NusratNoor_A03_DataExploration

Nusrat Noor

Fall 2023

OVERVIEW

This exercise accompanies the lessons in Environmental Data Analytics on Data Exploration.

Directions

1. Rename this file `<FirstLast>_A03_DataExploration.Rmd` (replacing `<FirstLast>` with your first and last name).
2. Change "Student Name" on line 3 (above) with your name.
3. Work through the steps, **creating code and output** that fulfill each instruction.
4. Assign a useful **name to each code chunk** and include ample **comments** with your code.
5. Be sure to **answer the questions** in this assignment document.
6. When you have completed the assignment, **Knit** the text and code into a single PDF file.
7. After Knitting, submit the completed exercise (PDF file) to the dropbox in Sakai.

TIP: If your code extends past the page when knit, tidy your code by manually inserting line breaks.

TIP: If your code fails to knit, check that no `install.packages()` or `View()` commands exist in your code.

Set up your R session

1. Check your working directory, load necessary packages (tidyverse, lubridate), and upload two datasets: the ECOTOX neonicotinoid dataset (ECOTOX_Neonicotinoids_Insects_raw.csv) and the Niwot Ridge NEON dataset for litter and woody debris (NEON_NIWO_Litter_massdata_2018-08_raw.csv). Name these datasets "Neonics" and "Litter", respectively. Be sure to include the subcommand to read strings in as factors.

```
getwd() #checked current directory, in the EDE_Fall2023 folder
```

```
## [1] "/home/guest/R/EDE_Fall2023"
```

```
library(lubridate) #loaded lubridate
library(tidyverse) #loaded tidyverse packages

Neonics <- read.csv("./Data/Raw/ECOTOX_Neonicotinoids_Insects_raw.csv",
                    stringsAsFactors = TRUE)
#uploaded the ecotox neonics data, and named it Neonics in one command and
#set the read strings in as factors subcommand

Litter <- read.csv("./Data/Raw/NEON_NIWO_Litter_massdata_2018-08_raw.csv",
                   stringsAsFactors = TRUE)
#uploaded the litter data and named it and set string to read as factors in one command
```

Learn about your system

2. The neonicotinoid dataset was collected from the Environmental Protection Agency's ECOTOX Knowledgebase, a database for ecotoxicology research. Neonicotinoids are a class of insecticides used widely in agriculture. The dataset that has been pulled includes all studies published on insects. Why might we be interested in the ecotoxicology of neonicotinoids on insects? Feel free to do a brief internet search if you feel you need more background information.

   Answer: It's important to get an understanding on the impact of neonicotinoids on insects since they can be such an important part of ecosystem health. These insecticides are targetting them and so looking at all the research on insects can help to show how insects in areas with neonicotinoid usage differ from those in areas without and compare any potential differences over time. We want to be able to know exactly in what ways the insecticides are impacting the insects to then make more informed management decisions.

3. The Niwot Ridge litter and woody debris dataset was collected from the National Ecological Observatory Network, which collectively includes 81 aquatic and terrestrial sites across 20 ecoclimatic domains. 32 of these sites sample forest litter and woody debris, and we will focus on the Niwot Ridge long-term ecological research (LTER) station in Colorado. Why might we be interested in studying litter and woody debris that falls to the ground in forests? Feel free to do a brief internet search if you feel you need more background information.

   Answer: We would want to do this as a result of the increase in forest fires due to the accumulaiton of debris. This is something that is having huge impacts on people and environments and we need to better understand what is happening and the factors surrounding it (how quickly leaf litter is falling and accumulaing) to make more informed management decisions.

4. How is litter and woody debris sampled as part of the NEON network? Read the NEON_Litterfall_UserGuide.pdf document to learn more. List three pieces of salient information about the sampling methods here:

   Answer: 1."Litter is defined as material that is dropped from the forest canopy and has a buttt end diameter <2cm and a length <50cm" (Jones K., 2017) 2.All of tthe samples were taking in terrestrial sitets with woody vegetation of at least 2meters tall and the size of the plots depended on available place, plot spacing, and/or tower airshed sizes. (Jones K., 2017) 3. The placements of the traps in each plot were either targeted or randomized depending on the vegetation. (Jones K., 2017)

Obtain basic summaries of your data (Neonics)

5. What are the dimensions of the dataset?

```
dim(Neonics) #ran the dimensions function, it showed that there are 4623 rows and 30 columns
```

```
## [1] 4623   30
```

6. Using the `summary` function on the "Effect" column, determine the most common effects that are studied. Why might these effects specifically be of interest?

```
summary(Neonics$Effect) #ran summary function of the effects column using the $ sign
```

```
##     Accumulation        Avoidance         Behavior     Biochemistry
##               12              102              360               11
##          Cell(s)      Development        Enzyme(s) Feeding behavior
##                9              136               62              255
##         Genetics           Growth        Histology       Hormone(s)
##               82               38                5                1
##    Immunological     Intoxication       Morphology        Mortality
##               16               12               22             1493
##       Physiology       Population     Reproduction
```

```
##                 7              1803               197
```

Answer: These effects are important to know exactly what kind of impacts the insecticides are having on insects and which impacts are more prevalent/more often occuring and needs a closer look at.

7. Using the `summary` function, determine the six most commonly studied species in the dataset (common name). What do these species have in common, and why might they be of interest over other insects? Feel free to do a brief internet search for more information if needed.[TIP: The `sort()` command can sort the output of the summary command. . .]

```
species_name_summary <- summary(Neonics$Species.Common.Name) #got the counts for each
#species studied in the dataset
species_name_summary #called out the summary
```

```
##                          Honey Bee                     Parasitic Wasp
##                                667                                285
##               Buff Tailed Bumblebee                 Carniolan Honey Bee
##                                183                                152
##                          Bumble Bee                   Italian Honeybee
##                                140                                113
##                     Japanese Beetle                  Asian Lady Beetle
##                                 94                                 76
##                     Euonymus Scale                           Wireworm
##                                 75                                 69
##                  European Dark Bee                  Minute Pirate Bug
##                                 66                                 62
##                Asian Citrus Psyllid                     Parastic Wasp
##                                 60                                 58
##              Colorado Potato Beetle                   Parasitoid Wasp
##                                 57                                 51
##                Erythrina Gall Wasp                     Beetle Order
##                                 49                                 47
##         Snout Beetle Family, Weevil           Sevenspotted Lady Beetle
##                                 47                                 46
##                     True Bug Order               Buff-tailed Bumblebee
##                                 45                                 39
##                      Aphid Family                    Cabbage Looper
##                                 38                                 38
##                Sweetpotato Whitefly                    Braconid Wasp
##                                 37                                 33
##                     Cotton Aphid                    Predatory Mite
##                                 33                                 33
##              Ladybird Beetle Family                       Parasitoid
##                                 30                                 30
##                     Scarab Beetle                    Spring Tiphia
##                                 29                                 29
##                      Thrip Order                 Ground Beetle Family
##                                 29                                 27
##                  Rove Beetle Family                    Tobacco Aphid
##                                 27                                 27
##                     Chalcid Wasp               Convergent Lady Beetle
##                                 25                                 25
##                     Stingless Bee                  Spider/Mite Class
##                                 25                                 24
##                Tobacco Flea Beetle                   Citrus Leafminer
```

```
##                              24                              23
##                  Ladybird Beetle                     Mason Bee
##                              23                              22
##                        Mosquito                 Argentine Ant
##                              22                              21
##                          Beetle       Flatheaded Appletree Borer
##                              21                              20
##              Horned Oak Gall Wasp              Leaf Beetle Family
##                              20                              20
##                 Potato Leafhopper       Tooth-necked Fungus Beetle
##                              20                              20
##                     Codling Moth        Black-spotted Lady Beetle
##                              19                              18
##                     Calico Scale             Fairyfly Parasitoid
##                              18                              18
##                      Lady Beetle          Minute Parasitic Wasps
##                              18                              18
##                        Mirid Bug               Mulberry Pyralid
##                              18                              18
##                         Silkworm                 Vedalia Beetle
##                              18                              18
##             Araneoid Spider Order                     Bee Order
##                              17                              17
##                   Egg Parasitoid                  Insect Class
##                              17                              17
##          Moth And Butterfly Order     Oystershell Scale Parasitoid
##                              17                              17
## Hemlock Woolly Adelgid Lady Beetle       Hemlock Wooly Adelgid
##                              16                              16
##                            Mite                   Onion Thrip
##                              16                              16
##             Western Flower Thrips                  Corn Earworm
##                              15                              14
##                 Green Peach Aphid                     House Fly
##                              14                              14
##                        Ox Beetle            Red Scale Parasite
##                              14                              14
##               Spined Soldier Bug          Armoured Scale Family
##                              14                              13
##                Diamondback Moth                  Eulophid Wasp
##                              13                              13
##                Monarch Butterfly                  Predatory Bug
##                              13                              13
##             Yellow Fever Mosquito           Braconid Parasitoid
##                              13                              12
##                     Common Thrip     Eastern Subterranean Termite
##                              12                              12
##                           Jassid                    Mite Order
##                              12                              12
##                        Pea Aphid               Pond Wolf Spider
##                              12                              12
##          Spotless Ladybird Beetle          Glasshouse Potato Wasp
##                              11                              10
##                         Lacewing          Southern House Mosquito
```

```
##                                10                                10
##            Two Spotted Lady Beetle                        Ant Family
##                                10                                 9
##                       Apple Maggot                           (Other)
##                                 9                               670
```

```
sorted_species <- sort(species_name_summary, decreasing = TRUE)
#sorted the value counts by  decreasing counts
sorted_species #called out the object to make sure it did sort it correctly
```

```
##                            (Other)                        Honey Bee
##                                670                              667
##                     Parasitic Wasp              Buff Tailed Bumblebee
##                                285                              183
##                 Carniolan Honey Bee                      Bumble Bee
##                                152                              140
##                    Italian Honeybee                  Japanese Beetle
##                                113                               94
##                  Asian Lady Beetle                   Euonymus Scale
##                                 76                               75
##                           Wireworm                 European Dark Bee
##                                 69                               66
##                  Minute Pirate Bug               Asian Citrus Psyllid
##                                 62                               60
##                      Parastic Wasp             Colorado Potato Beetle
##                                 58                               57
##                    Parasitoid Wasp                Erythrina Gall Wasp
##                                 51                               49
##                       Beetle Order        Snout Beetle Family, Weevil
##                                 47                               47
##            Sevenspotted Lady Beetle                    True Bug Order
##                                 46                               45
##               Buff-tailed Bumblebee                      Aphid Family
##                                 39                               38
##                     Cabbage Looper                Sweetpotato Whitefly
##                                 38                               37
##                     Braconid Wasp                     Cotton Aphid
##                                 33                               33
##                     Predatory Mite             Ladybird Beetle Family
##                                 33                               30
##                        Parasitoid                     Scarab Beetle
##                                 30                               29
##                     Spring Tiphia                      Thrip Order
##                                 29                               29
##                Ground Beetle Family                Rove Beetle Family
##                                 27                               27
##                     Tobacco Aphid                     Chalcid Wasp
##                                 27                               25
##              Convergent Lady Beetle                    Stingless Bee
##                                 25                               25
##                  Spider/Mite Class                Tobacco Flea Beetle
##                                 24                               24
##                  Citrus Leafminer                   Ladybird Beetle
##                                 23                               23
##                         Mason Bee                         Mosquito
```

```
##                              22                              22
##                  Argentine Ant                         Beetle
##                              21                              21
##       Flatheaded Appletree Borer             Horned Oak Gall Wasp
##                              20                              20
##              Leaf Beetle Family                Potato Leafhopper
##                              20                              20
##       Tooth-necked Fungus Beetle                    Codling Moth
##                              20                              19
##        Black-spotted Lady Beetle                    Calico Scale
##                              18                              18
##             Fairyfly Parasitoid                     Lady Beetle
##                              18                              18
##           Minute Parasitic Wasps                       Mirid Bug
##                              18                              18
##                Mulberry Pyralid                        Silkworm
##                              18                              18
##                  Vedalia Beetle            Araneoid Spider Order
##                              18                              17
##                      Bee Order                   Egg Parasitoid
##                              17                              17
##                   Insect Class          Moth And Butterfly Order
##                              17                              17
##      Oystershell Scale Parasitoid Hemlock Woolly Adelgid Lady Beetle
##                              17                              16
##            Hemlock Wooly Adelgid                            Mite
##                              16                              16
##                    Onion Thrip             Western Flower Thrips
##                              16                              15
##                   Corn Earworm                Green Peach Aphid
##                              14                              14
##                       House Fly                        Ox Beetle
##                              14                              14
##              Red Scale Parasite                Spined Soldier Bug
##                              14                              14
##            Armoured Scale Family                 Diamondback Moth
##                              13                              13
##                  Eulophid Wasp                 Monarch Butterfly
##                              13                              13
##                  Predatory Bug             Yellow Fever Mosquito
##                              13                              13
##              Braconid Parasitoid                      Common Thrip
##                              12                              12
##      Eastern Subterranean Termite                           Jassid
##                              12                              12
##                     Mite Order                         Pea Aphid
##                              12                              12
##                Pond Wolf Spider          Spotless Ladybird Beetle
##                              12                              11
##           Glasshouse Potato Wasp                        Lacewing
##                              10                              10
##           Southern House Mosquito           Two Spotted Lady Beetle
##                              10                              10
##                      Ant Family                      Apple Maggot
```

```
##                                 9                                 9
```

```
top_six <- head(sorted_species, 6)
#asked to show the top 6 species names studied from the descending list,
#making them the most studied
top_six #called out the top six
```

```
##               (Other)             Honey Bee        Parasitic Wasp
##                   670                   667                   285
## Buff Tailed Bumblebee   Carniolan Honey Bee            Bumble Bee
##                   183                   152                   140
```

Answer: They are all very important to ecosystem health and provide a lot of services. They are all also not the target species for pesticides so them being impacted by the pesticides is an unwanted and very dangerous impact.

8. Concentrations are always a numeric value. What is the class of `Conc.1..Author.` column in the dataset, and why is it not numeric?

```
class(Neonics$Conc.1..Author.)
```

```
## [1] "factor"
```

```
#checked the class of the conc.1..author and it was factor class
```

Answer: The Conc.1..Author column's class is factor because not all the fields only have numbers in them, some say "NR" which can only be there if the class is categorical i.e. a factor

Explore your data graphically (Neonics)

9. Using `geom_freqpoly`, generate a plot of the number of studies conducted by publication year.

```
Publication_Year <- Neonics$Publication.Year #set publication year as vector
Publication_Year # called back publication year
```

```
##    [1] 1982 1982 1986 1986 1986 1986 1986 1986 1986 1986 1986 1986 1982 1982
##   [15] 1982 1982 1982 1982 2013 2013 2014 2014 2012 2012 2012 2012 2012 2012
##   [29] 2017 2017 2015 2015 2015 2015 2008 2019 2019 2019 2019 2019 2019 2019
##   [43] 2019 2019 2019 1992 1992 1992 1992 2004 2014 2014 2011 1992 1992 2003
##   [57] 2003 2011 2011 2003 2016 2016 2016 2003 2003 2003 2003 2003 2003 2011
##   [71] 2008 2008 2008 2008 2010 2010 2010 2010 2010 2010 2010 2010 2014 2002
##   [85] 2002 2002 2014 2006 2006 2015 2015 2017 2017 2008 2008 2008 2008 2008
##   [99] 2008 2008 2008 2008 2008 2008 2008 2003 2003 2008 2006 2006 2017 2017
##  [113] 2017 2017 2017 2017 2015 2006 2014 2006 2004 2006 2006 2004 2004 2012
##  [127] 2012 2012 2012 2009 2006 2015 2015 2017 2017 2014 2006 2017 2017 2013
##  [141] 2013 2014 2014 2012 2012 2012 2012 2012 2012 2006 2006 2006 2006 2006
##  [155] 2006 2006 2014 2014 2014 2015 2014 2014 2008 2017 2017 2011 2012 2012
##  [169] 2011 2004 2004 2004 2008 2014 2011 2011 2011 2011 2008 2008 2007 2008
##  [183] 2008 2008 2008 2008 2015 2012 2012 2011 2011 2011 2011 2015 2015 1992
##  [197] 1992 2004 2013 2015 2013 2011 2015 2015 2015 2015 2009 2008 2008 2008
##  [211] 2008 2008 2008 2008 2015 2008 2008 2009 2009 2015 2009 2008 2008 2008
##  [225] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
##  [239] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
##  [253] 2008 2008 2008 2008 2008 2008 1992 1992 2009 2009 2008 2015 2008 2015
##  [267] 2015 2014 2011 2011 2015 2016 2016 2016 2017 2012 2012 2005 2005 2005
##  [281] 2004 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2012 2012 2008 2008
##  [295] 2008 2008 1992 1992 1992 1992 2014 2014 2014 2014 2014 2014 2011 2004
##  [309] 2006 2005 2005 2014 2012 2012 2014 2014 2012 2012 2005 2004 2011 2011
```

```
##  [323] 2005 2006 2006 2006 2006 2016 2011 2012 2017 2017 2014 2014 2007 2007
##  [337] 2006 2005 2005 2006 2005 2005 2012 2007 2006 2017 2017 2017 2017 2017
##  [351] 2017 2012 2012 2007 2016 2016 2016 2016 2015 2015 2015 2015 2015 2014
##  [365] 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2005 2005 2005 2005
##  [379] 2005 2007 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003
##  [393] 2003 2003 2003 2003 2003 2003 2003 2005 2005 2005 2005 2014 2005 2006
##  [407] 2004 2011 2006 2015 2015 2015 2015 2004 2015 2015 2006 2006 2006 2006
##  [421] 2006 2006 2006 2006 2006 2006 2006 2006 2006 2006 2006 2005 2005 2006
##  [435] 2004 2004 2015 2015 2005 2005 2005 2005 2007 2007 2007 2007 2007 2007
##  [449] 2007 2011 2010 2010 2005 2016 2005 2016 2005 2015 2015 2015 2007 2007
##  [463] 2005 2014 2012 2012 2014 2014 2014 2005 2005 2013 2013 2013 2006 2010
##  [477] 2010 2007 2007 2007 2007 2007 2007 2007 2015 2015 2015 2015 2006 2006
##  [491] 2006 2006 2006 2006 2006 2005 2005 2017 2017 2006 2005 2005 2001 2017
##  [505] 2017 2005 2005 2005 2001 2005 2005 2012 2012 2013 2013 2013 2018 2013
##  [519] 2004 2004 2004 2004 2018 2014 2014 2012 2012 2012 2013 2012 2012 2018
##  [533] 2012 2017 2017 2017 2015 2015 2017 2006 2006 2006 2006 2017 2017 2017
##  [547] 2017 2017 2017 2006 2015 2006 2006 2012 2012 2012 2012 2012 2012 2012
##  [561] 2012 2012 2012 2012 2012 2012 2012 2011 2011 2011 2011 2011 2011 2005
##  [575] 2005 2006 2005 2005 1998 1998 1998 2007 2001 1992 1992 2001 2001 2010
##  [589] 2010 2010 2010 2003 2003 2003 2010 2010 2014 2009 2009 2009 2009 2014
##  [603] 2014 2010 2006 2006 2006 2006 2006 1998 2015 2010 2006 2006 2006 2006
##  [617] 2006 2006 2015 2015 2015 2006 2013 2013 2015 2009 2015 2011 2011 2016
##  [631] 2016 1998 2001 2001 2014 2014 1995 1995 2008 2008 2008 2008 2008 2008
##  [645] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
##  [659] 2008 2008 2008 2017 2017 2000 2000 2000 2005 2005 2005 2015 2015 2012
##  [673] 2012 2012 2012 2008 2008 2008 2010 2010 2010 2010 2010 2010 2010 2010
##  [687] 2010 2010 2008 1993 2007 2007 2003 2003 2004 2004 2004 2004 2004 2004
##  [701] 2004 2003 2004 2004 2004 2004 2015 2015 2015 2015 1996 2012 2012 2012
##  [715] 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2008 2008 2008 1998
##  [729] 2008 1996 1996 1993 1993 1993 1993 1993 1993 2012 1996 1996 2016 2016
##  [743] 2016 1993 1993 1993 1999 1993 1993 1993 1993 1993 1993 1993 1993 1999
##  [757] 1993 1993 1993 1999 2016 2016 2013 2013 2013 2013 2014 2013 2010 2010
##  [771] 2010 2003 2006 2006 2006 2006 2006 2006 2006 2000 1995 1999 1999 2008
##  [785] 2008 2015 2015 1993 2000 2000 2000 1995 1993 2000 1993 2000 2008 2008
##  [799] 2008 2001 2001 2001 2001 2001 2001 2001 2001 2001 2014 2011 2008 2008 2008
##  [813] 2014 2014 2014 2014 2014 2014 2014 2014 2005 2013 2017 1992 1992 1992
##  [827] 1992 1992 2003 2003 2003 2003 2003 2001 2003 2003 2001 2003 2003 2001
##  [841] 2003 2001 2003 2001 2003 2003 2003 2004 2013 2013 2013 2014 2014 2017
##  [855] 2017 2012 2013 2003 2003 2003 2003 2003 1997 2014 2013 2013 2001 2018
##  [869] 2012 2012 2012 2010 2010 2010 2013 2011 2011 2004 2010 2010 2010 2005
##  [883] 2010 1997 2002 2008 2001 2001 2014 2015 2014 2014 2014 2008 2012 2014
##  [897] 2012 2012 2012 2001 2014 2002 2012 2014 2012 2010 2001 2017 2012 2013
##  [911] 2012 2003 2003 2014 2014 2014 2012 2005 2004 2004 2004 2008 2008 2008
##  [925] 2001 2001 2014 2013 2014 2014 2014 2014 2012 2013 2013 2014 2014 2014
##  [939] 2014 2003 2003 2003 2003 2003 2003 2004 1997 1997 2012 2012 2012 2012
##  [953] 2010 2010 2010 2013 2001 2001 2001 2001 2014 2014 2014 2014 2014 2014
##  [967] 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2010
##  [981] 2010 2003 2008 2012 2010 2014 2015 2018 2018 2018 2014 1997 2001 2014
##  [995] 2014 2014 2014 2014 2014 2015 2014 2014 2014 2014 2014 2014 2012 2014
## [1009] 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014
## [1023] 2014 2014 2014 2014 2010 2010 2012 2014 2014 2001 2012 2012 2014 2012
## [1037] 2012 2014 2012 2014 2014 1992 1992 1992 1992 2003 2004 2003 2005 2003
## [1051] 2008 2012 2010 2012 2001 2018 1997 2014 2014 2010 2010 2010 2012 2014
## [1065] 2012 2013 2012 2014 2014 2012 2012 2014 2014 2014 2014 2014 2012 2012
```

```
## [1079] 1996 2010 2004 2004 2004 2008 2008 2008 2008 2008 2008 2001 2014 2015
## [1093] 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2012 2012 2012
## [1107] 2013 2012 2012 2012 2012 2012 2010 2012 2013 2014 2001 2012 2012 2012
## [1121] 2012 2012 2010 2014 2014 2015 2001 2001 2001 2001 2001 2001 2001 2001
## [1135] 2001 2001 2001 2016 2011 2010 2010 2010 2010 2010 2010 2010 2010 2016
## [1149] 2012 2012 2012 2016 2016 2012 2012 2012 2012 2012 2012 2012 2012 2012
## [1163] 2017 2009 2009 2009 2009 2009 2009 2016 2011 2010 2010 2010 2010 2012
## [1177] 2012 2012 2012 2012 2012 2001 2009 2009 2009 2012 2012 2012 2012 2012
## [1191] 2012 2012 2012 2012 2012 2012 2012 2009 2009 2009 2009 2009 2010 2010
## [1205] 2010 2010 2012 2010 2010 2010 2010 2009 2012 2012 2011 2009 2000 2000
## [1219] 2000 2000 2010 2010 2010 2010 2010 2010 2010 2010 2010 2013 2013 2013
## [1233] 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2004 2012 2012 2012
## [1247] 2012 2012 2012 2003 2012 2012 2012 2012 2012 2012 2003 2003 2003 2012
## [1261] 2012 2012 2012 2013 2013 2013 2013 2013 2013 2013 2013 2000 2000 2000
## [1275] 2000 2000 2000 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [1289] 2013 2013 2013 2013 2013 2013 2013 2005 2013 2013 2013 2013 2013 2013
## [1303] 2013 2013 2013 2013 2013 2013 2013 2005 2005 2013 2013 2013 2013 2013
## [1317] 2013 2013 2013 2013 2013 2013 2013 2013 2004 2004 2004 2001 2004 2006
## [1331] 2014 1998 1998 2012 2012 2012 2012 2009 2009 2009 2009 2005 2012 2012
## [1345] 2012 2015 2015 1999 1999 2009 2012 2005 2005 2005 2014 2014 1999 1999
## [1359] 1995 1995 2007 2007 2007 2011 2011 2011 1992 1997 1997 1997 1997 1996
## [1373] 1996 2006 2006 1994 2010 1994 1994 1995 2012 2012 2012 2012 2005 2005
## [1387] 1994 2008 2008 2008 2008 2009 2014 2014 2014 2010 2014 2014 2014 2014
## [1401] 2014 2014 2002 2014 2014 2010 2014 2014 2002 2014 2014 2014 2014 2014
## [1415] 2014 2002 2002 2014 2014 2014 2014 2014 2014 2014 2014 2002 2014 2014
## [1429] 2014 2014 2014 2002 2014 2014 2014 2014 2014 2014 2014 2014 2002 2002
## [1443] 2002 2002 2002 2002 2002 2010 2010 2014 2010 2010 2010 2010 2003 2003
## [1457] 2003 2010 2010 2010 2014 2014 2014 2014 2014 2012 2012 2012 2012 2012
## [1471] 2012 2013 2012 2015 2014 2015 2015 2012 2014 2014 2000 2013 2014 2014
## [1485] 2005 2005 2000 2012 2012 2012 2014 2014 2014 2014 2014 2014 2014 2014
## [1499] 2014 2014 2012 2012 2012 2012 2014 2014 2000 2012 2000 2012 2010 2010
## [1513] 2010 2010 2001 2012 2012 2012 2012 2010 2011 2000 2012 2000 2015 2010
## [1527] 2010 2010 2012 2012 2012 2012 2012 2012 2012 2012 2012 2010 2012 2012
## [1541] 2013 2014 2010 2010 2012 2012 2012 2001 2014 2014 2014 2014 2014 2014
## [1555] 2014 2014 2014 2014 2014 2014 2014 2012 2012 2012 2014 2014 2014 2014
## [1569] 2014 2015 2012 2012 2014 2012 2012 2012 2012 2012 2012 2010 2012 2000
## [1583] 2014 2006 2006 2006 2010 2010 2011 2010 2010 2010 2010 2013 2013 2013
## [1597] 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [1611] 2013 2013 2013 2013 2013 2013 1999 1999 1999 1999 1999 1999 1999 1999
## [1625] 2011 2011 2011 2011 2012 2012 2012 2012 2012 2012 2012 2012 2013 2013
## [1639] 2013 2013 2013 2013 1998 2003 2000 2000 2000 2000 2000 2000 2000 2000
## [1653] 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2000 2009 2009
## [1667] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2005 2009 1999 1999
## [1681] 2009 2009 2009 2009 2009 2009 2009 2009 2005 2005 2000 2011 2011 2011
## [1695] 1998 2005 2005 2000 2009 2012 1998 2010 2010 2010 2010 2010 2010 2010
## [1709] 2010 2006 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [1723] 2009 2009 2009 2009 2009 2009 2009 2009 2014 2005 2014 2012 2012 2012
## [1737] 2012 2014 2002 2006 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014
## [1751] 2014 2014 2014 2014 2014 2014 2014 2014 2014 2016 2016 2014 2014 2014
## [1765] 2014 2006 2001 2001 2001 2001 2001 2001 2001 2001 2014 2014 2014 2014
## [1779] 2014 2014 2014 2014 2014 2014 2015 2015 2012 2012 2012 2012 2012 2001
## [1793] 2001 2001 2001 2001 2001 2001 2001 2012 2012 2008 2008 2001 2001 2001
## [1807] 2001 2001 2001 2001 2001 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [1821] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
```

