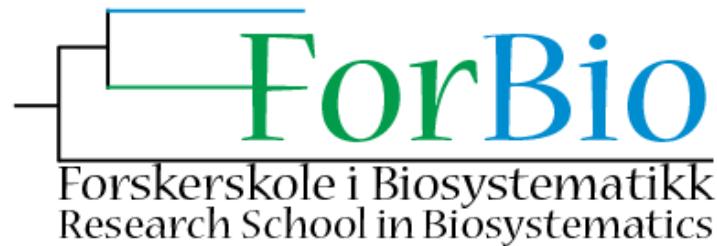




UiO • Natural History Museum
University of Oslo



International Scientific Conference
**Information Technologies in
the Research of Biodiversity**
Irkutsk, Russian Federation
September 11-14, 2018





If a tree falls in the forest, and nobody publishes the event in GBIF, did it really happen?

Global Biodiversity Information Facility,
free and open access to biodiversity data.



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GBIF: MULTIPLE-PURPOSE DATA PUBLISHING SERVICES



Norwegian Red List



TIMELINE FOR GBIF.no

1999 – OECD Science Forum recommend creating a GBIF

2001 – GBIF.org is created

2003 Nov – seminar in Oslo recommend Norway to join GBIF

2004 Feb – Norway sign the MoU with GBIF

2005 – The Norwegian GBIF Node at NHM in Oslo is created

- Annual GBIF.no Node budget is 300k Euro
- 2 Node staff members: Node Manager & IT developer

2020 – A proposed permanent GBIF.no e-infrastructure service established with 4 staff members...???



GBIF.no

Node team at NHM, University of Oslo

Dag Endresen, *Node manager*

Christian Svindseth, *Developer → Aug 2018*

Vidar Bakken, *Head engineer (part-time)*

Fridtjof Mehlum, *Head of Delegation*



UiO Natural History Museum

Einar Timdal, *Associate professor*

Geir Søli, *Associate professor*



Norwegian Biodiversity Information Center

Wouter Koch, *GBIF.no node member*

Nils Valland, *GBIF.no board member*



NTNU University Museum

Anders Finstad, *GBIF Science committee*

Solveig Bakken, *GBIF.no board member*



Research Council of Norway

Christian Wexels Riser, *Contact point at RCN*

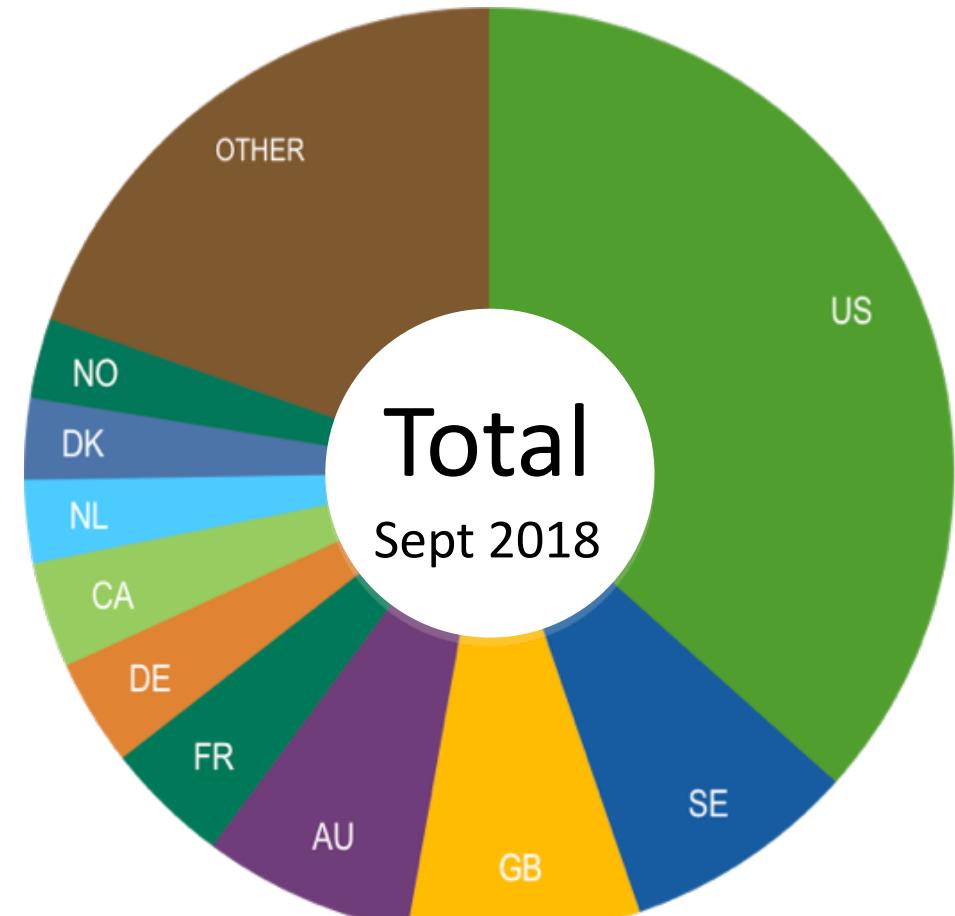
Per Backe-Hansen, *Head of Delegation → 2016*

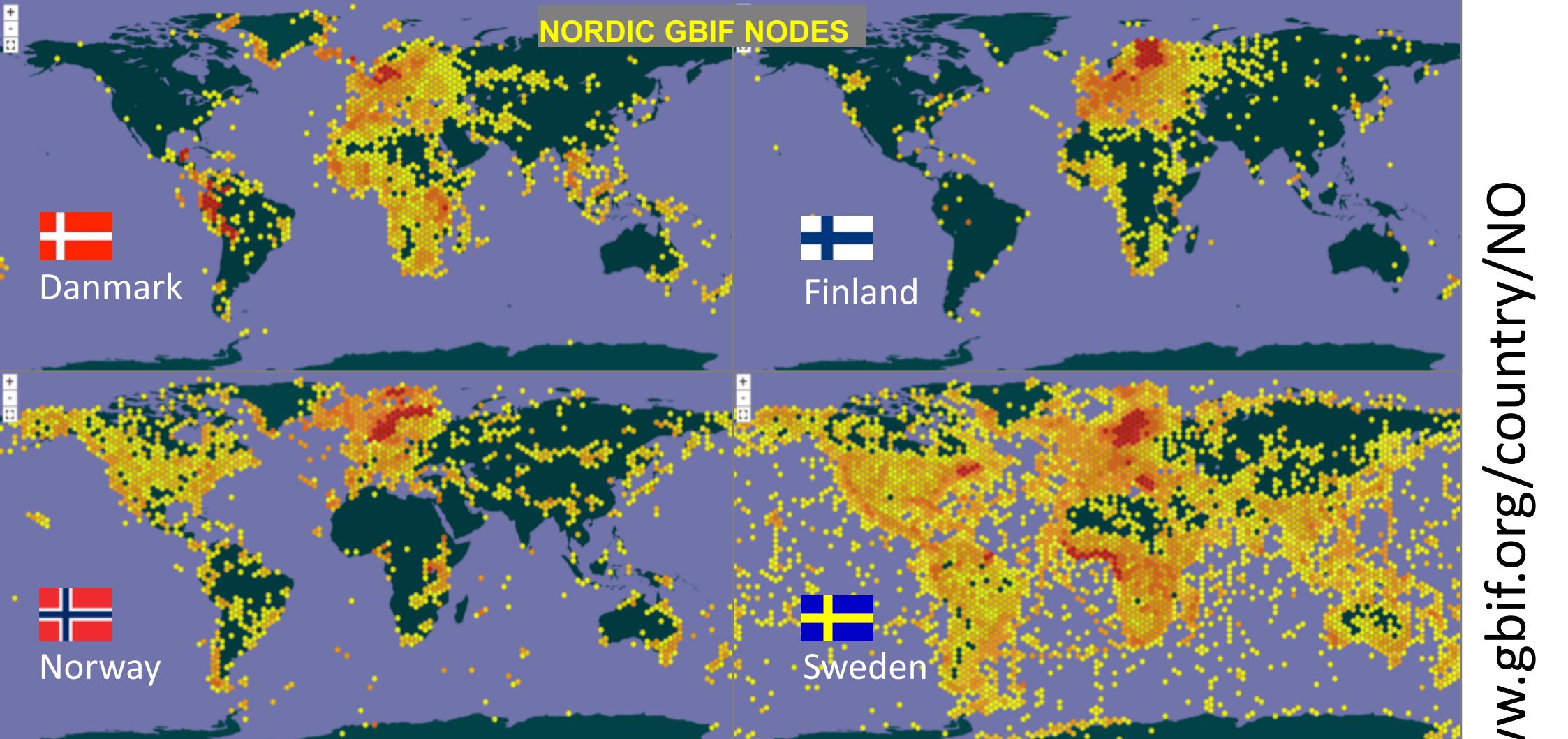
Contact us at: helpdesk@gbif.no

TOTAL NUMBER OF OCCURRENCE RECORDS PUBLISHED BY COUNTRY

STATUS 12TH SEPTEMBER 2018

#	Country	Occurrences	Datasets
1	United States	350,446,091	564
2	Sweden	81,523,907	44
3	United Kingdom	80,056,500	834
4	Australia	72,294,428	329
5	France	64,532,813	1,124
6	Canada	42,694,714	177
7	Germany	38,848,365	31,823
8	Netherlands	28,669,273	295
9	Norway	28,511,193	212
10	Denmark	27,901,323	167
-	Russia	1,416,162	50



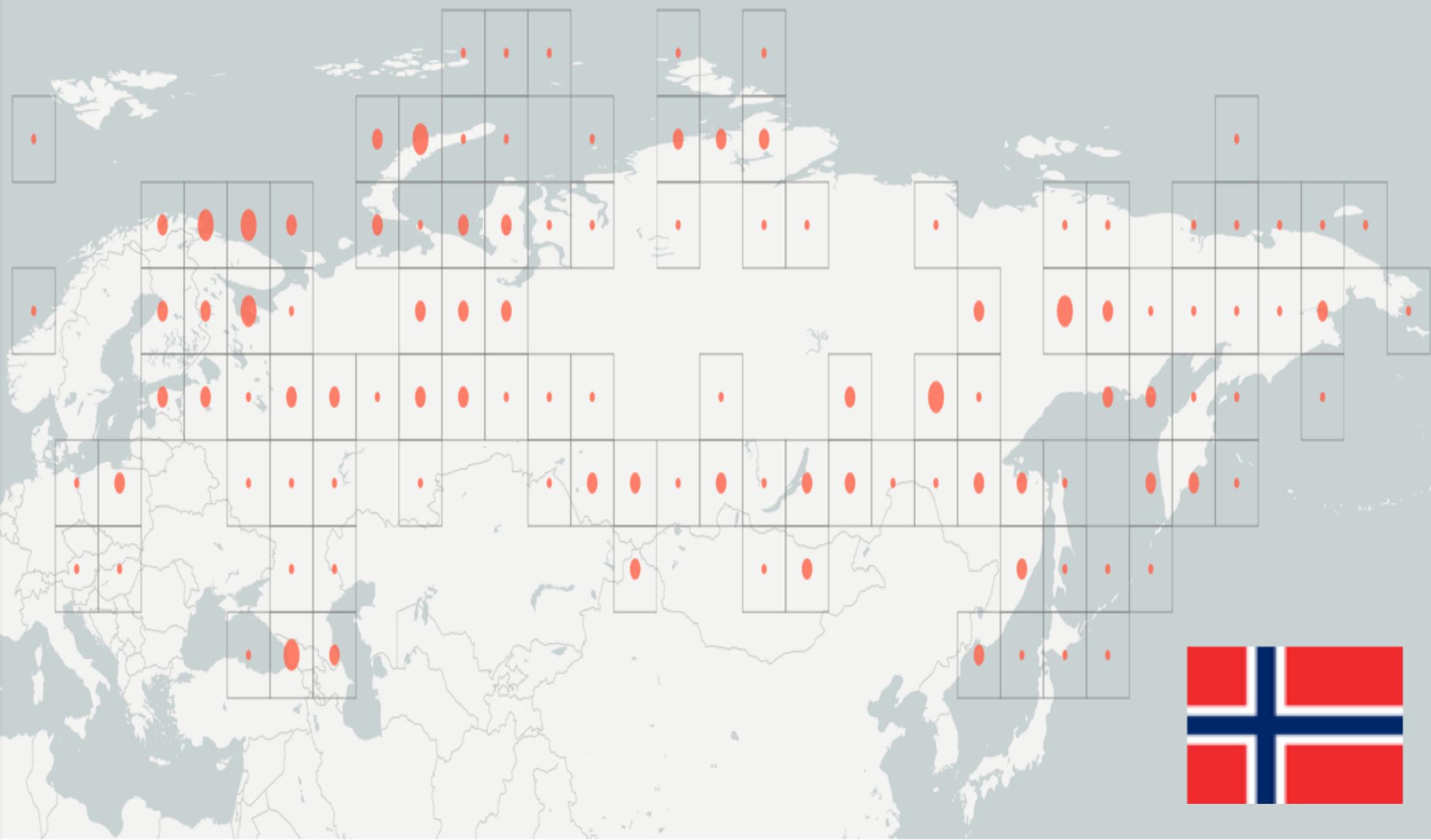


AUG 2018	Datasets	Occurrences
Denmark	167	27 901 323
Finland	57	25 390 614
Iceland	4	812 980
Norway	212	28 511 193
Sweden	44	81 523 907



