

MY-DATA607-Week06-Project2-Convoys

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Week 6 - Project 2 - Dataset 1: Military Convoys in WWII

```
##setwd("c:/users/Michael/DROPBOX/priv/CUNY/MSDS/201809-Fall/DATA607_Andy_Sabrina/Week06-Project 2")
```

The assignment is as follows:

Choose any three of the “wide” datasets identified in the Week 6 [sic] Discussion items.

For each of the three chosen datasets:

(1) Create a .CSV file (or optionally, a MySQL database!) that includes all of the information above. You’re encouraged to use a “wide” structure similar to how the information appears above, so that you can practice tidying and transformations as described below.

Note: For reasons explained below, I am loading multiple (eight) tables from the web. It is easier to do this by putting each table into an individual Excel sheet, where all the sheets are joined together in an Excel Workbook, rather than in 8 separate .csv files .

(2) Read the information from your .CSV file into R, and use `tidyr` and `dplyr` as needed to tidy and transform your data.

(3) Perform analysis

(4) Your code should be in an R Markdown file, posted to rpubs.com, and should include narrative descriptions of your data cleanup work, analysis, and conclusions.

```
library(readr)
library(stringr)
library(tidyr)
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(tibble)
library(ggplot2)
library(utils)
library(scales)
```

```
##
## Attaching package: 'scales'
## The following object is masked from 'package:readr':
##
##      col_factor
```

Data Loading

Load the raw datafile :

The data comes from the following webpage, as suggested by Romerl:

https://en.wikipedia.org/wiki/List_of_Allied_convoy_during_World_War_II_by_region

This webpage contains eight tables, each corresponding to a different part of the globe.

Because we have not yet covered web scraping, I don't know how to read and parse the 8 tables directly from the Wikipedia page. So, instead I used functionality available within Excel to extract each of the 8 tables into a separate sheet within an Excel workbook. I have loaded this excel workbook into my github, from which it can be extracted as below.

I then loaded these 8 tables into R using library `XLConnect`, where they form a list of 8 dataframes.

I then proceed to perform the data cleanup, merging, etc., from this point.

While it would have been possible to write each of the eight tables back into an individual .csv file and then read each back in to R, that would create excess messiness. As given, the tables can't be put into an individual .csv because the headers are not identical (specifically, the second column, which details the convoy routes, is region-specific.)

Military convoy tables (suggested by Romerl)

```
#setwd("C:/Users/Michael/Dropbox/priv/CUNY/MSDS/201809-Fall/DATA607_Andy_Sabrina/Week06-Project 2/ConvoyTables")
```

```
### The excel workbook "EightConvoyTables.xlsx" contains 8 sheets, each of which is a table from the URL list
### https://en.wikipedia.org/wiki/List_of_Allied_convoy_during_World_War_II_by_region
```

There are 8 tables in the Wikipedia page, which are named as follows:

```
ConvoyTableNames <- c(
  '01-European Coastal Atlantic Convoys',
  '02-North Atlantic Convoys',
  '03-North American Coastal and Caribbean Convoys',
  '04-Mediterranean and North African Coastal Convoys',
  '05-South Atlantic Convoys',
  '06-Indian Ocean Convoys',
  '07-Pacific Convoys',
  '08-Normandy Invasion Convoys'
)
```

Use the library “XLConnect” to load up the Excel workbook into R, creating a separate dataframe for each of the 8 tables

```
### The package "XLConnect" easily loads up an Excel Workbook with multiple sheets, putting each sheet .
```

```
### If the package "XLConnect" is not already installed on this computer, then install it
if (is.na(installed.packages()[,"Package"]["XLConnect"])) {
  install.packages("XLConnect")
}
```

```
### load the library XLConnect
require(XLConnect)
```

```
## Loading required package: XLConnect
```

```
## Loading required package: XLConnectJars
```

```
## XLConnect 0.2-15 by Mirai Solutions GmbH [aut],
##   Martin Studer [cre],
##   The Apache Software Foundation [ctb, cph] (Apache POI),
##   Graph Builder [ctb, cph] (Curvesapi Java library)
```

```
## http://www.mirai-solutions.com
## https://github.com/miraisolutions/xlconnect
```

Read the excel workbook into R using loadWorkbook from XLConnect .

Note that the Excel sheets are initially named Sheet1, Sheet2, ... Sheet8 .

```
### if loading the file from my local machine:
### wb <- loadWorkbook("Convoys/EightConvoys.xlsx")
```

```
### If retrieving the files from my Github:
```

```
sourcefile = "https://raw.githubusercontent.com/myampol/MY607/master/EightConvoys.xlsx"
destfile = "c:/temp/EightConvoys.xlsx"
download.file(sourcefile,destfile,mode="wb")
```

```
### load the entire Excel workbook into R
wb <- loadWorkbook(destfile)
```

Use readWorksheet from XLConnect to create a list which captures each of the 8 sheets into an individual dataframe (again, the sheets are still named Sheet1, Sheet2,...,Sheet8)

```
lst = readWorksheet(wb, sheet = getSheets(wb))
```

Have a look at the structure of the list

```
str(lst)
```

```
## List of 8
```

```
## $ Sheet1:'data.frame': 39 obs. of 6 variables:
```

```
## ..$ Code.Prefix : chr [1:39] "BB" "BC" "BD" "BK" ...
```

```
## ..$ Coastal.Convoy.Routes: chr [1:39] "Belfast or River Clyde to Bristol Channel" "Bristol Channel"
```

```

## ..$ First.Sailing      : chr [1:39] "1940 from Belfast - 1945 from Clyde" NA "September 1943" "S
## ..$ Last.Sailing       : chr [1:39] "1943 from Belfast - 1945 from Clyde" NA NA NA ...
## ..$ Number.of.Convoys  : num [1:39] NA NA NA NA NA NA NA NA NA NA ...
## ..$ Notes              : chr [1:39] NA "outward and return convoys used same number" NA NA ...
## $ Sheet2:'data.frame': 36 obs. of 6 variables:
## ..$ Code.Prefix        : chr [1:36] "AT" "BHX" "CK" "CT" ...
## ..$ North.Atlantic.Routes: chr [1:36] "United States to British Isles" "Bermuda to Liverpool" "Cha
## ..$ First.Sailing       : chr [1:36] "March 1942" "May 1940" "1944" "1941" ...
## ..$ Last.Sailing        : chr [1:36] "1945" "March 1941" "1944" "1941" ...
## ..$ Number.of.Convoys   : chr [1:36] NA "97 (# 41-137)" NA NA ...
## ..$ Notes              : chr [1:36] "troopships" "sailed from Bermuda and merged with same number
## $ Sheet3:'data.frame': 65 obs. of 6 variables:
## ..$ Code.Prefix        : chr [1:65] "AH" "ARG" "AW" "BS" ...
## ..$ North.American.Coastal.and.Caribbean.Routes: chr [1:65] "Aruba to Halifax Harbour" "Boston to
## ..$ First.Sailing       : chr [1:65] "July 1942" NA NA NA ...
## ..$ Last.Sailing        : chr [1:65] "September 1942" NA NA NA ...
## ..$ Number.of.Convoys   : logi [1:65] NA NA NA NA NA NA ...
## ..$ Notes              : chr [1:65] "a brief tanker series" "USN convoys" ...
## $ Sheet4:'data.frame': 73 obs. of 6 variables:
## ..$ Code.Prefix        : chr [1:73] "AC" "AG" "AH" "AN" ...
## ..$ Mediterranean.and.North.African.Coastal.Routes: chr [1:73] "Alexandria to Tobruk" "Alexandria
## ..$ First.Sailing       : chr [1:73] "1941" "1941" "September 1943" "194
## ..$ Last.Sailing        : chr [1:73] "1941" "1941" NA "1941" ...
## ..$ Number.of.Convoys   : logi [1:73] NA NA NA NA NA NA ...
## ..$ Notes              : chr [1:73] NA NA NA NA ...
## $ Sheet5:'data.frame': 53 obs. of 6 variables:
## ..$ Code.Prefix        : chr [1:53] "AS" "BF" "BRN" "BT" ...
## ..$ South.Atlantic.Routes: chr [1:53] "United States to Suez Canal" "Bahia to Freetown" "Bahia to
## ..$ First.Sailing       : chr [1:53] "1942" "1943" "late 1942" "November 1942" ...
## ..$ Last.Sailing        : chr [1:53] "1942" NA NA "July 1943" ...
## ..$ Number.of.Convoys   : logi [1:53] NA NA NA NA NA NA ...
## ..$ Notes              : chr [1:53] "via Freetown" "USN escorts" NA NA ...
## $ Sheet6:'data.frame': 65 obs. of 6 variables:
## ..$ Code.Prefix        : chr [1:65] "AB" "ABF" "AJ" "AK" ...
## ..$ Indian.Ocean.Routes: chr [1:65] "Aden to Mumbai" "Aden to Mumbai" "Aden to Colombo" "Aden to K
## ..$ First.Sailing       : chr [1:65] "November 1942" NA NA NA ...
## ..$ Last.Sailing        : chr [1:65] NA NA NA NA ...
## ..$ Number.of.Convoys   : num [1:65] NA NA NA NA NA NA NA NA NA NA ...
## ..$ Notes              : chr [1:65] NA "fast troopship convoys" NA NA ...
## $ Sheet7:'data.frame': 47 obs. of 6 variables:
## ..$ Code.Prefix        : chr [1:47] "AN" "BG" "BN" "BT" ...
## ..$ Pacific.Routes      : chr [1:47] "Admiralty Islands to New Guinea" "Milne Bay to New Guinea (OR)
## ..$ First.Sailing       : chr [1:47] NA NA NA "1943 (Sydney to US)" ...
## ..$ Last.Sailing        : chr [1:47] NA NA NA "1944 (Sydney to US)" ...
## ..$ Number.of.Convoys   : logi [1:47] NA NA NA NA NA NA ...
## ..$ Notes              : chr [1:47] NA NA NA "Sydney to US were troop convoys" ...
## $ Sheet8:'data.frame': 53 obs. of 6 variables:
## ..$ Code.Prefix        : chr [1:53] "ATM" "BEC" "COC" "EBC" ...
## ..$ Normandy.Invasion.Convoys: chr [1:53] "Antwerp to River Thames" "Bristol Channel to France" "P
## ..$ First.Sailing       : chr [1:53] "late 1944" "June 1944" "late 1944" "June 1944" ...
## ..$ Last.Sailing        : chr [1:53] "1945" "October 1944" "early 1945" "October 1944" ...
## ..$ Number.of.Convoys   : num [1:53] NA NA NA NA 1 NA NA 2 2 NA ...
## ..$ Notes              : chr [1:53] NA NA NA NA ...

```

Tidy and transform the data

The header of the second column (*.Routes , except for the final table) in each table differs; each should correspond to the the name of the respective Convoy for that part of the world.

