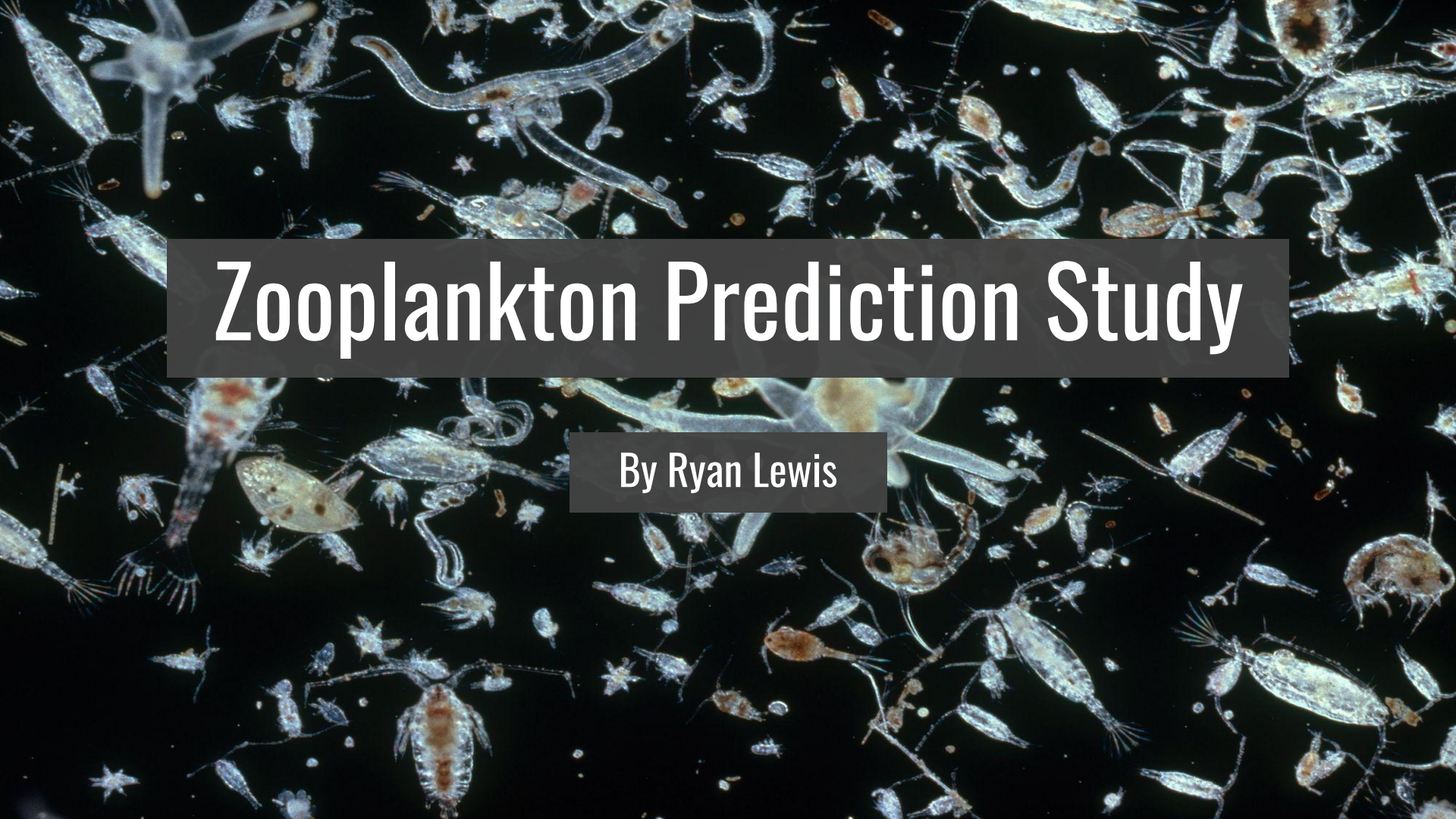


Zooplankton Prediction Study

By Ryan Lewis

Zooplankton

Zooplankton

- Cute?

Zooplankton

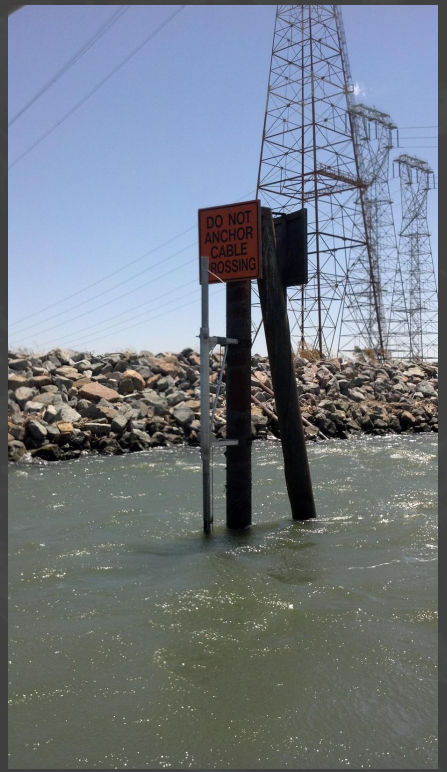
- Cute?
- Edible?

