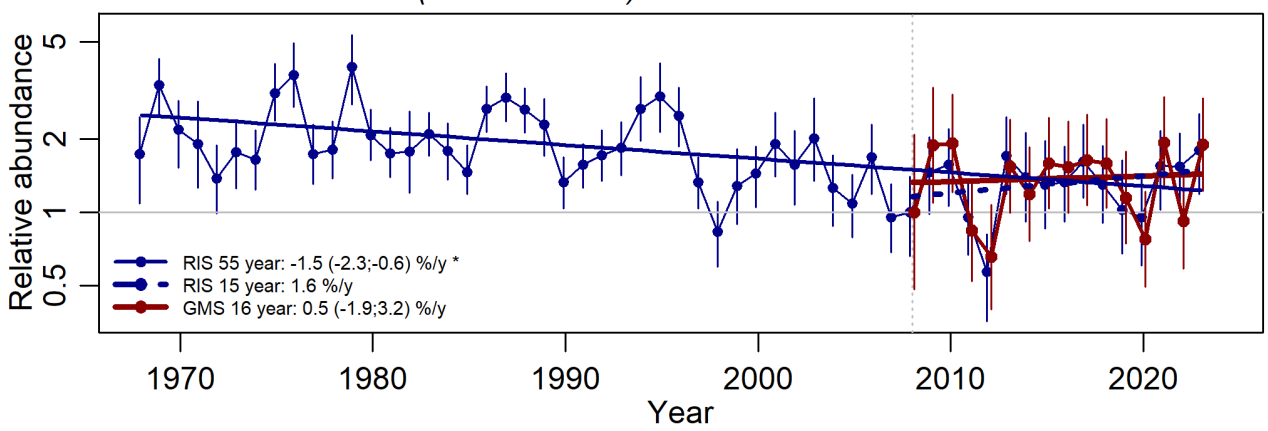
** Increasing over long term (RIS) but decreasing significantly in GMS*

70.081: Grey Pine Carpet (Thera obeliscata)



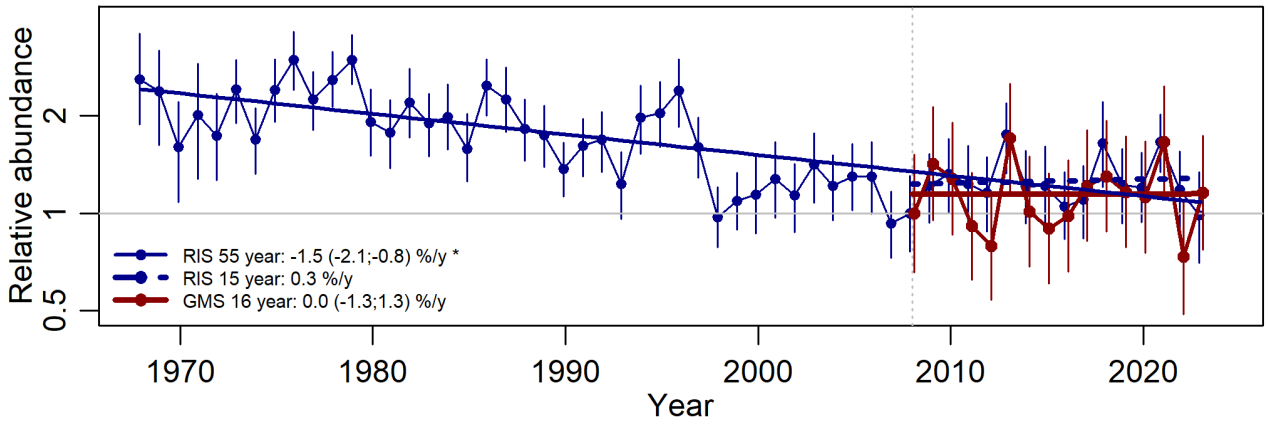
** Steady decline in both datasets*

70.085: Barred Yellow (Cidaria fulvata)



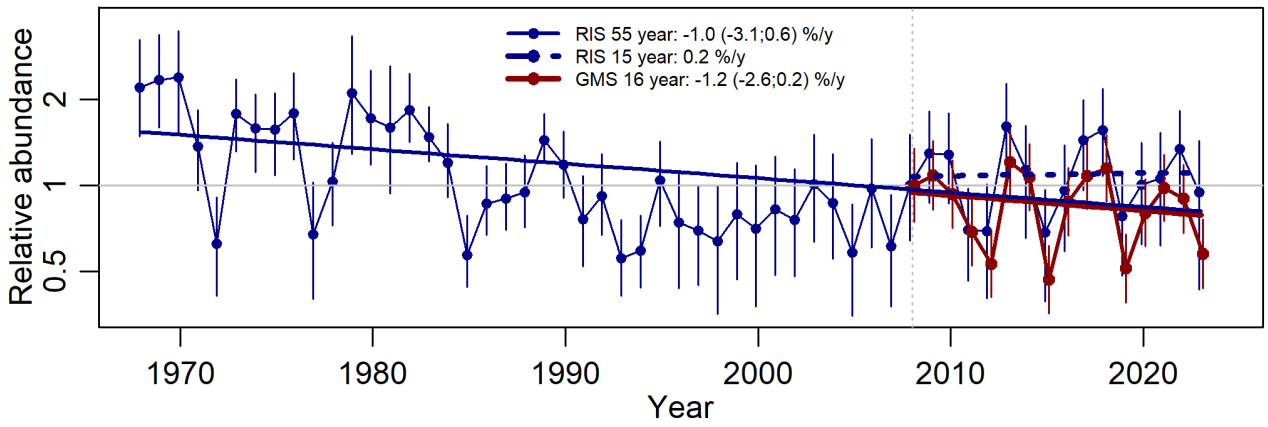
** Long-term decline may be stabilising*

70.093: Barred Straw (Gandaritis pyraliata)



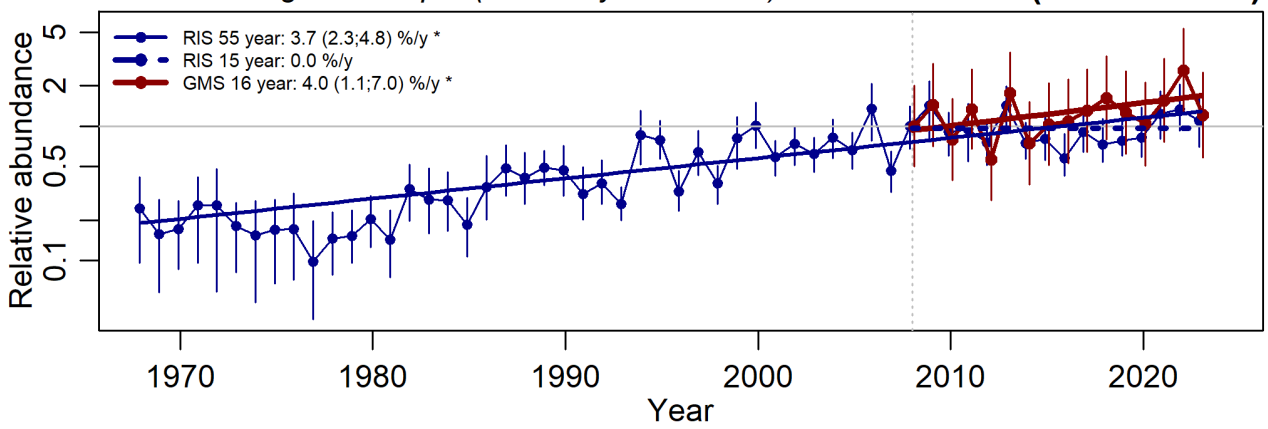
** Long-term decline may be stabilising*

70.094: Small Phoenix (Ecliptopera silaceata)



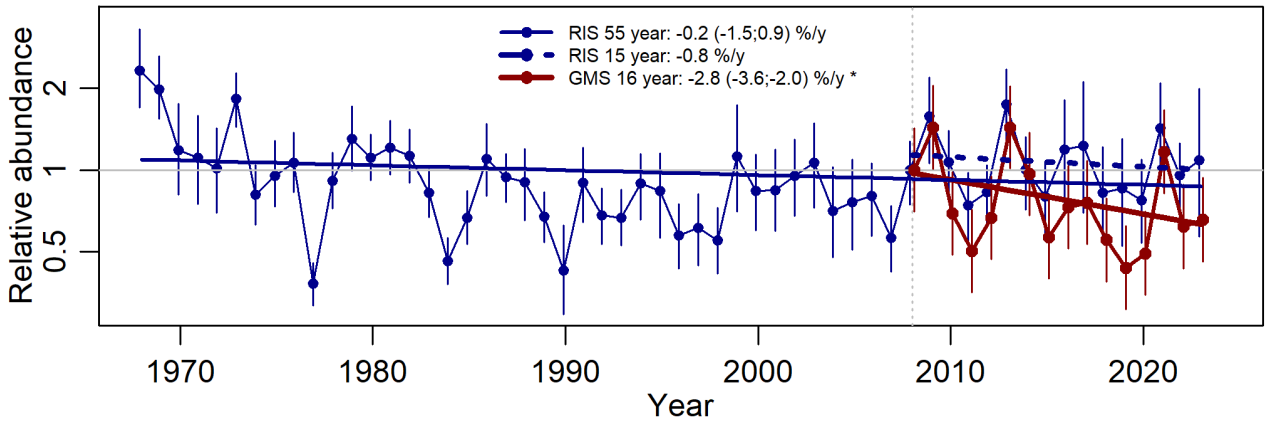
** No detectable trends*

70.095: Red-green Carpet (Chloroclysta siterata) **(Winter Data)**



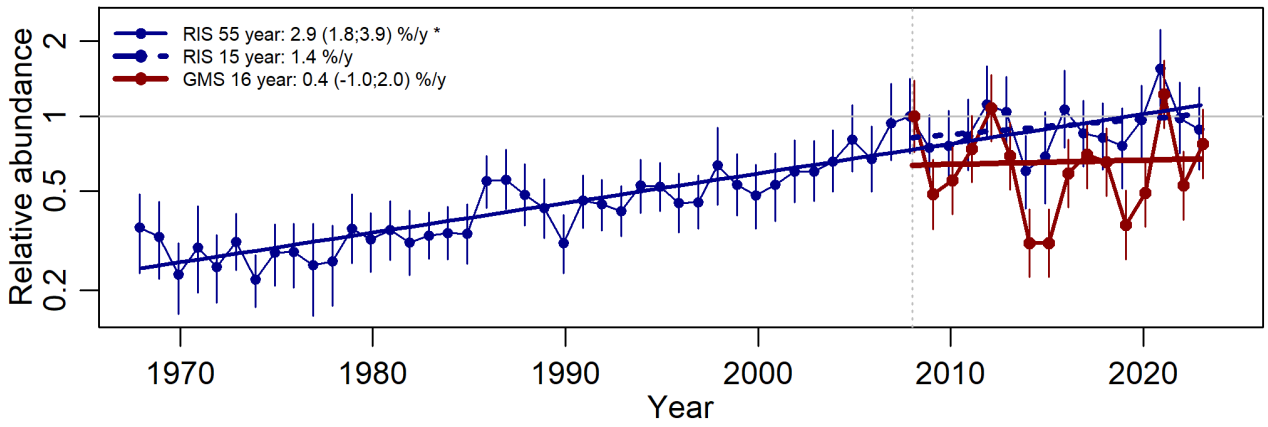
** Increasing significantly over both long (RIS) and short (GMS) term*

70.097: Common Marbled Carpet (Dysstroma truncata)

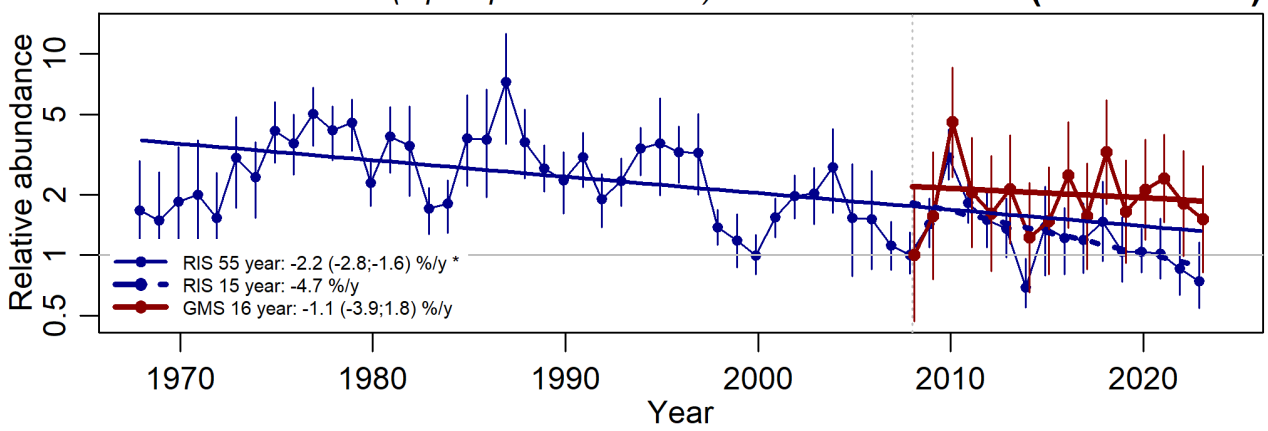


** GMS shows recent significant decline - not apparent in RIS*

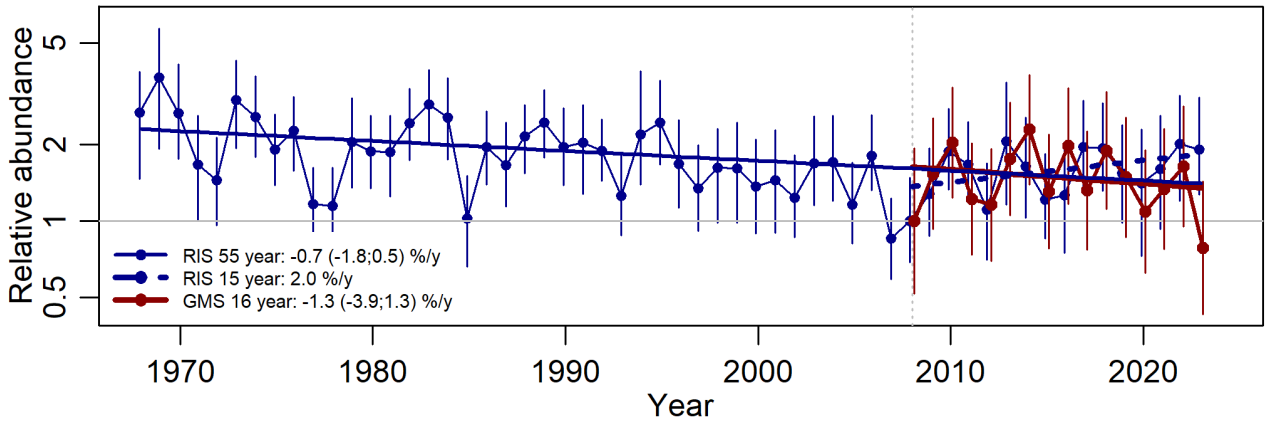
70.100: Green Carpet (Colostygia pectinataria)



70.106: Winter Moth (Operophtera brumata) **(Winter Data)**

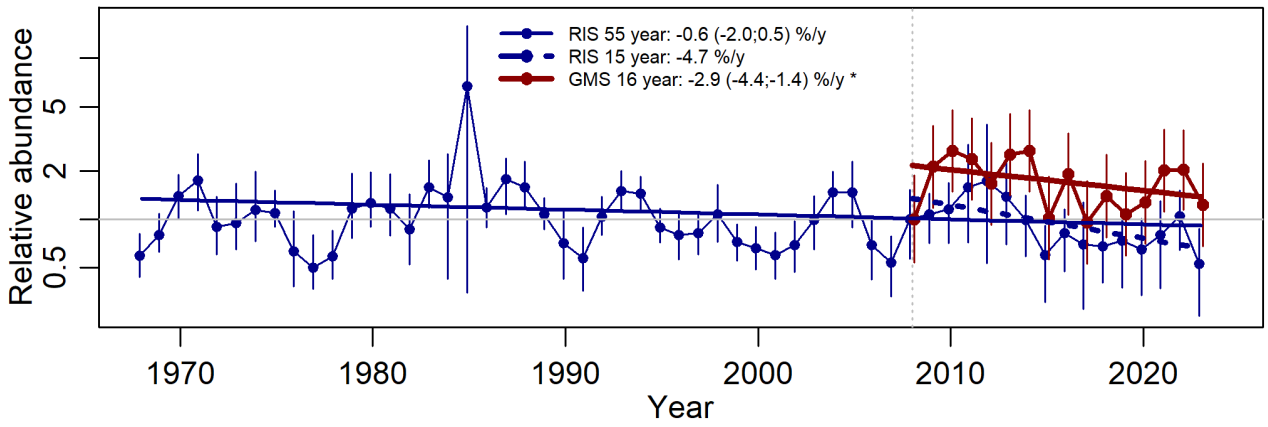


70.132: Rivulet (Perizoma affinitata)



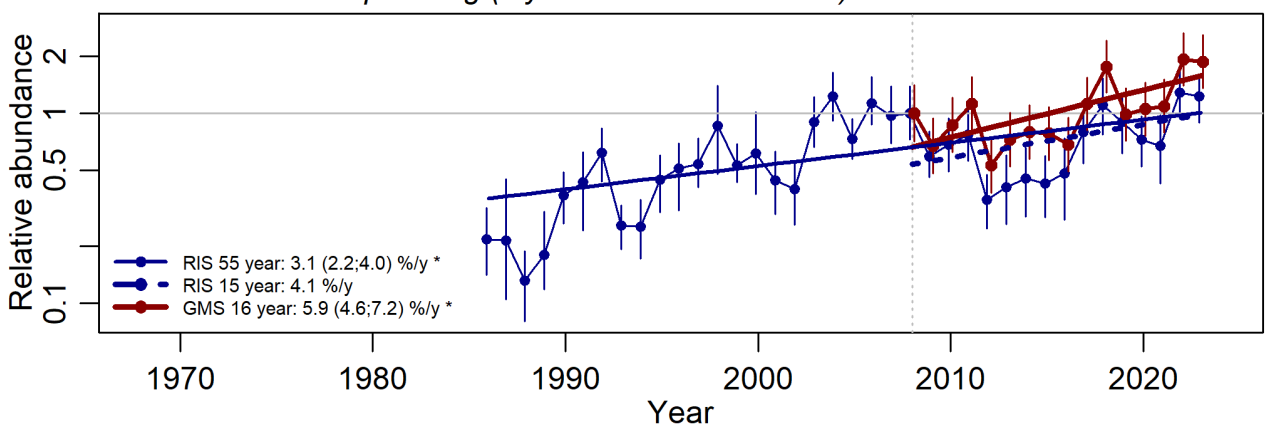
** No detectable trends*

70.133: Small Rivulet (Perizoma alchemillata)



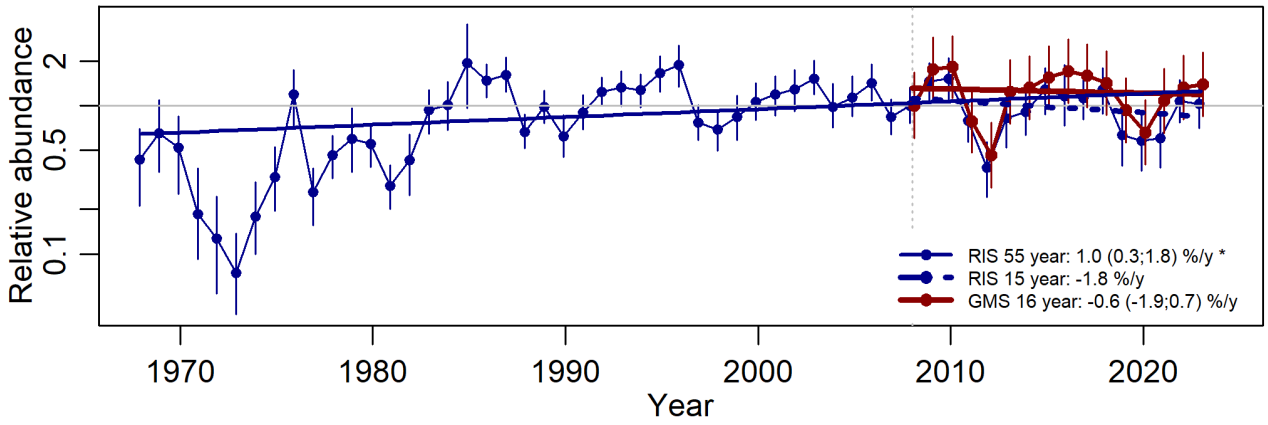
** GMS shows recent decline - consistent with RIS*

70.141: Double-striped Pug (Gymnoscelis rufifasciata)



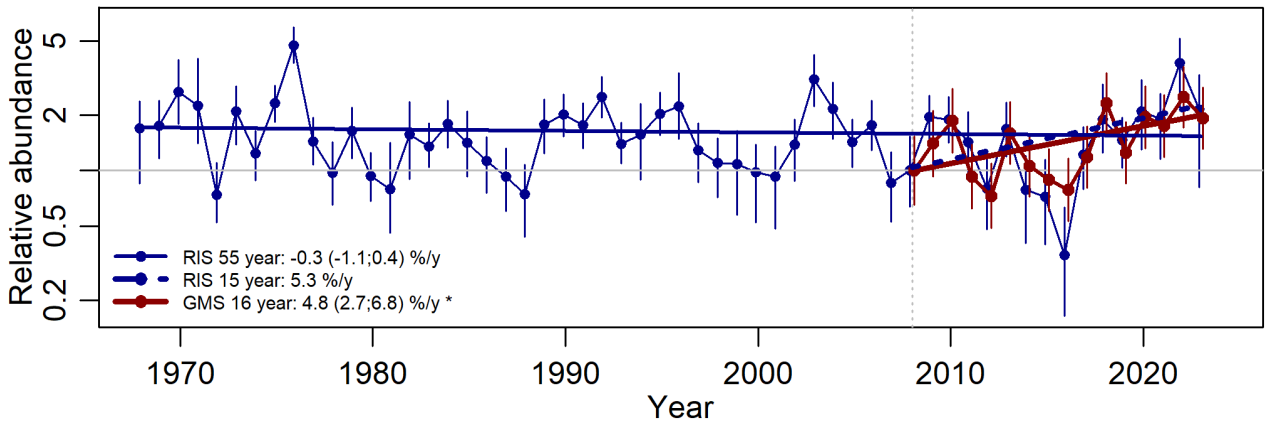
** Increasing significanty in both series*

70.144: Green Pug (Pasiphila rectangulata)



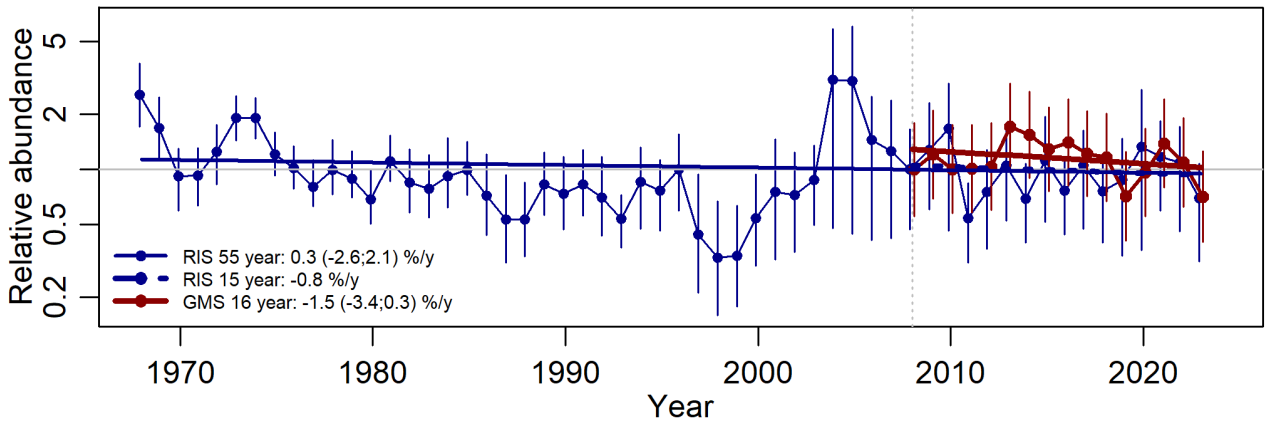
** Long-tern increase up to the '80s has plateaued. No detectable trend in GMS*

70.173: Lime-speck Pug (Eupithecia centaureata)

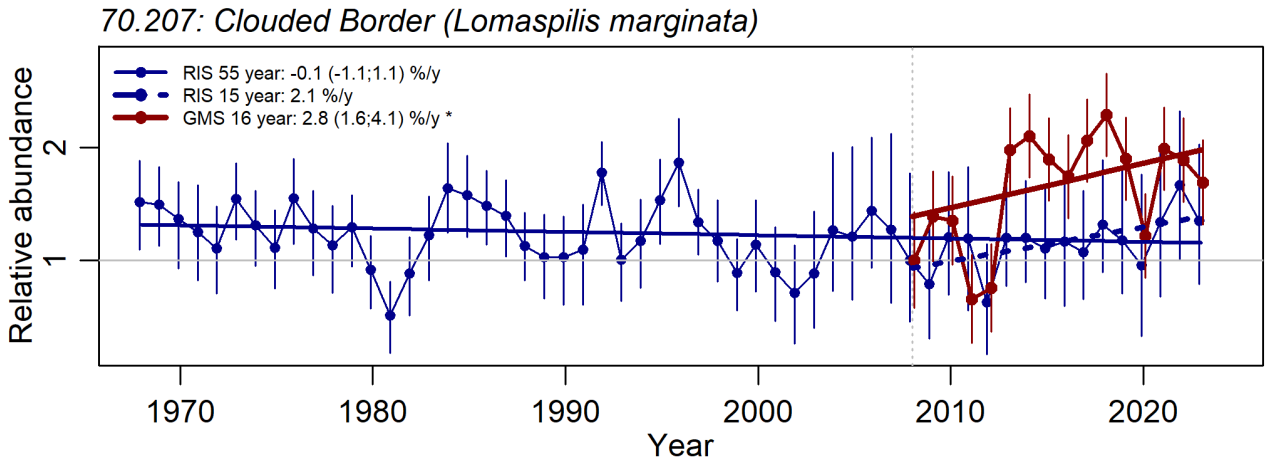


** Increase in recent years in both series.*

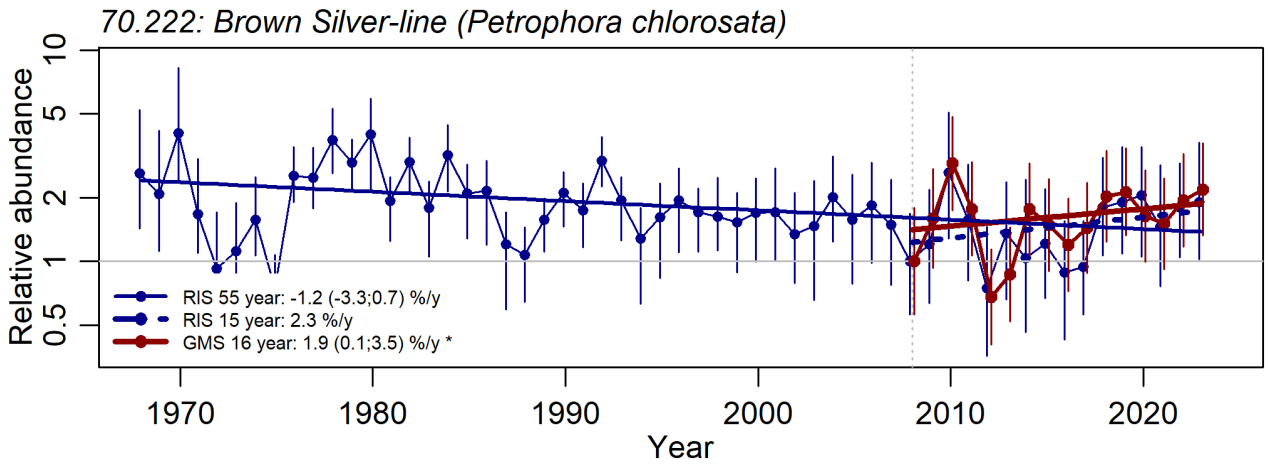
70.205: Magpie (Abraxas grossulariata)



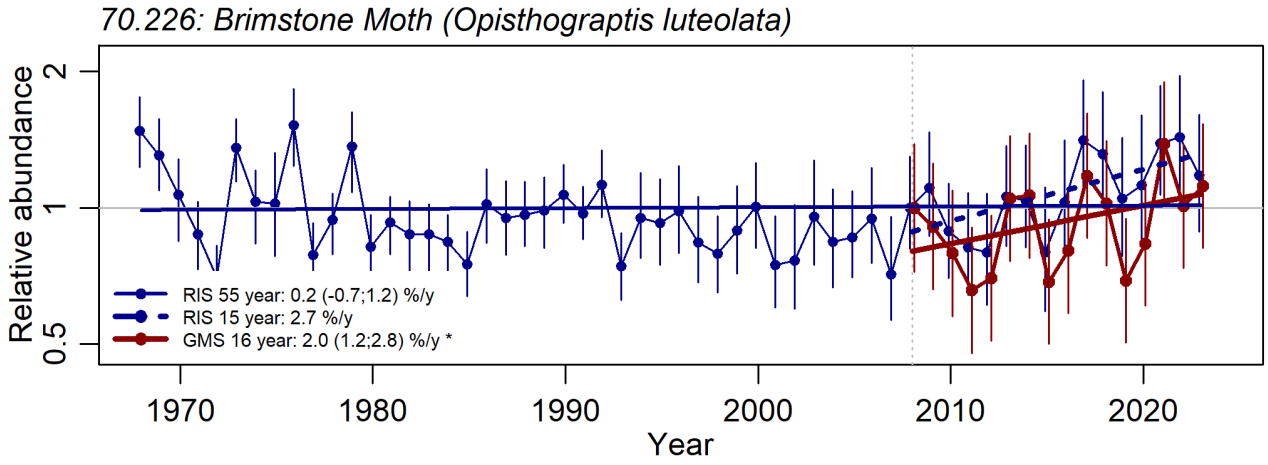
** No detectable trends*



** Increase in recent years in both series.*
** Increase more extreme in GMS - do wonder about confusion with Box-Tree moth?*

