Hmw_05

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Answer 1

```
library(neonDivData)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(stringr)
data_plant
```

```
## # A tibble: 915,539 x 26
##    location_id    siteID plotID  unique_sample_id     observation_date~ taxon_id
##    <chr>          <chr>  <chr>   <chr>                <chr>             <chr>
##  1 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        VILA11
##  2 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        ACSA3
##  3 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        FAGR
##  4 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        FAGR
##  5 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        FAGR
##  6 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        FAGR
##  7 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        ACSA3
##  8 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        FAGR
##  9 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        ACPE
## 10 BART_006.base~ BART   BART_0~ BART_006.basePlot.d~ 2014-06-10        ACSA3
## # ... with 915,529 more rows, and 20 more variables: taxon_name <chr>,
## #   taxon_rank <chr>, variable_name <chr>, value <dbl>, unit <chr>,
## #   presence_absence <dbl>, subplotID <chr>, subplot_id <chr>,
## #   subsubplot_id <chr>, boutNumber <chr>, nativeStatusCode <chr>,
## #   heightPlantOver300cm <chr>, heightPlantSpecies <chr>, release <chr>,
## #   sample_area_m2 <chr>, latitude <dbl>, longitude <dbl>, elevation <dbl>,
## #   plotType <chr>, nlcdClass <chr>
```

```
Data_plant2 =
  mutate(data_plant,genus = sapply(strsplit(data_plant$taxon_name, split = ' '),`[`, 1),taxon_na
me)

sample(unique(Data_plant2$genus),100)
```

```
##   [1] "Boehmeria"      "Microseris"     "Schizachyrium"  "Cymopterus"
##   [5] "Aplectrum"      "Rudbeckia"      "Tofieldia"      "Dasistoma"
##   [9] "Petradoria"     "Nephrolepis"    "Melia"          "Orthocarpus"
##  [13] "Chorizanthe"    "Echinopepon"    "Gymnanthes"     "Phleum"
##  [17] "Viola"          "Nassella"       "Garrya"         "Cyrtandra"
##  [21] "Jatropha"       "Grindelia"      "Sibbaldia"      "Trillium"
##  [25] "Freesia"        "Axonopus"       "Apiastrum"      "Cheilanthes"
##  [29] "Boerhavia"      "Anredera"       "Arctagrostis"   "Lewisia"
##  [33] "Anthaenantia"   "Butia"          "Dicerandra"     "Fouquieria"
##  [37] "Penthorum"      "Chrysosplenium" "Brachymenium"   "Adoxa"
##  [41] "Liriodendron"   "Eubotrys"       "Cenchrus"       "Tragia"
##  [45] "Boschniakia"    "Baileya"        "Galeopsis"      "Pentodon"
##  [49] "Mollugo"        "Cupania"        "Canna"          "Aliciella"
##  [53] "Tropidocarpum"  "Bupleurum"      "Chrysophyllum"  "Lupinus"
##  [57] "Arbutus"        "Talinum"        "Sideroxylon"    "Erythronium"
##  [61] "Phryma"         "Desmatodon"     "Packera"        "Urena"
##  [65] "Dichaetophora"  "Cardaria"       "×Triticosecale" "Glechoma"
##  [69] "Encelia"        "Minuartia"      "Lysichiton"     "Dirca"
##  [73] "Zizia"          "Ipomoea"        "Digitaria"      "Tiarella"
##  [77] "Vernicia"       "Onobrychis"     "Deiregyne"      "Arrhenatherum"
##  [81] "Cyanthillium"   "Dulichium"      "Brazoria"       "Portulaca"
##  [85] "Pithecellobium" "Pellia"         "Pyrola"         "Carpinus"
##  [89] "Ilex"           "Picradeniopsis" "Aconitum"       "Sabal"
##  [93] "Schoenocrambe"  "Chenopodium"    "Lythrum"        "Potamogeton"
##  [97] "Triadenum"      "Pontederia"     "Evolvulus"      "Spermolepis"
```