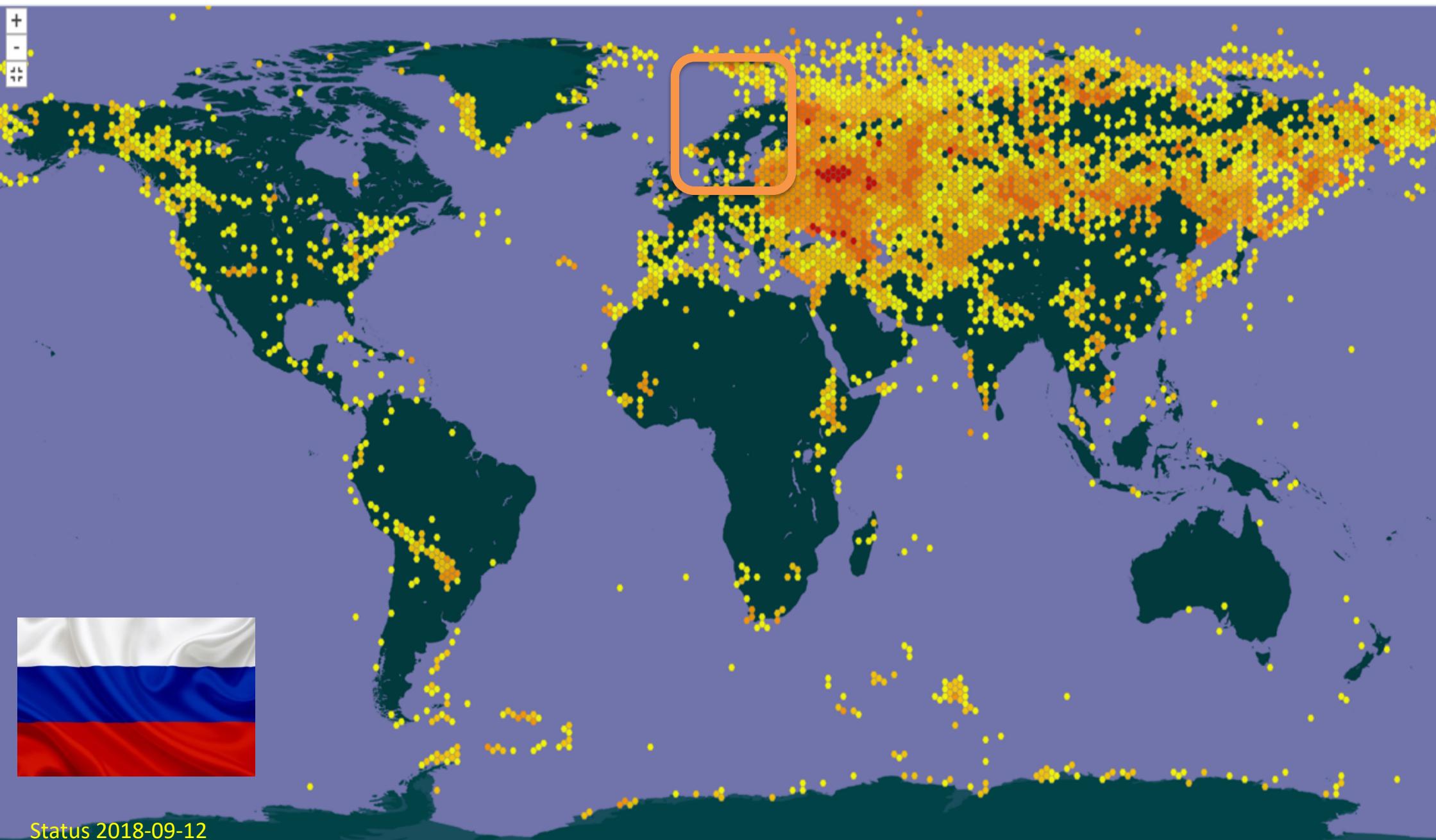
<http://www.gbif.org/country/NO>

10,015 SPECIES OCCURRENCES IN GBIF FROM NORWEGIAN INSTITUTIONS, WITH LOCATIONS IN THE RUSSIAN FEDERATION



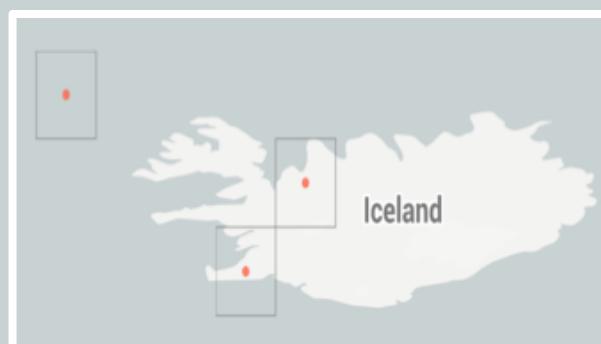
DATA PUBLISHED FROM RUSSIA IN GBIF

1,416,162 occurrences from Russian institutions -- 4,659 occurrences in the Nordic countries

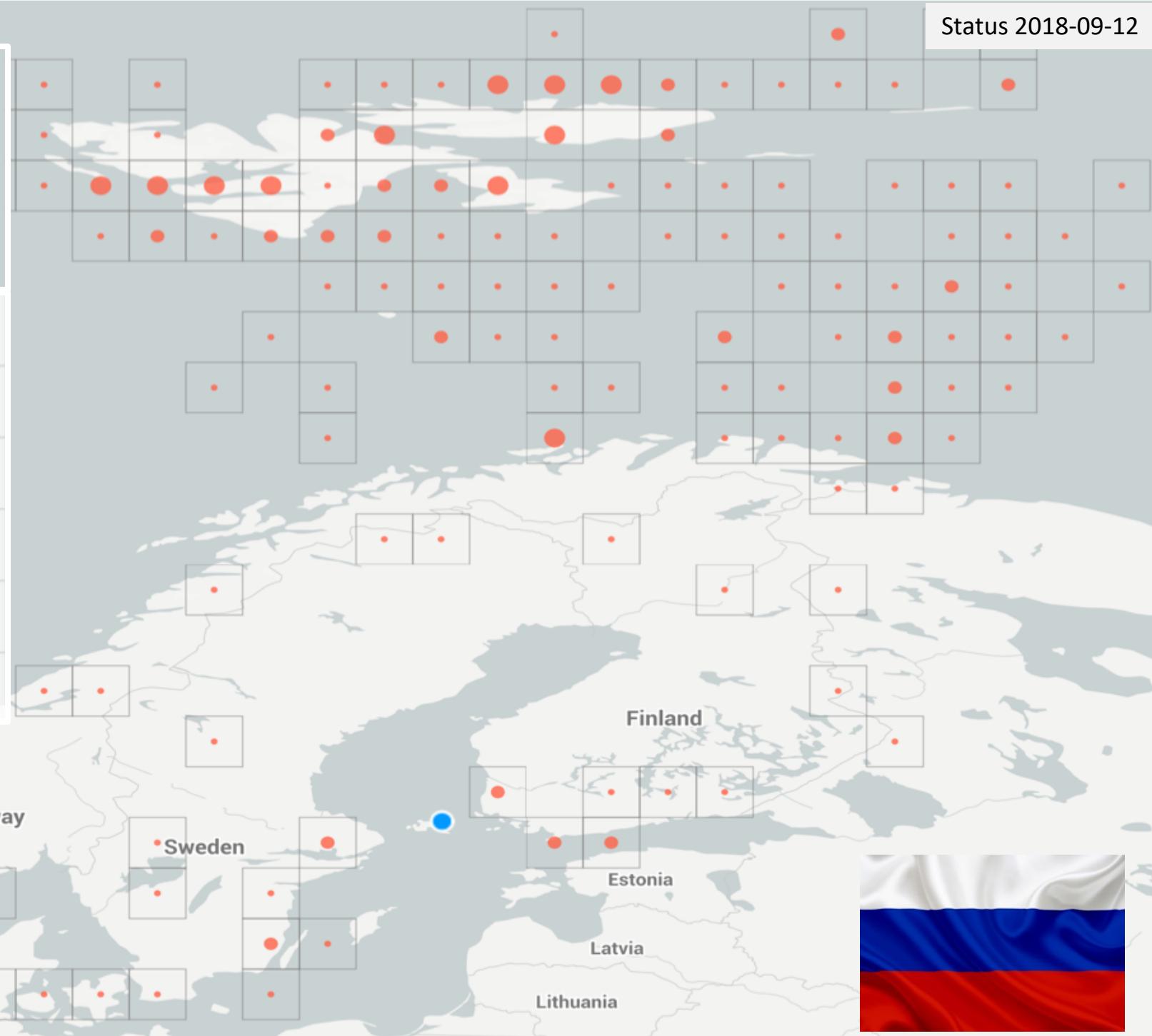


4,659 species occurrences in GBIF from Russian institutions, with locations in the Nordic countries