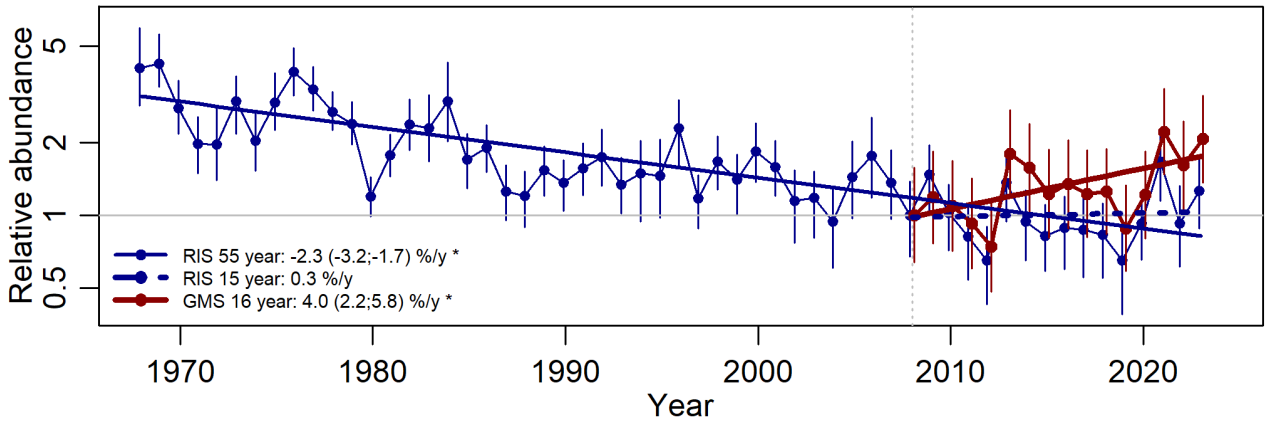


** Recent modest but significant increase*



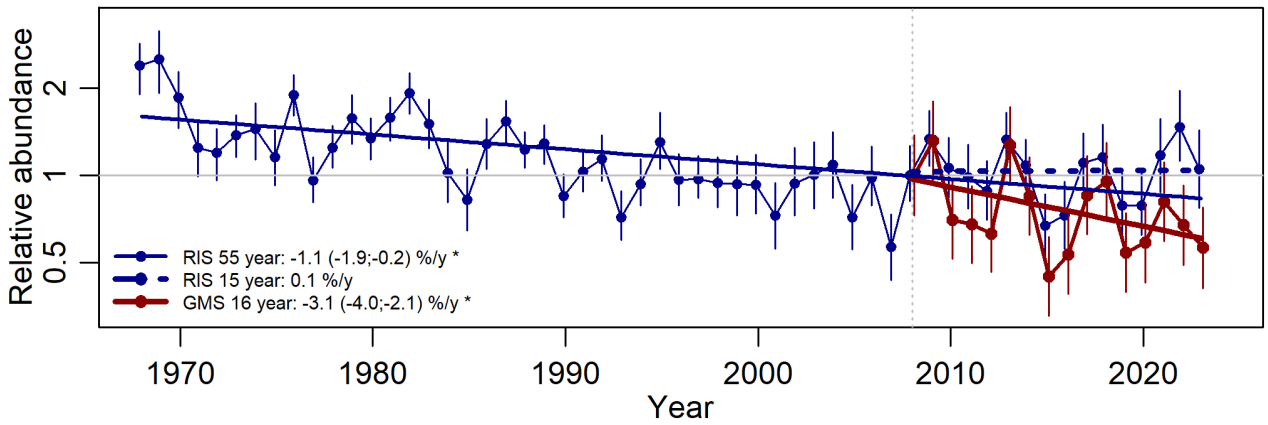
** Increase in recent years in both series.*

70.234: Canary-shouldered Thorn (Ennomos alniaria)



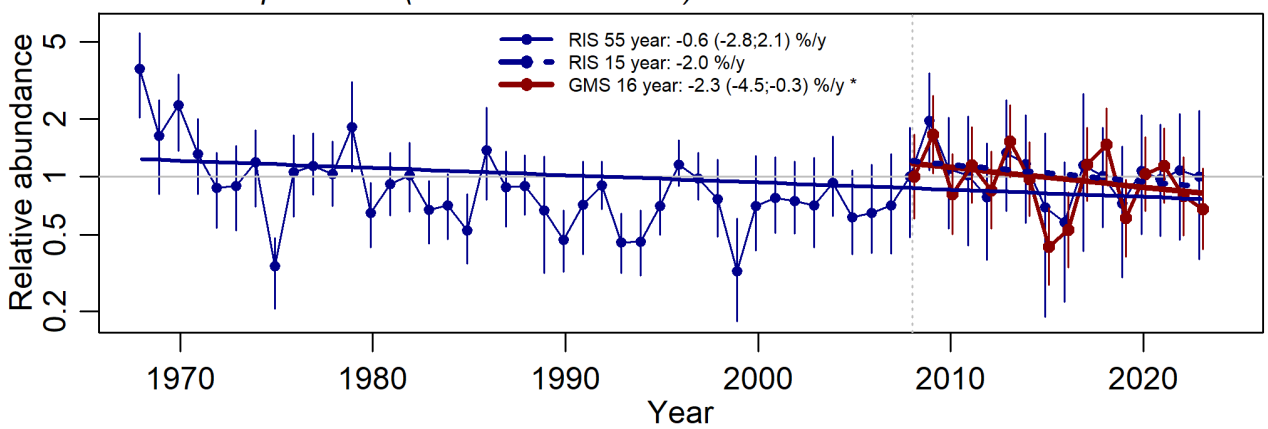
** Increasing in GMS against long-term overall decline*
** GMS shows increase whilst RIS simply stabilises*

70.237: Early Thorn (Selenia dentaria)



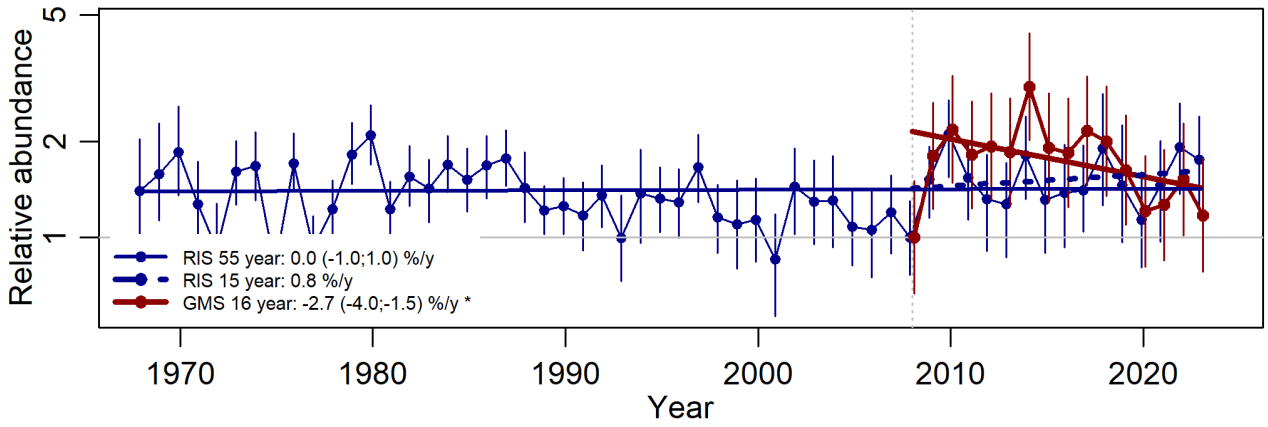
** Declining in both datasets*
** Some evidence of stabilisation in RIS, but not in GMS*

70.239: Purple Thorn (Selenia tetralunaria)

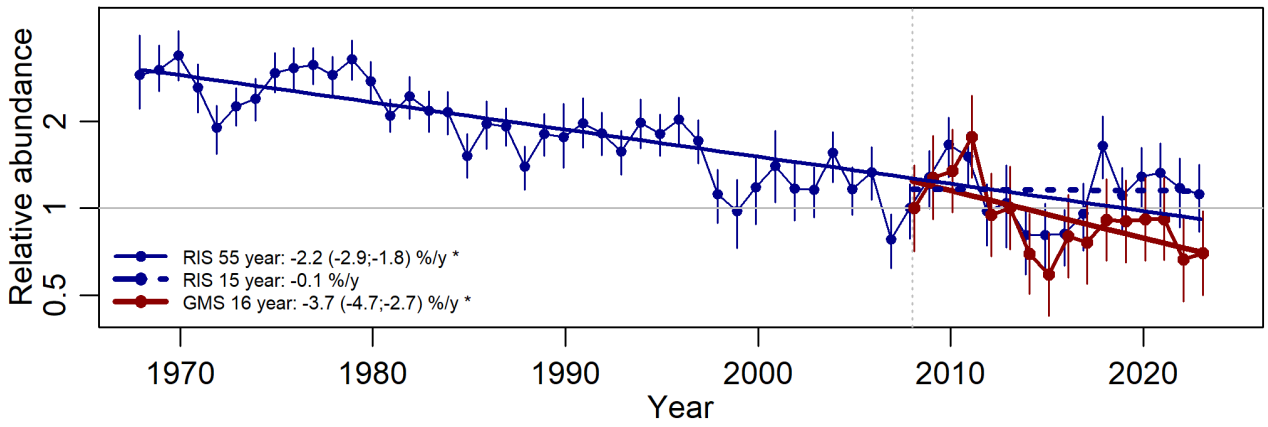


** GMS shows decline - consitent with RIS*

70.240: Scalloped Hazel (Odontopera bidentata)

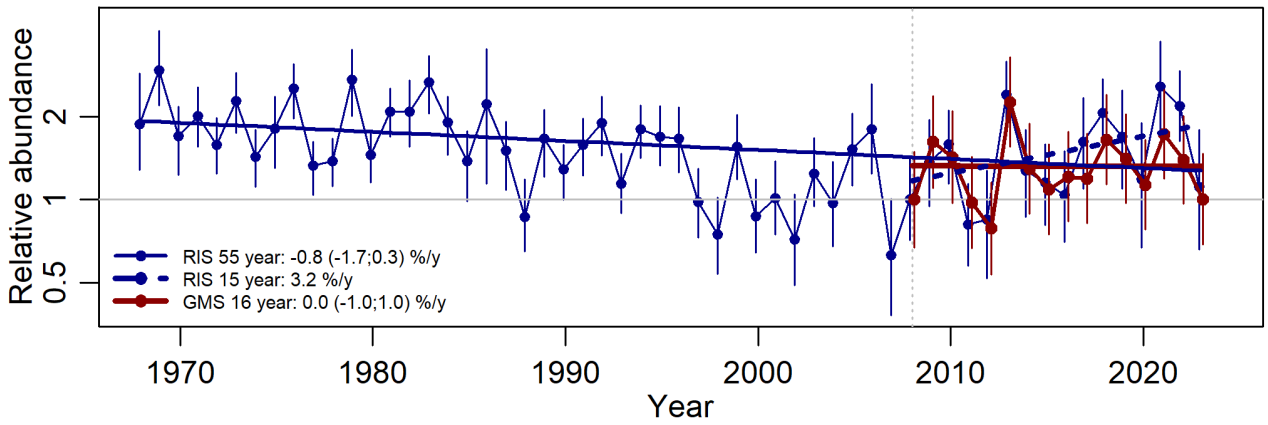


70.241: Scalloped Oak (Crocallis elinguaria)

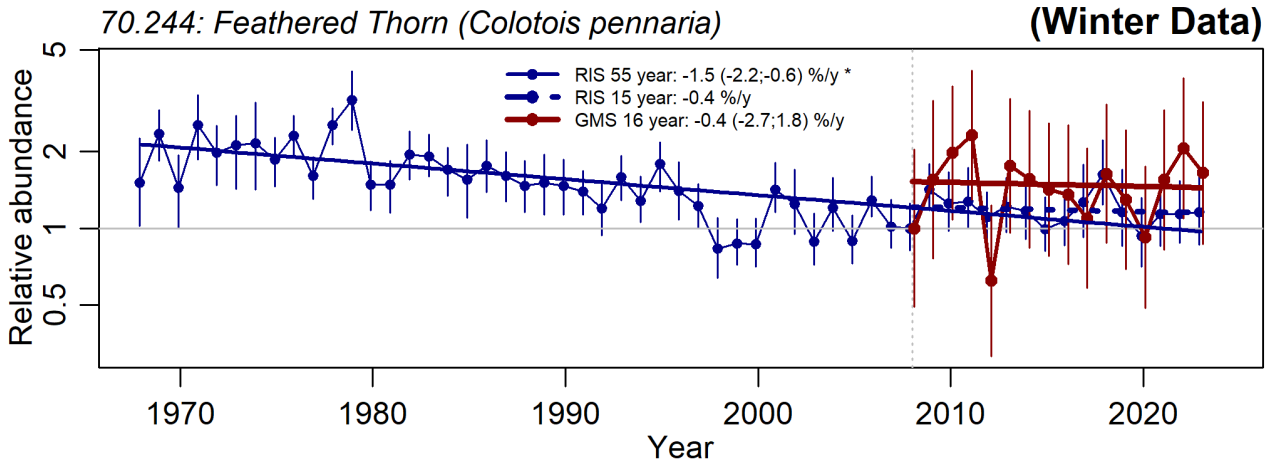


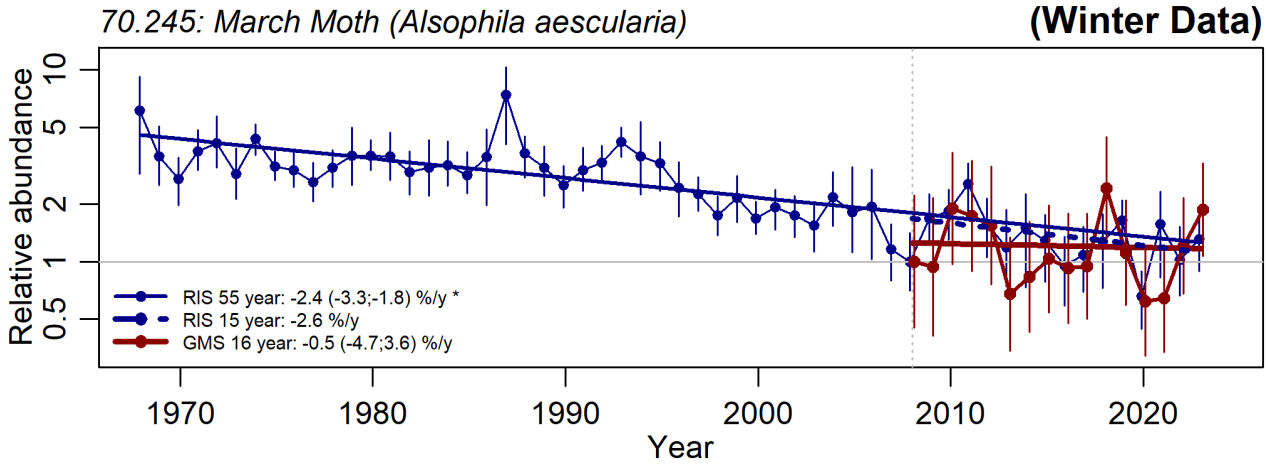
** Declining in both datasets*
** Slight evidence for stabilisation in RIS but not in GMS*

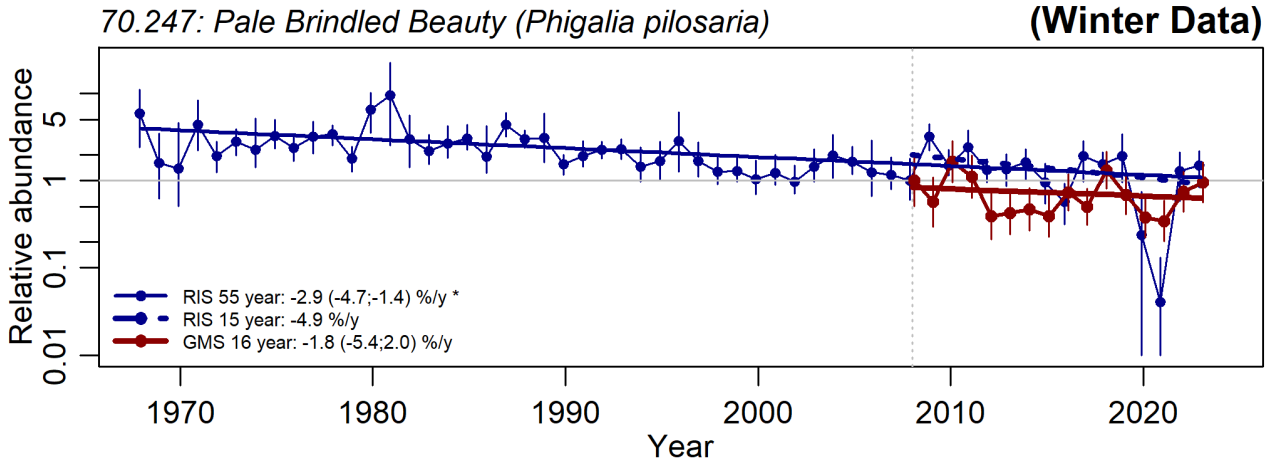
70.243: Swallow-tailed Moth (Ourapteryx sambucaria)



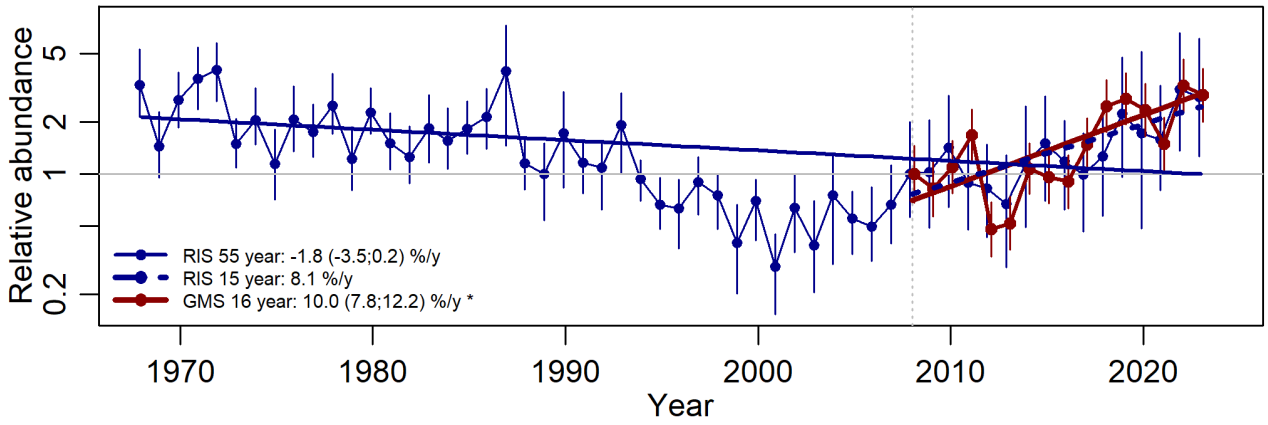
** No detectable trends*
** (But RIS data suggests recovery from low in 2000's)*


70.244: Feathered Thorn (Colotois pennaria)
(Winter Data)
RIS 55 year: -1.5 (-2.2;-0.6) %/y *
RIS 15 year: -0.4 %/y
GMS 16 year: -0.4 (-2.7;1.8) %/y
Relative abundance
0.5
1
2
5
1970
1980
1990
2000
2010
2020
Year


70.245: March Moth (Alsophila aescularia)
(Winter Data)
RIS 55 year: -2.4 (-3.3;-1.8) %/y *
RIS 15 year: -2.6 %/y
GMS 16 year: -0.5 (-4.7;3.6) %/y
Relative abundance
0.5
1
2
5
10
1970
1980
1990
2000
2010
2020
Year

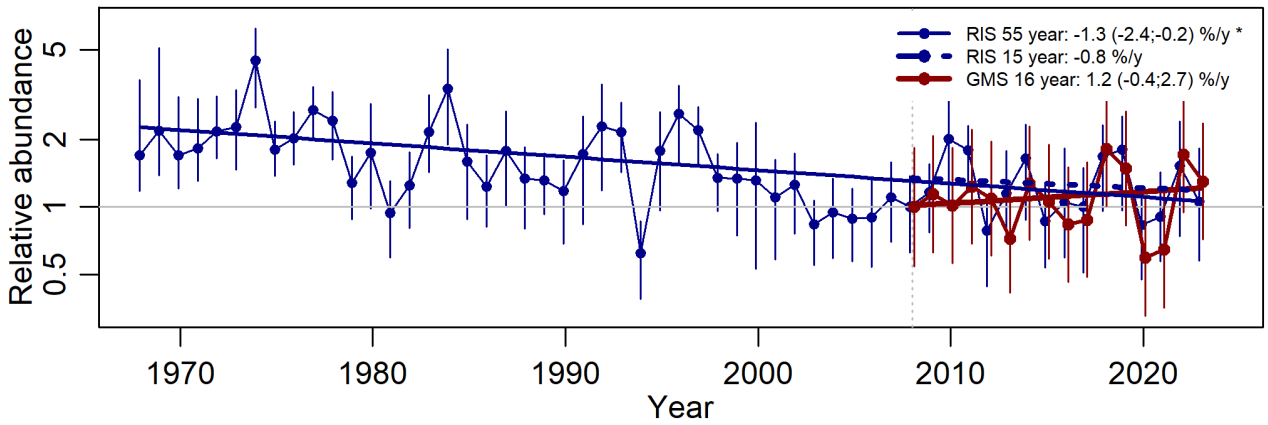

70.247: Pale Brindled Beauty (Phigalia pilosaria)
(Winter Data)
RIS 55 year: -2.9 (-4.7;-1.4) %/y *
RIS 15 year: -4.9 %/y
GMS 16 year: -1.8 (-5.4;2.0) %/y
Relative abundance
0.01
0.1
1
5
1970
1980
1990
2000
2010
2020
Year

70.248: Brindled Beauty (Lycia hirtaria)



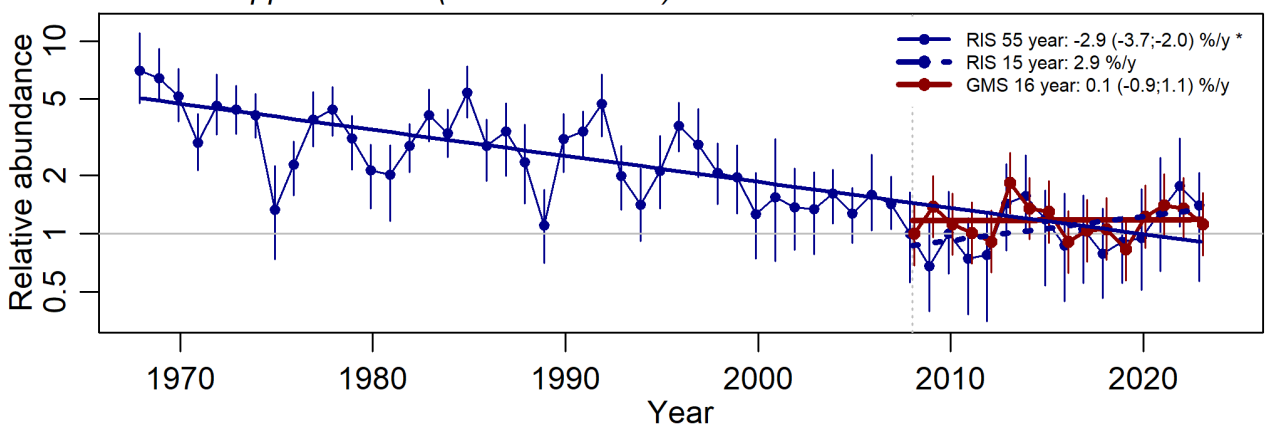
** Increasing recently in both series following decline up to early 2000's*

70.251: Oak Beauty (Biston strataria)

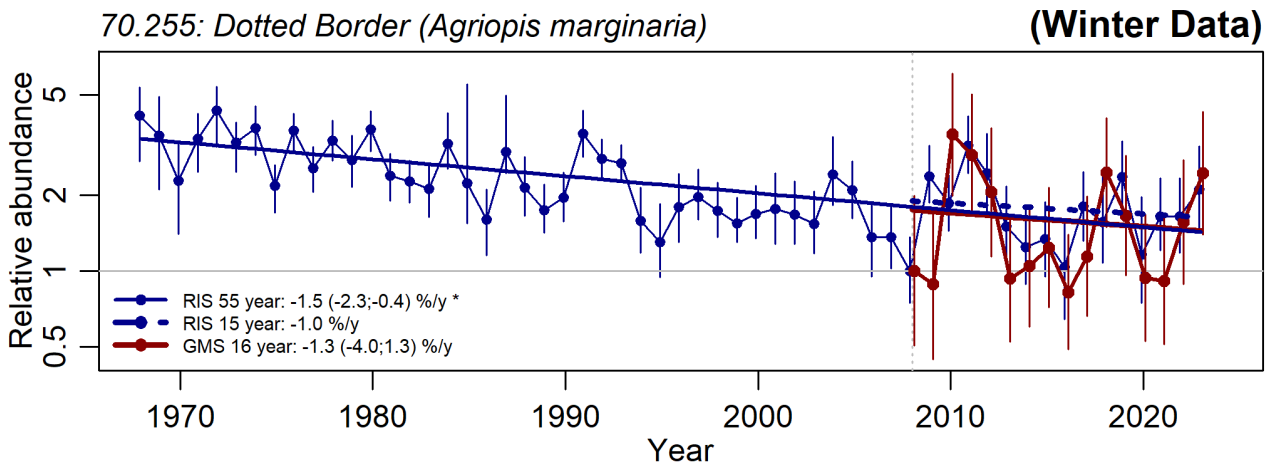


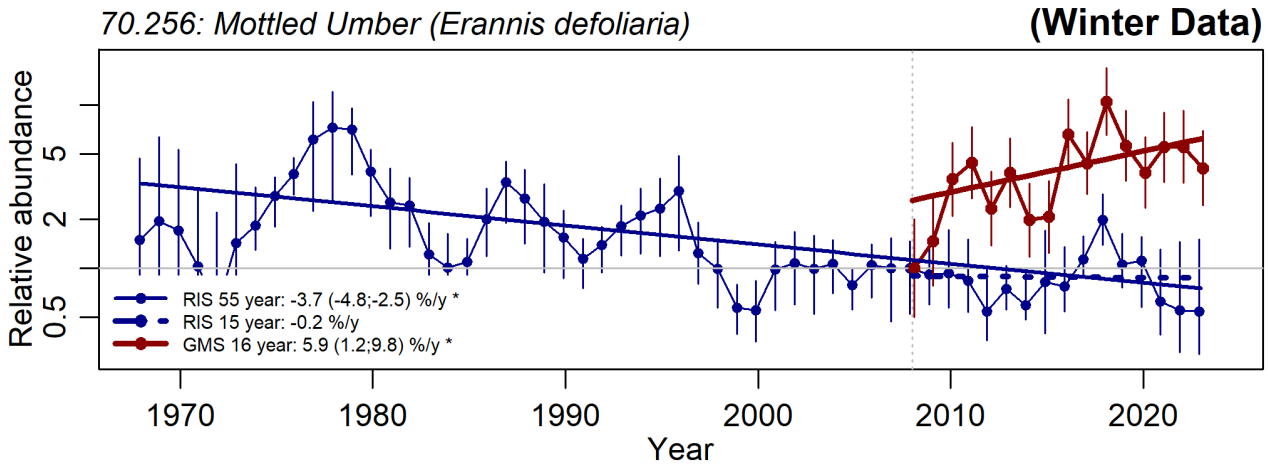
** Declining long-tern but may be stabilising*

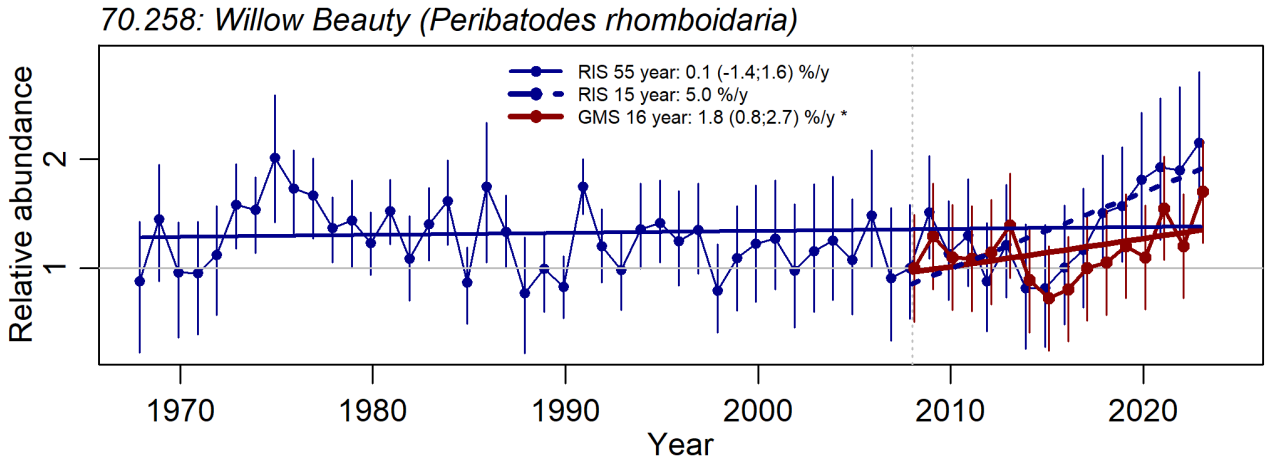
70.252: Peppered Moth (Biston betularia)



** Long-tern RIS decline nay be stabilising*

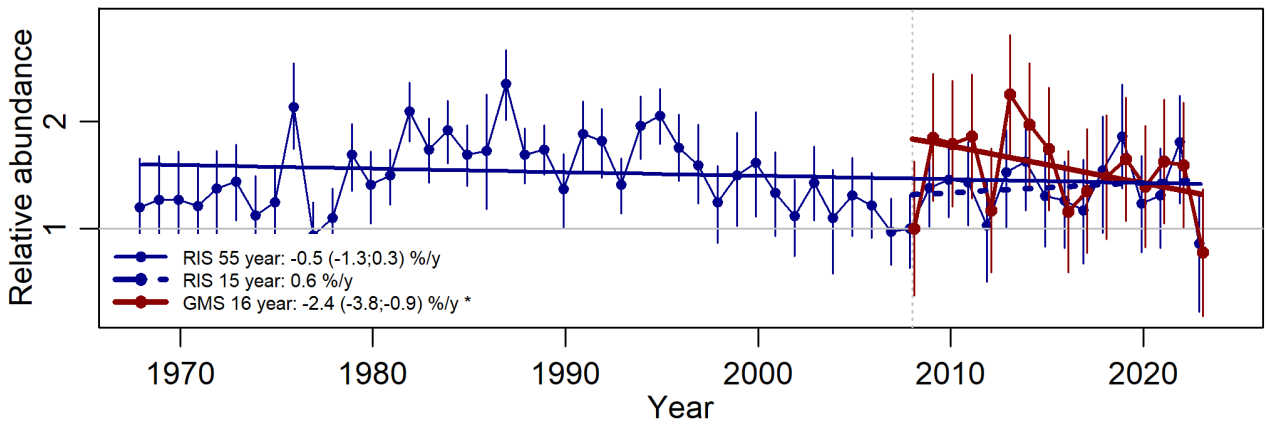






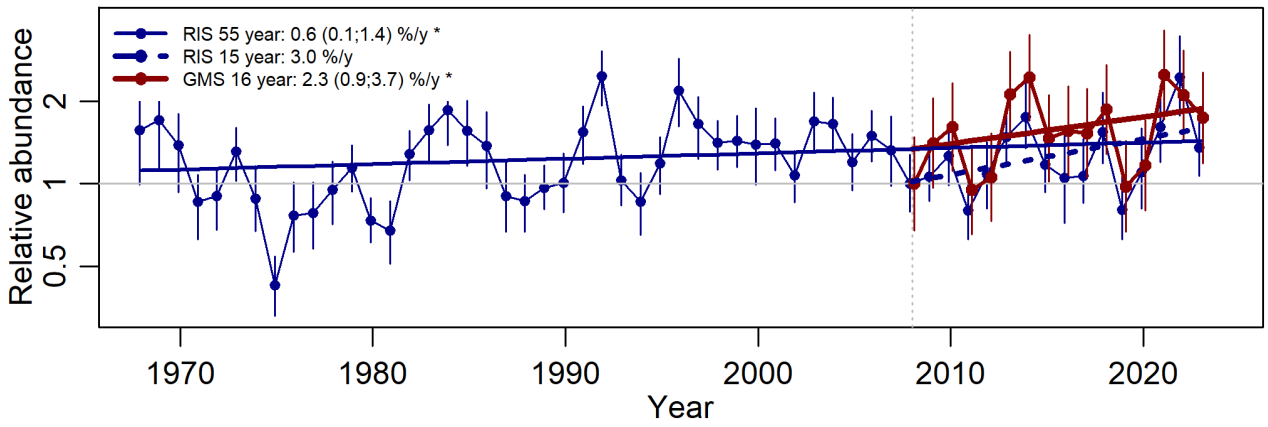
** Significant recent increase*

70.265: Mottled Beauty (Alcis repandata)