Answer 2

```
Data_plant2$taxon_name2 <- paste(sapply(strsplit(data_plant$taxon_name, split = ' '),`[`, 1), sa
pply(strsplit(data_plant$taxon_name, split = ' '),`[`, 2))

sample(unique(Data_plant2$taxon_name2), 100)
```

```
##   [1] "Argythamnia neomexicana"   "Paulownia tomentosa"
##   [3] "Oxalis stricta"            "Magnolia virginiana"
##   [5] "Hieracium gracile"         "Axonopus furcatus"
##   [7] "Perideridia pringlei"      "Eleocharis acicularis"
##   [9] "Draba fladnizensis"        "Dodonaea viscosa"
##  [11] "Nasturtium officinale"     "Asclepias linearis"
##  [13] "Brachyelytrum aristosum"   "Melinis repens"
##  [15] "Astragalus vexilliflexus"  "Galactia dubia"
##  [17] "Cylindrocolea sp."         "Tephrosia hispidula"
##  [19] "Rumex hastatulus"          "Muhlenbergia racemosa"
##  [21] "Cryptantha affinis"        "Trifolium nanum"
##  [23] "Pectis linifolia"          "Ipomoea imperati"
##  [25] "Lupinus onustus"           "Mentha sp."
##  [27] "Chapmannia sp."            "Mimulus layneae"
##  [29] "Carex pellita"             "Cardamine diphylla"
##  [31] "Lupinus benthamii"         "Tragia smallii"
##  [33] "Paspalum plicatulum"       "Sphaeralcea parvifolia"
##  [35] "Colchicum autumnale"       "Bidens frondosa"
##  [37] "Chelone lyonii"            "Hybanthus sp."
##  [39] "Bouteloua gracilis"        "Cymopterus acaulis"
##  [41] "Dioscorea villosa"         "Caulophyllum giganteum"
##  [43] "Symphoricarpos spp."       "Nyssa biflora"
##  [45] "Bromus porteri"            "Tragopogon dubius"
##  [47] "Callisia ornata"           "Pteridium aquilinum"
##  [49] "Lathyrus japonicus"        "Agrostis humilis"
##  [51] "Leucanthemum sp."          "Hymenocallis occidentalis"
##  [53] "Prunus spp."               "Alyssum spp."
##  [55] "Digitaria bicornis"        "Agrostis scabra"
##  [57] "Panicum gattingeri"        "Salix sericea"
##  [59] "Allium brevistylum"        "Collinsonia serotina"
##  [61] "Parietaria pensylvanica"   "Pinguicula villosa"
##  [63] "Eschscholzia glyptosperma" "Linnaea sp."
##  [65] "Stenanthium sp."           "Muhlenbergia bushii"
##  [67] "Avena sativa"              "Echinochloa sp."
##  [69] "Quercus vaseyana"          "Chenopodium album"
##  [71] "Paspalum dilatatum"        "Letharia vulpina"
##  [73] "Rhynchospora harveyi"      "Securigera varia"
##  [75] "Erigeron melanocephalus"   "Santalum paniculatum"
##  [77] "Echinodorus berteroi"      "Bulbostylis sp."
##  [79] "Rosa micrantha"            "Vaccinium parvifolium"
##  [81] "Lasiacis divaricata"       "Cunila origanoides"
##  [83] "Cryptantha flavoculata"    "Carya glabra"
##  [85] "Claytonia caroliniana"     "Thermopsis montana"
##  [87] "Spiranthes sp."            "Chamaesyce capitellata"
##  [89] "Lythrum hyssopifolium"     "Seymeria cassioides"
##  [91] "Oxytropis spp."            "Sisymbrium spp."
##  [93] "Albizia lebbeck"           "Antheropeas lanosum"
##  [95] "Trillium ovatum"           "Erythronium umbilicatum"
##  [97] "Sideroxylon salicifolium"  "Hymenocallis crassifolia"
##  [99] "Helianthus salicifolius"   "Athyrium filix-femina"
```

