Creating objects from layer and saving to Rdata file

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Introduction

The purpose of this file is to create all objects that the app references. The code at the end of this file creates an Rdata file that is saved to the "shiny" folder, giving the app access to all of the data that it needs in order to run.

Check that data files exist

The code in this document only runs if the renamed data files (created in create-renamed-objects.rmd) exist within the "data" folder. We can check if the needed data exists by using `file.exists()`.

```
file.exists("data/amherst-college-trails.dbf")
```

```
[1] TRUE
```

```
file.exists("data/amherst-college-trails.prj")
```

```
[1] TRUE
```

```
file.exists("data/amherst-college-trails.shp")
```

```
[1] TRUE
```

```
file.exists("data/amherst-college-trails.shx")
```

```
[1] TRUE
```

```
file.exists("data/bike-trails.dbf")
```

```
[1] TRUE
```

```
file.exists("data/bike-trails.prj")
```

```
[1] TRUE
```

```
file.exists("data/bike-trails.shp")
```

```
[1] TRUE
```

```
file.exists("data/bike-trails.shx")
```

```
[1] TRUE
```

```
file.exists("data/elevation-contours.dbf")
```

```
[1] TRUE
```

```
file.exists("data/elevation-contours.prj")
```

```
[1] TRUE
```

```
file.exists("data/elevation-contours.shp")
```

```
[1] TRUE
```

```
file.exists("data/elevation-contours.shx")
```

```
[1] TRUE
```

Identify layer types

We will set the `dsn` and save the layers.

Set the dsn

First, we have to set the `dsn` so that the computer knows where to look to find the data that contains the layers.

```
# Set the dsn to where the data is
dsn <- "data" # Note that we are using a relative path here

# List the files in the dsn
list.files(dsn)
```

```
 [1] "amherst-college-trails.dbf" "amherst-college-trails.prj"
 [3] "amherst-college-trails.shp" "amherst-college-trails.shx"
 [5] "bike-trails.dbf"            "bike-trails.prj"
 [7] "bike-trails.shp"            "bike-trails.shx"
 [9] "elevation-contours.dbf"     "elevation-contours.prj"
[11] "elevation-contours.shp"     "elevation-contours.shx"
```

When we list the files found in `dsn`, we are listing the files found in the data folder since we set `dsn` to be `"data"`.

Layer types

The next step we will take is to use `sf::st_layers()` to be able to see the types of layers that we have.

```
# Save layers from dsn
layers <- st_layers(dsn)

# Print layers
layers
```

```
Driver: ESRI Shapefile
Available layers:
              layer_name  geometry_type features fields
1     elevation-contours 3D Line String    12240      4
2 amherst-college-trails    Line String       16      2
3            bike-trails    Line String      272     13
```

We see that we have three layers in our files, which is unsurprising. The `elevation-contours` layer has a geometry of type `3D Line String`, while the `amherst-college-trails` and the `bike-trails` layers are of geometry type `Line String`.

Create objects for each layer

We can save each layer to an object. These objects will be saved in an Rdata file and will be accessible to the app.

Amherst College trails

```
# Read in layer
amherst_college_trails <- st_read(dsn, layer = "amherst-college-trails")
```

```
Reading layer `amherst-college-trails' from data source `/Users/nicolefrontero/Dropbox (Amherst College)
Simple feature collection with 16 features and 2 fields
geometry type:  LINESTRING
dimension:      XY
bbox:           xmin: -72.52022 ymin: 42.36015 xmax: -72.50184 ymax: 42.37297
geographic CRS: WGS 84
```

Bike trails

```
# Read in layer
bike_trails <- st_read(dsn, layer = "bike-trails")
```

```
Reading layer `bike-trails' from data source `/Users/nicolefrontero/Dropbox (Amherst College)/495 proje
Simple feature collection with 272 features and 13 fields
geometry type:  MULTILINESTRING
dimension:      XY
bbox:           xmin: 42526.52 ymin: 794291 xmax: 328921.5 ymax: 957916.8
projected CRS:  NAD83 / Massachusetts Mainland
```

Elevation contours

```
# Read in layer
elevations_contour <- st_read(dsn, layer = "elevation-contours")
```

```
Reading layer `elevation-contours' from data source `/Users/nicolefrontero/Dropbox (Amherst College)/49
Simple feature collection with 12240 features and 4 fields
geometry type:  MULTILINESTRING
dimension:      XYZ
bbox:           xmin: 376497.2 ymin: 2956001 xmax: 387161.8 ymax: 2964037
z_range:        zmin: 140.9998 zmax: 353.0001
projected CRS:  NAD83 / Massachusetts Mainland (ftUS) + NAVD88 height
```

Trail lengths table

In the app, there will be a tab that features a table with the lengths of each of the trails. We will prepare a data frame for that tab here and we will save it to the Rdata file. Note that the app will ultimately have access to all objects in the Rdata file.

```
# Trail lengths in miles
trail_lengths_miles <- amherst_college_trails %>%
  st_length %>% units::set_units("miles") %>%
  round(digits = 2)

# Trail lengths in kilometers
```

```r
trail_lengths_kilometers <- amherst_college_trails %>%
  st_length %>% units::set_units("kilometers") %>%
  round(digits = 2)
```

```r
# Trail names
trail_names <- amherst_college_trails$Trail

# Bind miles and kilometers lengths together
trail_lengths_df <- data.frame(cbind(trail_names,
                                     trail_lengths_miles,
                                     trail_lengths_kilometers))

# Set column names (for display in the app)
colnames(trail_lengths_df) <- c("Trail name",
                                "Length in miles",
                                "Length in kilometers")
```

Save the Rda

Now that we have created all of the objects that the app requires to run, we will save them all to an Rdata file. This Rdata file (which will have a file extension of .rda) will be loaded into Global.R. Global.R is a special file. Any R objects in Global.R will be accessible to the Shiny app. Using a Global.R file will allow for the code in the app to be run once and stored so that we can avoid the problem of the app taking a long time to run.

Note that neither the the `bike-trails` layer nor the `elevation-contours` layer are featured in the app. However, in the event that future work with these data sets and with making maps of the Amherst area occurs, it may prove useful to have access to these layers. For this reason, the `bike-trails` and `elevation-contours` layers are saved in the Rdata file.

We will save the Rdata file to the "shiny" folder.

```r
# Save the Rdata file
save(
  # Amherst College trails layer
  amherst_college_trails,
  # Elevations contour layer
  elevations_contour,
  # Bike trails layer
  bike_trails,
  # Trail lengths dataframe
  trail_lengths_df,
  # File name and location
  file = "shiny/app-objects.rda"
  )
```