Check the listing to ensure that we haven't gotten the above ConvoyTableNames out-of-sequence:

```
for (i in 1:8) print(paste(ConvoyTableNames[i], "|", names(lst[[i]][2])))
```

```
## [1] "01-European Coastal Atlantic Convoys | Coastal.Convoy.Routes"
## [1] "02-North Atlantic Convoys | North.Atlantic.Routes"
## [1] "03-North American Coastal and Caribbean Convoys | North.American.Coastal.and.Caribbean.Routes"
## [1] "04-Mediterranean and North African Coastal Convoys | Mediterranean.and.North.African.Coastal.Ro
## [1] "05-South Atlantic Convoys | South.Atlantic.Routes"
## [1] "06-Indian Ocean Convoys | Indian.Ocean.Routes"
## [1] "07-Pacific Convoys | Pacific.Routes"
## [1] "08-Normandy Invasion Convoys | Normandy.Invasion.Convoys"
```

The correspondence between the above pairs of names indicate that we are indeed loading up the sheets (Sheet1, Sheet2, etc.) in the correct sequence.

Rename the 8 dataframes to reflect which Convoy each dataframe represents:

```
names(lst) <- ConvoyTableNames
```

Have a look at the head of each table:

```
for (i in names(lst)) {
  print(i)
  print(head(lst[[i]]))
  #####print(knitr::kable(head(lst[[i]]),format="markdown"))
  print("-----")
}
```

```
## [1] "01-European Coastal Atlantic Convoys"
##   Code.Prefix           Coastal.Convoy.Routes
## 1      BB Belfast or River Clyde to Bristol Channel
## 2      BC           Bristol Channel to Bay of Biscay
## 3      BD           White Sea to Dikson Island
## 4      BK           White Sea to Kola Inlet
## 5      BTC           Bristol Channel to River Thames
## 6      CE      St. Helens Roads to Southend-on-Sea
##           First.Sailing                      Last.Sailing
## 1 1940 from Belfast - 1945 from Clyde 1943 from Belfast - 1945 from Clyde
## 2                                <NA>                      <NA>
## 3                September 1943                      <NA>
## 4                Summer 1941                        <NA>
## 5                1944                                1945
## 6                <NA>                                <NA>
##   Number.of.Convoys                      Notes
## 1                NA                      <NA>
## 2                NA outward and return convoys used same number
```

```

## 3          NA          <NA>
## 4          NA          <NA>
## 5          NA          <NA>
## 6          NA          <NA>
## [1] "-----"
## [1] "02-North Atlantic Convoys"
##   Code.Prefix          North.Atlantic.Routes
## 1      AT          United States to British Isles
## 2      BHX          Bermuda to Liverpool
## 3      CK  Charleston, South Carolina to British Isles
## 4      CT          British Isles to Canada
## 5      CU Caribbean (later New York City) to Liverpool
## 6      GUF          Mediterranean to Chesapeake Bay
##   First.Sailing  Last.Sailing  Number.of.Convoys
## 1      March 1942          1945          <NA>
## 2      May 1940      March 1941      97 (# 41-137)
## 3          1944          1944          <NA>
## 4          1941          1941          <NA>
## 5      20 March 1943  30 May 1945      73
## 6 29 November 1942 16 April 1945      22
##                                     Notes
## 1                                     troopships
## 2 sailed from Bermuda and merged with same number HX convoy at sea
## 3                                     rarely used
## 4                                     troopships
## 5      14-knot convoys of tankers with some fast cargo ships
## 6                                     faster ships
## [1] "-----"
## [1] "03-North American Coastal and Caribbean Convoys"
##   Code.Prefix          North.American.Coastal.and.Caribbean.Routes
## 1      AH          Aruba to Halifax Harbour
## 2      ARG          Boston to Argentia, Newfoundland
## 3      AW          Aruba to Curaçao
## 4      BS Corner Brook, Newfoundland to Sydney, Nova Scotia
## 5      BW  Sydney, Nova Scotia to St. John's, Newfoundland
## 6      BX          Boston to Halifax Harbour
##   First.Sailing  Last.Sailing  Number.of.Convoys  Notes
## 1      July 1942 September 1942      NA a brief tanker series
## 2          <NA>          <NA>      NA      USN convoys
## 3          <NA>          <NA>      NA local tanker traffic
## 4          <NA>          <NA>      NA      a brief series
## 5          1942          <NA>      NA          <NA>
## 6 21 March 1942      22 May 1945      NA          <NA>
## [1] "-----"
## [1] "04-Mediterranean and North African Coastal Convoys"
##   Code.Prefix  Mediterranean.and.North.African.Coastal.Routes
## 1      AC          Alexandria to Tobruk
## 2      AG          Alexandria to Greece
## 3      AH          Augusta, Sicily to heel of Italy
## 4      AN          Alexandria to Piraeus
## 5      AP          British Isles to Egypt
## 6      ARM          local Mediterranean
##   First.Sailing  Last.Sailing  Number.of.Convoys  Notes
## 1          1941          1941      NA      <NA>

```

```

## 2          1941          1941          NA          <NA>
## 3 September 1943          <NA>          NA          <NA>
## 4          1940          1941          NA          <NA>
## 5      summer 1940  summer 1940          NA  troopships
## 6          <NA>          <NA>          NA  little used
## [1] "-----"
## [1] "05-South Atlantic Convoys"
##      Code.Prefix          South.Atlantic.Routes  First.Sailing
## 1          AS          United States to Suez Canal          1942
## 2          BF          Bahia to Freetown          1943
## 3          BRN          Bahia to Recife northward          late 1942
## 4          BT          Bahia to Trinidad November 1942
## 5          CF Cape Town to British Isles via west Africa          <NA>
## 6          CN          Cape Town northward to dispersal          <NA>
##      Last.Sailing Number.of.Convoys          Notes
## 1          1942          NA via Freetown
## 2          <NA>          NA  USN escorts
## 3          <NA>          NA          <NA>
## 4      July 1943          NA          <NA>
## 5          <NA>          NA  little used
## 6          <NA>          NA          <NA>
## [1] "-----"
## [1] "06-Indian Ocean Convoys"
##      Code.Prefix          Indian.Ocean.Routes  First.Sailing
## 1          AB          Aden to Mumbai November 1942
## 2          ABF          Aden to Mumbai          <NA>
## 3          AJ          Aden to Colombo          <NA>
## 4          AK          Aden to Kilindini Harbour          <NA>
## 5          AKD Aden to Durban via Kilindini Harbour September 1943
## 6          AM          Chittagong to Chennai          <NA>
##      Last.Sailing Number.of.Convoys          Notes
## 1          <NA>          NA          <NA>
## 2          <NA>          NA fast troopship convoys
## 3          <NA>          NA          <NA>
## 4          <NA>          NA          <NA>
## 5          <NA>          NA          <NA>
## 6          <NA>          NA          <NA>
## [1] "-----"
## [1] "07-Pacific Convoys"
##      Code.Prefix
## 1          AN
## 2          BG
## 3          BN
## 4          BT
## 5          BV
## 6          CO
##
##          Pacific.Routes
## 1          Admiralty Islands to New Guinea
## 2  Milne Bay to New Guinea (OR) Brisbane to Gladstone, Queensland
## 3          New Britain to New Guinea
## 4  Sydney to United States (OR) Brisbane to Townsville, Queensland
## 5          Brisbane to Townsville, Queensland
## 6          Newcastle, New South Wales to Melbourne and Adelaide
##      First.Sailing          Last.Sailing Number.of.Convoys

```

```

## 1          <NA>          <NA>          NA
## 2          <NA>          <NA>          NA
## 3          <NA>          <NA>          NA
## 4 1943 (Sydney to US) 1944 (Sydney to US)  NA
## 5          <NA>          <NA>          NA
## 6          1942          1942          NA
##
##              Notes
## 1          <NA>
## 2          <NA>
## 3          <NA>
## 4 Sydney to US were troop convoys
## 5          <NA>
## 6          <NA>
## [1] "-----"
## [1] "08-Normandy Invasion Convoys"
##   Code.Prefix  Normandy.Invasion.Convoys First.Sailing  Last.Sailing
## 1      ATM      Antwerp to River Thames    late 1944      1945
## 2      BEC      Bristol Channel to France    June 1944    October 1944
## 3      COC      Plymouth to Brittany    late 1944      early 1945
## 4      EBC      Bristol Channel to France    June 1944    October 1944
## 5      EBM      Bristol Channel to France    June 1944      June 1944
## 6      ECM Falmouth, Cornwall to France    June 1944 early July 1944
##   Number.of.Convoys      Notes
## 1      NA      <NA>
## 2      NA      <NA>
## 3      NA      <NA>
## 4      NA      <NA>
## 5      1 motor transport convoy
## 6      NA      <NA>
## [1] "-----"

```

We need to perform various operations on the tables before we can concatenate them together.

When XLConnect read in each table, it made nearly everything type character, with the exception of the column “Number.of.Convoys”.

For some tables, everything in this column was blank, so it was assigned type logical.

For some other tables, there were numerical values for a few entries, so the column was assigned type numeric.

And, one table (#02) includes entries containing parentheses, hashmarks, and hyphens, so it was loaded as type character:

```

for (i in names(lst)) {
  cat(i, "\n")
  cat(str(lst[[i]]$Number.of.Convoys))
  cat(class(lst[[i]]$Number.of.Convoys), "\n")
  cat("-----\n")
}

```



```

}

## 01-European Coastal Atlantic Convoys
## num [1:39] NA NA NA NA NA NA NA NA NA NA NA ...
## numeric
## -----
## 02-North Atlantic Convoys
## chr [1:36] NA "97 (# 41-137)" NA NA "73" "22" "92" "89" "377" "17" ...
## character
## -----
## 03-North American Coastal and Caribbean Convoys
## logi [1:65] NA NA NA NA NA NA NA ...
## logical
## -----
## 04-Mediterranean and North African Coastal Convoys
## logi [1:73] NA NA NA NA NA NA NA ...
## logical
## -----
## 05-South Atlantic Convoys
## logi [1:53] NA NA NA NA NA NA NA ...
## logical
## -----
## 06-Indian Ocean Convoys
## num [1:65] NA NA NA NA NA NA NA NA NA NA NA ...
## numeric
## -----
## 07-Pacific Convoys
## logi [1:47] NA NA NA NA NA NA NA ...
## logical
## -----
## 08-Normandy Invasion Convoys
## num [1:53] NA NA NA NA 1 NA NA 2 2 NA ...
## numeric
## -----

```

(1) Before we can concatenate all 8 tables together, we have to cast the above column to same data type (character) because we may get an error if we attempt to combine the tables without having done so because relying on R to perform the casting will only work if we start with the table containing character data and append the other tables to it – automatic casting of numeric or logical to character will succeed, but the process will fail if trying to cast character to numeric given the specific data.

(2) We want to add a column which identifies which of the 8 regions each row corresponds to, which we will do using `add_column` from `tibble`.

(3) Additionally, in order to combine all the various “*.Routes” columns (and, in the final table, the equivalent column named “Normandy.Invasion.Convoy”) into a single column, we need to make every table have the same header or else we will have lots of separate columns for each type of routes, which is not what we want.

