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ESM 244 |Winter 2018

## Assignment 2

***Task 2: Parameter Estimation – Wild Fish Catch***

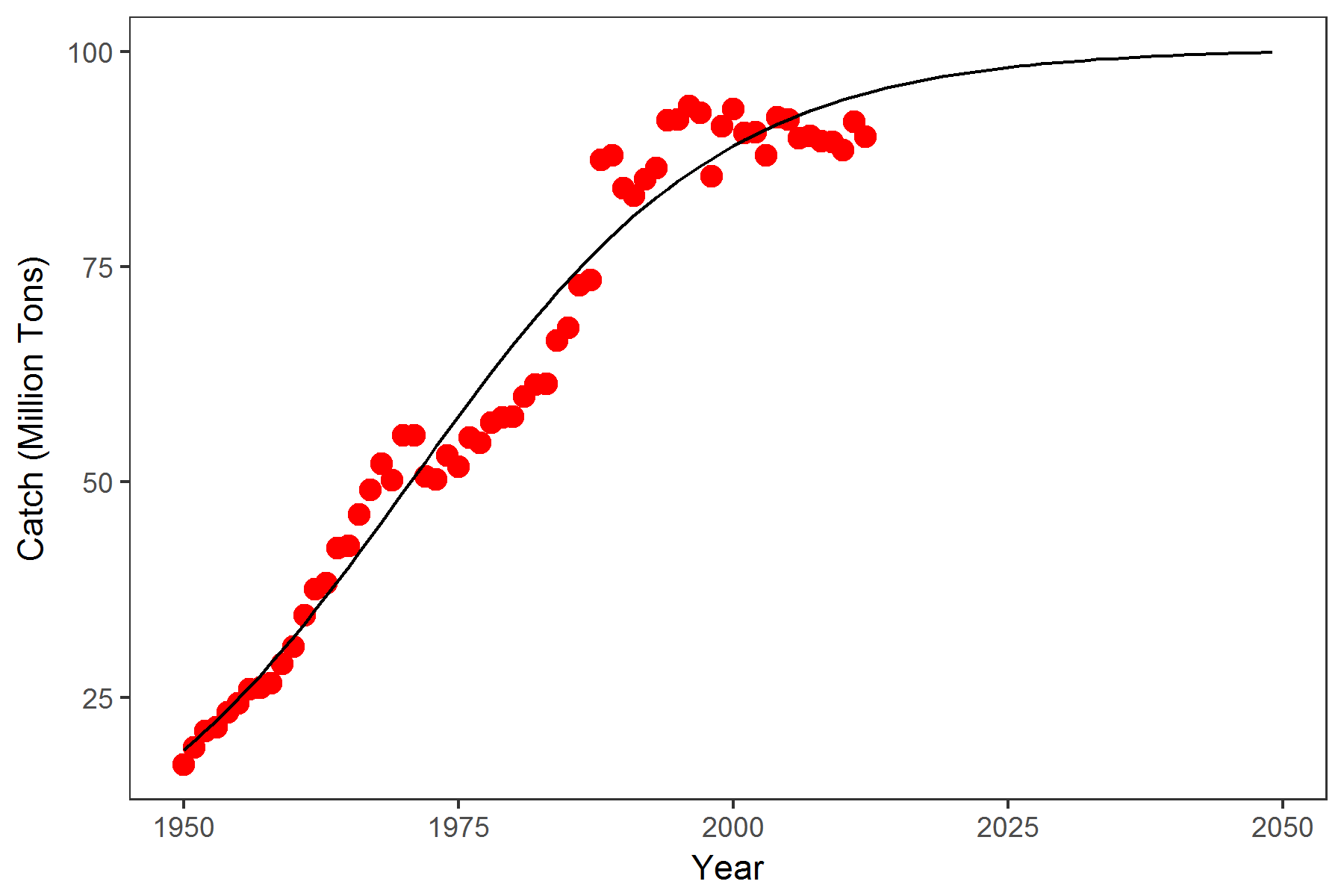


Figure 1: Global Wild Fish Catch. Historical data from 1915 to 2012, with non-linear model projection of future catch. Source: Earth Policy Institute with 1950-2010 from U.N. Food and Agriculture Organization (FAO), Global Capture Production and Global Aquaculture Production, electronic databases, at www.fao.org/fishery/topic/16140/en, updated March 2012

***Task 3: Bootstrapped Confidence Intervals for Proportions***

Load Packages.

library(tidyverse)

## Loading tidyverse: ggplot2  
## Loading tidyverse: tibble  
## Loading tidyverse: tidyr  
## Loading tidyverse: readr  
## Loading tidyverse: purrr  
## Loading tidyverse: dplyr