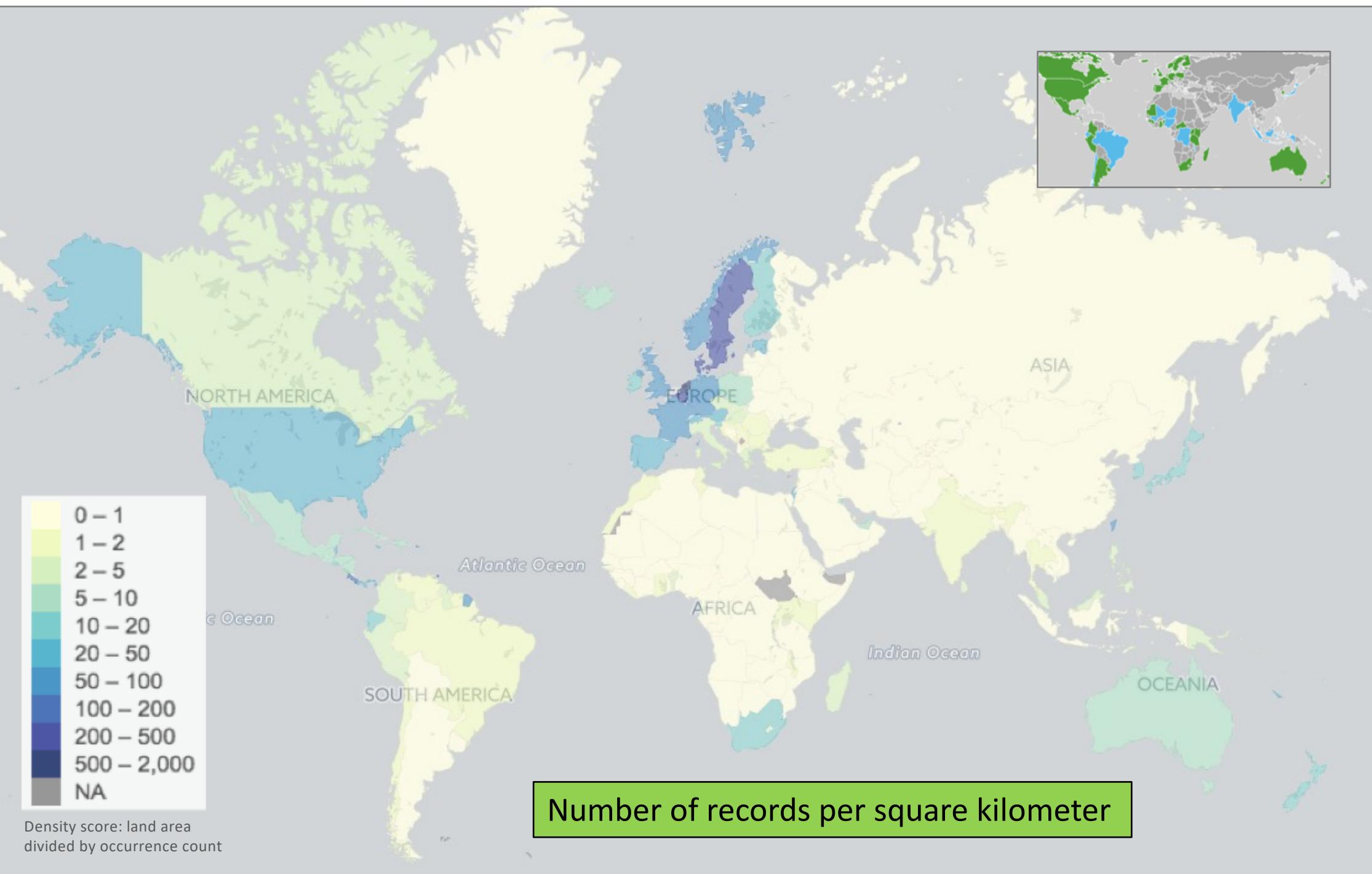
Status 2018-09-12



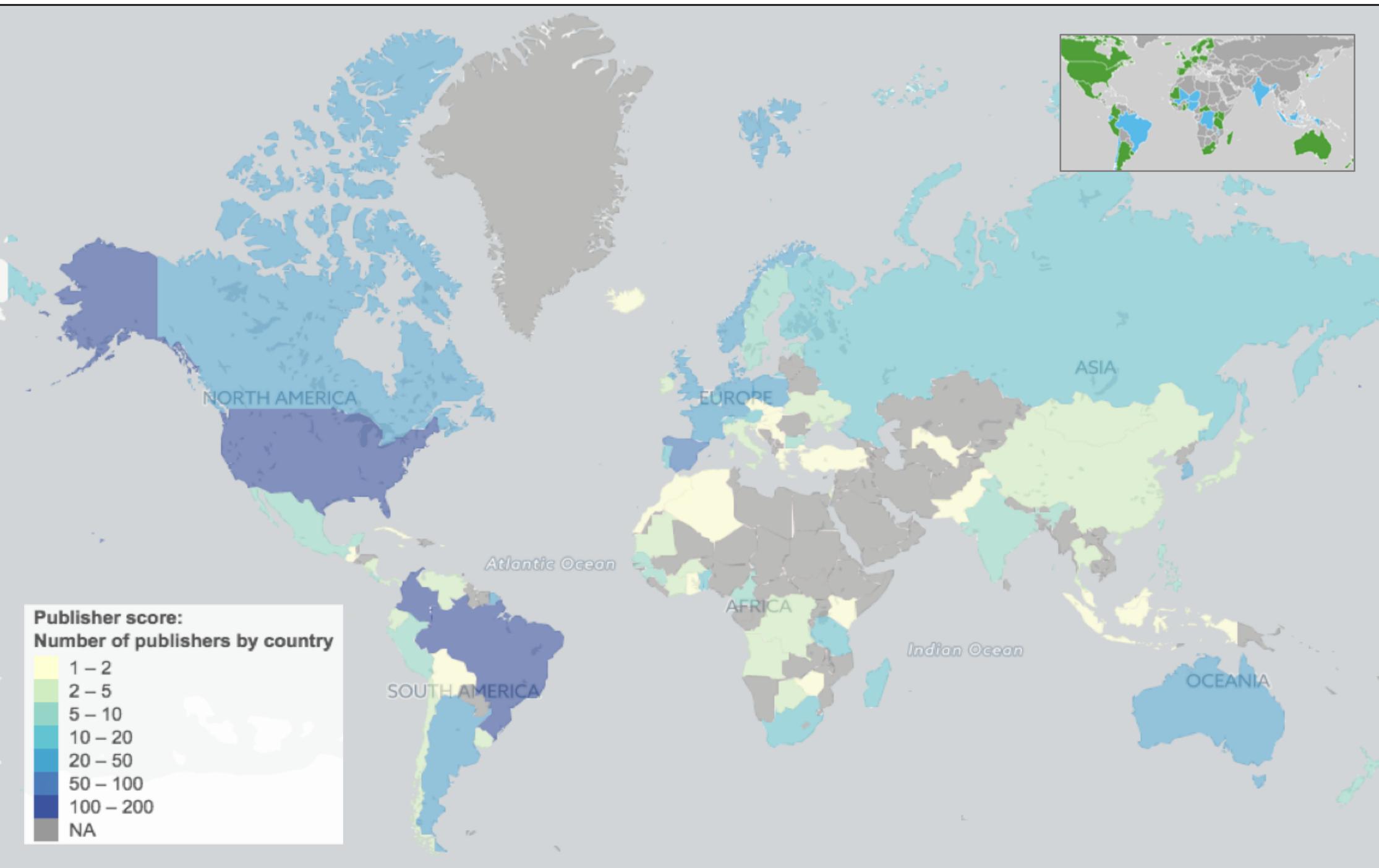
Svalbard and Jan Mayen	3,983
Norway	830
Finland	738
Sweden	195
Denmark	46
Iceland	7



DATA COVERAGE IN GBIF (PER KM²)

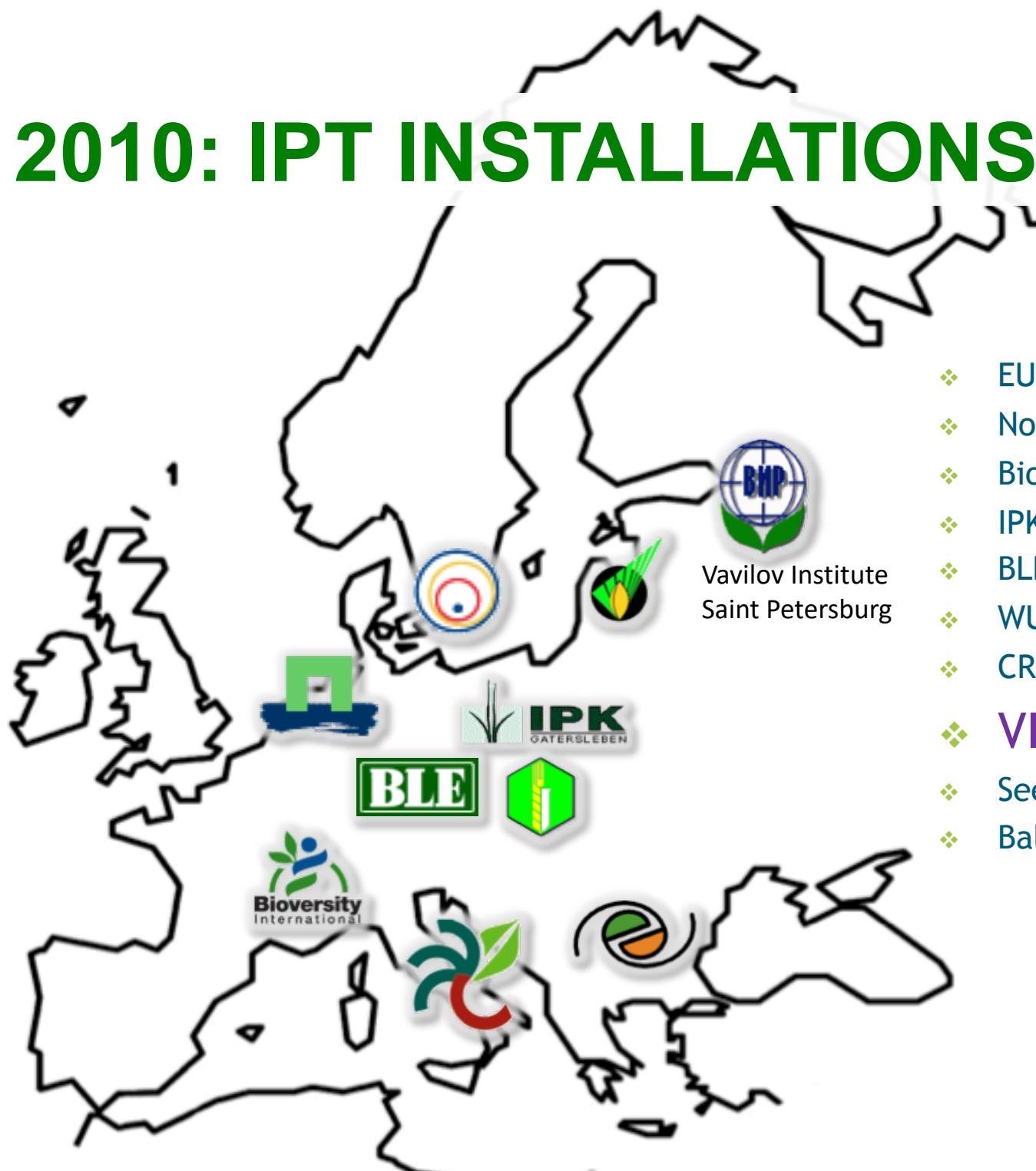


NUMBER OF DATA PUBLISHERS (BY COUNTRY)

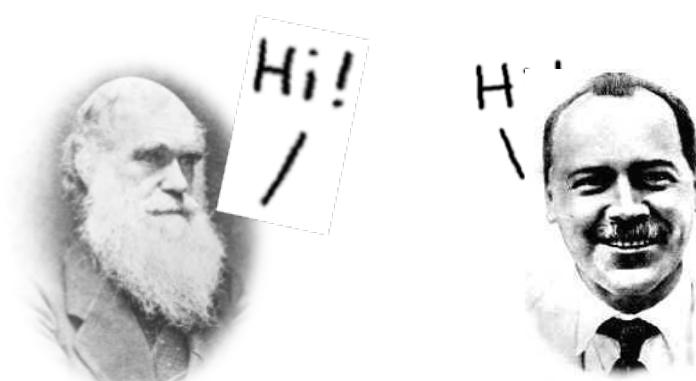


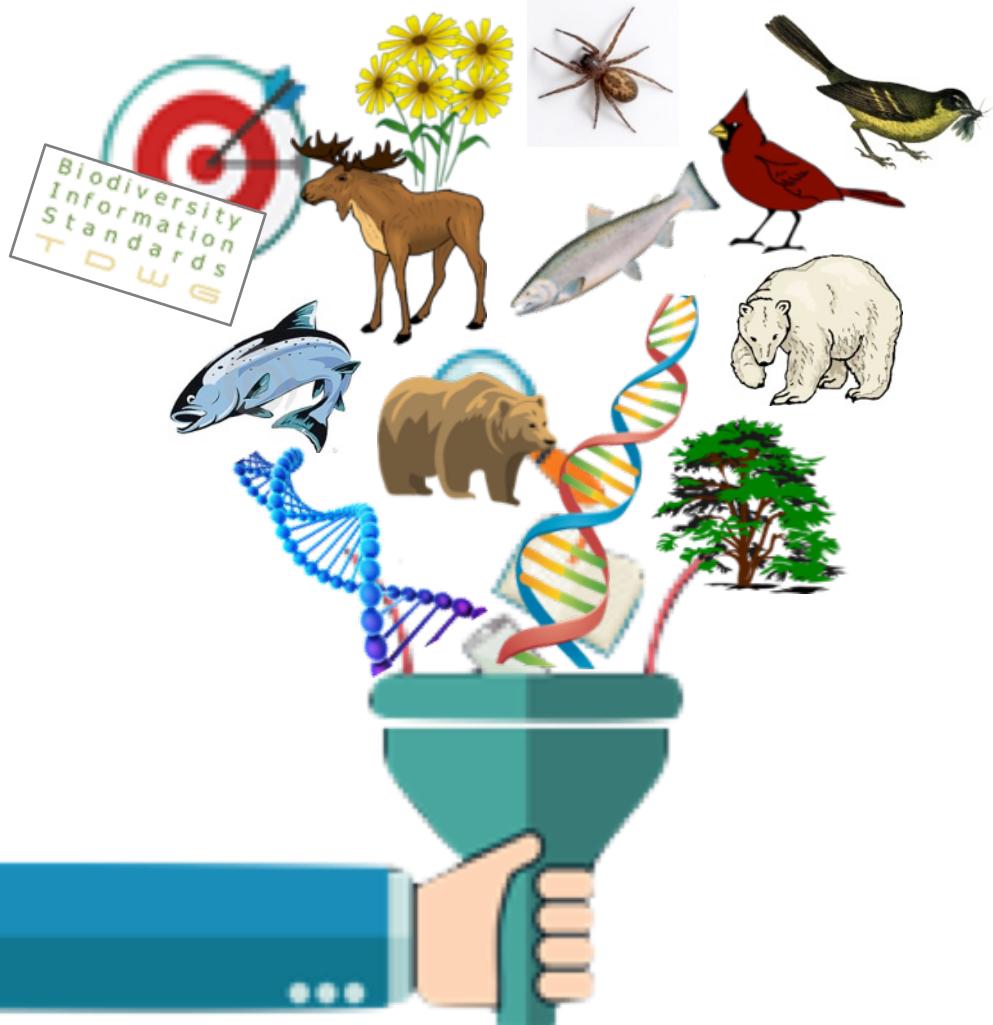
2010: IPT INSTALLATIONS FOR EURISCO

co-funded by GBIF



- ❖ EURISCO
- ❖ NordGen (Nordic countries)
- ❖ Bioversity-Montpellier (France)
- ❖ IPK Gatersleben (Germany)
- ❖ BLE (Germany)
- ❖ WUR CGN (The Netherlands)
- ❖ CRI (Czech Republic)
- ❖ VIR (Russian Federation)
- ❖ SeedNET (Balkan)
- ❖ Baltic (Estonia, Latvia, Lithuania)