Once the above changes are made, we can use `bind_rows` from `dplyr` to append the dataframes together. Here we do this by creating an empty dataframe called `AllConvoys` and then appending each table as we loop through:

```
AllConvoys=NULL

for (df_name in names(lst)) {

  ### When each sheet was initially read in, the type assigned to Number.of.Convoys varied.
  ### We cannot append all the tables together if the type of this column is not uniform
  ### therefore, forcibly cast all such items to CHARACTER

  lst[[df_name]]$Number.of.Convoys <- as.character(lst[[df_name]]$Number.of.Convoys)

  ### expand each dataframe by inserting a "Region" column which contains the region name
  lst[[df_name]] <- add_column(lst[[df_name]],Region=df_name,.before=1)

  ### Because we put the region name at the beginning (i.e., leftmost-column),
  ### the column containing the various Routes has shifted from column 2 to column 3.
  ### In order to aggregate all such columns together across the eight dataframes,
  ### rename them all "Routes", as the new "Region" column contains the necessary information to identify them.

  names(lst[[df_name]])[3] <- "Routes"

  ### concatenate all eight tables together using bind_rows
  ### here we're doing it one-at-a-time by appending each table onto the previous ones
  ### note that this would fail without the type adjustment above on Number.of.Convoys

  AllConvoys <- bind_rows(AllConvoys,lst[[df_name]])

  ##cat("\nEnd of processing ",df_name)
}
```

We now have a table which contains 431 rows. Here are views of selections from the table:

```
dim(AllConvoys)
```

```
## [1] 431 7
```

```
head(AllConvoys)
```

```
##                               Region Code.Prefix
## 1 01-European Coastal Atlantic Convoys          BB
## 2 01-European Coastal Atlantic Convoys          BC
## 3 01-European Coastal Atlantic Convoys          BD
## 4 01-European Coastal Atlantic Convoys          BK
## 5 01-European Coastal Atlantic Convoys          BTC
## 6 01-European Coastal Atlantic Convoys          CE
##
##                               Routes
## 1 Belfast or River Clyde to Bristol Channel
## 2           Bristol Channel to Bay of Biscay
## 3           White Sea to Dikson Island
## 4           White Sea to Kola Inlet
## 5           Bristol Channel to River Thames
```

```
## 6      St. Helens Roads to Southend-on-Sea
##              First.Sailing              Last.Sailing
## 1 1940 from Belfast - 1945 from Clyde 1943 from Belfast - 1945 from Clyde
## 2              <NA>              <NA>
## 3              September 1943              <NA>
## 4              Summer 1941              <NA>
## 5              1944              1945
## 6              <NA>              <NA>
##      Number.of.Convoys              Notes
## 1              <NA>              <NA>
## 2              <NA> outward and return convoys used same number
## 3              <NA>              <NA>
## 4              <NA>              <NA>
## 5              <NA>              <NA>
## 6              <NA>              <NA>
```

```
tail(AllConvoys)
```

```
##              Region Code.Prefix
## 426 08-Normandy Invasion Convoys      WEP
## 427 08-Normandy Invasion Convoys      WFM
## 428 08-Normandy Invasion Convoys      WMP
## 429 08-Normandy Invasion Convoys      WNC
## 430 08-Normandy Invasion Convoys      WNL
## 431 08-Normandy Invasion Convoys      WVP
##              Routes First.Sailing Last.Sailing
## 426 Isle of Wight to Cherbourg-Octeville December 1944 December 1944
## 427              <NA> October 1944 November 1944
## 428 Isle of Wight to Arromanches-les-Bains November 1944 December 1944
## 429              Isle of Wight to Le Havre December 1944 May 1945
## 430              Isle of Wight to France April 1945 May 1945
## 431              Isle of Wight to France December 1944 May 1945
##      Number.of.Convoys      Notes
## 426              <NA>      <NA>
## 427              <NA> invasion convoys
## 428              <NA>      <NA>
## 429              <NA>      <NA>
## 430              <NA>      <NA>
## 431              <NA>      <NA>
```

```
#### Note that the below two subsetting/filtering methods select the same rows, but differ on the index
AllConvoys[seq(1,431,25),]
```

```
##              Region Code.Prefix
## 1              01-European Coastal Atlantic Convoys      BB
## 26             01-European Coastal Atlantic Convoys      NP
## 51             02-North Atlantic Convoys      KJ
## 76             03-North American Coastal and Caribbean Convoys      AH
## 101            03-North American Coastal and Caribbean Convoys      HK
## 126            03-North American Coastal and Caribbean Convoys      SH
## 151            04-Mediterranean and North African Coastal Convoys      CG
## 176            04-Mediterranean and North African Coastal Convoys      MW
## 201            04-Mediterranean and North African Coastal Convoys      TSS
## 226            05-South Atlantic Convoys      FB
## 251            05-South Atlantic Convoys      STL
```

## 276	06-Indian Ocean Convoys	BAF
## 301	06-Indian Ocean Convoys	JC
## 326	06-Indian Ocean Convoys	SR
## 351	07-Pacific Convoys	MS
## 376	07-Pacific Convoys	VK
## 401	08-Normandy Invasion Convoys	FPP
## 426	08-Normandy Invasion Convoys	WEP
##	Routes	
## 1	Belfast or River Clyde to Bristol Channel	
## 26	British Isles to Norway	
## 51	Kingston, Jamaica to United Kingdom	
## 76	Aruba to Halifax Harbour	
## 101	Houston, Texas to Key West, Florida	
## 126	Sydney, Nova Scotia to Halifax Harbour	
## 151	Casablanca to Gibraltar	
## 176	Alexandria to Malta	
## 201	assault convoys for Naples landings	
## 226	Freetown to Bahia	
## 251	Freetown to Lagos via Sekondi-Takoradi	
## 276	Mumbai to Aden	
## 301	Colombo to Kolkata	
## 326	Kolkata to Yangon	
## 351	Melbourne to Singapore	
## 376	Sydney to Wellington	
## 401	France to Portland Harbour	
## 426	Isle of Wight to Cherbourg-Octeville	
##	First.Sailing	
## 1	1940 from Belfast - 1945 from Clyde	
## 26	April 1940	
## 51	<NA>	
## 76	July 1942	
## 101	<NA>	
## 126	<NA>	
## 151	<NA>	
## 176	<NA>	
## 201	<NA>	
## 226	<NA>	
## 251	<NA>	
## 276	<NA>	
## 301	<NA>	
## 326	1941	
## 351	November 1941	
## 376	<NA>	
## 401	July 1944	
## 426	December 1944	
##	Last.Sailing	Number.of.Convoys
## 1	1943 from Belfast - 1945 from Clyde	<NA>
## 26	May 1940	<NA>
## 51	<NA>	<NA>
## 76	September 1942	<NA>
## 101	<NA>	<NA>
## 126	<NA>	<NA>
## 151	<NA>	<NA>
## 176	<NA>	<NA>

```

## 201                <NA>                <NA>
## 226                <NA>                <NA>
## 251                <NA>                <NA>
## 276                <NA>                <NA>
## 301                <NA>                <NA>
## 326                1942                <NA>
## 351                February 1942        <NA>
## 376                <NA>                <NA>
## 401                August 1944         <NA>
## 426                December 1944       <NA>
##                Notes
## 1                <NA>
## 26                troop convoys
## 51                <NA>
## 76 a brief tanker series
## 101               <NA>
## 126               <NA>
## 151               <NA>
## 176               <NA>
## 201               <NA>
## 226               <NA>
## 251               <NA>
## 276                fast troopships
## 301               <NA>
## 326               <NA>
## 351               <NA>
## 376               <NA>
## 401                personnel convoys
## 426               <NA>

```

```
filter(AllConvoys,row_number() %% 25==1)
```

```

##                Region Code.Prefix
## 1                01-European Coastal Atlantic Convoys        BB
## 2                01-European Coastal Atlantic Convoys        NP
## 3                02-North Atlantic Convoys                    KJ
## 4                03-North American Coastal and Caribbean Convoys    AH
## 5                03-North American Coastal and Caribbean Convoys    HK
## 6                03-North American Coastal and Caribbean Convoys    SH
## 7                04-Mediterranean and North African Coastal Convoys    CG
## 8                04-Mediterranean and North African Coastal Convoys    MW
## 9                04-Mediterranean and North African Coastal Convoys    TSS
## 10               05-South Atlantic Convoys                    FB
## 11               05-South Atlantic Convoys                    STL
## 12               06-Indian Ocean Convoys                      BAF
## 13               06-Indian Ocean Convoys                      JC
## 14               06-Indian Ocean Convoys                      SR
## 15               07-Pacific Convoys                          MS
## 16               07-Pacific Convoys                          VK
## 17               08-Normandy Invasion Convoys                 FPP
## 18               08-Normandy Invasion Convoys                 WEP
##                Routes
## 1 Belfast or River Clyde to Bristol Channel
## 2                British Isles to Norway
## 3 Kingston, Jamaica to United Kingdom

```

## 4	Aruba to Halifax Harbour	
## 5	Houston, Texas to Key West, Florida	
## 6	Sydney, Nova Scotia to Halifax Harbour	
## 7	Casablanca to Gibraltar	
## 8	Alexandria to Malta	
## 9	assault convoys for Naples landings	
## 10	Freetown to Bahia	
## 11	Freetown to Lagos via Sekondi-Takoradi	
## 12	Mumbai to Aden	
## 13	Colombo to Kolkata	
## 14	Kolkata to Yangon	
## 15	Melbourne to Singapore	
## 16	Sydney to Wellington	
## 17	France to Portland Harbour	
## 18	Isle of Wight to Cherbourg-Octeville	
##	First.Sailing	Last.Sailing
## 1	1940 from Belfast - 1945 from Clyde	1943 from Belfast - 1945 from Clyde
## 2	April 1940	May 1940
## 3	<NA>	<NA>
## 4	July 1942	September 1942
## 5	<NA>	<NA>
## 6	<NA>	<NA>
## 7	<NA>	<NA>
## 8	<NA>	<NA>
## 9	<NA>	<NA>
## 10	<NA>	<NA>
## 11	<NA>	<NA>
## 12	<NA>	<NA>
## 13	<NA>	<NA>
## 14	1941	1942
## 15	November 1941	February 1942
## 16	<NA>	<NA>
## 17	July 1944	August 1944
## 18	December 1944	December 1944
##	Number.of.Convoys	Notes
## 1	<NA>	<NA>
## 2	<NA>	troop convoys
## 3	<NA>	<NA>
## 4	<NA>	a brief tanker series
## 5	<NA>	<NA>
## 6	<NA>	<NA>
## 7	<NA>	<NA>
## 8	<NA>	<NA>
## 9	<NA>	<NA>
## 10	<NA>	<NA>
## 11	<NA>	<NA>
## 12	<NA>	fast troopships
## 13	<NA>	<NA>
## 14	<NA>	<NA>
## 15	<NA>	<NA>
## 16	<NA>	<NA>
## 17	<NA>	personnel convoys
## 18	<NA>	<NA>

Most of the Routes are of the form “Origin” to “Destination”.