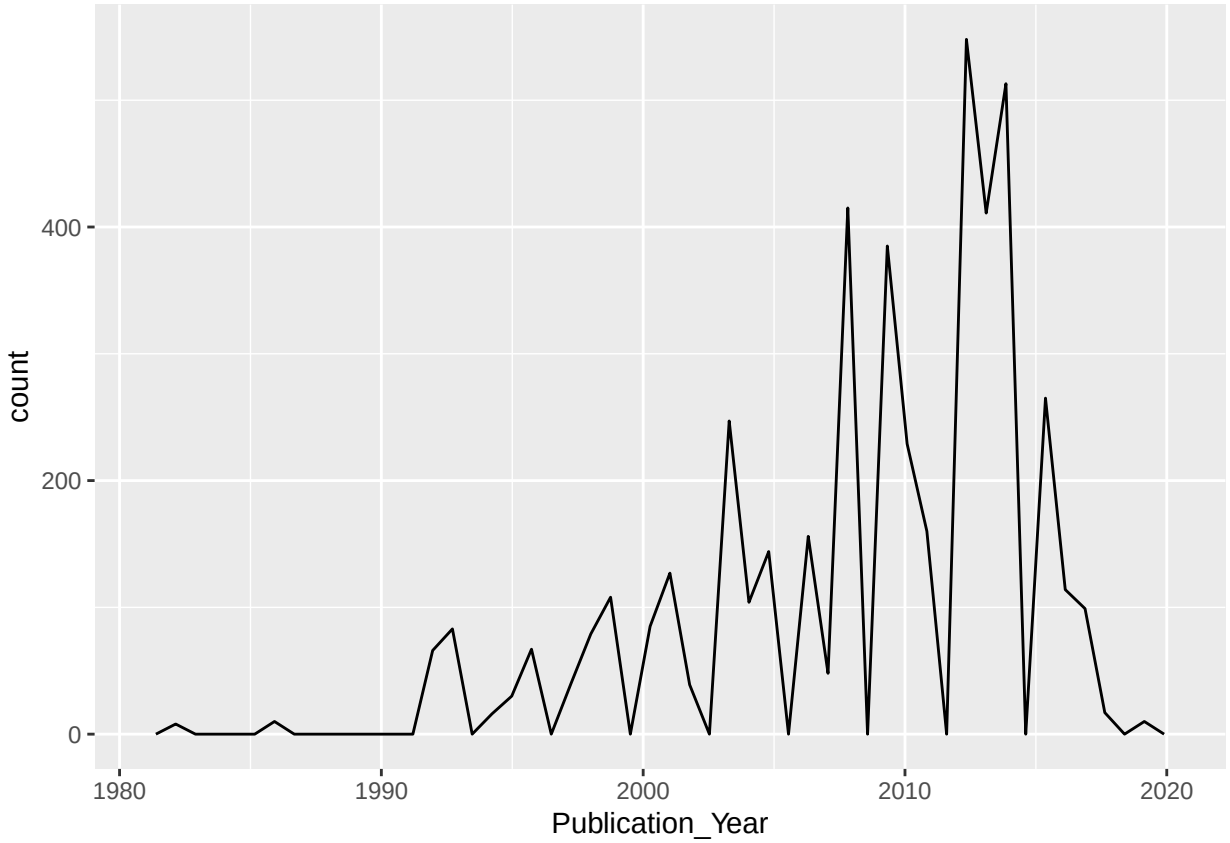
```
## [1835] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [1849] 2009 2009 2009 2009 1995 2001 1995 2001 2008 2008 2008 1998 1998 1996
## [1863] 1996 1996 1998 1998 2000 2000 1999 2015 2016 2015 2013 2013 2009 2009
## [1877] 2009 2013 2013 2013 2013 2013 2009 2009 2009 2009 2009 2009 2009 2009
## [1891] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2017 2017 2002 2002 2002
## [1905] 2002 2002 2003 2003 1998 2000 2000 1998 1998 2001 2001 2001 2001 2000
## [1919] 2000 2003 2004 2000 2000 2004 2004 2004 2004 2004 2004 2004 2004 1996
## [1933] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [1947] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [1961] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [1975] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [1989] 2008 2008 2008 2008 1998 2009 2009 2009 2007 1993 1993 1993 1993 1993
## [2003] 1993 1996 1998 1998 1995 1995 2009 2009 2009 2009 2009 2009 1996 1995
## [2017] 2014 2014 2003 2003 2011 2017 2017 2012 2012 2012 2012 2011 2012 2012
## [2031] 2011 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012
## [2045] 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012
## [2059] 2012 2012 2017 2017 2017 2017 2016 2016 2016 1998 1996 1999 1998 1998
## [2073] 1998 1999 1999 1999 1995 1995 1996 1996 1998 1999 1999 1999 1998 1998
## [2087] 1992 2011 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [2101] 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [2115] 2013 2013 2013 2013 2013 2013 2005 2013 2013 2013 2013 2013 2013 2013
## [2129] 2008 1998 1998 1998 2004 1995 1999 1999 1995 2009 2009 2000 2012 2012
## [2143] 2012 2012 1992 2005 2005 1999 1999 1999 1999 1999 1999 2011 2005 2014
## [2157] 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014
## [2171] 2014 2014 2014 2000 2011 2007 2009 2009 2009 2009 2009 2009 2009 2009
## [2185] 2009 2009 2009 2009 2009 2009 2000 2003 2003 2003 2003 2003 2003 2003
## [2199] 2016 2016 2002 2002 2003 2003 2003 2001 2001 2001 2001 2001 2001 2001
## [2213] 2001 2016 2016 2002 2002 2003 2003 2003 2003 2003 2003 2003 2002 2003
## [2227] 2003 2014 2005 1997 1997 1997 2005 2005 1999 2009 2009 2009 2009 2009
## [2241] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [2255] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [2269] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 1996 1996
## [2283] 1996 1996 2001 2014 1996 2001 2001 2001 2001 2001 2001 2001 2008 2008
## [2297] 2008 2008 2008 2008 2008 2008 2008 2008 1999 1999 2007 2007 2012 1995
## [2311] 1995 2016 2016 2013 2009 2009 2014 2008 2008 2008 2008 2008 2008 2008
## [2325] 2008 1992 1992 2007 2007 2007 2007 2007 2007 2008 2012 2011 2012 2012
## [2339] 2012 2012 2012 2012 1999 1999 2014 2014 2014 2010 2010 2010 2010 2010
## [2353] 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010
## [2367] 2015 2007 1996 1996 1996 1996 2015 2015 2012 2012 2012 1997 1998 1998
## [2381] 1993 1993 2009 1999 2001 2001 2001 1994 1994 1998 1999 1999 1993 1993
## [2395] 1998 1992 1993 1998 1997 1992 1999 1992 1994 1998 1998 1994 1995 1995
## [2409] 1999 1999 1999 1994 1996 1996 2006 1996 1996 1996 1996 1996 2001 2001
## [2423] 2001 2001 2001 1996 1996 1996 1996 1996 1996 1996 2001 2008 2008 2008
## [2437] 2008 2008 2008 2008 2016 2004 2008 2016 2004 2008 2016 2004 2016 2004
## [2451] 2008 2000 2000 2000 2002 1996 1996 2000 2000 2000 2009 1997 1998 1992
## [2465] 2009 2009 1992 1992 1999 1999 2015 2015 2015 2015 2015 2015 2015 2015
## [2479] 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012
## [2493] 2012 2012 2012 2012 2012 2012 2012 2012 1999 1999 1999 1999 2012 2012
## [2507] 2012 2012 2012 2012 1996 2010 2010 2010 2015 1998 1999 1999 1999 1998
## [2521] 1995 1995 1998 1996 1998 1999 1996 1999 1996 1998 1998 1992 1999 1999
## [2535] 1999 1992 1992 1998 2002 1998 1998 1998 1998 2002 1999 1999 1997 1999
## [2549] 2001 2001 2001 2009 2005 2004 2005 2004 2004 2004 2012 2001 2001 2001
## [2563] 1997 1997 2000 2000 2000 2000 2000 2005 2005 2005 2005 1992 1992 2014
## [2577] 2014 2011 2011 2011 2011 2009 1998 1998 2003 2003 1998 2003 1999 1999
```

```
## [2591] 1999 1999 2009 2012 2012 2012 2012 2012 2012 2011 2005 2014 2003 2003
## [2605] 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003
## [2619] 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003
## [2633] 2003 2003 2003 2003 2003 1997 1997 1997 1997 1997 1997 1997 1997 1997
## [2647] 1997 1997 1997 2005 1995 1992 2009 2013 2013 2009 2008 2008 2008 2008
## [2661] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [2675] 2009 2009 2009 1999 1998 1998 2008 1996 1998 2000 2012 2012 2012 2001
## [2689] 2012 2012 2012 2012 2012 2001 2001 2008 1995 1995 1998 1998 1998 1998
## [2703] 2003 1998 2003 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [2717] 2008 2008 2008 2008 2008 2008 2008 2008 2008 1998 1998 1996 1998 2013
## [2731] 2013 2013 2013 2013 2013 2013 1996 1996 1996 2003 2014 2014 2008 2008
## [2745] 2008 2008 2000 2000 2000 1996 1996 2003 1997 1999 2006 1996 1996 1996
## [2759] 1996 1996 1996 2006 2006 2006 1996 2006 1996 1996 2009 2009 2009 2009
## [2773] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 1997 2013 2013
## [2787] 2013 2013 2013 2013 2013 1996 1998 2000 2003 2009 2000 2000 2000 2000
## [2801] 2000 2005 2005 2005 2005 2005 2005 1997 1998 2016 2016 2002 2008 2008
## [2815] 2008 2008 2008 2008 2017 2017 2011 2011 2011 2011 2011 2011 2011 2011
## [2829] 2011 2011 2011 2011 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [2843] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [2857] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009
## [2871] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2009 2007 2007 2007
## [2885] 2007 2007 2007 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993
## [2899] 1993 2003 2003 2003 1998 1996 2008 2003 2003 2003 2003 2003 2003 2003
## [2913] 2014 2003 2003 2003 2003 2003 2009 2009 2010 2010 2010 2010 2010 2010
## [2927] 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010 2005 2005 1999 1999
## [2941] 1998 1995 1995 2001 1995 2017 2017 2001 2014 2001 2001 2001 2001 2001
## [2955] 2001 2001 1996 1999 1999 1999 1999 1998 1998 2005 1998 1994 1994 1994
## [2969] 1994 1994 2015 2012 2012 2012 2012 2012 2012 2012 1997 1996 2007 2007
## [2983] 2007 2009 2009 2009 2009 2009 2009 1999 1999 2009 2009 2009 2009 2009
## [2997] 2009 2009 2009 2009 2009 2009 2009 2009 2009 2005 2005 2005 1993 1998
## [3011] 2001 2014 2003 2014 2014 2014 2014 2014 2014 2014 2009 2011 2013 2013
## [3025] 2010 2010 2010 2010 2010 2010 2015 2015 2015 2006 2000 2000 2000 2000
## [3039] 2008 2008 2008 2008 1998 1993 1993 1993 1998 2015 2015 2012 2012 2012
## [3053] 2012 1997 1997 1997 1997 2002 2002 2009 2009 2009 2009 2009 2009 2011
## [3067] 2011 2002 2002 2002 2002 1999 2009 2009 2009 2009 2009 2009 2009 2009
## [3081] 2009 2009 2009 2009 2009 2009 1998 2003 2003 2003 2006 2006 2006 2006
## [3095] 2006 2006 2006 2005 2003 2005 2005 2005 2005 2003 2003 2003 2005 2005
## [3109] 2005 2006 2006 2006 2008 2014 2011 2013 2003 2003 2003 2003 2003 2003
## [3123] 2003 2003 2003 2003 2003 2011 2011 2011 2011 2011 2011 2011 2011 2011
## [3137] 2011 2011 2011 2011 2011 2009 2013 2013 2018 2009 2013 2005 2005 2004
## [3151] 2004 2018 2014 2014 2012 2012 2012 2013 2012 2015 2015 2015 2012 2018
## [3165] 2015 2012 2015 2015 2015 2015 1995 2001 1995 2001 2003 2003 2003 2003
## [3179] 2003 2003 2003 2003 2003 2003 2003 2003 1993 1993 1993 1993 1993 1993
## [3193] 1993 1993 1993 1994 1993 1993 1997 1993 1993 1994 1993 1993 1993 1993
## [3207] 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993 1993
## [3221] 1993 1999 1998 1996 1998 2008 2008 2008 2000 2003 2003 1998 2014 2014
## [3235] 2004 2016 2015 2015 2013 2013 2015 2015 2015 2015 2015 2015 2015 2015
## [3249] 2015 2015 2015 2014 2014 2012 2012 2012 2012 2015 2015 2015 2012 2015
## [3263] 2012 2015 2015 2015 2015 2011 2011 2014 2014 2014 2014 2008 2008 2008
## [3277] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [3291] 2008 2008 2008 1999 1999 2017 2017 2005 2005 2005 2011 2012 2012 2008
## [3305] 2008 2008 2004 2004 2004 2003 2004 2011 2003 2003 2003 2003 2015 2015
## [3319] 2015 2015 2008 2003 2003 1999 1999 2008 2008 2011 2015 2016 2014 2011
## [3333] 2011 2011 2011 2011 2011 2015 2003 2003 2003 2003 2003 2003 2003 2003
```

```
## [3347] 1992 1992 1992 2004 2012 2011 2011 2011 2014 2014 2014 2014 2009 2012
## [3361] 2012 2012 2012 2012 2015 2009 2015 2014 2014 2014 2012 2015 2014 2014
## [3375] 2014 2012 2012 2012 2012 2014 2015 2015 2014 2014 2014 2014 2008 2012
## [3389] 2012 2009 2009 2012 2014 2015 2009 2014 2014 2014 2015 2014 2014 2014
## [3403] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [3417] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [3431] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [3445] 2008 2008 2008 2008 1992 1992 1992 2015 2009 2009 2014 2015 2015 2014
## [3459] 2014 2014 2012 2012 2012 2012 2003 2003 2003 2003 2003 2003 2003 2003
## [3473] 2008 2014 2015 2015 2012 2011 2011 2015 2015 2008 2014 2014 2014 2015
## [3487] 2012 2012 2012 2012 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [3501] 2013 2013 2016 2016 2016 2017 2010 2010 2010 2010 2010 2010 2010 2010
## [3515] 2010 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [3529] 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [3543] 2013 2013 2013 2013 2013 2013 2012 2012 2003 2005 2015 1999 1999 1999
## [3557] 2012 2012 2013 2008 2008 2008 2008 2010 2010 2010 2010 2015 2005 2015
## [3571] 2010 2015 2015 2005 2005 2005 2015 2010 2015 2013 2014 2014 2013 2013
## [3585] 2014 2013 2013 2014 2014 2013 2014 2014 2013 2014 2014 2016 2016 2016
## [3599] 2016 2015 2011 2016 2016 2016 2016 2016 2016 2010 2010 2010 2006 2012
## [3613] 2012 2003 2014 2014 2012 2012 2003 2015 2015 2015 2015 2015 2015 2015
## [3627] 2015 2015 2011 2011 2015 1999 1999 1999 1999 2015 2015 2013 2011 2012
## [3641] 2012 2017 2017 2016 2016 2016 2016 2016 2016 2009 2009 2009 2003 2003
## [3655] 2012 2003 2012 2011 2017 2017 2017 2017 2012 2012 2012 2012 2017 2017
## [3669] 1999 1999 1999 1999 2011 2005 2011 2011 2016 2016 2016 2016 2012 2012
## [3683] 2012 2012 1999 1999 1999 2011 2005 2011 2015 2015 2015 2015 2015 2015
## [3697] 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003 2003
## [3711] 2003 2003 2003 2005 2005 2005 1999 2015 2015 2015 2015 2015 2015 2015
## [3725] 2015 2013 2013 2013 2013 2013 2013 2013 2013 2013 2015 2011 2004 2004 2004
## [3739] 2004 2004 2015 2004 1999 1998 2005 2005 2006 2006 2006 2008 2008 2008
## [3753] 2015 2009 2009 2015 2014 2014 2014 2014 2014 1999 1999 1999 2015 1999
## [3767] 1999 1999 1999 1999 2009 2015 2005 2014 2014 2014 2016 2011 2016 2005
## [3781] 2016 2016 2016 2016 2012 2012 2012 2012 2008 2013 2014 2009 2009 2009
## [3795] 2008 2009 2008 2009 2009 2009 2009 2009 2009 2008 2008 2008 2008 2009
## [3809] 2009 2009 2008 2008 2008 2013 2005 2009 2009 2009 2009 2009 2008 2003
## [3823] 2005 2009 2017 2017 2003 2003 2003 2003 2003 2017 2017 2015 2015 2005
## [3837] 2015 2003 2014 2014 2014 2014 2014 2014 2014 2006 2013 2013 2017 2011
## [3851] 2011 2017 2017 2017 2017 2017 2017 2017 2012 2012 2005 2005 2013 2009
## [3865] 2013 2013 2018 2009 2013 2015 2015 2015 2015 2015 2015 2015 2015 2015
## [3879] 2015 2015 2004 2004 2004 2018 2014 2014 2014 2014 2014 2014 2014 2014
## [3893] 2014 2014 2014 2012 2012 2012 2012 2015 2015 2015 2012 2018 2015 2012
## [3907] 2015 2015 2015 2015 2004 2008 2008 2008 2012 2012 2012 2012 2012 2012
## [3921] 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2003 2012
## [3935] 2012 2012 2012 2012 2012 2012 2012 2012 2012 2003 2003 2011 2011 2011
## [3949] 2011 2011 2011 2011 2011 2004 2004 2004 2004 2011 2011 2004 2004 2004
## [3963] 2004 2010 1992 1992 2015 2015 1992 1992 1992 1992 1992 1992 2004 2015
## [3977] 2015 2015 2015 2015 2015 2015 2015 2014 2013 2015 2014 2014 2014 2014
## [3991] 2014 2014 2014 2014 2014 2014 1992 1992 1992 1992 1992 1992 2015 2014
## [4005] 2014 2013 2014 2014 2014 2014 2015 2010 2006 2011 2006 2010 2010 2010
## [4019] 2010 2011 2011 2006 2006 2006 2004 2004 2004 2004 2004 2004 2011 2010
## [4033] 2012 2012 2009 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010 2010
## [4047] 2010 2010 2009 2009 2010 2010 2010 2010 2010 2010 2012 2012 2010 2012
## [4061] 2012 2012 2012 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [4075] 2014 2013 2013 2013 2013 2011 2006 2006 2006 2006 2006 2006 2006 2006
## [4089] 2006 2006 2006 2006 2013 2010 2015 2010 2012 2012 2012 2012 2006 2009
```

```
## [4103] 2009 2015 2018 2018 2015 2015 2015 2018 2015 2015 2015 2015 2015 2017
## [4117] 2017 2017 2017 2017 2017 2017 2017 2017 2017 2017 2015 2015 2015 2015
## [4131] 2017 2017 2017 2017 2017 2017 2012 2012 2012 2012 2012 2012 2012 2012
## [4145] 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012 2012
## [4159] 2012 2012 2012 2012 2012 2012 2011 2011 2011 2011 2011 2011 2011 2008
## [4173] 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008 2008
## [4187] 2008 2008 2008 2008 2008 2005 2012 2012 2012 2012 2012 2016 2016 2016
## [4201] 2012 2016 2016 2013 2005 2011 2011 2011 2011 2011 2011 1992 1992 2004
## [4215] 2011 2011 2011 2014 2014 2016 2016 2016 2016 2014 2013 2013 2016 2015
## [4229] 2016 2014 2014 2014 2013 2015 2013 2013 2016 2016 2016 2014 2015 2016
## [4243] 2014 2014 2014 2015 2014 2014 2014 2014 2014 2014 1992 1992 2013 2014
## [4257] 2013 2013 2014 2015 2014 2014 2014 2013 2013 2011 2011 2016 2012 2012
## [4271] 2012 2016 2016 2017 2012 2012 2012 2012 2012 2012 2012 2016 2016 2012
## [4285] 2012 2012 2012 2012 2016 2012 2012 2012 2012 2012 2012 2012 2016 2012
## [4299] 2012 2012 2010 2010 2010 2010 2010 2010 2010 2010 2010 2013 2013 2013
## [4313] 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [4327] 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2012
## [4341] 2012 2005 2012 2012 2012 2012 2009 2014 2013 2013 2013 2014 2013 2014
## [4355] 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2014 2013
## [4369] 2014 2014 2014 2014 2014 2013 2013 2013 2013 2013 2014 2013 2013 2013
## [4383] 2013 2014 2014 2014 2014 2013 2013 2013 2013 2013 2013 2004 2014 2014
## [4397] 2013 2014 2014 2014 2014 2004 2014 2014 2014 2014 2014 2014 2014 2014
## [4411] 2014 2014 2014 2014 2014 2004 2004 2004 2004 2014 2004 2014 2013 2013
## [4425] 2013 2013 2014 2016 2015 2015 2015 2016 2015 2015 2016 2016 2015 2015
## [4439] 2015 2012 2006 2006 2005 2010 2010 2010 2010 2010 2010 2012 2016 2016
## [4453] 2012 2012 2012 2012 2012 2006 2005 2014 2014 2014 2011 2011 2011 2011
## [4467] 2011 2006 2006 2006 2016 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [4481] 2013 2013 2013 2013 2013 2013 2013 2009 2015 2015 2015 2015 2015 2015
## [4495] 2015 2015 2015 2015 2015 2015 2015 2008 2008 2008 2008 2005 2006 2013
## [4509] 2013 2013 2006 2005 2009 2009 2009 2009 2016 2016 2016 2005 2005 2012
## [4523] 2012 2016 2016 2016 2016 2014 2014 2006 2005 2016 2016 2006 2006 2005
## [4537] 2006 2006 2006 2006 2006 2006 2006 2006 2006 2006 2006 2006 2006 2006
## [4551] 2005 2009 2008 2008 2008 2008 2012 2012 2012 2005 2012 2012 2015 2015
## [4565] 2009 2009 2009 2006 2005 2013 2013 2013 2013 2013 2013 2013 2013 2013
## [4579] 2013 2013 2013 2013 2013 2013 2013 2009 2009 2009 2013 2013 2013 2013
## [4593] 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2013 2016 2016
## [4607] 2005 2006 2015 2015 2015 2012 2012 2012 2012 2014 2014 2008 2008 2009
## [4621] 2009 2011 2006
```

```
ggplot(Neonics) +
  geom_freqpoly(aes(x = Publication_Year), bins = 50)
```




```
#plotted a frequency plot of the number of studies by publication year
```