Zooplankton

- Cute?
- Edible?
- Delta Smelt

Process

- Find water quality data
- Match nearby survey stations
- Match data by time
- Find correlations
- Produce prediction model

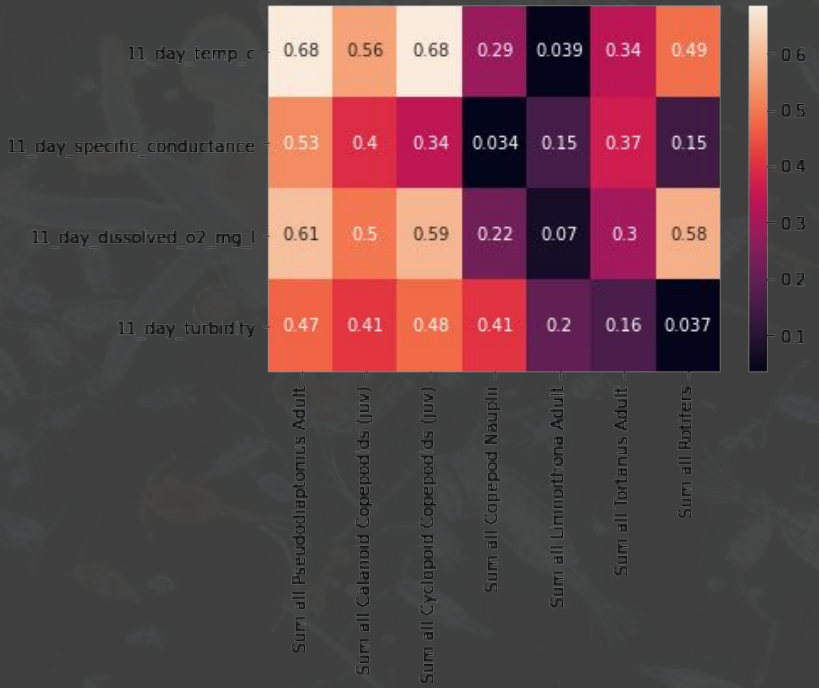


Matching the Stations

usgs
plankton

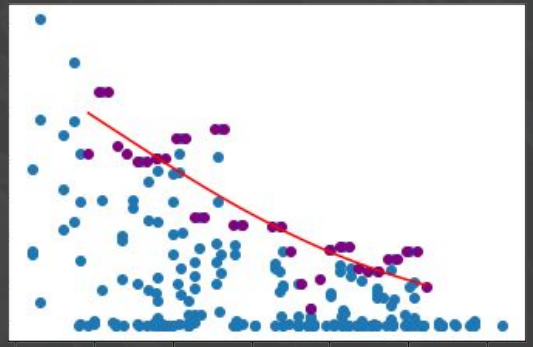
EDA:

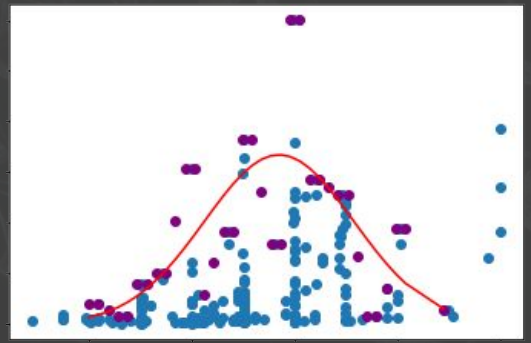
- Correlations



EDA:

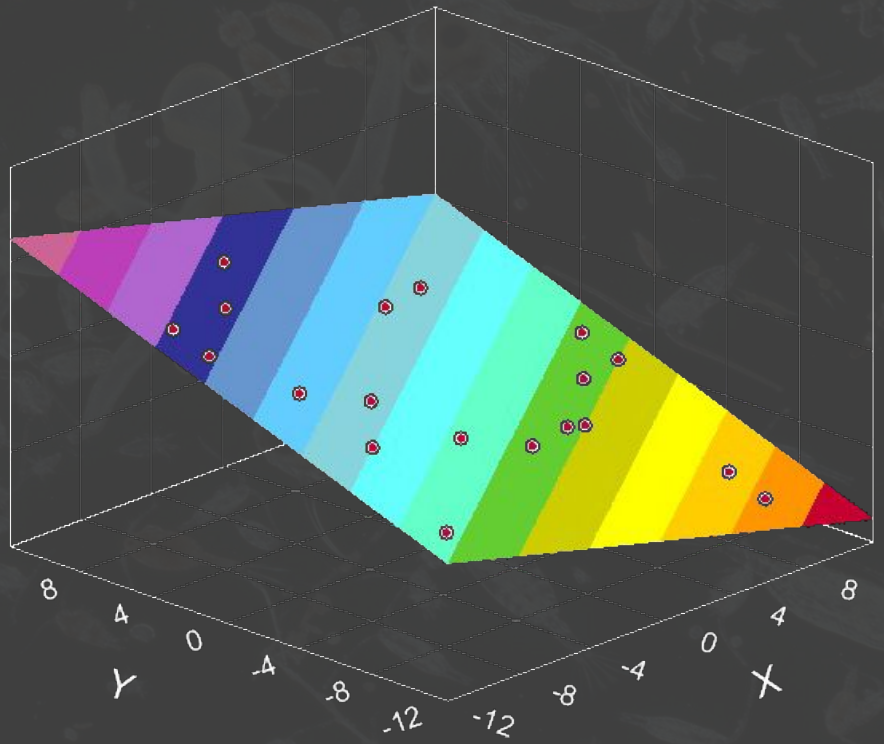
- Correlations
- Trends





EDA:

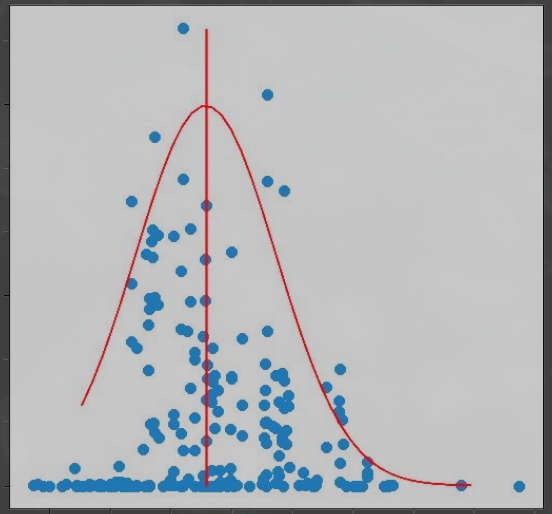
- Correlations
- Trends
- Modelling

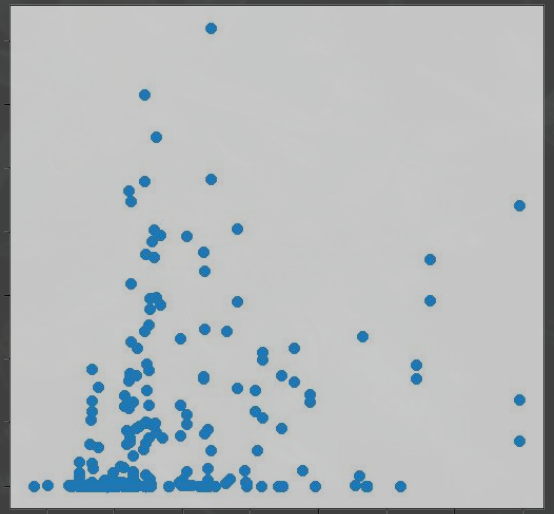


Initial Model

$$\text{Prediction} = C_1 pH + C_2 Temp + \ldots + C_n dO_2 + C_{n+1}$$

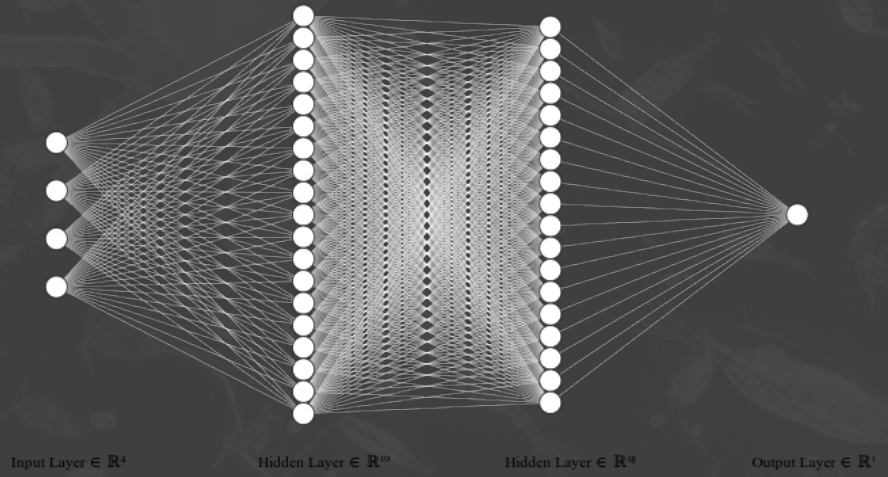
Feature Engineering





“Improved” models