Extract the Origin and Destination into individual columns, but retain the original route so we can examine those for which such separation fails

```
AllConvoys <- extract(AllConvoys,
                      Routes,
                      into = c('Origin', 'Destination'),
                      '(.*)\\sto\\s(.*)',
                      remove=FALSE)
```

```
head(AllConvoys)
```

```
##                                Region Code.Prefix
## 1 01-European Coastal Atlantic Convoys          BB
## 2 01-European Coastal Atlantic Convoys          BC
## 3 01-European Coastal Atlantic Convoys          BD
## 4 01-European Coastal Atlantic Convoys          BK
## 5 01-European Coastal Atlantic Convoys          BTC
## 6 01-European Coastal Atlantic Convoys          CE
##                                Routes              Origin
## 1 Belfast or River Clyde to Bristol Channel Belfast or River Clyde
## 2          Bristol Channel to Bay of Biscay      Bristol Channel
## 3          White Sea to Dikson Island             White Sea
## 4          White Sea to Kola Inlet                 White Sea
## 5          Bristol Channel to River Thames        Bristol Channel
## 6          St. Helens Roads to Southend-on-Sea     St. Helens Roads
##                                Destination          First.Sailing
## 1 Bristol Channel 1940 from Belfast - 1945 from Clyde
## 2 Bay of Biscay                                     <NA>
## 3 Dikson Island                                     September 1943
## 4 Kola Inlet                                       Summer 1941
## 5 River Thames                                    1944
## 6 Southend-on-Sea                                 <NA>
##                                Last.Sailing Number.of.Convoys
## 1 1943 from Belfast - 1945 from Clyde             <NA>
## 2                                     <NA>          <NA>
## 3                                     <NA>          <NA>
## 4                                     <NA>          <NA>
## 5                                     1945          <NA>
## 6                                     <NA>          <NA>
##                                Notes
## 1                                     <NA>
## 2 outward and return convoys used same number
## 3                                     <NA>
## 4                                     <NA>
## 5                                     <NA>
## 6                                     <NA>
```

```
tail(AllConvoys)
```

```
##                                Region Code.Prefix
## 426 08-Normandy Invasion Convoys          WEP
## 427 08-Normandy Invasion Convoys          WFM
## 428 08-Normandy Invasion Convoys          WMP
```

```

## 429 08-Normandy Invasion Convoys      WNC
## 430 08-Normandy Invasion Convoys      WNL
## 431 08-Normandy Invasion Convoys      WVP
##                                     Routes      Origin
## 426  Isle of Wight to Cherbourg-Octeville Isle of Wight
## 427                                     <NA>      <NA>
## 428 Isle of Wight to Arromanches-les-Bains Isle of Wight
## 429             Isle of Wight to Le Havre Isle of Wight
## 430             Isle of Wight to France Isle of Wight
## 431             Isle of Wight to France Isle of Wight
##                                     Destination First.Sailing Last.Sailing Number.of.Convoys
## 426  Cherbourg-Octeville December 1944 December 1944      <NA>
## 427                                     <NA>  October 1944 November 1944      <NA>
## 428 Arromanches-les-Bains November 1944 December 1944      <NA>
## 429             Le Havre December 1944      May 1945      <NA>
## 430             France April 1945      May 1945      <NA>
## 431             France December 1944      May 1945      <NA>
##                                     Notes
## 426                                     <NA>
## 427 invasion convoys
## 428                                     <NA>
## 429                                     <NA>
## 430                                     <NA>
## 431                                     <NA>

```

Let's examine those items which didn't have " to " in the Route

```

Failed_To_Extract <- filter(.data = AllConvoys, is.na(Origin))
Failed_To_Extract

```

```

##                                     Region Code.Prefix
## 1  04-Mediterranean and North African Coastal Convoys      ARM
## 2  04-Mediterranean and North African Coastal Convoys      CNF
## 3  04-Mediterranean and North African Coastal Convoys      NCF
## 4  04-Mediterranean and North African Coastal Convoys      NCS
## 5  04-Mediterranean and North African Coastal Convoys      SBF
## 6  04-Mediterranean and North African Coastal Convoys      SBM
## 7  04-Mediterranean and North African Coastal Convoys      TJF
## 8  04-Mediterranean and North African Coastal Convoys      TJM
## 9  04-Mediterranean and North African Coastal Convoys      TJS
## 10 04-Mediterranean and North African Coastal Convoys      TSF
## 11 04-Mediterranean and North African Coastal Convoys      TSM
## 12 04-Mediterranean and North African Coastal Convoys      TSS
## 13             05-South Atlantic Convoys      LGE
## 14             05-South Atlantic Convoys      LGW
## 15             05-South Atlantic Convoys      OSS
## 16             05-South Atlantic Convoys      PGE
## 17             07-Pacific Convoys      NLY
## 18             08-Normandy Invasion Convoys      EXP
## 19             08-Normandy Invasion Convoys      WAP
## 20             08-Normandy Invasion Convoys      WDC
## 21             08-Normandy Invasion Convoys      WFM
##                                     Routes Origin Destination
## 1                                     local Mediterranean <NA>      <NA>

```


## 2	convoys for Allied invasion of Sicily	<NA>	<NA>
## 3	fast convoys for Allied invasion of Sicily	<NA>	<NA>
## 4	slow convoys for Allied invasion of Sicily	<NA>	<NA>
## 5	assault convoys for Allied invasion of Sicily	<NA>	<NA>
## 6	assault convoys for Allied invasion of Sicily	<NA>	<NA>
## 7	assault convoys for Allied invasion of Sicily	<NA>	<NA>
## 8	assault convoys for Allied invasion of Sicily	<NA>	<NA>
## 9	assault convoys for Allied invasion of Sicily	<NA>	<NA>
## 10	assault convoys for Naples landings	<NA>	<NA>
## 11	assault convoys for Naples landings	<NA>	<NA>
## 12	assault convoys for Naples landings	<NA>	<NA>
## 13	Lagos eastbound	<NA>	<NA>
## 14	Lagos westbound	<NA>	<NA>
## 15	Freetown southward	<NA>	<NA>
## 16	Pointe-Noire southward	<NA>	<NA>
## 17	Lingayen Gulf - Jayapura - Leyte	<NA>	<NA>
## 18		<NA>	<NA>
## 19		<NA>	<NA>
## 20		<NA>	<NA>
## 21		<NA>	<NA>
##	First.Sailing Last.Sailing Number.of.Convoys		
## 1	<NA>	<NA>	<NA>
## 2	<NA>	<NA>	<NA>
## 3	1943	1943	<NA>
## 4	1943	1943	<NA>
## 5	1943	1943	<NA>
## 6	1943	1943	<NA>
## 7	1943	1943	<NA>
## 8	1943	1943	<NA>
## 9	1943	1943	<NA>
## 10	<NA>	<NA>	<NA>
## 11	<NA>	<NA>	<NA>
## 12	<NA>	<NA>	<NA>
## 13	<NA>	<NA>	<NA>
## 14	<NA>	<NA>	<NA>
## 15	<NA>	<NA>	<NA>
## 16	<NA>	<NA>	<NA>
## 17	<NA>	<NA>	<NA>
## 18	June 1944	October 1944	<NA>
## 19	June 1944	October 1944	<NA>
## 20	September 1944	December 1944	<NA>
## 21	October 1944	November 1944	<NA>
##			Notes
## 1			little used
## 2			special designation
## 3			<NA>
## 4			<NA>
## 5			<NA>
## 6			<NA>
## 7			<NA>
## 8			<NA>
## 9			<NA>
## 10			<NA>
## 11			<NA>

```
## 12                                <NA>
## 13                        local west African traffic
## 14                        local west African traffic
## 15 southward extension of the corresponding OS convoy
## 16                        local traffic
## 17                                <NA>
## 18                        invasion convoys
## 19                        invasion convoys
## 20                        invasion convoys
## 21                        invasion convoys
```

There are 21 such rows where the Route is not of the form (Origin) to (Destination).

There is a column “Number.of.Convoys” which lists the number of times a particular route was used. Unfortunately it is not populated for most rows. There are a few rows where the entry includes a count as well as additional information (apparently a range of sequence numbers, e.g., “97 (# 41-137”).

```
AllConvoys %>% filter(str_detect(string = Number.of.Convoys, pattern = "\\("))
```

```
##           Region Code.Prefix      Routes      Origin
## 1 02-North Atlantic Convoys      BHX  Bermuda to Liverpool  Bermuda
## 2 02-North Atlantic Convoys      JW   Iceland to White Sea  Iceland
## 3 02-North Atlantic Convoys      RA White Sea to Scotland White Sea
## Destination      First.Sailing Last.Sailing Number.of.Convoys
## 1  Liverpool      May 1940      March 1941      97 (# 41-137)
## 2  White Sea 25 December 1942  12 May 1945      17 (# 51-67)
## 3  Scotland 30 December 1942  23 May 1945      17 (# 51-67)
##
##                                     Notes
## 1 sailed from Bermuda and merged with same number HX convoy at sea
## 2                                     replaced PQ convoys
## 3                                     replaced QP convoys
```

We need to remove this extraneous detail from these items in order to be able to make any use of the counts. Additionally, we need to cast the values from character back to numeric.

```
AllConvoys <- AllConvoys %>%
  mutate(Number.of.Convoys =
    Number.of.Convoys = as.numeric(
      gsub(pattern = ".*$", replacement = "", x = Number.of.Convoys)))
```