Answer 3

```
library(dplyr)
n_1 <- Data_plant2 %>%
  filter(sample_area_m2 == '1')%>%
  group_by(siteID) %>%
  summarise(richness_1m2 = n_distinct(taxon_name2))
n_1
```

```
## # A tibble: 47 x 2
##    siteID richness_1m2
##    <chr>         <int>
##  1 ABBY            188
##  2 BARR             71
##  3 BART             80
##  4 BLAN            268
##  5 BONA             73
##  6 CLBJ            413
##  7 CPER            187
##  8 DCFS            223
##  9 DEJU            153
## 10 DELA            303
## # ... with 37 more rows
```

```
library(dplyr)
n_10 <- Data_plant2 %>%
  filter(sample_area_m2 %in% c(1,10))%>%
  group_by(siteID) %>%
  summarise(richness_10m2 = n_distinct(taxon_name2))
n_10
```

```
## # A tibble: 47 x 2
##    siteID richness_10m2
##    <chr>          <int>
##  1 ABBY             229
##  2 BARR              87
##  3 BART             104
##  4 BLAN             313
##  5 BONA              89
##  6 CLBJ             477
##  7 CPER             226
##  8 DCFS             264
##  9 DEJU             184
## 10 DELA             391
## # ... with 37 more rows
```

```
library(dplyr)
n_100 <- Data_plant2 %>%
  filter(sample_area_m2 %in% c(1,10,100))%>%
  group_by(siteID) %>%
  summarise(richness_100m2 = n_distinct(taxon_name2))
n_100
```

```
## # A tibble: 47 x 2
##    siteID richness_100m2
##    <chr>           <int>
##  1 ABBY              262
##  2 BARR               91
##  3 BART              127
##  4 BLAN              378
##  5 BONA              101
##  6 CLBJ              517
##  7 CPER              245
##  8 DCFS              293
##  9 DEJU              199
## 10 DELA              457
## # ... with 37 more rows
```

```
n_all = dplyr::left_join(n_1, n_10)%>%
  left_join(n_100)
```

```
## Joining, by = "siteID"
## Joining, by = "siteID"
```

```
n_all
```

```
## # A tibble: 47 x 4
##    siteID richness_1m2 richness_10m2 richness_100m2
##    <chr>         <int>         <int>          <int>
##  1 ABBY            188           229            262
##  2 BARR             71            87             91
##  3 BART             80           104            127
##  4 BLAN            268           313            378
##  5 BONA             73            89            101
##  6 CLBJ            413           477            517
##  7 CPER            187           226            245
##  8 DCFS            223           264            293
##  9 DEJU            153           184            199
## 10 DELA            303           391            457
## # ... with 37 more rows
```

Answer 4

```
library(tidyr)
n_all_long <- n_all %>%
  pivot_longer(cols = -c(siteID), names_to = "spatial_scale", values_to = "richness")
n_all_long$richness<-as.numeric(n_all_long$richness)
n_all_long
```

```
## # A tibble: 141 x 3
##    siteID spatial_scale  richness
##    <chr>  <chr>             <dbl>
##  1 ABBY   richness_1m2        188
##  2 ABBY   richness_10m2       229
##  3 ABBY   richness_100m2      262
##  4 BARR   richness_1m2         71
##  5 BARR   richness_10m2        87
##  6 BARR   richness_100m2       91
##  7 BART   richness_1m2         80
##  8 BART   richness_10m2       104
##  9 BART   richness_100m2      127
## 10 BLAN   richness_1m2        268
## # ... with 131 more rows
```

Answer 5

```
library(ggplot2)
ggplot(n_all_long, aes(x = spatial_scale, y = richness, group = siteID))+
  geom_line()+
  geom_point()
```