10. Reproduce the same graph but now add a color aesthetic so that different Test.Location are displayed as different colors.

```
Test_location <- Neonics$Test.Location # set test location vector
Test_location #called out test location
```

```
##    [1] Lab                 Lab                 Lab
##    [4] Lab                 Lab                 Lab
##    [7] Lab                 Lab                 Lab
##   [10] Lab                 Lab                 Lab
##   [13] Lab                 Lab                 Lab
##   [16] Lab                 Lab                 Lab
##   [19] Lab                 Lab                 Lab
##   [22] Lab                 Lab                 Lab
##   [25] Lab                 Lab                 Lab
##   [28] Lab                 Field natural       Field natural
##   [31] Lab                 Lab                 Lab
##   [34] Lab                 Field natural       Lab
##   [37] Lab                 Lab                 Lab
##   [40] Lab                 Lab                 Lab
##   [43] Lab                 Lab                 Lab
##   [46] Lab                 Lab                 Lab
##   [49] Lab                 Lab                 Lab
##   [52] Lab                 Lab                 Lab
##   [55] Lab                 Field artificial    Field artificial
```

```
##   [58] Lab                Lab                Lab
##   [61] Lab                Lab                Lab
##   [64] Lab                Lab                Field artificial
##   [67] Field artificial   Lab                Field artificial
##   [70] Lab                Field natural      Field natural
##   [73] Field natural      Field natural      Lab
##   [76] Lab                Lab                Lab
##   [79] Lab                Lab                Lab
##   [82] Lab                Field natural      Field natural
##   [85] Field natural      Field natural      Field natural
##   [88] Field natural      Field natural      Lab
##   [91] Lab                Field natural      Field natural
##   [94] Lab                Lab                Lab
##   [97] Lab                Lab                Lab
##  [100] Lab                Lab                Lab
##  [103] Lab                Lab                Lab
##  [106] Lab                Lab                Field natural
##  [109] Field natural      Field natural      Field natural
##  [112] Field natural      Field natural      Field natural
##  [115] Field natural      Field natural      Lab
##  [118] Field natural      Field natural      Field natural
##  [121] Lab                Field natural      Field natural
##  [124] Field natural      Field natural      Lab
##  [127] Lab                Lab                Lab
##  [130] Lab                Field natural      Lab
##  [133] Lab                Field natural      Field natural
##  [136] Field natural      Field natural      Field natural
##  [139] Field natural      Lab                Lab
##  [142] Lab                Lab                Lab
##  [145] Lab                Lab                Lab
##  [148] Lab                Lab                Lab
##  [151] Lab                Lab                Lab
##  [154] Lab                Lab                Field natural
##  [157] Field natural      Lab                Lab
##  [160] Lab                Lab                Lab
##  [163] Lab                Field natural      Field natural
##  [166] Field natural      Field natural      Field natural
##  [169] Field natural      Field natural      Field natural
##  [172] Lab                Field natural      Lab
##  [175] Lab                Lab                Lab
##  [178] Lab                Field natural      Field natural
##  [181] Lab                Lab                Lab
##  [184] Lab                Lab                Lab
##  [187] Lab                Lab                Lab
##  [190] Lab                Lab                Lab
##  [193] Lab                Lab                Lab
##  [196] Lab                Lab                Lab
##  [199] Lab                Lab                Lab
##  [202] Lab                Lab                Lab
##  [205] Lab                Lab                Lab
##  [208] Lab                Lab                Lab
##  [211] Lab                Lab                Lab
##  [214] Lab                Lab                Lab
##  [217] Lab                Lab                Lab
```

```
##  [220] Lab                Lab                Lab
##  [223] Lab                Lab                Lab
##  [226] Lab                Lab                Lab
##  [229] Lab                Lab                Lab
##  [232] Lab                Lab                Lab
##  [235] Lab                Lab                Lab
##  [238] Lab                Lab                Lab
##  [241] Lab                Lab                Lab
##  [244] Lab                Lab                Lab
##  [247] Lab                Lab                Lab
##  [250] Lab                Lab                Lab
##  [253] Lab                Lab                Lab
##  [256] Lab                Lab                Lab
##  [259] Lab                Lab                Lab
##  [262] Lab                Lab                Lab
##  [265] Lab                Lab                Lab
##  [268] Lab                Lab                Lab
##  [271] Lab                Lab                Field natural
##  [274] Lab                Lab                Field natural
##  [277] Field natural      Field natural      Field natural
##  [280] Field natural      Field natural      Lab
##  [283] Lab                Lab                Lab
##  [286] Lab                Lab                Lab
##  [289] Lab                Lab                Field natural
##  [292] Field natural      Field natural      Field natural
##  [295] Field natural      Field natural      Lab
##  [298] Lab                Lab                Lab
##  [301] Lab                Lab                Lab
##  [304] Lab                Lab                Lab
##  [307] Field natural      Lab                Field natural
##  [310] Field natural      Field natural      Lab
##  [313] Field natural      Field natural      Lab
##  [316] Lab                Field natural      Field natural
##  [319] Field natural      Field natural      Field natural
##  [322] Field natural      Field natural      Field natural
##  [325] Lab                Lab                Lab
##  [328] Lab                Field natural      Lab
##  [331] Field natural      Field natural      Lab
##  [334] Lab                Lab                Lab
##  [337] Field natural      Field natural      Field natural
##  [340] Field natural      Field natural      Field natural
##  [343] Lab                Lab                Lab
##  [346] Field natural      Field natural      Field natural
##  [349] Field natural      Field natural      Field natural
##  [352] Lab                Lab                Lab
##  [355] Lab                Lab                Lab
##  [358] Lab                Lab                Lab
##  [361] Lab                Lab                Lab
##  [364] Field natural      Field natural      Field natural
##  [367] Field natural      Field natural      Field natural
##  [370] Field natural      Field natural      Field natural
##  [373] Field natural      Field natural      Field natural
##  [376] Field natural      Field natural      Field natural
##  [379] Field natural      Lab                Lab
```

```
##  [382] Lab                Lab                Lab
##  [385] Lab                Lab                Lab
##  [388] Lab                Lab                Lab
##  [391] Lab                Lab                Lab
##  [394] Lab                Lab                Lab
##  [397] Lab                Lab                Lab
##  [400] Field artificial   Field artificial   Field natural
##  [403] Field natural      Lab                Field natural
##  [406] Field natural      Field natural      Field natural
##  [409] Field natural      Lab                Lab
##  [412] Lab                Lab                Lab
##  [415] Lab                Lab                Field natural
##  [418] Field natural      Field natural      Field natural
##  [421] Field natural      Field natural      Lab
##  [424] Lab                Lab                Lab
##  [427] Lab                Lab                Lab
##  [430] Lab                Lab                Field natural
##  [433] Field natural      Field natural      Field natural
##  [436] Field natural      Lab                Lab
##  [439] Field natural      Field natural      Field natural
##  [442] Field natural      Lab                Lab
##  [445] Lab                Lab                Lab
##  [448] Lab                Lab                Lab
##  [451] Lab                Lab                Lab
##  [454] Lab                Lab                Lab
##  [457] Lab                Lab                Lab
##  [460] Lab                Lab                Lab
##  [463] Field natural      Lab                Lab
##  [466] Lab                Field natural      Field natural
##  [469] Field natural      Field natural      Field natural
##  [472] Lab                Lab                Lab
##  [475] Field natural      Lab                Lab
##  [478] Lab                Lab                Lab
##  [481] Lab                Lab                Lab
##  [484] Lab                Lab                Lab
##  [487] Lab                Lab                Field natural
##  [490] Field natural      Field natural      Field natural
##  [493] Field natural      Field natural      Field natural
##  [496] Field natural      Field natural      Field natural
##  [499] Field natural      Field natural      Field natural
##  [502] Field natural      Lab                Field natural
##  [505] Field natural      Field natural      Field natural
##  [508] Field natural      Lab                Lab
##  [511] Lab                Field natural      Field natural
##  [514] Lab                Lab                Lab
##  [517] Lab                Lab                Lab
##  [520] Lab                Lab                Lab
##  [523] Lab                Lab                Lab
##  [526] Lab                Lab                Lab
##  [529] Lab                Lab                Lab
##  [532] Lab                Lab                Lab
##  [535] Lab                Lab                Lab
##  [538] Lab                Lab                Lab
##  [541] Lab                Lab                Lab
```

```
##  [544] Lab                Lab                Lab
##  [547] Lab                Lab                Lab
##  [550] Lab                Lab                Field natural
##  [553] Field natural      Lab                Lab
##  [556] Lab                Lab                Lab
##  [559] Lab                Lab                Lab
##  [562] Lab                Lab                Lab
##  [565] Lab                Lab                Lab
##  [568] Field natural      Field natural      Field natural
##  [571] Field natural      Field natural      Field natural
##  [574] Field natural      Field natural      Field natural
##  [577] Field natural      Field natural      Field natural
##  [580] Field natural      Field natural      Lab
##  [583] Field natural      Field natural      Field natural
##  [586] Lab                Lab                Lab
##  [589] Lab                Lab                Lab
##  [592] Lab                Lab                Lab
##  [595] Lab                Lab                Lab
##  [598] Lab                Lab                Lab
##  [601] Lab                Lab                Field natural
##  [604] Lab                Field natural      Field natural
##  [607] Field natural      Field natural      Field natural
##  [610] Field natural      Field natural      Lab
##  [613] Field natural      Field natural      Field natural
##  [616] Field natural      Field natural      Field natural
##  [619] Field natural      Lab                Lab
##  [622] Lab                Lab                Lab
##  [625] Lab                Lab                Lab
##  [628] Field natural      Lab                Lab
##  [631] Lab                Lab                Lab
##  [634] Lab                Lab                Lab
##  [637] Field natural      Field natural      Lab
##  [640] Lab                Lab                Lab
##  [643] Lab                Lab                Lab
##  [646] Lab                Lab                Lab
##  [649] Lab                Lab                Lab
##  [652] Lab                Lab                Lab
##  [655] Lab                Lab                Lab
##  [658] Lab                Lab                Lab
##  [661] Lab                Field natural      Field natural
##  [664] Lab                Lab                Lab
##  [667] Lab                Lab                Lab
##  [670] Field natural      Field natural      Field natural
##  [673] Field natural      Field natural      Field natural
##  [676] Lab                Lab                Lab
##  [679] Lab                Lab                Lab
##  [682] Lab                Lab                Lab
##  [685] Lab                Lab                Lab
##  [688] Lab                Lab                Field natural
##  [691] Lab                Lab                Lab
##  [694] Lab                Lab                Lab
##  [697] Lab                Lab                Lab
##  [700] Lab                Lab                Lab
##  [703] Lab                Lab                Lab
```

```
##  [706] Lab                Lab                Lab
##  [709] Lab                Lab                Field natural
##  [712] Lab                Lab                Lab
##  [715] Lab                Lab                Lab
##  [718] Lab                Lab                Lab
##  [721] Lab                Lab                Lab
##  [724] Lab                Field natural      Field natural
##  [727] Field natural      Lab                Field natural
##  [730] Lab                Lab                Field natural
##  [733] Field natural      Field natural      Field natural
##  [736] Field natural      Field natural      Field natural
##  [739] Field natural      Field natural      Field natural
##  [742] Field natural      Field natural      Field natural
##  [745] Field natural      Field natural      Field natural
##  [748] Field natural      Field natural      Field natural
##  [751] Field natural      Field natural      Field natural
##  [754] Field natural      Field natural      Field natural
##  [757] Field natural      Field natural      Field natural
##  [760] Field natural      Field natural      Field natural
##  [763] Lab                Lab                Lab
##  [766] Lab                Lab                Lab
##  [769] Lab                Lab                Lab
##  [772] Lab                Field natural      Field natural
##  [775] Field natural      Field natural      Field natural
##  [778] Field natural      Lab                Field natural
##  [781] Field natural      Field natural      Field natural
##  [784] Field natural      Field natural      Field natural
##  [787] Field natural      Field natural      Field natural
##  [790] Field natural      Field natural      Field natural
##  [793] Field natural      Field natural      Field natural
##  [796] Field natural      Field natural      Field natural
##  [799] Field natural      Field natural      Field natural
##  [802] Field natural      Field natural      Field natural
##  [805] Field natural      Field natural      Field natural
##  [808] Field natural      Lab                Field natural
##  [811] Field natural      Field natural      Lab
##  [814] Lab                Lab                Lab
##  [817] Lab                Lab                Lab
##  [820] Lab                Lab                Lab
##  [823] Lab                Lab                Lab
##  [826] Lab                Lab                Lab
##  [829] Lab                Lab                Lab
##  [832] Lab                Lab                Lab
##  [835] Lab                Lab                Lab
##  [838] Lab                Lab                Lab
##  [841] Lab                Lab                Lab
##  [844] Lab                Lab                Lab
##  [847] Lab                Lab                Lab
##  [850] Lab                Lab                Lab
##  [853] Lab                Lab                Lab
##  [856] Lab                Lab                Lab
##  [859] Lab                Lab                Lab
##  [862] Lab                Field natural      Field natural
##  [865] Lab                Lab                Lab
```

```
##  [868] Lab                 Lab                 Lab
##  [871] Lab                 Lab                 Lab
##  [874] Lab                 Lab                 Lab
##  [877] Lab                 Lab                 Lab
##  [880] Lab                 Lab                 Field artificial
##  [883] Lab                 Field natural       Lab
##  [886] Field natural       Lab                 Lab
##  [889] Lab                 Lab                 Lab
##  [892] Lab                 Lab                 Lab
##  [895] Lab                 Lab                 Lab
##  [898] Field artificial    Field artificial    Lab
##  [901] Lab                 Lab                 Lab
##  [904] Lab                 Lab                 Lab
##  [907] Lab                 Field natural       Lab
##  [910] Lab                 Lab                 Lab
##  [913] Lab                 Lab                 Lab
##  [916] Lab                 Lab                 Field artificial
##  [919] Lab                 Lab                 Lab
##  [922] Lab                 Lab                 Lab
##  [925] Lab                 Lab                 Lab
##  [928] Field artificial    Lab                 Lab
##  [931] Lab                 Lab                 Field artificial
##  [934] Lab                 Lab                 Lab
##  [937] Lab                 Lab                 Lab
##  [940] Lab                 Lab                 Lab
##  [943] Lab                 Lab                 Lab
##  [946] Field natural       Field natural       Field natural
##  [949] Lab                 Lab                 Lab
##  [952] Lab                 Lab                 Lab
##  [955] Lab                 Lab                 Field natural
##  [958] Field natural       Field natural       Field natural
##  [961] Lab                 Lab                 Lab
##  [964] Lab                 Lab                 Lab
##  [967] Lab                 Lab                 Lab
##  [970] Lab                 Lab                 Lab
##  [973] Lab                 Lab                 Lab
##  [976] Lab                 Lab                 Lab
##  [979] Lab                 Lab                 Lab
##  [982] Lab                 Lab                 Field artificial
##  [985] Lab                 Lab                 Lab
##  [988] Lab                 Lab                 Lab
##  [991] Lab                 Field natural       Lab
##  [994] Lab                 Lab                 Lab
##  [997] Lab                 Lab                 Lab
## [1000] Lab                 Lab                 Lab
## [1003] Lab                 Lab                 Lab
## [1006] Lab                 Lab                 Lab
## [1009] Lab                 Lab                 Lab
## [1012] Lab                 Lab                 Lab
## [1015] Lab                 Lab                 Lab
## [1018] Lab                 Lab                 Lab
## [1021] Lab                 Lab                 Lab
## [1024] Lab                 Lab                 Lab
## [1027] Lab                 Lab                 Lab
```

```
## [1030] Lab                 Lab                 Lab
## [1033] Lab                 Lab                 Lab
## [1036] Lab                 Lab                 Lab
## [1039] Lab                 Lab                 Lab
## [1042] Lab                 Lab                 Lab
## [1045] Lab                 Lab                 Lab
## [1048] Lab                 Field artificial    Lab
## [1051] Lab                 Lab                 Lab
## [1054] Lab                 Lab                 Lab
## [1057] Field natural       Lab                 Lab
## [1060] Lab                 Lab                 Lab
## [1063] Lab                 Field natural       Lab
## [1066] Lab                 Lab                 Lab
## [1069] Lab                 Field artificial    Field artificial
## [1072] Lab                 Lab                 Lab
## [1075] Lab                 Lab                 Lab
## [1078] Lab                 Field natural       Lab
## [1081] Lab                 Lab                 Lab
## [1084] Lab                 Lab                 Lab
## [1087] Lab                 Lab                 Lab
## [1090] Lab                 Lab                 Lab
## [1093] Lab                 Lab                 Lab
## [1096] Lab                 Lab                 Lab
## [1099] Lab                 Lab                 Lab
## [1102] Lab                 Lab                 Field artificial
## [1105] Field artificial    Field artificial    Lab
## [1108] Field artificial    Field artificial    Field artificial
## [1111] Lab                 Lab                 Lab
## [1114] Field artificial    Lab                 Lab
## [1117] Lab                 Field artificial    Field artificial
## [1120] Lab                 Lab                 Lab
## [1123] Lab                 Lab                 Lab
## [1126] Lab                 Lab                 Lab
## [1129] Lab                 Lab                 Lab
## [1132] Lab                 Lab                 Lab
## [1135] Lab                 Lab                 Lab
## [1138] Lab                 Field artificial    Lab
## [1141] Lab                 Lab                 Lab
## [1144] Lab                 Lab                 Lab
## [1147] Lab                 Lab                 Lab
## [1150] Lab                 Lab                 Lab
## [1153] Lab                 Lab                 Lab
## [1156] Lab                 Lab                 Lab
## [1159] Lab                 Lab                 Lab
## [1162] Lab                 Lab                 Field artificial
## [1165] Field artificial    Field artificial    Field artificial
## [1168] Field artificial    Field artificial    Lab
## [1171] Field artificial    Lab                 Lab
## [1174] Lab                 Lab                 Lab
## [1177] Lab                 Lab                 Lab
## [1180] Lab                 Lab                 Lab
## [1183] Field artificial    Field artificial    Field artificial
## [1186] Lab                 Lab                 Lab
## [1189] Lab                 Lab                 Lab
```

```
## [1192] Lab                 Lab                 Lab
## [1195] Lab                 Lab                 Lab
## [1198] Field artificial    Field artificial    Field artificial
## [1201] Field artificial    Field artificial    Lab
## [1204] Lab                 Lab                 Lab
## [1207] Lab                 Lab                 Lab
## [1210] Lab                 Lab                 Field artificial
## [1213] Lab                 Lab                 Field artificial
## [1216] Field artificial    Lab                 Lab
## [1219] Lab                 Lab                 Lab
## [1222] Lab                 Lab                 Lab
## [1225] Lab                 Lab                 Lab
## [1228] Lab                 Lab                 Lab
## [1231] Lab                 Lab                 Lab
## [1234] Lab                 Lab                 Lab
## [1237] Lab                 Lab                 Lab
## [1240] Lab                 Lab                 Lab
## [1243] Lab                 Lab                 Lab
## [1246] Lab                 Lab                 Lab
## [1249] Lab                 Field natural       Lab
## [1252] Lab                 Lab                 Lab
## [1255] Lab                 Lab                 Field natural
## [1258] Field natural       Field natural       Lab
## [1261] Lab                 Lab                 Lab
## [1264] Lab                 Lab                 Lab
## [1267] Lab                 Lab                 Lab
## [1270] Lab                 Lab                 Lab
## [1273] Lab                 Lab                 Lab
## [1276] Lab                 Lab                 Lab
## [1279] Lab                 Lab                 Lab
## [1282] Lab                 Lab                 Lab
## [1285] Lab                 Lab                 Lab
## [1288] Lab                 Lab                 Lab
## [1291] Lab                 Lab                 Lab
## [1294] Lab                 Lab                 Field artificial
## [1297] Lab                 Lab                 Lab
## [1300] Lab                 Lab                 Lab
## [1303] Lab                 Lab                 Lab
## [1306] Lab                 Lab                 Lab
## [1309] Lab                 Field artificial    Field artificial
## [1312] Lab                 Lab                 Lab
## [1315] Lab                 Lab                 Lab
## [1318] Lab                 Lab                 Lab
## [1321] Lab                 Lab                 Lab
## [1324] Lab                 Lab                 Lab
## [1327] Lab                 Field artificial    Lab
## [1330] Lab                 Field natural       Field natural
## [1333] Field natural       Field natural       Field natural
## [1336] Field natural       Field natural       Field natural
## [1339] Field natural       Field natural       Field natural
## [1342] Field natural       Field natural       Field natural
## [1345] Field natural       Field natural       Field natural
## [1348] Field natural       Field natural       Field natural
## [1351] Field natural       Field natural       Field natural
```

```