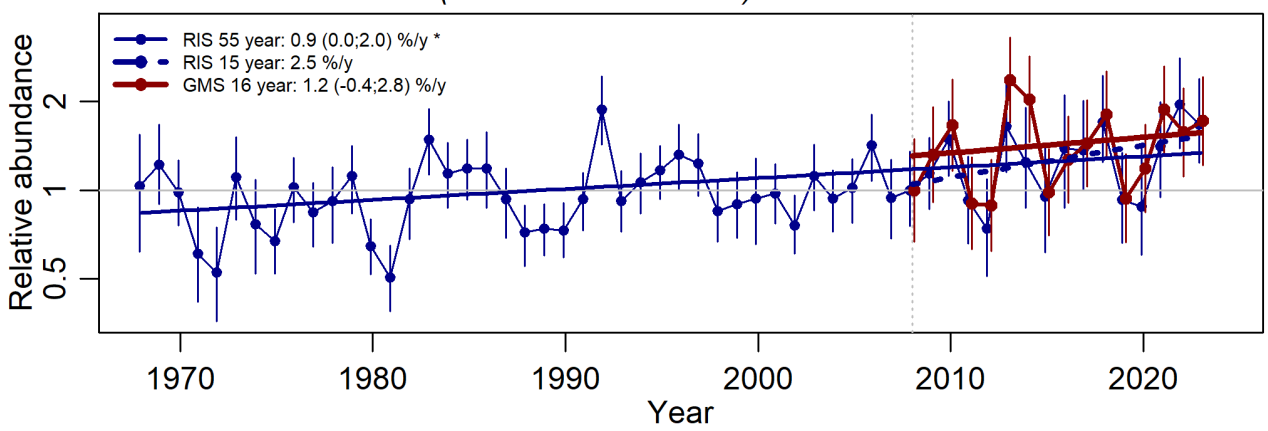
** GMS shows decline - not seen in RIS*

70.277: Common White Wave (Cabera pusaria)



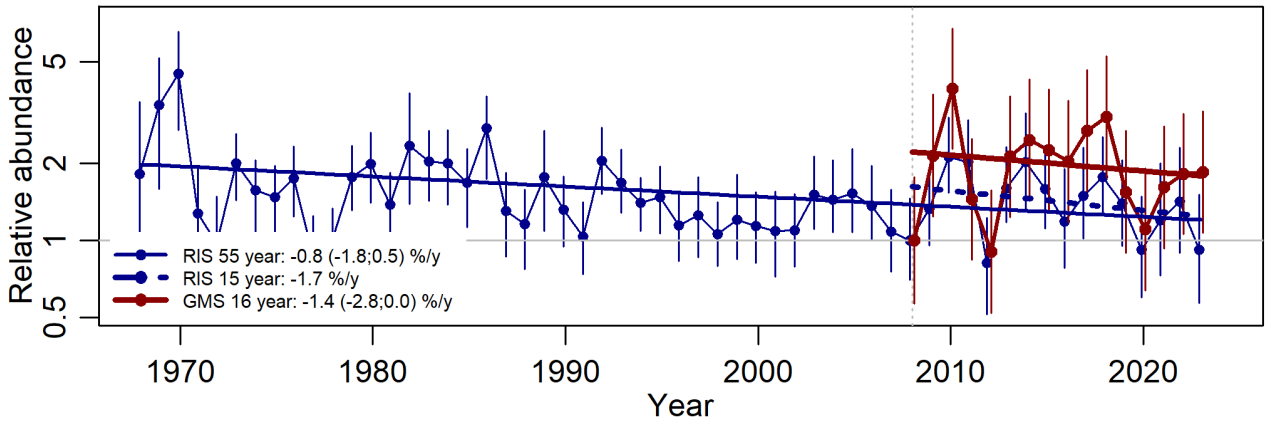
** Increasing in both series*

70.278: Common Wave (Cabera exanthemata)

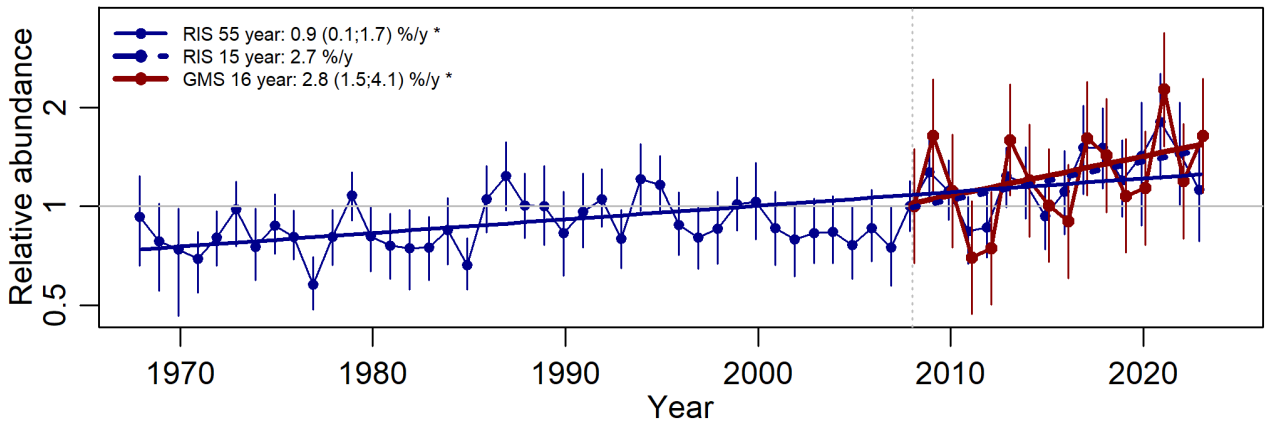


** Non-significant steady increase in both series*

70.280: Clouded Silver (Lomographa temerata)

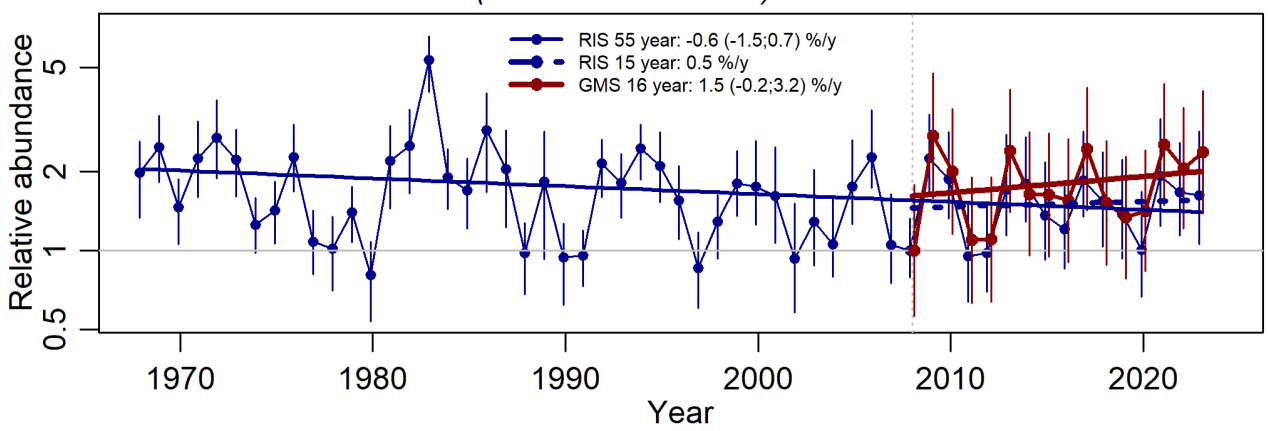


70.283: Light Emerald (Campaea margaritaria)



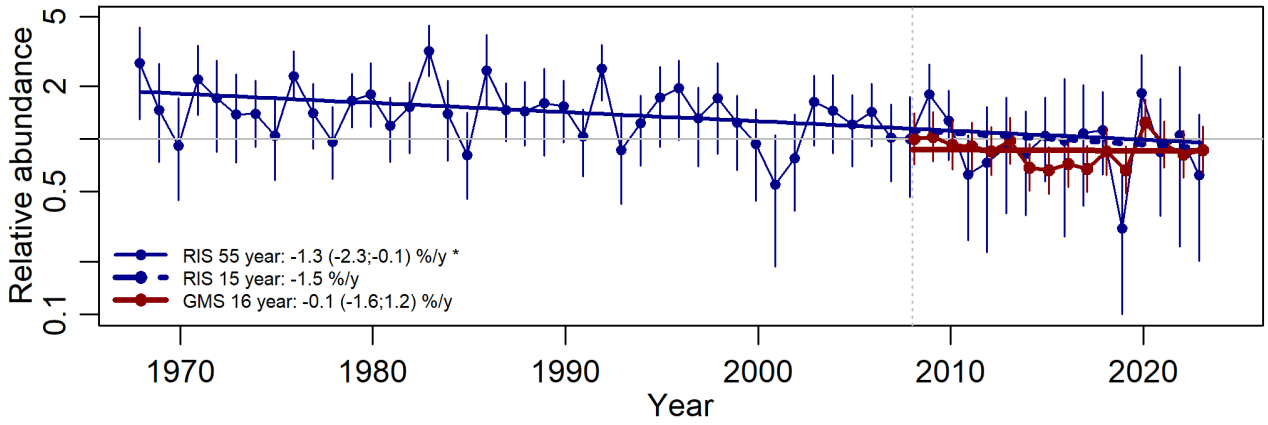
** Increasing in both series*

70.305: Common Emerald (Hemithea aestivaria)



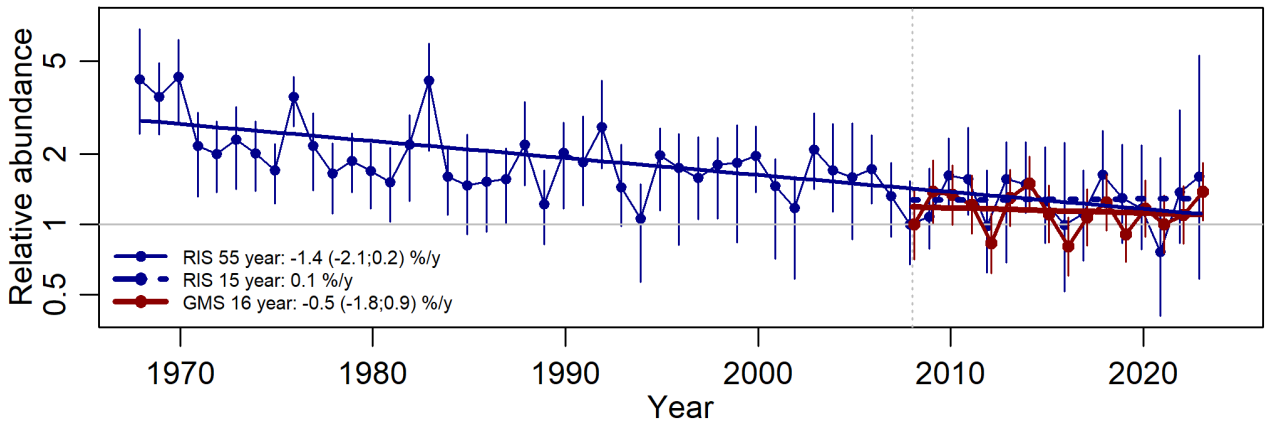
** No detectable trends*

71.012: Iron Prominent (Notodonta dromedarius)



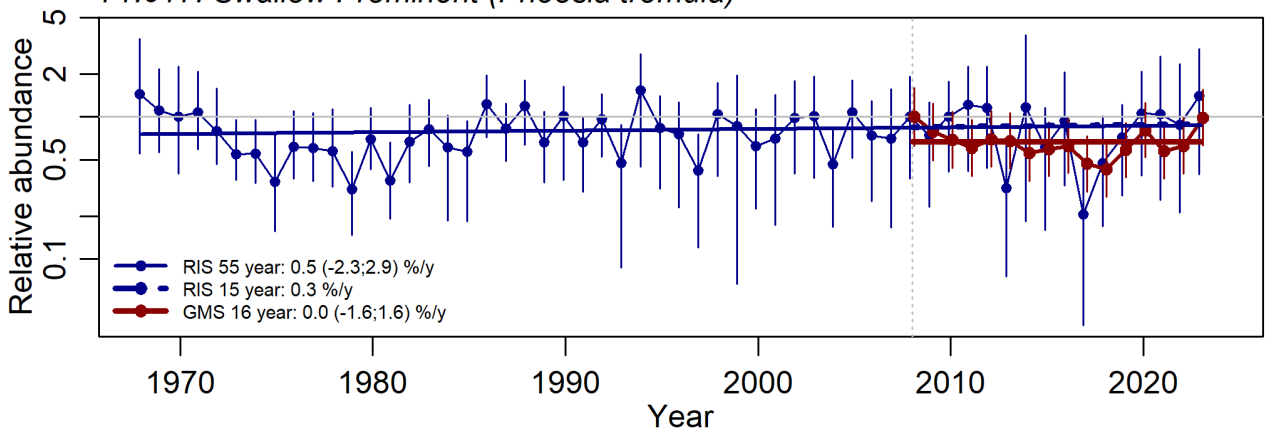
** No detectable trends*

71.013: Pebble Prominent (Notodonta ziczac)



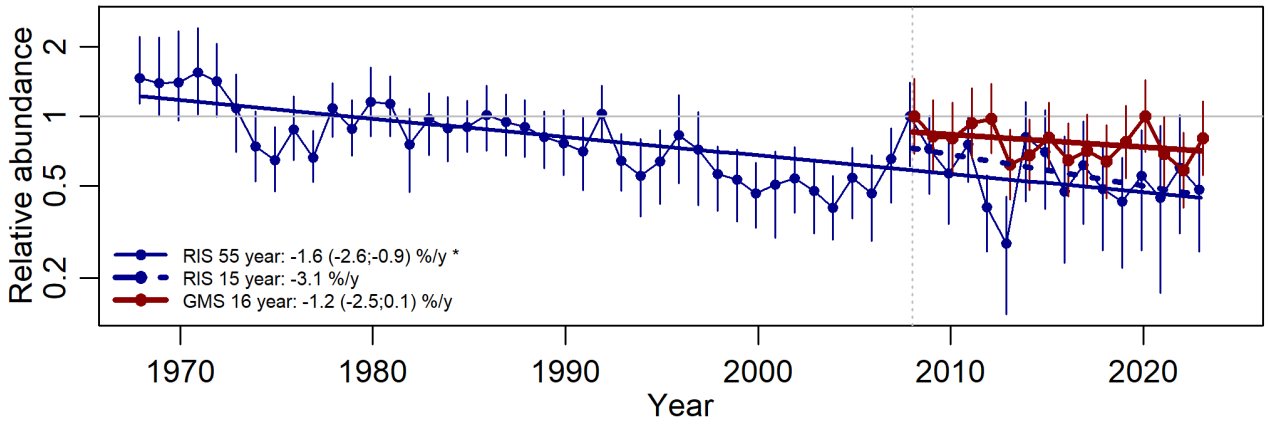
** Long-term decline in RIS not detectable in GMS*

71.017: Swallow Prominent (Pheosia tremula)



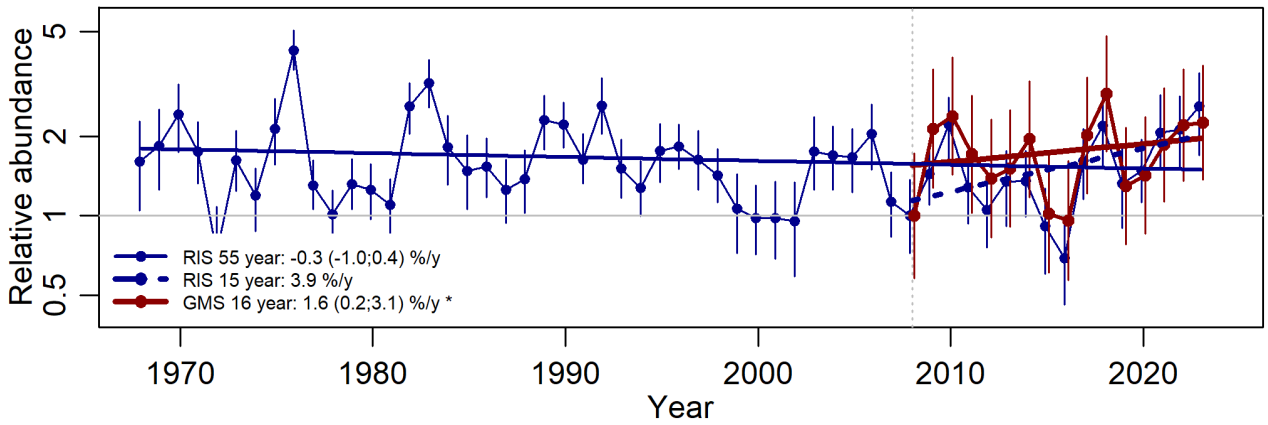
** No detectable trends*

71.018: Lesser Swallow Prominent (Pheosia gnoma)

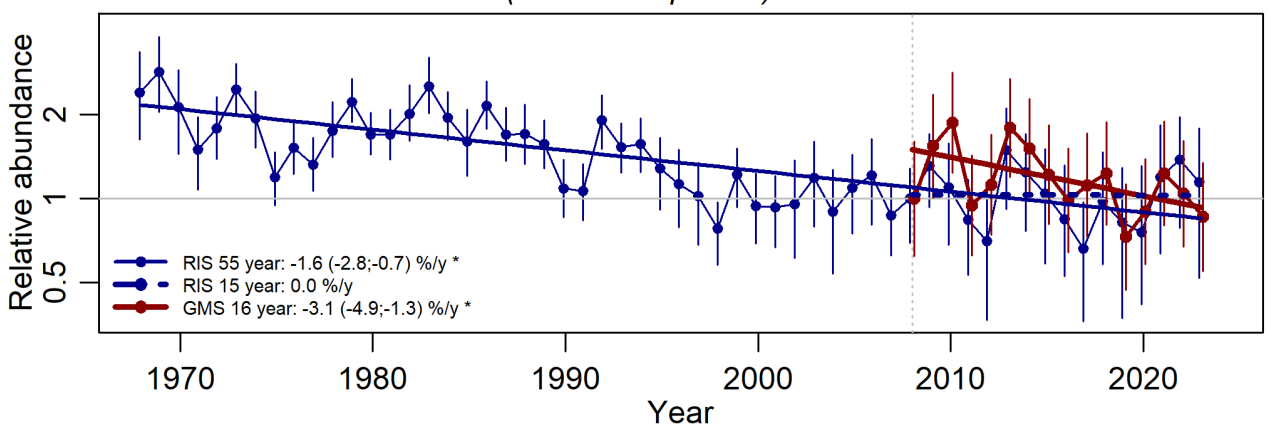


** Long term steady decline - GMS consistent but not significant*

71.020: Pale Prominent (Pterostoma palpina)

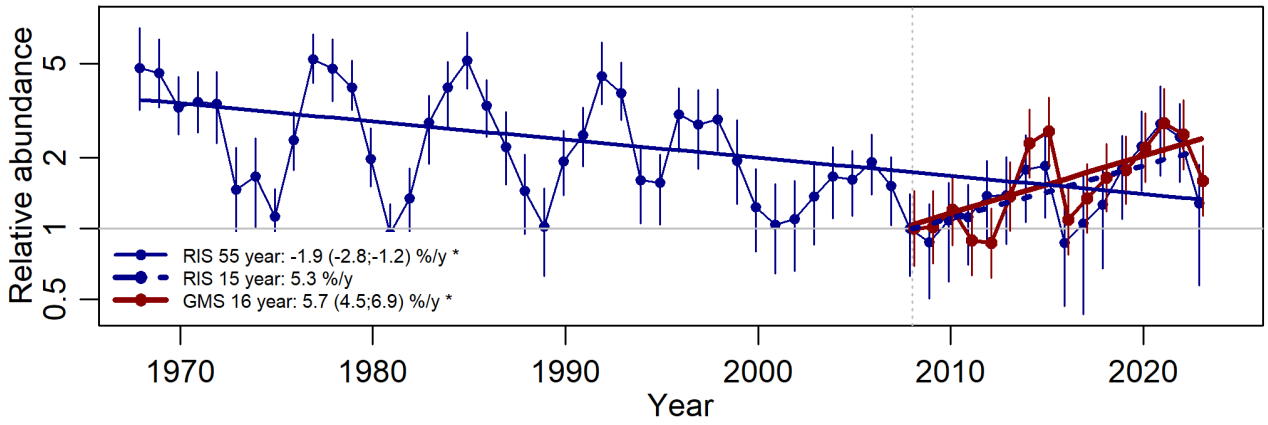


71.021: Coxcomb Prominent (Ptilodon capucina)



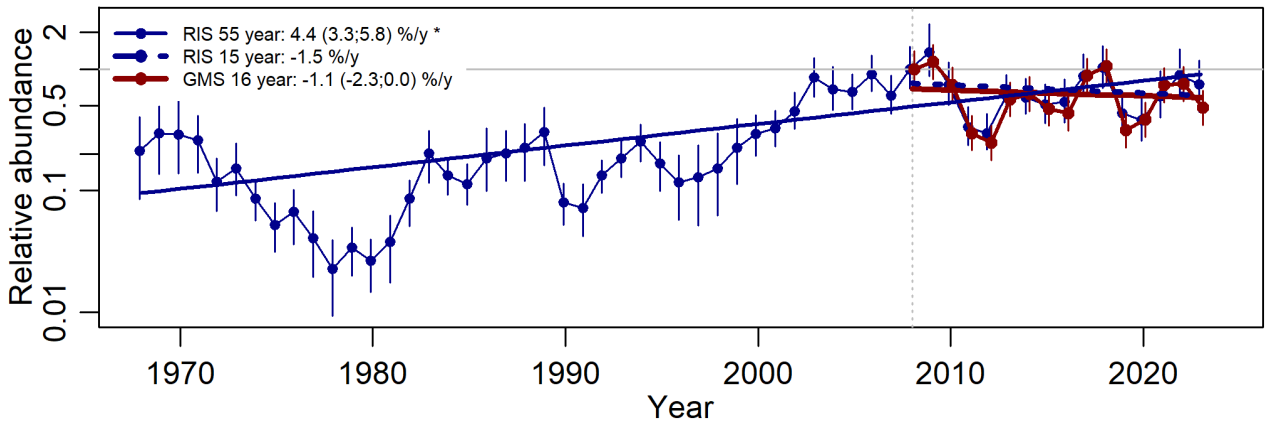
** Consistent steady decline in both series*

71.025: Buff-tip (Phalera bucephala)



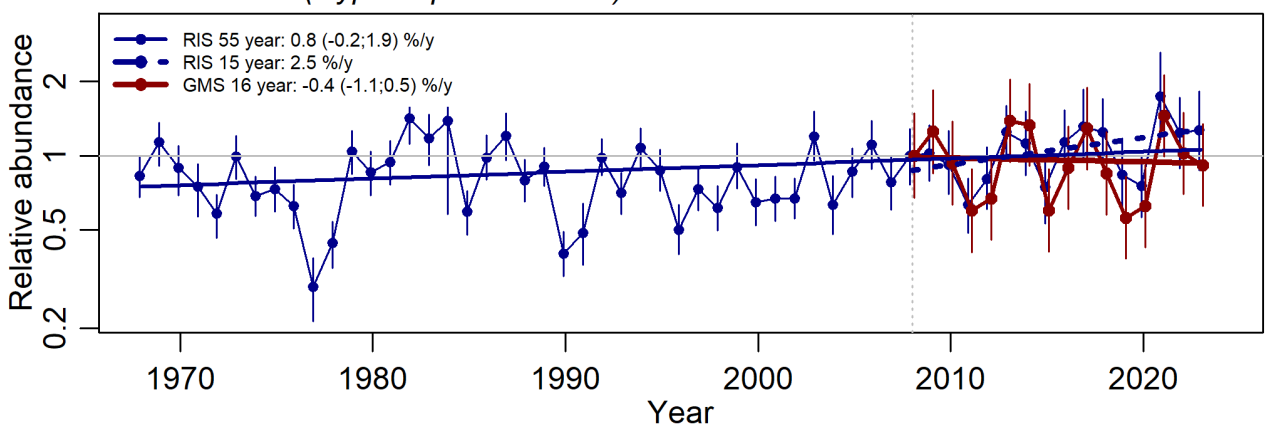
** Longterm RIS decline reversed in both datasets*
** GMS significant increase (but note long-term periodicity)*

72.002: Straw Dot (Rivula sericealis)



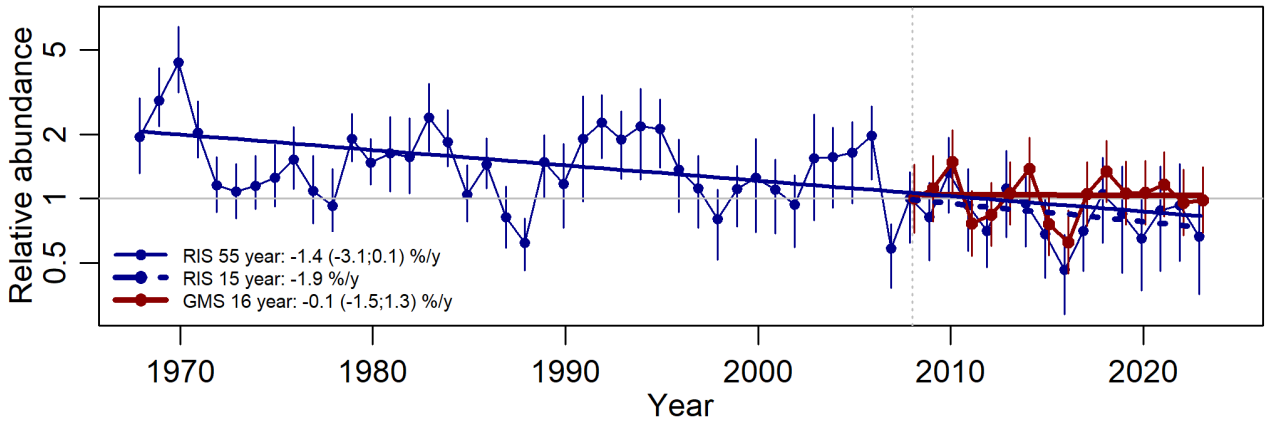
** Long-term increasing but plateau after 2010*
** Such that GMS shows (non-significant) decline*

72.003: Snout (Hypena proboscidalis)



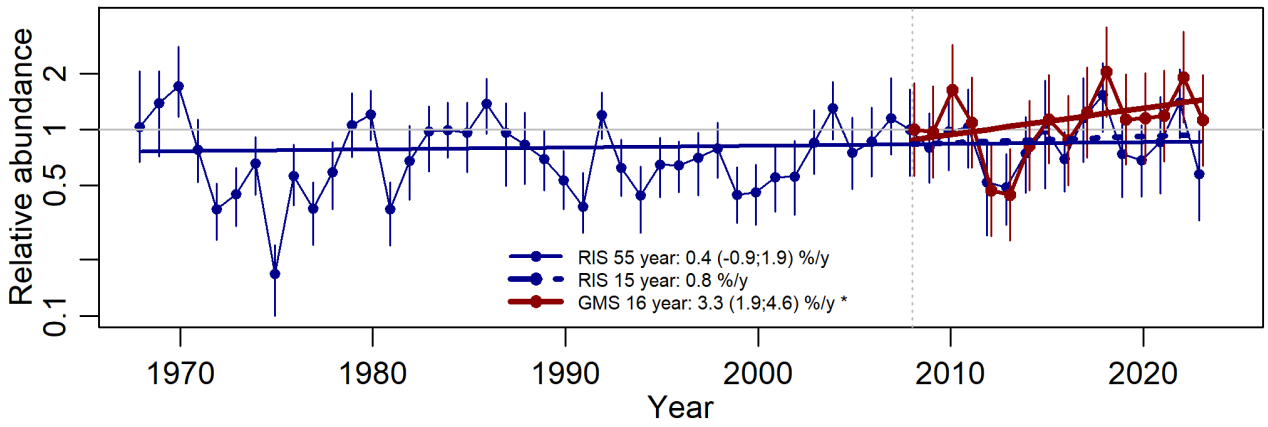
** No detectable trends*

72.013: Yellow-tail (Euproctis similis)



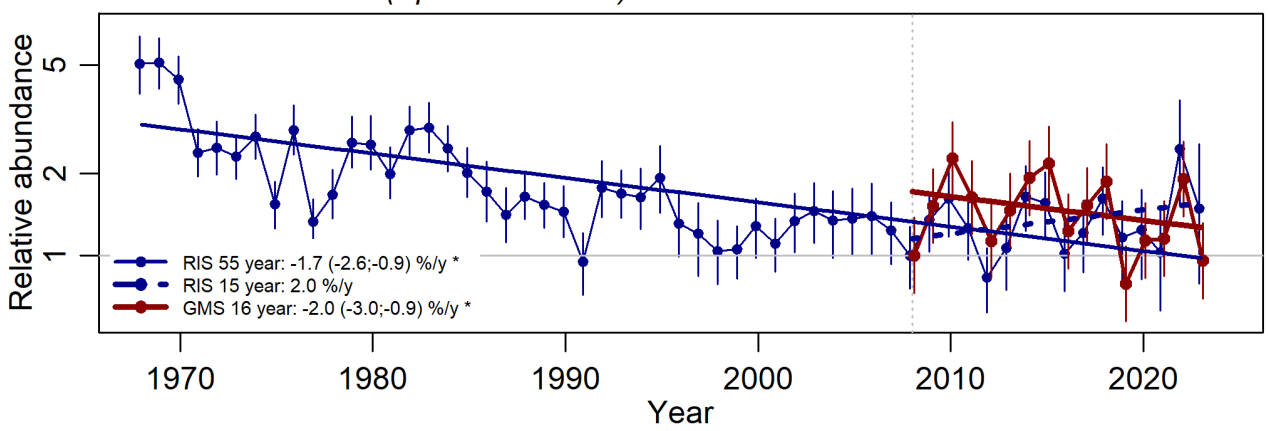
** No detectable trends*

72.015: Pale Tussock (Calliteara pudibunda)



