Draft paper results Aug 14

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Data overview

Our data set includes 4700 unique public water systems representing all of the public water with spatial boundary data in SABL (confirm). Of these water systems 2765 are community water systems, 685 are Non-Transient Non-Community systems and 1250 are Transient Non-Community systems. The mean population served by these systems is 8672.5861702.
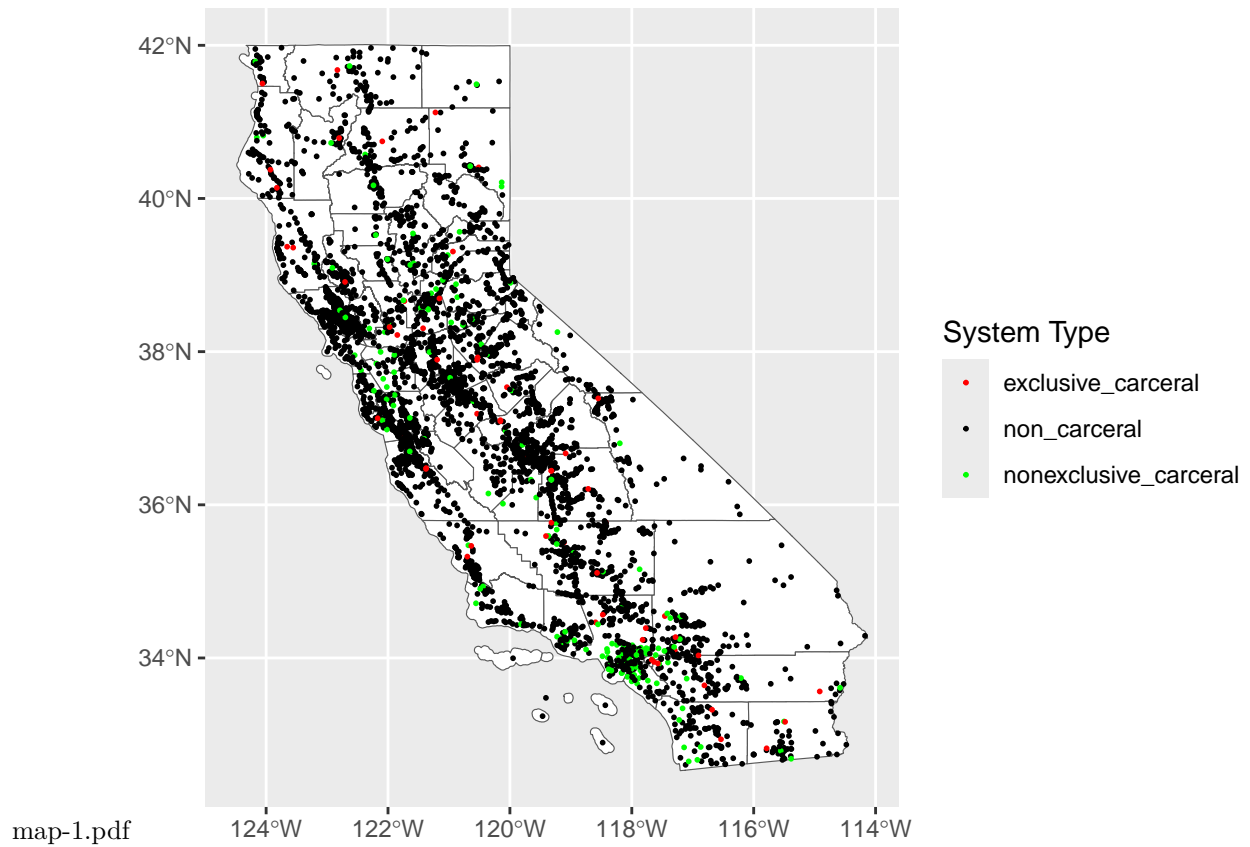
Describing carceral water systems

We classify these systems into three categories: Carceral water systems that primarily or exclusively serve carceral facilities operated by the operator of the facility; non-exclusive carceral water systems that serve one or more carceral facilities in addition to other customers and non-carceral systems that do not serve any carceral faciltiies. We find that 58 or 1.2340426% are carceral water systems. 163 or 3.4680851% are non-exclusive carceral systems and 4479 or 95.2978723% are noncarceral systems.