## [1354] Field natural       Lab                Lab
## [1357] Field natural       Field natural      Field natural
## [1360] Field natural       Lab                Lab
## [1363] Lab                 Lab                Lab
## [1366] Lab                 Field natural      Field natural
## [1369] Field natural       Field natural      Field natural
## [1372] Field natural       Field natural      Lab
## [1375] Lab                 Field natural      Field undeterminable
## [1378] Field natural       Field natural      Field natural
## [1381] Field natural       Field natural      Field natural
## [1384] Field natural       Lab                Lab
## [1387] Field natural       Field natural      Field natural
## [1390] Field natural       Field natural      Lab
## [1393] Lab                 Lab                Lab
## [1396] Lab                 Lab                Lab
## [1399] Lab                 Lab                Lab
## [1402] Lab                 Field natural      Lab
## [1405] Lab                 Lab                Lab
## [1408] Lab                 Field natural      Lab
## [1411] Lab                 Lab                Lab
## [1414] Lab                 Lab                Field natural
## [1417] Field natural       Lab                Lab
## [1420] Lab                 Lab                Lab
## [1423] Lab                 Lab                Lab
## [1426] Field natural       Lab                Lab
## [1429] Lab                 Lab                Lab
## [1432] Field natural       Lab                Lab
## [1435] Lab                 Lab                Lab
## [1438] Lab                 Lab                Lab
## [1441] Field natural       Field natural      Field natural
## [1444] Field natural       Field natural      Field natural
## [1447] Field natural       Lab                Lab
## [1450] Lab                 Lab                Lab
## [1453] Lab                 Lab                Lab
## [1456] Lab                 Lab                Lab
## [1459] Lab                 Lab                Lab
## [1462] Lab                 Lab                Lab
## [1465] Lab                 Lab                Lab
## [1468] Lab                 Lab                Lab
## [1471] Lab                 Lab                Lab
## [1474] Lab                 Lab                Lab
## [1477] Lab                 Lab                Lab
## [1480] Lab                 Lab                Lab
## [1483] Lab                 Lab                Lab
## [1486] Lab                 Lab                Lab
## [1489] Lab                 Lab                Lab
## [1492] Lab                 Lab                Lab
## [1495] Lab                 Lab                Lab
## [1498] Lab                 Lab                Lab
## [1501] Lab                 Lab                Lab
## [1504] Lab                 Lab                Lab
## [1507] Lab                 Lab                Lab
## [1510] Lab                 Lab                Lab
## [1513] Lab                 Lab                Field natural
```

```
## [1516] Lab                 Lab                 Lab
## [1519] Lab                 Lab                 Lab
## [1522] Lab                 Lab                 Lab
## [1525] Lab                 Lab                 Lab
## [1528] Lab                 Lab                 Lab
## [1531] Lab                 Lab                 Lab
## [1534] Lab                 Lab                 Lab
## [1537] Lab                 Lab                 Lab
## [1540] Lab                 Lab                 Lab
## [1543] Lab                 Lab                 Lab
## [1546] Lab                 Lab                 Field natural
## [1549] Lab                 Lab                 Lab
## [1552] Lab                 Lab                 Lab
## [1555] Lab                 Lab                 Lab
## [1558] Lab                 Lab                 Lab
## [1561] Lab                 Lab                 Lab
## [1564] Lab                 Lab                 Lab
## [1567] Lab                 Lab                 Lab
## [1570] Lab                 Lab                 Lab
## [1573] Lab                 Lab                 Lab
## [1576] Lab                 Lab                 Lab
## [1579] Lab                 Lab                 Lab
## [1582] Lab                 Lab                 Lab
## [1585] Lab                 Lab                 Lab
## [1588] Lab                 Lab                 Lab
## [1591] Lab                 Lab                 Lab
## [1594] Lab                 Lab                 Lab
## [1597] Lab                 Lab                 Lab
## [1600] Lab                 Lab                 Lab
## [1603] Lab                 Lab                 Lab
## [1606] Lab                 Lab                 Lab
## [1609] Lab                 Lab                 Lab
## [1612] Lab                 Lab                 Lab
## [1615] Lab                 Lab                 Lab
## [1618] Lab                 Lab                 Lab
## [1621] Lab                 Lab                 Lab
## [1624] Lab                 Lab                 Lab
## [1627] Lab                 Lab                 Lab
## [1630] Lab                 Lab                 Lab
## [1633] Lab                 Lab                 Lab
## [1636] Lab                 Lab                 Lab
## [1639] Lab                 Lab                 Lab
## [1642] Lab                 Field natural       Lab
## [1645] Field natural       Field natural       Field natural
## [1648] Field natural       Field natural       Field natural
## [1651] Field natural       Field natural       Field natural
## [1654] Field natural       Field natural       Field natural
## [1657] Field natural       Field natural       Field natural
## [1660] Field natural       Field natural       Field natural
## [1663] Field natural       Field natural       Field natural
## [1666] Field natural       Field natural       Field natural
## [1669] Field natural       Field natural       Field natural
## [1672] Field natural       Field natural       Field natural
## [1675] Field natural       Field natural       Field natural
```

```
## [1678] Field natural       Field natural       Field natural
## [1681] Field natural       Field natural       Field natural
## [1684] Field natural       Field natural       Field natural
## [1687] Field natural       Field natural       Field natural
## [1690] Field natural       Lab                 Lab
## [1693] Lab                 Lab                 Field natural
## [1696] Field natural       Field natural       Lab
## [1699] Field natural       Field natural       Field natural
## [1702] Field natural       Field natural       Field natural
## [1705] Field natural       Field natural       Field natural
## [1708] Field natural       Field natural       Lab
## [1711] Field natural       Field natural       Field natural
## [1714] Field natural       Field natural       Field natural
## [1717] Field natural       Field natural       Field natural
## [1720] Field natural       Field natural       Field natural
## [1723] Field natural       Field natural       Field natural
## [1726] Field natural       Field natural       Field natural
## [1729] Field natural       Field natural       Field natural
## [1732] Lab                 Lab                 Field natural
## [1735] Field natural       Field natural       Field natural
## [1738] Lab                 Lab                 Lab
## [1741] Lab                 Lab                 Lab
## [1744] Lab                 Lab                 Lab
## [1747] Lab                 Lab                 Lab
## [1750] Lab                 Lab                 Lab
## [1753] Lab                 Lab                 Lab
## [1756] Lab                 Lab                 Lab
## [1759] Field natural       Field natural       Field natural
## [1762] Lab                 Lab                 Lab
## [1765] Lab                 Lab                 Field natural
## [1768] Field natural       Field natural       Field natural
## [1771] Field natural       Field natural       Field natural
## [1774] Field natural       Lab                 Lab
## [1777] Lab                 Lab                 Lab
## [1780] Lab                 Lab                 Lab
## [1783] Lab                 Field natural       Field natural
## [1786] Field natural       Field natural       Field natural
## [1789] Field natural       Field natural       Lab
## [1792] Field natural       Field natural       Field natural
## [1795] Field natural       Field natural       Field natural
## [1798] Field natural       Field natural       Field natural
## [1801] Lab                 Field natural       Field natural
## [1804] Field natural       Field natural       Field natural
## [1807] Field natural       Field natural       Field natural
## [1810] Field natural       Field natural       Field natural
## [1813] Field natural       Field natural       Field natural
## [1816] Field natural       Field natural       Field natural
## [1819] Field natural       Field natural       Field natural
## [1822] Field natural       Field natural       Field natural
## [1825] Field natural       Field natural       Field natural
## [1828] Field natural       Field natural       Field natural
## [1831] Field natural       Field natural       Field natural
## [1834] Field natural       Field natural       Field natural
## [1837] Field natural       Field natural       Field natural
```

```
## [1840] Field natural       Field natural       Field natural
## [1843] Field natural       Field natural       Field natural
## [1846] Field natural       Field natural       Field natural
## [1849] Field natural       Field natural       Field natural
## [1852] Field natural       Lab                 Lab
## [1855] Lab                 Lab                 Field natural
## [1858] Field natural       Field natural       Field natural
## [1861] Lab                 Lab                 Lab
## [1864] Lab                 Field natural       Field natural
## [1867] Lab                 Lab                 Field natural
## [1870] Lab                 Lab                 Lab
## [1873] Field natural       Field natural       Field natural
## [1876] Field natural       Field natural       Field natural
## [1879] Field natural       Field natural       Field natural
## [1882] Field natural       Field natural       Field natural
## [1885] Field natural       Field natural       Field natural
## [1888] Field natural       Field natural       Field natural
## [1891] Field natural       Field natural       Field natural
## [1894] Field natural       Field natural       Field natural
## [1897] Field natural       Field natural       Field natural
## [1900] Field natural       Field natural       Lab
## [1903] Lab                 Lab                 Lab
## [1906] Lab                 Lab                 Lab
## [1909] Field natural       Lab                 Field natural
## [1912] Field natural       Field natural       Lab
## [1915] Lab                 Lab                 Lab
## [1918] Field natural       Field natural       Lab
## [1921] Lab                 Lab                 Lab
## [1924] Lab                 Lab                 Lab
## [1927] Lab                 Lab                 Lab
## [1930] Lab                 Lab                 Field natural
## [1933] Field natural       Field natural       Field natural
## [1936] Field natural       Field natural       Field natural
## [1939] Field natural       Field natural       Field natural
## [1942] Field natural       Field natural       Field natural
## [1945] Field natural       Field natural       Field natural
## [1948] Field natural       Field natural       Field natural
## [1951] Field natural       Field natural       Field natural
## [1954] Field natural       Field natural       Field natural
## [1957] Field natural       Field natural       Field natural
## [1960] Field natural       Field natural       Field natural
## [1963] Field natural       Field natural       Field natural
## [1966] Field natural       Field natural       Field natural
## [1969] Field natural       Field natural       Field natural
## [1972] Field natural       Field natural       Field natural
## [1975] Field natural       Field natural       Field natural
## [1978] Field natural       Field natural       Field natural
## [1981] Field natural       Field natural       Field natural
## [1984] Field natural       Field natural       Field natural
## [1987] Field natural       Field natural       Field natural
## [1990] Field natural       Field natural       Field natural
## [1993] Field natural       Field natural       Field natural
## [1996] Field natural       Lab                 Field natural
## [1999] Field natural       Lab                 Lab
```

```
## [2002] Lab                 Lab                 Field natural
## [2005] Field natural       Field natural       Field natural
## [2008] Field natural       Field natural       Field natural
## [2011] Field natural       Field natural       Field natural
## [2014] Field natural       Field natural       Field natural
## [2017] Field natural       Field natural       Lab
## [2020] Lab                 Lab                 Field natural
## [2023] Field natural       Lab                 Lab
## [2026] Lab                 Lab                 Lab
## [2029] Lab                 Lab                 Lab
## [2032] Lab                 Lab                 Lab
## [2035] Lab                 Lab                 Lab
## [2038] Lab                 Lab                 Lab
## [2041] Lab                 Lab                 Lab
## [2044] Lab                 Lab                 Lab
## [2047] Lab                 Lab                 Lab
## [2050] Lab                 Lab                 Lab
## [2053] Lab                 Lab                 Lab
## [2056] Lab                 Lab                 Lab
## [2059] Lab                 Lab                 Field natural
## [2062] Field natural       Field natural       Field natural
## [2065] Field natural       Field natural       Field natural
## [2068] Field natural       Field natural       Field natural
## [2071] Field natural       Field natural       Field natural
## [2074] Field natural       Field natural       Field natural
## [2077] Field natural       Field natural       Field natural
## [2080] Field natural       Field natural       Field natural
## [2083] Field natural       Field natural       Field natural
## [2086] Field natural       Field natural       Lab
## [2089] Lab                 Lab                 Lab
## [2092] Lab                 Lab                 Lab
## [2095] Lab                 Lab                 Lab
## [2098] Lab                 Lab                 Lab
## [2101] Lab                 Lab                 Lab
## [2104] Lab                 Lab                 Lab
## [2107] Lab                 Lab                 Lab
## [2110] Lab                 Lab                 Lab
## [2113] Lab                 Lab                 Lab
## [2116] Lab                 Lab                 Lab
## [2119] Lab                 Lab                 Field natural
## [2122] Field natural       Field natural       Field natural
## [2125] Field natural       Field natural       Field natural
## [2128] Field natural       Field natural       Field natural
## [2131] Field natural       Field natural       Field natural
## [2134] Field natural       Field natural       Field natural
## [2137] Field natural       Field natural       Field natural
## [2140] Field artificial    Lab                 Lab
## [2143] Lab                 Lab                 Field natural
## [2146] Lab                 Lab                 Field natural
## [2149] Field natural       Field natural       Field natural
## [2152] Field natural       Field natural       Lab
## [2155] Field natural       Lab                 Lab
## [2158] Lab                 Lab                 Lab
## [2161] Lab                 Lab                 Lab
```

```
## [2164] Lab                Lab                Lab
## [2167] Lab                Lab                Lab
## [2170] Lab                Lab                Lab
## [2173] Lab                Lab                Lab
## [2176] Lab                Lab                Lab
## [2179] Lab                Lab                Lab
## [2182] Lab                Lab                Lab
## [2185] Lab                Lab                Lab
## [2188] Lab                Lab                Lab
## [2191] Lab                Lab                Lab
## [2194] Lab                Lab                Lab
## [2197] Lab                Lab                Field natural
## [2200] Field natural      Lab                Lab
## [2203] Lab                Lab                Lab
## [2206] Field natural      Field natural      Field natural
## [2209] Field natural      Field natural      Field natural
## [2212] Field natural      Field natural      Field natural
## [2215] Field natural      Lab                Lab
## [2218] Lab                Lab                Lab
## [2221] Lab                Lab                Lab
## [2224] Lab                Lab                Lab
## [2227] Lab                Lab                Field natural
## [2230] Field natural      Field natural      Field natural
## [2233] Field artificial   Field artificial   Field natural
## [2236] Field natural      Field natural      Field natural
## [2239] Field natural      Field natural      Field natural
## [2242] Field natural      Field natural      Field natural
## [2245] Field natural      Field natural      Field natural
## [2248] Field natural      Field natural      Field natural
## [2251] Field natural      Field natural      Field natural
## [2254] Field natural      Field natural      Field natural
## [2257] Field natural      Field natural      Field natural
## [2260] Field natural      Field natural      Field natural
## [2263] Field natural      Field natural      Field natural
## [2266] Field natural      Field natural      Field natural
## [2269] Field natural      Field natural      Field natural
## [2272] Field natural      Field natural      Field natural
## [2275] Field natural      Field natural      Field natural
## [2278] Field natural      Field natural      Field natural
## [2281] Lab                Lab                Lab
## [2284] Lab                Field natural      Lab
## [2287] Lab                Field natural      Field natural
## [2290] Field natural      Field natural      Field natural
## [2293] Field natural      Field natural      Lab
## [2296] Lab                Lab                Lab
## [2299] Lab                Lab                Lab
## [2302] Lab                Lab                Lab
## [2305] Field natural      Field natural      Lab
## [2308] Lab                Field natural      Field natural
## [2311] Field natural      Field natural      Field natural
## [2314] Lab                Field natural      Field natural
## [2317] Field natural      Field natural      Field natural
## [2320] Field natural      Field natural      Field natural
## [2323] Field natural      Field natural      Field natural
```

```
## [2326] Field natural        Field natural        Lab
## [2329] Lab                  Lab                  Lab
## [2332] Lab                  Lab                  Field natural
## [2335] Field natural        Field natural        Field natural
## [2338] Field natural        Field natural        Field natural
## [2341] Field natural        Field natural        Field natural
## [2344] Field natural        Lab                  Lab
## [2347] Lab                  Lab                  Lab
## [2350] Lab                  Lab                  Lab
## [2353] Lab                  Lab                  Lab
## [2356] Lab                  Lab                  Lab
## [2359] Lab                  Lab                  Lab
## [2362] Lab                  Lab                  Lab
## [2365] Lab                  Lab                  Field natural
## [2368] Lab                  Field natural        Field natural
## [2371] Field natural        Field natural        Lab
## [2374] Lab                  Lab                  Lab
## [2377] Lab                  Field undeterminable Field natural
## [2380] Field natural        Field natural        Field natural
## [2383] Field natural        Field natural        Lab
## [2386] Lab                  Lab                  Field natural
## [2389] Field natural        Field natural        Field natural
## [2392] Field natural        Field natural        Field natural
## [2395] Field natural        Field natural        Field natural
## [2398] Field natural        Field natural        Field natural
## [2401] Field natural        Field natural        Field natural
## [2404] Field natural        Field natural        Field natural
## [2407] Field natural        Field natural        Field natural
## [2410] Field natural        Field natural        Field natural
## [2413] Field natural        Field natural        Field natural
## [2416] Field natural        Field natural        Field natural
## [2419] Field natural        Field natural        Lab
## [2422] Lab                  Lab                  Lab
## [2425] Lab                  Field natural        Field natural
## [2428] Field natural        Field natural        Field natural
## [2431] Field natural        Field natural        Lab
## [2434] Field natural        Field natural        Field natural
## [2437] Field natural        Field natural        Field natural
## [2440] Field natural        Lab                  Lab
## [2443] Field natural        Lab                  Lab
## [2446] Field natural        Lab                  Lab
## [2449] Lab                  Lab                  Field natural
## [2452] Field natural        Field natural        Field natural
## [2455] Field natural        Lab                  Lab
## [2458] Field natural        Field natural        Field natural
## [2461] Field natural        Field natural        Field natural
## [2464] Field natural        Lab                  Lab
## [2467] Lab                  Lab                  Field natural
## [2470] Field natural        Lab                  Lab
## [2473] Lab                  Lab                  Lab
## [2476] Lab                  Lab                  Lab
## [2479] Lab                  Lab                  Lab
## [2482] Lab                  Lab                  Lab
## [2485] Lab                  Lab                  Lab
```

```
## [2488] Lab                Lab                Lab
## [2491] Lab                Lab                Lab
## [2494] Lab                Lab                Lab
## [2497] Lab                Lab                Lab
## [2500] Lab                Field natural      Field natural
## [2503] Field natural      Field natural      Field natural
## [2506] Field natural      Field natural      Field natural
## [2509] Field natural      Field natural      Field natural
## [2512] Lab                Lab                Lab
## [2515] Lab                Field natural      Field natural
## [2518] Field natural      Field natural      Field natural
## [2521] Field natural      Field natural      Field natural
## [2524] Field natural      Field natural      Field natural
## [2527] Field natural      Field natural      Field natural
## [2530] Field natural      Field natural      Field natural
## [2533] Field natural      Field natural      Field natural
## [2536] Field natural      Field natural      Lab
## [2539] Lab                Field natural      Field natural
## [2542] Field natural      Field natural      Lab
## [2545] Field natural      Field natural      Field natural
## [2548] Field natural      Field natural      Field natural
## [2551] Field natural      Lab                Lab
## [2554] Lab                Lab                Lab
## [2557] Lab                Lab                Lab
## [2560] Lab                Lab                Field artificial
## [2563] Field natural      Field natural      Lab
## [2566] Lab                Field natural      Field natural
## [2569] Field natural      Field natural      Field natural
## [2572] Field natural      Field natural      Lab
## [2575] Lab                Field natural      Field natural
## [2578] Field artificial   Field artificial   Field artificial
## [2581] Lab                Field natural      Lab
## [2584] Lab                Lab                Lab
## [2587] Lab                Lab                Field natural
## [2590] Field natural      Field natural      Field natural
## [2593] Field natural      Field natural      Field natural
## [2596] Field natural      Field natural      Field natural
## [2599] Field natural      Lab                Field natural
## [2602] Lab                Field artificial   Lab
## [2605] Lab                Field artificial   Lab
## [2608] Lab                Field artificial   Lab
## [2611] Lab                Lab                Lab
## [2614] Lab                Lab                Field artificial
## [2617] Lab                Lab                Field artificial
## [2620] Field artificial   Field artificial   Field artificial
## [2623] Field artificial   Field artificial   Field artificial
## [2626] Field artificial   Field artificial   Field artificial
## [2629] Lab                Lab                Field artificial
## [2632] Field artificial   Field artificial   Field artificial
## [2635] Lab                Lab                Lab
## [2638] Lab                Lab                Lab
## [2641] Lab                Lab                Lab
## [2644] Lab                Lab                Lab
## [2647] Lab                Lab                Lab
```

```