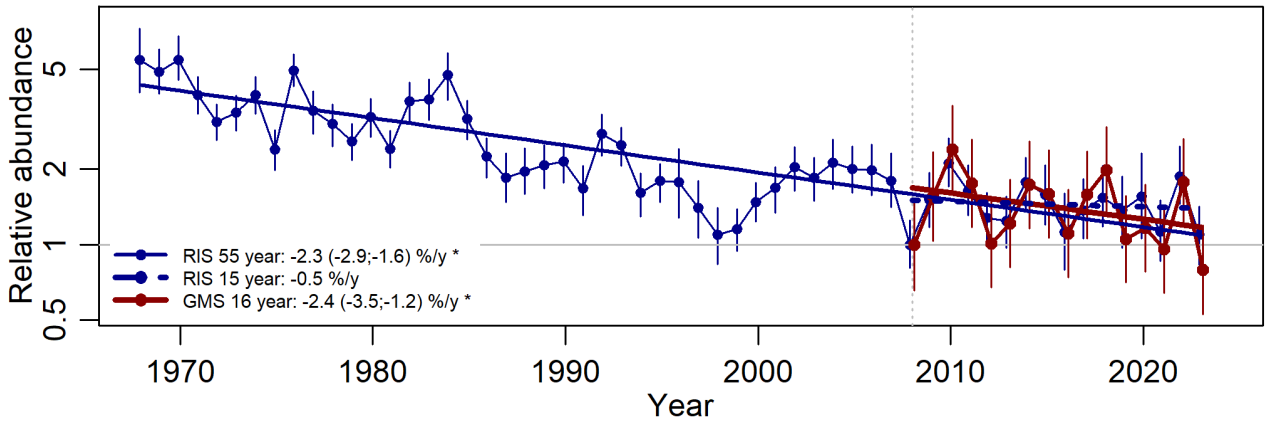
** GMS shows a significant increase - consistent with RIS*

72.019: Buff Ermine (Spilosoma lutea)

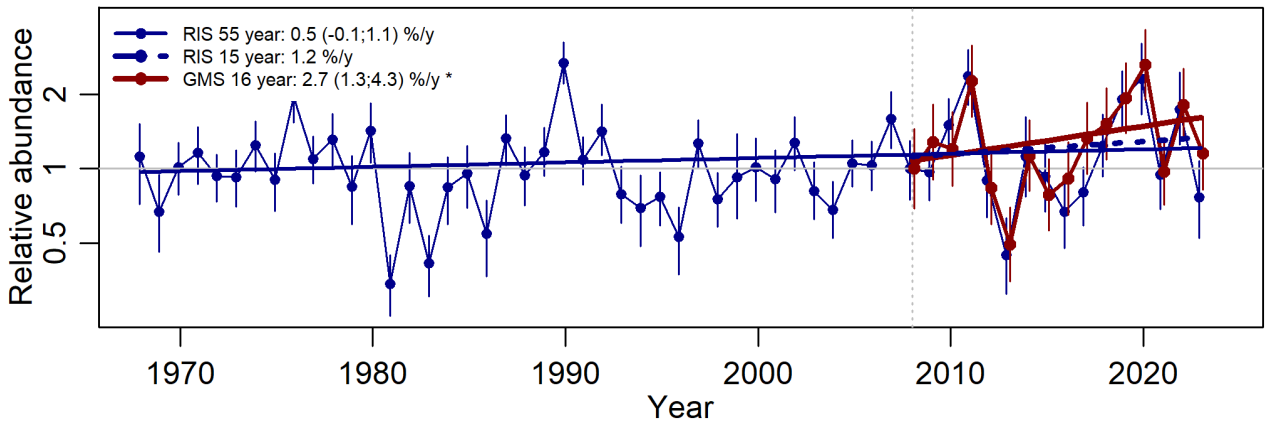


** Both series show significant decline*

72.020: White Ermine (Spilosoma lubricipeda)

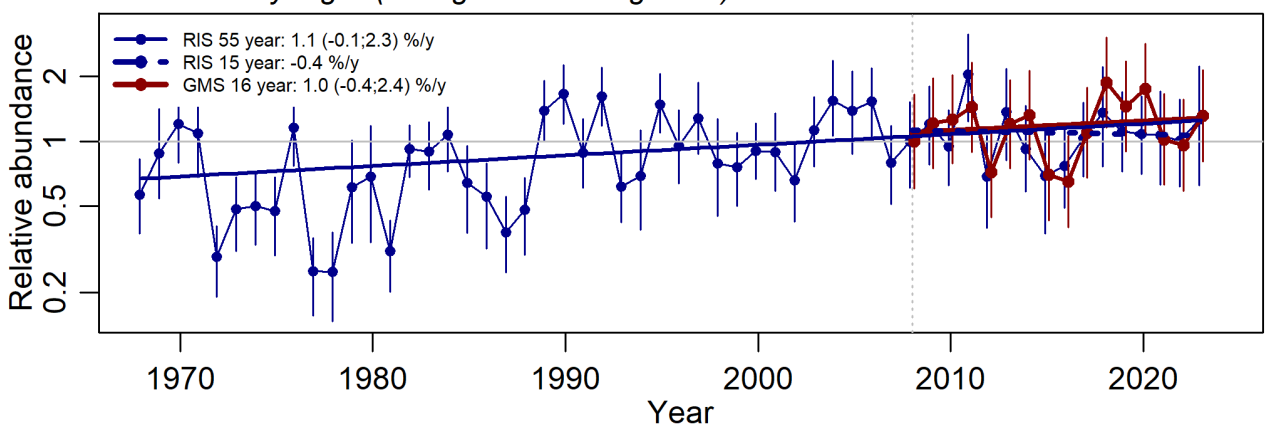


72.022: Muslin Moth (Diaphora mendica)

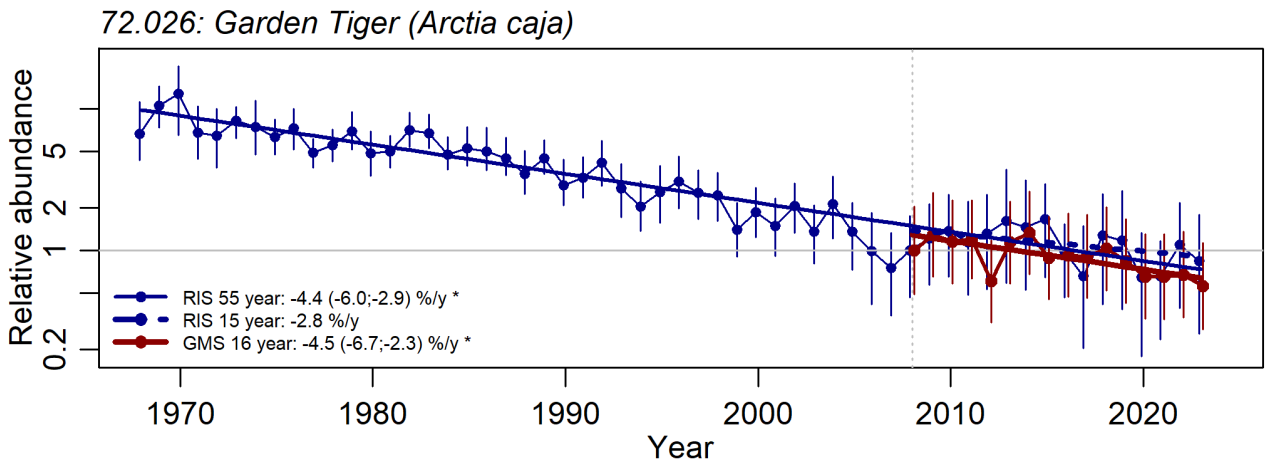


** Both series show significant increase*

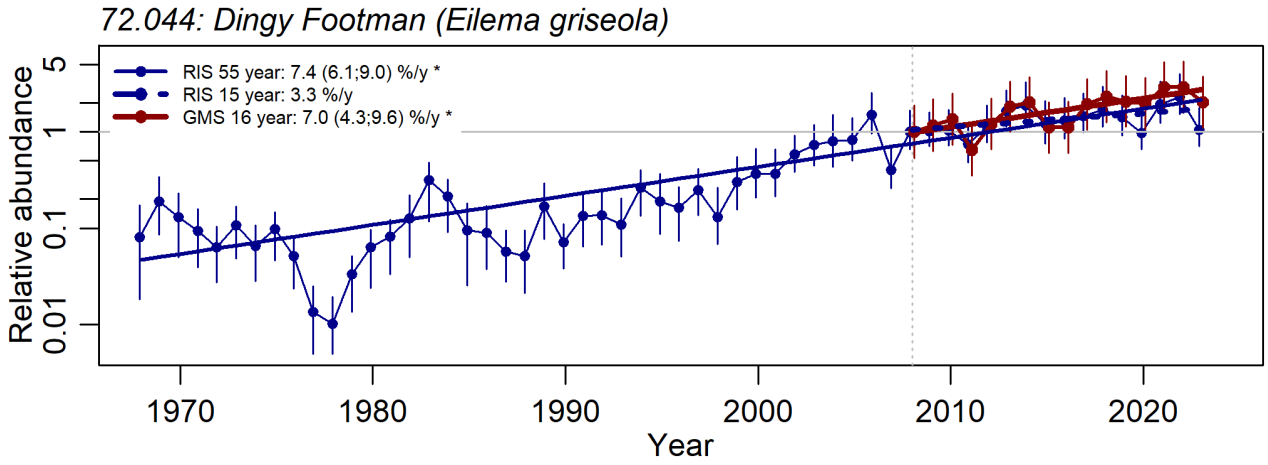
72.024: Ruby Tiger (Phragmatobia fuliginosa)



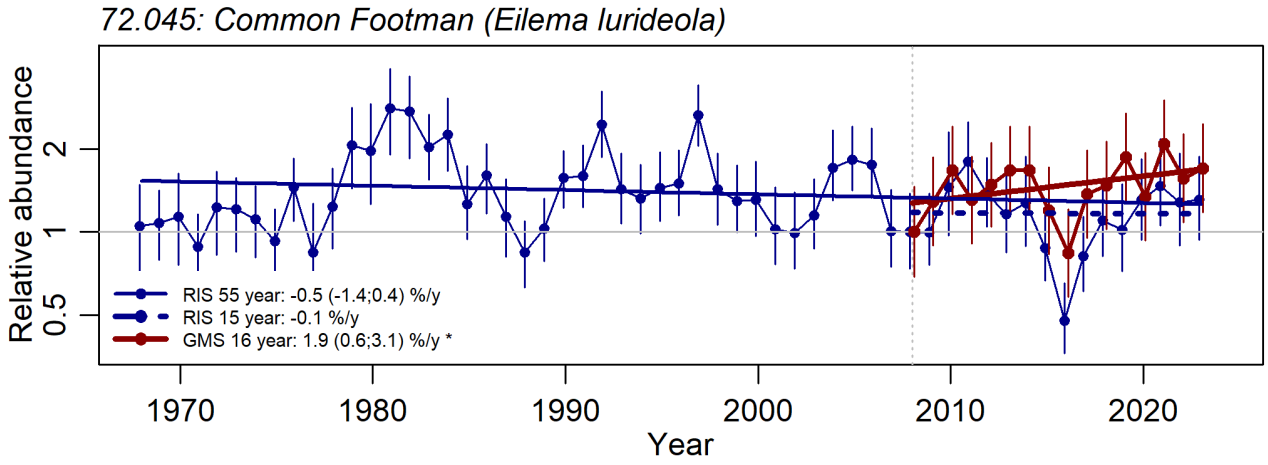
** No detectable trends*



* Both series show large significant decline

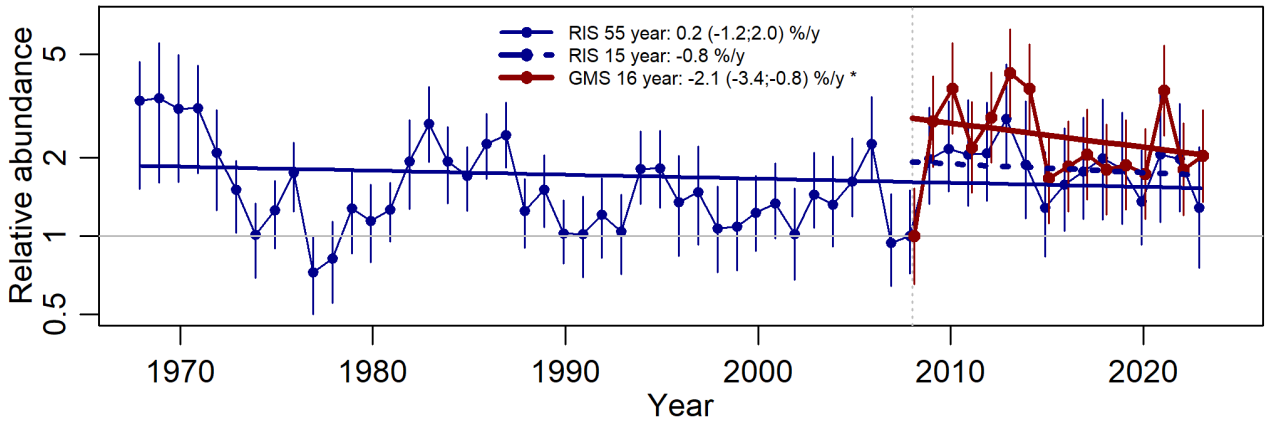


* Both series show significant large increase



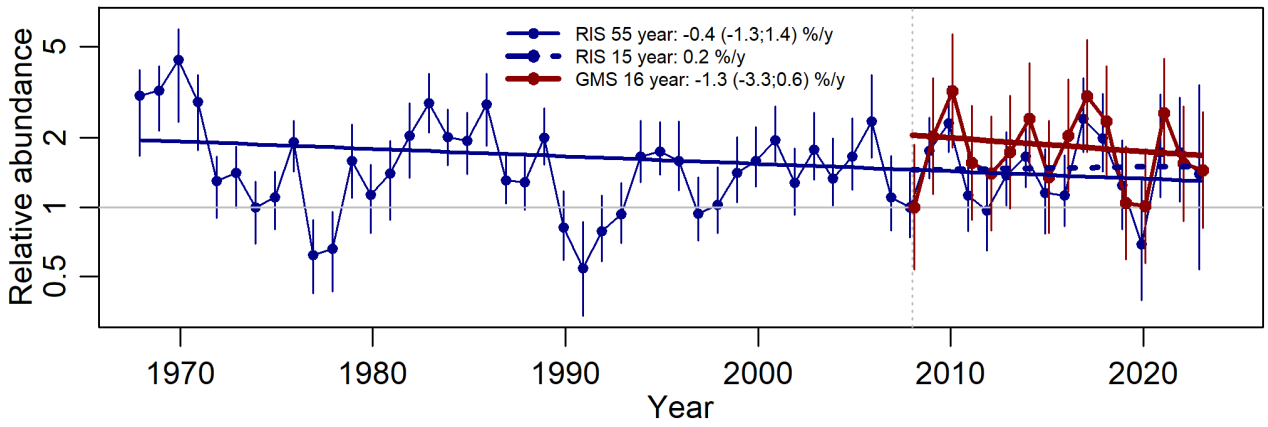
* GMS shows recent increase not seen in RIS

72.053: Fan-foot (Herminia tarsipennalis)



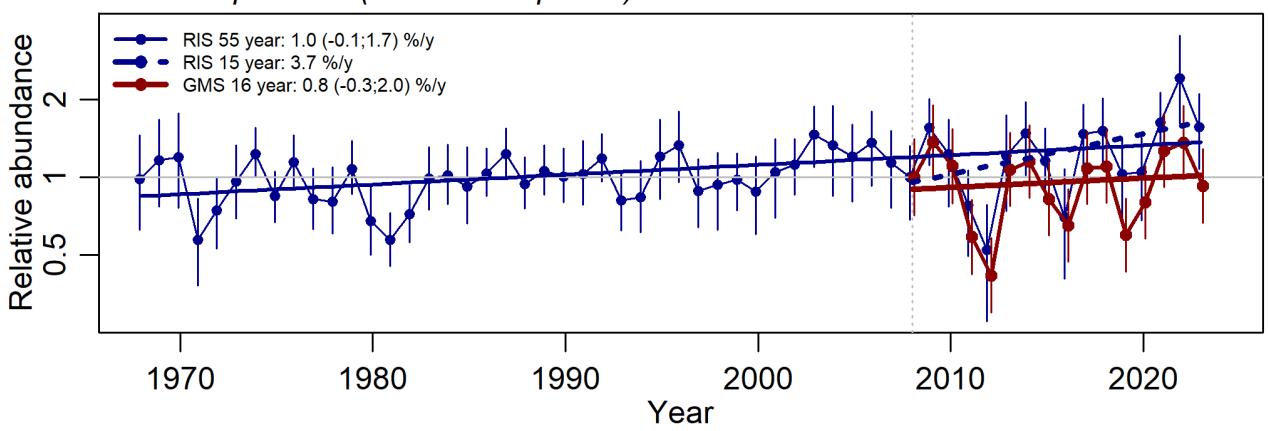
** GMS shows recent decrease not seen in RIS - but very variable year-to-year*

72.055: Small Fan-foot (Herminia grisealis)



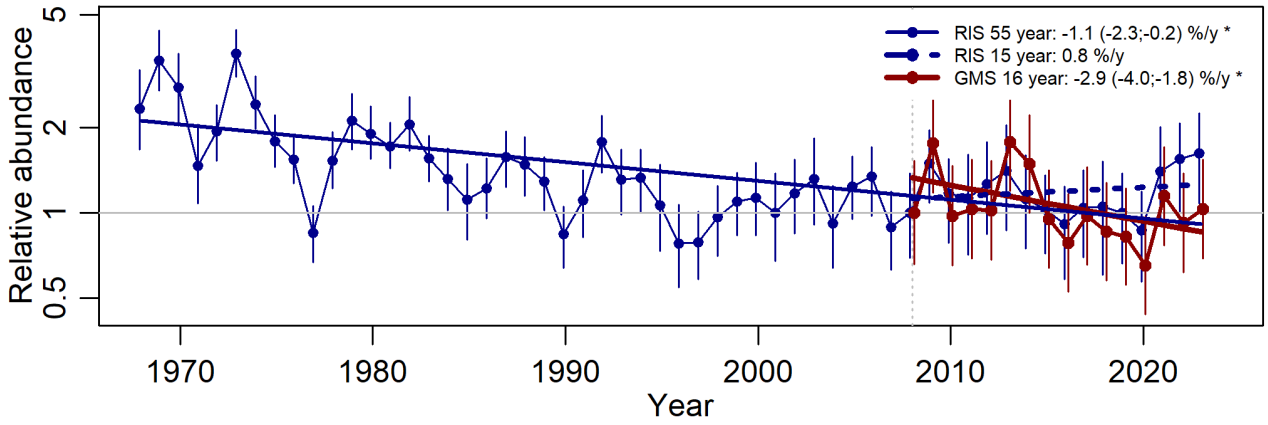
** No detectable trends*

73.001: Spectacle (Abrostola tripartita)



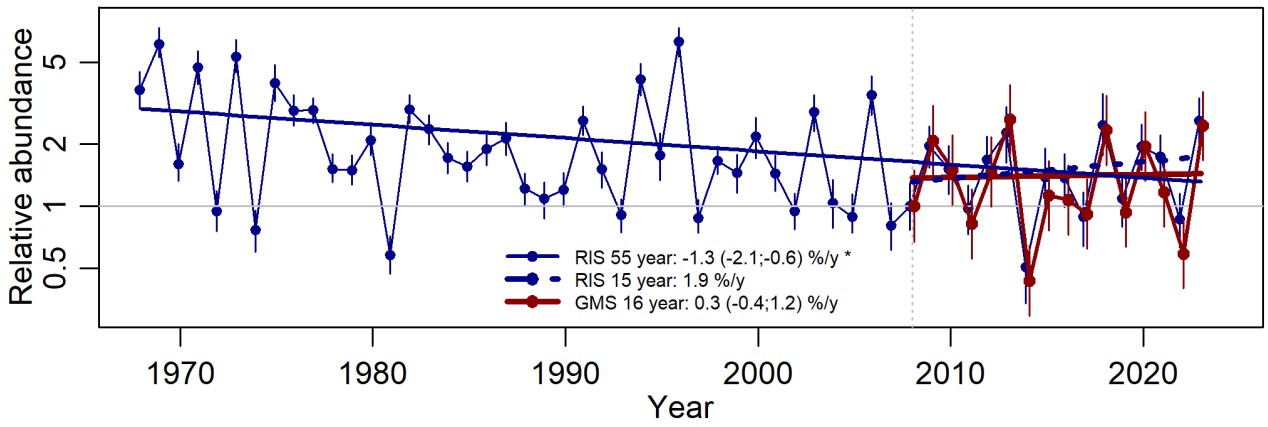
** No detectable trends*

73.012: Burnished Brass (Diachrysia chrysitis)



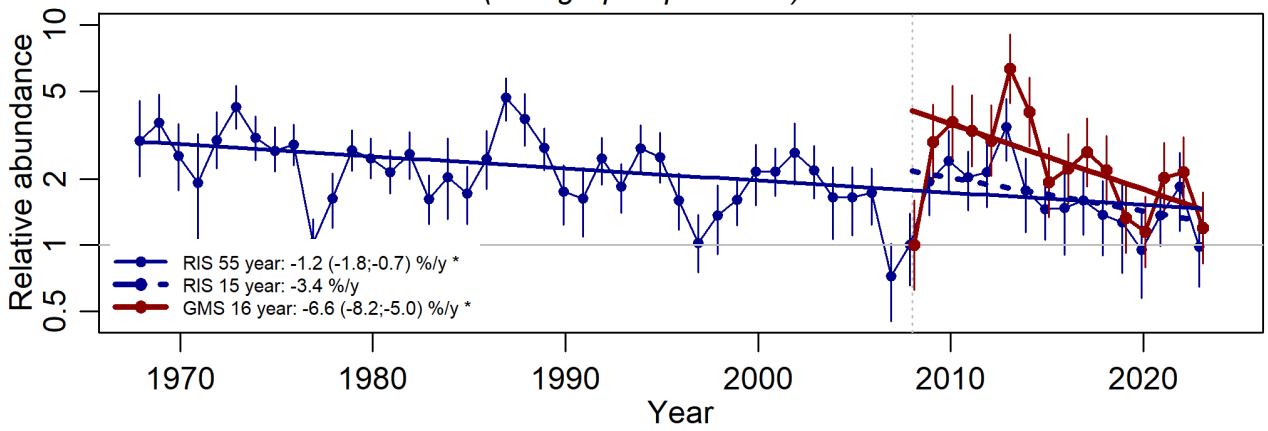
** Both series show significant decline*

73.015: Silver Y (Autographa gamma)

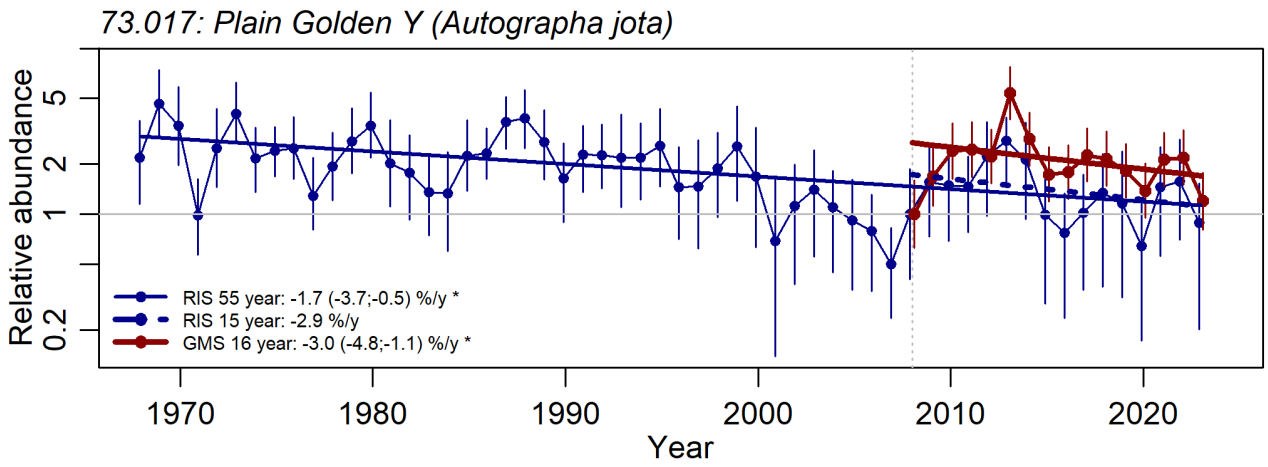


** GMS shows stable abundance against long-term decline*
** GMS and RIS data are in particularly close agreement fornthis ubiquitous species*

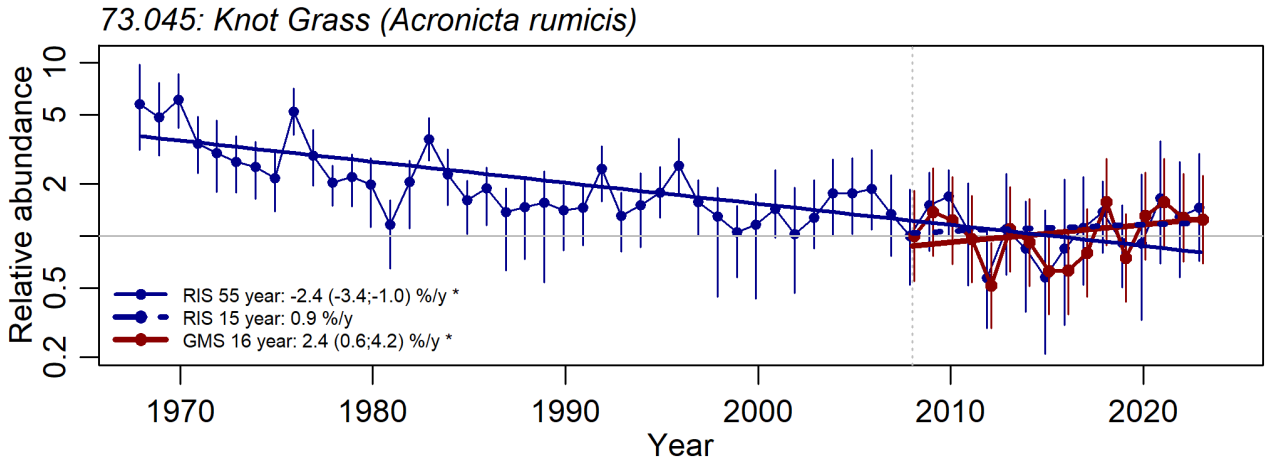
73.016: Beautiful Golden Y (Autographa pulchrina)



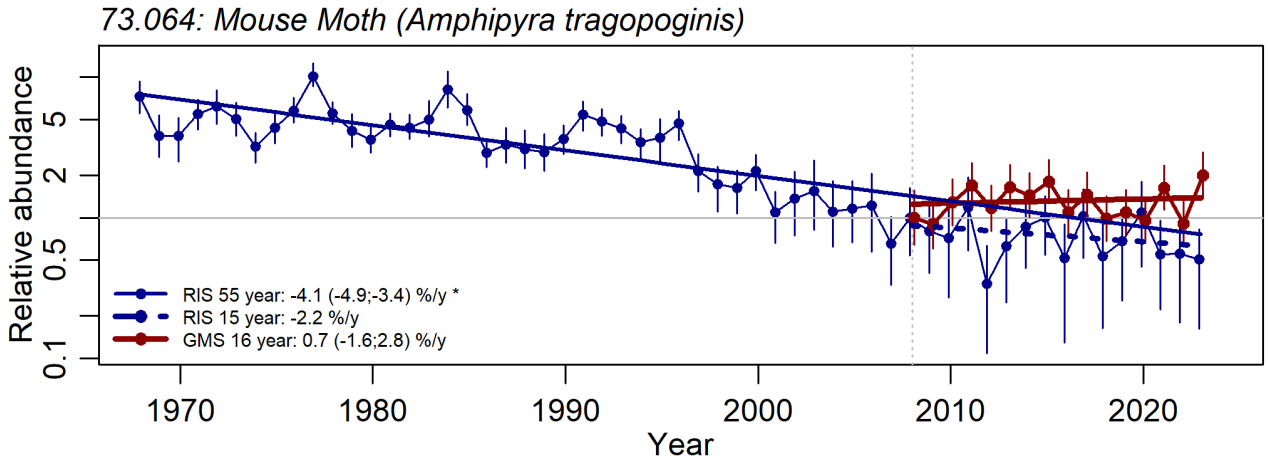
** Both series show significant decline, GMS particularly strong decline*