Characteristic	exclusive_carceral N = 58	non_carceral N = 4,479	nonexclusive_carceral N = 163
population	533 (100, 3,857)	156 (60, 550)	61,462 (15,437, 139,461)
state_classification			
COMMUNITY	46 (79%)	2,560 (57%)	159 (98%)
NON-TRANSIENT NON-COMMUNITY	12 (21%)	669 (15%)	4 (2.5%)
TRANSIENT NON-COMMUNITY	0 (0%)	1,250 (28%)	0 (0%)
watersource			
GW	45 (78%)	3,713 (83%)	49 (30%)
SW	13 (22%)	766 (17%)	114 (70%)
purchased			
Not purchased	53 (91%)	4,099 (92%)	98 (60%)
Purchased	5 (8.6%)	380 (8.5%)	65 (40%)

[1] Median (Q1, Q3); n (%)

As you can see above, many of the non-exclusive carceral systems rely on surface water. Which is interesting. Many of those systems are concentrated in the bay area, Sacramento and northern central valley areas and southern california whereas exclusive carceral systems are fairly evenly spread throughout the state.

map-1.pdf

Outcome (performance) descriptive results

Next we can see if these categories of water systems perform differently using different performance measures related to water quality, accessibility and TMF capacity.

Characteristic	exclusive_carceral N = 58	non_carceral N = 4,479	nonexclusive_carceral N = 163
binary_viol_over5yrs_mcl			
0	56 (97%)	4,094 (91%)	153 (94%)
1	2 (3.4%)	385 (8.6%)	10 (6.1%)
binary_viol_over5yrs_mon			
0	36 (62%)	3,400 (76%)	134 (82%)
1	22 (38%)	1,079 (24%)	29 (18%)
count_of_viols_over5yrs_mcl	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)
count_of_viols_over5yrs_mon	0.00 (0.00, 1.00)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)
Water_Quality_Category_Score	0.25 (0.00, 1.50)	0.25 (0.00, 1.50)	0.50 (0.00, 1.50)
Accessibility_Category_Score	1.00 (0.33, 1.33)	1.00 (0.33, 1.33)	0.00 (0.00, 0.50)
TMF_Capacity_Category_Score	1.00 (1.00, 1.00)	0.33 (0.00, 0.67)	0.33 (0.00, 0.67)
Total_Risk_Assessment_Score	0.67 (0.50, 1.00)	0.56 (0.33, 0.88)	0.42 (0.18, 0.64)
SAFER_Status			
At-Risk	15 (33%)	524 (19%)	16 (16%)
Failing	4 (8.7%)	365 (13%)	6 (6.0%)
Not At-Risk	18 (39%)	1,432 (53%)	67 (67%)
Potentially At-Risk	9 (20%)	406 (15%)	11 (11%)
Number_of_Water_Sources	2.0 (1.0, 3.0)	2.0 (1.0, 3.0)	7.5 (3.0, 11.5)
Absence_of_Interties			
N	10 (22%)	422 (15%)	19 (19%)
N/A	0 (0%)	166 (6.1%)	52 (52%)
Y	36 (78%)	2,139 (78%)	29 (29%)
Source_Capacity_Violations			
N	46 (100%)	2,667 (98%)	100 (100%)
Y	0 (0%)	60 (2.2%)	0 (0%)
Bottled_Water_or_Hauled_Water_Reliance			
N	45 (98%)	2,575 (94%)	99 (99%)
Y	1 (2.2%)	152 (5.6%)	1 (1.0%)
Significant_Deficiencies			
0	44 (96%)	2,697 (99%)	100 (100%)
1	0 (0%)	23 (0.8%)	0 (0%)
2	0 (0%)	6 (0.2%)	0 (0%)
3	0 (0%)	1 (<0.1%)	0 (0%)
4	2 (4.3%)	0 (0%)	0 (0%)
SC3i_Count_Distribution	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)	0.00 (0.00, 0.00)
SC5e_Drought_Impact			
0	56 (100%)	3,812 (97%)	25 (86%)
1	0 (0%)	127 (3.2%)	4 (14%)
Distributiondis_any			
0	55 (98%)	3,508 (91%)	23 (79%)
1	1 (1.8%)	342 (8.9%)	6 (21%)
n_ccr_missing			
0	34 (59%)	1,844 (41%)	123 (75%)
1	17 (29%)	466 (10%)	28 (17%)
2	3 (5.2%)	338 (7.5%)	7 (4.3%)
3	2 (3.4%)	347 (7.7%)	3 (1.8%)
4	2 (3.4%)	1,484 (33%)	2 (1.2%)
Missing_ccr_any	24 (41%)	2,635 (59%)	40 (25%)
Missing_ccr_twoplus	7 (12%)	2,169 (48%)	12 (7.4%)

[1] n (%); Median (Q1, Q3)

GLMs for outcomes with controls

Lastly we can use GLMs to see if any of these relationships are stastisticallly significant while holding other driving factors like system size constant.