- Lasso
- Ridge
- Neural Net

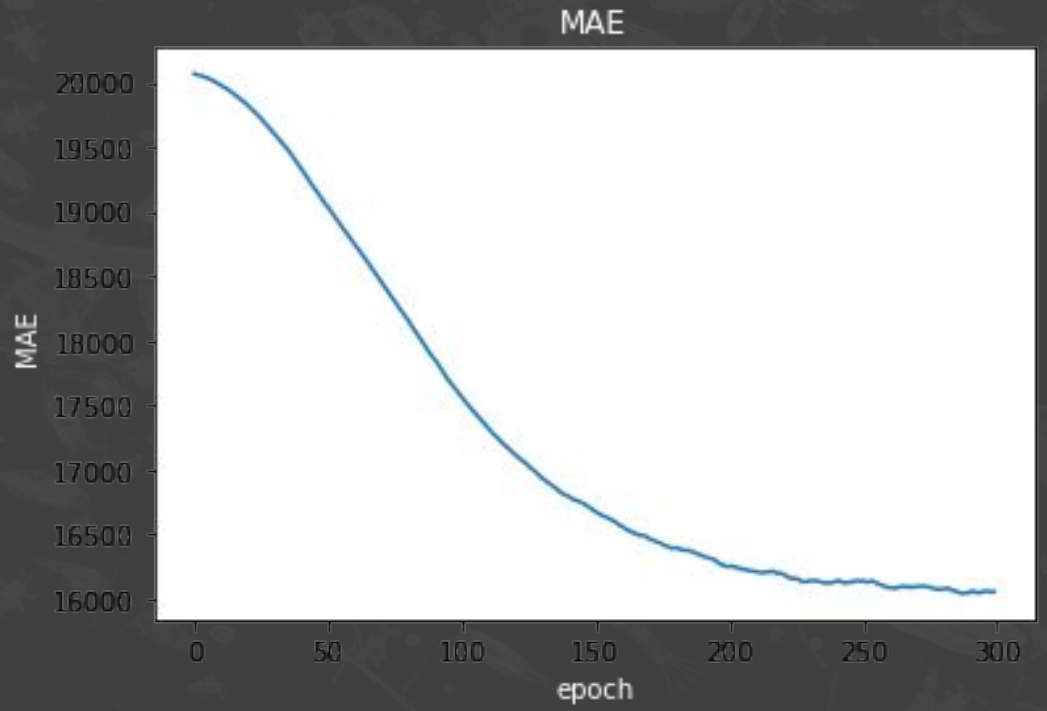


Resultant MAEs

- linreg: 14,694
- lasso: 17,747
- ridge: 16,882
- keras: 16,056

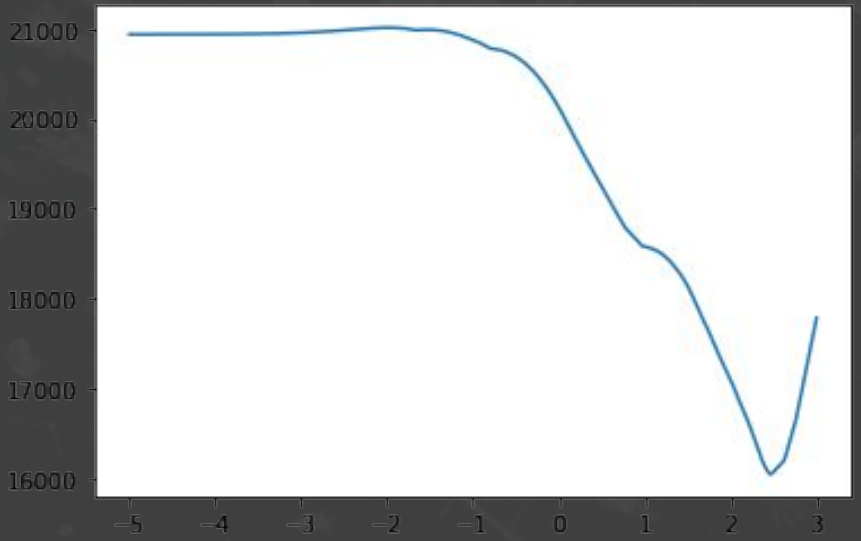
Max Values:

- ~1 million

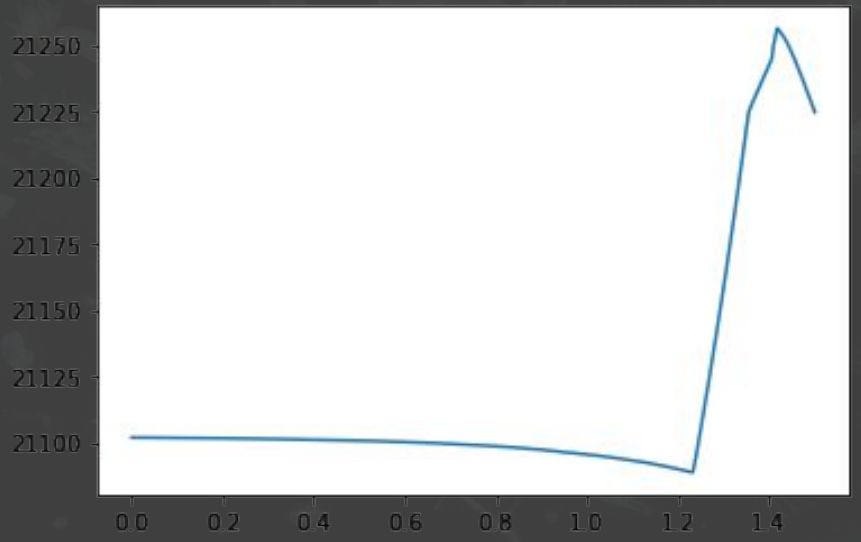


Questions?