** Both series show significant decline*

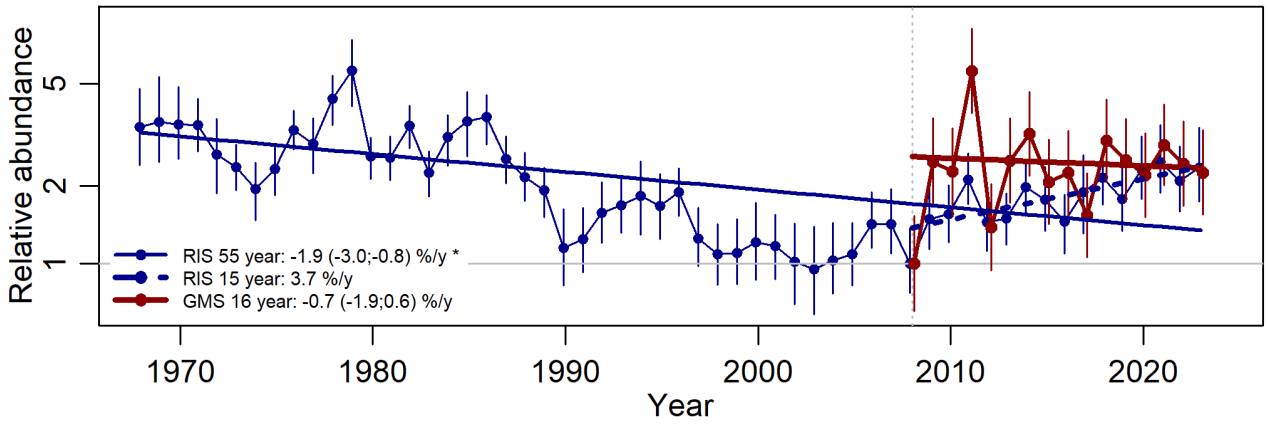


** Long-term decline ibut modest recent recovery*
** GMS shows significant increase and consistent with RIS data*



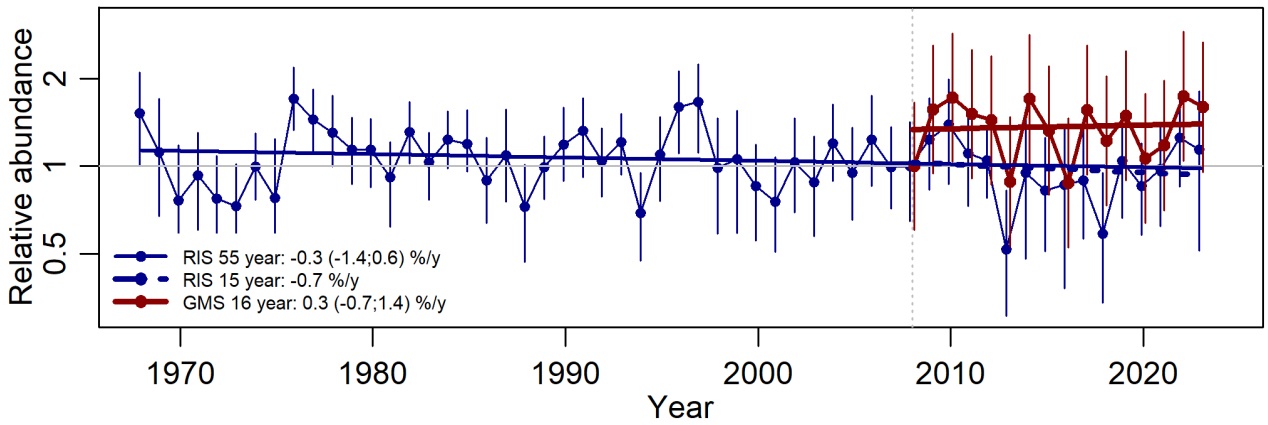
** Long term decline may be stabilising - GMS non-significantly increasing*

73.068: Green-brindled Crescent (Allophyes oxyacanthae)



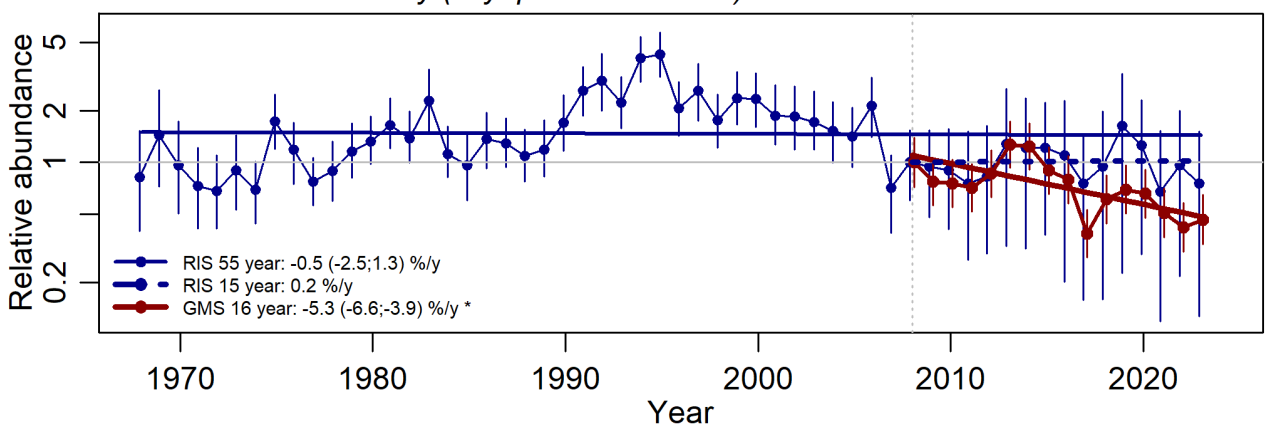
** Long-term decline; recent trends rather undefined*

73.069: Early Grey (Xylocampa areola)



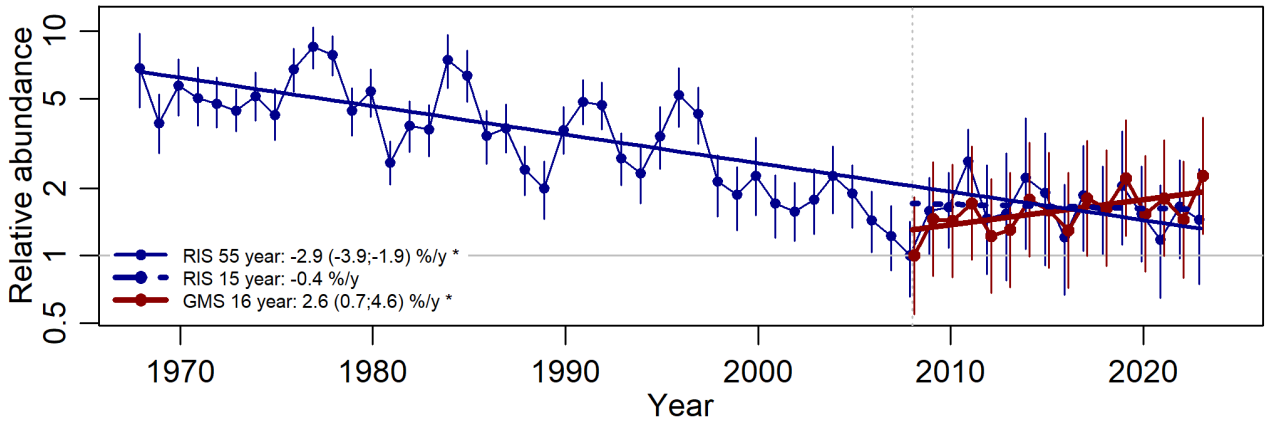
** No detectable trends*

73.084: Marbled Beauty (Bryophila domestica)



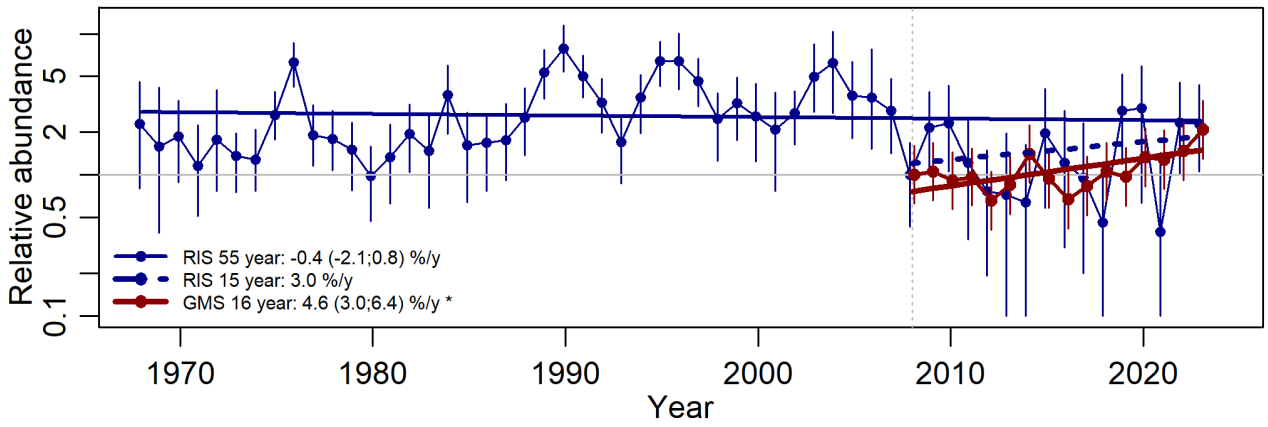
** GMS shows recent significant decrease - not seen in RIS data*

73.092: Mottled Rustic (Caradrina morpheus)



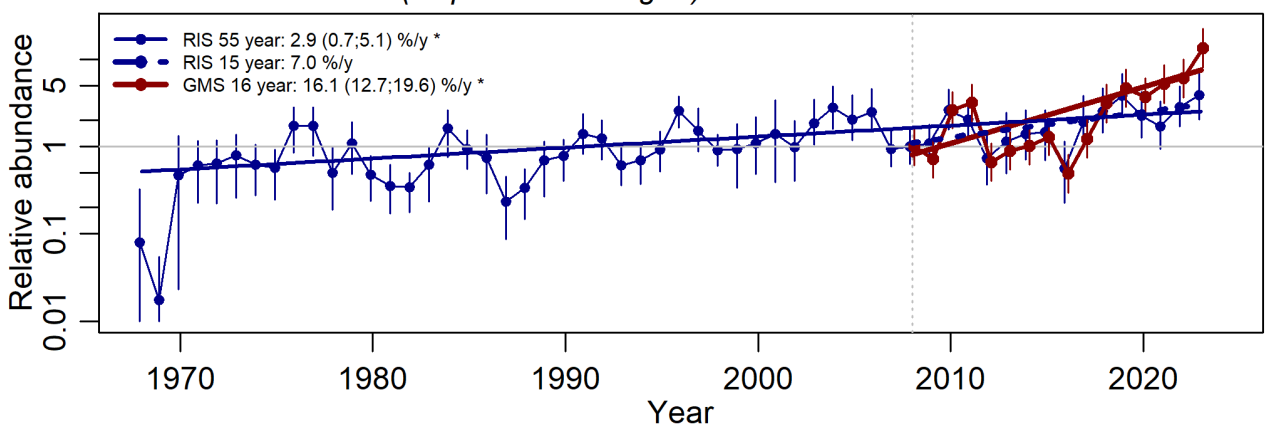
** Long-term decline reversed and GMS shows significant recovery*
** Recovery also seen in RIS dataset*

73.095: Pale Mottled Willow (Caradrina clavipalpis)



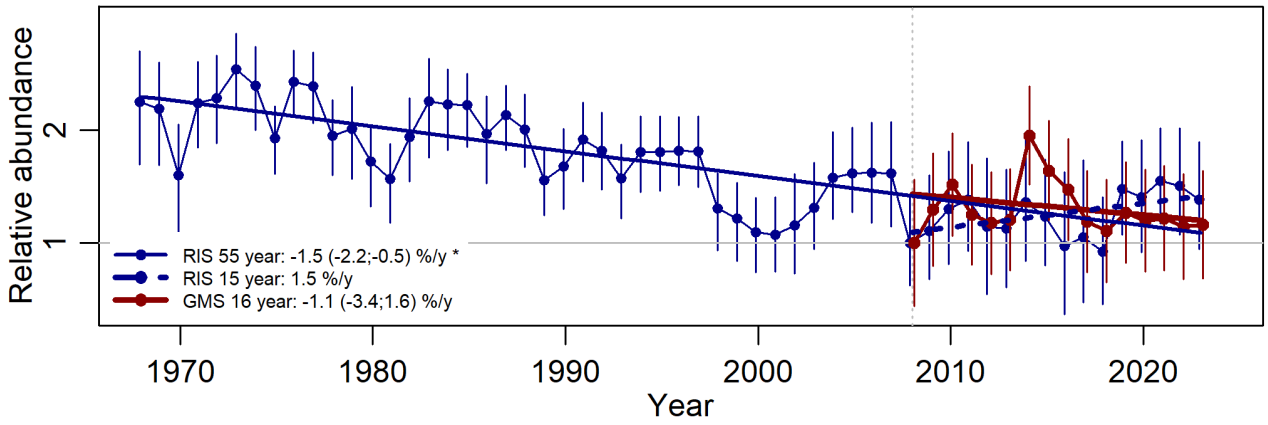
** GMS shows significant increase*

73.099: Vine's Rustic (Hoplodrina ambigua)



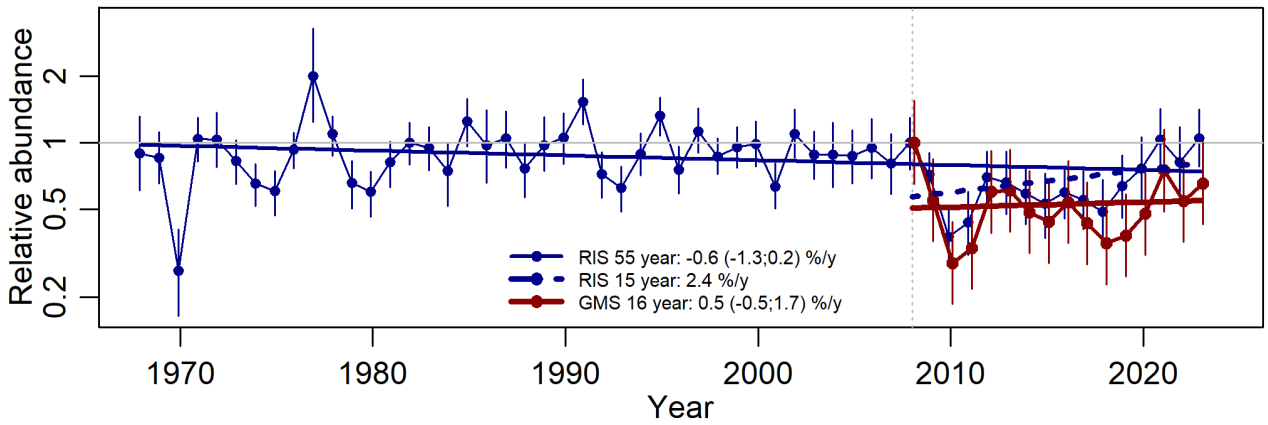
** Steady long-term increase in abundance*
** Rather more dramatic increase in GMS*

73.102: Brown Rustic (Rusina ferruginea)



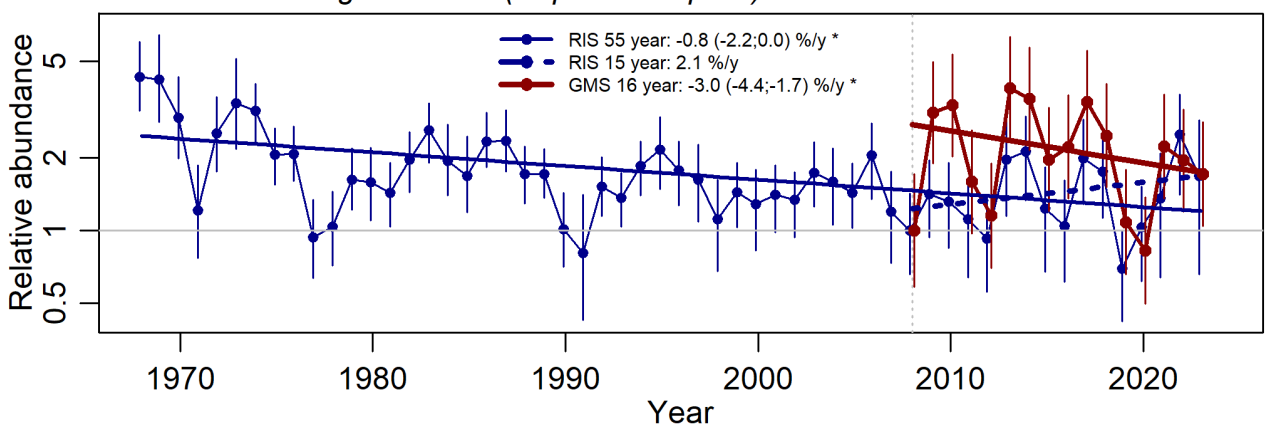
** Long-term decline, no change detectable in GMS*

73.113: Angle Shades (Phlogophora meticulosa)



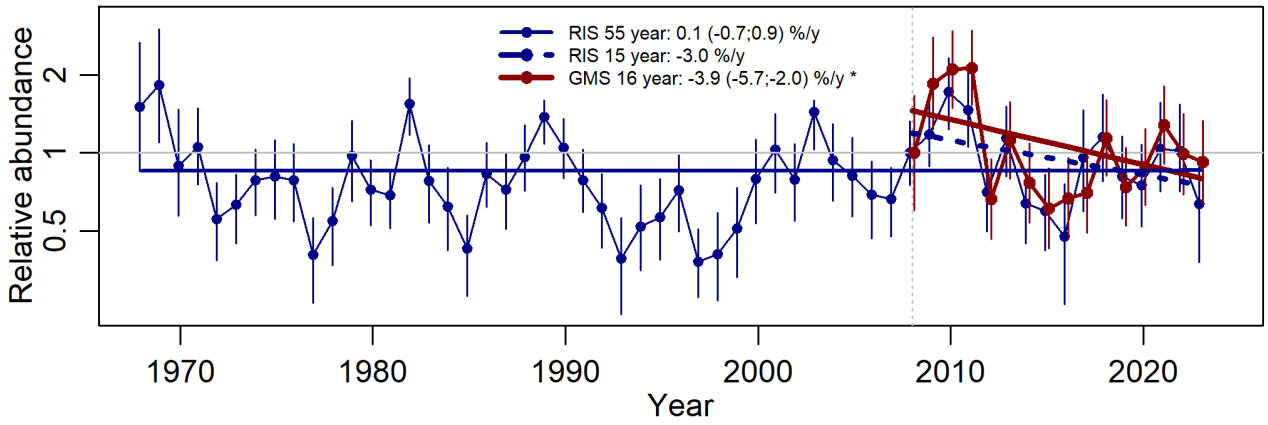
** No detectable trends*

73.114: Small Angle Shades (Euplexia lucipara)



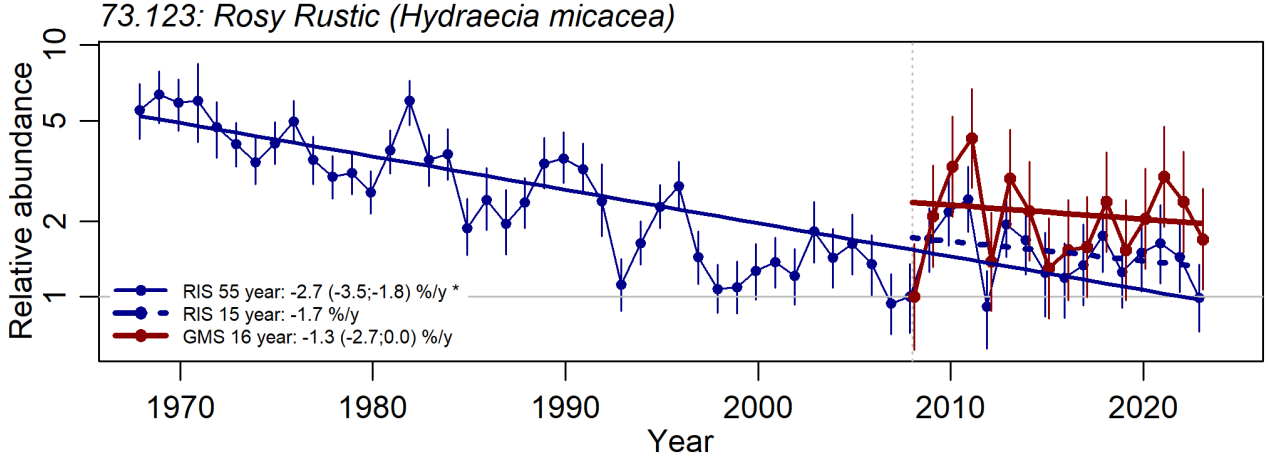
** Declining in both datasets*

73.121: Frosted Orange (Gortyna flavago)



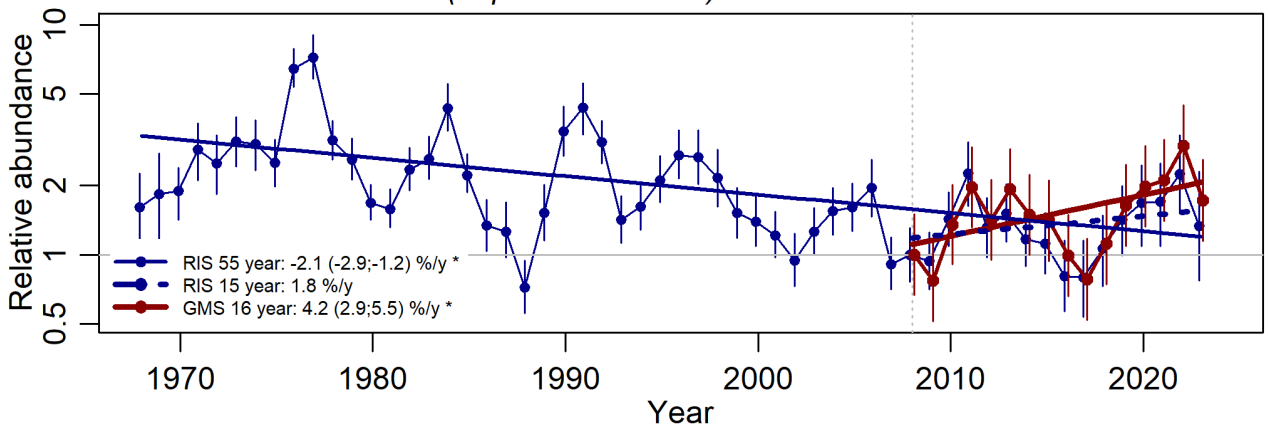
** Significant decline in GMS - consistent with RIS data*
** Largely due to 3 exceptionally good years around 2010*

73.123: Rosy Rustic (Hydraecia micacea)



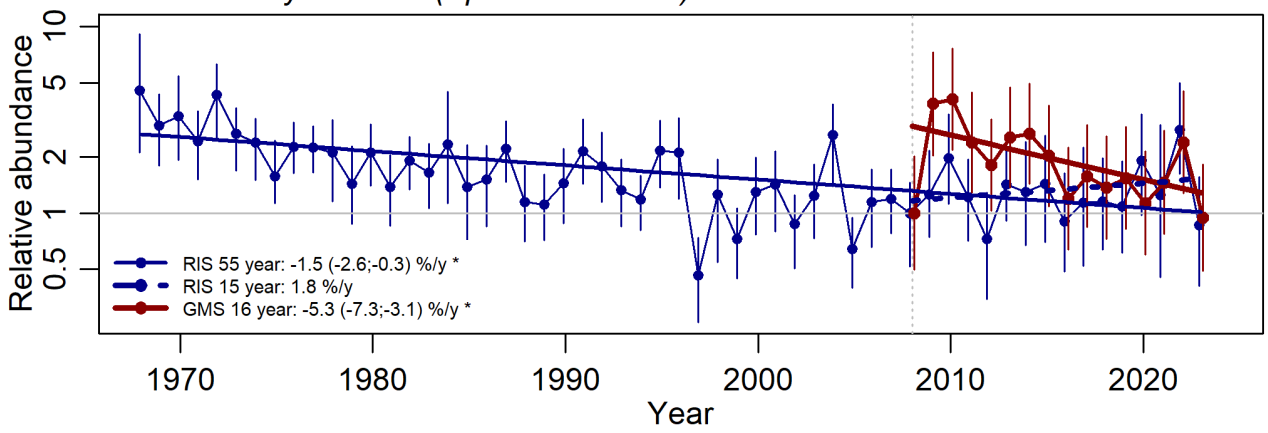
** RIS long-term decline may be stabilising*
** Slower decline in GMS not significant*

73.131: Flounced Rustic (Luperina testacea)



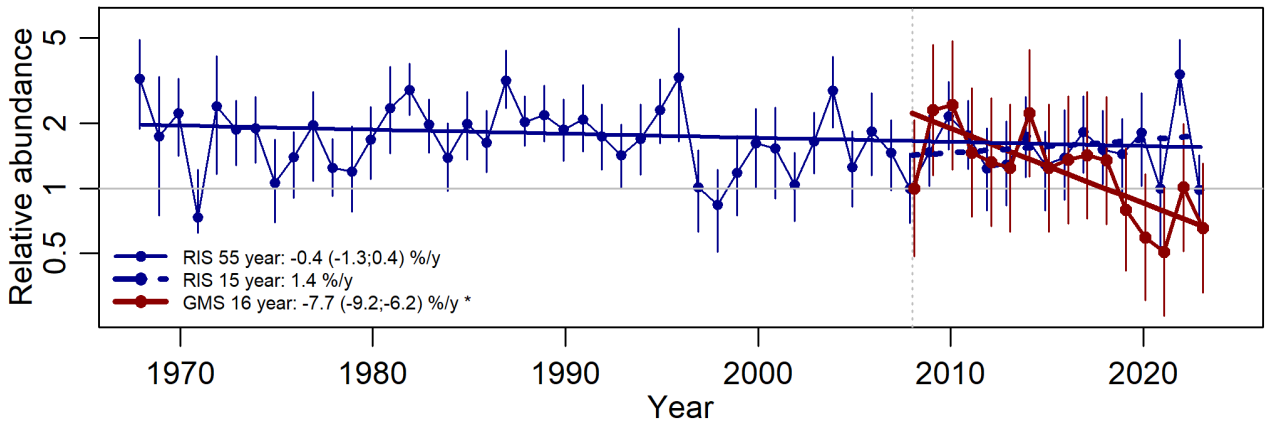
** GMS incresing significantly agaist a long-term significant decline*
** RIS data also shows recovery*

73.154: Dusky Brocade (Apamea remissa)



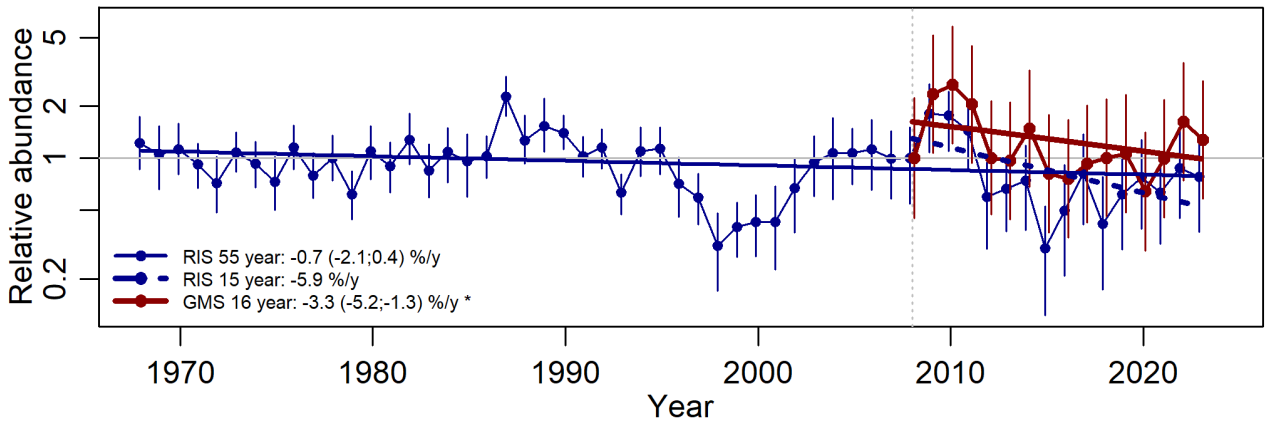
** Declining in both series*

73.156: Clouded-bordered Brindle (Apamea crenata)



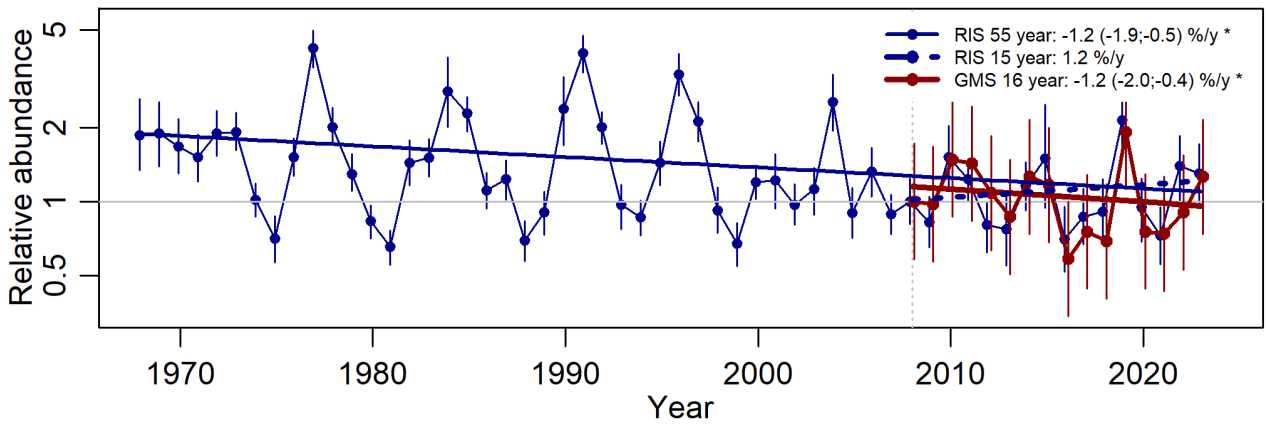
** Strong decline in GMS not seen in RIS*

73.158: Rustic Shoulder-knot (Apamea sordens)



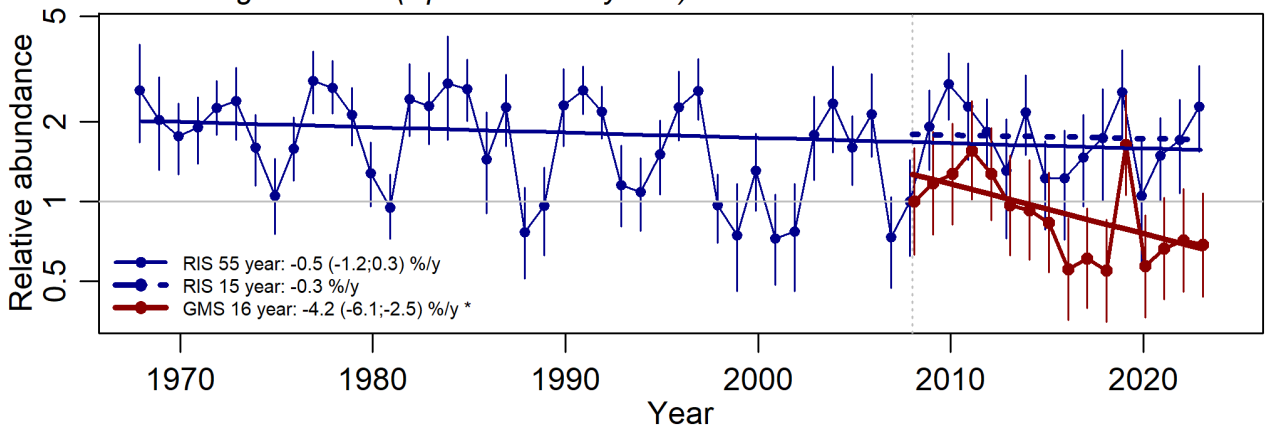
** Recent decline in GMS data also seen in RIS*

73.162: Dark Arches (Apamea monoglypha)