## [2650] Lab                Lab                Field natural
## [2653] Field natural      Lab                Lab
## [2656] Lab                Lab                Field natural
## [2659] Lab                Field natural      Lab
## [2662] Field natural      Lab                Lab
## [2665] Lab                Lab                Lab
## [2668] Field natural      Field natural      Lab
## [2671] Lab                Field natural      Lab
## [2674] Lab                Field natural      Field natural
## [2677] Field natural      Field natural      Field natural
## [2680] Field natural      Field natural      Field natural
## [2683] Field natural      Lab                Lab
## [2686] Lab                Lab                Lab
## [2689] Lab                Lab                Lab
## [2692] Lab                Lab                Lab
## [2695] Lab                Field natural      Field natural
## [2698] Field natural      Lab                Lab
## [2701] Lab                Lab                Lab
## [2704] Lab                Lab                Field natural
## [2707] Field natural      Field natural      Field natural
## [2710] Field natural      Field natural      Field natural
## [2713] Field natural      Field natural      Field natural
## [2716] Field natural      Field natural      Field natural
## [2719] Field natural      Field natural      Field natural
## [2722] Field natural      Field natural      Field natural
## [2725] Field natural      Lab                Lab
## [2728] Field natural      Field natural      Field natural
## [2731] Field natural      Field natural      Field natural
## [2734] Field natural      Field natural      Field natural
## [2737] Field natural      Field natural      Field natural
## [2740] Lab                Field natural      Field natural
## [2743] Lab                Lab                Lab
## [2746] Lab                Lab                Lab
## [2749] Lab                Lab                Lab
## [2752] Lab                Field undeterminable Field natural
## [2755] Lab                Lab                Lab
## [2758] Lab                Lab                Lab
## [2761] Lab                Lab                Lab
## [2764] Lab                Lab                Lab
## [2767] Lab                Lab                Field natural
## [2770] Field natural      Field natural      Field natural
## [2773] Field natural      Field natural      Field natural
## [2776] Field natural      Field natural      Field natural
## [2779] Field natural      Field natural      Field natural
## [2782] Field natural      Field natural      Field natural
## [2785] Field natural      Field natural      Field natural
## [2788] Field natural      Field natural      Field natural
## [2791] Field natural      Field natural      Field natural
## [2794] Lab                Field natural      Field natural
## [2797] Lab                Lab                Lab
## [2800] Lab                Lab                Lab
## [2803] Lab                Lab                Lab
## [2806] Lab                Lab                Field natural
## [2809] Field natural      Field natural      Field natural
```

```
## [2812] Lab                Field natural       Field natural
## [2815] Field natural      Field natural       Field natural
## [2818] Field natural      Field natural       Field natural
## [2821] Lab                Lab                 Lab
## [2824] Lab                Field artificial    Field artificial
## [2827] Field artificial   Field artificial    Lab
## [2830] Lab                Lab                 Lab
## [2833] Field natural      Field natural       Field natural
## [2836] Field natural      Field natural       Field natural
## [2839] Field natural      Field natural       Field natural
## [2842] Field natural      Field natural       Field natural
## [2845] Field natural      Field natural       Field natural
## [2848] Field natural      Field natural       Field natural
## [2851] Field natural      Field natural       Field natural
## [2854] Field natural      Field natural       Field natural
## [2857] Field natural      Field natural       Field natural
## [2860] Field natural      Field natural       Field natural
## [2863] Field natural      Field natural       Field natural
## [2866] Field natural      Field natural       Field natural
## [2869] Field natural      Field natural       Field natural
## [2872] Field natural      Field natural       Field natural
## [2875] Field natural      Field natural       Field natural
## [2878] Field natural      Field natural       Field natural
## [2881] Field natural      Lab                 Lab
## [2884] Lab                Lab                 Lab
## [2887] Lab                Lab                 Lab
## [2890] Lab                Lab                 Lab
## [2893] Lab                Lab                 Lab
## [2896] Lab                Lab                 Lab
## [2899] Lab                Field natural       Lab
## [2902] Field natural      Field natural       Field natural
## [2905] Field natural      Lab                 Lab
## [2908] Lab                Lab                 Lab
## [2911] Lab                Lab                 Field natural
## [2914] Lab                Lab                 Lab
## [2917] Lab                Lab                 Field natural
## [2920] Field natural      Lab                 Lab
## [2923] Lab                Lab                 Lab
## [2926] Lab                Lab                 Lab
## [2929] Lab                Lab                 Lab
## [2932] Lab                Lab                 Lab
## [2935] Lab                Lab                 Lab
## [2938] Lab                Field natural       Field natural
## [2941] Field natural      Field natural       Field natural
## [2944] Lab                Field natural       Field natural
## [2947] Field natural      Field natural       Field natural
## [2950] Field natural      Field natural       Field natural
## [2953] Field natural      Field natural       Field natural
## [2956] Field natural      Field natural       Field natural
## [2959] Field natural      Field natural       Field natural
## [2962] Field natural      Field natural       Field natural
## [2965] Field natural      Lab                 Lab
## [2968] Lab                Lab                 Lab
## [2971] Lab                Lab                 Lab
```

```
## [2974] Lab                Lab                Lab
## [2977] Lab                Lab                Field natural
## [2980] Field natural      Lab                Lab
## [2983] Lab                Field natural      Field natural
## [2986] Field natural      Field natural      Field natural
## [2989] Field natural      Field natural      Field natural
## [2992] Field natural      Field natural      Field natural
## [2995] Field natural      Field natural      Field natural
## [2998] Field natural      Field natural      Field natural
## [3001] Field natural      Field natural      Field natural
## [3004] Field natural      Field natural      Field natural
## [3007] Field natural      Field natural      Field natural
## [3010] Field natural      Lab                Field natural
## [3013] Lab                Lab                Lab
## [3016] Lab                Lab                Lab
## [3019] Lab                Lab                Field natural
## [3022] Lab                Field natural      Field natural
## [3025] Lab                Lab                Lab
## [3028] Lab                Lab                Lab
## [3031] Lab                Lab                Lab
## [3034] Lab                Lab                Field natural
## [3037] Field natural      Field natural      Lab
## [3040] Lab                Lab                Lab
## [3043] Field natural      Field natural      Field natural
## [3046] Field natural      Field natural      Field natural
## [3049] Field natural      Field natural      Field natural
## [3052] Field natural      Field natural      Field natural
## [3055] Field natural      Field natural      Field natural
## [3058] Field natural      Field natural      Field natural
## [3061] Field natural      Field natural      Field natural
## [3064] Field natural      Field natural      Field natural
## [3067] Field natural      Field natural      Field natural
## [3070] Field natural      Field natural      Field natural
## [3073] Field natural      Field natural      Field natural
## [3076] Field natural      Field natural      Field natural
## [3079] Field natural      Field natural      Field natural
## [3082] Field natural      Field natural      Field natural
## [3085] Field natural      Field natural      Field natural
## [3088] Field natural      Lab                Field natural
## [3091] Lab                Lab                Lab
## [3094] Lab                Lab                Lab
## [3097] Lab                Lab                Lab
## [3100] Lab                Lab                Lab
## [3103] Lab                Lab                Lab
## [3106] Lab                Lab                Lab
## [3109] Lab                Lab                Lab
## [3112] Lab                Lab                Field natural
## [3115] Lab                Lab                Lab
## [3118] Lab                Lab                Lab
## [3121] Lab                Lab                Lab
## [3124] Lab                Lab                Lab
## [3127] Lab                Lab                Lab
## [3130] Lab                Lab                Lab
## [3133] Lab                Lab                Lab
```

```
## [3136] Lab                  Lab                  Lab
## [3139] Lab                  Lab                  Lab
## [3142] Lab                  Lab                  Lab
## [3145] Lab                  Lab                  Lab
## [3148] Lab                  Lab                  Lab
## [3151] Lab                  Lab                  Lab
## [3154] Lab                  Lab                  Lab
## [3157] Lab                  Lab                  Lab
## [3160] Lab                  Lab                  Lab
## [3163] Lab                  Lab                  Lab
## [3166] Lab                  Lab                  Lab
## [3169] Lab                  Lab                  Lab
## [3172] Lab                  Lab                  Lab
## [3175] Lab                  Lab                  Lab
## [3178] Lab                  Lab                  Lab
## [3181] Lab                  Lab                  Lab
## [3184] Lab                  Lab                  Lab
## [3187] Field natural        Field natural        Field natural
## [3190] Field natural        Field natural        Field natural
## [3193] Field natural        Field natural        Field natural
## [3196] Field natural        Field natural        Field natural
## [3199] Field undeterminable Field natural        Field natural
## [3202] Field natural        Field natural        Field natural
## [3205] Field natural        Field natural        Field natural
## [3208] Field natural        Field natural        Field natural
## [3211] Field natural        Field natural        Field natural
## [3214] Field natural        Field natural        Field natural
## [3217] Field natural        Field natural        Field natural
## [3220] Field natural        Field natural        Field natural
## [3223] Field natural        Field natural        Field natural
## [3226] Lab                  Lab                  Lab
## [3229] Lab                  Lab                  Lab
## [3232] Field natural        Field natural        Field natural
## [3235] Lab                  Lab                  Lab
## [3238] Lab                  Lab                  Lab
## [3241] Lab                  Lab                  Lab
## [3244] Lab                  Lab                  Lab
## [3247] Lab                  Lab                  Lab
## [3250] Lab                  Lab                  Lab
## [3253] Lab                  Lab                  Lab
## [3256] Lab                  Lab                  Lab
## [3259] Lab                  Lab                  Lab
## [3262] Lab                  Lab                  Lab
## [3265] Lab                  Lab                  Lab
## [3268] Lab                  Field natural        Lab
## [3271] Lab                  Lab                  Lab
## [3274] Lab                  Lab                  Lab
## [3277] Lab                  Lab                  Lab
## [3280] Lab                  Lab                  Lab
## [3283] Lab                  Lab                  Lab
## [3286] Lab                  Lab                  Lab
## [3289] Lab                  Lab                  Lab
## [3292] Lab                  Lab                  Field artificial
## [3295] Field natural        Field natural        Field natural
```

```
## [3298] Lab                Lab                Lab
## [3301] Field natural      Field natural      Field natural
## [3304] Lab                Lab                Lab
## [3307] Lab                Lab                Lab
## [3310] Lab                Lab                Field natural
## [3313] Lab                Lab                Lab
## [3316] Lab                Lab                Lab
## [3319] Lab                Lab                Field natural
## [3322] Lab                Lab                Field natural
## [3325] Field natural      Field natural      Field natural
## [3328] Lab                Lab                Lab
## [3331] Lab                Lab                Lab
## [3334] Lab                Lab                Lab
## [3337] Lab                Lab                Lab
## [3340] Lab                Lab                Lab
## [3343] Lab                Lab                Lab
## [3346] Lab                Lab                Lab
## [3349] Lab                Lab                Lab
## [3352] Lab                Lab                Lab
## [3355] Lab                Lab                Lab
## [3358] Lab                Lab                Lab
## [3361] Lab                Lab                Lab
## [3364] Lab                Lab                Lab
## [3367] Lab                Lab                Lab
## [3370] Lab                Lab                Lab
## [3373] Lab                Lab                Lab
## [3376] Field natural      Field natural      Field natural
## [3379] Field natural      Lab                Lab
## [3382] Lab                Lab                Lab
## [3385] Lab                Lab                Lab
## [3388] Lab                Lab                Lab
## [3391] Lab                Lab                Lab
## [3394] Lab                Lab                Lab
## [3397] Lab                Lab                Lab
## [3400] Lab                Lab                Lab
## [3403] Lab                Lab                Lab
## [3406] Lab                Lab                Lab
## [3409] Lab                Lab                Lab
## [3412] Lab                Lab                Lab
## [3415] Lab                Lab                Lab
## [3418] Lab                Lab                Lab
## [3421] Lab                Lab                Lab
## [3424] Lab                Lab                Lab
## [3427] Lab                Lab                Lab
## [3430] Lab                Lab                Lab
## [3433] Lab                Lab                Lab
## [3436] Lab                Lab                Lab
## [3439] Lab                Lab                Lab
## [3442] Lab                Lab                Lab
## [3445] Lab                Lab                Lab
## [3448] Lab                Lab                Lab
## [3451] Lab                Lab                Lab
## [3454] Lab                Lab                Lab
## [3457] Lab                Lab                Lab
```

```
## [3460] Lab                 Lab                 Lab
## [3463] Lab                 Lab                 Lab
## [3466] Lab                 Lab                 Lab
## [3469] Lab                 Lab                 Lab
## [3472] Lab                 Lab                 Lab
## [3475] Lab                 Lab                 Lab
## [3478] Lab                 Lab                 Lab
## [3481] Lab                 Lab                 Lab
## [3484] Lab                 Lab                 Lab
## [3487] Field natural       Field natural       Field natural
## [3490] Field natural       Lab                 Lab
## [3493] Lab                 Lab                 Lab
## [3496] Lab                 Lab                 Lab
## [3499] Lab                 Lab                 Lab
## [3502] Lab                 Lab                 Lab
## [3505] Lab                 Lab                 Lab
## [3508] Lab                 Lab                 Lab
## [3511] Lab                 Lab                 Lab
## [3514] Lab                 Lab                 Lab
## [3517] Lab                 Lab                 Lab
## [3520] Lab                 Lab                 Lab
## [3523] Lab                 Lab                 Lab
## [3526] Lab                 Lab                 Lab
## [3529] Lab                 Lab                 Lab
## [3532] Lab                 Lab                 Lab
## [3535] Lab                 Lab                 Lab
## [3538] Lab                 Lab                 Lab
## [3541] Lab                 Lab                 Lab
## [3544] Lab                 Lab                 Lab
## [3547] Lab                 Lab                 Field natural
## [3550] Field natural       Field natural       Field natural
## [3553] Field natural       Field natural       Field natural
## [3556] Field natural       Field natural       Field natural
## [3559] Field natural       Field natural       Field natural
## [3562] Field natural       Field natural       Lab
## [3565] Lab                 Lab                 Lab
## [3568] Lab                 Lab                 Lab
## [3571] Lab                 Lab                 Lab
## [3574] Lab                 Lab                 Lab
## [3577] Lab                 Lab                 Lab
## [3580] Lab                 Field artificial    Field artificial
## [3583] Lab                 Lab                 Field artificial
## [3586] Lab                 Lab                 Field artificial
## [3589] Field artificial    Lab                 Field artificial
## [3592] Field artificial    Lab                 Field artificial
## [3595] Field artificial    Lab                 Lab
## [3598] Lab                 Lab                 Field natural
## [3601] Field natural       Lab                 Lab
## [3604] Field natural       Lab                 Lab
## [3607] Lab                 Field natural       Field natural
## [3610] Field natural       Lab                 Field natural
## [3613] Field natural       Field natural       Lab
## [3616] Lab                 Field natural       Field natural
## [3619] Field natural       Field natural       Lab
```

```
## [3622] Lab                Lab                Lab
## [3625] Lab                Lab                Lab
## [3628] Lab                Field natural      Field natural
## [3631] Field natural      Field natural      Field natural
## [3634] Field natural      Field natural      Lab
## [3637] Lab                Field natural      Field natural
## [3640] Lab                Lab                Field natural
## [3643] Field natural      Lab                Lab
## [3646] Field natural      Lab                Lab
## [3649] Lab                Lab                Field natural
## [3652] Field natural      Lab                Lab
## [3655] Lab                Lab                Lab
## [3658] Lab                Field natural      Field natural
## [3661] Field natural      Field natural      Lab
## [3664] Lab                Lab                Lab
## [3667] Field natural      Field natural      Field natural
## [3670] Field natural      Field natural      Field natural
## [3673] Lab                Field natural      Lab
## [3676] Field natural      Lab                Lab
## [3679] Lab                Lab                Lab
## [3682] Lab                Lab                Lab
## [3685] Field natural      Field natural      Field natural
## [3688] Lab                Field natural      Lab
## [3691] Lab                Lab                Lab
## [3694] Lab                Lab                Field natural
## [3697] Lab                Lab                Lab
## [3700] Lab                Lab                Lab
## [3703] Lab                Lab                Lab
## [3706] Lab                Lab                Lab
## [3709] Lab                Lab                Lab
## [3712] Lab                Lab                Field artificial
## [3715] Field natural      Field artificial   Field natural
## [3718] Lab                Lab                Lab
## [3721] Lab                Lab                Lab
## [3724] Lab                Lab                Lab
## [3727] Lab                Lab                Lab
## [3730] Lab                Lab                Lab
## [3733] Lab                Field natural      Field natural
## [3736] Field natural      Field natural      Field natural
## [3739] Field natural      Field natural      Field natural
## [3742] Lab                Field natural      Field natural
## [3745] Field natural      Field natural      Field natural
## [3748] Field natural      Field natural      Field natural
## [3751] Field natural      Field natural      Field artificial
## [3754] Field natural      Field natural      Field natural
## [3757] Lab                Lab                Lab
## [3760] Lab                Lab                Field natural
## [3763] Field natural      Field natural      Lab
## [3766] Field natural      Field natural      Field natural
## [3769] Field natural      Field natural      Lab
## [3772] Field natural      Field natural      Lab
## [3775] Lab                Lab                Lab
## [3778] Lab                Lab                Field natural
## [3781] Field natural      Lab                Lab
```

```
## [3784] Lab                Lab                Lab
## [3787] Lab                Lab                Field natural
## [3790] Field natural      Lab                Field natural
## [3793] Field natural      Field natural      Field natural
## [3796] Field natural      Field natural      Field natural
## [3799] Field natural      Field natural      Field natural
## [3802] Field natural      Field natural      Field natural
## [3805] Field natural      Field natural      Field natural
## [3808] Field natural      Field natural      Field natural
## [3811] Field natural      Field natural      Field natural
## [3814] Field natural      Lab                Field natural
## [3817] Field natural      Field natural      Field natural
## [3820] Field natural      Field natural      Lab
## [3823] Lab                Field natural      Field natural
## [3826] Field natural      Lab                Lab
## [3829] Lab                Lab                Lab
## [3832] Field natural      Field natural      Field natural
## [3835] Field natural      Field natural      Lab
## [3838] Lab                Lab                Lab
## [3841] Lab                Lab                Lab
## [3844] Lab                Lab                Lab
## [3847] Field natural      Field natural      Lab
## [3850] Lab                Field natural      Lab
## [3853] Lab                Lab                Lab
## [3856] Lab                Lab                Lab
## [3859] Field natural      Field natural      Lab
## [3862] Lab                Lab                Lab
## [3865] Lab                Lab                Lab
## [3868] Lab                Lab                Lab
## [3871] Lab                Lab                Lab
## [3874] Lab                Lab                Lab
## [3877] Lab                Lab                Lab
## [3880] Lab                Lab                Lab
## [3883] Lab                Lab                Lab
## [3886] Lab                Lab                Lab
## [3889] Lab                Lab                Lab
## [3892] Lab                Lab                Lab
## [3895] Lab                Lab                Lab
## [3898] Lab                Lab                Lab
## [3901] Lab                Lab                Lab
## [3904] Lab                Lab                Lab
## [3907] Lab                Lab                Lab
## [3910] Lab                Lab                Lab
## [3913] Lab                Lab                Lab
## [3916] Lab                Lab                Lab
## [3919] Lab                Lab                Lab
## [3922] Lab                Lab                Lab
## [3925] Lab                Lab                Lab
## [3928] Lab                Lab                Lab
## [3931] Lab                Lab                Lab
## [3934] Lab                Lab                Lab
## [3937] Lab                Lab                Lab
## [3940] Lab                Lab                Lab
## [3943] Lab                Lab                Lab
```

```
## [3946] Field natural       Field natural       Field natural
## [3949] Field natural       Field natural       Field natural
## [3952] Field natural       Field natural       Lab
## [3955] Lab                 Lab                 Lab
## [3958] Field natural       Field natural       Lab
## [3961] Lab                 Lab                 Lab
## [3964] Field natural       Lab                 Lab
## [3967] Lab                 Lab                 Lab
## [3970] Lab                 Lab                 Lab
## [3973] Lab                 Lab                 Lab
## [3976] Lab                 Lab                 Lab
## [3979] Lab                 Lab                 Lab
## [3982] Lab                 Lab                 Lab
## [3985] Field artificial    Lab                 Lab
## [3988] Lab                 Lab                 Lab
## [3991] Lab                 Lab                 Lab
## [3994] Lab                 Lab                 Lab
## [3997] Lab                 Lab                 Lab
## [4000] Lab                 Lab                 Lab
## [4003] Lab                 Lab                 Lab
## [4006] Field artificial    Lab                 Lab
## [4009] Lab                 Lab                 Lab
## [4012] Field natural       Field natural       Field natural
## [4015] Field natural       Field natural       Field natural
## [4018] Field natural       Field natural       Field natural
## [4021] Field natural       Lab                 Lab
## [4024] Lab                 Lab                 Lab
## [4027] Lab                 Lab                 Lab
## [4030] Lab                 Field natural       Field natural
## [4033] Lab                 Lab                 Lab
## [4036] Field natural       Field natural       Field natural
## [4039] Field natural       Field natural       Field natural
## [4042] Field natural       Field natural       Field natural
## [4045] Field natural       Field natural       Field natural
## [4048] Field natural       Field natural       Field natural
## [4051] Field natural       Field natural       Field natural
## [4054] Field natural       Field natural       Field natural
## [4057] Lab                 Lab                 Field natural
## [4060] Lab                 Lab                 Lab
## [4063] Lab                 Field natural       Field natural
## [4066] Field natural       Field natural       Field natural
## [4069] Field natural       Field natural       Field natural
## [4072] Field natural       Field natural       Field natural
## [4075] Lab                 Field natural       Field natural
## [4078] Lab                 Lab                 Field natural
## [4081] Field natural       Field natural       Field natural
## [4084] Field natural       Lab                 Lab
## [4087] Lab                 Lab                 Lab
## [4090] Lab                 Lab                 Lab
## [4093] Lab                 Field natural       Lab
## [4096] Field natural       Lab                 Lab
## [4099] Lab                 Lab                 Lab
## [4102] Field natural       Field natural       Lab
## [4105] Lab                 Lab                 Lab
```