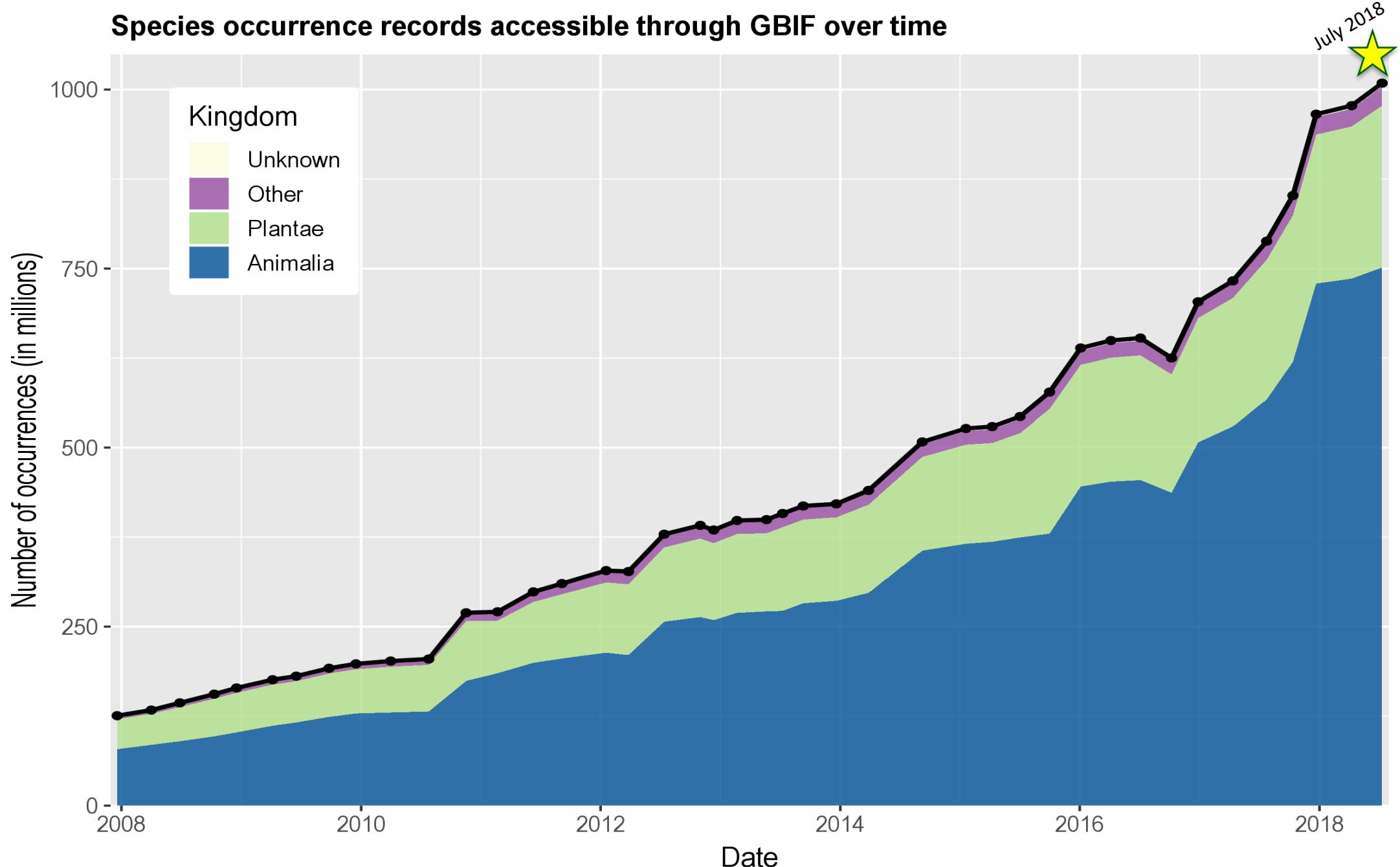
*If a tree falls in the forest, and
nobody deposit a sample in a
museum or a biobank, did it
really happen?*

Norwegian Barcode of Life - NorBOL

*Proposed: Norwegian Infrastructure for
Biodiversity Genomics (NIBIGEN)*

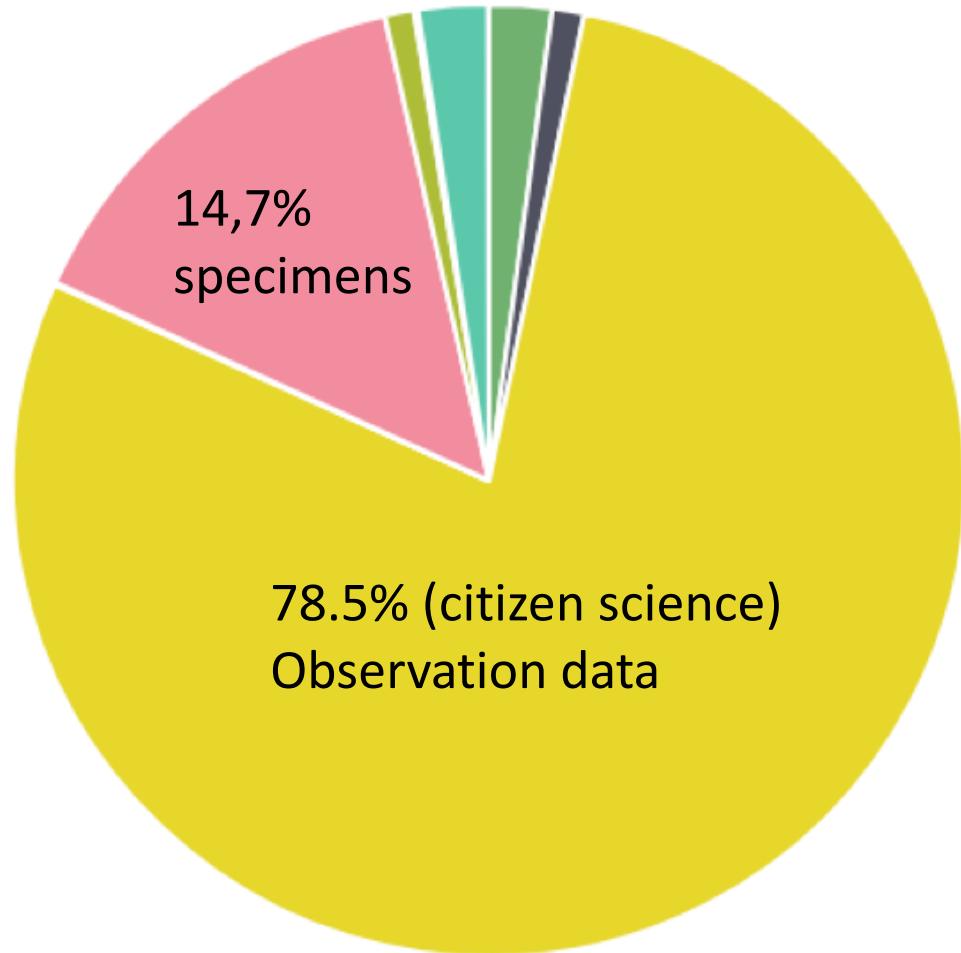
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University of Oslo

DATA PUBLISHED THROUGH GBIF.ORG



RAPID INCREASE IN GBIF OF (CITIZEN SCIENCE) OBSERVATION DATA

Data from natural history **specimens** has always been at the **core** of GBIF's work.



Observation	21,737,696
Machine observation	11,004,908
Human observation	799,310,001
<u>Material sample</u> (biobank-samples)	554,303
Literature	234,405
Preserved specimen	149,109,670
Fossil specimen	10,059,634
Living specimen	1,397,835
Unknown	24,239,469

- Observation
- Machine observation
- Human observation
- Material sample
- Literature
- Preserved specimen
- Fossil specimen
- Living specimen
- Unknown
- Other or unknown

NORWEGIAN BARCODE OF LIFE - NORBOL

- The Norwegian Barcode of Life (NorBOL) is a national network of research institutions for collaboration on DNA barcoding in Norway and a regional node in the International Barcode of Life Project (iBOL).
- Our goal is to barcode 20 000 species within 2018 and make all data available in the Barcode of Life Data Systems (BOLD).
- The steering group is smaller, contains representatives of the university museums of Oslo, Bergen, Tromsø and Trondheim as well as the larger research institutes.



TRAINING COURSE BY LAKE BAIKAL IN SIBERIA

DATA MOBILIZATION SKILLS: TRAINING ON MOBILIZING
BIODIVERSITY DATA USING **GBIF** AND **BOLD** TOOLS.



14-20 September 2018



17 students

- 6 Nordic
- 11 Russian

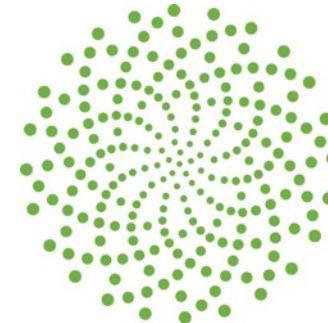


TRANSCRIPTION OF SPECIMEN LABELS



Photo: Smithsonian National Museum of Natural History, USNM-445024-Eutoxeres-aquila

DIGITIZED SPECIMENS (OSLO)



Fungi: 640 000



Insects: 3,4 mill



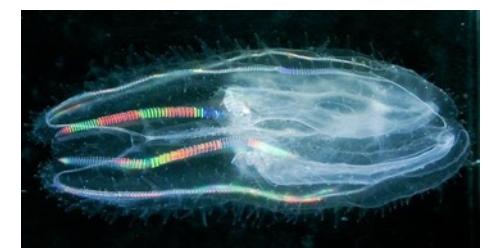
Vascular plants:
2,2 mill



Paleontology:
900 000



Invertebrates: 600 000



Catalog number: O-L-000014
Human-friendly

<http://purl.org/nhmuio/id/41d9cbb4-4590-4265-8079-ca44d46d27c3>
machine-friendly

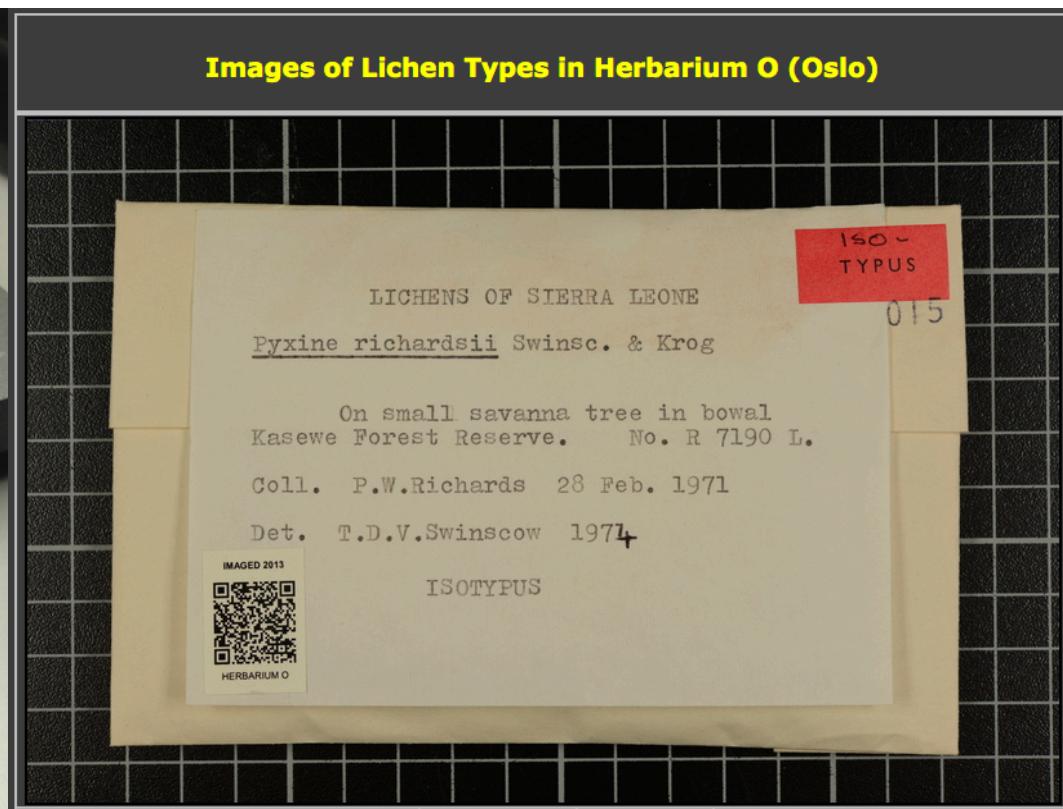
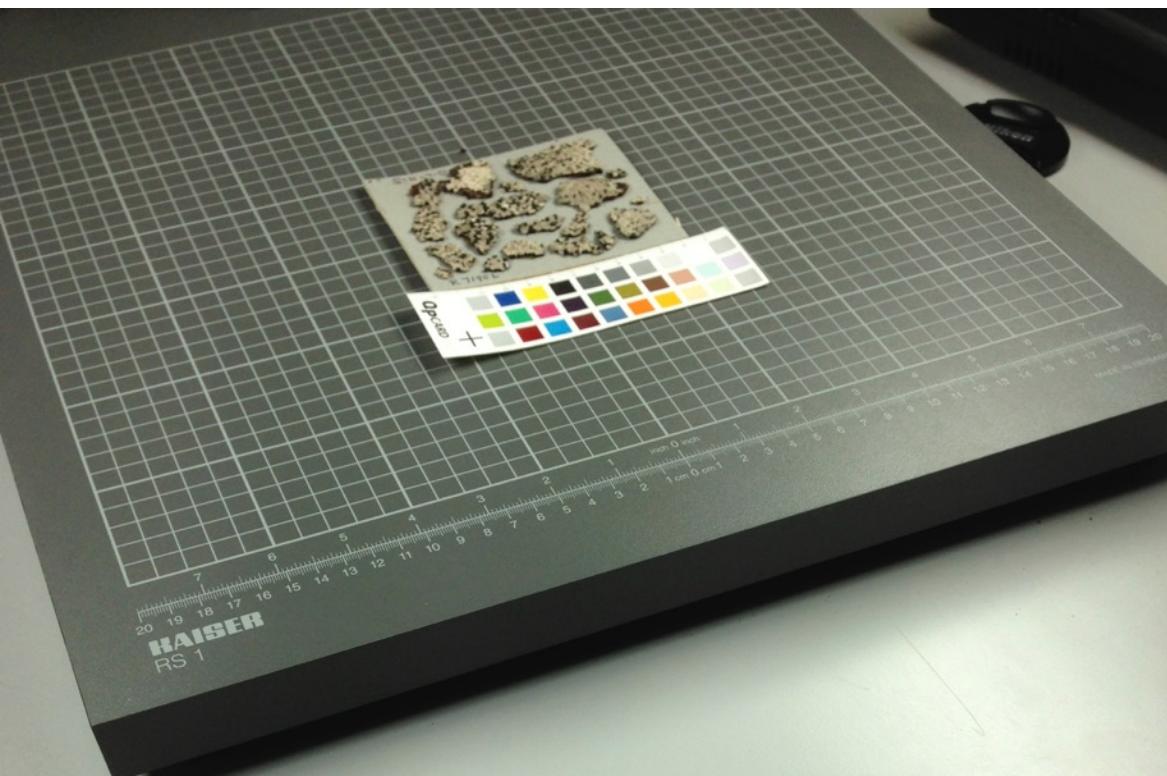
2013

GBIF.no



Photo: Curator Einar Timdal making images of type specimens in the NHM-Uo lichen herbarium in 2013 by Dag Endresen, CC-by.