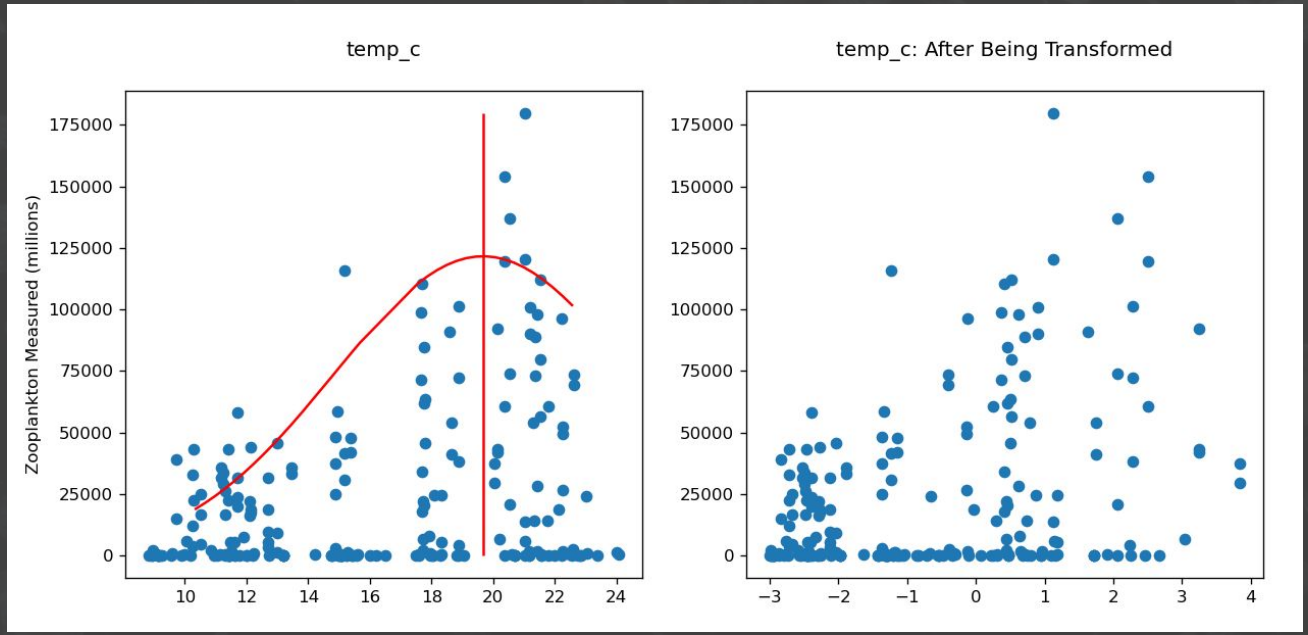
Appendix: Ridge MAE vs Alpha



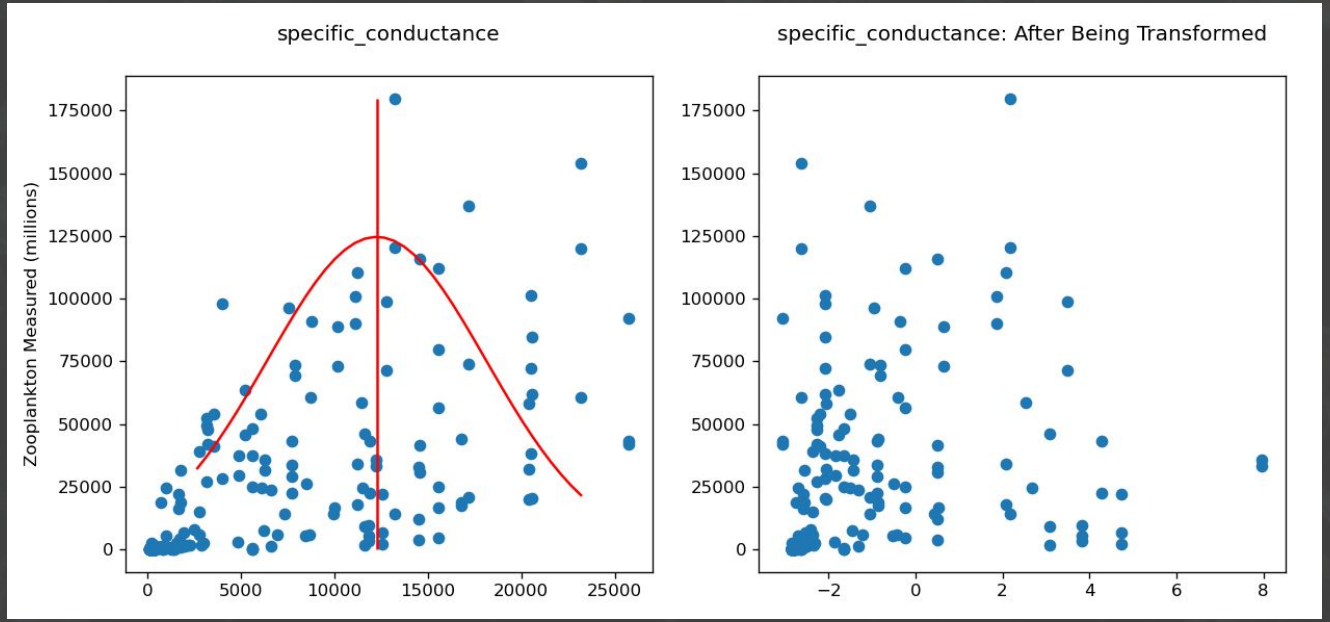
Appendix: Lasso MAE vs Alpha



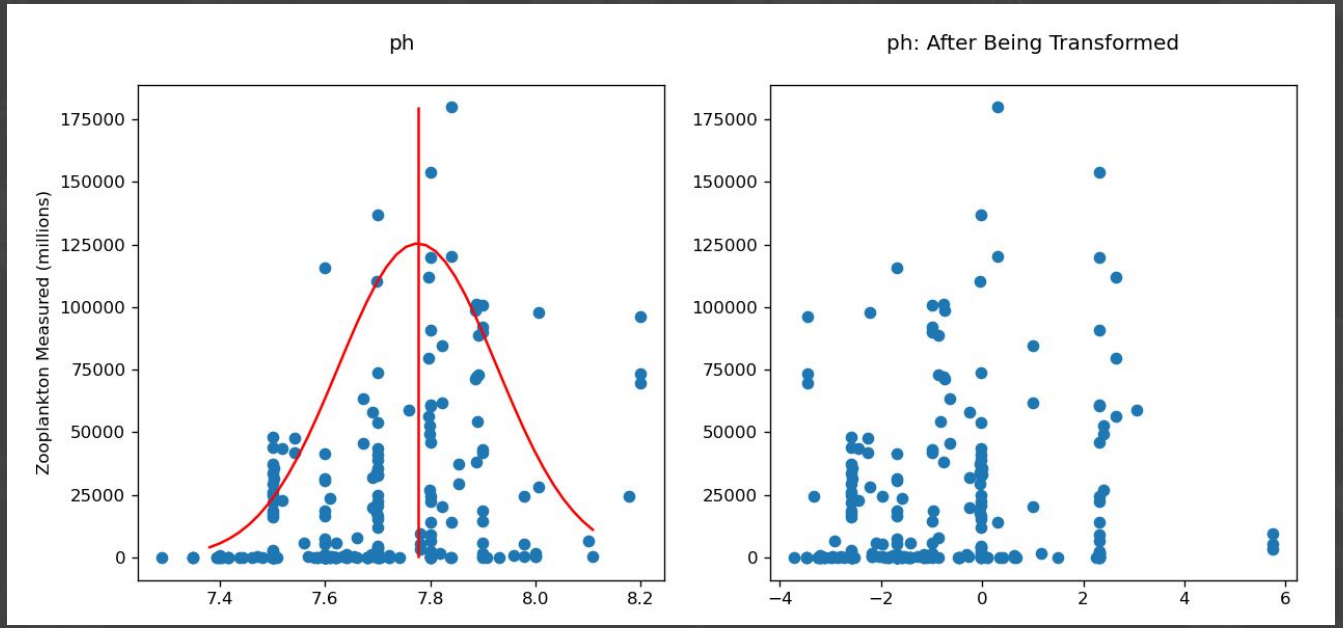
Appendix:


temp_c
temp_c: After Being Transformed
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
10
12
14
16
18
20
22
24
−3
−2
−1
0
1
2
3
4

