Bees Wasps and Ants Recording Society

EUROPEAN INVERTEBRATE SURVEY

PROVISIONAL ATLAS

OF THE

INSECTS OF THE BRITISH ISLES

General editor John HEATH

Part 3

HYMENOPTERA – APIDAE

(Bombus: Psithyrus)

Bumblebees

Edited for the Bee Research Association by

D.V.ALFORD

(Ministry of Agriculture, Fisheries and Food, Cambridge)

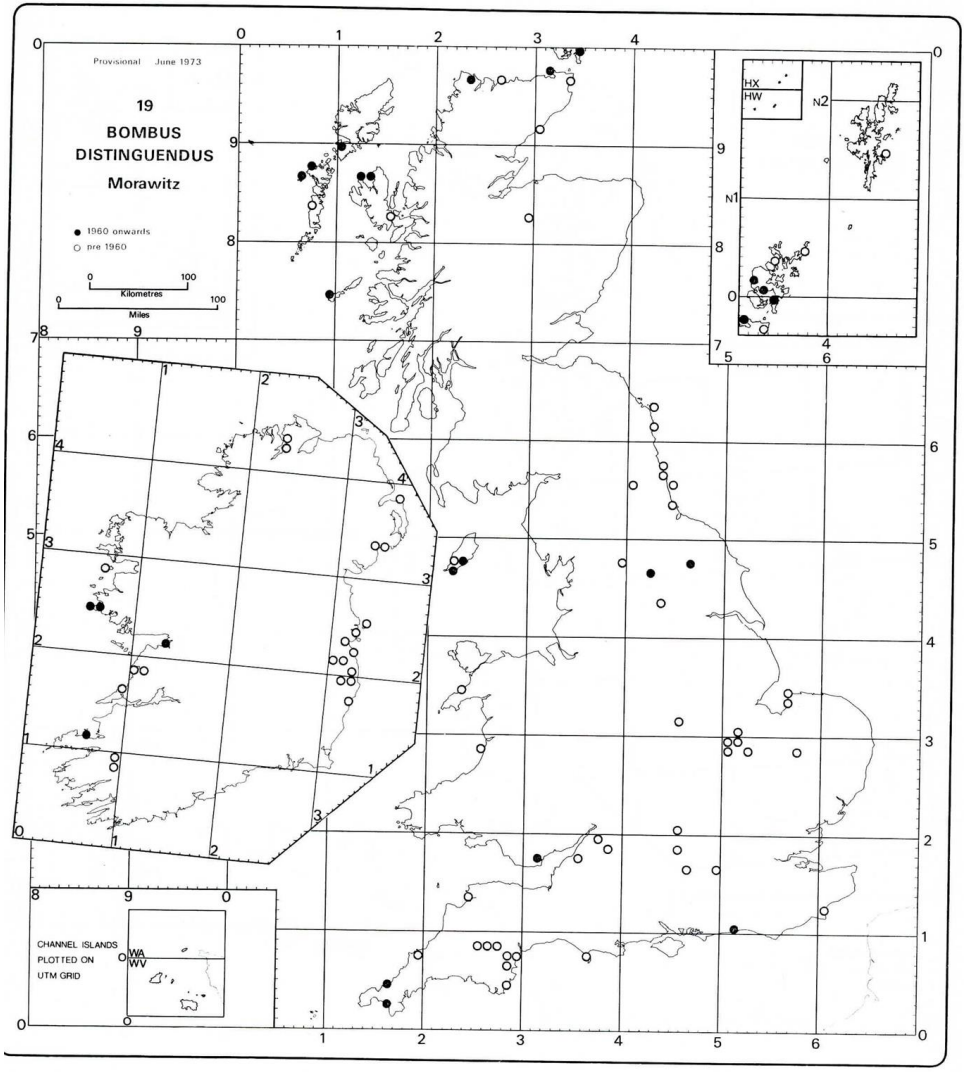
Biological Records Centre, Monks Wood Experimental Station,
Abbots Ripton,
Huntingdon.

1973

NATURAL ENVIRONMENT RESEARCH COUNCIL

B R C

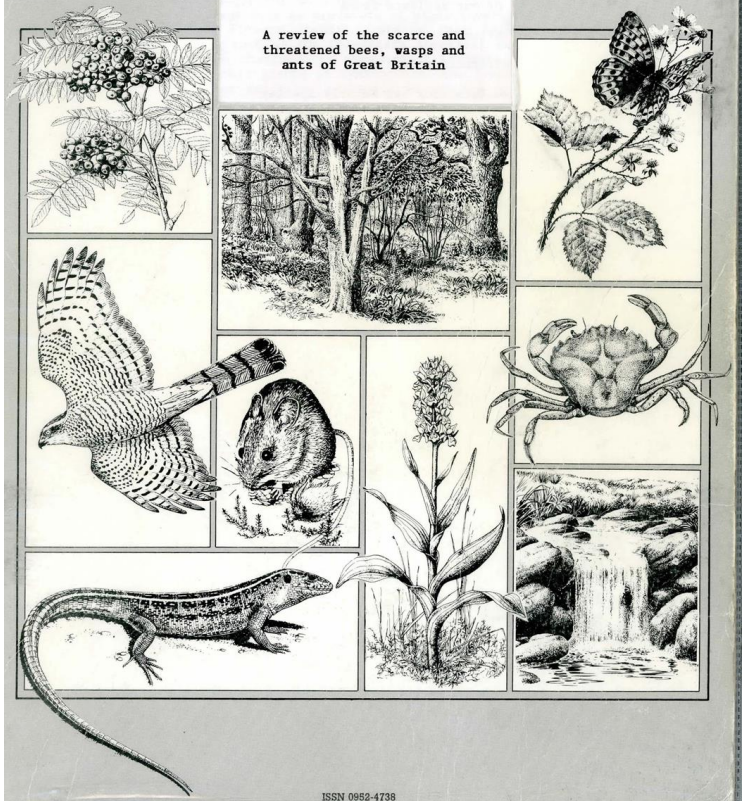
PRICE £0.75


Provisional June 1973
19
BOMBUS
DISTINGUENDUS
Morawitz
1960 onwards
pre 1960
0 100
Kilometres
0 100
Miles
HX
HW
N2
N1
CHANNEL ISLANDS
PLOTTED ON
UTM GRID
WA
WV