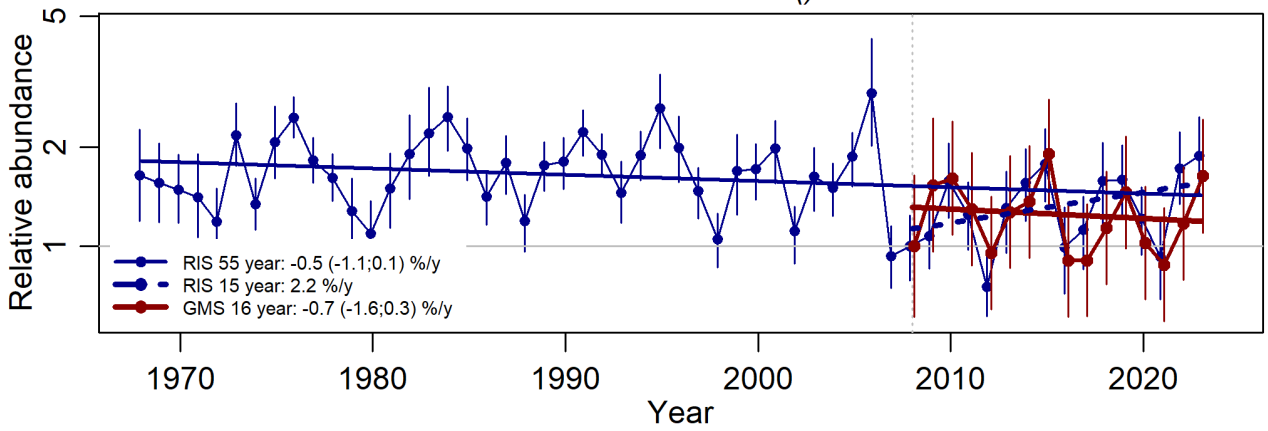
** Declining in both series*

73.163: Light Arches (Apamea lithoxylaea)

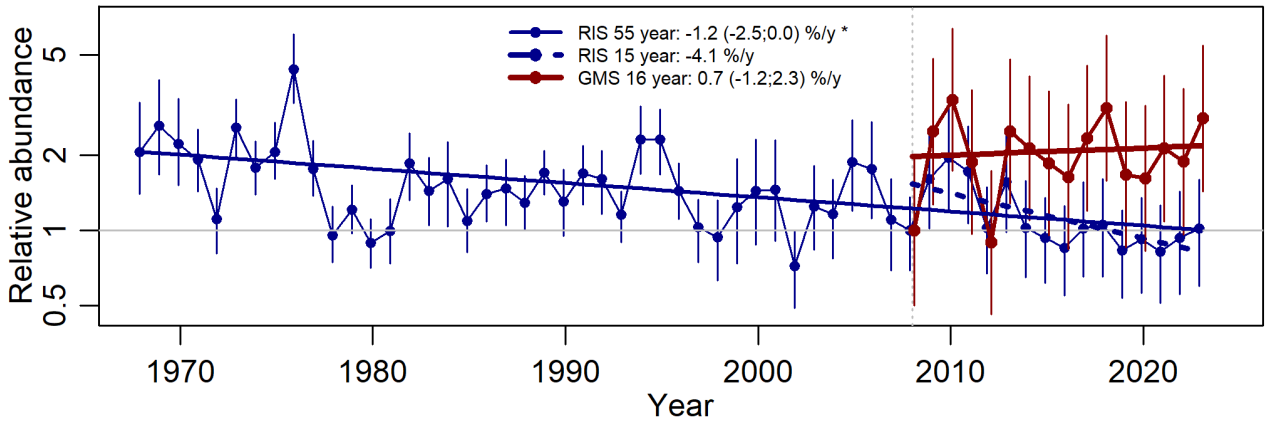


** Decline in GMS not seen in RIS*

73.169x: Common Rustic/Lesser Common Rustic ()

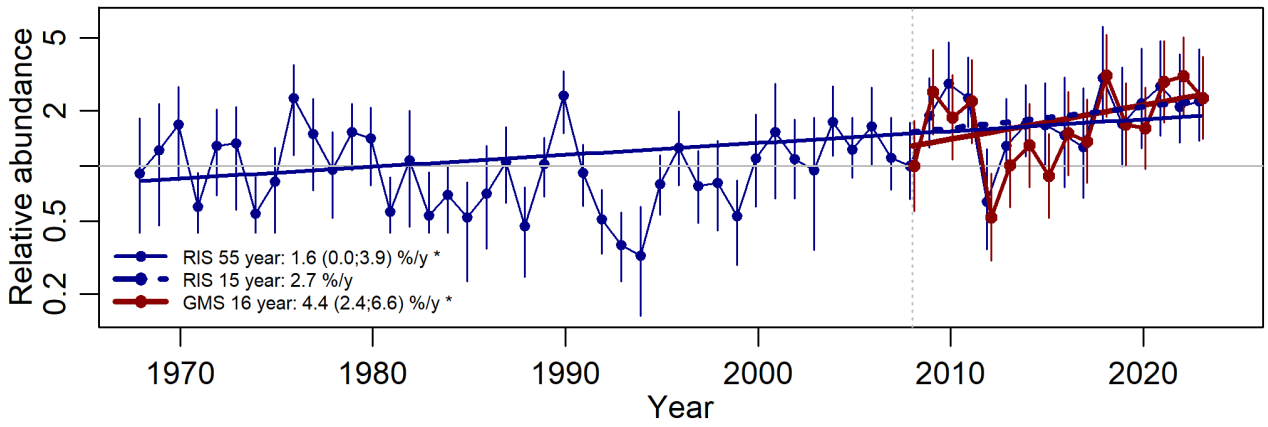


73.176: Middle-barred Minor (Oligia fasciuncula)

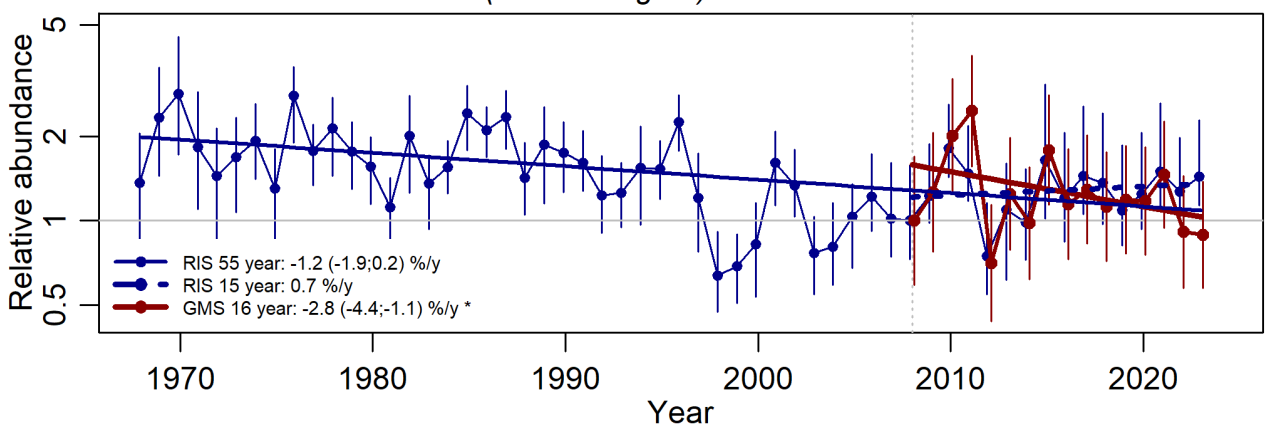


** No detectable trends*

73.180: Barred Sallow (Tiliacea aurago)

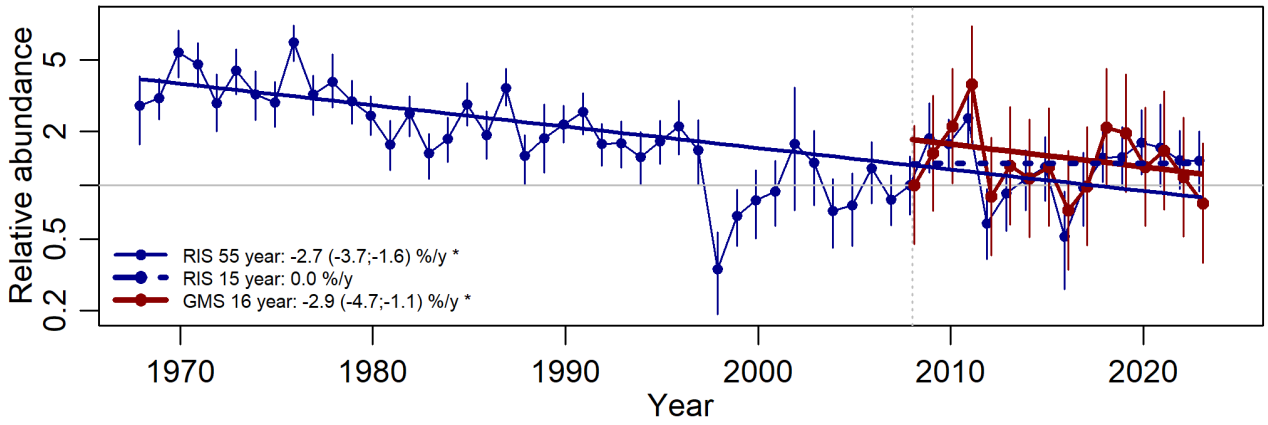


73.181: Pink-barred Sallow (Xanthia togata)



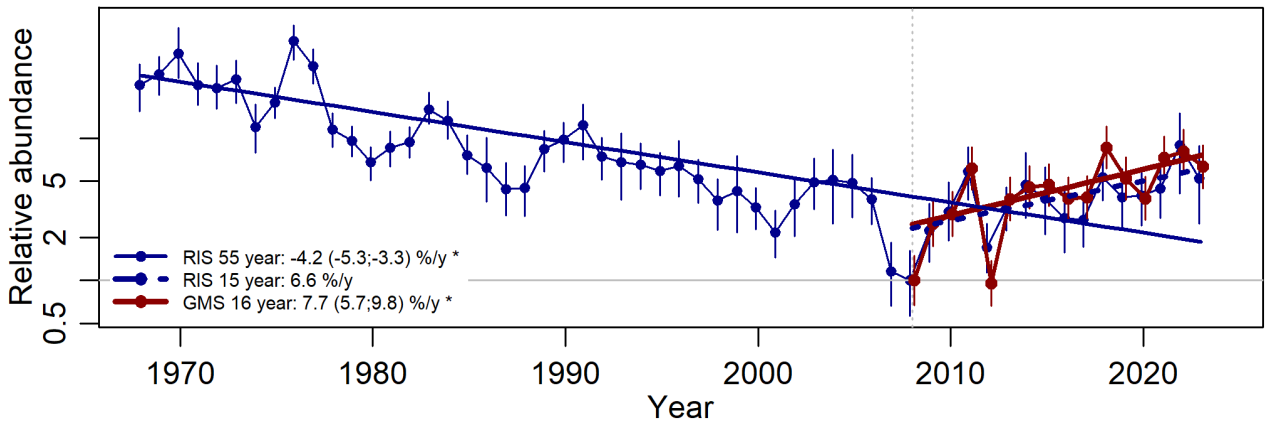
** Declining in GMS - decline not seen in RIS*

73.182: Sallow (Cirrhia icteritia)



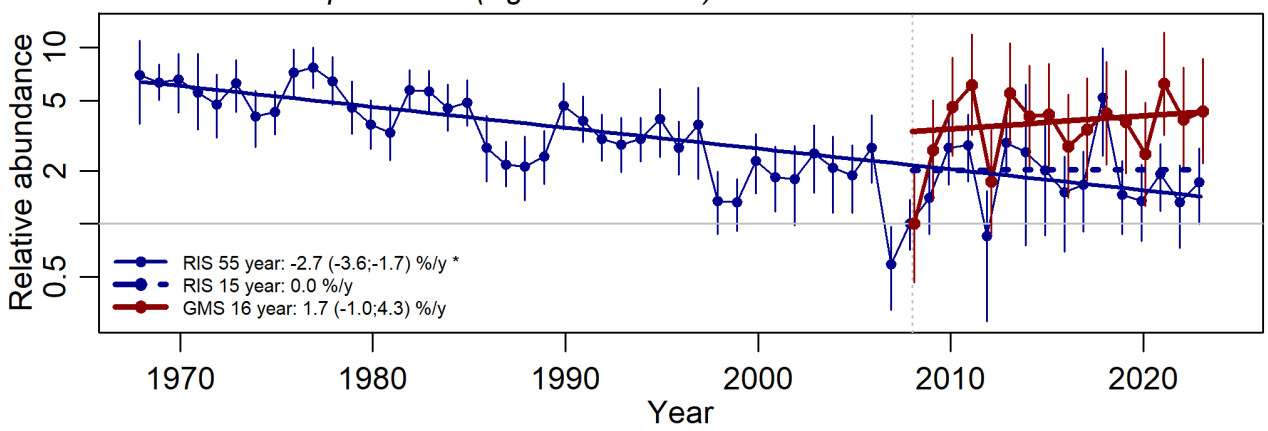
** Declining in both series*

73.186: Beaded Chestnut (Agrochola lychnidis)



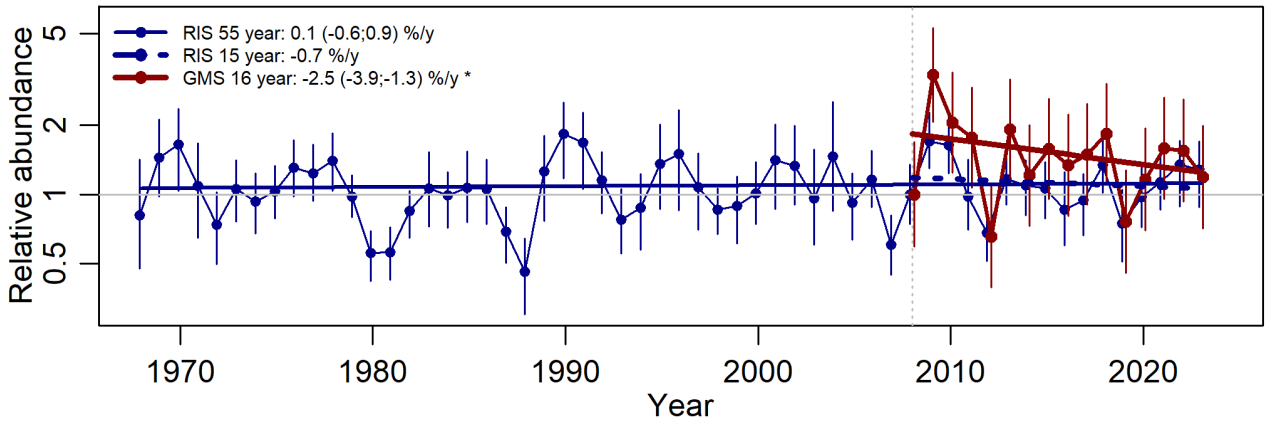
** GMS shows a significant icrease - consistent with RIS data*
** This reverses a long-term decrease seen in RIS data*

73.187: Brown-spot Pinion (Agrochola litura)



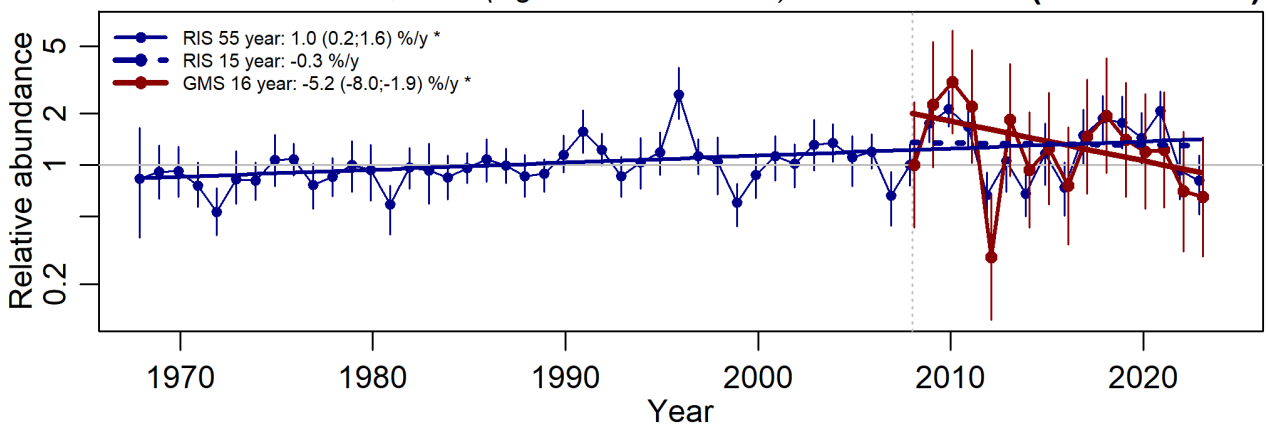
** No detectable change in GMS, but long-term decrease in RIS*

73.189: Red-line Quaker (Agrochola lota)

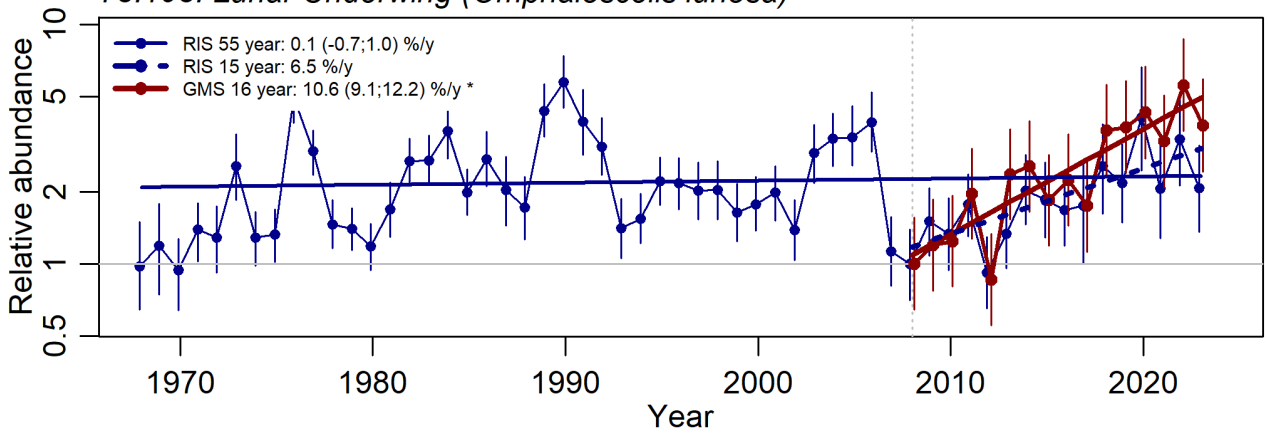


** Modest decline in GMS not detectable in RIS which shows stable numbers*

73.190: Yellow-line Quaker (Agrochola macilenta) **(Winter Data)**

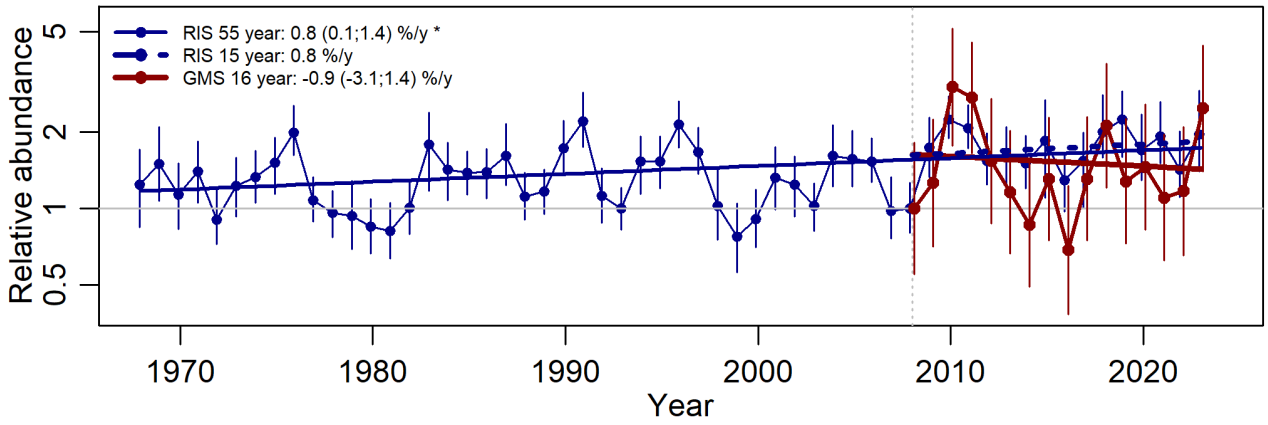


73.193: Lunar Underwing (Omphaloscelis lunosa)

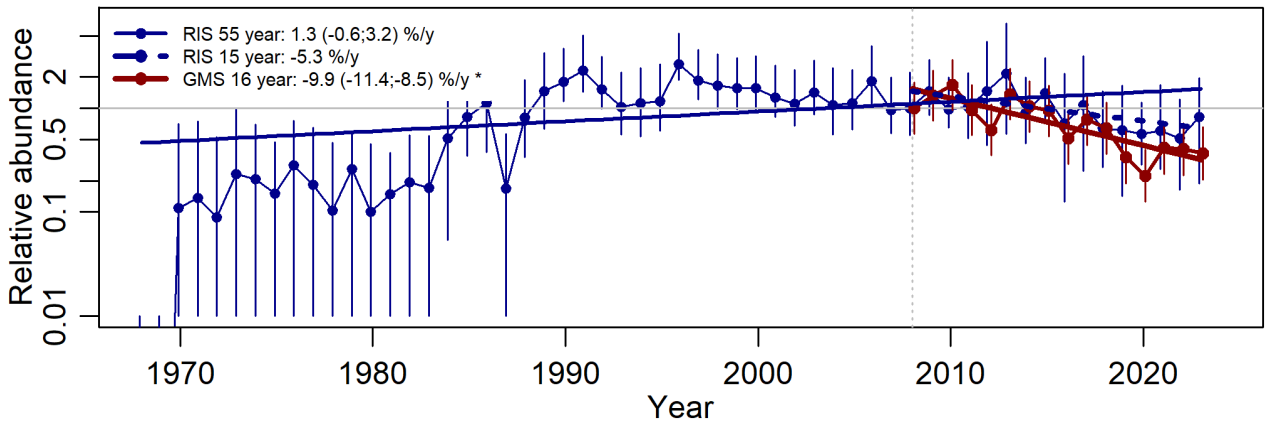


** Dramatic increase in GMS - also seen in RIS - following very poor years in 2007/8*

73.194: Chestnut (Conistra vaccinii) **(Winter Data)**

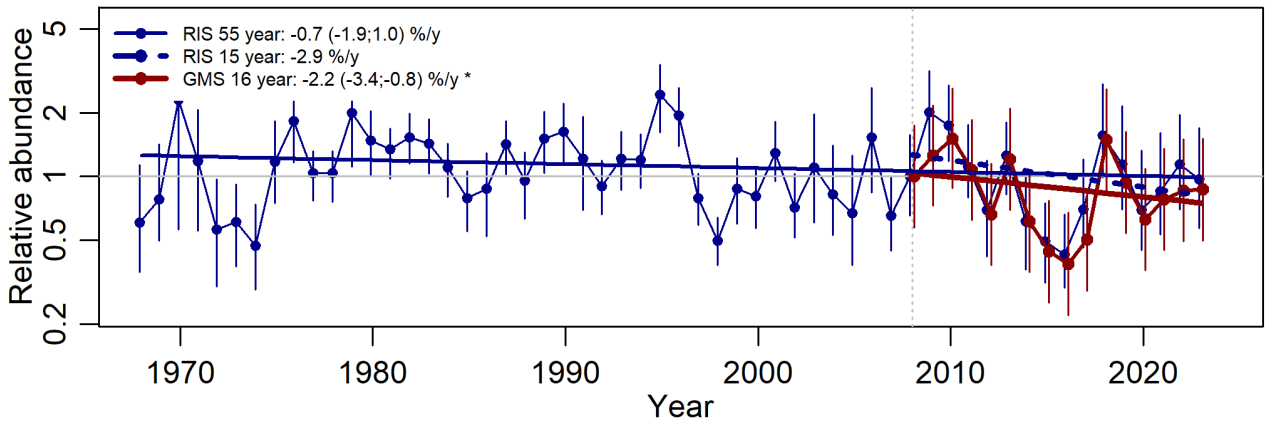


73.206: Blair's Shoulder-knot (Lithophane leautieri hesperica)



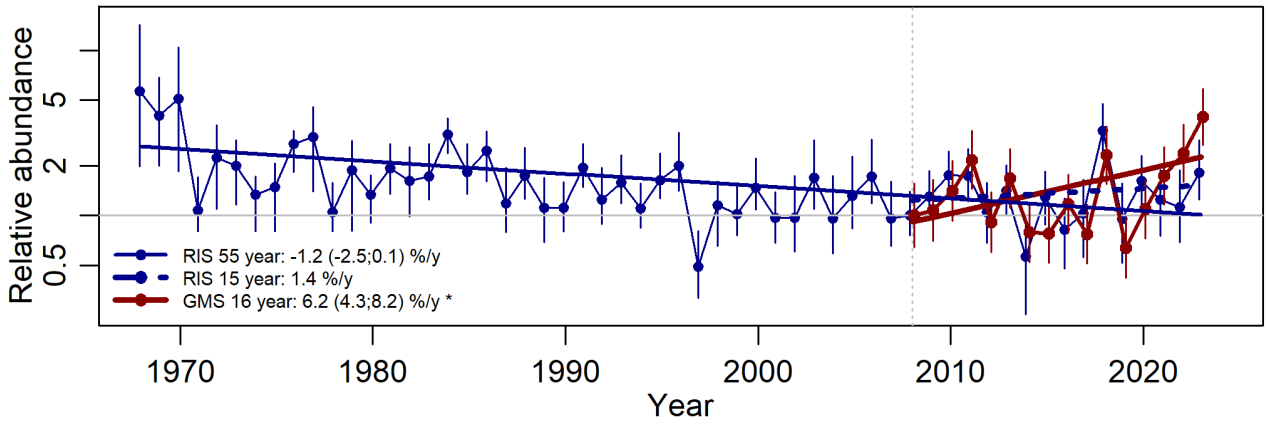
** GMS data shows large decline - RIS data similar*
** Contrasting with large increase since very low numbers in 70s*

73.216: Dun-bar (Cosmia trapezina)



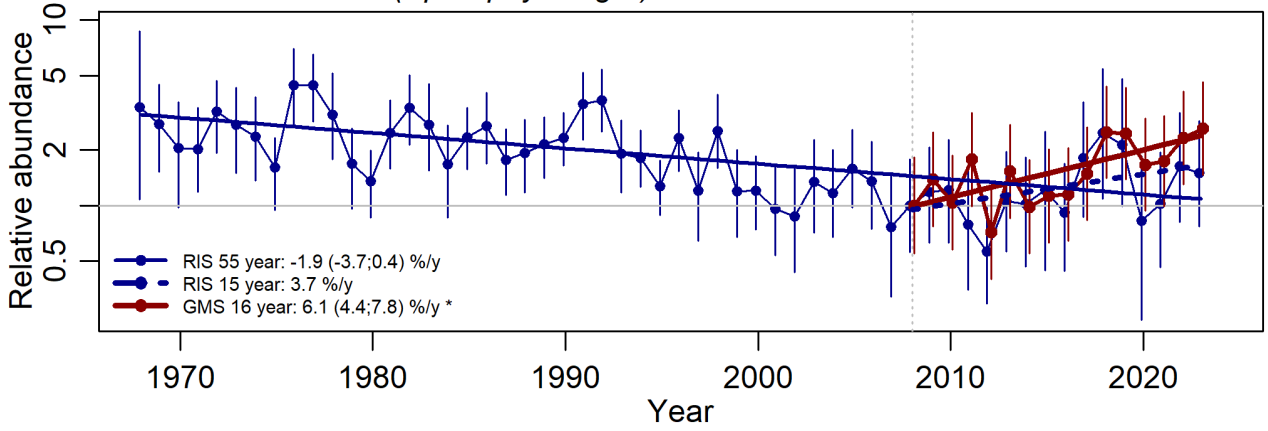
** Recent modest decline in both series*

73.219: Centre-barred Sallow (Atethmia centrago)



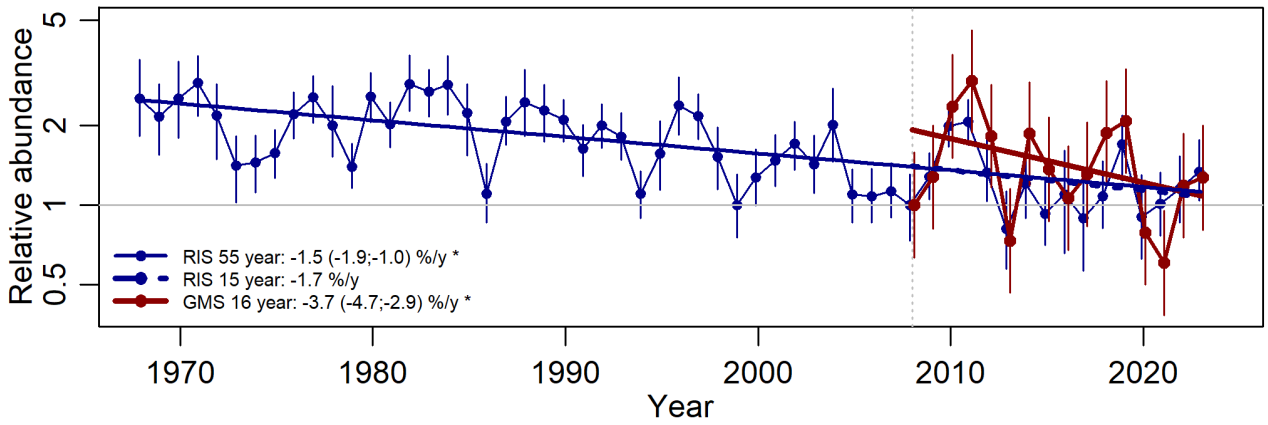
** Increasing in GMS but not in RIS*

73.233: Black Rustic (Aporophyla nigra)



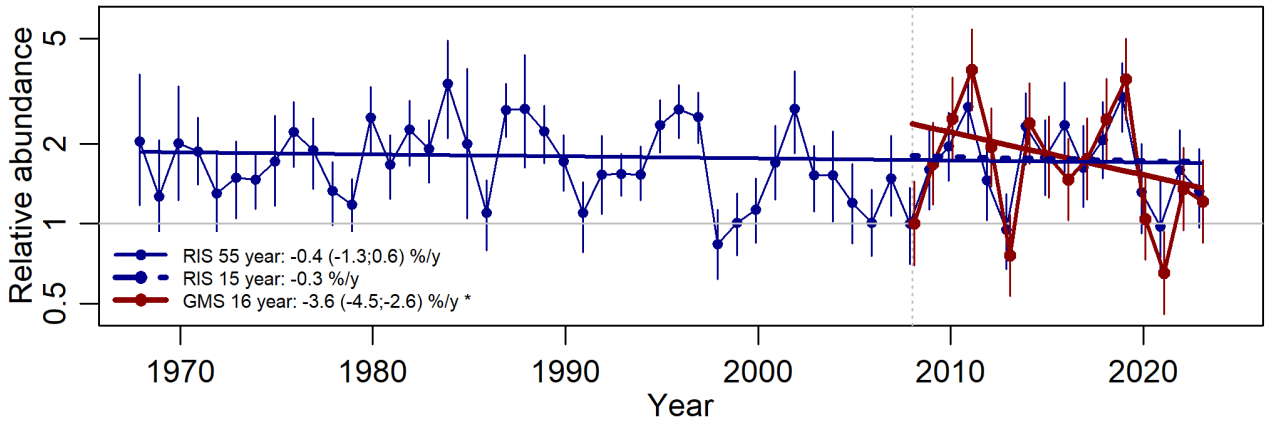
** Recent large increase in both series*