Images of Lichen Types in Herbarium O (Oslo)



Pyxine richardsii Swinscow & Krog **ISOTYPE** **O-L-000015** [Click on image for full size \(36 MPx\)](#)

Protolog: Swinscow,TDV/Krog,H, *Norw. J. Bot.* **22:** 127 (1975)
Locality: SIERRA LEONE: bowal Kasewe Forest Reserve, 1971.02.28, Richards, P.W. R 7190 L
Currently accepted name: *Pyxine richardsii* Swinscow & Krog



2014-2015

Transcription at:

DigForsk
as
DATTERSLSKAP AV UNIRAND AS
HØTELIG AV UNIVERSITETET I OSLO

ca 15 terra byte images

Imaging at:

Digitarium



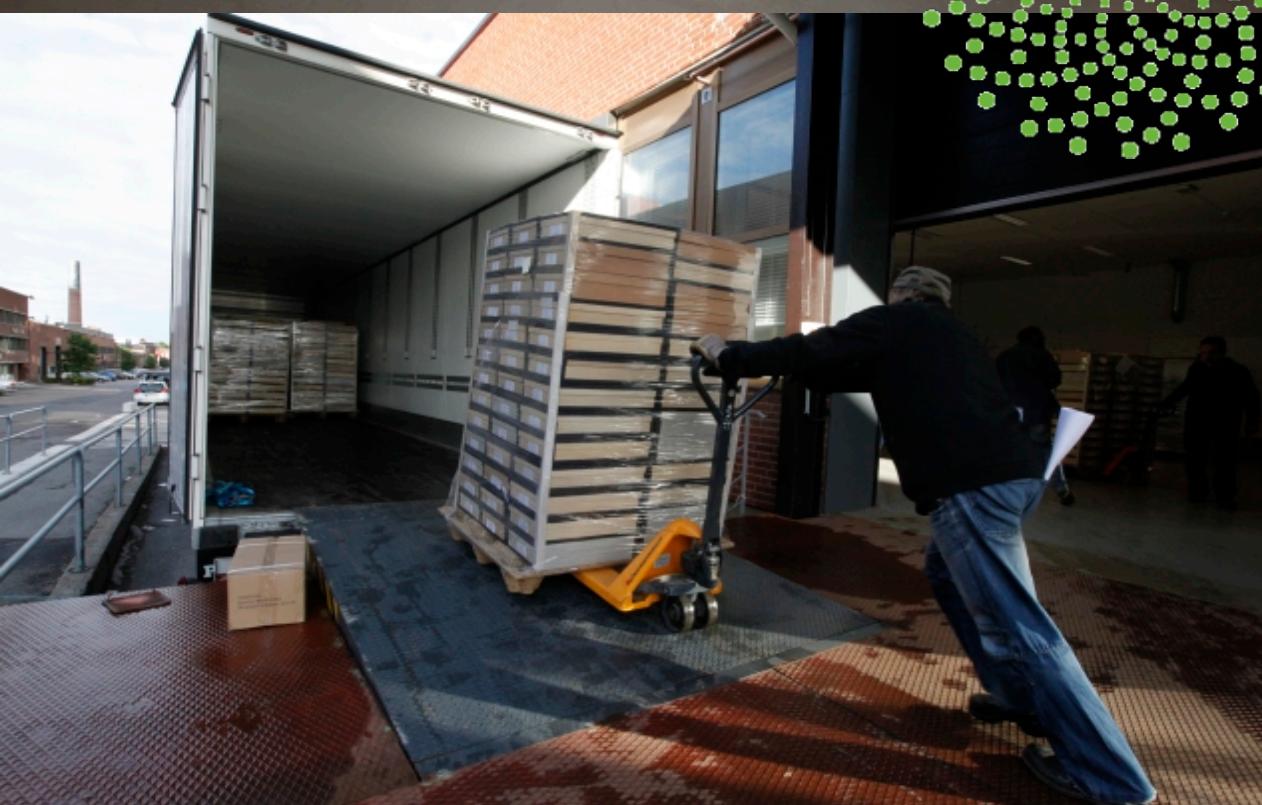
Packing of the herbarium in Oslo, Norway



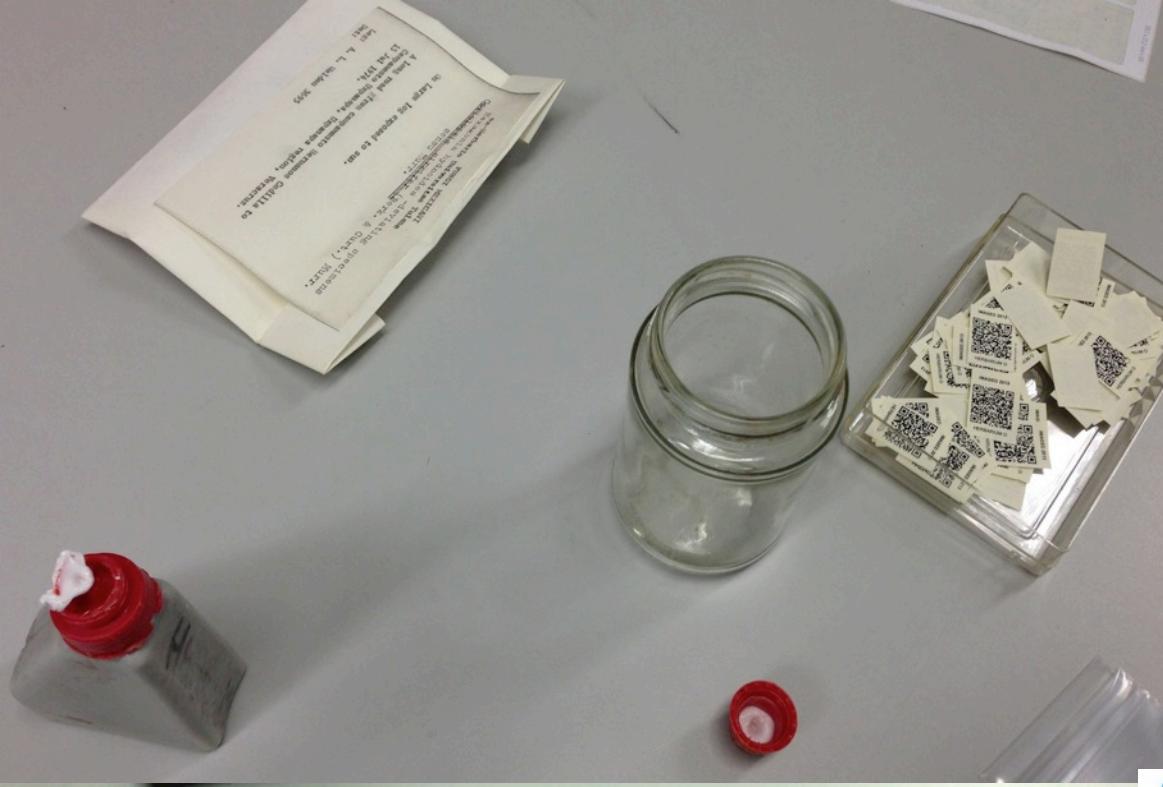
Photo: UiO-NHM-Oslo



Photo: Digitarium



Un-packing of the herbarium in Joensuu, Finland



<http://purl.org/nhmuio/id/41d9ccb4-4590-4265-8079-ca44d46d27c3>

(machine friendly)

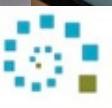
Catalog number: O-L-000014

(human friendly)



GBIF Norway



 Digitarium





WeDigBio

NHM Oslo

October 2017



Velkommen til dugnad!

Her kan du hjelpe oss med å transkribere etiketter fra norske naturhistoriske museumssamlinger. I første omgang blir det fokus på et lite utvalg karplanter fra Telemark fra samlingene til Naturhistorisk Museum i Oslo.

Du kan gjerne bruke dette verktøyet anonymt uten å registrere deg, men hvis du vil ha transkripsjoner og annoteringer attribuert til deg kan du [opprette en brukerprofil her](#).

Siste endringer

- 2017-10-31 Ny instruksjonsvideo (kartfesting)
- 2017-10-24 Prioritering av objekter uten koordinater (kartfesting)
- 2017-10-16 Støtte for instruksjonsvideoer
- 2017-10-15 Innloggede brukere kan revidere de 10 siste transkripsjonene sine

[Alle endringer](#)

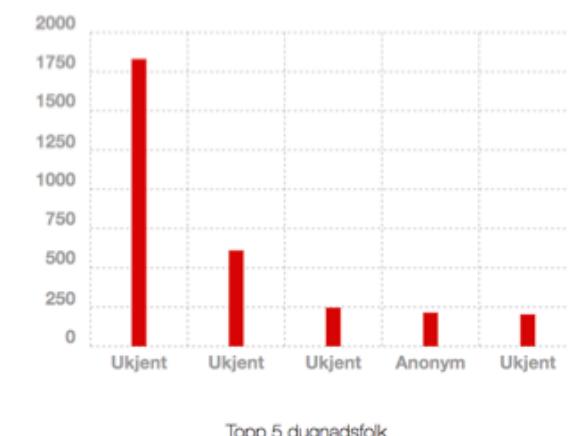
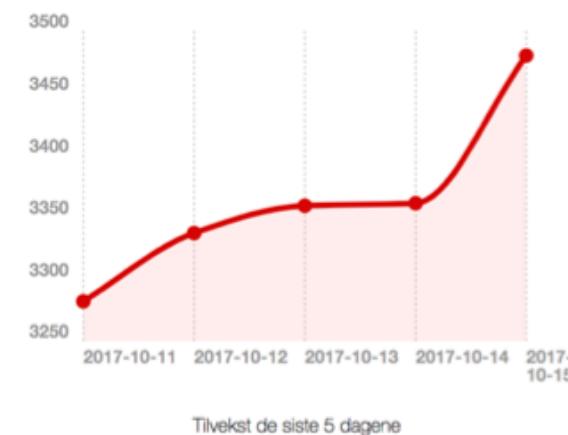
Kartfesting: Karplanter fra Telemark



Transkribering: Karplanter fra Telemark



Transkribering: Fossildugnad



Herb. Univers. Osloensis

Heterodermia diademata (Tayl.) Awas.

KENYA

Rift Valley Prov. Uasin Gishu Distr.

5 km NW of Timboroa summit, on
moist brush by lake, and fence posts.

0-04 N 35-32 E

2650 m

2/1973 2K19/ 138

Hildur Krog

TLC (..../..):

zeorin

afranorin

Hildur Krog 19.



O-L-185347

[Sign up or Sign in!](#)
(4 transcriptions)

Scientific name: *Heterodermia diademata* (Tayl.) Awas.

Country: Kenya

Province: Rift Valley Prov.

District: Uasin Gishu Distr.

Locality: 5 km NW of Timboroa summit,
on moist brush by lake, and
fence posts.

Habitat: moist brush by lake

Position: 0-04n 35-32e

Show map...

Elevation: 2650 m

Collector: Hildur Krog

Collector no: 2K19/138

Date: Day 2 1973

[Skip this record...](#) [Next record...](#)

Show help...



HERBARIU

O-L-185347

[Sign up or Sign in!](#)
(4 transcriptions)Scientific name: *Heterodermia diademata* (Tayl.) Awas.

Country: Kenya

Province: Rift Valley Prov.

District: Uasin Gishu Distr.