```
Data$carceral_sys <- relevel(Data$carceral_sys, ref = "non_carceral")

MCL_violations <- glm(binary_viol_over5yrs_mcl ~ carceral_sys + population + watersource + purchased + :
summary(MCL_violations)
```

```
##
## Call:
## glm(formula = binary_viol_over5yrs_mcl ~ carceral_sys + population +
##     watersource + purchased + state_classification, family = binomial,
##     data = Data)
##
## Coefficients:
##                                                    Estimate Std. Error z value
## (Intercept)                                      -2.045e+00  7.182e-02 -28.477
## carceral_sysexclusive_carceral                   -1.237e+00  7.225e-01  -1.712
## carceral_sysnonexclusive_carceral                 3.087e-01  3.718e-01   0.830
## population                                       -1.684e-05  5.660e-06  -2.975
## watersourceSW                                     3.124e-01  1.551e-01   2.014
## purchasedPurchased                               -1.067e+00  2.760e-01  -3.865
## state_classificationNON-TRANSIENT NON-COMMUNITY -9.472e-02  1.426e-01  -0.664
## state_classificationTRANSIENT NON-COMMUNITY      -1.215e+00  1.636e-01  -7.425
##                                                  Pr(>|z|)
## (Intercept)                                       < 2e-16 ***
## carceral_sysexclusive_carceral                   0.086864 .
## carceral_sysnonexclusive_carceral                0.406312
## population                                       0.002926 **
## watersourceSW                                    0.043997 *
## purchasedPurchased                               0.000111 ***
## state_classificationNON-TRANSIENT NON-COMMUNITY 0.506469
## state_classificationTRANSIENT NON-COMMUNITY      1.13e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 2721.8  on 4699  degrees of freedom
## Residual deviance: 2615.6  on 4692  degrees of freedom
## AIC: 2631.6
##
## Number of Fisher Scoring iterations: 7
```

```
MR_violations <- glm(binary_viol_over5yrs_mon ~ carceral_sys + population + watersource + purchased + s
summary(MR_violations)
```

```
##
## Call:
## glm(formula = binary_viol_over5yrs_mon ~ carceral_sys + population +
##     watersource + purchased + state_classification, family = binomial,
##     data = Data)
##
## Coefficients:
```