Analysis

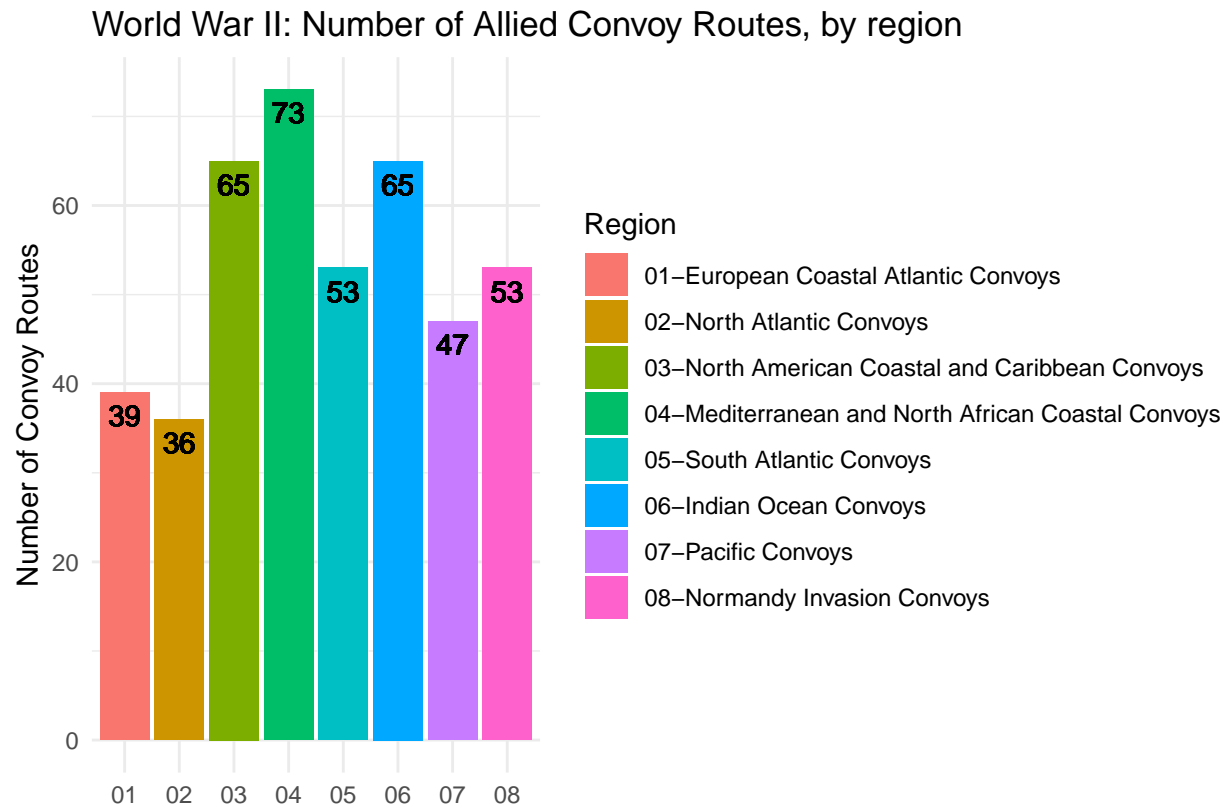
Plot the number of convoy routes per region:

```
AllConvoys %>%
  select(Region) %>%
  mutate(RegionNum = substr(Region, 1, 2)) %>%
  ggplot(aes(x = factor(RegionNum), y = table(RegionNum)[RegionNum], fill = Region)) +
  geom_bar(stat = "identity", position = "dodge") +
  theme_minimal() +
  geom_text(aes(label = as.integer(table(RegionNum)[RegionNum])),
```

```

    vjust=1.6, color="black",
    position = position_dodge(0.8), size=4) +
scale_x_discrete( expand = waiver(), position = "bottom")+
scale_y_continuous(name = waiver(), breaks = waiver(),
    minor_breaks = waiver(), labels = waiver(), limits = NULL,
    expand = waiver(), oob = censor, na.value = NA_real_,
    trans = "identity", position = "left", sec.axis = waiver()) +
labs(x="",y="Number of Convoy Routes")+
ggtitle("World War II: Number of Allied Convoy Routes, by region")

```



Although there is field “Number.of.Convoys” which apparently counts the number of times a particular route was used, it is not populated for most rows. In particular, it is only populated for 33 rows out of 431.

```

CountOfConvoysDefined <- AllConvoys %>% filter(!is.na(Number.of.Convoys)) %>% count(x = .)

Total.Number.of.Convoys <- sum(AllConvoys$Number.of.Convoys, na.rm=T)

```

Once the data is cleaned, the number of rows for which the Number.of.Convoys is not NA is 33 .

The totalsum of the number of convoys on such rows is 2842 .

These are such rows:

```
AllConvoys %>% filter(!is.na(Number.of.Convoys))
```

##		Region	Code.Prefix
## 1	01-European Coastal Atlantic Convoys		OA
## 2	01-European Coastal Atlantic Convoys		OB
## 3	02-North Atlantic Convoys		BHX
## 4	02-North Atlantic Convoys		CU
## 5	02-North Atlantic Convoys		GUF
## 6	02-North Atlantic Convoys		GUS
## 7	02-North Atlantic Convoys		HG
## 8	02-North Atlantic Convoys		HX
## 9	02-North Atlantic Convoys		HXF
## 10	02-North Atlantic Convoys		JW
## 11	02-North Atlantic Convoys		KMF
## 12	02-North Atlantic Convoys		KMS
## 13	02-North Atlantic Convoys		MKF
## 14	02-North Atlantic Convoys		MKS
## 15	02-North Atlantic Convoys		OG
## 16	02-North Atlantic Convoys		ON
## 17	02-North Atlantic Convoys		ONS
## 18	02-North Atlantic Convoys		OS
## 19	02-North Atlantic Convoys		PQ
## 20	02-North Atlantic Convoys		QP
## 21	02-North Atlantic Convoys		RA
## 22	02-North Atlantic Convoys		RB
## 23	02-North Atlantic Convoys		SC
## 24	02-North Atlantic Convoys		SL
## 25	02-North Atlantic Convoys		UC
## 26	02-North Atlantic Convoys		UGF
## 27	02-North Atlantic Convoys		UGS
## 28	06-Indian Ocean Convoys		DM
## 29	06-Indian Ocean Convoys		JMG
## 30	06-Indian Ocean Convoys		MD
## 31	08-Normandy Invasion Convoys		EBM
## 32	08-Normandy Invasion Convoys		EMM
## 33	08-Normandy Invasion Convoys		EMP
##		Routes	
## 1	River Thames (or Methil, Fife after July 1940) to Liverpool		
## 2	Liverpool to the Atlantic Ocean		
## 3	Bermuda to Liverpool		
## 4	Caribbean (later New York City) to Liverpool		
## 5	Mediterranean to Chesapeake Bay		
## 6	Mediterranean to Chesapeake Bay		
## 7	Gibraltar to Liverpool		
## 8	Halifax Harbour (later New York City) to Liverpool		
## 9	Halifax Harbour to Liverpool		
## 10	Iceland to White Sea		
## 11	Firth of Clyde to Mediterranean		
## 12	Liverpool to Mediterranean		
## 13	Mediterranean to Firth of Clyde or Liverpool		
## 14	Mediterranean to Liverpool		
## 15	Liverpool to Gibraltar		
## 16	Liverpool to Halifax Harbour		

## 17	Liverpool to Halifax Harbour
## 18	Liverpool to Sierra Leone
## 19	Iceland to White Sea
## 20	White Sea to Iceland
## 21	White Sea to Scotland
## 22	United States to British Isles
## 23	Sydney, Nova Scotia (or Halifax Harbour or New York City) to Liverpool
## 24	Sierra Leone to Liverpool
## 25	Liverpool to Caribbean (later New York City)
## 26	Chesapeake Bay to Mediterranean
## 27	Chesapeake Bay to Mediterranean
## 28	Durban to Malaya
## 29	assault convoy to Malaya
## 30	Madagascar to Durban
## 31	Bristol Channel to France
## 32	Belfast to France
## 33	Belfast to France
##	Origin
## 1	River Thames (or Methil, Fife after July 1940)
## 2	Liverpool
## 3	Bermuda
## 4	Caribbean (later New York City)
## 5	Mediterranean
## 6	Mediterranean
## 7	Gibraltar
## 8	Halifax Harbour (later New York City)
## 9	Halifax Harbour
## 10	Iceland
## 11	Firth of Clyde
## 12	Liverpool
## 13	Mediterranean
## 14	Mediterranean
## 15	Liverpool
## 16	Liverpool
## 17	Liverpool
## 18	Liverpool
## 19	Iceland
## 20	White Sea
## 21	White Sea
## 22	United States
## 23	Sydney, Nova Scotia (or Halifax Harbour or New York City)
## 24	Sierra Leone
## 25	Liverpool
## 26	Chesapeake Bay
## 27	Chesapeake Bay
## 28	Durban
## 29	assault convoy
## 30	Madagascar
## 31	Bristol Channel
## 32	Belfast
## 33	Belfast
##	Destination First.Sailing Last.Sailing
## 1	Liverpool 7 September 1939 24 October 1940
## 2	the Atlantic Ocean 7 September 1939 21 July 1941

## 3	Liverpool	May 1940	March 1941
## 4	Liverpool	20 March 1943	30 May 1945
## 5	Chesapeake Bay	29 November 1942	16 April 1945
## 6	Chesapeake Bay	21 December 1942	27 May 1945
## 7	Liverpool	26 September 1939	19 September 1942
## 8	Liverpool	16 Sept 1939	23 May 1945
## 9	Liverpool	29 Sept 1939	12 February 1940
## 10	White Sea	25 December 1942	12 May 1945
## 11	Mediterranean	26 October 1942	23 May 1945
## 12	Mediterranean	22 October 1942	27 April 1945
## 13	Firth of Clyde or Liverpool	12 November 1942	4 June 1945
## 14	Liverpool	12 November 1942	25 May 1945
## 15	Gibraltar	2 October 1939	17 October 1943
## 16	Halifax Harbour	26 July 1941	27 May 1945
## 17	Halifax Harbour	15 March 1943	21 May 1945
## 18	Sierra Leone	24 July 1941	27 May 1945
## 19	White Sea	29 September 1941	2 September 1942
## 20	Iceland	28 September 1941	17 November 1942
## 21	Scotland	30 December 1942	23 May 1945
## 22	British Isles	September 1942	September 1942
## 23	Liverpool	15 August 1940	26 May 1945
## 24	Liverpool	14 September 1939	25 November 1944
## 25	Caribbean (later New York City)	15 February 1943	3 June 1945
## 26	Mediterranean	24 October 1942	8 April 1945
## 27	Mediterranean	13 November 1942	28 May 1945
## 28	Malaya	1941	1942
## 29	Malaya	September 1945	<NA>
## 30	Durban	<NA>	<NA>
## 31	France	June 1944	June 1944
## 32	France	June 1944	July 1944
## 33	France	July 1944	July 1944
##	Number.of.Convoys		
## 1	234		
## 2	345		
## 3	97		
## 4	73		
## 5	22		
## 6	92		
## 7	89		
## 8	377		
## 9	17		
## 10	17		
## 11	45		
## 12	98		
## 13	45		
## 14	103		
## 15	95		
## 16	307		
## 17	51		
## 18	131		
## 19	18		
## 20	15		
## 21	17		
## 22	1		

```

## 23          177
## 24          178
## 25          71
## 26          22
## 27          95
## 28           3
## 29           1
## 30           1
## 31           1
## 32           2
## 33           2
##
## 1
## 2          merged with OA convoy in the southwest approaches - ON and
## 3          sailed from Bermuda and merged with
## 4          14-knot convoys of tankers
## 5
## 6
## 7          replaced by ML
## 8          9-knot convoys for ships of substantial tonnage
## 9
## 10
## 11          faster
## 12 slower ships to the Mediterranean - 1st 12 sailed independently - remainder sailed with OS convoys
## 13          faster
## 14          slower ships from the Mediterranean- 1st 11 sailed independently - remainder merged with
## 15          early sailings every 5th merged OA/OB convoy became an OG convoy at sea - later
## 16 replaced OB convoys for North American destinations - alternate convoys included slower ships
## 17          slower ships
## 18          replaced OB convoys for non-North American destinations - included KMS convoys
## 19
## 20
## 21
## 22
## 23          7-knot convoys of eastbound ships to
## 24          merged with
## 25          14-knot convoys of tankers
## 26          faster ships - (UGF-1) was the in
## 27
## 28
## 29
## 30
## 31
## 32
## 33