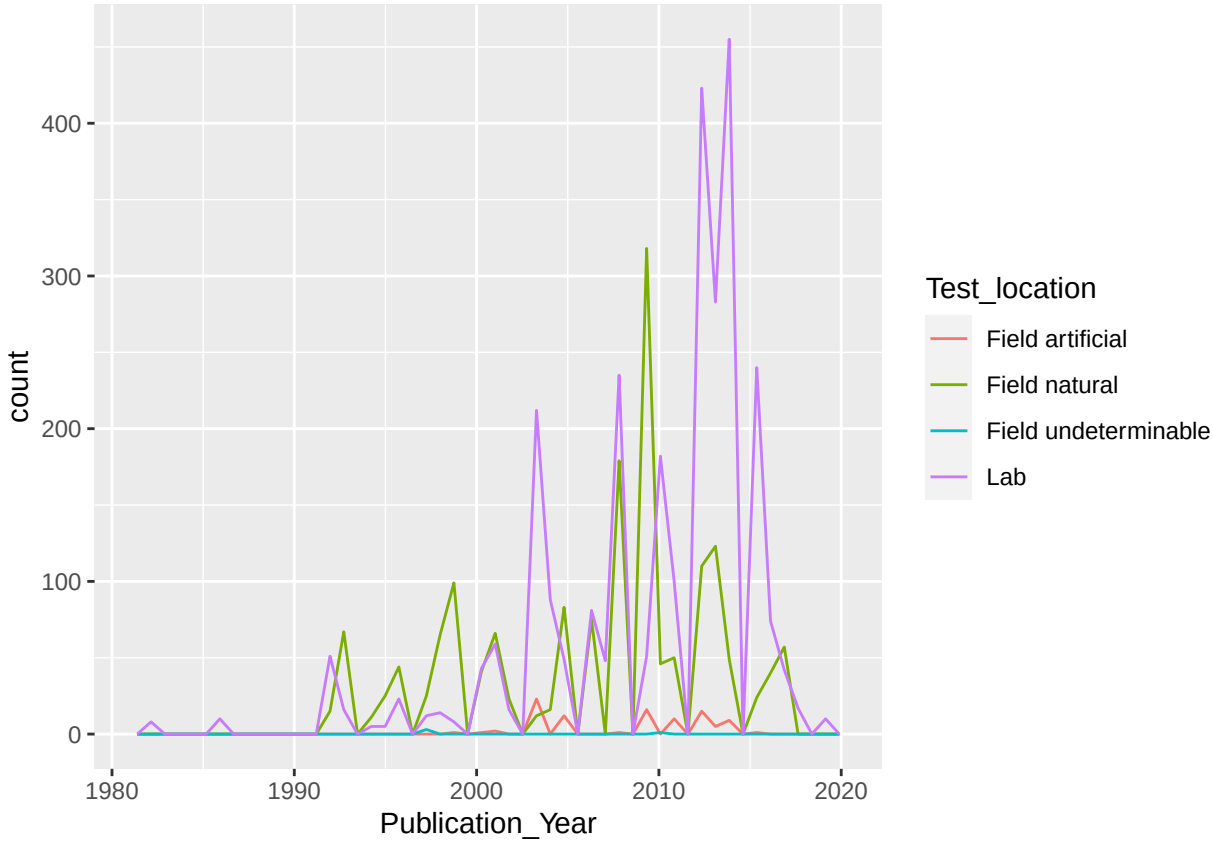
```
## [4108] Lab                 Lab                 Lab
## [4111] Lab                 Lab                 Lab
## [4114] Lab                 Lab                 Lab
## [4117] Lab                 Lab                 Lab
## [4120] Lab                 Lab                 Lab
## [4123] Lab                 Lab                 Lab
## [4126] Lab                 Lab                 Lab
## [4129] Lab                 Lab                 Lab
## [4132] Lab                 Lab                 Lab
## [4135] Lab                 Lab                 Lab
## [4138] Lab                 Lab                 Lab
## [4141] Lab                 Lab                 Lab
## [4144] Lab                 Lab                 Lab
## [4147] Lab                 Lab                 Lab
## [4150] Lab                 Lab                 Lab
## [4153] Lab                 Lab                 Lab
## [4156] Lab                 Lab                 Lab
## [4159] Lab                 Lab                 Lab
## [4162] Lab                 Lab                 Lab
## [4165] Field natural       Field natural       Field natural
## [4168] Field natural       Field natural       Field natural
## [4171] Field natural       Lab                 Lab
## [4174] Lab                 Lab                 Lab
## [4177] Lab                 Lab                 Lab
## [4180] Lab                 Lab                 Lab
## [4183] Lab                 Lab                 Lab
## [4186] Lab                 Lab                 Lab
## [4189] Lab                 Lab                 Lab
## [4192] Field natural       Field natural       Field natural
## [4195] Field natural       Field natural       Field natural
## [4198] Field natural       Field natural       Field natural
## [4201] Lab                 Field natural       Field natural
## [4204] Field natural       Lab                 Lab
## [4207] Lab                 Lab                 Lab
## [4210] Lab                 Lab                 Lab
## [4213] Lab                 Lab                 Lab
## [4216] Lab                 Lab                 Lab
## [4219] Lab                 Lab                 Lab
## [4222] Lab                 Lab                 Field natural
## [4225] Lab                 Lab                 Lab
## [4228] Lab                 Lab                 Lab
## [4231] Lab                 Lab                 Field artificial
## [4234] Lab                 Lab                 Lab
## [4237] Lab                 Lab                 Lab
## [4240] Lab                 Lab                 Lab
## [4243] Lab                 Lab                 Lab
## [4246] Lab                 Lab                 Lab
## [4249] Lab                 Lab                 Lab
## [4252] Lab                 Lab                 Lab
## [4255] Lab                 Field natural       Lab
## [4258] Field artificial    Lab                 Lab
## [4261] Lab                 Lab                 Lab
## [4264] Lab                 Lab                 Lab
## [4267] Lab                 Lab                 Lab
```

```
## [4270] Lab                Lab                Lab
## [4273] Lab                Lab                Lab
## [4276] Lab                Lab                Lab
## [4279] Lab                Lab                Lab
## [4282] Lab                Lab                Lab
## [4285] Lab                Lab                Lab
## [4288] Lab                Lab                Lab
## [4291] Lab                Lab                Lab
## [4294] Lab                Lab                Lab
## [4297] Lab                Lab                Lab
## [4300] Lab                Lab                Lab
## [4303] Lab                Lab                Lab
## [4306] Lab                Lab                Lab
## [4309] Lab                Lab                Lab
## [4312] Lab                Lab                Lab
## [4315] Lab                Lab                Lab
## [4318] Lab                Lab                Lab
## [4321] Lab                Lab                Lab
## [4324] Lab                Lab                Lab
## [4327] Lab                Lab                Lab
## [4330] Lab                Lab                Lab
## [4333] Lab                Lab                Lab
## [4336] Lab                Lab                Lab
## [4339] Lab                Field natural      Field natural
## [4342] Field natural      Field natural      Field natural
## [4345] Field natural      Field natural      Lab
## [4348] Lab                Field natural      Field natural
## [4351] Field natural      Lab                Field natural
## [4354] Lab                Lab                Lab
## [4357] Lab                Lab                Lab
## [4360] Lab                Lab                Lab
## [4363] Lab                Lab                Field natural
## [4366] Lab                Lab                Field natural
## [4369] Field natural      Lab                Lab
## [4372] Lab                Lab                Field natural
## [4375] Field natural      Field natural      Field natural
## [4378] Field natural      Field natural      Field natural
## [4381] Field natural      Field natural      Field natural
## [4384] Lab                Lab                Lab
## [4387] Lab                Field natural      Field natural
## [4390] Field natural      Field natural      Field natural
## [4393] Field natural      Lab                Lab
## [4396] Field natural      Field natural      Lab
## [4399] Lab                Lab                Lab
## [4402] Lab                Lab                Lab
## [4405] Lab                Field natural      Lab
## [4408] Lab                Lab                Lab
## [4411] Lab                Lab                Lab
## [4414] Lab                Lab                Lab
## [4417] Lab                Lab                Lab
## [4420] Field natural      Lab                Field natural
## [4423] Field natural      Field natural      Field natural
## [4426] Field natural      Lab                Lab
## [4429] Lab                Lab                Lab
```

```
## [4432] Lab                Lab                Lab
## [4435] Lab                Lab                Lab
## [4438] Lab                Lab                Field natural
## [4441] Field natural      Field natural      Field natural
## [4444] Field natural      Field natural      Field natural
## [4447] Field natural      Field natural      Field natural
## [4450] Field natural      Field natural      Field natural
## [4453] Field natural      Field natural      Field natural
## [4456] Lab                Field natural      Field natural
## [4459] Field natural      Lab                Lab
## [4462] Lab                Lab                Lab
## [4465] Lab                Lab                Lab
## [4468] Lab                Lab                Lab
## [4471] Lab                Field natural      Field natural
## [4474] Field natural      Field natural      Field natural
## [4477] Field natural      Field natural      Field natural
## [4480] Field natural      Field natural      Field natural
## [4483] Field natural      Field natural      Field natural
## [4486] Field natural      Field natural      Lab
## [4489] Lab                Lab                Lab
## [4492] Lab                Lab                Lab
## [4495] Lab                Lab                Lab
## [4498] Lab                Lab                Lab
## [4501] Lab                Field natural      Field natural
## [4504] Field natural      Field natural      Field natural
## [4507] Field natural      Lab                Lab
## [4510] Lab                Field natural      Field natural
## [4513] Field natural      Field natural      Field natural
## [4516] Field natural      Field natural      Field natural
## [4519] Field natural      Field natural      Field natural
## [4522] Field natural      Field natural      Field natural
## [4525] Field natural      Field natural      Field natural
## [4528] Lab                Lab                Field natural
## [4531] Field natural      Field natural      Field natural
## [4534] Field natural      Field natural      Field natural
## [4537] Lab                Lab                Lab
## [4540] Lab                Lab                Lab
## [4543] Lab                Lab                Lab
## [4546] Lab                Lab                Lab
## [4549] Lab                Field natural      Field natural
## [4552] Lab                Field natural      Field natural
## [4555] Field natural      Field natural      Field natural
## [4558] Field natural      Lab                Field natural
## [4561] Field natural      Field natural      Lab
## [4564] Lab                Lab                Field natural
## [4567] Field natural      Field natural      Field natural
## [4570] Field natural      Field natural      Field natural
## [4573] Field natural      Field natural      Field natural
## [4576] Field natural      Field natural      Field natural
## [4579] Field natural      Field natural      Field natural
## [4582] Field natural      Field natural      Field natural
## [4585] Field natural      Field natural      Field natural
## [4588] Field natural      Field natural      Field natural
## [4591] Field natural      Field natural      Field natural
```

```
## [4594] Field natural        Field natural        Field natural
## [4597] Field natural        Field natural        Field natural
## [4600] Field natural        Field natural        Field natural
## [4603] Field natural        Field natural        Field natural
## [4606] Field natural        Field natural        Field natural
## [4609] Lab                  Lab                  Lab
## [4612] Field natural        Field natural        Field natural
## [4615] Field natural        Lab                  Lab
## [4618] Lab                  Field artificial     Lab
## [4621] Lab                  Field natural        Field natural
## Levels: Field artificial Field natural Field undeterminable Lab
```

```
ggplot(Neonics) +
  geom_freqpoly(aes(x = Publication_Year, color = Test_location), bins = 50)
```




```
#ran frequency polygraph for the publication year and formatted
#it so the each test location was a different color
```