```
##                                                 Estimate Std. Error z value
## (Intercept)                                    -9.929e-01  5.003e-02 -19.844
## carceral_sysexclusive_carceral                  5.690e-01  2.741e-01   2.076
## carceral_sysnonexclusive_carceral              -2.258e-01  2.364e-01  -0.955
## population                                     -1.605e-06  1.316e-06  -1.219
## watersourceSW                                   2.582e-02  1.089e-01   0.237
## purchasedPurchased                             -4.169e-01  1.517e-01  -2.748
## state_classificationNON-TRANSIENT NON-COMMUNITY -1.785e-01  1.015e-01  -1.758
## state_classificationTRANSIENT NON-COMMUNITY     -3.543e-01  8.490e-02  -4.173
##                                                 Pr(>|z|)
## (Intercept)                                      < 2e-16 ***
## carceral_sysexclusive_carceral                   0.03793 *
## carceral_sysnonexclusive_carceral                0.33946
## population                                       0.22275
## watersourceSW                                    0.81259
## purchasedPurchased                               0.00599 **
## state_classificationNON-TRANSIENT NON-COMMUNITY  0.07867 .
## state_classificationTRANSIENT NON-COMMUNITY         3e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 5184.8  on 4699   degrees of freedom
## Residual deviance: 5148.6  on 4692   degrees of freedom
## AIC: 5164.6
##
## Number of Fisher Scoring iterations: 5
```

```r
NA_WQ <- lm(Water_Quality_Category_Score ~ carceral_sys + population + watersource + purchased + state_
summary(NA_WQ)
```

```
##
## Call:
## lm(formula = Water_Quality_Category_Score ~ carceral_sys + population +
##     watersource + purchased + state_classification, data = Data,
##     family = binomial)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.2906 -0.7978 -0.5053  0.6984  5.2022
##
## Coefficients:
##                                                 Estimate Std. Error t value
## (Intercept)                                     7.974e-01  2.340e-02  34.081
## carceral_sysexclusive_carceral                  1.066e-01  1.527e-01   0.698
## carceral_sysnonexclusive_carceral               1.415e-01  1.141e-01   1.240
## population                                      3.754e-06  1.547e-06   2.426
## watersourceSW                                  -2.928e-01  5.727e-02  -5.112
## purchasedPurchased                             -1.613e-01  7.153e-02  -2.256
## state_classificationNON-TRANSIENT NON-COMMUNITY 1.307e-02  7.490e-02   0.174
## state_classificationTRANSIENT NON-COMMUNITY    -7.988e-01  7.259e-01  -1.100
##                                                 Pr(>|t|)
## (Intercept)                                      < 2e-16 ***
## carceral_sysexclusive_carceral                    0.4853
```

```
## carceral_sysnonexclusive_carceral                    0.2151
## population                                            0.0153 *
## watersourceSW                                         3.39e-07 ***
## purchasedPurchased                                    0.0242 *
## state_classificationNON-TRANSIENT NON-COMMUNITY       0.8615
## state_classificationTRANSIENT NON-COMMUNITY           0.2713
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.026 on 2865 degrees of freedom
##   (1827 observations deleted due to missingness)
## Multiple R-squared:  0.02162,    Adjusted R-squared:  0.01923
## F-statistic: 9.043 on 7 and 2865 DF,  p-value: 4.414e-11
```

```r
NA_AC <- lm(Accessibility_Category_Score ~ carceral_sys + population + watersource + purchased + state_
summary(NA_AC)
```

```
##
## Call:
## lm(formula = Accessibility_Category_Score ~ carceral_sys + population +
##     watersource + purchased + state_classification, data = Data,
##     family = binomial)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.6273 -0.6472 -0.0214  0.3692  3.3572
##
## Coefficients:
##                                             Estimate Std. Error t value
## (Intercept)                                 9.821e-01  1.694e-02  57.988
## carceral_sysexclusive_carceral            -8.477e-02  1.105e-01  -0.767
## carceral_sysnonexclusive_carceral         -7.521e-02  8.261e-02  -0.910
## population                                 -1.281e-05  1.120e-06 -11.441
## watersourceSW                              1.397e-02  4.146e-02   0.337
## purchasedPurchased                         -3.390e-01  5.177e-02  -6.548
## state_classificationNON-TRANSIENT NON-COMMUNITY  6.457e-01  5.422e-02  11.909
## state_classificationTRANSIENT NON-COMMUNITY    -1.474e-01  5.255e-01  -0.281
##                                            Pr(>|t|)
## (Intercept)                                 < 2e-16 ***
## carceral_sysexclusive_carceral                0.443
## carceral_sysnonexclusive_carceral             0.363
## population                                  < 2e-16 ***
## watersourceSW                                 0.736
## purchasedPurchased                          6.91e-11 ***
## state_classificationNON-TRANSIENT NON-COMMUNITY  < 2e-16 ***
## state_classificationTRANSIENT NON-COMMUNITY    0.779
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7427 on 2865 degrees of freedom