Locality: 5 km NW of Timbora summit,
on moist brush by lake, and
fence posts.

Habitat: moist brush by lake

Position: 0-04n 35-32e

[Hide map...](#)

Elevation: 2650 m

Collector: Hildur Krog

Collector no: 2K19/138

Date: Day 2 1973

[Skip this record...](#) [Next record...](#)[Show help...](#)

Herb. Univers. Osloensis

Heterodermia diademata (Tayl.) Awas.

KENYA

Rift Valley Prov. Uasin Gishu Distr.

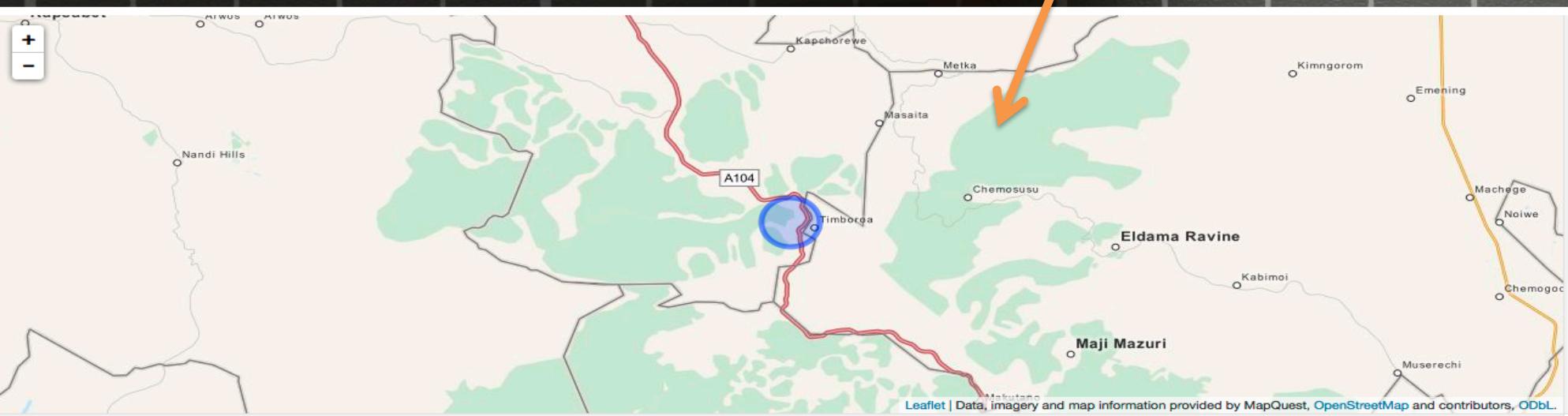
5 km NW of Timboroa summit, on
moist brush by lake, and fence posts.

0-04 N 35-32 E

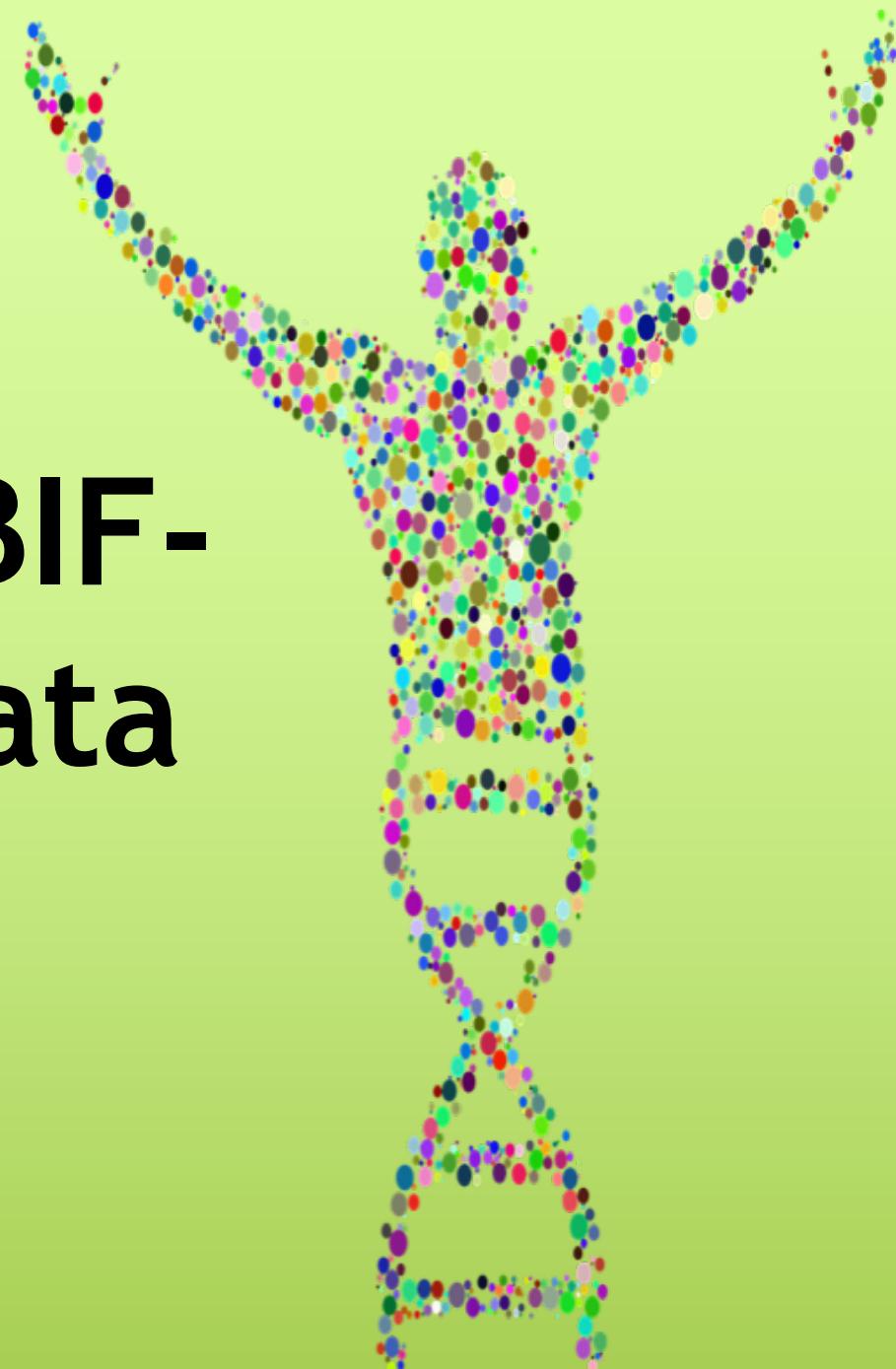
2650 m

2/1973 2K19/ 138

Hildur Krog

<http://gbif.no/transcribe>

Re-use of GBIF- mediated data





*If a tree falls in the forest and nobody reuses this information
in peer review validated research
— for what purpose did we then
publish the event in GBIF?*

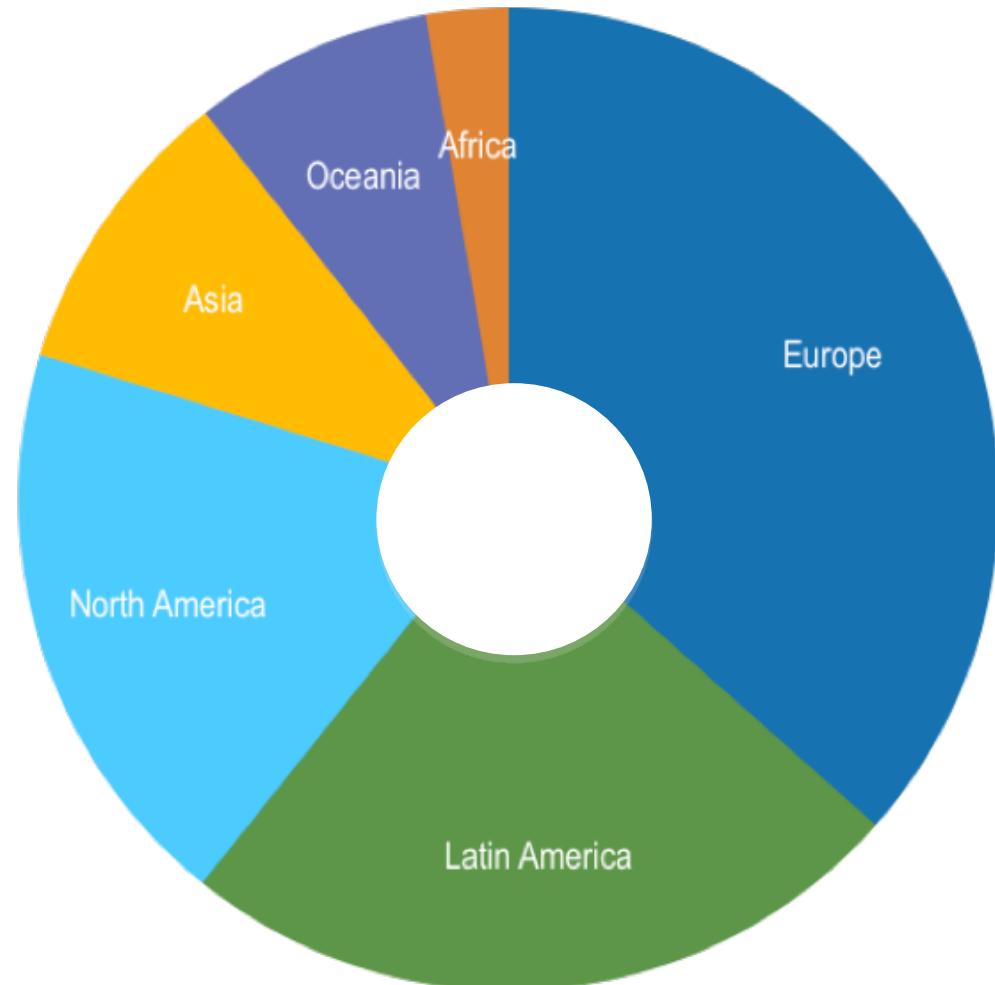


UiO : **Department of Biosciences**
University of Oslo

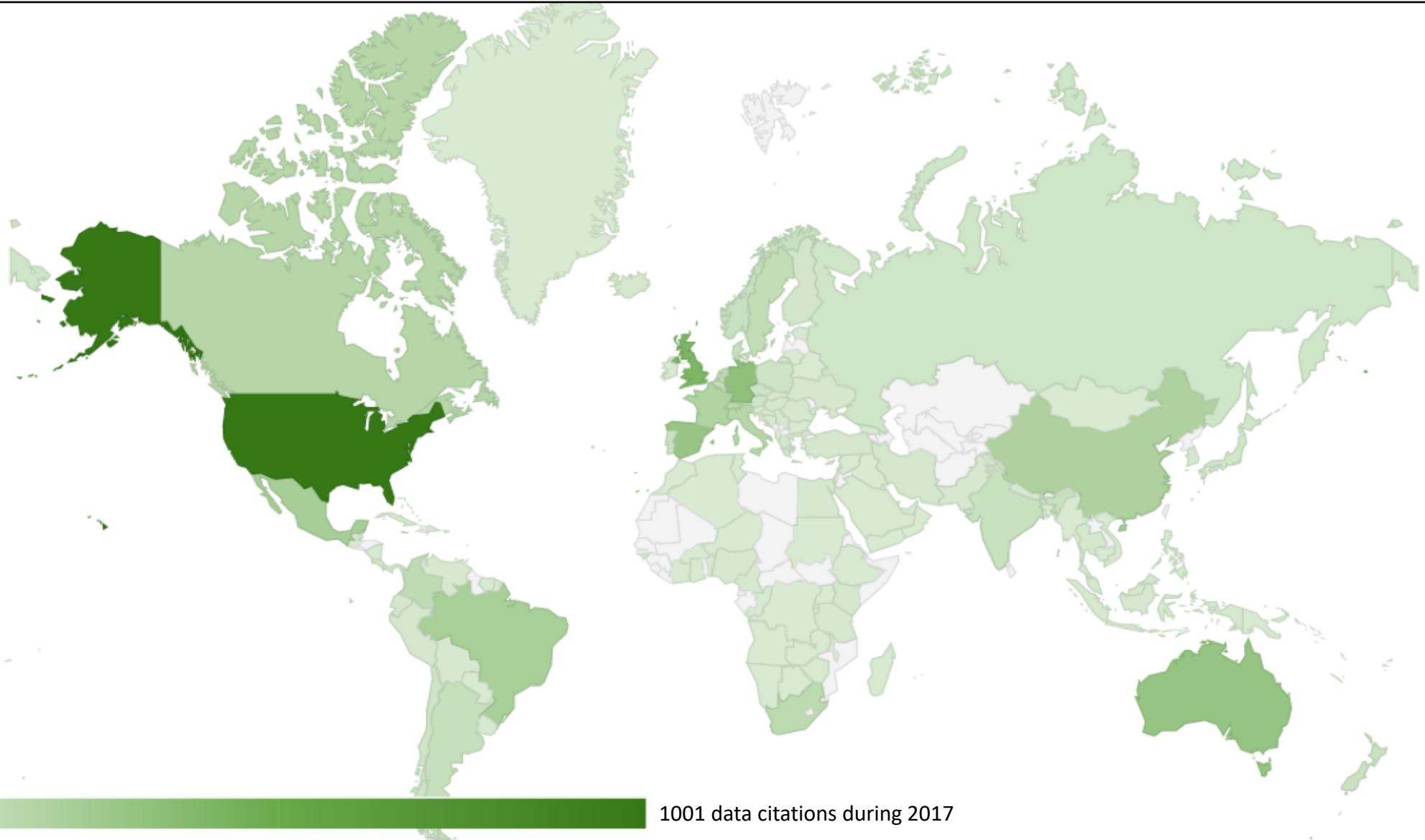
PEER-REVIEWED USES, BY COUNTRY AND REGION