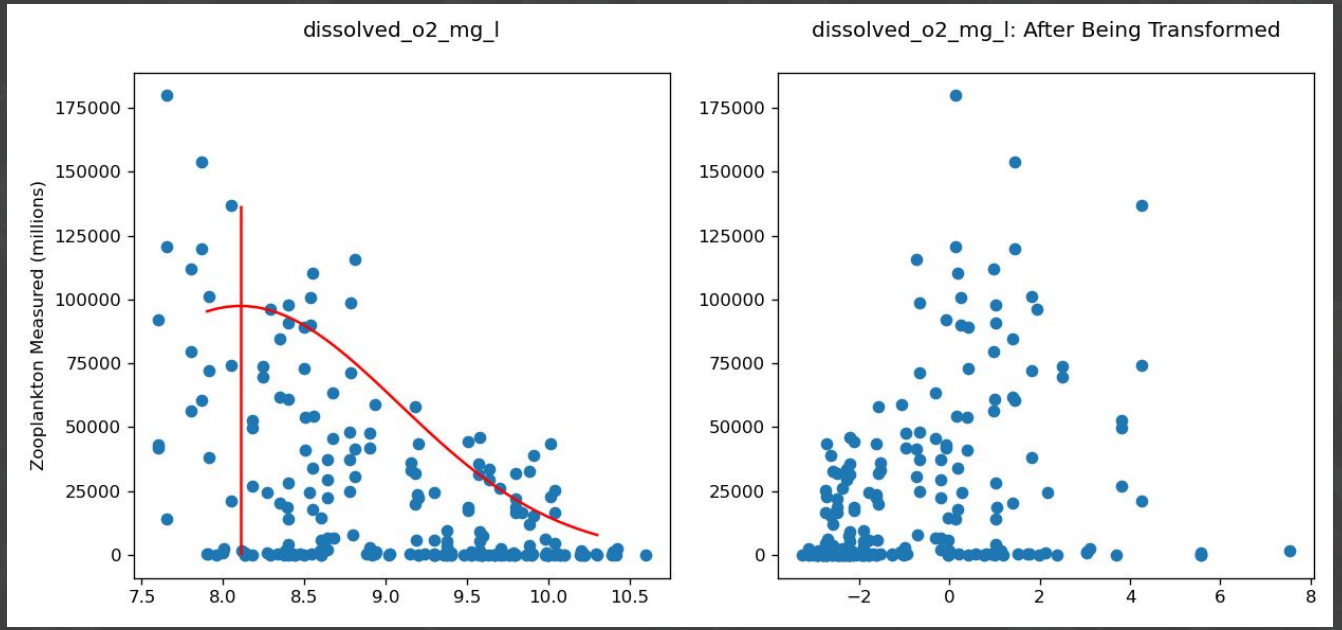
Appendix:


specific_conductance
specific_conductance: After Being Transformed
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
0
5000
10000
15000
20000
25000
−2
0
2
4
6
8

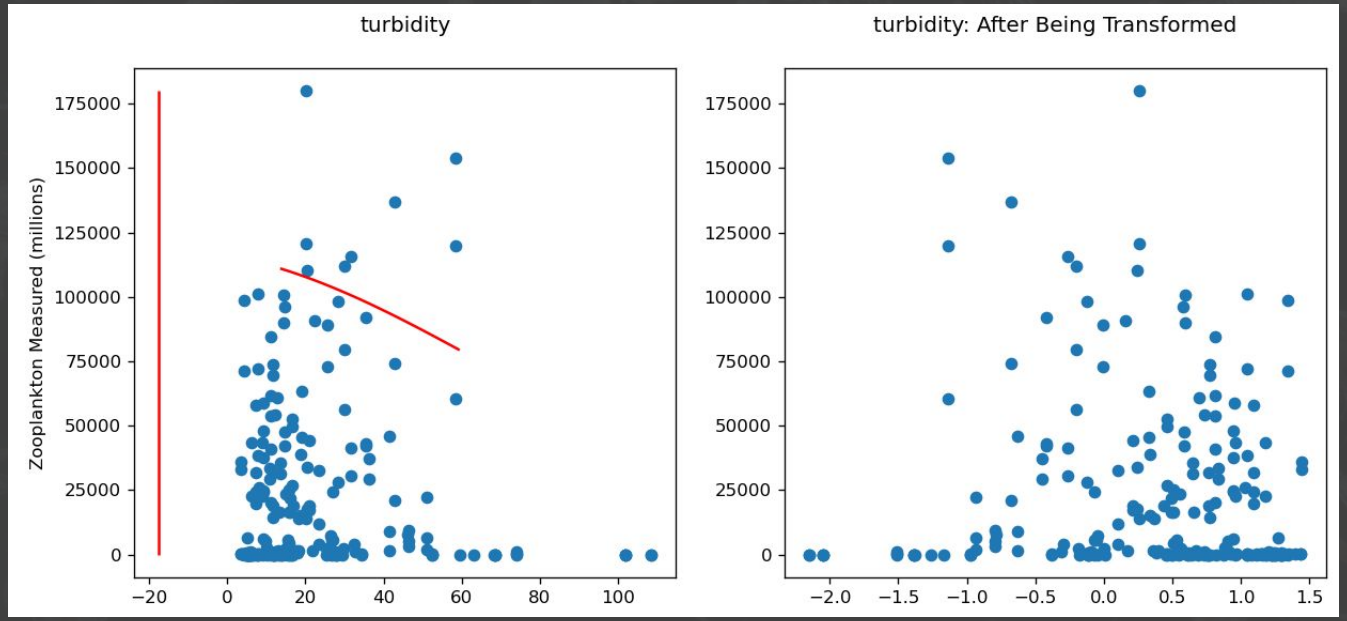
Appendix:


ph
ph: After Being Transformed
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
7.4
7.6
7.8
8.0
8.2
−4
−2
0
2
4
6