NATURE CONSERVANCY COUNCIL

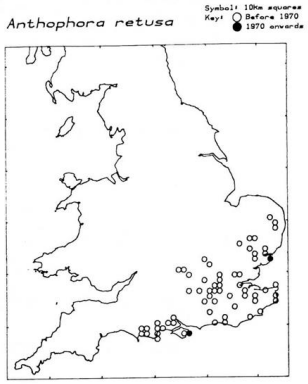
Research & survey in nature conservation

A review of the scarce and threatened bees, wasps and ants of Great Britain



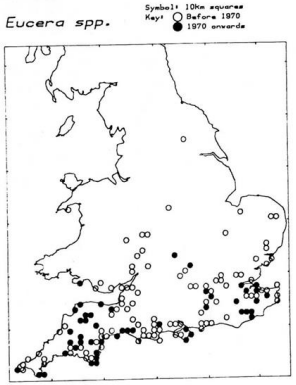
ISSN 0952-4738

Anthophora retusa

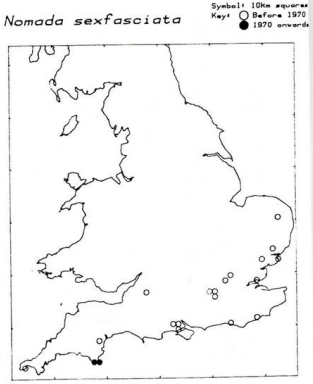


Melecta luctuosa

Eucera spp.



Nomada sexfasciata



Bombus App. in Tullie House Museum (CALMG) Carlisle
coll: G.B. Routledge, F.H. Day.

B. hemilis

♂	Tarn Lodge	1916 × 2	G.B.R.	Genitalia not visible
♀	Tarn Lodge	1916	"	NY5254 VC 70
–	Whitegill	1922 × 2	F.H.D.	NY3546
–	Drigg	1922	"	SD0696
–	Harraby, Carlisle	1916	"	NY45
–	Isle of Mull	VI. 1922 × 2	"	NM73? VC 103
–	Blackwell, Cmd.	1953	"	NY4053
–	Cummersdale	1935	"	NY35
♀	Dundraw	1901	"	NY4050

B muscorum

♀	Tarn Lodge	1916 × 15	G.B.R.	} B. smithianus
♀	Tarn Lodge	1916		
	Durham Park, Chs.	1919		SJ76 VC 58
	Kingmoor	1917, '21	F.H.D.	NY3656
	Dundraw	1916, '20, 21	"	
	Bowness Moss	1912	"	NY26
	Carlisle	1936	"	NY45
	Orton	1900	"	NY35
	Drumburgh Moss	1921	"	NY25
♀	Newton Reigny Moss	1924	"	NY43

B. monticola

♀	Cumrew Fell	1912	F.H.D.	NY5651
	Cumwhitton Moss	1916	"	NY5151
	Mungrisdale	1922	"	NY33
	Tarn Lodge + ♀	1916	G.B.R.	
♀	Armathwaite	1926	F.H.D.	NY54
	Hartsop	1935	"	NY41
	High Pike	1901	"	NY?
	Whinlatter	1939	"	NY12

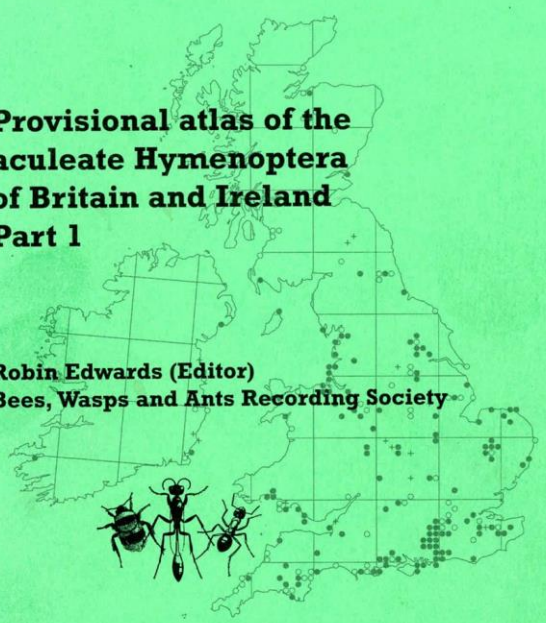
recorder

Species	Locality	GR	Date	Collector
Bombus humilis	Buckland Newton	ST60	14 MAY 1950	Boon, O.C. det. Spooner, G.M.
Bombus humilis	Badbury Rings	ST90	12 AUG 1953	Spooner, G.M.
Bombus humilis	Badbury Rings	ST90	28 JUL 1997	Else, G.R.
Bombus humilis	Badbury Rings	ST90	28 JUL 1997	Else, G.R. & Roberts S.P.M.
Bombus humilis	Badbury Rings	ST90	28 JUL 1997	Roberts, S.P.M.& Else, G.R.
Bombus humilis	Chapperton Down	ST94	20 JUL 1994	Else, G.R.
Bombus humilis	Chapperton Down	ST94	20 JUL 1994	Roberts, S.P.M.
Bombus humilis	Great Cheverell Hill	ST95	09 JUL 1995	Else, G.R.
Bombus humilis	Great Cheverell Hill	ST95	28 SEP 1997	Else, G.R.
Bombus humilis	Holt Heath	SU00	1987	Roberts, S.P.M.
Bombus humilis	Holt Heath	SU00	06 JUN 1988	Roberts, S.P.M.
Bombus humilis	Holt Heath	SU00	07 JUL 1988	Roberts, S.P.M.
Bombus humilis	Uddens	SU00	30 AUG 1987	Else, G.R.
Bombus humilis	Martin Down	SU01	30 JUL 1997	Else, G.R.
Bombus humilis	Martin Down	SU01	30 JUL 1997	Roberts, S.P.M.& Else, G.R.
Bombus humilis	Chitterne Down	SU04	20 JUL 1994	Roberts, S.P.M &. Else, G.R.
Bombus humilis	Orcheston Down	SU04	21 JUL 1994	Else, G.R.
Bombus humilis	Orcheston Down	SU04	21 JUL 1994	Roberts, S.P.M. & Else, G.R.
Bombus humilis	Tilshead	SU04	16 AUG 1991	Roberts, S.P.M.
Bombus humilis	Tilshead	SU04	25 AUG 1991	Roberts, S.P.M. & Else, G.R.
Bombus humilis	Tilshead	SU04	27 JUN 1992	Else, G.R.
Bombus humilis	Tilshead	SU04	27 JUN 1992	Else, G.R.
Bombus humilis	Tilshead	SU04	13 JUL 1992	Else, G.R.
Bombus humilis	Tilshead	SU04	13 JUL 1992	Else, G.R.
Bombus humilis	Tilshead	SU04	06 JUN 1993	Else, G.R.
Bombus humilis	Tilshead	SU04	09 JUL 1995	Else, G.R.
Bombus humilis	Tilshead	SU04	12 JUL 1995	Else, G.R.
Bombus humilis	Tilshead	SU04	29 JUN 1997	Else, G.R.
Bombus humilis	Tilshead	SU04	06 JUL 1997	Else, G.R.
Bombus humilis	Tilshead	SU04	29 JUL 1997	Else, G.R.
Bombus humilis	Tilshead	SU04	30 MAY 1998	Else, G.R.
Bombus humilis	Tilshead	SU04	25 JUL 1998	Else, G.R.
Bombus humilis	Tilshead	SU04	25 JUL 1998	Roberts, S.P.M. & Else, G.R.
Bombus humilis	Tilshead	SU04	25 JUL 1998	Roberts, S.P.M. & Else, G.R.
Bombus humilis	Tilshead	SU04	26 JUL 1998	Else, G.R.
Bombus humilis	Tilshead	SU04	26 JUL 1998	Roberts, S.P.M. & Else, G.R.