STATUS 2018 (JAN-SEP)

Total # of peer-reviewed papers by country		
1	United States	212
2	Australia	73
3	United Kingdom	74
4	Mexico	73
5	Brazil	69
6	Spain	61
7	Germany	57
7	China	56
9	Canada	47
10	France	45
...	Norway	19
...	Russia	16

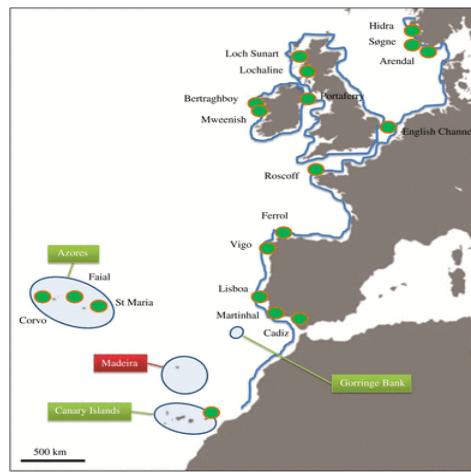


RESEARCH USE OF GBIF-MEDIATED DATA

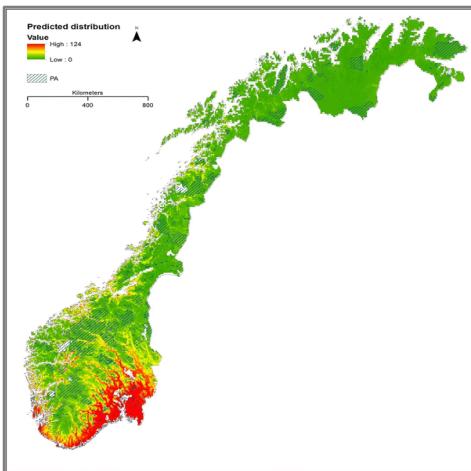


Number of papers citing use of GBIF as data source, per country of at least one author

FEATURED RESEARCH NORWAY



Almada et al. (2017) Map of sampling locations for *Labrus bergylta*



Phillips et al. (2016) predicted distribution of 187 priority CWR in Norway

Almada F, Francisco S, Lima C, FitzGerald R, Mirimin L, Villegas-Ríos D et al. (2017) Historical gene flow constraints in a northeastern Atlantic fish: phylogeography of the ballan wrasse *Labrus bergylta* across its distribution range. Royal Society Open Science 4(2) 160773. Author countries: Portugal, Ireland, Norway, Spain. Published 15 February 2017. [DOI:10.1098/rsos.160773](https://doi.org/10.1098/rsos.160773)

Chala D, Zimmermann N, Brochmann C, Bakkestuen V (2017) Migration corridors for alpine plants among the 'sky islands' of eastern Africa: do they, or did they exist? Alpine Botany 1-12. Author countries: Norway, Switzerland. First Online 08 February 2017. [doi:10.1007/s00035-017-0184-z](https://doi.org/10.1007/s00035-017-0184-z)

Solberg, SØ and Chou, YY (2017) Conservation of Indigenous Vegetables from a Hotspot in Tropical Asia: What Did We Learn from Vavilov? *Frontiers in Plant Science*. [doi:10.3389/fpls.2016.01982](https://doi.org/10.3389/fpls.2016.01982) Author country: Taiwan, (Norway). 108 787 species occurrence records used. Crop: Vegetables.

Phillips, J., Magos Brehm, J., van Oort, B., Asdal, Å., Rasmussen, M., & Maxted, N. (2017) Climate change and national crop wild relative conservation planning. Ambio 1-14. First Online 18 February 2017 [doi:10.1007/s13280-017-0905-y](https://doi.org/10.1007/s13280-017-0905-y) Author countries: UK, Norway

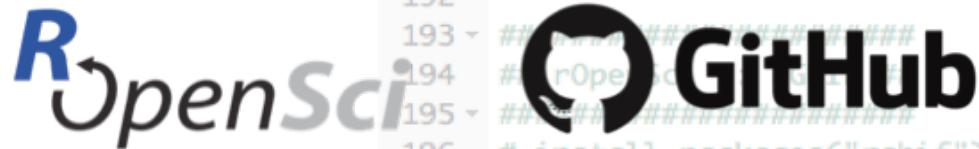
R. M. Araújo, J. Assis, R. Aguiar, L. Aioldi, I. Bárbara, I. Bartsch, T. Bekkby, H. Christie, D. Davoult, S. Derrien-Courtel, C. Fernandez, S. Fredriksen, F. Gevaert, H. Gundersen, A. Le Gal, L. Lévêque, N. Mieszkowska, K. M. Norderhaug, P. Oliveira, A. Puente, J. M. Rico, E. Rinde, H. Schubert, E. M. Strain, M. Valero, F. Viard, I. Sousa-Pinto (2016) Status, trends and drivers of kelp forests in Europe: an expert assessment. Biodiversity and Conservation 25(7) 1319-1348. [doi:10.1007/s10531-016-1141-7](https://doi.org/10.1007/s10531-016-1141-7) Author countries: Portugal, Spain, Italy, Germany, Norway, France, UK, Australia.

Speed J.D.M., Austrheim G. (2017) The importance of herbivore density and management as determinants of the distribution of rare plant species. Biological Conservation 205: 77–84. [doi:10.1016/j.biocon.2016.11.030](https://doi.org/10.1016/j.biocon.2016.11.030) Author country: Norway

Phillips J, Asdal Å, Brehm JM, Rasmussen M, and Maxted N (2016) *In situ* and *ex situ* diversity analysis of priority crop wild relatives in Norway. Diversity and distributions 22(11): 1112-1126. [doi:10.1111/ddi.12470](https://doi.org/10.1111/ddi.12470). Author countries: United Kingdom, Portugal, Norway. 382,605 occurrence data records used – [GBIF News Story](#)

The Norwegian GBIF node (GBIF.no) and the
ForBio Research School in Biosystematics
organized R training for the Nordic Oikos
conference in Trondheim in February 2018.

<http://www.gbif.no/events/2018/Nordic-Oikos-2018-R-workshop.html>



```
170  ##"Avenella flexuosa (L.) Drejer" has taxonKey=4149465
171  name_usage(key=4149465)$data$scientificName
172  name_usage(key=4149465)$data$accepted
173  name_usage(key=4149465)$data$acceptedKey
174  name_usage(key=4149465)$data$taxonomicStatus
175
176  r <- name_lookup("Deschampsia flexuosa")
177  r <- name_lookup("Deschampsia flexuosa (L.) Nees")
178
179  r <- name_lookup("Deschampsia flexuosa")
180  r <- name_lookup("Deschampsia flexuosa (L.) Trin.") //
181  r <- name_lookup("Deschampsia flexuosa (L.) Nees") //
182  r <- name_lookup("Avenella flexuosa (L.) Drejer") // t
183
184  r <- name_usage(key=2703179, data='synonyms')
185  r <- name_usage(key=2703179, data='synonyms')$data$key
186
187  #r$data$key
188
189  ?name_lookup
190  ?name_usage
191  ?name_usage
192
193  #####
194  # rOpenSci
195  #####
196  # install.packages("rgbif")
197  # require(rgbif) # interface to GBIF new API 2013
198  # http://cran.r-project.org/web/packages/rgbif/index.html
199  # See http://ropensci.org/tutorials/rgbif_tutorial_new
200  # See http://ropensci.org/tutorials/rgbif_tutorial.htm
201  # citation(package='rgbif') for the citation for this
```



Figure 3 The ELC map for Norway composed of 27 ELC zones each representing a unique combination of environmental variables. See Table S8 for average values in each zone. Zone 0 refers to those areas where information for some of the components making up the map is missing. Variables used to create map: altitude, northness, eastness, slope, precipitation seasonality, isothermality, topsoil organic content and topsoil pH. Created in CAPTOGEN using the ELC mapas tool. Cell size is equivalent to 10 km² at the equator. Map drawn to Geographic Coordinate System: WGS 1984.

Examples of use for
GBIF-mediated data

Predictive data analysis

using species occurrence data points from GBIF

Thormann, I.; Parra-Quijano, M.; **Endresen, D.T.F.**; Rubio-Teso, M.L.; Iriondo, J.M., & Maxted, N. (2014). *Predictive characterization of crop wild relatives and landraces: Technical guidelines version 1*. Bioversity International. [ISBN 978-92-9255-004-2](http://www.bioversityinternational.org/publications/predictive-characterization-crop-wild-relatives-and-landraces-technical-guidelines-version-1).

Examples of use for
GBIF-mediated data

CWR conservation

Development of a conservation plan for Crop Wild Relatives in Norway -- with extracted CWR species occurrence data from GBIF.

Phillips, J., Magos Brehm, J., van Oort, B. **Asdal, Å.**,
Rasmussen, M., Maxted, N. (2017) Climate change and national crop wild relative conservation planning. *Ambio*.
[DOI:10.1007/s13280-017-0905-y](https://doi.org/10.1007/s13280-017-0905-y)

Phillips, J., **Asdal, Å.**, Brehm, J.M., **Rasmussen M.**, Maxted, N. (2016) *In situ* and *ex situ* diversity analysis of priority crop wild relatives in Norway. *Diversity and Distributions*, 22, 1112–1126. [DOI: 10.1111/ddi.12470](https://doi.org/10.1111/ddi.12470)

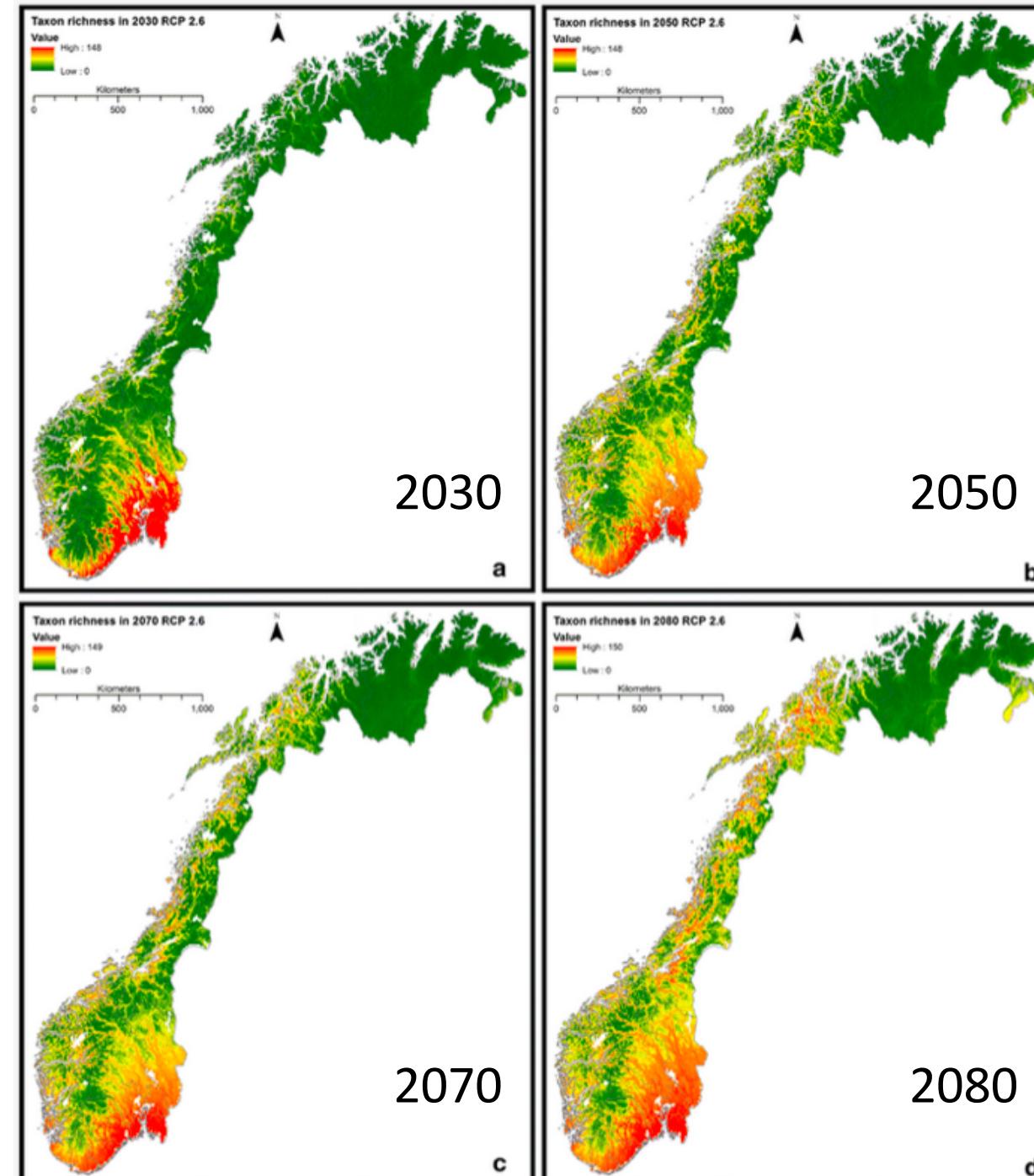


Figure. The average predicted taxon richness of 187 priority CWR in Norway under RCP 2.6 for the years **a** 2030, **b** 2050, **c** 2070, **d** 2080. Raster grid cell size 0.0416, approximately equal to $4 \times 8 \text{ km}^2$ (Phillips *et al.* 2017)

<http://www.gbif.org/newsroom/uses/2016-phillips-et-al>



CWR
Crop Wild Relatives

Nordic Crop Wild Relatives

ADD OBSERVATIONS

Recent observations [View all ▾](#)
[Grid](#) [List](#)

Most Observed Species

	Timothy 7 observations
	Sea kale 3 observations
	Woodland Strawberry 1 observation
	Red Clover 1 observation
	Common Hop 1 observation

Data Quality Assessment

Quality grade: [Research](#) [Details](#)

Add your own observations to this [Nordic CWR group in iNaturalist](#)

Observations peer-review validated by other amateur naturalists are published in GBIF

<http://www.inaturalist.org/projects/nordic-crop-wild-relatives>

Nordic Crop Wild Relative (CWR) Check...