```

This sums up the Number.of.Convoys by region, where such number is not NA:

```

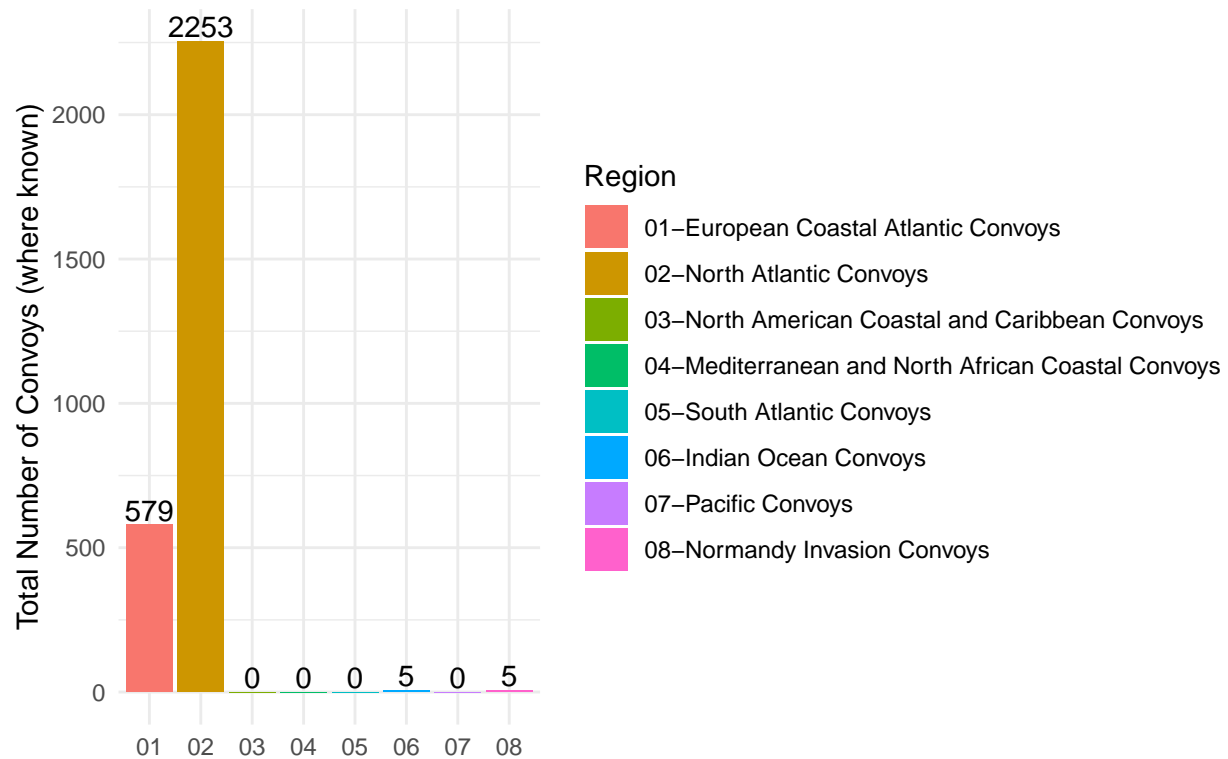
TotalConvoysByRegion <- AllConvoys %>%
  group_by(Region) %>%
  summarise(total_convoys = sum(Number.of.Convoys, na.rm = T)) %>%
  ungroup()
TotalConvoysByRegion

```

```
## # A tibble: 8 x 2
##   Region                                total_convoy
##   <chr>                                <dbl>
## 1 01-European Coastal Atlantic Convoys      579
## 2 02-North Atlantic Convoys                2253
## 3 03-North American Coastal and Caribbean Convoys      0
## 4 04-Mediterranean and North African Coastal Convoys    0
## 5 05-South Atlantic Convoys                  0
## 6 06-Indian Ocean Convoys                    5
## 7 07-Pacific Convoys                        0
## 8 08-Normandy Invasion Convoys              5
```

```
TotalConvoysByRegion %>%
  mutate(RegionNum=substr(Region,1,2)) %>%
  ggplot(aes(x=factor(RegionNum), y=total_convoy, fill=Region)) +
  geom_bar(stat="identity", position="dodge")+
  theme_minimal()+
  geom_text(aes(label=total_convoy,
                vjust=-0.2, color="black",
                position = position_dodge(0.8), size=4) +
  scale_x_discrete( expand = waiver(), position = "bottom")+
  scale_y_continuous(name = waiver(), breaks = waiver(),
                    minor_breaks = waiver(), labels = waiver(), limits = NULL,
                    expand = waiver(), oob = censor, na.value = NA_real_,
                    trans = "identity", position = "left", sec.axis = waiver()) +
  labs(x="",y="Total Number of Convoys (where known)")+
  ggtitle("World War II: Total Number of Allied Convoys (where known), by region")
```


World War II: Total Number of Allied Convoys (where known), by region



Convoy routes by Origin (top 10)

```
ConvoysByOrigin <- AllConvoys %>%
  group_by(Origin) %>%
  summarise(ConvoyRoutesByOrigin = n()) %>%
  arrange(.data = ., desc(ConvoyRoutesByOrigin)) %>%
  ungroup()
top_n(x = ConvoysByOrigin, wt=ConvoyRoutesByOrigin, n = 10)
```

```
## # A tibble: 11 x 2
##   Origin          ConvoyRoutesByOrigin
##   <chr>              <int>
## 1 <NA>                21
## 2 Trinidad           13
## 3 France              11
## 4 Isle of Wight       10
## 5 River Thames        10
## 6 Freetown             9
## 7 Halifax Harbour     9
## 8 Alexandria           8
## 9 British Isles       8
## 10 Dakar               8
## 11 Liverpool           8
```

The above reflects the fact that there are 21 routes for which it was not possible to extract origin/destination details.

Convoy routes by Destination (top 10)

```
ConvoysByDestination <- AllConvoys %>%
  filter(!is.na(Destination)) %>%
  group_by(Destination) %>%
  summarise(ConvoyRoutesByDestination = n()) %>%
  arrange(.data = ., desc(ConvoyRoutesByDestination)) %>%
  ungroup()
top_n(x = ConvoysByDestination, wt=ConvoyRoutesByDestination, n = 10)
```

```
## # A tibble: 11 x 2
##   Destination          ConvoyRoutesByDestination
##   <chr>                  <int>
## 1 France                  19
## 2 Liverpool               10
## 3 Townsville, Queensland 10
## 4 Aden                    8
## 5 British Isles           8
## 6 Halifax Harbour         8
## 7 Guantanamo Bay Naval Base 7
## 8 Key West, Florida        7
## 9 dispersal                6
## 10 Gibraltar               6
## 11 Trinidad                6
```

This example would have also shown the 21 rows for which Destination is “NA”, except I have filtered them out.

From above we can observe that there are a large number of Convoy routes for which the “Origin” or “Destination” is simply “France”, without further designation of a specific city/port. As it turns out, all such items are associated with the Normandy Invasion:

```
AllConvoys %>%
  filter(Origin=="France"|Destination=="France")
```

```
##           Region Code.Prefix          Routes
## 1 08-Normandy Invasion Convoys    BEC    Bristol Channel to France
## 2 08-Normandy Invasion Convoys    EBC    Bristol Channel to France
## 3 08-Normandy Invasion Convoys    EBM    Bristol Channel to France
## 4 08-Normandy Invasion Convoys    ECM    Falmouth, Cornwall to France
## 5 08-Normandy Invasion Convoys    EMM          Belfast to France
## 6 08-Normandy Invasion Convoys    EMP          Belfast to France
## 7 08-Normandy Invasion Convoys    ETC          River Thames to France
## 8 08-Normandy Invasion Convoys    ETM          River Thames to France
## 9 08-Normandy Invasion Convoys    EWL    Isle of Wight to France
## 10 08-Normandy Invasion Convoys   EWM    Isle of Wight to France
## 11 08-Normandy Invasion Convoys   EWP    Isle of Wight to France
## 12 08-Normandy Invasion Convoys    FC    France to western England
## 13 08-Normandy Invasion Convoys   FCP    France to western England
```