JOINT NATURE CONSERVATION COMMITTEE

Institute of Terrestrial Ecology

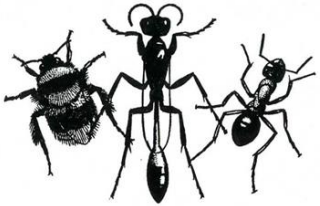
Provisional atlas of the aculeate Hymenoptera of Britain and Ireland Part 1



Robin Edwards (Editor)
Bees, Wasps and Ants Recording Society

Centre for Ecology and Hydrology
Natural Environment Research Council

ISSN 1746-5230



BWARS Newsletter

Spring 2005

BWARS web pages are at www.bwars.com

President Dr Michael Archer

BWARS
Newsletter
Autumn 2013

ISSN 17456-5230

Bees Wasps and Ants
Recording Society

20 Vein 2m-cu strongly curved outwards (fig. Gen45). Glossa very short and bilobed apically (fig. Gen46). ***Colletes*** (p. 311)

– Vein 2m-cu straight or only weakly curved outwards (fig. Gen02). Glossa long, acutely pointed or narrowly rounded apically (fig. Gen47). 21

Fig. Gen45. Right wing of *Colletes floralis*.

Fig. Gen46. Glossa of *Colletes hederae*.

Fig. Gen47. Glossa of *Andrena thoracica*.

21 Lower margin of antennal socket connected to upper margin of clypeus by a pair of subantennal sutures (figs. Gen48a, 48b); (commonly obscured by facial hairs). Facial foveae present (figs. Gen49, 50); (very obvious in females but shallow and sometimes difficult to discern in males). ***Andrena*** (p. 203)

(See over for second part of couplet.)

Fig. Gen48a. Antennal sutures of *Andrena dorsata*.

Fig. Gen48b. Antennal sutures of *A. dorsata*, indicated.

Fig. Gen49. Face of female *Andrena labiata* showing facial fovea.

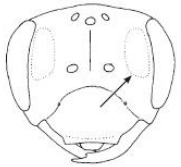


Fig. Gen50. Face of female *Andrena scotica*, facial fovea indicated.


Science
21 July 2006 | $10
AAAS

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DOI: 10.1111/gcb.14608

INVITED LETTER TO THE EDITOR

WILEY Global Change Biology

"Insectageddon": A call for more robust data and rigorous analyses

As members of that subset of the human population who love insects, we have been alarmed by a recent publication reporting their global decline and impending extinction (Sánchez-Bayo & Wyckhuys, 2019), and the accompanying media furore. Indeed, there has been a growing tide of concern over the magnitude and potential consequences of diminishing insect populations (e.g., Hallmann et al., 2017; Lister & Garcia, 2018). However, we respectfully suggest that accounts of the demise of insects may be slightly exaggerated. Bad things are happening—we agree—but this is not the whole story. We call for hard-nosed, balanced, and numerical analysis of the changes taking place, and for calm and even-handed interpretation of the changes, rather than rushing headlong into the hyperbole of impending apocalypse.

Reports of insect declines come as no surprise to entomologists; this has been familiar territory for many decades (Leather, 2019). The latest article by Sánchez-Bayo and Wyckhuys (2019) makes a substantial and valuable contribution to the field, bringing together many of the individual studies in one review. However, considerable uncertainties and potential biases remain.

A key problem stems from the "Methodology" section, which states "… we performed a search on the online Web of Science database using the keywords [insect*] AND [declin*] AND [survey]……" Using the search term [declin*] immediately biases the meta-analysis toward exaggerated estimates of decline rates, even assuming there is no underlying publication bias in the literature. An unbiased review of the literature would still find declines, but estimates based on this "unidirectional" methodology are not credible.

Extrapolation from measured rates of decline to extinction has four further and currently unresolved challenges, which are associated with translating rates of change across types of data, spatial scales, locations, and durations.

Nearly all "disappearances" of insect species reported in the literature represent losses of species from individual sites or regions, but it requires quite different data and calculations to extrapolate to the extinction of species at larger spatial scales. Many British insect species have declined massively at a local level, but most of them still survive somewhere in Britain and even fewer are endangered at a European spatial scale. Furthermore, a preponderance of data come from Europe and North America, as Sánchez-Bayo and Wyckhuys (2019) highlight. Trying to extrapolate from population or biomass declines over several decades, or from threatened species lists, in "developed" temperate zone countries to, say, 100-year species-level extinctions of undescribed endemics confined to the precipitous eastern flanks of the Andes does not wash. A far more sophisticated approach is required if we wish to estimate global extinction rates.