73.242: Clouded Drab (Orthosia incerta)



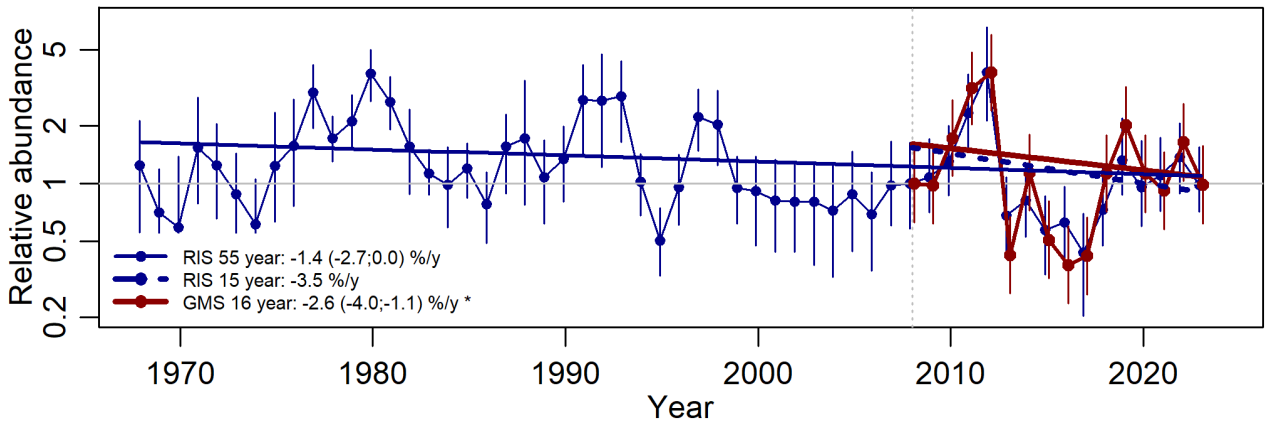
** Steady decline in both series*

73.244: Common Quaker (Orthosia cerasi)



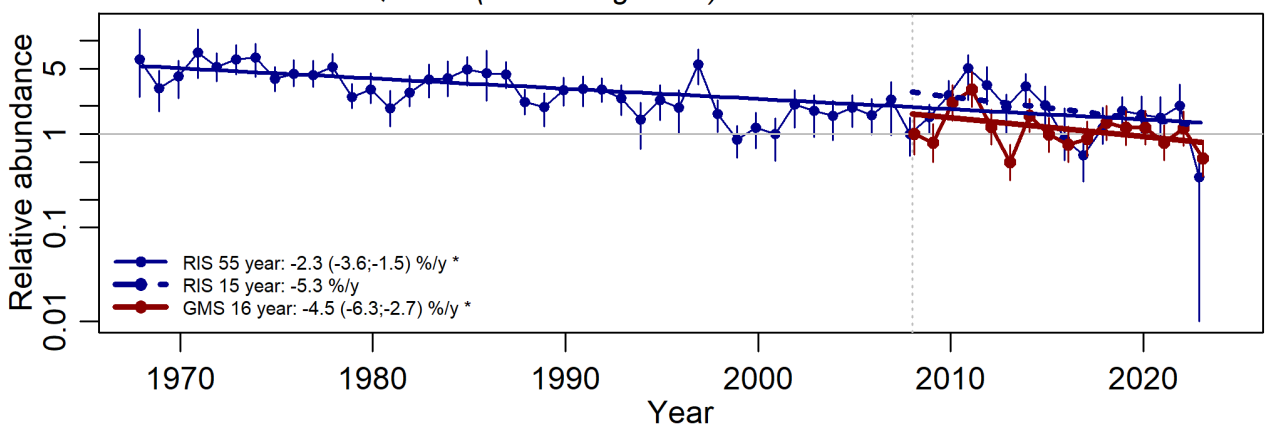
** Modest decline in GMS abundance, not seen in RIS*

73.245: Small Quaker (Orthosia cruda)



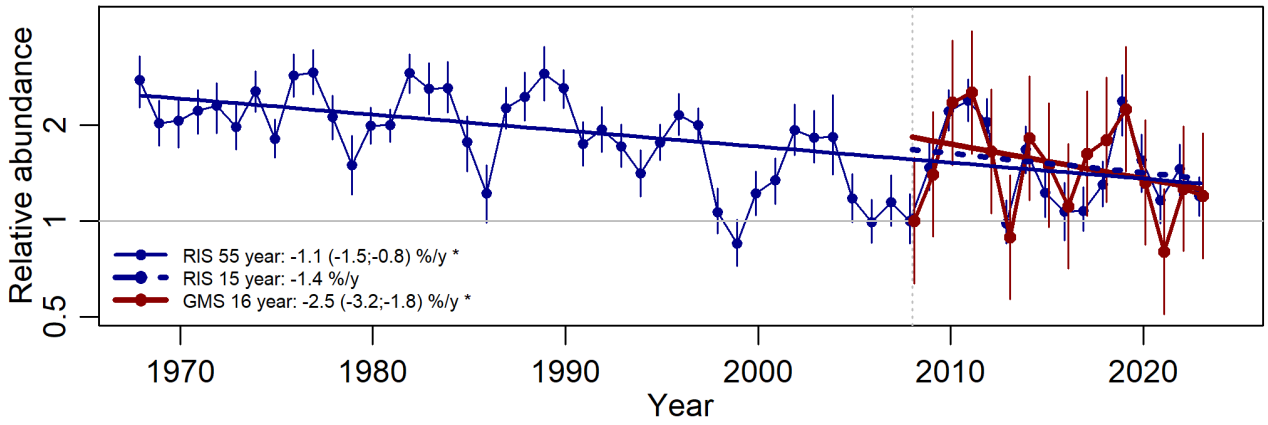
** Modest recent decline in GMS, consistent with RIS*

73.247: Powdered Quaker (Orthosia gracilis)



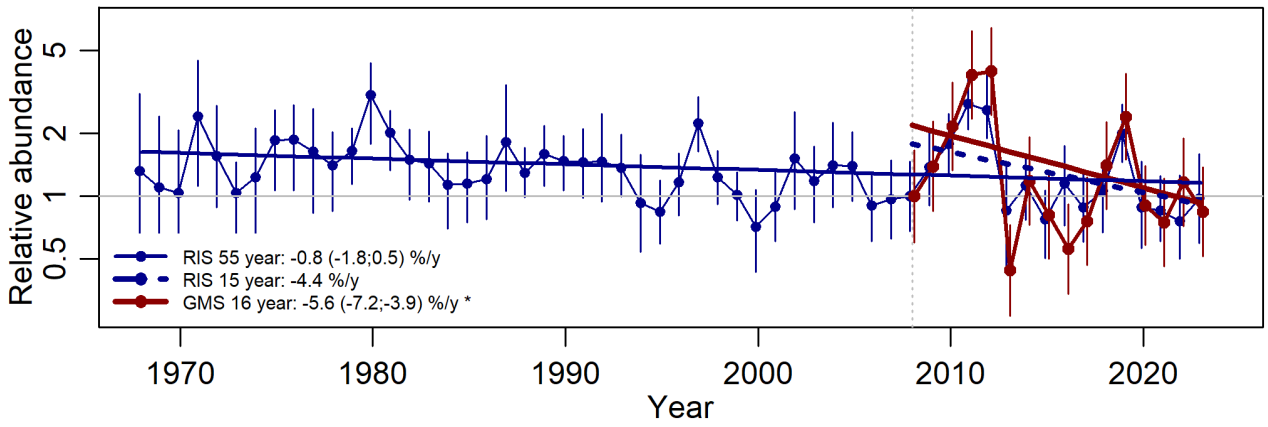
** Steady decline in both series*

73.249: Hebrew Character (Orthosia gothica)



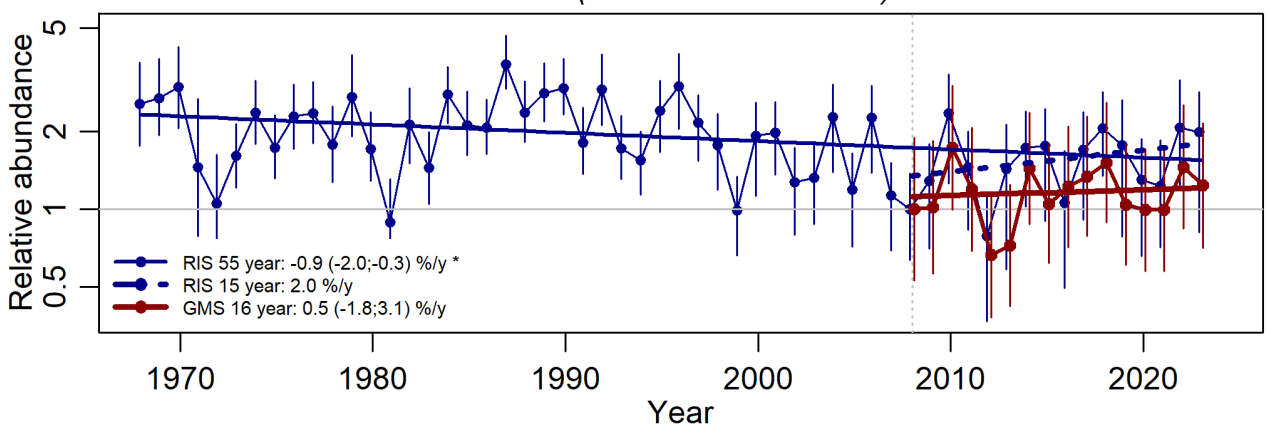
* *Steady decline in both series*

73.250: Twin-spotted Quaker (Anorthoa munda)



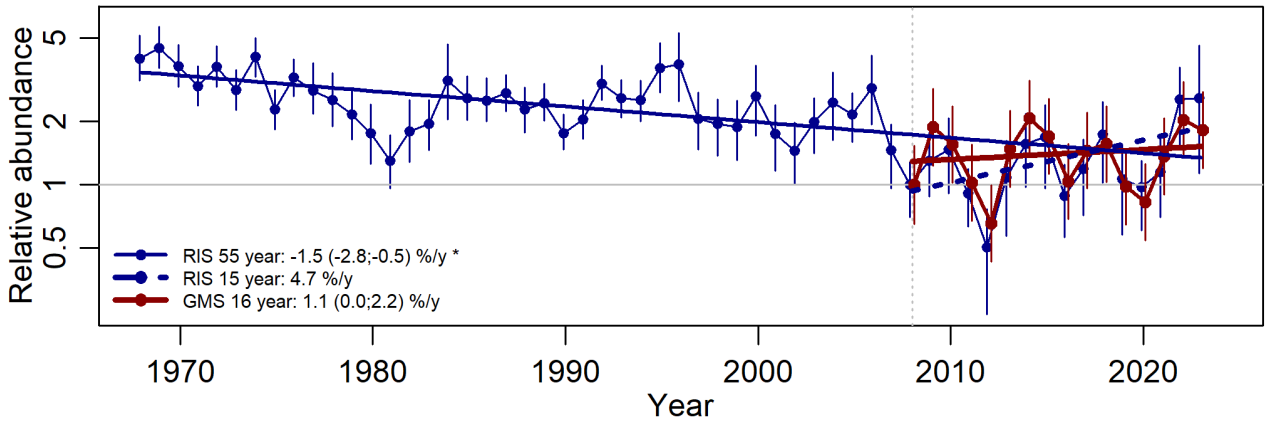
* *Steady decline in both series*

73.264: Pale-shouldered Brocade (Lacanobia thalassina)



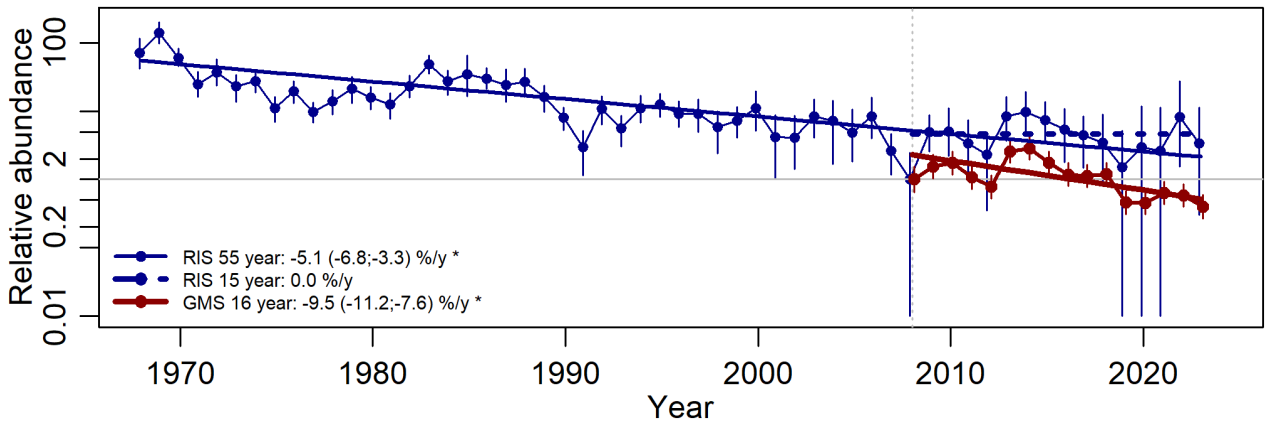
* *Slow long-term decline not detected in GMS*

73.267: Bright-line Brown-eye (Lacanobia oleracea)

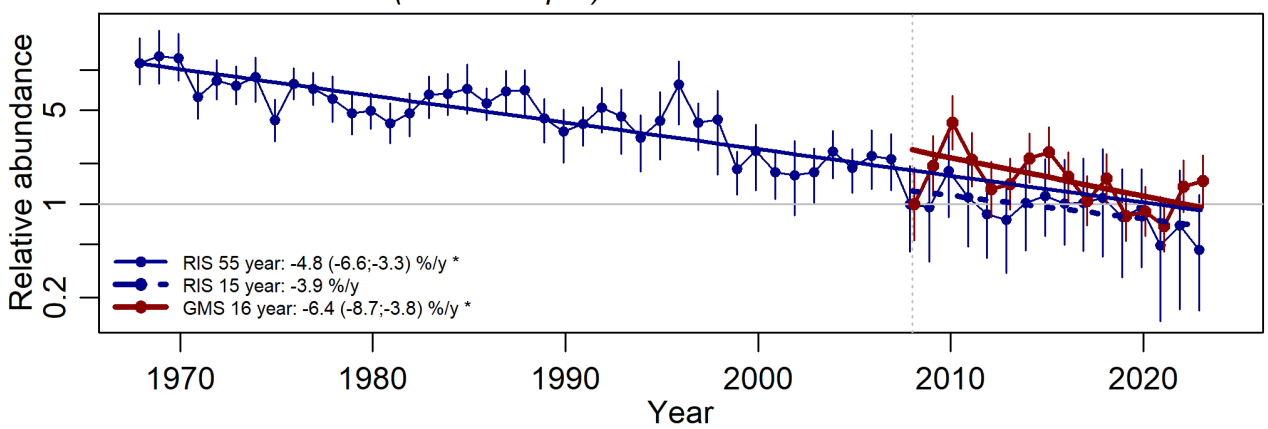


** No detectable trends in GMS*
** Long-term decline in RIS may be reversing in recent years*

73.270: Dot Moth (Melanchra persicariae)

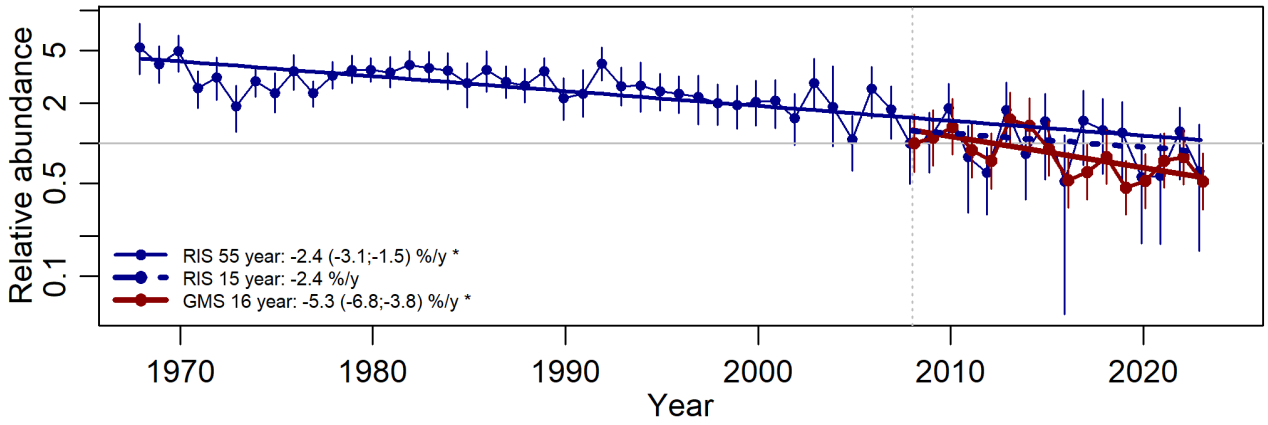


73.271: Broom Moth (Ceramica pisi)



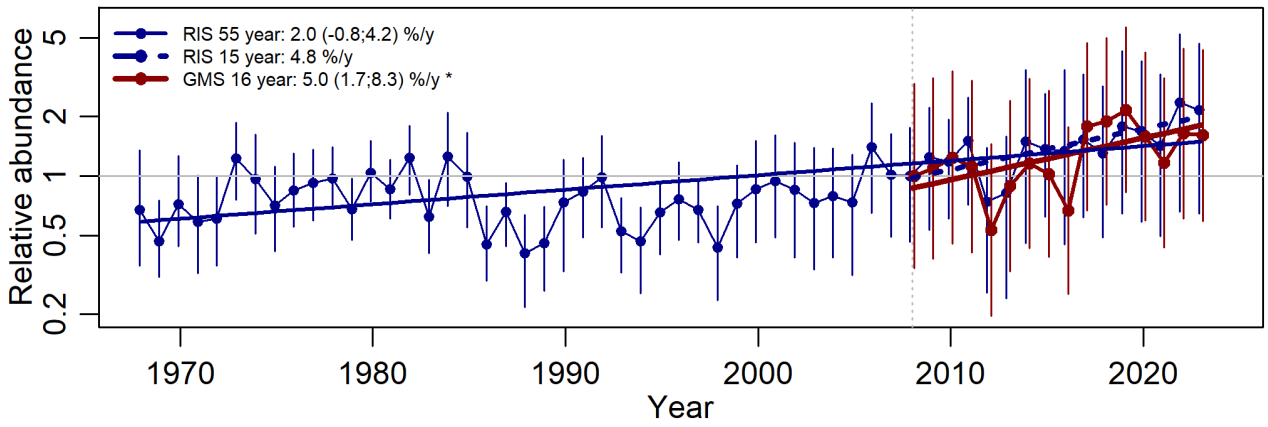
** Steady decline in both series*

73.274: Cabbage Moth (Mamestra brassicae)

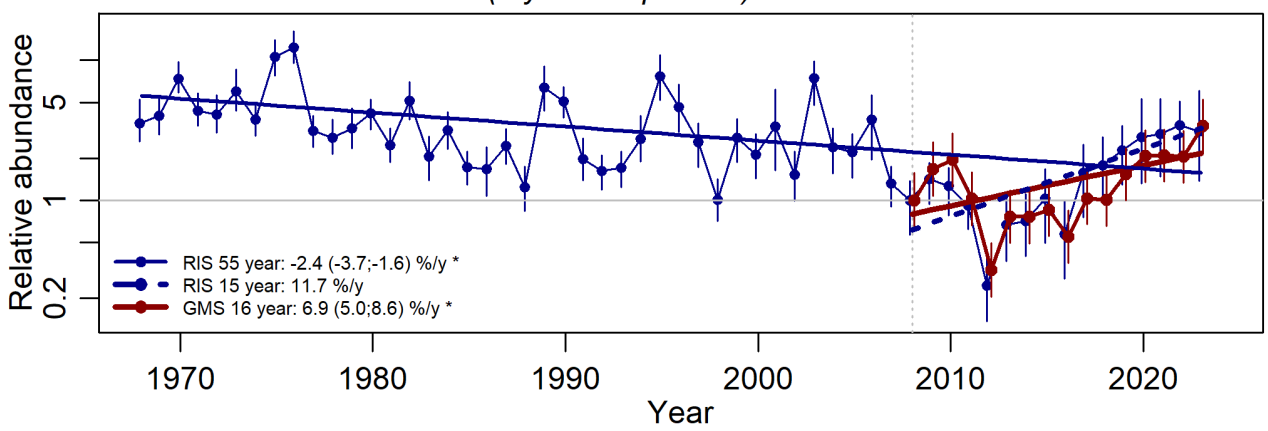


** Steady decline in both series*

73.290: Brown-line Bright-eye (Mythimna conigera)

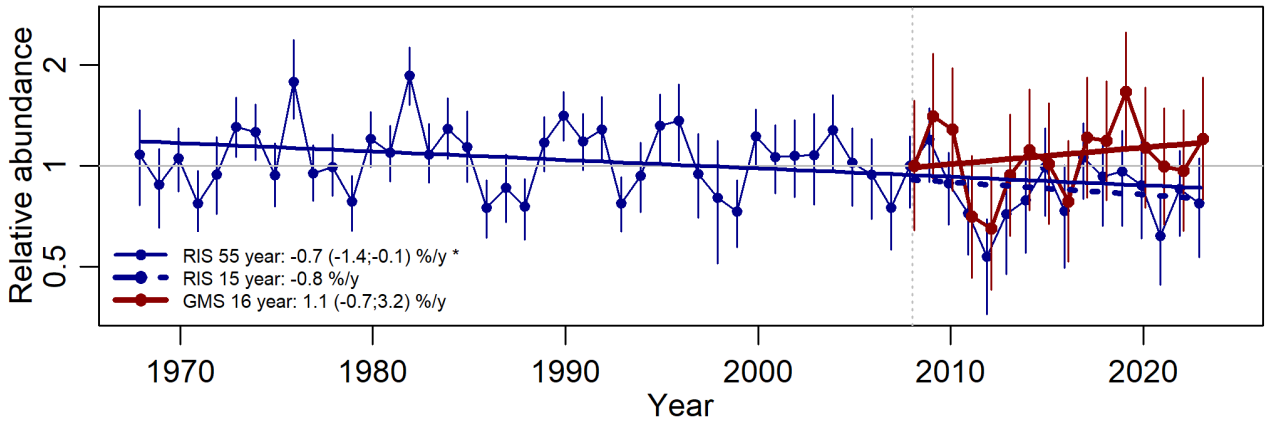


73.291: Common Wainscot (Mythimna pallens)



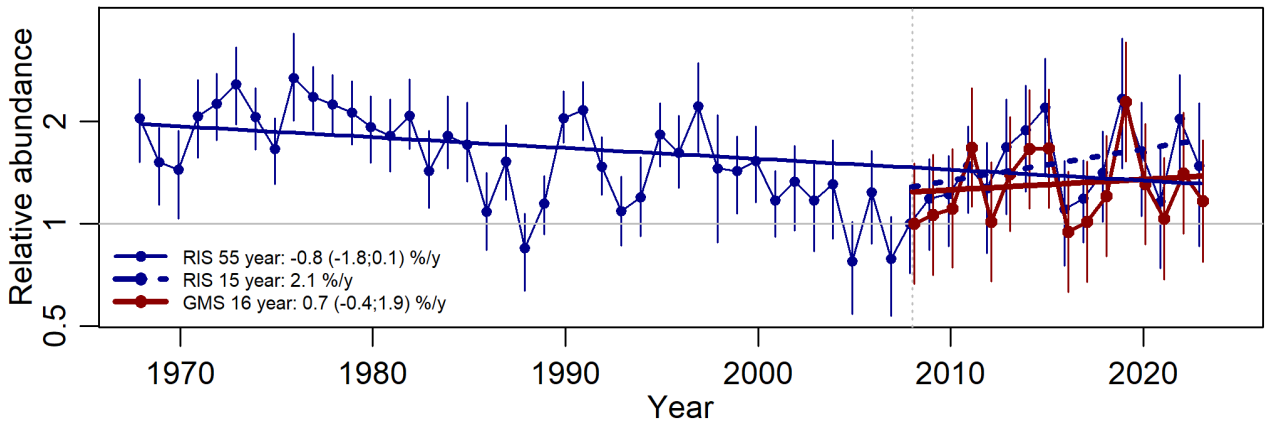
** GMS shows recent increase - consistent with RIS*
** This is set against a long-term decline. Recent recovey from a very poor year in 2012*

73.293: Smoky Wainscot (Mythimna impura)



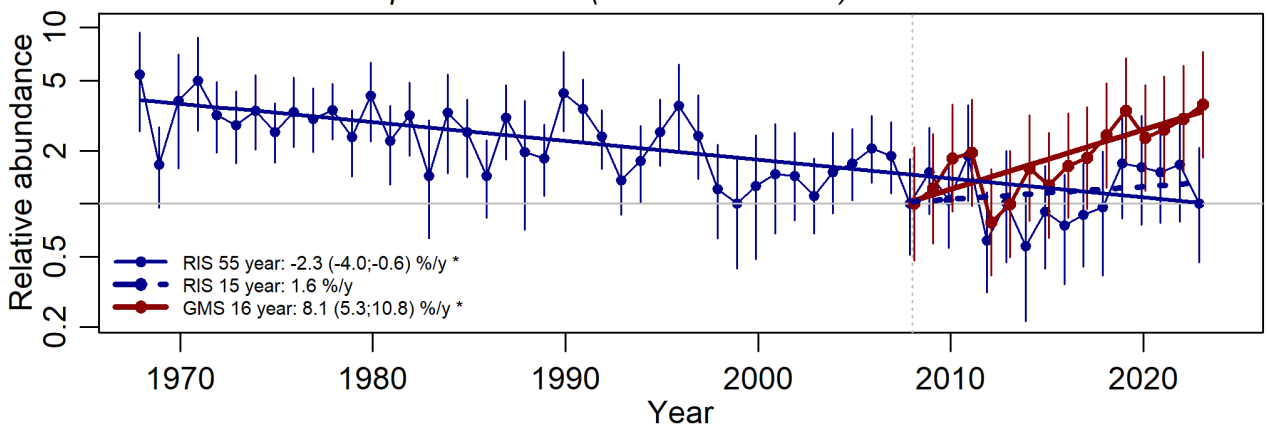
** Long-term decline. GMS not detecting any trend*

73.298: Clay (Mythimna ferrago)



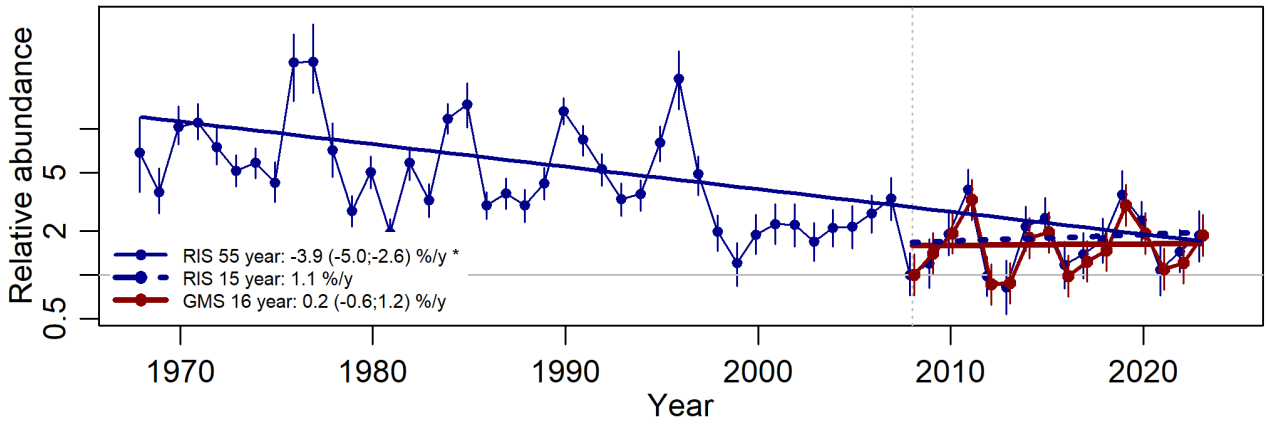
** No detectable changes in either series*

73.301: Shoulder-striped Wainscot (Leucania comma)



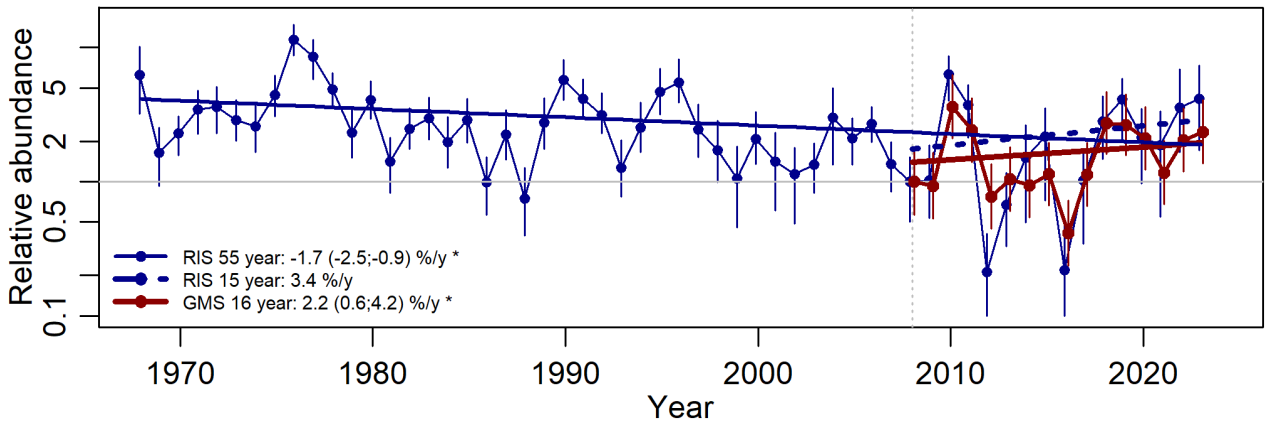
** Recent increse in GMS dseries - consistent with RIS*
** This reverses long-term decline*

73.317: Heart & Dart (Agrotis exclamationis)