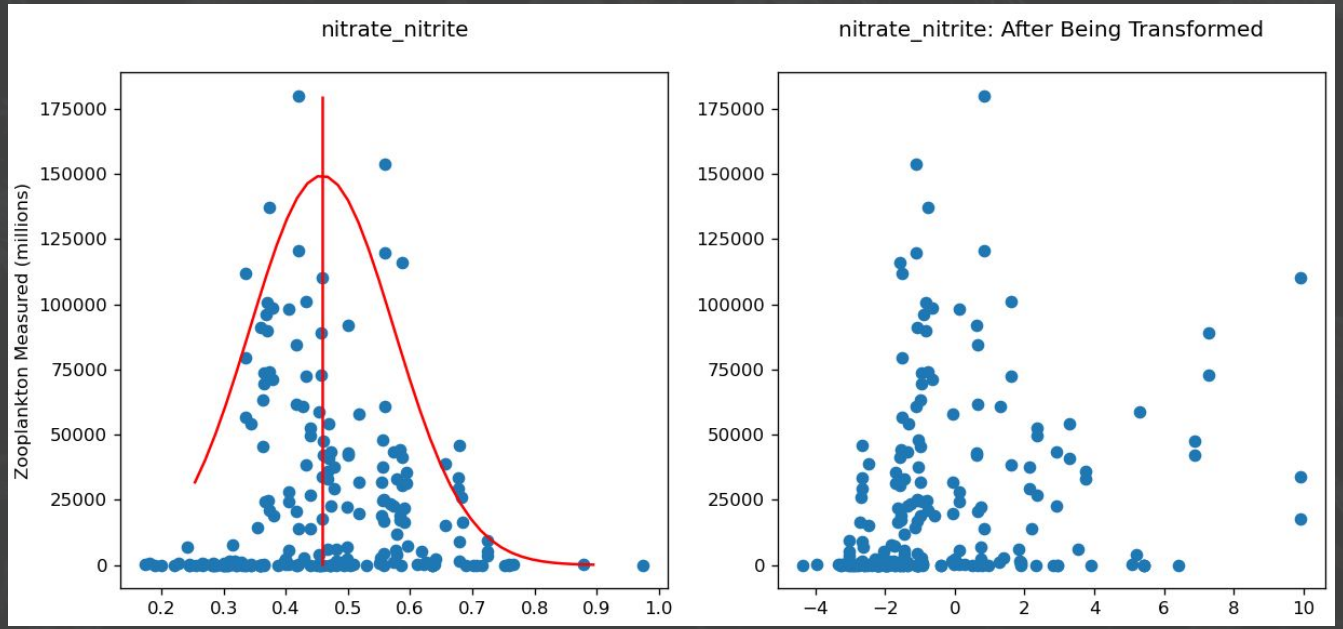
Appendix:


dissolved_o2_mg_l
dissolved_o2_mg_l: After Being Transformed
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
7.5
8.0
8.5
9.0
9.5
10.0
10.5
−2
0
2
4
6
8

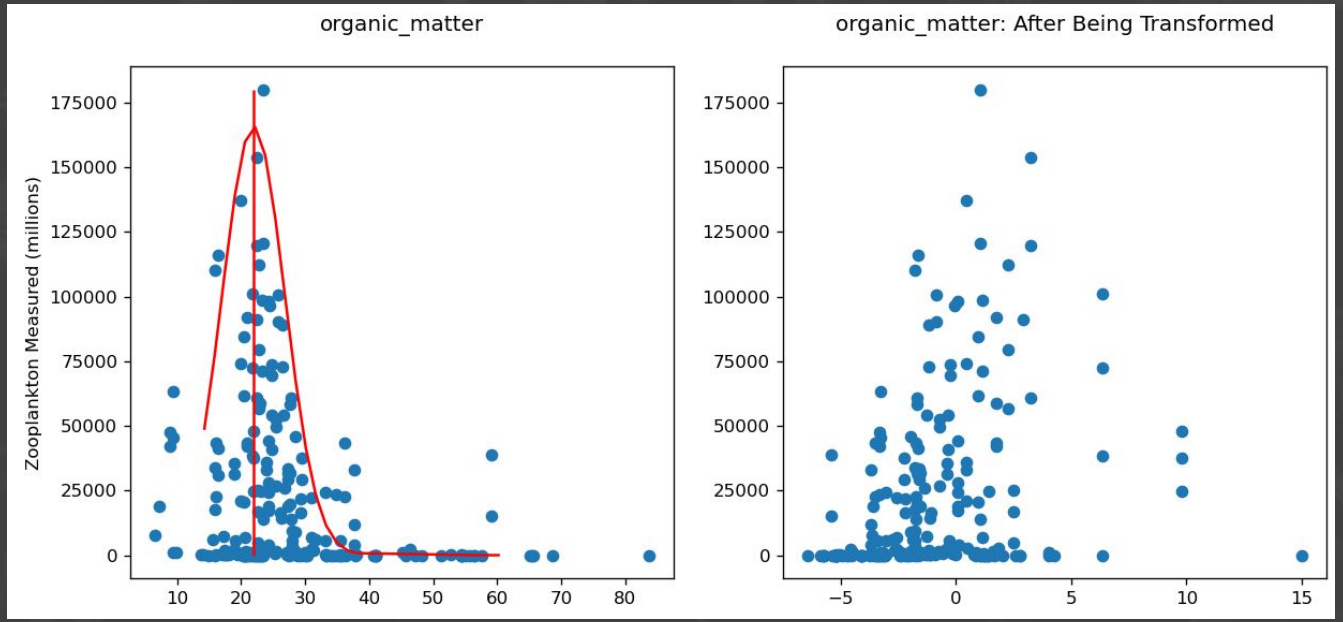
Appendix:


turbidity
turbidity: After Being Transformed
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
−20
0
20
40
60
80
100
−2.0
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5