Many studies find that abundances, biomass, or species richness are declining in some locations, but not everywhere, and some species are declining but others are not. For example, Shortall et al. (2009) reported declines in flying insect biomass at one of four sample sites over a 30-year period, while Fox et al. (2014) reported that, while 260 British moth species declined, 160 increased significantly. In both cases, extrapolating the average rate of decline to a future zero-biomass or zero-species world would clearly not be appropriate, since declines are not evident at many sites and for many species. The idea that there will be hardly any insect biomass or species left in the world in 50 to 100 years is misleading. Dynamism of the biological world is sufficiently great (particularly now) that the arrival of new species and increases in some of the species already present must be factored into estimates of future prospects for biomass and biodiversity.

Given the headline statements in the original articles, it was not surprising that the media reported the apocalypse with some enthusiasm! Interestingly, the BBC (McGrath, 2019) and others reported that we will have plagues of insect pests instead, which bears almost no relation to the data presented in the paper. Even if pests increase in future, there is scant evidence that this will be predominantly because of the decline in other insect species.

The authors concluded that "Habitat restoration, coupled with a drastic reduction in agro-chemical inputs and agricultural 'redesign', is probably the most effective way to stop further declines, particularly in areas under intensive agriculture." We fully appreciate the importance of developing sustainable approaches to agriculture, and have contributed to this active area of research (e.g., Pretty et al., 2018). But we also recognise that crop pests and diseases, many vectored by insects, currently cause 35% yield losses, and can rise to 70% in the absence of pesticides (Popp, Peto, & Nagy, 2013). Since agriculture is already the proximate driver of 80% of deforestation (Kissinger, Herold, & Sy, 2012), any solutions to the current "crisis" which require additional farmland to maintain food supplies may exacerbate some of the problems for global insect conservation. Joined-up thinking is required.

In conclusion, robust data are needed from all parts of the world to assess the status and trends of insect abundances, biomass, species richness, and the functions (beneficial and harmful to humans) they perform. Ultimately, this requires a step-change in funding (Leather, 2019). Hyping-up the situation based on incomplete and potentially biased data may generate necessary short-term

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What is BWARS?

- Voluntary society
- Set up for the promotion of recording and conservation
- No campaigning
- No data interpretation
- Maximum amount of high quality data possible

Data Quality: Validation vs Verification

- Validation: Is the data formatted correctly?
- Verification: Does this data point make sense?
- Automation of validation is very doable (BWARS Checker)
- Automation of verification is (currently) impossible
- Humans are still required to verify records
- Automation can highlight suspicious records

BWARS Checker

- Input data in raw form
- Automated processes to attempt to convert that raw data to a structure
- Human guidance where required
- Automated processes can never make decisions
- Currently restricted to BWARS taxa, but exploring other taxa
- Largest requirement is a correctly digitised taxonomic system

Entry Record ID 2049 | Examined ☐ | Pass No | Find Unexamined 'No' | Find All 'No' | Error Counter 0

Input

BWARS ID

Species Name: bombus lucorum

From ID

From Name

15007 Bombus lucorum
iso. Williams : 2000

Bombus lucorum agg
iso. Murray et al : 2008

15022 Bombus lucorum
iso. Sladen : 1912

Bombus lucorum agg
iso. Murray et al : 2008

20003 Bombus lucorum
iso. Murray et al : 2008

Bombus lucorum
iso. Murray et al : 2008

20004 Bombus lucorum agg
iso. Murray et al : 2008

Bombus lucorum agg
iso. Murray et al : 2008

ID

VC 12

Name From: North Hampshire

VC	Name	Area
12	North Hampshire	100

Grid Reference: SU287425
Location
2fig matchfield
4fig matchfield: SU2842

	D	M	Y
Date Separate			
Date Lower	12/4/2018		
Date Upper			

Collector
Determiner
Voucher
Submitter

	Count	Basis
Male		adu
Female		
Queen	2	
Worker		
Nest		

Flower
Nectar
Pollen
Prey

Field 1
Field 2
Field 3
Field 4
Systematic Survey

TIK
Species Name

Grid Reference: SU287425
Location

Vicecounty Num: 12
Vicecounty Name: North Hampshire

Date Lower: 2018-04-12
Date Upper: 2018-04-12

Collector
Determiner
Voucher
Submitter

ScriptLog

Multiple species matches, require manual selection
Lower Date is non-ISO

	Count	Basis
Male		1
Female		
Queen	2	1
Worker		
Nest		

Flower
Nectar
Pollen
Prey

Additional Information
Systematic Survey

Checker Notes

PreProcess All | Process All | PreProcess Current | Process Current | Reset All Output | Reset Current | Find Unexamined matching GridRef and Collector | Export Passes | Export Fails as CSV

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PreProcess Current | Process Current | Reset Current | Export Fails as CSV

Taxonomic ‘iso.’ System

- ‘iso.’ - In the Sense Of
- Extension of the Linnaean type system
- Complete encoding of Linnaean system for relational databases
- Enables true-to-type tracking of records through taxonomic evolution
- Avoidance of numeric ‘keys’ to species
- Append author and year of understanding to name
- Extensively tested in BWARS remit, now exploring other areas

BWARS ‘FrontEnd’

- Where all records end up
- Direct import from checker
- Duplicate records
- Parent-Child adjustment tracking
- Duplication identification and elimination (28% Duplication on Core)
- Very unfinished, lots of ‘hacks’