## Conflicts with tidy packages ----------------------------------------------

## filter(): dplyr, stats  
## lag(): dplyr, stats

library(boot)

## Warning: package 'boot' was built under R version 3.4.3

library(nlstools)

##   
## 'nlstools' has been loaded.

## IMPORTANT NOTICE: Most nonlinear regression models and data set examples

## related to predictive microbiolgy have been moved to the package 'nlsMicrobio'

Create survey data vector and proportion function, then bootstrap.

survey <- rep(1:0, c(22,14))  
  
prop\_fun <- function (x, i) {sum(x[i])/length(x[i])}  
  
boot\_10000 <- boot(survey, prop\_fun, R = 10000)  
boot\_10000

##   
## ORDINARY NONPARAMETRIC BOOTSTRAP  
##   
##   
## Call:  
## boot(data = survey, statistic = prop\_fun, R = 10000)  
##   
##   
## Bootstrap Statistics :  
## original bias std. error  
## t1\* 0.6111111 0.001241667 0.0813038

hist(boot\_10000$t,  
 main="Histogram for UCSB Survey Bootstrap",   
 xlab="Percent that Experienced Negative Behavior",   
 border="white",   
 col="gray")

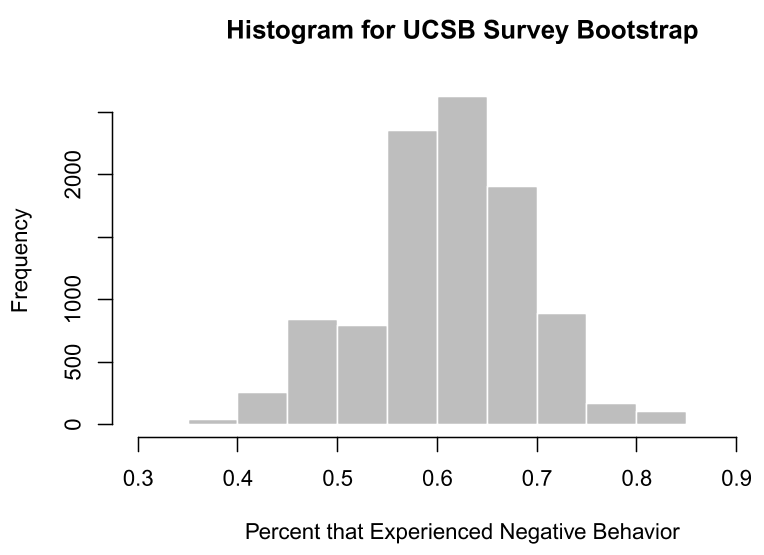


Figure 2: 10,000 bootstrap samples of UCSB survey data. Original data (n = 36) stated that 22 of those surveyed (61%) identifying as genderqueer responded that they had personally experienced “exclusionary, offensive, hostile or intimidating conduct”. Source: 2014 UCSB Campus Climate Project Final Report (prepared by Rankin & Associates Consulting, available at http://campusclimate.ucop.edu/\_common/files/pdf-climate/ucsb-fullreport.pdf).

survey\_ci <- boot.ci(boot\_10000, conf = 0.95, type = "perc")  
survey\_ci

## BOOTSTRAP CONFIDENCE INTERVAL CALCULATIONS  
## Based on 10000 bootstrap replicates  
##   
## CALL :   
## boot.ci(boot.out = boot\_10000, conf = 0.95, type = "perc")  
##   
## Intervals :   
## Level Percentile   
## 95% ( 0.4444, 0.7778 )   
## Calculations and Intervals on Original Scale

The mean percent of genderqueer students who responded that they had personally experienced “exclusionary, offensive, hostile or intimidating conduct” is 61% (n =36), with a bootstrapped 95% confidence interval of [0.44, 0.7778] tons (10,000 bootstrap samples).