## 14	08-Normandy	Invasion	Convoys	FPM	France to Portland Harbour
## 15	08-Normandy	Invasion	Convoys	FPP	France to Portland Harbour
## 16	08-Normandy	Invasion	Convoys	FTC	France to River Thames
## 17	08-Normandy	Invasion	Convoys	FTM	France to River Thames
## 18	08-Normandy	Invasion	Convoys	FWC	France to Isle of Wight
## 19	08-Normandy	Invasion	Convoys	FWL	France to Isle of Wight
## 20	08-Normandy	Invasion	Convoys	FWM	France to Isle of Wight
## 21	08-Normandy	Invasion	Convoys	FWP	France to Isle of Wight
## 22	08-Normandy	Invasion	Convoys	FXP	France to British Isles
## 23	08-Normandy	Invasion	Convoys	NAP	Dover to France
## 24	08-Normandy	Invasion	Convoys	TAP	River Thames to France
## 25	08-Normandy	Invasion	Convoys	TMC	River Thames to France
## 26	08-Normandy	Invasion	Convoys	TMM	River Thames to France
## 27	08-Normandy	Invasion	Convoys	WEC	Isle of Wight to France
## 28	08-Normandy	Invasion	Convoys	WEL	Isle of Wight to France
## 29	08-Normandy	Invasion	Convoys	WNL	Isle of Wight to France
## 30	08-Normandy	Invasion	Convoys	WVP	Isle of Wight to France
##		Origin	Destination	First.Sailing	Last.Sailing
## 1		Bristol Channel	France	June 1944	October 1944
## 2		Bristol Channel	France	June 1944	October 1944
## 3		Bristol Channel	France	June 1944	June 1944
## 4		Falmouth, Cornwall	France	June 1944	early July 1944
## 5		Belfast	France	June 1944	July 1944
## 6		Belfast	France	July 1944	July 1944
## 7		River Thames	France	June 1944	October 1944
## 8		River Thames	France	June 1944	October 1944
## 9		Isle of Wight	France	June 1944	June 1944
## 10		Isle of Wight	France	September 1944	October 1944
## 11		Isle of Wight	France	<NA>	<NA>
## 12		France	western England	June 1944	July 1944
## 13		France	western England	June 1944	July 1944
## 14		France	Portland Harbour	<NA>	<NA>
## 15		France	Portland Harbour	July 1944	August 1944
## 16		France	River Thames	1944	1944
## 17		France	River Thames	1944	1944
## 18		France	Isle of Wight	June 1944	<NA>
## 19		France	Isle of Wight	1944	1944
## 20		France	Isle of Wight	June 1944	July 1944
## 21		France	Isle of Wight	June 1944	September 1944
## 22		France	British Isles	June 1944	October 1944
## 23		Dover	France	December 1944	December 1944
## 24		River Thames	France	1945	1945
## 25		River Thames	France	June 1944	October 1944
## 26		River Thames	France	June 1944	October 1944
## 27		Isle of Wight	France	December 1944	May 1945
## 28		Isle of Wight	France	1944	1945
## 29		Isle of Wight	France	April 1945	May 1945
## 30		Isle of Wight	France	December 1944	May 1945
##		Number.of.Convoys			Notes
## 1		NA			<NA>
## 2		NA			<NA>
## 3		1		motor transport	convoy
## 4		NA			<NA>
## 5		2			<NA>

```
## 6      2      <NA>
## 7      NA      <NA>
## 8      NA      motor transport convoys
## 9      NA mainly landings ships and landing craft
## 10     NA      motor transport convoys
## 11     NA      personnel convoys
## 12     NA      <NA>
## 13     NA      personnel convoys
## 14     NA      motor transport convoys
## 15     NA      personnel convoys
## 16     NA      <NA>
## 17     NA      motor transport convoys
## 18     NA      <NA>
## 19     NA      landing craft convoys
## 20     NA      motor transport convoys
## 21     NA      personnel convoys
## 22     NA      <NA>
## 23     NA      <NA>
## 24     NA      <NA>
## 25     NA      <NA>
## 26     NA      motor transport convoys
## 27     NA      <NA>
## 28     NA      landing craft
## 29     NA      <NA>
## 30     NA      <NA>
```

```
ConvoysByOriginExInvasion <- AllConvoys %>% filter(.data = ., Region != ConvoyTableNames[8] & !is.na(
  group_by(Origin) %>%
  summarise(ConvoyRoutesByOrigin = n()) %>%
  arrange(.data = ., desc(ConvoyRoutesByOrigin)) %>%
  ungroup()
top_n(x = ConvoysByOriginExInvasion, wt=ConvoyRoutesByOrigin, n = 10)
```

```
## # A tibble: 10 x 2
##   Origin      ConvoyRoutesByOrigin
##   <chr>          <int>
## 1 Trinidad      13
## 2 Freetown       9
## 3 Halifax Harbour 9
## 4 Alexandria     8
## 5 British Isles   8
## 6 Dakar           8
## 7 Liverpool       8
## 8 Aden            7
## 9 Gibraltar       7
## 10 Guantanamo Bay Naval Base 7
```

```
ConvoysByDestinationExInvasion <- AllConvoys %>% filter(.data = ., Region != ConvoyTableNames[8] & !i
  group_by(Destination) %>%
  summarise(ConvoyRoutesByDestination = n()) %>%
  arrange(.data = ., desc(ConvoyRoutesByDestination)) %>%
  ungroup()
top_n(x = ConvoysByDestinationExInvasion, wt=ConvoyRoutesByDestination, n = 10)
```

```
## # A tibble: 10 x 2
```

```
##      Destination      ConvoyRoutesByDestination
##      <chr>              <int>
##  1 Liverpool          10
##  2 Townsville, Queensland 10
##  3 Aden                8
##  4 Halifax Harbour     8
##  5 British Isles       7
##  6 Guantanamo Bay Naval Base 7
##  7 Key West, Florida   7
##  8 dispersal           6
##  9 Gibraltar           6
## 10 Trinidad            6
```

We see that a sizable number of convoys are to or from Liverpool, a major U.K. port:

```
AllConvoys %>%
  filter(Origin=="Liverpool"|Destination=="Liverpool")
```

```
##      Region Code.Prefix
##  1 01-European Coastal Atlantic Convoys OA
##  2 01-European Coastal Atlantic Convoys OB
##  3      02-North Atlantic Convoys BHX
##  4      02-North Atlantic Convoys CU
##  5      02-North Atlantic Convoys HG
##  6      02-North Atlantic Convoys HX
##  7      02-North Atlantic Convoys HXF
##  8      02-North Atlantic Convoys KMS
##  9      02-North Atlantic Convoys MKS
## 10      02-North Atlantic Convoys OG
## 11      02-North Atlantic Convoys ON
## 12      02-North Atlantic Convoys ONS
## 13      02-North Atlantic Convoys OS
## 14      02-North Atlantic Convoys SC
## 15      02-North Atlantic Convoys SL
## 16      02-North Atlantic Convoys TCU
## 17      02-North Atlantic Convoys TUC
## 18      02-North Atlantic Convoys UC

##      Routes
##  1      River Thames (or Methil, Fife after July 1940) to Liverpool
##  2      Liverpool to the Atlantic Ocean
##  3      Bermuda to Liverpool
##  4      Caribbean (later New York City) to Liverpool
##  5      Gibraltar to Liverpool
##  6      Halifax Harbour (later New York City) to Liverpool
##  7      Halifax Harbour to Liverpool
##  8      Liverpool to Mediterranean
##  9      Mediterranean to Liverpool
## 10      Liverpool to Gibraltar
## 11      Liverpool to Halifax Harbour
## 12      Liverpool to Halifax Harbour
## 13      Liverpool to Sierra Leone
## 14 Sydney, Nova Scotia (or Halifax Harbour or New York City) to Liverpool
## 15      Sierra Leone to Liverpool
## 16      Caribbean (later New York City) to Liverpool
```

## 17	Liverpool to Caribbean (later New York City)
## 18	Liverpool to Caribbean (later New York City)
##	Origin
## 1	River Thames (or Methil, Fife after July 1940)
## 2	Liverpool
## 3	Bermuda
## 4	Caribbean (later New York City)
## 5	Gibraltar
## 6	Halifax Harbour (later New York City)
## 7	Halifax Harbour
## 8	Liverpool
## 9	Mediterranean
## 10	Liverpool
## 11	Liverpool
## 12	Liverpool
## 13	Liverpool
## 14	Sydney, Nova Scotia (or Halifax Harbour or New York City)
## 15	Sierra Leone
## 16	Caribbean (later New York City)
## 17	Liverpool
## 18	Liverpool
##	Destination First.Sailing Last.Sailing
## 1	Liverpool 7 September 1939 24 October 1940
## 2	the Atlantic Ocean 7 September 1939 21 July 1941
## 3	Liverpool May 1940 March 1941
## 4	Liverpool 20 March 1943 30 May 1945
## 5	Liverpool 26 September 1939 19 September 1942
## 6	Liverpool 16 Sept 1939 23 May 1945
## 7	Liverpool 29 Sept 1939 12 February 1940
## 8	Mediterranean 22 October 1942 27 April 1945
## 9	Liverpool 12 November 1942 25 May 1945
## 10	Gibraltar 2 October 1939 17 October 1943
## 11	Halifax Harbour 26 July 1941 27 May 1945
## 12	Halifax Harbour 15 March 1943 21 May 1945
## 13	Sierra Leone 24 July 1941 27 May 1945
## 14	Liverpool 15 August 1940 26 May 1945
## 15	Liverpool 14 September 1939 25 November 1944
## 16	Liverpool <NA> <NA>
## 17	Caribbean (later New York City) <NA> <NA>
## 18	Caribbean (later New York City) 15 February 1943 3 June 1945
##	Number.of.Convoys
## 1	234
## 2	345
## 3	97
## 4	73
## 5	89
## 6	377
## 7	17
## 8	98
## 9	103
## 10	95
## 11	307
## 12	51
## 13	131

```

## 14          177
## 15          178
## 16          NA
## 17          NA
## 18          71
##
## 1
## 2          merged with OA convoy in the southwest approaches - ON and
## 3          sailed from Bermuda and merged with
## 4          14-knot convoys of tankers
## 5          replaced by ML
## 6          9-knot convoys for ships of susceptible
## 7
## 8 slower ships to the Mediterranean - 1st 12 sailed independently - remainder sailed with OS convoys
## 9 slower ships from the Mediterranean- 1st 11 sailed independently - remainder merged with
## 10 early sailings every 5th merged OA/OB convoy became an OG convoy at sea - later
## 11 replaced OB convoys for North American destinations - alternate convoys included slower ships
## 12          slower ships with
## 13          replaced OB convoys for non-North American destinations - included KMS convoys
## 14          7-knot convoys of eastbound ships to
## 15          merged with
## 16          14-knot CU convoys of tankers and fast
## 17          14-knot UC convoys of tankers and fast
## 18          14-knot convoys of tankers

```

And, for those routes on which we have frequency information, we see that Liverpool is well-represented at the top of the list:

```

FrequentlyUsedConvoyRoutes <- AllConvoys %>% filter(.data = ., !is.na(Number.of.Convoys)) %>%
  #group_by(Origin) %>%
  #summarise(ConvoyRoutesByOrigin = n()) %>%
  arrange(.data = ., desc(Number.of.Convoys)) %>%
  ungroup()
top_n(x = FrequentlyUsedConvoyRoutes, wt=Number.of.Convoys, n = 10)

```

	Region	Code.Prefix	Routes
## 1	02-North Atlantic Convoys	HX	
## 2	01-European Coastal Atlantic Convoys	OB	
## 3	02-North Atlantic Convoys	ON	
## 4	01-European Coastal Atlantic Convoys	OA	
## 5	02-North Atlantic Convoys	SL	
## 6	02-North Atlantic Convoys	SC	
## 7	02-North Atlantic Convoys	OS	
## 8	02-North Atlantic Convoys	MKS	
## 9	02-North Atlantic Convoys	KMS	
## 10	02-North Atlantic Convoys	BHX	
## 1			Halifax Harbour (later New York City) to Liverpool
## 2			Liverpool to the Atlantic Ocean
## 3			Liverpool to Halifax Harbour
## 4			River Thames (or Methil, Fife after July 1940) to Liverpool
## 5			Sierra Leone to Liverpool
## 6			Sydney, Nova Scotia (or Halifax Harbour or New York City) to Liverpool
## 7			Liverpool to Sierra Leone

```

## 8           Mediterranean to Liverpool
## 9           Liverpool to Mediterranean
## 10          Bermuda to Liverpool
##           Origin
## 1           Halifax Harbour (later New York City)
## 2           Liverpool
## 3           Liverpool
## 4           River Thames (or Methil, Fife after July 1940)
## 5           Sierra Leone
## 6 Sydney, Nova Scotia (or Halifax Harbour or New York City)
## 7           Liverpool
## 8           Mediterranean
## 9           Liverpool
## 10          Bermuda
##           Destination      First.Sailing      Last.Sailing      Number.of.Convoys
## 1           Liverpool      16 Sept 1939      23 May 1945          377
## 2 the Atlantic Ocean      7 September 1939  21 July 1941          345
## 3           Halifax Harbour  26 July 1941      27 May 1945          307
## 4           Liverpool      7 September 1939  24 October 1940       234
## 5           Liverpool      14 September 1939  25 November 1944       178
## 6           Liverpool      15 August 1940     26 May 1945          177
## 7           Sierra Leone    24 July 1941      27 May 1945          131
## 8           Liverpool      12 November 1942   25 May 1945          103
## 9           Mediterranean    22 October 1942   27 April 1945          98
## 10          Liverpool       May 1940          March 1941           97
##
## 1
## 2           merged with OA convoy in the southwest approaches - ON and
## 3 replaced OB convoys for North American destinations - alternate convoys included slower ships
## 4           merged with OB convoys
## 5           merged with
## 6           7-knot convoys of eastbound ships to
## 7 replaced OB convoys for non-North American destinations - included KMS convoys
## 8 slower ships from the Mediterranean- 1st 11 sailed independently - remainder merged with
## 9 slower ships to the Mediterranean - 1st 12 sailed independently - remainder sailed with OS convoys
## 10          sailed from Bermuda and merged with