Record ID 821950 **Exportable** yes

Submitted TIK 7525
Current TIK 7525
Species Name Anthophora bimaculata

Grid Reference SU855220
Location Stedham Common

Vicecounty Num 13
Vicecounty Name West Sussex

Date Lower 2007-06-13
Date Upper 2007-06-13

Collector M. Edwards
Determiner M. Edwards
Voucher M. Edwards
Submitter

	Count	Basis
Male		1
Female		
Queen		
Worker		
Nest		

Flower
Nectar
Pollen
Prey

Systematic Survey

Additional Information

Script Log

Parent Of Go
Child Of Go

Suspend Reason

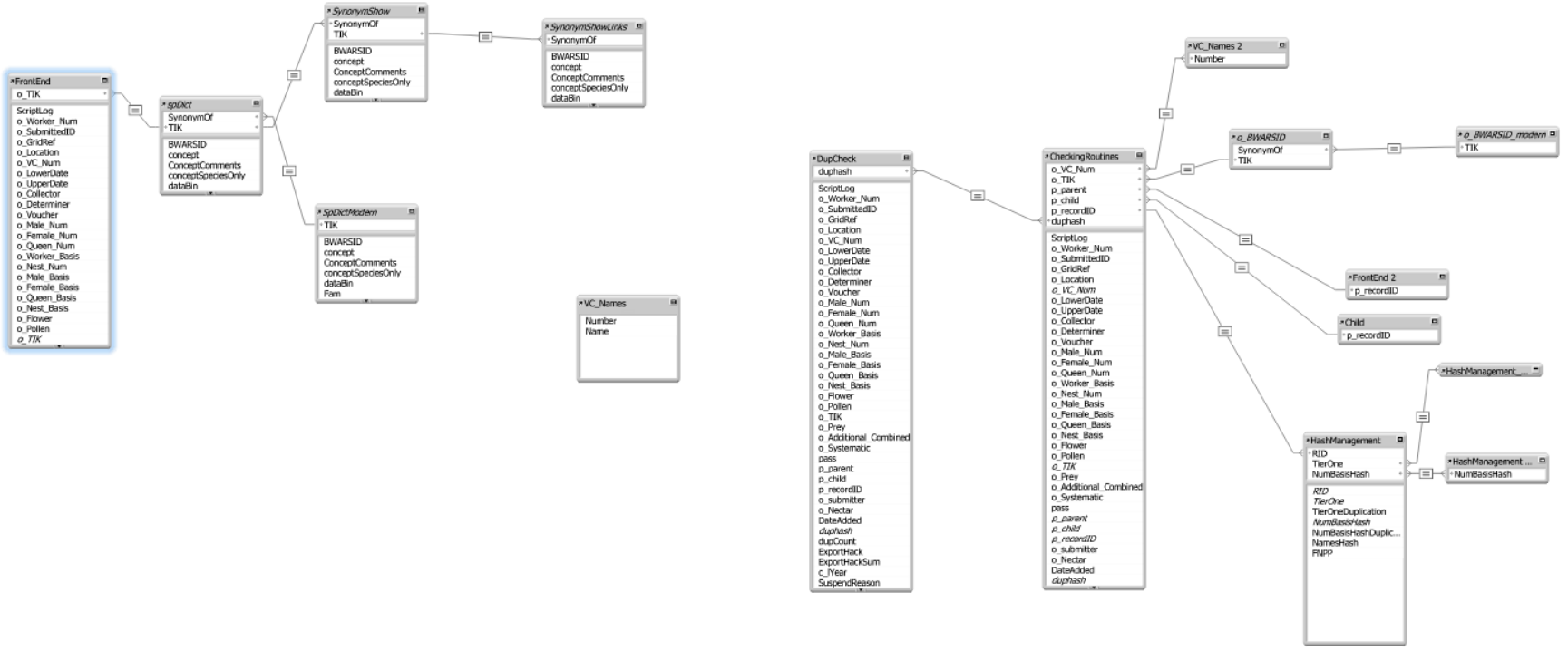
466392	Yes
821950	yes

duphash C54D792590FE77B55F0E5EA2BC6DF1C8
dupCount 2
ExportHack 0
ExportHackSum 0

c_lYear 2007
c_uYear 2007

TierOne
TierOneDuplication
NumBasisHash
NamesHash
FNPP

DateAdded 19/03/2017


FrontEnd
o_TIK
ScriptLog
o_Worker_Num
o_SubmittedID
o_GridRef
o_Location
o_VC_Num
o_LowerDate
o_UpperDate
o_Collector
o_Determiner
o_Voucher
o_Male_Num
o_Female_Num
o_Queen_Num
o_Worker_Basis
o_Nest_Num
o_Male_Basis
o_Female_Basis
o_Queen_Basis
o_Nest_Basis
o_Flower
o_Pollen
o_TIK
spDict
SynonymOf
TIK
BWARSID
concept
ConceptComments
conceptSpeciesOnly
dataBin
SynonymShow
SynonymOf
TIK
BWARSID
concept
ConceptComments
conceptSpeciesOnly
dataBin
SynonymShowLinks
SynonymOf
BWARSID
concept
ConceptComments
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dataBin
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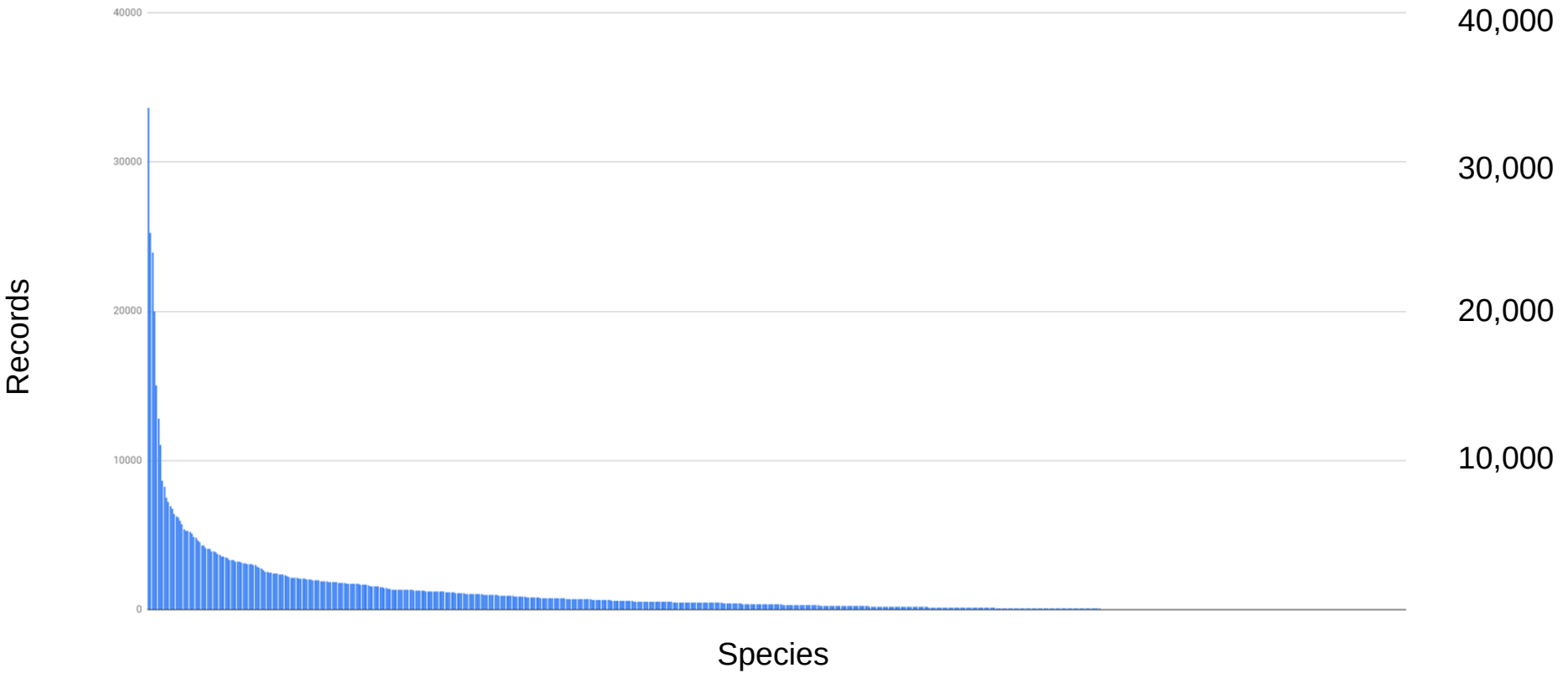
dataBin
Fam
VC_Names