##   (1827 observations deleted due to missingness)
## Multiple R-squared:  0.1588, Adjusted R-squared:  0.1567
## F-statistic: 77.25 on 7 and 2865 DF,  p-value: < 2.2e-16
```

```
NA_TMF <- lm(TMF_Capacity_Category_Score ~ carceral_sys + population + watersource + purchased + state_
summary(NA_TMF)
```

```
##
## Call:
## lm(formula = TMF_Capacity_Category_Score ~ carceral_sys + population +
##     watersource + purchased + state_classification, data = Data,
##     family = binomial)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.81667 -0.42637 -0.04382  0.21563  2.21760
##
## Coefficients:
##                                           Estimate Std. Error t value
## (Intercept)                              4.555e-01  9.606e-03  47.416
## carceral_sysexclusive_carceral           5.406e-01  6.269e-02   8.623
## carceral_sysnonexclusive_carceral       -2.305e-02  4.686e-02  -0.492
## population                              -2.966e-06  6.352e-07  -4.670
## watersourceSW                            2.000e-02  2.351e-02   0.851
## purchasedPurchased                      -8.797e-02  2.937e-02  -2.996
## state_classificationNON-TRANSIENT NON-COMMUNITY -4.114e-01  3.075e-02 -13.377
## state_classificationTRANSIENT NON-COMMUNITY  2.106e-01  2.980e-01   0.707
##                                          Pr(>|t|)
## (Intercept)                               < 2e-16 ***
## carceral_sysexclusive_carceral            < 2e-16 ***
## carceral_sysnonexclusive_carceral         0.62284
## population                               3.14e-06 ***
## watersourceSW                             0.39505
## purchasedPurchased                        0.00276 **
## state_classificationNON-TRANSIENT NON-COMMUNITY  < 2e-16 ***
## state_classificationTRANSIENT NON-COMMUNITY  0.47990
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4213 on 2865 degrees of freedom
##   (1827 observations deleted due to missingness)
## Multiple R-squared:  0.09596,    Adjusted R-squared:  0.09375
## F-statistic: 43.45 on 7 and 2865 DF,  p-value: < 2.2e-16
```

```
Data$Failingoratrisk <- ifelse(Data$SAFER_Status == "Failing" | Data$SAFER_Status == "At-Risk", 1, 0)
Data$failing <- ifelse(Data$SAFER_Status == "Failing", 1, 0)

Fail_or_atrisk <- lm(Failingoratrisk ~ carceral_sys + population + watersource + purchased + state_class
summary(Fail_or_atrisk)
```

```
##
## Call:
## lm(formula = Failingoratrisk ~ carceral_sys + population + watersource +
##     purchased + state_classification, data = Data, family = binomial)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.4422 -0.3622 -0.3169  0.6374  1.0558
```

```
## 
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                      3.628e-01  1.052e-02  34.485
## carceral_sysexclusive_carceral                   7.954e-02  6.865e-02   1.159
## carceral_sysnonexclusive_carceral                4.233e-02  5.132e-02   0.825
## population                                      -3.026e-06  6.956e-07  -4.350
## watersourceSW                                   -4.053e-02  2.575e-02  -1.574
## purchasedPurchased                              -1.211e-01  3.216e-02  -3.764
## state_classificationNON-TRANSIENT NON-COMMUNITY  7.520e-03  3.368e-02   0.223
## state_classificationTRANSIENT NON-COMMUNITY     -3.617e-01  3.264e-01  -1.108
##                                                  Pr(>|t|)
## (Intercept)                                      < 2e-16 ***
## carceral_sysexclusive_carceral                   0.24670
## carceral_sysnonexclusive_carceral                0.40951
## population                                       1.41e-05 ***
## watersourceSW                                    0.11562
## purchasedPurchased                               0.00017 ***
## state_classificationNON-TRANSIENT NON-COMMUNITY  0.82332
## state_classificationTRANSIENT NON-COMMUNITY      0.26790
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 0.4614 on 2865 degrees of freedom
##   (1827 observations deleted due to missingness)
## Multiple R-squared:  0.03045,    Adjusted R-squared:  0.02808
## F-statistic: 12.85 on 7 and 2865 DF,  p-value: 2.319e-16
```

```r
Fail <- lm(failing ~ carceral_sys + population + watersource + purchased + state_classification, data =
summary(Fail)
```

```
## 
## Call:
## lm(formula = failing ~ carceral_sys + population + watersource +
##     purchased + state_classification, data = Data, family = binomial)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.15450 -0.15437 -0.15068 -0.05643  1.02245