Checklist dataset published by Nordic Genetic Resource Center (NORDGEN)

1,893 | 3,326

Species Taxa

[View species](#)

Information

Stats

Checklist Metrics

KINGDOMS

Taxa within GBIF backbone kingdoms.



● Plantae 3,106

RANKS

Number of accepted taxa by ranks.



- order 41
- family 103
- genus 429
- section 28
- species 1,893
- subspecies 483
- variety 238
- form 7

INTERPRETATION ISSUES

Issues flagged during GBIF processing.



- Backbone match none 220
- Rank invalid 104

Checklist Overlap

GBIF BACKBONE

Percentage of name usages also found in the [GBIF Backbone](#).



93%

CATALOGUE OF LIFE

Percentage of name usages also found in the [Catalogue of Life](#).



78%

Names

There are 0 [synonyms](#) in this dataset.

UNIQUE NAMES

There are 3,326 unique names in this dataset. On average 0% of the names are found in more than one taxon.

Vernacular Name Languages

Swedish



1951

Norwegian Bokmål

Norwegian Nynorsk

Finnish

Danish

Extension Data

There are 3,326 records in the checklist. For each extension type, the total number of extension records are illustrated as the average coverage per taxon.



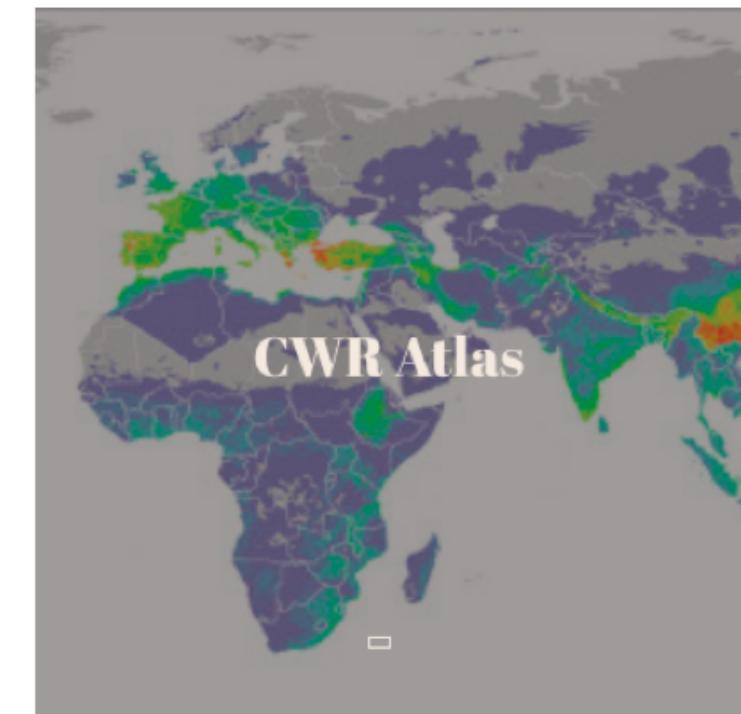
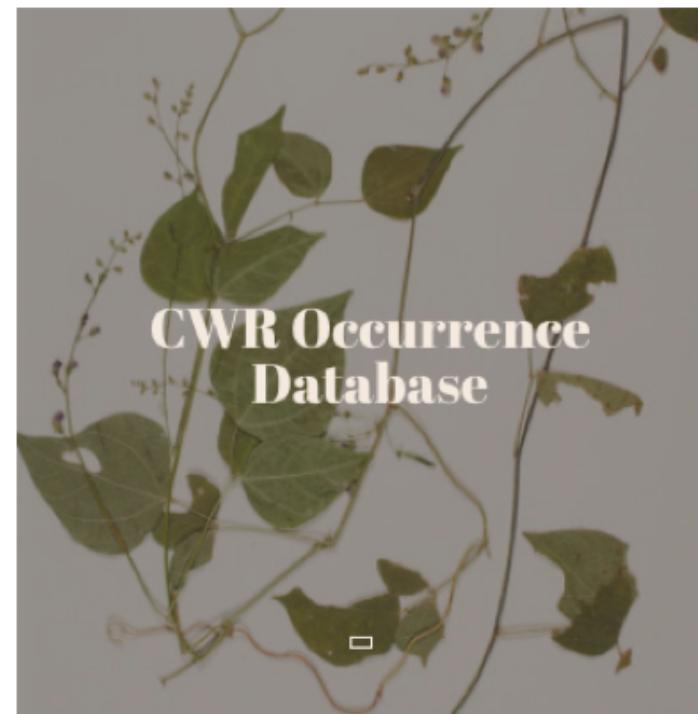
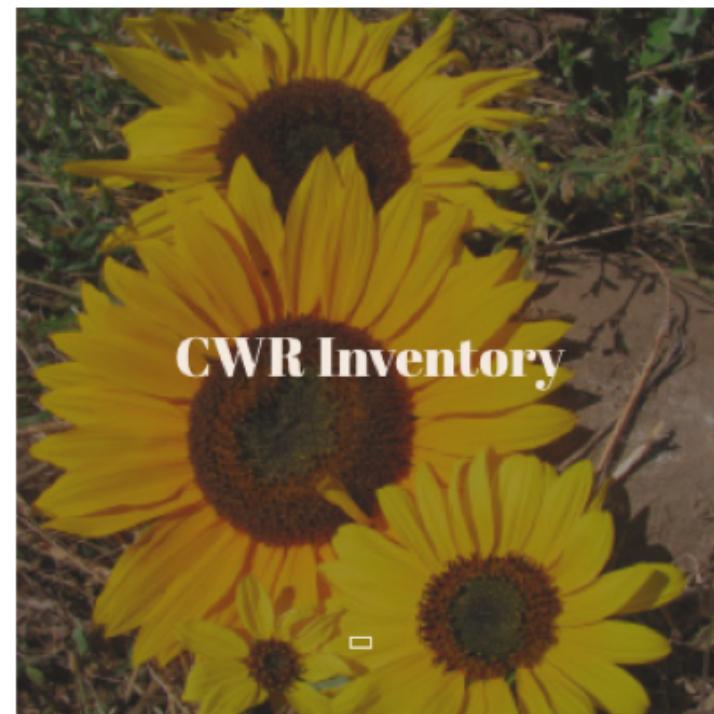
Vernacular Names
11,348



The Nordic Crop Wild Relative (CWR) checklist is published in GBIF

[doi:10.15468/itkype](https://doi.org/10.15468/itkype)

Nordic CWR conservation priorities are developed using GBIF-mediated data.





OCCURRENCE DATASET | 22 FEBRUARY 2017

A global database for the distributions of crop wild relatives

Humberto Sotelo • GBIF Norway Helpdesk • Nora Patricia Castañeda-Alvarez • Dag Endresen

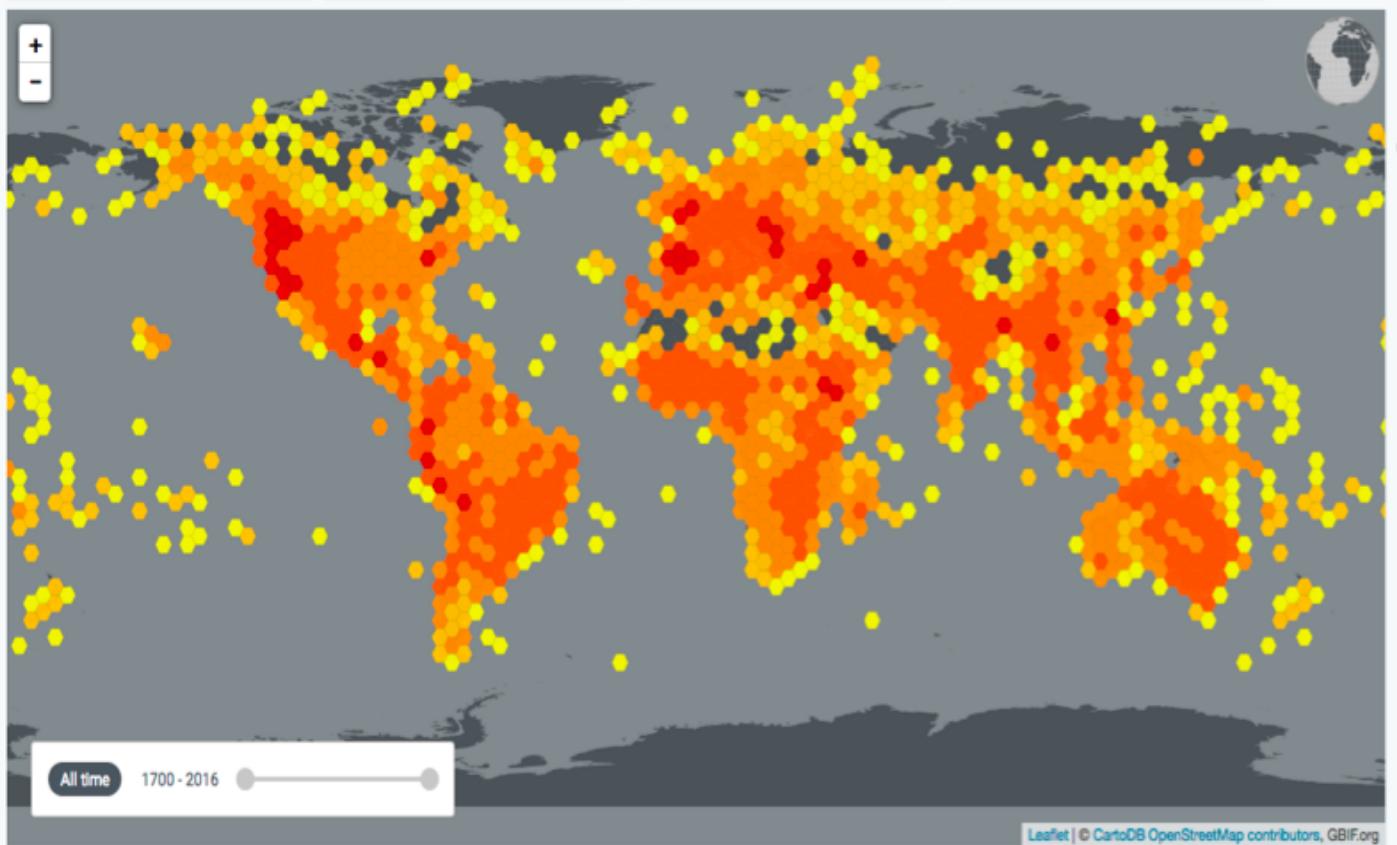
DATASET TAXONOMY ORIGIN METRICS

[DOWNLOAD](#) EXPLORE

This dataset originally held 5 647 442 total records, where 34% of the records corresponded to germplasm accessions and 66% to herbarium samples. A total of 3 231 286 records had cross-checked coordinates (see Figure 2).... [more](#)

Publisher: Centro Internacional de Agricultura Tropical (CIAT)

License: CC BY 4.0

[Citation](#) [DOI](#) 10.15468/jyrthk3,403,811
occurrences36%
With coordinates34%
With year99.9%
With taxon match

The Global Crop Wild Relative Occurrence Database include data from hundreds of data sources – including GBIF

The CWR Database is again published in GBIF
(*excluding the data records originating from GBIF*)

[DOI: 10.15468/jyrthk](#)

Vincent *et al.* (2013). A prioritized crop wild relative inventory to help underpin global food security.
doi:10.1016/j.biocon.2013.08.011