Number
Name
DupCheck
duphash
ScriptLog
o_Worker_Num
o_SubmittedID
o_GridRef
o_Location
o_VC_Num
o_LowerDate
o_UpperDate
o_Collector
o_Determiner
o_Voucher
o_Male_Num
o_Female_Num
o_Queen_Num
o_Worker_Basis
o_Nest_Num
o_Male_Basis
o_Female_Basis
o_Queen_Basis
o_Nest_Basis
o_Flower
o_Pollen
o_TIK
o_Prey
o_Additional_Combined
o_Systematic
pass
p_parent
p_child
p_recordID
o_submitter
o_Nectar
DateAdded
duphash
dupCount
ExportHack
ExportHackSum
c_Year
SuspendReason
CheckingRoutines
o_VC_Num
o_TIK
p_parent
p_child
p_recordID
duphash
ScriptLog
o_Worker_Num
o_SubmittedID
o_GridRef
o_Location
o_VC_Num
o_LowerDate
o_UpperDate
o_Collector
o_Determiner
o_Voucher
o_Male_Num
o_Female_Num
o_Queen_Num
o_Worker_Basis
o_Nest_Num
o_Male_Basis
o_Female_Basis
o_Queen_Basis
o_Nest_Basis
o_Flower
o_Pollen
o_TIK
o_Prey
o_Additional_Combined
o_Systematic
pass
p_parent
p_child
p_recordID
o_submitter
o_Nectar
DateAdded
duphash
VC_Names 2
Number
o_BWARSID
SynonymOf
TIK
o_BWARSID_modern
TIK
FrontEnd 2
p_recordID
Child
p_recordID
HashManagement_...
HashManagement
RID
TierOne
NumBasisHash
RID
TierOne
TierOneDuplication
NumBasisHash
NumBasisHashDuplic...
NamesHash
FNPP
HashManagement ...
NumBasisHash

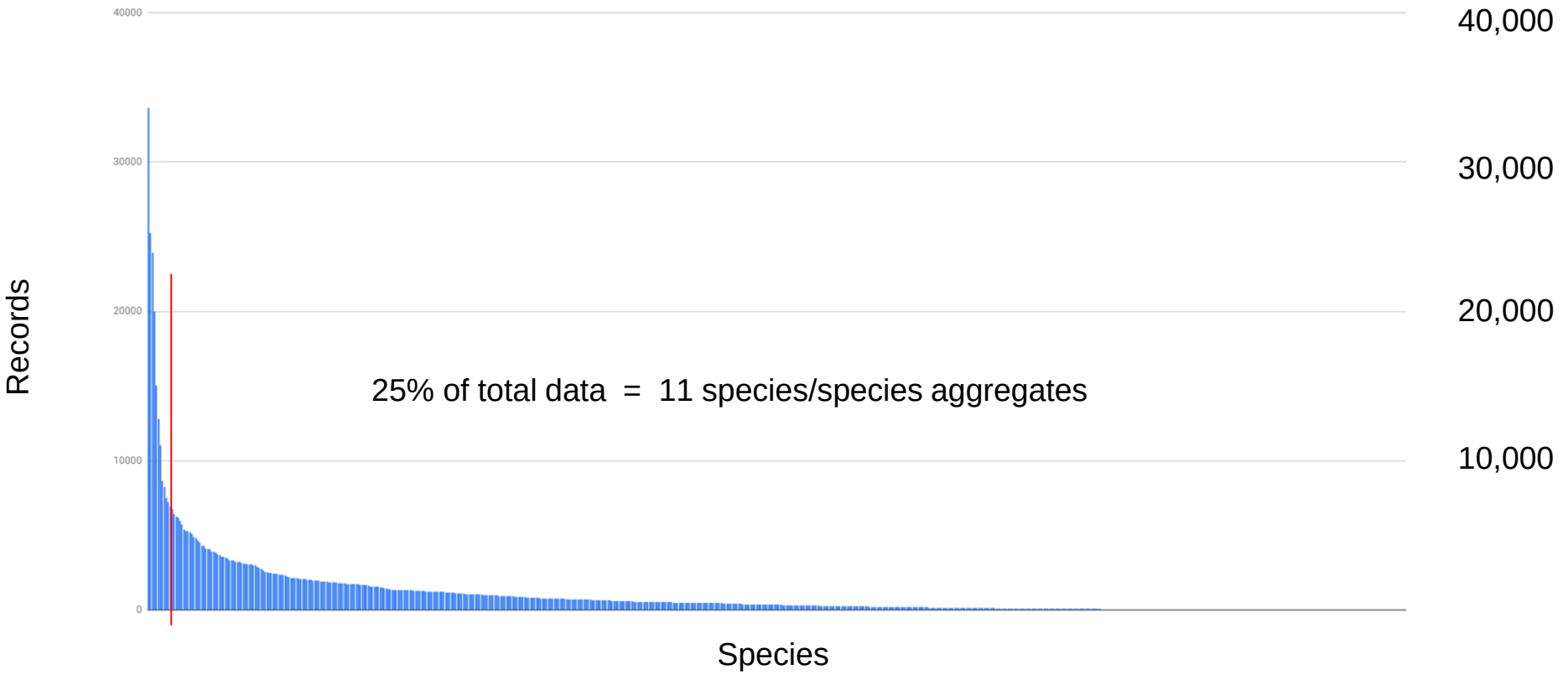
More interesting bits

- Moved our data to a (couple of) SQL systems as part of a test
- Ran core duplication removal as a test
- Poked around at the data a bit
- Also sent data for mapping (Josh Baum)