## 
## Coefficients:
##                                                  Estimate Std. Error t value
## (Intercept)                                      1.545e-01  7.634e-03  20.241
## carceral_sysexclusive_carceral                  -5.084e-02  4.982e-02  -1.021
## carceral_sysnonexclusive_carceral               -1.160e-02  3.724e-02  -0.312
## population                                      -9.295e-07  5.047e-07  -1.842
## watersourceSW                                   -4.066e-02  1.869e-02  -2.176
## purchasedPurchased                              -5.736e-02  2.334e-02  -2.458
## state_classificationNON-TRANSIENT NON-COMMUNITY -4.832e-03  2.444e-02  -0.198
## state_classificationTRANSIENT NON-COMMUNITY     -1.542e-01  2.368e-01  -0.651
##                                                  Pr(>|t|)
## (Intercept)                                      <2e-16 ***
## carceral_sysexclusive_carceral                   0.3075
## carceral_sysnonexclusive_carceral                0.7554
## population                                       0.0656 .
```

```
## watersourceSW                                       0.0296 *
## purchasedPurchased                                   0.0140 *
## state_classificationNON-TRANSIENT NON-COMMUNITY      0.8433
## state_classificationTRANSIENT NON-COMMUNITY          0.5151
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3348 on 2865 degrees of freedom
##   (1827 observations deleted due to missingness)
## Multiple R-squared:  0.01525,    Adjusted R-squared:  0.01285
## F-statistic:  6.34 on 7 and 2865 DF,  p-value: 2.064e-07
```

```r
CCR_anymissing <- glm(Missing_ccr_any ~ carceral_sys + population + watersource + purchased + state_clas
summary(CCR_anymissing)
```

```
##
## Call:
## glm(formula = Missing_ccr_any ~ carceral_sys + population + watersource +
##     purchased + state_classification, family = binomial, data = Data)
##
## Coefficients:
##                                                Estimate Std. Error z value
## (Intercept)                                   -1.516e-01  4.501e-02  -3.367
## carceral_sysexclusive_carceral               -1.129e-01  2.697e-01  -0.418
## carceral_sysnonexclusive_carceral            -3.446e-01  2.141e-01  -1.609
## population                                    -5.792e-06  1.705e-06  -3.396
## watersourceSW                                  9.472e-02  1.052e-01   0.900
## purchasedPurchased                            -5.412e-01  1.355e-01  -3.996
## state_classificationNON-TRANSIENT NON-COMMUNITY -2.323e-01  8.868e-02  -2.619
## state_classificationTRANSIENT NON-COMMUNITY    4.629e+00  2.722e-01  17.005
##                                                Pr(>|z|)
## (Intercept)                                   0.000761 ***
## carceral_sysexclusive_carceral               0.675588
## carceral_sysnonexclusive_carceral            0.107542
## population                                    0.000683 ***
## watersourceSW                                 0.367938
## purchasedPurchased                            6.45e-05 ***
## state_classificationNON-TRANSIENT NON-COMMUNITY 0.008810 **
## state_classificationTRANSIENT NON-COMMUNITY    < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 6411.5  on 4699  degrees of freedom
## Residual deviance: 4784.8  on 4692  degrees of freedom
## AIC: 4800.8
##
## Number of Fisher Scoring iterations: 7
```

```r
CCR_missingtwoplus <- glm(Missing_ccr_twoplus ~ carceral_sys + population + watersource + purchased + st
summary(CCR_missingtwoplus)
```

```
##
## Call:
```

```