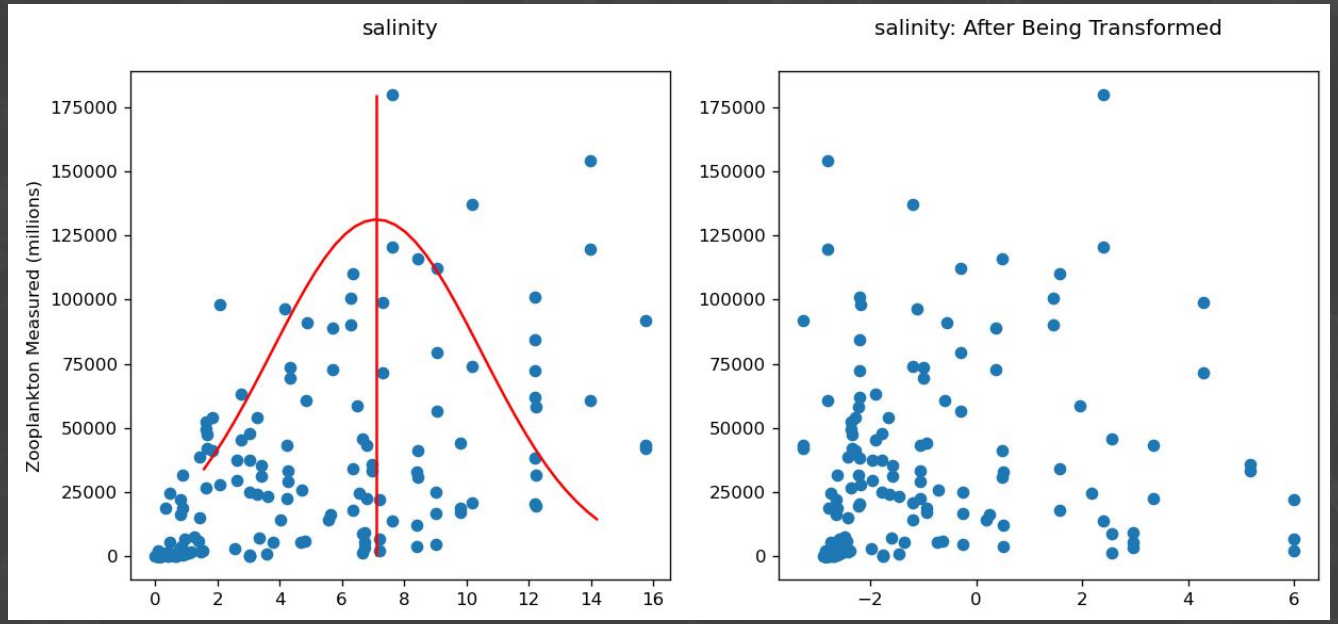
Appendix:


nitrate_nitrite
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1.0
nitrate_nitrite: After Being Transformed
175000
150000
125000
100000
75000
50000
25000
0
−4
−2
0
2
4
6
8
10

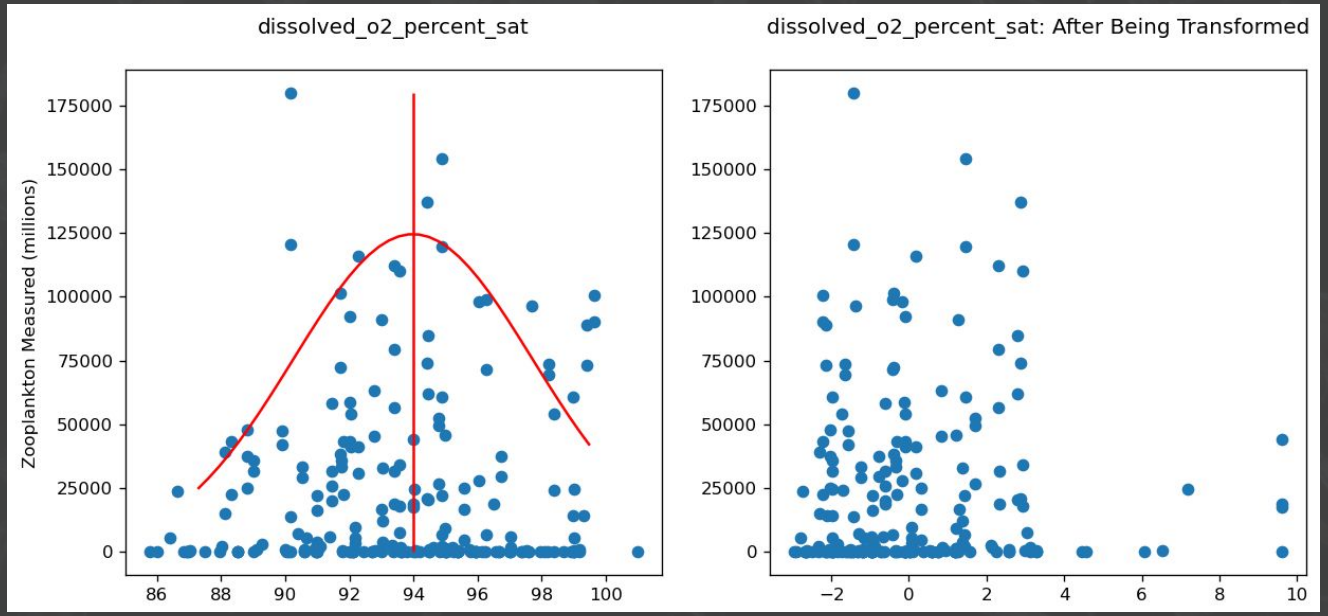
Appendix:


organic_matter
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
10
20
30
40
50
60
70
80
organic_matter: After Being Transformed
175000
150000
125000
100000
75000
50000
25000
0
−5
0
5
10
15

Appendix:


salinity
salinity: After Being Transformed
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
0
2
4
6
8
10
12
14
16
−2
0
2
4
6

Appendix:


dissolved_o2_percent_sat
dissolved_o2_percent_sat: After Being Transformed
Zooplankton Measured (millions)
175000
150000
125000
100000
75000
50000
25000
0
86
88
90
92
94
96
98
100
−2
0
2
4
6
8
10