Interpret this graph. What are the most common test locations, and do they differ over time?

> Answer: The most common test locations are "Field natural" and "Lab". "Field natural" was more common and would compete with "lab" locations but in recent years, "lab" locations are dominating in terms of frequency.

11. Create a bar graph of Endpoint counts. What are the two most common end points, and how are they defined? Consult the ECOTOX_CodeAppendix for more information.

[**TIP**: Add `theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))` to the end of your plot command to rotate and align the X-axis labels...]

```
Endpoint <- Neonics$Endpoint #set endpoint vector
Endpoint #called back endpoint
```

```
##    [1] LD50    LD50    LC50    LC50    LC50    LC50    LC50    LC50    LC50
##   [10] LC50    LC50    LC50    IC50    IC50    LOEL    LOEL    NR      NR-ZERO
##   [19] LC50    LC95    LC50    LC95    LC50    LC95    LC50    LC95    LC50
##   [28] LC95    LOEL    LOEL    LC50    LC50    LC90    LC90    NOEL    LOEL
##   [37] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    NOEL    NOEL
##   [46] LD50    LD50    LD50    LD50    LD50    LD50    LD50    LOEC    NOEL
##   [55] NOEL    NOEL    NOEL    NR-ZERO NR-ZERO LD50    LOEL    LOEL    LOEL
##   [64] NR      NR      NR      NR      NR-ZERO NR      NOEL    LOEL    LOEL
##   [73] LOEL    NOEL    EC50    LC50    LOEC    LOEC    NOEC    NR      NR-LETH
##   [82] NR-ZERO LOEL    LOEL    LOEL    NOEL    LOEL    NOEL    LOEL    LC50
##   [91] LC90    LOEL    LOEL    LC50    LC50    LC50    LC50    LC50    LC50
##  [100] LC50    LC50    LC50    LC50    LC50    LC50    LC50    LC90    NR
##  [109] NOEL    NOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
##  [118] NOEL    LOEL    LOEL    LC50    LOEL    NOEL    LOEL    NOEL    LOEL
##  [127] LOEL    NOEL    NR-ZERO LD50    NOEL    LOEL    NR-LETH LOEL    LOEL
##  [136] LOEL    NOEL    LOEL    LOEL    LC50    LC95    LC50    LC95    LC50
##  [145] LC95    LC50    LC95    LC50    LC95    LOEL    LOEL    LOEL    LOEL
##  [154] LOEL    NOEL    NOEL    LOEL    LC50    LOEL    LC50    LC50    LOEL
##  [163] LC50    LOEL    LOEL    NOEL    LOEL    LOEL    NOEL    LOEL    LOEL
##  [172] NOEL    NOEL    LOEL    LOEL    LOEL    NR-LETH LOEL    LOEL    NOEL
##  [181] LC50    LOEL    LOEL    LOEL    NOEL    NOEL    NR-ZERO LOEL    LOEL
##  [190] LOEL    LOEL    LOEL    LOEL    IC50    IC50    LD50    LD50    LD50
##  [199] LD50    LD50    LD90    LOEC    LOEL    LOEL    LOEL    LOEL    LOEL
##  [208] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    NOEC
##  [217] NOEC    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
##  [226] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
##  [235] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
##  [244] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
##  [253] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
##  [262] NOEL    NR      NR      NR      NR      NR      NR-LETH NR-ZERO NR-ZERO
##  [271] NR-ZERO LOEL    LOEL    NOEL    NOEL    LOEL    LOEL    NOEL    NOEL
##  [280] NOEL    NOEL    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL
##  [289] NOEL    NOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    LD50
##  [298] LD50    NOEL    NOEL    LC10    LC50    LC90    LOEL    LOEL    NOEL
##  [307] NOEL    NR-LETH NOEL    LOEL    NOEL    LOEL    LOEL    LOEL    LC50
##  [316] LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    LOEL    NOEL
##  [325] LOEL    LOEL    NR-LETH LC50    NOEL    LOEL    LOEL    LOEL    LC50
##  [334] LOEL    LC50    LOEL    NOEL    LOEL    NOEL    NOEL    NOEL    NOEL
##  [343] NOEL    LC50    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
##  [352] NOEL    NOEL    LC50    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
##  [361] LOEL    LOEL    NOEL    LOEL    LOEL    NOEL    NOEL    LOEL    LOEL
##  [370] NOEL    LOEL    LOEL    LOEL    LOEL    NOEL    NOEL    LOEL    NOEL
##  [379] NOEL    LC50    LC50    LC50    LC50    LC50    LC50    LC50    LC50
##  [388] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    NR-LETH NR-LETH
##  [397] NR-LETH NR-LETH NR-LETH LOEL    LOEL    NOEL    LOEL    LOEL    NOEL
##  [406] NOEL    LOEL    NOEL    LOEL    LC50    LOEL    LOEL    LOEL    LC50
##  [415] LC50    LC95    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    LOEL
##  [424] LOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NR-LETH LOEL
##  [433] NOEL    NOEL    LOEL    NOEL    LOEL    NOEL    NOEL    NOEL    NOEL
##  [442] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
##  [451] LC50    LOEL    LOEL    LT50    NOEL    NOEL    NOEL    LOEL    LOEL
```

```
##  [460] LOEL     LC50     LOEL     LOEL     LOEL     NOEL     NOEL     LOEL     LOEL
##  [469] NOEL     LOEL     LOEL     LD50     LD50     LD90     NOEL     NOEL     NOEL
##  [478] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     LC50     LC50
##  [487] LC50     LC50     LOEL     NOEL     LOEL     NOEL     NOEL     NOEL     NOEL
##  [496] LOEL     NOEL     LOEL     LOEL     NOEL     NOEL     NOEL     LC50     LOEL
##  [505] LOEL     LOEL     LOEL     LOEL     LC50     NOEL     NOEL     LOEL     LOEL
##  [514] LC50     LC50     LC50     LC50     LC95     NR       NR       NR-LETH  NR-LETH
##  [523] LC50     LC50     LC95     LC50     LC95     LC50     LC50     LC95     LC50
##  [532] LC50     LC95     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [541] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [550] NOEL     NOEL     LOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [559] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
##  [568] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [577] LOEL     LOEL     LOEL     LOEL     LOEL     NR-LETH  NOEL     LOEL     LOEL
##  [586] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
##  [595] NR-LETH  NR-LETH  LC50     LC50     LC50     LC50     LC50     LOEL     LOEL
##  [604] LC50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [613] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LC50     LC50
##  [622] LC50     LC50     LC50     LC90     LD50     LD50     NOEL     NOEL     LOEL
##  [631] LOEL     NR-LETH  NR       NR       LC50     LOEL     LOEL     LOEL     LC50
##  [640] LC90     LOEL     LT50     LT90     NOEL     NOEL     NOEL     NOEL     NOEL
##  [649] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [658] NOEL     NOEL     NR       NR       LOEL     LOEL     LOEL     NOEL     NR-ZERO
##  [667] LOEL     LOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [676] LC50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
##  [685] NOEL     NOEL     NOEL     NOEL     NR-LETH  NOEL     LOEL     NR-LETH  LT25
##  [694] LT50     NOEL     NOEL     NOEL     NOEL     NOEL     NR       NR       NR
##  [703] NR-LETH  NR-LETH  NR-LETH  LOEL     LC50     LC50     LC90     LC90     LOEL
##  [712] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     LOEL     LOEL
##  [721] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     LC50     NOEL
##  [730] LC50     LC90     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [739] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
##  [748] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [757] NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     LC50     LC75     LC90
##  [766] LOEC     LOEL     NR-ZERO  LOEL     LOEL     LOEL     NOEL     LOEL     LOEL
##  [775] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [784] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [793] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NR       NR
##  [802] NR       NR       NR       NR       NR       NR       LOEL     LC50     LOEL
##  [811] LOEL     NOEL     LT50     LT50     LT50     LT50     LT50     LT50     LT50
##  [820] LT50     LC50     LC50     LC50     LD50     LD50     LD50     LD50     LD50
##  [829] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
##  [838] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
##  [847] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
##  [856] LD50     LD90     LOEC     LOEC     LOEC     LOEC     LOEC     LOEL     LOEL
##  [865] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [874] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [883] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [892] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [901] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [910] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [919] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
##  [928] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LT50     LT50
##  [937] LT50     LT50     LT50     NOEC     NOEC     NOEC     NOEC     NOEC     NOEC
```

```
##  [946] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [955] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [964] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [973] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [982] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
##  [991] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1000] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1009] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1018] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1027] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1036] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1045] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1054] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1063] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1072] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1081] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1090] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1099] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1108] NOEL     NR       NR       NR       NR       NR       NR       NR       NR
## [1117] NR       NR       NR       NR       NR       NR       NR       NR       NR
## [1126] NR-ZERO  LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [1135] LD50     LD50     LD50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1144] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1153] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1162] LOEL     LOEL     NOEC     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1171] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1180] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1189] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1198] NOEL     NOEL     NOEL     NOEL     NR       NR       NR       NR       NR
## [1207] NR       NR       NR       NR       NR       NR       NR       NR       NR
## [1216] NR       LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [1225] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [1234] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [1243] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [1252] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1261] NOEL     NOEL     NOEL     NR       LOEL     LOEL     LOEL     LOEL     NOEL
## [1270] NOEL     NOEL     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [1279] LD50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1288] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL
## [1297] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1306] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1315] NOEL     NOEL     NR       NR       NR       NR       NR       NR       NR
## [1324] NR       LOEL     NOEL     NOEL     NR       NR-ZERO  LOEL     LOEL     LOEL
## [1333] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
## [1342] NOEL     NR       LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL
## [1351] NOEL     NOEL     NOEL     NOEL     LD30     LD50     LOEL     LOEL     LOEL
## [1360] LOEL     LC50     LOEL     NOEL     LC50     LOEL     LOEL     NOEL     LOEL
## [1369] LOEL     LOEL     LOEL     LOEL     LOEL     LC50     LC50     LOEL     LOEL
## [1378] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1387] NOEL     NOEL     NOEL     NOEL     NOEL     LC50     LOEL     LOEL     LOEL
## [1396] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1405] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1414] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1423] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
```

```
## [1432] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1441] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NR       NR-LETH
## [1450] NR-LETH EC50     EC50     LC50     LC50     LD50     LD50     LD50     LOEC
## [1459] LOEC     LOEC     LOEC     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1468] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1477] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1486] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1495] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1504] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEC     NOEC
## [1513] NOEC     NOEC     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1522] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1531] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1540] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1549] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1558] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1567] NOEL     NOEL     NOEL     NOEL     NOEL     NR       NR       NR       NR
## [1576] NR       NR       NR       NR       NR       NR       NR       NR       NR-LETH
## [1585] NR-LETH NR-LETH NR-LETH NR-LETH NR-LETH NR-LETH NR-ZERO NR-ZERO NR-ZERO
## [1594] EC10     EC10     EC10     EC10     EC10     EC10     EC50     EC50     EC50
## [1603] EC50     EC50     EC50     LOEL     NOEL     NOEL     NR       NR       NR
## [1612] NR       NR       NR       NR       NR       LOEL     LOEL     LOEL     LOEL
## [1621] LOEL     NOEL     NOEL     NOEL     LOEL     NOEL     NOEL     NR-ZERO LC50
## [1630] LC50     LC50     LC50     LC50     LC50     LC50     LC50     LOEL     LOEL
## [1639] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL
## [1648] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1657] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL
## [1666] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1675] LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1684] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL
## [1693] LOEL     NOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NR       NOEL
## [1702] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NR-ZERO
## [1711] LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1720] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1729] NOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1738] EC50     LC50     LC50     LD50     LD50     LD50     LD50     LD50     LD50
## [1747] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [1756] LD50     LD50     LD50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1765] LOEL     LT50     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1774] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LC50
## [1783] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1792] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1801] NR-LETH LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1810] NOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1819] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL
## [1828] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1837] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1846] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL     LOEL
## [1855] NOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LC50     LC50     LC50
## [1864] NR       LOEL     LOEL     NOEL     NR       LOEL     LC50     LC50     LC90
## [1873] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
## [1882] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1891] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1900] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     LC50     LC90
## [1909] NOEL     LC50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
```

```
## [1918] NOEL     NOEL     LOEL     LOEL     LC50     LC50     LC50     LC50     LC50
## [1927] LC50     LC50     LC50     LC50     LC50     LOEL     LOEL     LOEL     LOEL
## [1936] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1945] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1954] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1963] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [1972] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1981] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [1990] NOEL     NOEL     NOEL     LOEL     NOEL     NOEL     NOEL     NR-LETH  LOEL
## [1999] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2008] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [2017] NOEL     NOEL     NOEL     NOEL     LC50     LOEL     LOEL     LC10     LC25
## [2026] LC50     LC90     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2035] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2044] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2053] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL
## [2062] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     LOEL     LOEL     LOEL
## [2071] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2080] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NR       LC50
## [2089] LC10     LC50     LC90     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2098] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2107] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
## [2116] NOEL     NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     NOEL     NOEL
## [2125] NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     LOEL     NR       LOEL
## [2134] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL     LT50     LT50
## [2143] LT50     LT50     NOEL     NOEL     NOEL     LOEL     LOEL     NOEL     NOEL
## [2152] NOEL     NOEL     LC50     NOEL     LC50     LC50     LC50     LC50     LC50
## [2161] LC50     LC50     LC50     LC50     LC50     LC50     LC50     LC50     LC50
## [2170] LC50     LC50     LC50     LC50     LC50     LC50     LD50     LC50     LC50
## [2179] LC50     LC90     LC90     LC90     LT50     LT50     LT50     LT50     LT90
## [2188] LT90     LT90     LT90     LC50     LC50     LC50     LC50     LC50     LC50
## [2197] LC50     LC50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2206] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2215] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NR       NR-LETH  NR-LETH
## [2224] NR-LETH  NR-ZERO  NR-ZERO  NR-ZERO  LC50     NOEL     NOEL     NOEL     NOEL
## [2233] NOEL     NOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2242] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2251] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL
## [2260] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2269] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2278] NOEL     NOEL     NOEL     LD50     LD50     LD50     LD50     LOEL     LOEL
## [2287] LT50     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL
## [2296] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2305] NOEL     NOEL     LD50     NOEL     NOEC     NOEL     NOEL     NOEL     NOEL
## [2314] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2323] NOEL     NOEL     NOEL     NOEL     NOEL     LOEL     NOEL     NOEL     NOEL
## [2332] NOEL     NOEL     NOEL     LOEC     LOEL     LOEL     LOEL     NOEC     NOEL
## [2341] NR       NR       LOEL     NOEL     LD50     LD50     LD50     LD50     LD90
## [2350] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2359] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NR       NOEL
## [2368] NR-LETH  NOEL     NOEL     NOEL     NR       LC50     LC95     LOEL     LOEL
## [2377] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     LC10
## [2386] LC20     LC50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [2395] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
```

```
## [2404] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2413] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2422] LOEL    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [2431] NOEL    NOEL    NR      LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2440] LOEL    LOEL    LOEL    LOEL    LOEL    LT50    NOEL    NOEL    NOEL
## [2449] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    LOEL    NOEL    NOEL
## [2458] NOEL    NOEL    NOEL    NOEL    LOEL    NOEL    NOEL    NR      LC50
## [2467] LD50    NOEL    NOEL    NOEL    LD05    LD50    LOEL    LOEL    LOEL
## [2476] NOEL    NOEL    NOEL    LT50    LT50    LT50    LT50    LT50    LT50
## [2485] LT50    LT50    LT50    LT50    LT50    LT50    LT50    LT50    LT50
## [2494] LT50    LT50    NOEL    NOEL    NR      NR      NR      NOEL    NOEL
## [2503] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    LOEL
## [2512] NOEL    NOEL    NOEL    LC50    LOEL    LOEL    LOEL    LOEL    LOEL
## [2521] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2530] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LC50
## [2539] LC50    LOEL    LOEL    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL
## [2548] NOEL    NOEL    NOEL    NOEL    LD50    LC50    LOEL    LOEL    LOEL
## [2557] LOEL    NOEL    LC50    LOEL    LOEL    NOEL    LOEL    LOEL    LC50
## [2566] LC50    LOEL    NOEL    NOEL    NOEL    NOEL    NOEL    LOEL    LD50
## [2575] NOEL    NOEL    NOEL    LOEL    LOEL    LOEL    NR      NOEL    LC50
## [2584] LOEL    NOEL    NOEL    NOEL    NR-ZERO NOEL    NOEL    NOEL    NOEL
## [2593] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    LC50    LOEL
## [2602] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2611] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2620] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2629] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NR-LETH NR-LETH NR-LETH
## [2638] LC10    LC10    LC10    LC10    LC50    LC50    LC50    LC50    LC90
## [2647] LC90    LC90    LC90    NR-LETH NR-LETH NOEL    NOEL    LD50    LD90
## [2656] LC50    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [2665] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [2674] NOEL    LOEL    LOEL    LOEL    NOEL    LOEL    NOEL    NOEL    NOEL
## [2683] NOEL    LC50    LC50    LOEL    LOEL    LOEL    LOEL    LOEL    NOEL
## [2692] NOEL    NOEL    NOEL    NR-ZERO NOEL    NOEL    NOEL    LC50    LC50
## [2701] LC50    LOEL    NOEL    NOEL    NOEL    LOEL    LOEL    LOEL    LOEL
## [2710] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    NOEL
## [2719] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NR-ZERO NR-ZERO
## [2728] LOEL    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [2737] LOEL    NOEL    NOEL    LOEL    NOEL    NOEL    LOEL    LOEL    LOEL
## [2746] NOEL    LC50    LC50    LC50    LD50    LD50    LOEL    LOEL    NOEL
## [2755] LC50    LC50    LC50    LC50    LC50    LC50    LC50    LC95    LOEL
## [2764] LOEL    NOEL    NOEL    NOEL    NOEL    LOEL    LOEL    LOEL    LOEL
## [2773] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2782] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2791] LOEL    LOEL    LOEL    NOEC    NOEL    NOEL    NOEL    NOEL    NOEL
## [2800] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NR
## [2809] LOEL    LOEL    LOEL    LC50    LOEL    LOEL    LOEL    NOEL    NOEL
## [2818] NOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    NOEL
## [2827] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    LOEL    LOEL    LOEL
## [2836] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [2845] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    NOEL    NOEL
## [2854] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [2863] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [2872] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [2881] NR      LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    LOEL    LOEL
```

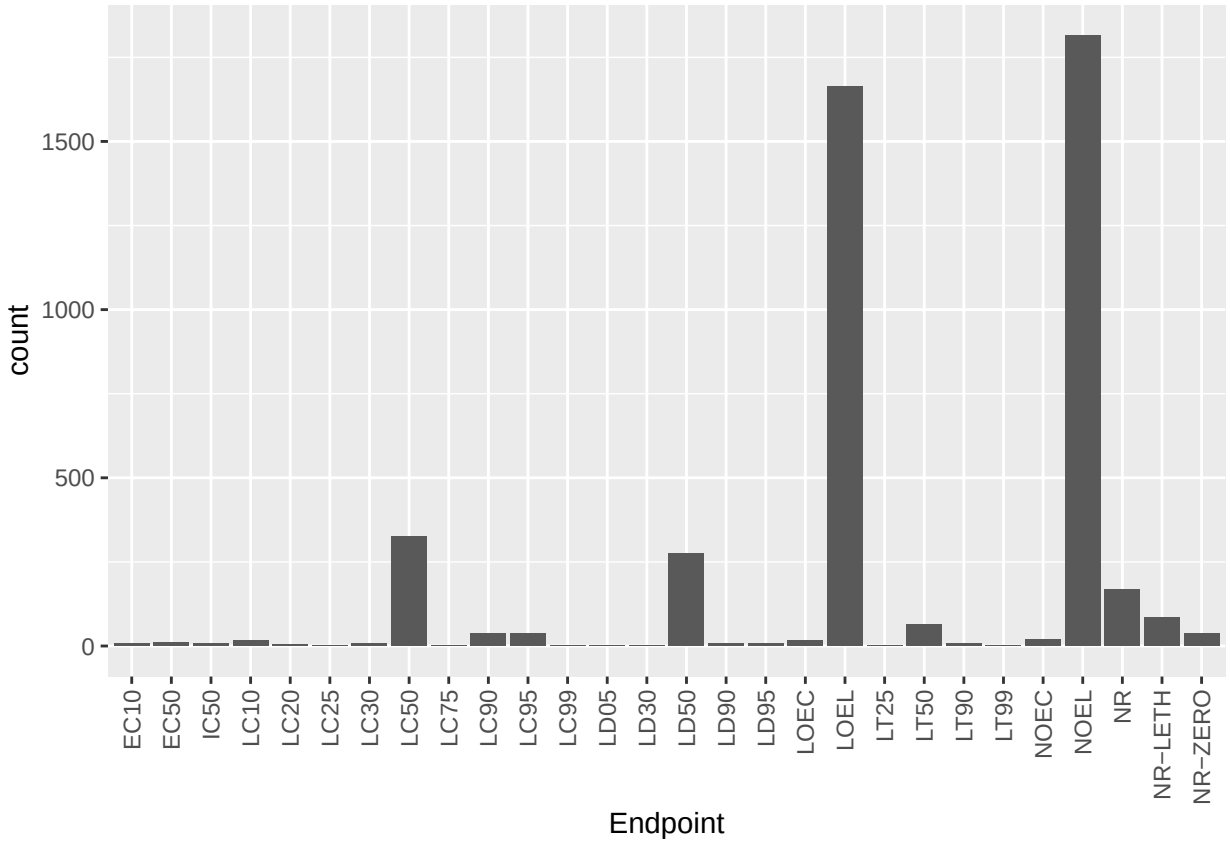
```
## [2890] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NR       NR       NR-LETH
## [2899] NR-LETH LOEL     LOEL     LOEL     NOEL     LOEL     LOEL     LOEL     LOEL
## [2908] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
## [2917] NR-LETH NR-LETH NOEL     NOEL     LD50     LD90     LOEL     LOEL     LOEL
## [2926] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2935] NOEL     NR       NOEL     NOEL     LOEL     LOEL     NOEL     NOEL     NOEL
## [2944] LC50     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
## [2953] NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [2962] LOEL     LOEL     LOEL     NOEL     LOEL     LOEL     NOEL     NOEL     NR-ZERO
## [2971] LC50     LC50     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [2980] NOEL     LOEL     LOEL     NR-LETH LOEL     LOEL     LOEL     LOEL     LOEL
## [2989] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [2998] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3007] NOEL     NOEL     LOEL     LOEL     LC50     NOEL     NR       LC50     LC90
## [3016] LC99     LOEL     LT50     LT50     LT99     NOEL     LC50     LOEL     LOEL
## [3025] NR       NR       NR       NR       NR-LETH NR-LETH LOEL     LOEL     NR-LETH
## [3034] LOEL     LC50     LOEL     LOEL     NOEL     LOEL     LOEL     NOEL     NOEL
## [3043] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3052] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3061] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [3070] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3079] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL
## [3088] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3097] LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3106] NOEL     NOEL     NOEL     NOEL     NR-LETH NR-LETH NR-LETH LOEL     LOEL
## [3115] LOEL     LC50     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
## [3124] NOEL     NOEL     NOEL     NR-LETH LC10     LC50     LC90     LOEL     LOEL
## [3133] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3142] LC50     LC50     LC50     LC50     LC95     LC95     LOEL     LOEL     NR
## [3151] NR-LETH LC50     LC50     LC95     LC50     LC95     LC50     LC50     LC95
## [3160] LC10     LC30     LC50     LC50     LC50     LC90     LC95     LOEL     NOEL
## [3169] NOEL     NOEL     LOEL     LOEL     NR-LETH NR-LETH LOEL     LOEL     LOEL
## [3178] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [3187] LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3196] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3205] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3214] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3223] LOEL     NOEL     LOEL     LC50     NR       NR-LETH LC50     NOEL     NOEL
## [3232] NOEL     NOEL     NOEL     LD50     LC50     LC50     LC50     LC50     LC95
## [3241] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [3250] NOEL     NOEL     LC50     LC95     LC50     LC95     LC50     LC95     LC10
## [3259] LC30     LC50     LC50     LC90     LC95     NOEL     NOEL     NOEL     NOEL
## [3268] LOEL     NOEL     LC50     LOEL     LC50     LOEL     LC50     LC90     LT50
## [3277] LT90     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3286] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL
## [3295] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     LOEL     LOEL
## [3304] LC50     LOEL     NR-LETH LC50     LC90     NOEL     NR       NR-LETH NOEL
## [3313] LOEL     LOEL     NOEL     NOEL     LC50     LC50     LC90     LC90     LOEL
## [3322] NOEL     NOEL     NOEL     NOEL     LOEL     NOEL     LC50     NR-LETH LOEL
## [3331] LC50     LC50     LC50     LC50     LC50     LC50     LC50     LC50     LC50
## [3340] LC50     LC50     LC50     LC50     LC50     LC50     LC50     LD50     LD50
## [3349] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [3358] LD50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3367] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
```

```
## [3376] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LT50     LT50
## [3385] LT50     LT50     NOEC     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3394] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3403] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3412] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3421] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3430] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3439] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3448] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3457] NOEL     NOEL     NOEL     NOEL     NR       NR       NR       NR       NR
## [3466] NR       NR       NR       NR       NR       NR       NR       NR       NR
## [3475] NR       NR       NR       NR       NR       NR       NR-LETH  NR-LETH  NR-LETH
## [3484] NR-LETH  NR-LETH  NR-ZERO  NR-ZERO  NR-ZERO  NR-ZERO  NR-ZERO  LD50     LD50
## [3493] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [3502] LD50     LOEL     LOEL     LOEL     LOEL     LD50     LD50     LD50     LD50
## [3511] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [3520] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [3529] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [3538] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [3547] LD50     LD50     LOEL     LOEL     LOEL     NOEL     NOEL     LOEL     LOEL
## [3556] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     EC50
## [3565] LC50     LOEC     LOEC     LOEL     LOEL     LOEL     NOEC     NOEL     NOEL
## [3574] NOEL     NOEL     NOEL     NOEL     NR       NR-LETH  LOEL     LOEL     LOEL
## [3583] LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3592] NOEL     NOEL     NOEL     NR       LC50     LC50     LC50     LC50     NOEL
## [3601] NOEL     LC20     LC50     LOEL     LOEL     LOEL     NOEL     LOEL     LOEL
## [3610] LOEL     NR-ZERO  LOEL     LOEL     LOEL     LC50     LOEL     LOEL     LOEL
## [3619] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3628] NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     NOEL     NOEL     LC50
## [3637] LC90     LOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LC20     LC50
## [3646] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3655] LOEL     NOEL     NOEL     LC50     LOEL     LOEL     LOEL     LOEL     LOEL
## [3664] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3673] LC50     NOEL     NOEL     NOEL     LOEL     LOEL     NOEL     NOEL     LT50
## [3682] LT50     LT50     LT50     LOEL     LOEL     NOEL     LC50     LOEL     LC50
## [3691] LT50     LT50     LT50     NR-LETH  NR-LETH  NOEL     LC50     LC50     LC50
## [3700] LC50     LC50     LC50     LC50     LOEL     NOEL     NOEL     NOEL     NOEL
## [3709] NOEL     NOEL     NR       NR-ZERO  NR-ZERO  LOEL     NOEL     NOEL     NOEL
## [3718] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LC10
## [3727] LC30     LC30     LC50     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL
## [3736] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     LC50     LOEL     LOEL
## [3745] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3754] LOEL     NOEL     NOEL     LOEL     LOEL     LOEL     NOEL     NOEL     LOEL
## [3763] NOEL     NOEL     LC50     LOEL     LOEL     LOEL     LOEL     LOEL     LD50
## [3772] NOEL     LOEL     LT50     LT50     NR-LETH  LC20     LC50     LC50     LOEL
## [3781] LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3790] NOEL     NR-LETH  LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3799] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3808] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL
## [3817] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NR       LOEL
## [3826] LOEL     LOEL     LOEL     LOEL     LOEL     NR-LETH  LOEL     LOEL     NOEL
## [3835] NOEL     LOEL     LC50     NR-LETH  LC50     LC90     LC99     LOEL     LT50
## [3844] LT50     LT99     NR-ZERO  LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3853] LOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     LOEL
```

```
## [3862] NOEL     LC50     LC50     LC50     LC50     LC50     LC95     LC95     LOEL
## [3871] LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL
## [3880] NOEL     NR       NR       NR-LETH  LC50     LC50     LC95     LOEL     LOEL
## [3889] LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     LC50     LC95
## [3898] LC50     LC95     LC10     LC30     LC50     LC50     LC50     LC90     LC95
## [3907] LOEL     LOEL     NOEL     NOEL     LC90     LC50     LT50     LT50     LOEL
## [3916] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3925] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [3934] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3943] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3952] NOEL     NOEL     LD50     LD50     LD95     LD95     NOEL     NOEL     LD50
## [3961] LD50     LD95     LD95     NOEL     LC50     NOEL     IC50     IC50     LD50
## [3970] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LOEL
## [3979] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [3988] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [3997] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4006] NOEL     NOEL     NOEL     NOEL     NOEL     NR       NOEL     LOEL     NOEL
## [4015] NOEL     NOEL     LOEL     LOEL     LOEL     NOEL     NOEL     LOEL     LOEL
## [4024] NR-LETH  LD50     LD50     LD50     LD95     LD95     LD95     NOEL     NOEL
## [4033] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [4042] LOEL     NOEL     NOEL     NOEL     NR       NR       NR       LOEL     LOEL
## [4051] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NR
## [4060] LOEL     LOEL     LOEL     NOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [4069] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LC50     NOEL     NOEL
## [4078] NOEL     NOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [4087] LOEL     LOEL     LOEL     LOEL     NR-LETH  NR-LETH  NR-ZERO  NOEL     LC50
## [4096] NOEL     NOEL     NOEL     NOEL     NOEL     NR-LETH  LOEL     LOEL     LC50
## [4105] LC50     LC50     LC10     LC30     LC50     LC50     LC90     LOEL     LOEL
## [4114] LOEL     NOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [4123] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL
## [4132] NOEL     NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     LOEL     LOEL
## [4141] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [4150] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4159] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4168] NOEL     NOEL     NOEL     NOEL     LC50     LC90     LT50     LT90     NOEL
## [4177] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4186] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     LOEL     LOEL     LOEL
## [4195] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NR-LETH  LOEL     LOEL
## [4204] NOEL     LC50     LC50     LC50     LC50     LC50     LC50     LC50     LD50
## [4213] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [4222] LD50     LD50     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [4231] LOEL     LOEL     LOEL     LOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4240] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4249] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4258] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NR       NR
## [4267] NR       LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL
## [4276] LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     LOEL     NOEL     NOEL
## [4285] NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL     NOEL
## [4294] NOEL     NOEL     NOEL     NOEL     NR       NR       NR       LD50     LD50
## [4303] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [4312] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [4321] LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50     LD50
## [4330] LD50     LD50     LOEL     LOEL     LD50     LD50     LD50     LD50     LD50
## [4339] LD50     LOEL     LOEL     NOEL     LOEL     NOEL     LOEL     LOEL     LC50
```

```
## [4348] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [4357] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [4366] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [4375] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [4384] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4393] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4402] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4411] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4420] NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NR-LETH LOEL
## [4429] LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4438] NOEL    NR-LETH NOEL    LOEL    NOEL    NOEL    LOEL    LOEL    LOEL
## [4447] LOEL    LOEL    NOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [4456] LOEL    NOEL    LOEL    LOEL    LOEL    LOEL    NR-LETH LOEL    LOEL
## [4465] NOEL    NOEL    NR-LETH LOEL    LOEL    NR-LETH LC50    LOEL    LOEL
## [4474] LOEL    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4483] NOEL    NOEL    NOEL    NOEL    NOEL    LOEL    LC10    LC20    LC50
## [4492] LC90    LOEL    NOEL    NOEL    NOEL    NOEL    NR      NR      NR
## [4501] NR      LOEL    LOEL    LOEL    LOEL    LOEL    NOEL    LD50    LOEL
## [4510] LOEL    NOEL    NOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [4519] NOEL    LOEL    LOEL    NOEL    NOEL    LOEL    LOEL    NOEL    NOEL
## [4528] NR      NR      NOEL    NOEL    NOEL    NOEL    LOEL    LOEL    LOEL
## [4537] LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    LOEL    NOEL    NOEL
## [4546] NOEL    NOEL    NOEL    NR-LETH NOEL    NOEL    LC50    NOEL    NOEL
## [4555] NOEL    NOEL    NOEL    NOEL    LC50    LOEL    NOEL    NOEL    LOEL
## [4564] LOEL    LC50    LOEL    LOEL    NOEL    NOEL    LOEL    LOEL    LOEL
## [4573] LOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4582] NOEL    NOEL    NOEL    NOEL    LOEL    LOEL    LOEL    LOEL    LOEL
## [4591] LOEL    LOEL    LOEL    LOEL    NOEL    NOEL    NOEL    NOEL    NOEL
## [4600] NOEL    NOEL    NOEL    NOEL    NOEL    LOEL    LOEL    LOEL    NOEL
## [4609] LOEL    LOEL    NOEL    LOEL    NOEL    LOEL    LOEL    LOEL    NR
## [4618] LOEL    NOEL    LC50    LC95    NOEL    NOEL
## 28 Levels: EC10 EC50 IC50 LC10 LC20 LC25 LC30 LC50 LC75 LC90 LC95 LC99 ... NR-ZERO
```

```
ggplot(Neonics, aes(x = Endpoint)) + geom_bar() +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))
```




```
# created a bar graph of neonics endpoints and formatted to make the xaxis easier ro read
```