## glm(formula = Missing_ccr_twoplus ~ carceral_sys + population +
##     watersource + purchased + state_classification, family = binomial,
##     data = Data)
##
## Coefficients:
##                                                Estimate Std. Error z value
## (Intercept)                                   -6.959e-01  4.920e-02 -14.146
## carceral_sysexclusive_carceral               -1.160e+00  4.058e-01  -2.860
## carceral_sysnonexclusive_carceral            -4.360e-01  3.328e-01  -1.310
## population                                    -3.465e-05  5.884e-06  -5.889
## watersourceSW                                  2.292e-01  1.160e-01   1.976
## purchasedPurchased                            -7.922e-01  1.735e-01  -4.567
## state_classificationNON-TRANSIENT NON-COMMUNITY -2.569e-01  9.778e-02  -2.627
## state_classificationTRANSIENT NON-COMMUNITY    4.587e+00  2.075e-01  22.110
##                                                Pr(>|z|)
## (Intercept)                                    < 2e-16 ***
## carceral_sysexclusive_carceral                 0.00424 **
## carceral_sysnonexclusive_carceral              0.19009
## population                                     3.88e-09 ***
## watersourceSW                                  0.04818 *
## purchasedPurchased                             4.95e-06 ***
## state_classificationNON-TRANSIENT NON-COMMUNITY  0.00861 **
## state_classificationTRANSIENT NON-COMMUNITY    < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 6493.2  on 4699  degrees of freedom
## Residual deviance: 4147.0  on 4692  degrees of freedom
## AIC: 4163
##
## Number of Fisher Scoring iterations: 7
Modeleddroughtimpact <- glm(SC5e_Drought_Impact ~ carceral_sys + population + watersource + purchased +
summary(Modeleddroughtimpact)

##
## Call:
## glm(formula = SC5e_Drought_Impact ~ carceral_sys + population +
##     watersource + purchased + state_classification, family = binomial,
##     data = Data)
##
## Coefficients:
##                                                Estimate Std. Error z value
## (Intercept)                                   -3.101e+00  1.205e-01 -25.739
## carceral_sysexclusive_carceral               -1.643e+01  1.341e+03  -0.012
## carceral_sysnonexclusive_carceral             5.118e-01  5.945e-01   0.861
## population                                     2.062e-06  3.080e-05   0.067
## watersourceSW                                  1.563e+00  2.007e-01   7.792
## purchasedPurchased                            -1.738e+00  4.199e-01  -4.139
## state_classificationNON-TRANSIENT NON-COMMUNITY -1.660e+01  4.210e+02  -0.039
## state_classificationTRANSIENT NON-COMMUNITY   -4.151e+00  1.006e+00  -4.127
##                                                Pr(>|z|)
## (Intercept)                                    < 2e-16 ***
```

```
## carceral_sysexclusive_carceral                     0.990
## carceral_sysnonexclusive_carceral                  0.389
## population                                          0.947
## watersourceSW                                       6.61e-15 ***
## purchasedPurchased                                  3.49e-05 ***
## state_classificationNON-TRANSIENT NON-COMMUNITY     0.969
## state_classificationTRANSIENT NON-COMMUNITY         3.67e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1154.99  on 4023  degrees of freedom
## Residual deviance:  943.99  on 4016  degrees of freedom
##   (676 observations deleted due to missingness)
## AIC: 959.99
##
## Number of Fisher Scoring iterations: 18
```

```r
Distribution_disrupt <- glm(Distributiondis_any ~ carceral_sys + population + watersource + purchased +
summary(Distribution_disrupt)
```