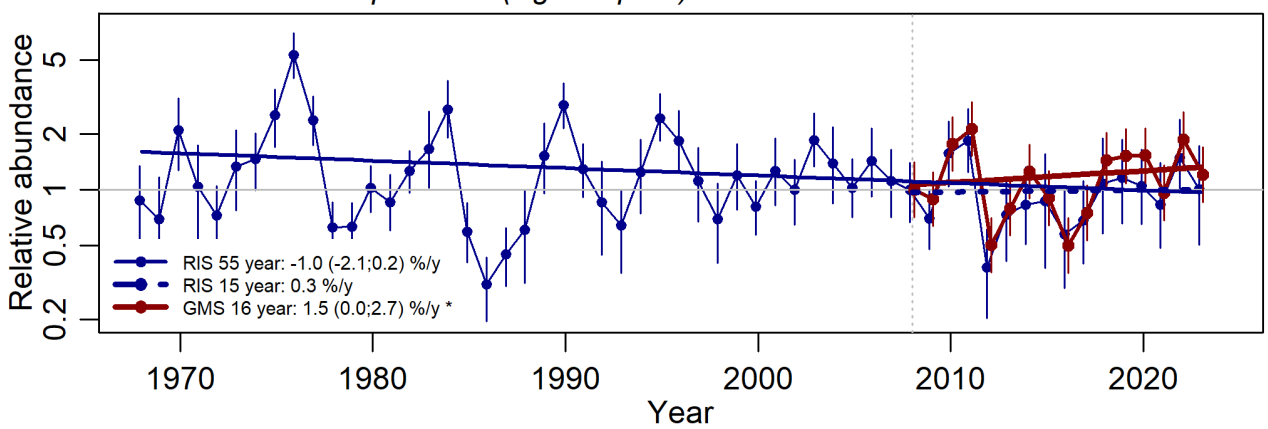
** Declining long-term, but no change detectable in GMS*
** A suggestion that decline may be bottoming out*

73.319: Turnip Moth (Agrotis segetum)



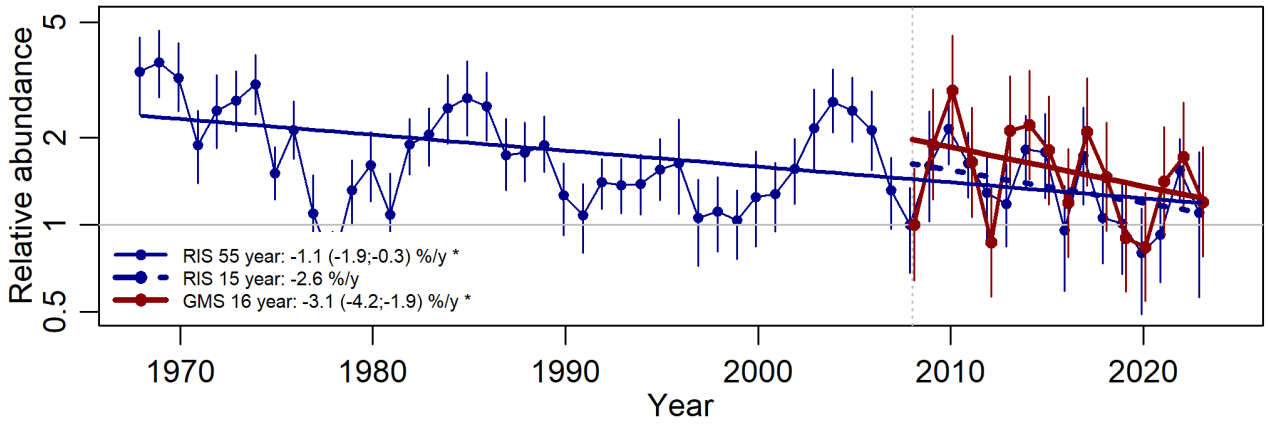
** RIS shows long-term slight decline, whilst GMS shows recent increase*
** Recent recovery from very poor years in 2012 and 2016*

73.325: Shuttle-shaped Dart (Agrotis puta)



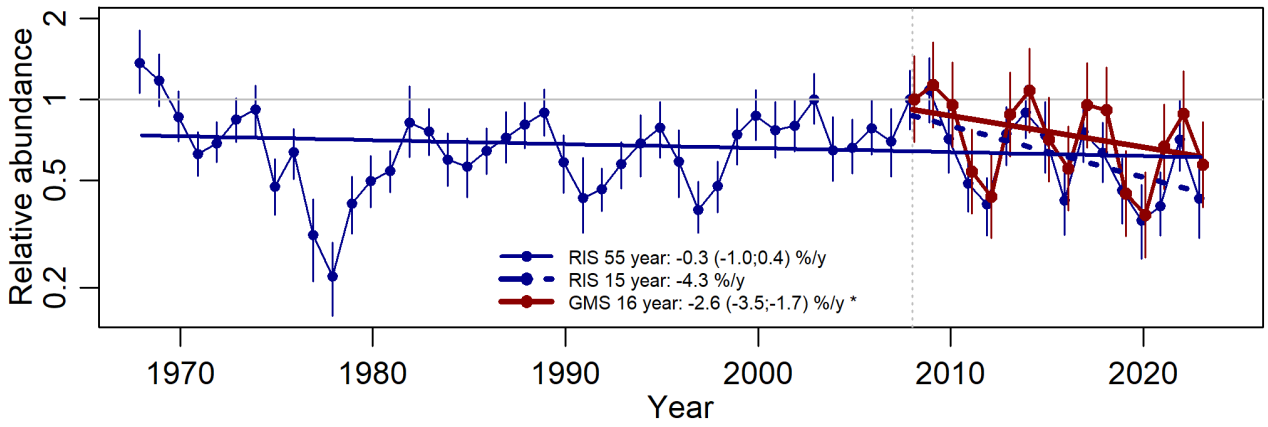
** Although long-term trend is stable, GMS shows a recent small increase*
** May just be a reflection of long-period periodicity?*

73.328: Flame (Axylia putris)



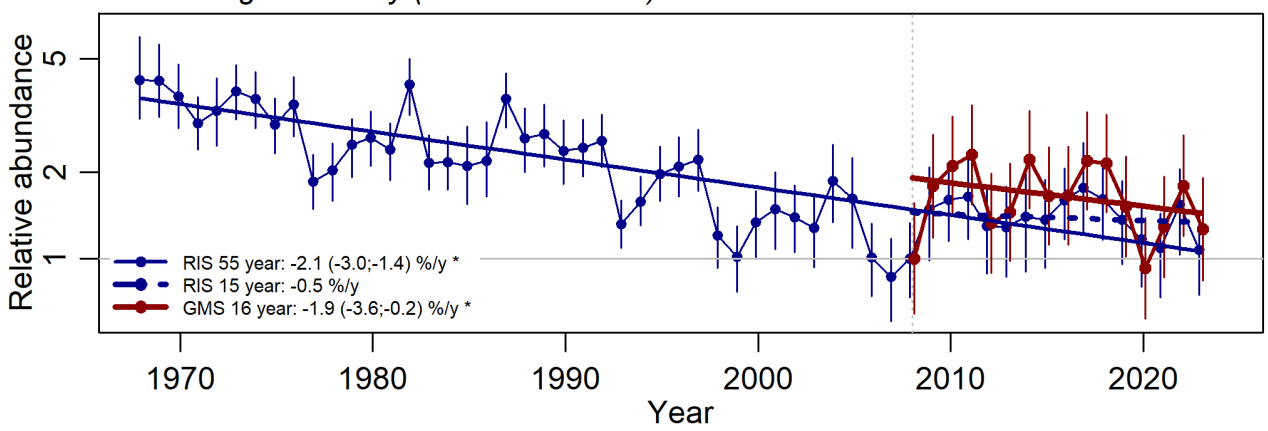
** Declining in both series*

73.329: Flame Shoulder (Ochropleura plecta)



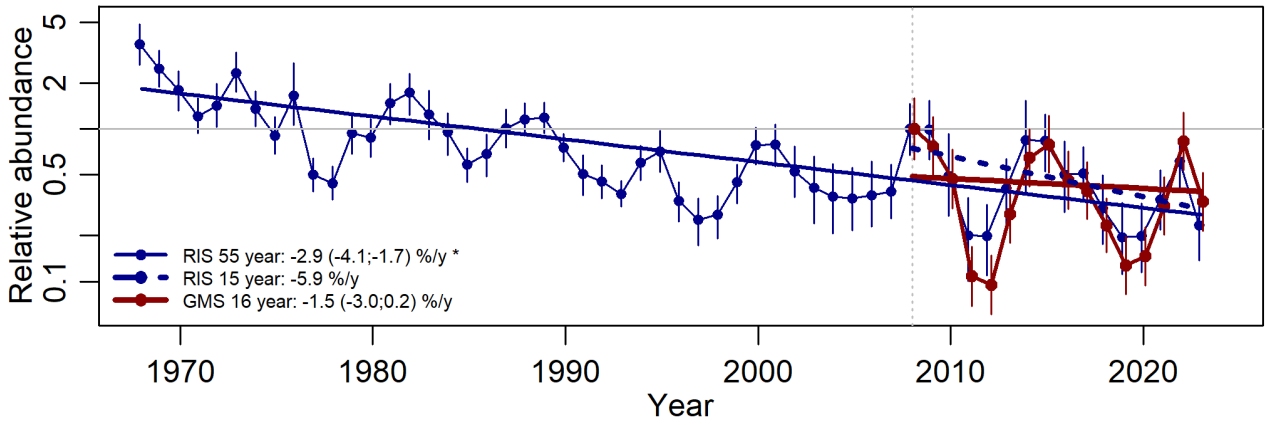
** GMS shows a small decline - consistent with RIS*

73.333: Ingrailed Clay (Diarsia mendica)



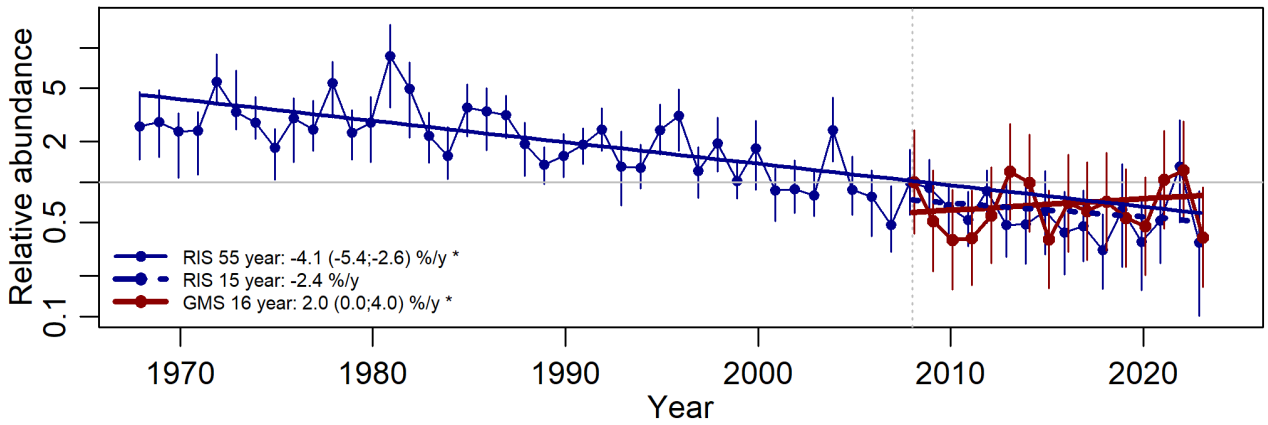
** Steady decline in both datasets*

73.334: Small Square-spot (Diarsia rubi)



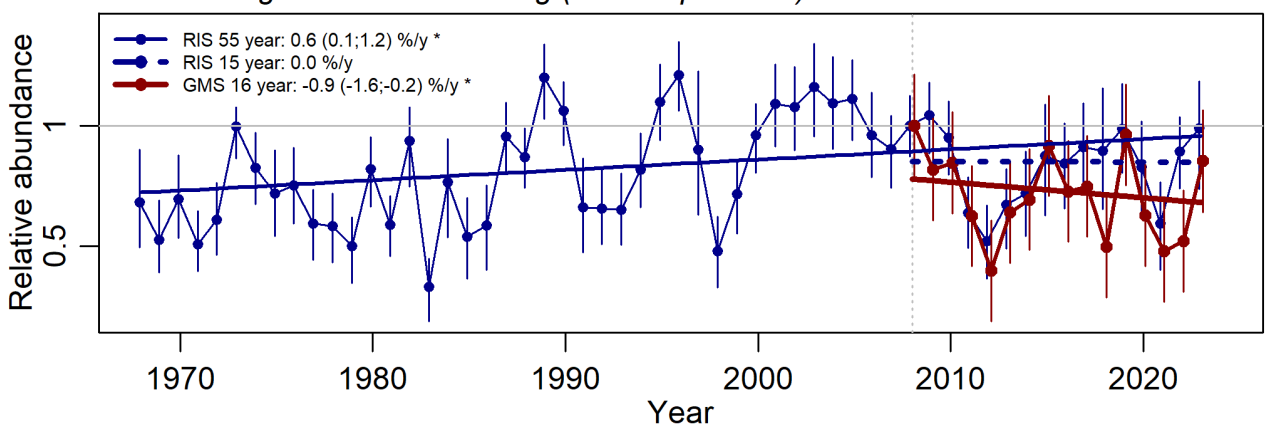
** Decreasing in both datasets, but not significant in GMS*

73.338: True Lover's Knot (Lycophotia porphyrea)



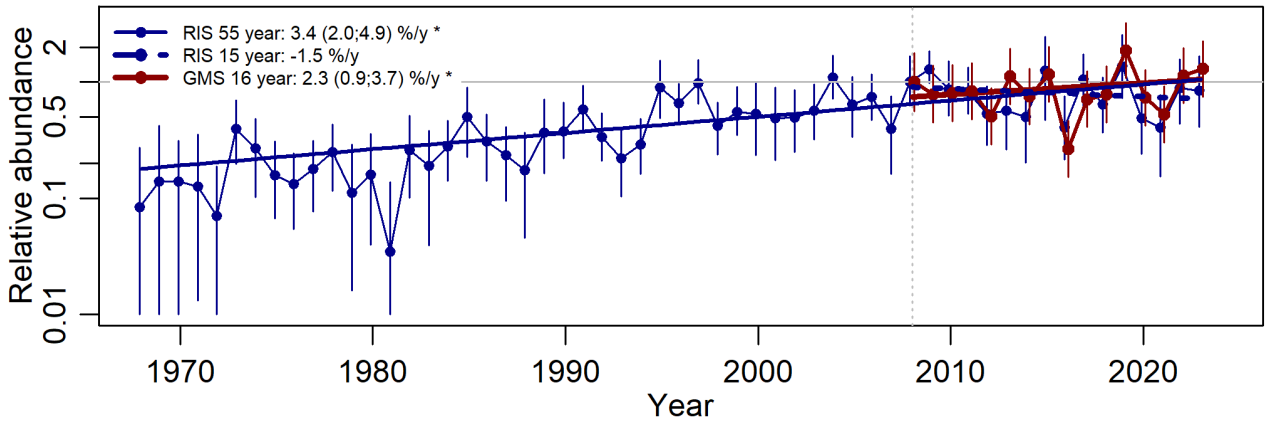
** GMS shows increase, consistent with RIS*
** Against a long-term decrease (which therefore may be reversing)*

73.342: Large Yellow Underwing (Noctua pronuba)



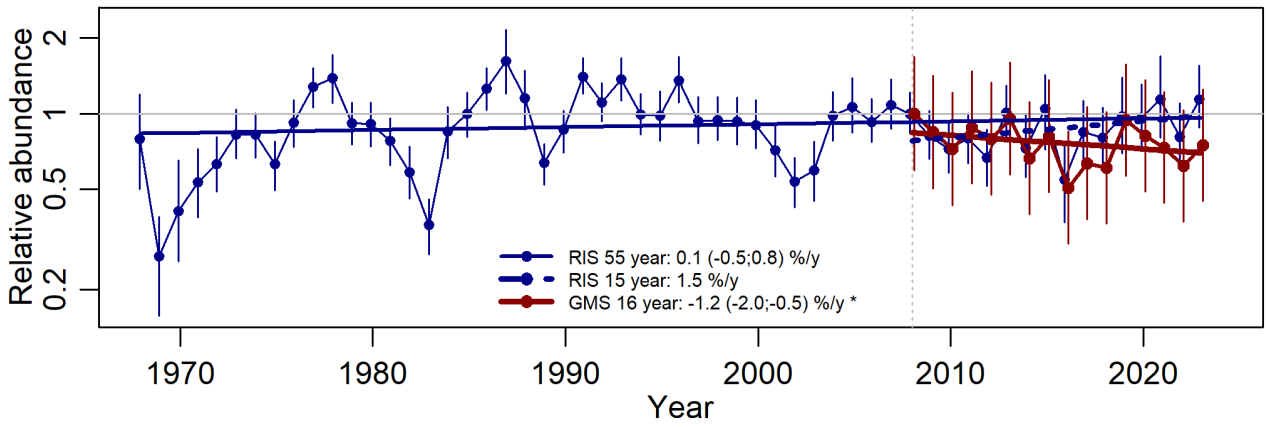
** Recent slight decrease in both datasets, but very variable year-to-year*

73.343: Broad-bordered Yellow Underwing (Noctua fimbriata)



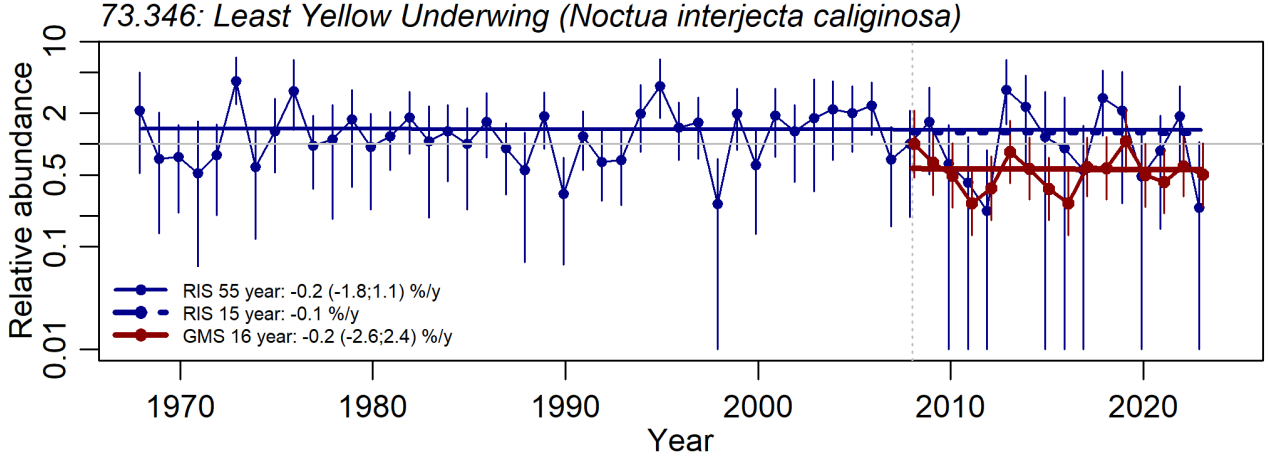
** Steady increase in both series*

73.345: Lesser Yellow Underwing (Noctua comes)



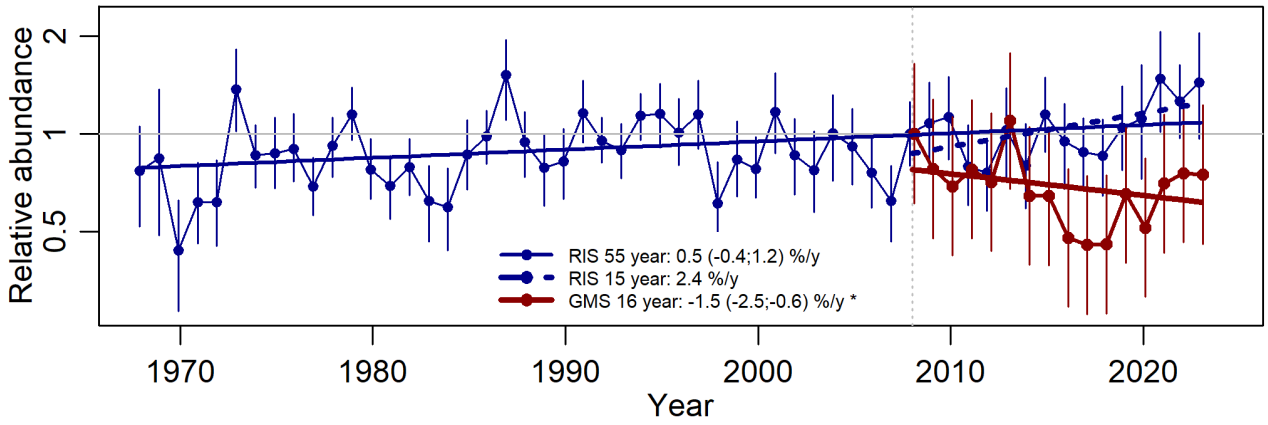
** Slight decrease in GMS which is not seen in RIS*

73.346: Least Yellow Underwing (Noctua interjecta caliginosa)



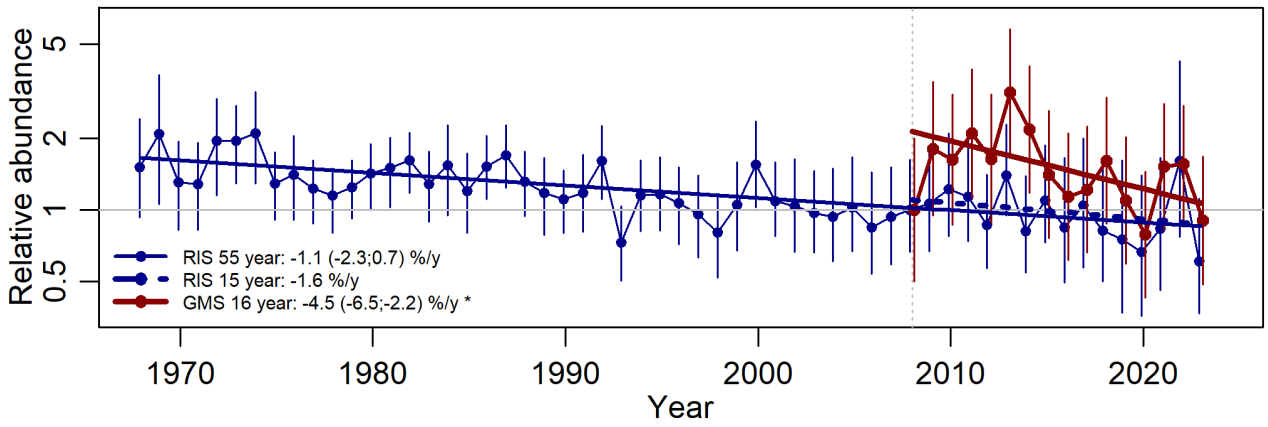
** No detectable changes in either series*

73.348: Lesser Broad-bordered Yellow Underwing (Noctua janthe)



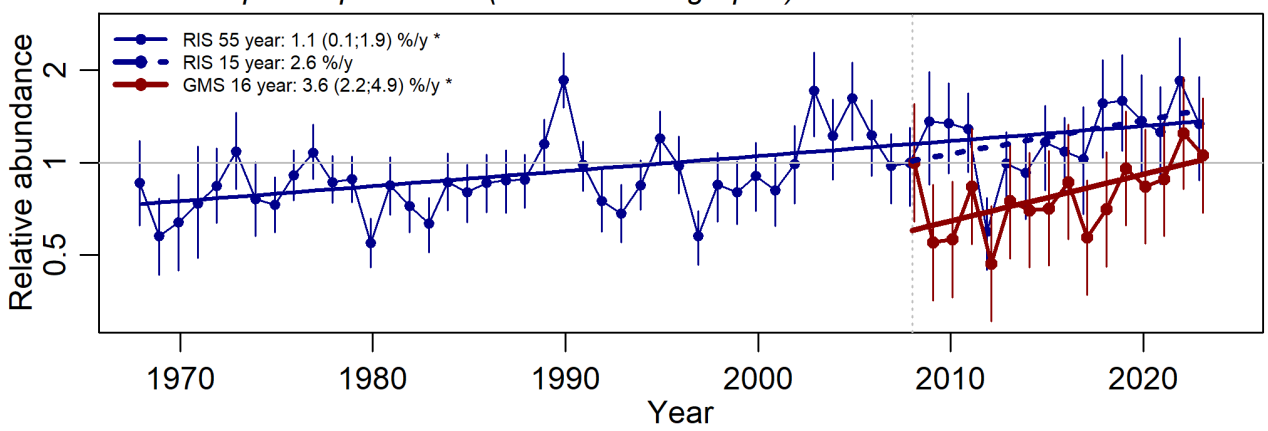
** Modest decline in GMS, not seen in RIS*

73.353: Dotted Clay (Xestia baja)

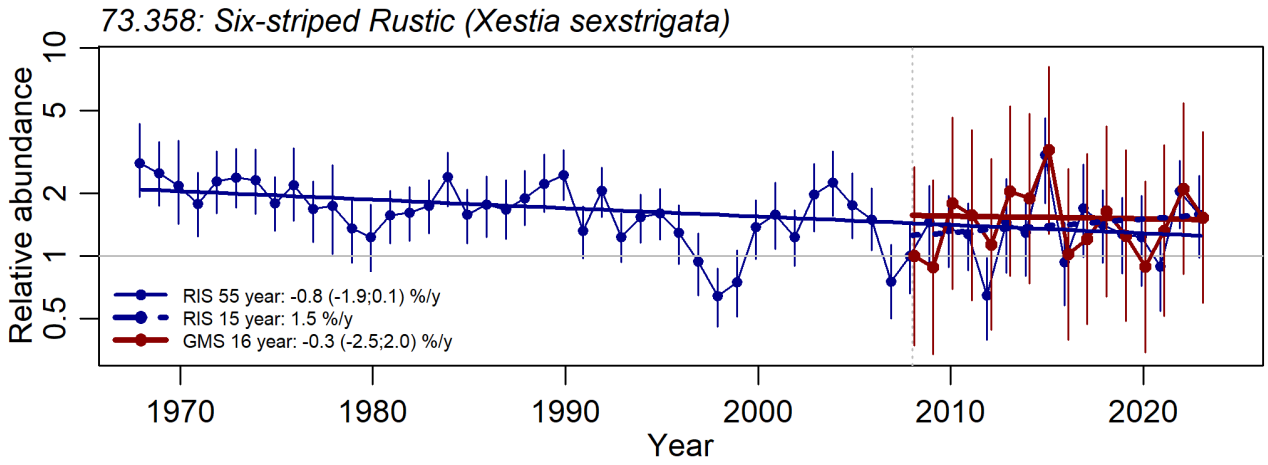


** Modest decline in GMS, not seen in RIS*
** (GMS has a some very good years in 2009-13, then back to being consisten with RIS)*

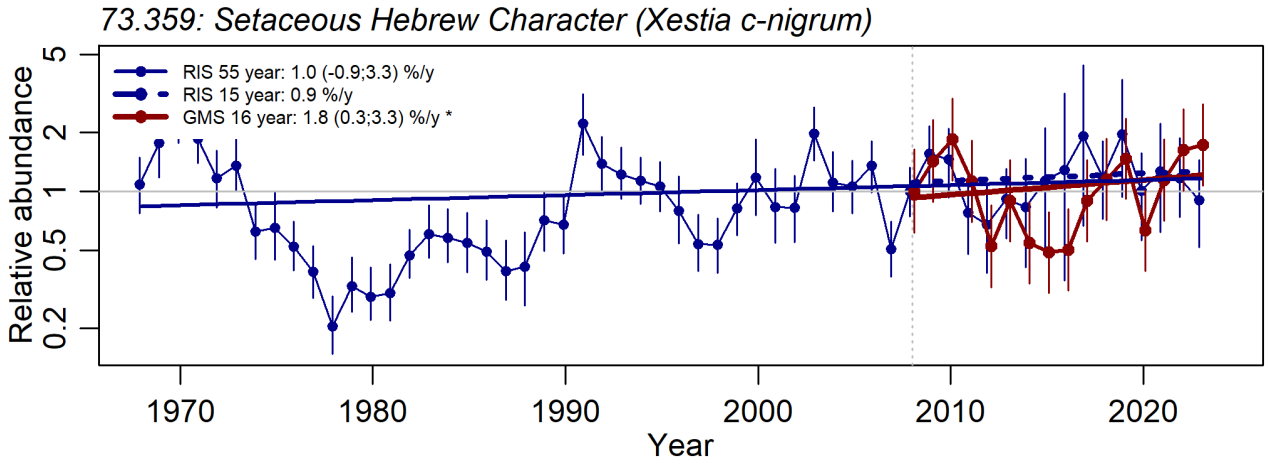
73.357: Square-spot Rustic (Xestia xanthographa)



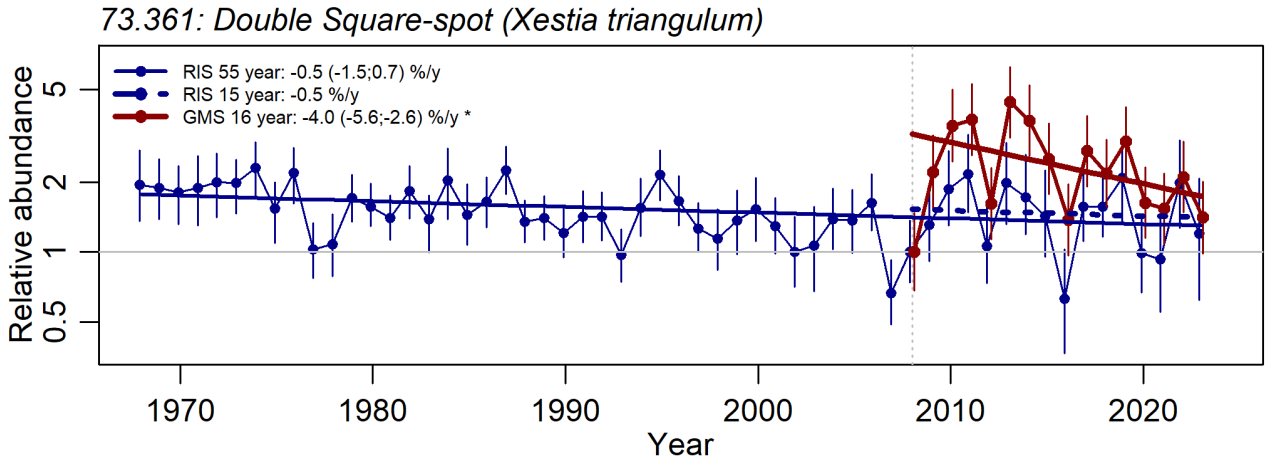
** Steady increase in both series*
** GMS has a very good year for this speciies in 2008*



** No detectable changes in either series*



** GMS detects a small increase in recent years - consistent with RIS*



** GMS shows modest decrease - not seen in RIS*