Answer: The two most common endpoints are LOEL and NOEL. LOEL is defined as Lowest-observable-effect-level. NOEL is defined as No-observable-effect-level.

Explore your data (Litter)

12. Determine the class of collectDate. Is it a date? If not, change to a date and confirm the new class of the variable. Using the `unique` function, determine which dates litter was sampled in August 2018.

```
class(Litter$collectDate) #checked the class, it was factor
```

```
## [1] "factor"
```

```
Litter$collectDate <- as.Date(Litter$collectDate) #changed the class to date using
#as.date function
class(Litter$collectDate)#checked that the class is now date
```

```
## [1] "Date"
```

```
august_2018 <- unique(Litter$collectDate[month(Litter$collectDate) == 8])
#used unique function to filter out the dates in august 2018
august_2018 #called back to check that it worked
```

```
## [1] "2018-08-02" "2018-08-30"
```

13. Using the `unique` function, determine how many plots were sampled at Niwot Ridge. How is the information obtained from `unique` different from that obtained from `summary`?

```
niwot_ridge_plots <- unique(Litter$plotID) #used the unique function to show how
#many samples were taken at Niwot Ridge
niwot_ridge_plots #called back
```

```
##  [1] NIWO_061 NIWO_064 NIWO_067 NIWO_040 NIWO_041 NIWO_063 NIWO_047 NIWO_051
##  [9] NIWO_058 NIWO_046 NIWO_062 NIWO_057
## 12 Levels: NIWO_040 NIWO_041 NIWO_046 NIWO_047 NIWO_051 NIWO_057 ... NIWO_067
```

Answer: 12 plots were sampled. The unique function only gives you unique values but doesn't give you any other data like how often each unique value was present in the data like the summary function does. Thats why its good for filtering out data.

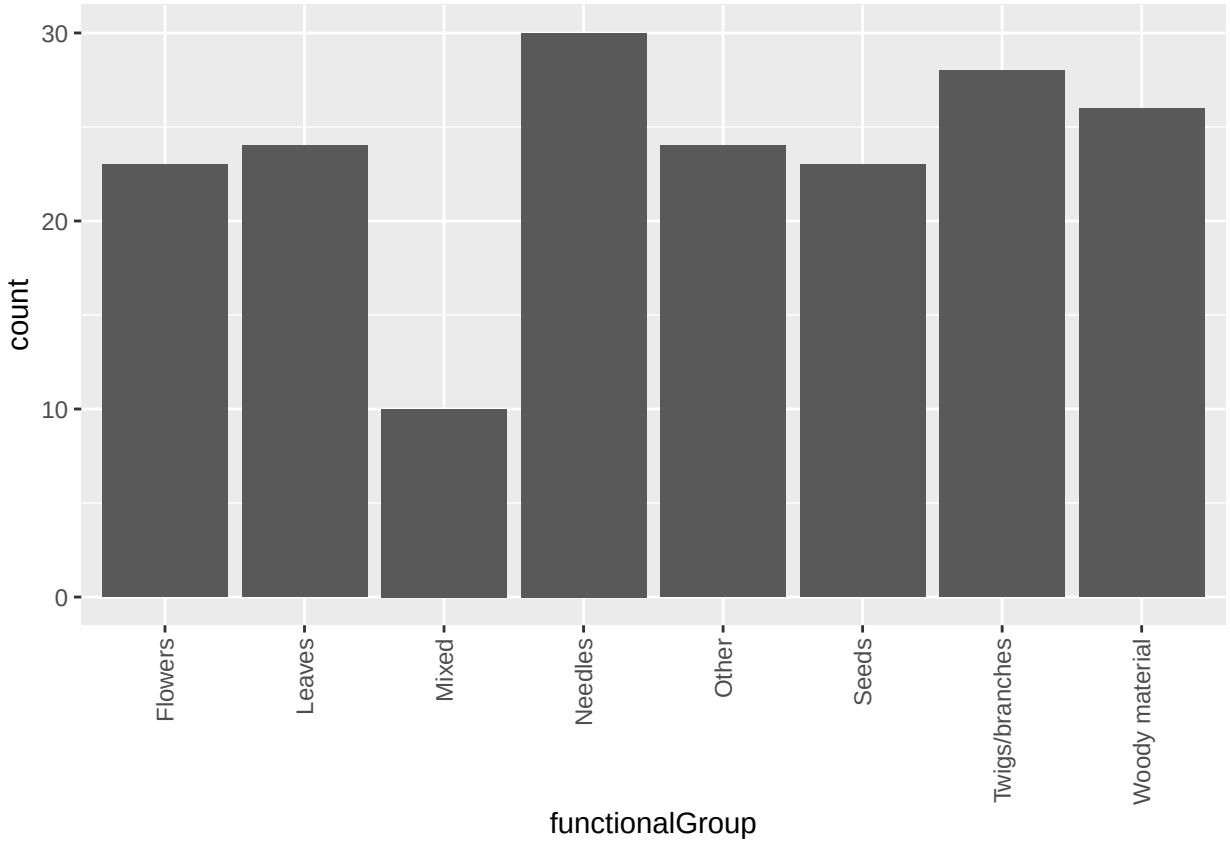
14. Create a bar graph of functionalGroup counts. This shows you what type of litter is collected at the Niwot Ridge sites. Notice that litter types are fairly equally distributed across the Niwot Ridge sites.

```
functionalGroup <- Litter$functionalGroup #set functional group vector
functionalGroup #called back functional group
```

```
##   [1] Twigs/branches Seeds          Woody material Flowers        Woody material
##   [6] Needles        Other          Leaves         Flowers        Woody material
##  [11] Woody material Leaves         Twigs/branches Other          Seeds
##  [16] Needles        Leaves         Flowers        Other          Woody material
##  [21] Twigs/branches Needles        Mixed          Seeds          Other
##  [26] Leaves         Twigs/branches Mixed          Woody material Needles
##  [31] Flowers        Mixed          Needles        Seeds          Mixed
##  [36] Seeds          Woody material Needles        Twigs/branches Leaves
##  [41] Seeds          Flowers        Needles        Woody material Other
##  [46] Twigs/branches Leaves         Leaves         Woody material Needles
##  [51] Flowers        Twigs/branches Leaves         Other          Seeds
##  [56] Leaves         Other          Twigs/branches Needles        Woody material
##  [61] Flowers        Seeds          Woody material Needles        Twigs/branches
##  [66] Needles        Other          Flowers        Leaves         Seeds
##  [71] Other          Other          Flowers        Needles        Leaves
##  [76] Twigs/branches Twigs/branches Mixed          Other          Needles
##  [81] Woody material Flowers        Seeds          Seeds          Twigs/branches
##  [86] Flowers        Leaves         Other          Needles        Woody material
##  [91] Needles        Mixed          Leaves         Needles        Flowers
##  [96] Seeds          Mixed          Other          Mixed          Woody material
## [101] Twigs/branches Needles        Twigs/branches Other          Seeds
## [106] Leaves         Flowers        Needles        Twigs/branches Woody material
## [111] Seeds          Other          Needles        Twigs/branches Leaves
## [116] Woody material Flowers        Woody material Other          Seeds
## [121] Flowers        Needles        Leaves         Twigs/branches Seeds
## [126] Needles        Leaves         Flowers        Woody material Twigs/branches
## [131] Other          Leaves         Needles        Other          Woody material
## [136] Seeds          Twigs/branches Flowers        Twigs/branches Seeds
## [141] Flowers        Leaves         Woody material Other          Twigs/branches
## [146] Needles        Other          Twigs/branches Woody material Flowers
## [151] Twigs/branches Seeds          Leaves         Needles        Woody material
## [156] Woody material Leaves         Flowers        Seeds          Other
## [161] Needles        Twigs/branches Needles        Flowers        Seeds
## [166] Other          Leaves         Twigs/branches Twigs/branches Woody material
## [171] Needles        Other          Leaves         Woody material Needles
## [176] Flowers        Seeds          Twigs/branches Mixed          Seeds
## [181] Woody material Other          Leaves         Needles        Twigs/branches
```

```
## [186] Mixed          Needles        Flowers
## 8 Levels: Flowers Leaves Mixed Needles Other Seeds ... Woody material
```

```
ggplot(Litter, aes(x = functionalGroup)) + geom_bar() +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))
```




```
#made a bar graph of the functional group counts and formatted to the xaxis was easier to read
```

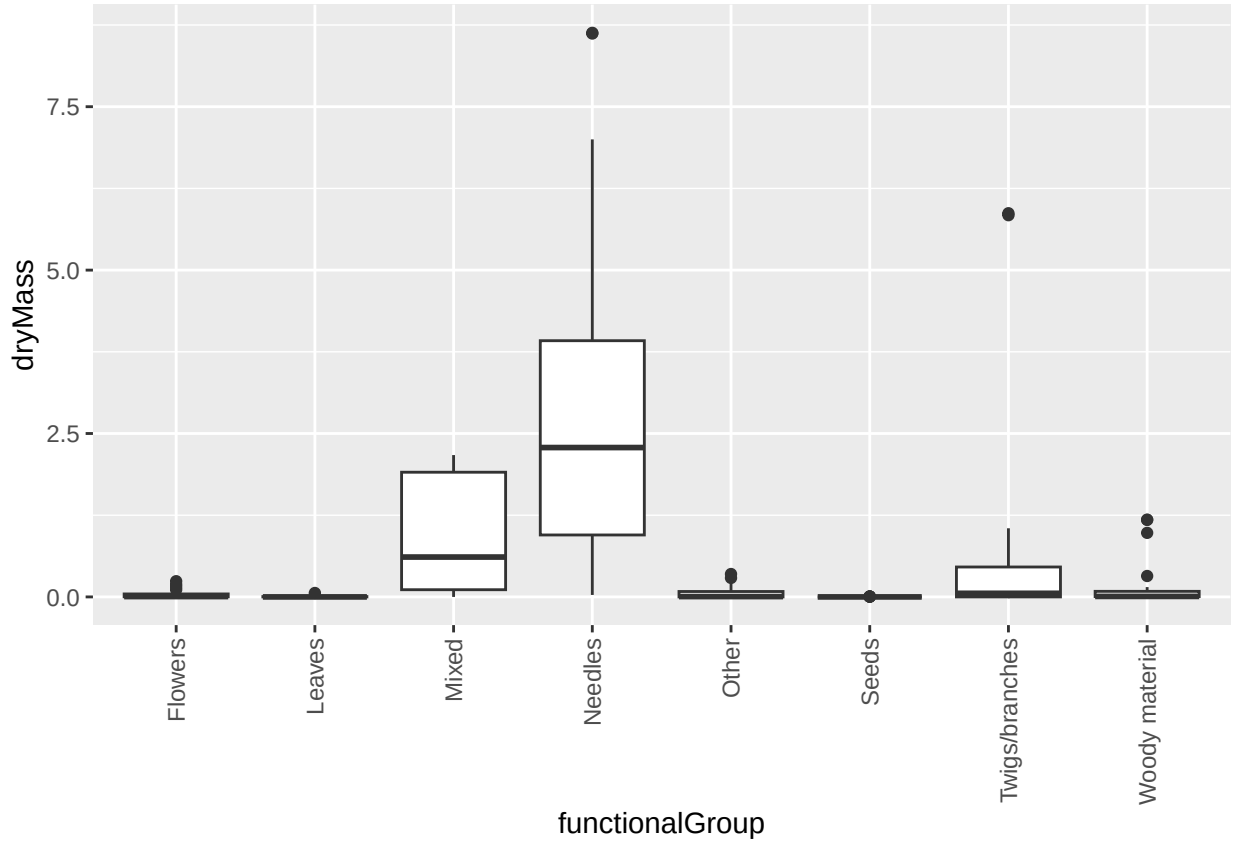
15. Using `geom_boxplot` and `geom_violin`, create a boxplot and a violin plot of dryMass by functionalGroup.

```
dryMass <- Litter$dryMass #set dryMass as vector
dryMass #called back dryMass
```

```
##   [1] 0.400 0.005 0.040 0.005 0.070 1.000 0.200 0.005 0.190 1.180 1.180 0.000
##  [13] 0.005 0.350 0.000 3.060 0.000 0.005 0.040 0.005 0.005 0.930 0.000 0.005
##  [25] 0.000 0.000 0.720 2.120 0.000 3.240 0.240 2.170 3.160 0.000 0.170 0.000
##  [37] 0.005 0.240 0.060 0.000 0.000 0.005 1.790 0.005 0.000 0.005 0.005 0.005
##  [49] 0.000 0.030 0.000 0.000 0.005 0.005 0.000 0.000 0.005 0.050 0.470 0.005
##  [61] 0.005 0.000 0.005 1.640 0.000 1.670 0.005 0.000 0.000 0.000 0.005 0.005
##  [73] 0.000 3.920 0.000 0.630 0.630 0.090 0.000 3.920 0.030 0.020 0.000 0.000
##  [85] 0.000 0.000 0.000 0.080 0.320 0.005 1.000 0.610 0.000 8.630 0.005 0.005
##  [97] 1.910 0.000 1.900 0.140 0.340 8.620 0.340 0.005 0.000 0.000 0.000 0.420
## [109] 0.000 0.005 0.000 0.010 0.900 0.020 0.000 0.005 0.000 0.000 0.005 0.000
## [121] 0.030 2.820 0.000 0.000 0.000 0.300 0.005 0.005 0.000 0.200 0.000 0.000
## [133] 7.000 0.110 0.090 0.000 1.050 0.005 1.050 0.005 0.005 0.060 0.050 0.090
## [145] 0.000 3.980 0.110 0.060 0.150 0.060 0.020 0.000 0.000 1.530 0.010 0.010
## [157] 0.005 0.110 0.000 0.080 2.820 0.000 4.090 0.070 0.000 0.290 0.000 5.840
```

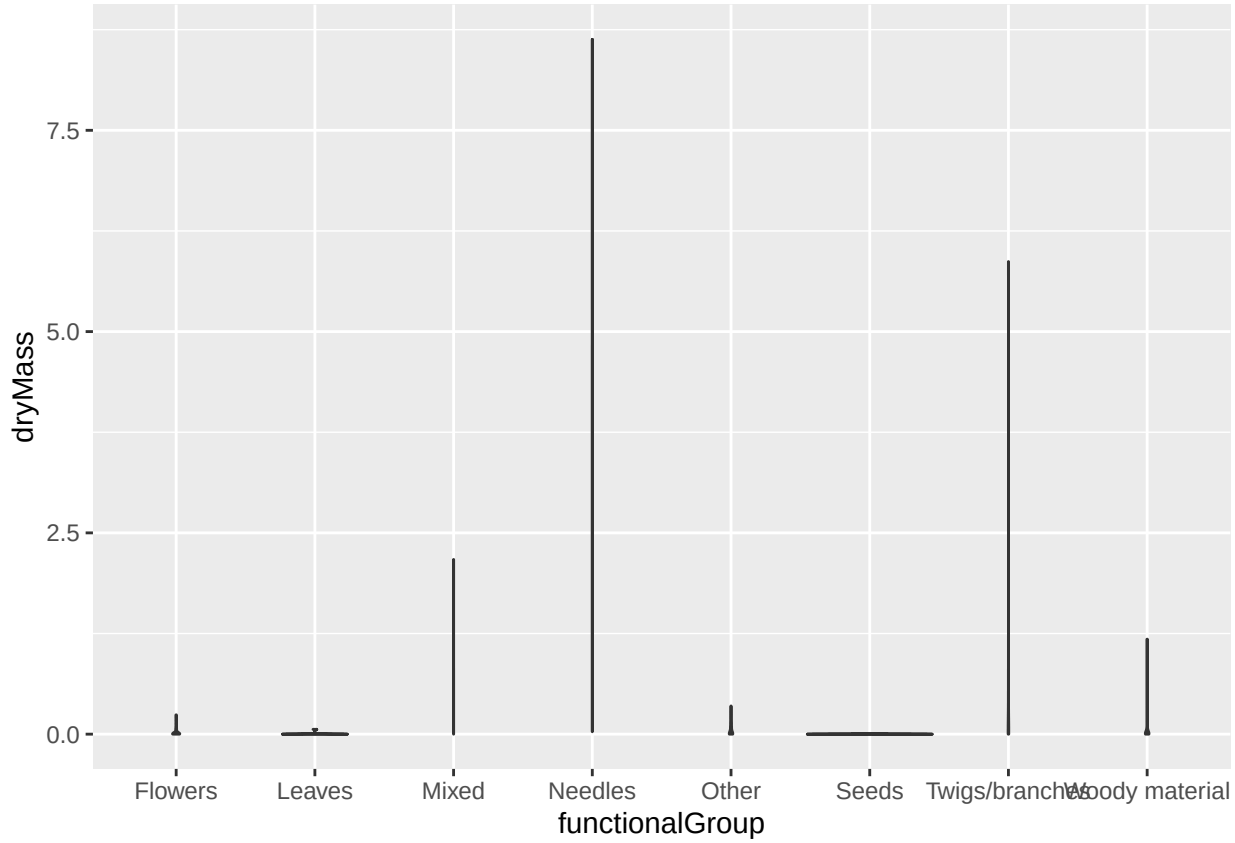
```
## [169] 5.870 0.320 2.280 0.000 0.000 0.005 2.290 0.005 0.000 0.150 0.070 0.005
## [181] 0.980 0.000 0.000 4.550 0.000 0.610 4.530 0.150
```

```
ggplot(Litter) +
  geom_boxplot(aes(x = functionalGroup, y = dryMass)) +
  theme(axis.text.x = element_text(angle = 90, vjust = 0.5, hjust=1))
```




```
#created a box plot of the dry mass by functional group counts and formatted
#the xaxis to make it easier to read

ggplot(Litter) +
      geom_violin(aes(x = functionalGroup, y = dryMass),
              draw_quantiles = c(0.25, 0.5, 0.75))
```




```
#created a violin plot of the dry mass by functional group counts
```

Why is the boxplot a more effective visualization option than the violin plot in this case?

> Answer: The boxplot is better in this case because there aren't that many data points (not much distribution) that fall into the IQR for the violin plot to show, so it ends up looking like thin black lines that are a lot harder to read than a box plot.

What type(s) of litter tend to have the highest biomass at these sites?

> Answer: Needles and and then mixed litter tend to have the highest biomass followed by twigs/branches.