***Task 4: RProjects, R Markdown, Data Wrangling and ggplot***

library(tidyverse)

pest <- read\_csv("ca\_pest.csv")  
  
pop <- read\_csv("ca\_pop.csv")

both <- merge(pest, pop, by = "County")  
  
both$PestConcentration <- both$PestConcentration <- both$PestPounds/both$CountyArea  
   
both <- both %>%   
 select(County, PestConcentration, MedFamilyIncome, Population) %>%  
 arrange(-PestConcentration)

ggplot( both, aes(x = MedFamilyIncome, y = PestConcentration)) +  
 geom\_jitter(aes(size = Population))+  
 ylab("Pesticide (Pounds per Square Mile)")+  
 xlab("Median Family Income")+  
 geom\_smooth(se = FALSE, method = "lm")+  
 theme\_bw()+  
 theme(panel.grid.major = element\_blank(),  
 panel.grid.minor = element\_blank())

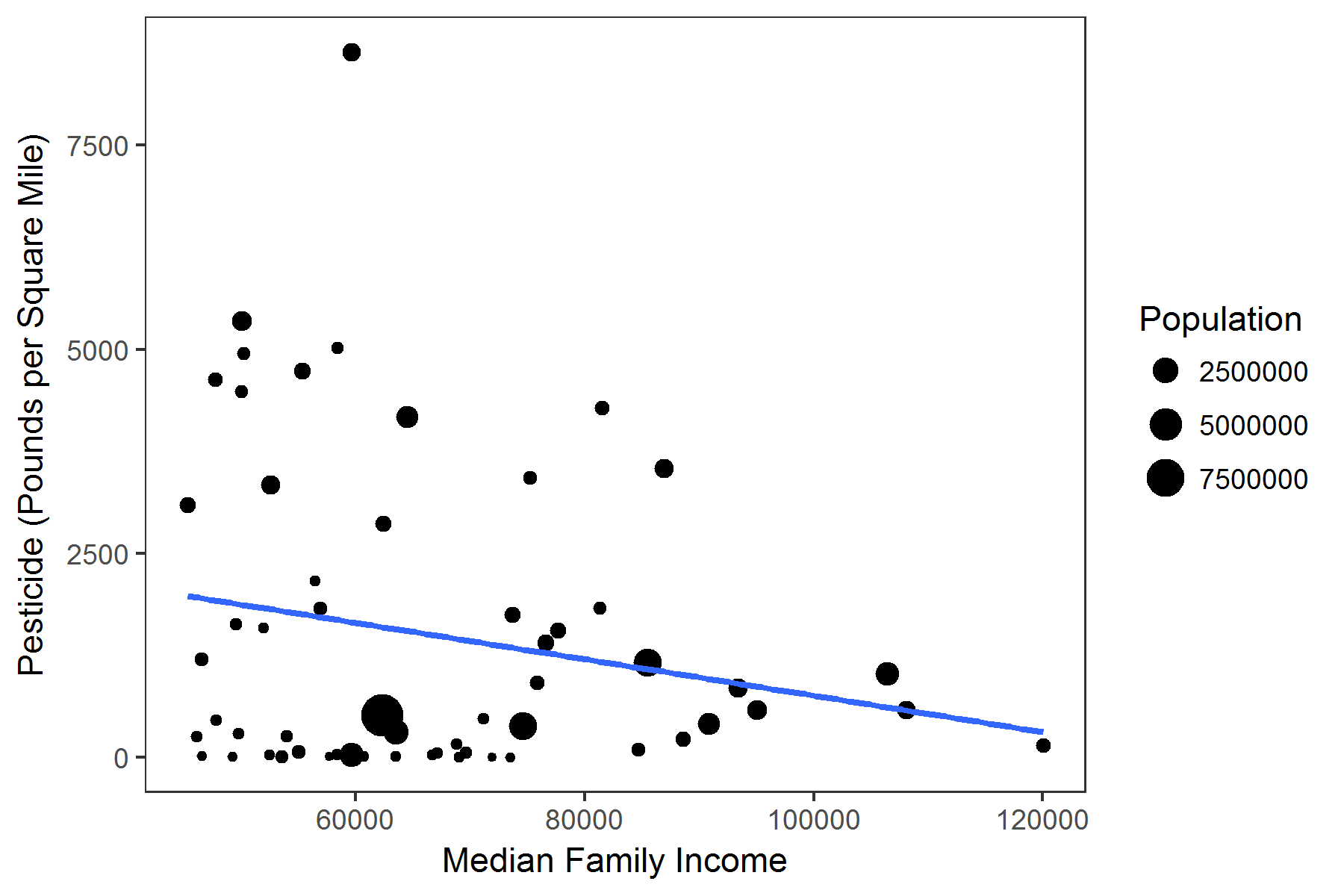


Figure 3: Pesticide Use in California Counties. Pesticide application in pounds per square mile for each county in California. Size of circle represents the county population size. Line of best fit shows decreased pesticide use corresponds with a higher family income. Pesticide data: 2014 CA pesticide application (by county) from the California Department of Pesticide Regulation. California population and income data: U.S. Census Bureau. American Community Survey, 2010- 2014 American Community Survey 5-Year Estimates.