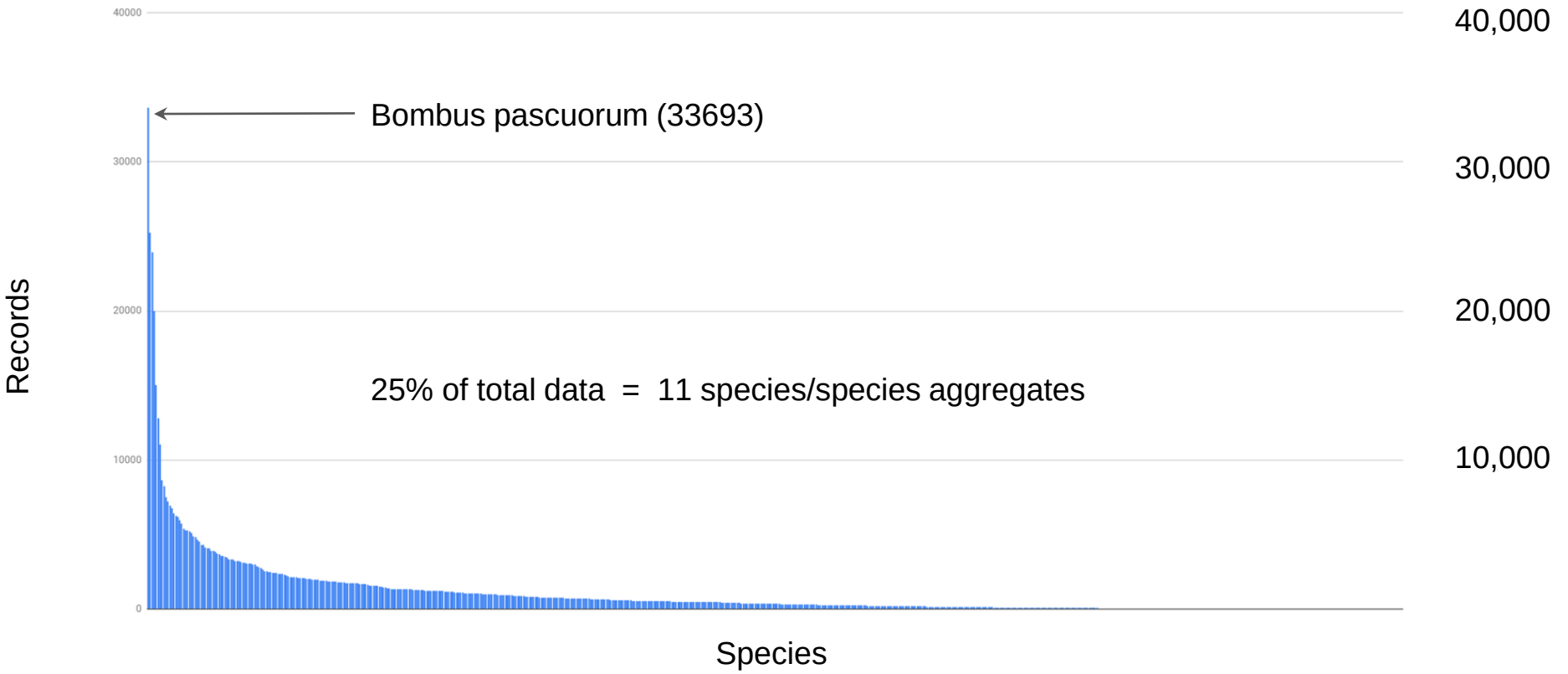
Species distribution by number of records



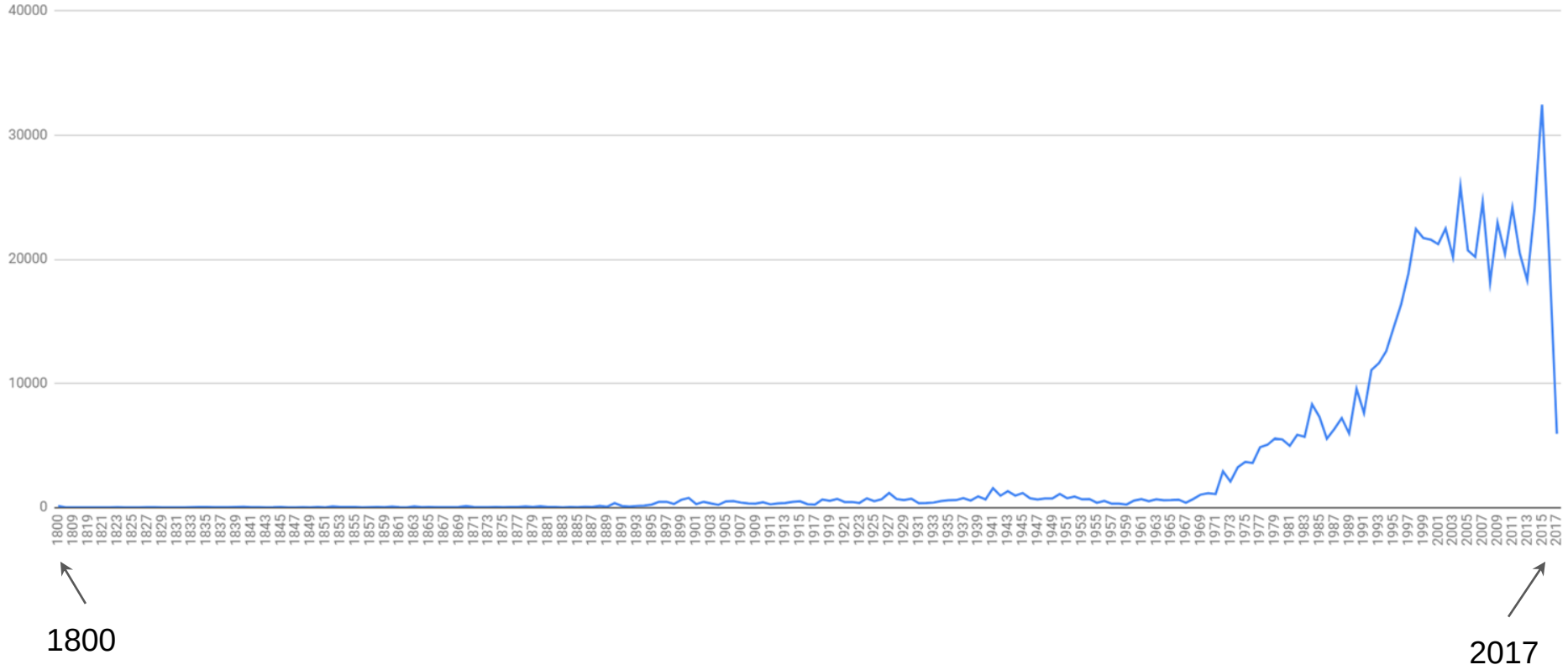
Species distribution by number of records