```

Aggregating, Liverpool is by far the most frequent origin:

```

FrequentlyUsedOrigins <- AllConvoys %>% filter(.data = ., !is.na(Number.of.Convoys)) %>%
  group_by(Origin) %>%
  summarise(total_convoys = sum(Number.of.Convoys, na.rm = T)) %>%
  arrange(.data = ., desc(total_convoys)) %>%
  ungroup()
top_n(x = FrequentlyUsedOrigins, wt=total_convoys, n = 10)

```

```

## # A tibble: 10 x 2
##   Origin                                total_convoys
##   <chr>                                <dbl>
## 1 Liverpool                            1098
## 2 Halifax Harbour (later New York City)  377
## 3 Mediterranean                        262
## 4 River Thames (or Methil, Fife after July 1940) 234
## 5 Sierra Leone                        178

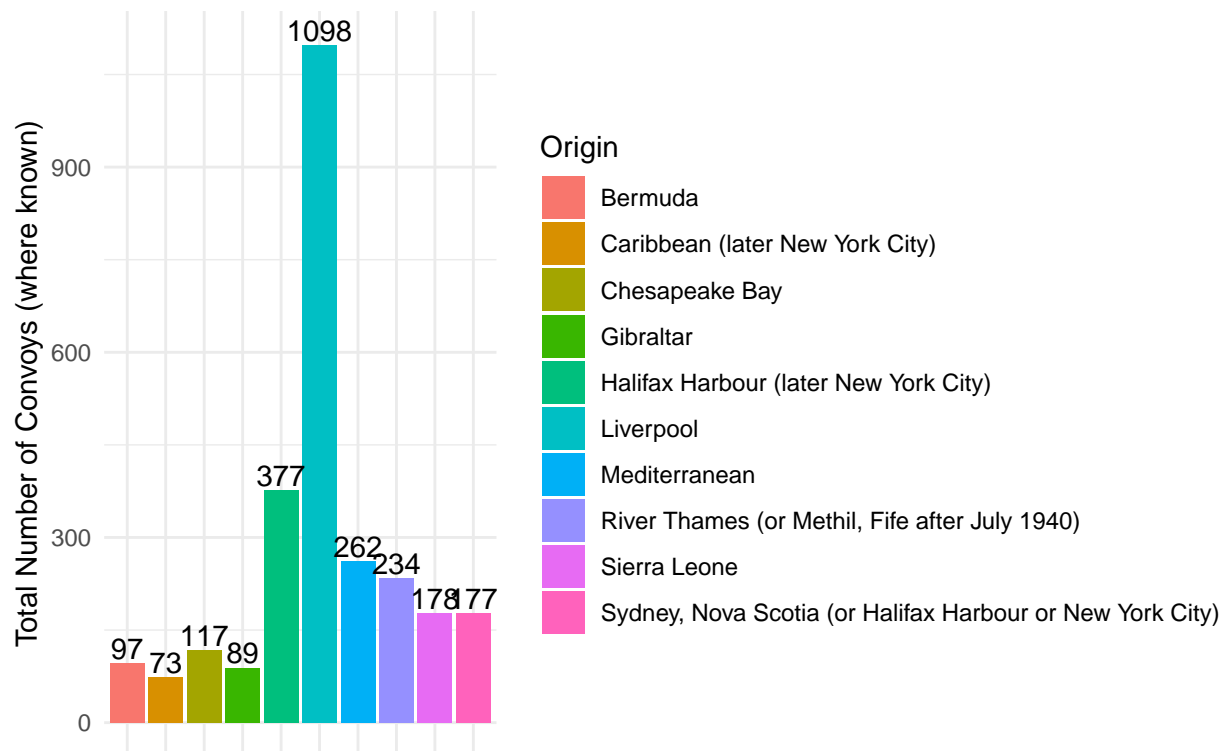
```


## 6 Sydney, Nova Scotia (or Halifax Harbour or New York City)	177
## 7 Chesapeake Bay	117
## 8 Bermuda	97
## 9 Gibraltar	89
## 10 Caribbean (later New York City)	73

Here's a plot of the top 10 Origins:

```
FrequentlyUsedOrigins %>%
  top_n(x = ., wt=total_convoys, n = 10) %>%
  ggplot(aes(x=Origin, y=total_convoys, fill=Origin)) +
  geom_bar(stat="identity", position="dodge")+
  theme_minimal()+
  theme(axis.text.x=element_blank()+
  geom_text(aes(label=total_convoys),
    vjust=-0.2, color="black",
    position = position_dodge(0.8), size=4) +
  scale_x_discrete( expand = waiver(), position = "bottom")+
  scale_y_continuous(name = waiver(), breaks = waiver(),
    minor_breaks = waiver(), labels = waiver(), limits = NULL,
    expand = waiver(), oob = censor, na.value = NA_real_,
    trans = "identity", position = "left", sec.axis = waiver()) +
  labs(x="",y="Total Number of Convoys (where known)")+
  ggtitle("World War II: Total Number of Allied Convoys (where known), by Origin")
```

World War II: Total Number of Allied Convoys (where known), by Origin



Similarly, Liverpool is also the most frequent destination:

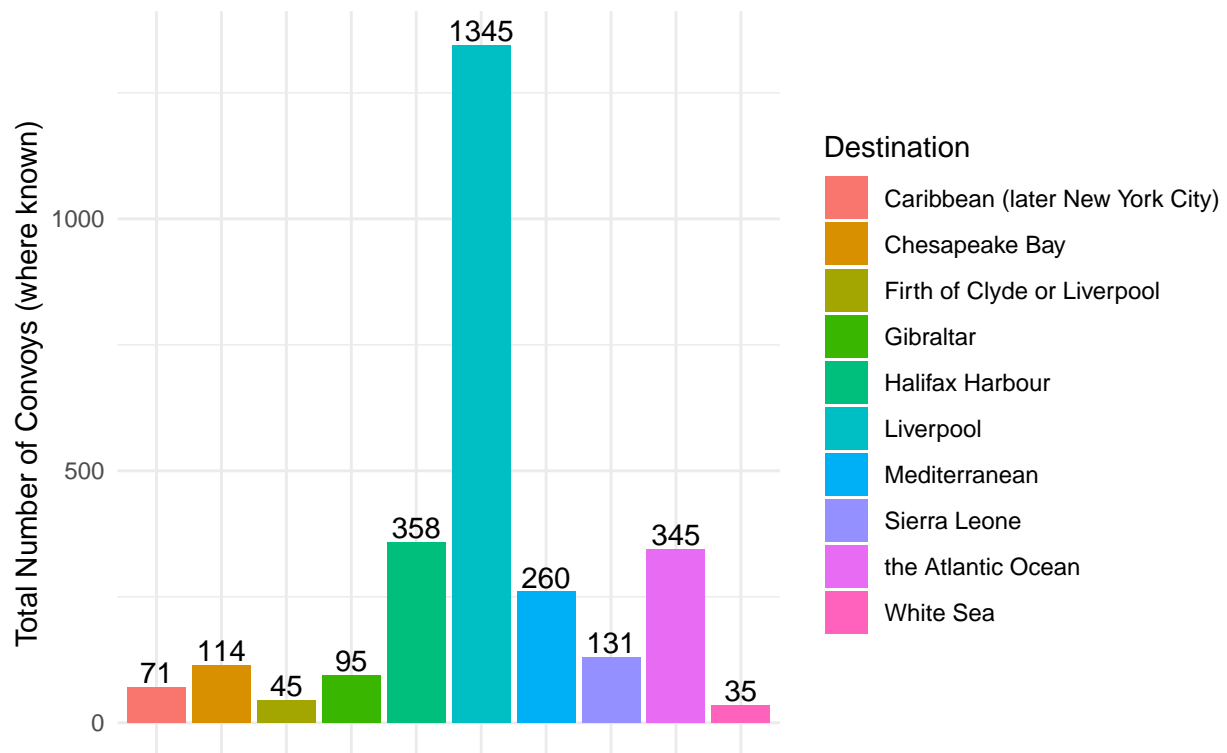
```
FrequentlyUsedDestinations <- AllConvoys %>% filter(.data = ., !is.na(Number.of.Convoys)) %>%
  group_by(Destination) %>%
  summarise(total_convoys = sum(Number.of.Convoys, na.rm = T)) %>%
  arrange(.data = ., desc(total_convoys)) %>%
  ungroup()
top_n(x = FrequentlyUsedDestinations, wt=total_convoys, n = 10)
```

```
## # A tibble: 10 x 2
##   Destination          total_convoys
##   <chr>              <dbl>
## 1 Liverpool          1345
## 2 Halifax Harbour    358
## 3 the Atlantic Ocean 345
## 4 Mediterranean      260
## 5 Sierra Leone       131
## 6 Chesapeake Bay     114
## 7 Gibraltar          95
## 8 Caribbean (later New York City) 71
## 9 Firth of Clyde or Liverpool 45
## 10 White Sea         35
```

Here's a plot of the top 10 Destinations:

```
FrequentlyUsedDestinations %>%
  top_n(x = ., wt=total_convoys, n = 10) %>%
  ggplot(aes(x=Destination, y=total_convoys, fill=Destination)) +
  geom_bar(stat="identity", position="dodge")+
  theme_minimal()+
  theme(axis.text.x=element_blank()+
  geom_text(aes(label=total_convoys,
    vjust=-0.2, color="black",
    position = position_dodge(0.8), size=4) +
  scale_x_discrete( expand = waiver(), position = "bottom")+
  scale_y_continuous(name = waiver(), breaks = waiver(),
    minor_breaks = waiver(), labels = waiver(), limits = NULL,
    expand = waiver(), oob = censor, na.value = NA_real_,
    trans = "identity", position = "left", sec.axis = waiver()) +
  labs(x="",y="Total Number of Convoys (where known)")+
  ggtitle("World War II: Total Number of Allied Convoys (where known), by Destination")
```

World War II: Total Number of Allied Convoys (where known), by Destination



Conclusion

This data set provides an interesting look at military convoys during WWII.

Because data is not given for the counts associated with most of the convoy routes, it is not possible to obtain useful information, as the graph above is an extremely crude estimate based upon the available data.

For those routes for which we do have such counts, Liverpool is by far the most frequently represented origin and destination, with Halifax a distant second.