```
##
## Call:
## glm(formula = Distributiondis_any ~ carceral_sys + population +
##     watersource + purchased + state_classification, family = binomial,
##     data = Data)
##
## Coefficients:
##                                                   Estimate Std. Error z value
## (Intercept)                                      -2.039e+00  7.403e-02 -27.546
## carceral_sysexclusive_carceral                   -1.964e+00  1.013e+00  -1.938
## carceral_sysnonexclusive_carceral                 3.218e-01  4.789e-01   0.672
## population                                        1.798e-05  9.364e-06   1.921
## watersourceSW                                     5.982e-01  1.550e-01   3.859
## purchasedPurchased                               -1.896e-02  2.156e-01  -0.088
## state_classificationNON-TRANSIENT NON-COMMUNITY  -1.758e+00  2.730e-01  -6.439
## state_classificationTRANSIENT NON-COMMUNITY      -1.255e+00  1.736e-01  -7.233
##                                                   Pr(>|z|)
## (Intercept)                                       < 2e-16 ***
## carceral_sysexclusive_carceral                    0.052640 .
## carceral_sysnonexclusive_carceral                 0.501627
## population                                        0.054793 .
## watersourceSW                                     0.000114 ***
## purchasedPurchased                                0.929894
## state_classificationNON-TRANSIENT NON-COMMUNITY   1.21e-10 ***
## state_classificationTRANSIENT NON-COMMUNITY       4.74e-13 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 2357.1  on 3934  degrees of freedom
## Residual deviance: 2191.8  on 3927  degrees of freedom
##   (765 observations deleted due to missingness)
```

```
## AIC: 2207.8
##
## Number of Fisher Scoring iterations: 6
```
```
Sig_dif <- glm(Significant_Deficiencies ~ carceral_sys + population + watersource + purchased + state_cl
summary(Sig_dif)
```
```
##
## Call:
## glm(formula = Significant_Deficiencies ~ carceral_sys + population +
##     watersource + purchased + state_classification, family = binomial,
##     data = Data)
##
## Coefficients:
##                                                 Estimate Std. Error z value
## (Intercept)                                    -4.399e+00  2.050e-01 -21.457
## carceral_sysexclusive_carceral                  1.387e+00  7.507e-01   1.847
## carceral_sysnonexclusive_carceral              -1.687e+01  1.666e+03  -0.010
## population                                      3.057e-05  1.071e-05   2.855
## watersourceSW                                  -1.733e+00  8.124e-01  -2.133
## purchasedPurchased                              5.618e-01  7.480e-01   0.751
## state_classificationNON-TRANSIENT NON-COMMUNITY -1.613e+01  1.230e+03  -0.013
## state_classificationTRANSIENT NON-COMMUNITY    -1.618e+01  1.254e+04  -0.001
##                                                 Pr(>|z|)
## (Intercept)                                     < 2e-16 ***
## carceral_sysexclusive_carceral                  0.06471 .
## carceral_sysnonexclusive_carceral               0.99192
## population                                      0.00431 **
## watersourceSW                                   0.03292 *
## purchasedPurchased                              0.45256
## state_classificationNON-TRANSIENT NON-COMMUNITY 0.98954
## state_classificationTRANSIENT NON-COMMUNITY     0.99897
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 351.47  on 2872  degrees of freedom
## Residual deviance: 332.14  on 2865  degrees of freedom
##   (1827 observations deleted due to missingness)
## AIC: 348.14
##
## Number of Fisher Scoring iterations: 19
```
```
Bottledwaterreliance <- glm(Bottled_Water_or_Hauled_Water_Reliance ~ carceral_sys + population + waterso
summary(Bottledwaterreliance)
```
```
##
## Call:
## glm(formula = Bottled_Water_or_Hauled_Water_Reliance ~ carceral_sys +
##     population + watersource + purchased + state_classification,
##     family = binomial, data = Data)
##
## Coefficients:
##                                                 Estimate Std. Error z value
```

```
## (Intercept)                                        -2.874e+00  1.062e-01 -27.061
## carceral_sysexclusive_carceral                      -8.154e-01  1.016e+00  -0.802
## carceral_sysnonexclusive_carceral                   -5.272e-01  1.042e+00  -0.506
## population                                          -6.932e-05  2.472e-05  -2.804
## watersourceSW                                        4.524e-02  2.607e-01   0.174
## purchasedPurchased                                   3.598e-01  3.249e-01   1.108
## state_classificationNON-TRANSIENT NON-COMMUNITY      1.113e+00  2.215e-01   5.024
## state_classificationTRANSIENT NON-COMMUNITY         -1.067e+01  3.786e+02  -0.028
##                                                     Pr(>|z|)
## (Intercept)                                          < 2e-16 ***
## carceral_sysexclusive_carceral                       0.42228
## carceral_sysnonexclusive_carceral                    0.61306
## population                                           0.00505 **
## watersourceSW                                        0.86223
## purchasedPurchased                                   0.26803
## state_classificationNON-TRANSIENT NON-COMMUNITY 5.07e-07 ***
## state_classificationTRANSIENT NON-COMMUNITY          0.97752
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 1200.9  on 2872  degrees of freedom
## Residual deviance: 1150.3  on 2865  degrees of freedom
##   (1827 observations deleted due to missingness)
## AIC: 1166.3
##
## Number of Fisher Scoring iterations: 12
```