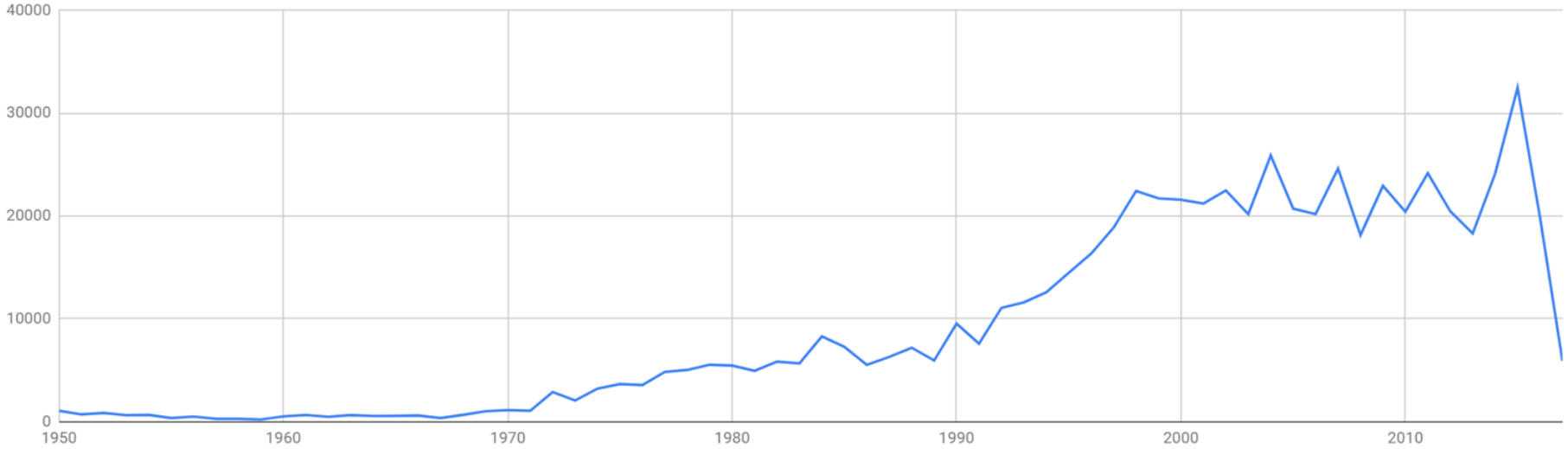
Species distribution by number of records



Records by year



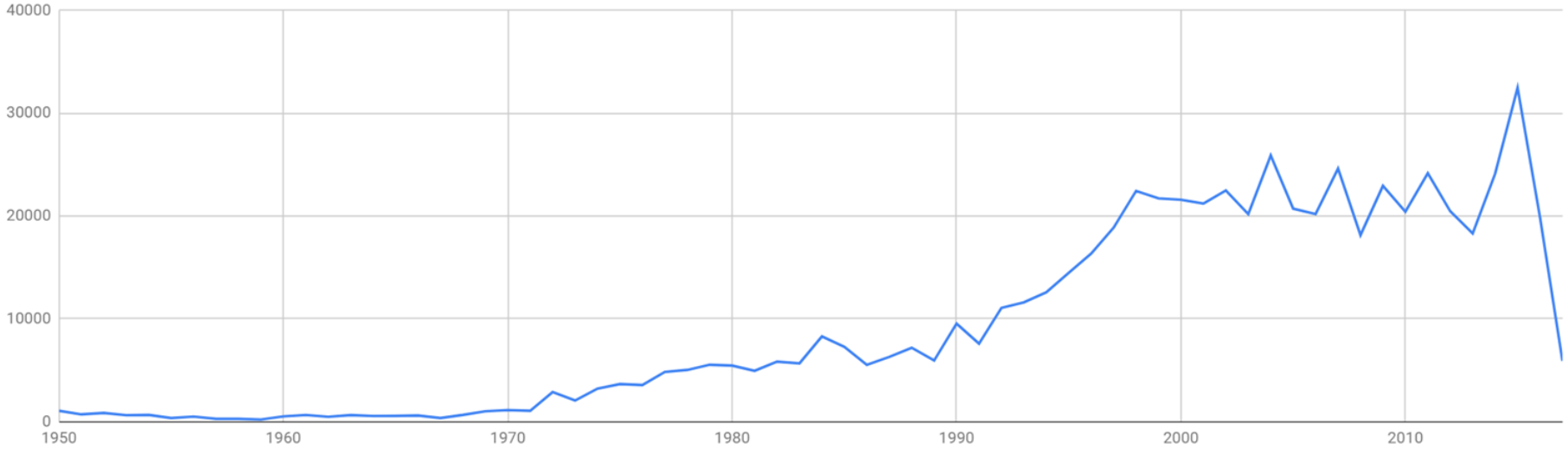
Records by year



1950

2017

Records by year



1950

20 years data of vaguely comparable volume

2017

Record Density